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September 7, 2007

Via Hand Delivery

Ms. Ann Cole
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

Re: Docket No. 070301-EI
Review of 2007 Electric Infrastructure Storm Hardening Plan Filed Pursuant To Rule 25-6.0342, Florida Administrative Code, Submitted by Florida Power and Light Company

Dear Ms. Cole:

Enclosed for filing in the above matter are an original and 15 copies of the Direct Testimony of Michael T. Harrelson on behalf of Florida Cable Telecommunications Association, Inc. Service has been made as indicated on the Certificate of Service. If there are any questions regarding this filing, please contact me at 202-973-4281.

Sincerely,

Maria T. Browne
John D. Seiver

Enclosures

CMP 2
COM 5
CTR 1
ECR
GCL 2
OPC
RCA 1
SCR
SGA
SEC
OTH

CERTIFICATE OF SERVICE

I hereby certify that a true copy of the foregoing *Direct Testimony of Michael T. Harrelson* on behalf of *Florida Cable Telecommunications Association, Inc.* was furnished by regular U.S. mail, on this the 7th day of September, 2007 to the following:

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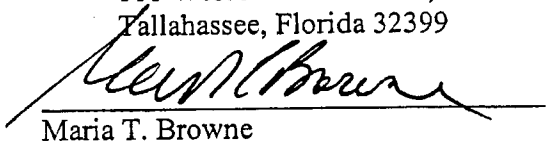

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

Review of 2007 Electric Infrastructure Storm Hardening Plan Filed pursuant to Rule 25-6.0342, F.A.C., Submitted by Florida Power & Light Company.	Docket No. 070301-EI

DIRECT TESTIMONY OF MICHAEL T. HARRELSON ON BEHALF OF FLORIDA CABLE TELECOMMUNICATIONS ASSOCIATION, INC.

SEPTEMBER 7, 2007

Introductory Issues

Q. Please state your name, title, and business address.

A. My name is Michael T. Harrelson. I am a registered professional engineer (Electrical), and an engineering consultant.

Q. On whose behalf are you filing this testimony?

A. I am appearing on behalf of the Florida Cable Telecommunications Association, Inc. ("FCTA"), an intervenor in this proceeding.

Q. Would you please summarize your education, experience and qualifications?

A. Certainly. I have a Bachelor of Science in Industrial Engineering from Georgia Tech where I was a co-op student while working for Georgia Power Company. I started working at Georgia Power in electric distribution in their co-op program in 1963 when I was 18. I was at Georgia Power in various districts and in various capacities of electric distribution, engineering, construction and maintenance until 1992. In 1992 I began a career as an Engineering Consultant. I am a registered professional engineer in Georgia and Florida. A more detailed rendering of my work history is included in my CV which is attached as Harrelson Exhibit 1 ("MTH-1").

Q. Have you had any experience in working with joint use of electric distribution poles by communications companies?

A. Yes. I have had extensive experience in this area.

Q. Do you have knowledge of the National Electrical Safety Code ("NESC")?

A. Yes, I do. The NESC is the national safety standard for electric supply stations and electric supply and communication lines. The current edition is ANSI C2-2007, ISBN No. 0-7381-4893-8. The purpose of the NESC is the practical safeguarding of persons during the installation, operation, or maintenance of electric supply and communication

lines and associated equipment. This code is not intended as a design specification or as a construction manual. The NESC rules contain the basic provisions that are considered necessary for the safety of employees and the public under the specified conditions. If the responsible party wishes to exceed these rules, he may do so for his own purposes, but need not do so for safety purposes. NESC compliance is mandatory in Florida for electric power and communications companies.

Q. Do you consider yourself knowledgeable in these areas?

A. Yes. I consider myself to be an expert in the NESC and its application to construction, installation, maintenance, inspection, and audit of electric and communications facilities on poles.

Q. Why is that?

A. I worked for Georgia Power Company for a total of 27 years, including during the late 1960s and early 1970s when the first cable television systems were being built in Georgia and elsewhere around the country. Because I worked for Georgia Power until 1992, I also witnessed the upgrade and rebuild of improved generations of cable television systems and saw how both cable companies and pole owners, including power companies, work together to complete these system upgrades and rebuilds. Since retiring from Georgia Power, I have worked as a consulting engineer and an expert witness to electric companies, cable companies and others.

Q. Have you ever been qualified as an expert witness?

A. Yes.

Q. In what subjects or fields have you been so qualified?

A. I have been qualified as an expert in (1) the NESC requirements; (2) electric power distribution design, construction, engineering, operation, and maintenance procedures; (3) joint use of utility poles by power and communications companies; (4) OSHA electric

power and communications safety regulation; and (5) the National Electric Code, which applies to electric power utilization systems.

Q. On how many occasions have you given testimony as an expert witness in these areas?

A. I have testified either in deposition or at trial approximately 41 times in the past 18 years. I testified in a pole attachment dispute before the Utah Public Service Commission in a matter closely related to some issues in this proceeding. That dispute involved attachment permitting procedures, engineering guidelines for attachments, and interpretations of the NESC. In addition, in a similar dispute in Arkansas, I submitted written testimony to the Federal Communications Commission ("FCC") and participated in a mediation session before the FCC. I have also submitted written comments to the Louisiana Public Service Commission in a proceeding to reconsider regulations regarding pole attachment procedures in Louisiana. Moreover, in the spring of last year I gave deposition testimony, submitted direct testimony and testified live on cross examination before the Chief Administrative Law Judge ("ALJ") at the FCC on behalf of the FCTA and four of its member operators. The issue in that proceeding was whether Gulf Power was entitled to charge pole attachment rates in excess of rates produced using the FCC formula for cable operator attachments based on, among other things, Gulf Power's claim that its poles were "full" and that no capacity for further attachments existed. I testified that safe and customary engineering practices, based on my years of experience and the NESC, demonstrated that Gulf Power's poles had capacity and the Chief ALJ agreed with my analysis. The matter is now on appeal. I also participated in the Florida Public Service Commission (hereinafter "FPSC" or the "Commission") rulemaking proceeding in Dockets No. 060172-EU and 060173-EU, through which Rule 25-6.0342, Florida Administrative Code ("F.A.C."), was developed. Furthermore, I submitted Comments to this Commission in the Storm Preparedness proceeding, Docket No. 060198-EIQ.

Q. Do you have additional relevant experience?

A. Yes. I have participated in more than 100 pieces of litigation or accident investigations as a consultant.

Q. Are there other aspects of your training and background that may be relevant to your testimony?

A. Yes. In addition to working in this industry for quite a number of years, I regularly attend conferences on joint use, conduct training sessions and conduct pole-line inspections for pole owners like electric utilities, not unlike the inspections that are, at least in part, at issue in this proceeding. Through these activities I am very familiar not only with standard industry practices as they relate to outside aerial utility plant and joint use, but I am also very familiar with the trends and "state-of-the-art" utility and communications company practices in this area.

Q. Have you had experience with hurricanes in South Florida?

A. Yes. I worked in South Florida for an electric cooperative in restoration of service after Hurricanes Jean, Francis, Charlie and Wilma. I personally observed the destruction of trees and buildings and their impact on distribution lines, as well as the poles leaning in softened soil and cascading failures caused by one pole being broken that resulted in several more poles being broken. I saw places where several poles broke and fell in one direction but several adjacent poles in the same line fell in the opposite direction indicating tornado type winds in localized areas. The greatest numbers of power outages were caused by tree limbs and broken wires, not broken poles.

Q. Has your work been limited to field work?

A. No. I have consulted as a Registered Professional Engineer in joint use contract interpretation and application for 15 years. This includes inspecting joint use facilities, training field engineers and line workers in the NESC, joint use contracts and safe-work

rules, and negotiating specific separation, clearance and arrangement requirements (which are additional requirements sometimes imposed by power companies). I have also negotiated procedures, techniques and schedules to complete safety audits, make-ready engineering, make-ready construction and post inspection for joint use projects. I have prepared and conducted numerous workshops or seminars for national joint use conferences and personally conducted several NESC code compliance audits, as well as prepared the make-ready engineering for the power companies and communications companies involved that was necessary to correct violations uncovered in those audits.

Q. Anything else?

A. Yes. In the past I have been President of the local utility coordinating committees in Brunswick and Milledgeville, Georgia and periodically attend national joint use conferences.

Q. Please describe your work as President of the local utility coordinating committees.

A. These are organizations that are established to foster better communication among the different industries and users that need to use poles and be in the right-of-way. We discuss, design and implement ways to accommodate safe, practical and timely access and use of the limited facilities that all these different companies need to provide their services.

Q. Do these committees facilitate joint use of poles?

A. Yes, in part. Other issues such as joint trenching, right-of-way restoration, tree-trimming and the like have also been considered. But the principal motive for these particular organizations and ones like them is to provide a forum for inter-industry understanding and to find real-world solutions to real-world problems in the joint use area.

Q. Are you sponsoring exhibits in this case?

A. Yes. MTH-1 (my curriculum vitae and list of testimonies); MTH-2 (CIF projects – Lateral Line and Other Guying Effects: Lake City Veterans Administration Hospital (Columbia County) and Lee County Memorial Hospital (Fort Myers)); MTH-3 (CIF projects – Large Trees by Hardened Lines: Lake City Veterans Administration Hospital (Columbia County) and Lee County Memorial Hospital,(Fort Myers)); MTH-4 (Affidavit of Dr. Lawrence M. Slavin Supporting Initial Comments of Verizon Florida, Inc. in Docket Nos. 060172-EU and 060173-EU ("Slavin Affidavit")); and MTH-5 (Process to Engage Third Party Attachers.

Q. Could you please explain what your assignment from FCTA was in this proceeding?

A. Certainly. My assignment was to evaluate the Storm Hardening Plan (the "Plan") filed by Florida Power & Light Co. (hereinafter "FPL" or the "Company") in this docket for the purpose of determining whether the Plan meets the overall objective of the Commission, as set forth in Rule 25-6.0342, F.A.C., of enhancing the reliability of electric transmission and distribution service in a prudent, practical and cost-effective manner. In my testimony, I will address the extent to which the Company has adopted extreme wind loading (EWL) standards for new construction, major planned work and critical infrastructure projects, the deployment strategy the Company will follow to implement those standards, and whether the adopted standards and deployment strategy meet the Commission's overall objectives. I will also address the extent to which the standards and procedures for third party attachments included in the Plan meet or exceed the NESC to assure as far as reasonably practicable that third party attachments do not impair electric service reliability or overload the pole, and are constructed, maintained and operated in accordance with generally accepted engineering practices for the investor-owned utility's (IOU) service territory. I will also address the extent to which the Company sought and attempted in good faith to accommodate input from attaching entities. I will also address

the Direct Testimony and Exhibits submitted by Manuel B. Miranda presenting the Company's Plan as well as responses to Interrogatories and document requests submitted by the Company.

Q. How do the provisions of the Company's Plan impact the cable operators who are attached to the Company's poles?

A. Cable operators rely on telephone and increasingly power company (who own collectively approximately 80% of the poles statewide) pole infrastructure to distribute video, voice and broadband services to over five million residents throughout the state of Florida. Cable operators are in an intensely competitive industry (competing with satellite operators and telephone companies) and have a fervent interest in ensuring that poles stay up—and their facilities too—to minimize service interruptions, provide access to the Internet, phone service, cable service and important emergency and information services. FCTA and its members also are interested in ensuring that the State's utility poles are safe and reliable and that construction, maintenance and inspection costs are reasonable. Because of quality service objectives and competitive pressures, cable operators must be sure there are no unreasonable delays in attaching or overlashing cables that would delay provisioning of service to customers, or unreasonable costs imposed that would jeopardize their ability to invest in new and innovative services. Cable operators pay rent based upon the fully allocated cost of the pole space occupied by the cable operator's attachment. Cable operators also directly reimburse utilities for the cost of making the pole ready for their attachments, and pay to make the pole compliant with the NESC when a cable operator is responsible for bringing the pole out of compliance. One of my biggest concerns is that all of these costs threaten to go up significantly due to the Company's Plan and cable operators could face additional delays in provisioning important services to their customers that are not related to pole safety and reliability. I will address these and

related issues below in reference to the Company's Plan and the relevant statutory and regulatory requirements.

Q. What is your understanding of what the Company's Plan must do to comply with Rule 25-6.0342, F.A.C.?

A. It is my understanding that under that provision the Company's Plan must meet the overall objective of enhancing the reliability of electric transmission and distribution service and reducing restoration costs and outage times in a prudent, practical, and cost-effective manner to the affected parties.

Q. Could you please give us details on what the Plan must include to meet those requirements?

A. Yes. First, the Plan must address the extent to which the Company complies with the NESC. Second, the Plan must address the extent to which it employs the EWL standards specified by Figure 250-2(d) of the 2007 edition of the NESC for new construction, major planned work, and critical infrastructure projects to achieve the objective of enhancing reliability and reducing restoration costs in a prudent, practical and cost effective manner. Third, the Plan must include a detailed description of its deployment strategy, including the facilities affected, the technical design specifications, construction standards, and construction methodologies employed, the communities and areas affected, the extent to which joint use facilities are affected, an estimate of the costs and benefits of the Plan generally, and an estimate of the costs and benefits of the Plan for third party attachers, and explain how the deployment strategy meets the desired objectives of enhancing reliability and reducing storm restoration costs and outage times associated with extreme weather events in a prudent, practical and cost effective manner. Fourth, the Plan must demonstrate that the Company maintains standards and procedures for third party attachments that meet or exceed the NESC so as to assure as far as reasonably practicable

that third party attachments do not impair electric service reliability or overload the pole, and are constructed, maintained and operated in accordance with generally accepted engineering practices for the IOU's service territory, and do not conflict with Title 47, United States Code, Section 224, relating to FCC jurisdiction over pole attachments. Lastly, the Company must show that, in developing its Plan, it sought input from, and attempted in good faith to accommodate concerns raised by, third party attachers such as cable operators.

Company Plan

Q. Have you read the Storm Hardening Plan filed by the Company in the referenced docket?

A. Yes.

Q. Have you reviewed the Direct Testimony and Exhibits of the Company's witness, Manuel B. Miranda, dated August 24, 2007 filed in support of the Company's Plan?

A. Yes.

Q. Have you reviewed the answers to interrogatories and responses to document requests filed by the Company to date in this proceeding?

A. Yes.

Q. Should the Commission find that the Company's Plan meets the desired objectives of enhancing the reliability of overhead and underground electrical transmission and distribution facilities and reducing restoration costs and outage times in a prudent, practical and cost effective manner?

A. No.

Q. Why not?

A. First, the Company's plan to apply EWL criteria to all new construction, major planned work and daily work in addition to critical infrastructure facilities and interstate crossings is not prudent, practical or cost effective. Second, the Company has not provided the

detailed description of its deployment strategy for years 2008 and 2009 that is required by Rule 25-6.0342(4), F.A.C. Third, certain aspects of the Company's deployment strategy are not prudent, practical or cost-effective. Fourth, certain of the Attachment Standards and Procedures set forth in the Plan do not relate to storm hardening but instead concern rates, terms and conditions that are regulated by the FCC, and others are not *reasonably practicable* as required by Rule 25-6.0342(5), F.A.C. Lastly, the Company has not fully satisfied its obligation to seek and attempt in good faith to accommodate concerns of third party attachers such as FCTA members.

Wind Loading Standard

Q. Does the Company's Plan address the extent to which, at a minimum, the Plan complies with the current edition of the NESC, ANSI C2-2007, as required by Rule 25-6.0342(3)(a)?

A. Yes. The Company's Plan addresses the extent to which it complies with the NESC to the extent required by Rule 25-6.0342(3)(a), F.A.C., at pages 7 and 8. This rule concerns strengthening poles to withstand extreme weather conditions produced by hurricanes—i.e., extreme wind. The relevant NESC rules are those that address strength and loading, including the effect of wind on the poles, which rules are located in Sections 24 (Grades of Construction), 25 (Loadings for Grades B and C) and 26 (Strength Requirements) of the NESC. It is my understanding that other provisions of the NESC, including those related to clearances between electric and communications facilities, are not at issue in this proceeding. FPL does not address those requirements, but refers to them, and therefore, I am not expressing an opinion on those provisions except to point out which ones fall outside the scope of this proceeding and therefore should not be approved. With this understanding, the Company's Plan addresses the extent to which it complies with the NESC to the extent required by F.A.C. 25-6.0342(3)(a).

Q. Does the Company's Plan comply, at a minimum, with the relevant provisions of the NESC?

A. Yes. The NESC specifies required pole line strengths for distribution lines using grades of construction including Grades B, C and N. The required grade of construction depends upon the voltage of the circuits carried on the pole and what the circuits cross over. Grade B design results in at least an "equivalent wind" strength of approximately 116 mph, and is thus "stronger" than Grade C design, which has at least an "equivalent wind" strength of approximately 86 mph. The NESC generally requires Grade C construction for "distribution" facilities 60 feet or less in height. Grade B is required for certain crossings, including railroad tracks, limited-access highways, and navigable waterways requiring waterway crossing permits. FPL states in its Plan that the Company historically designed all of its distribution facilities using Grade B loading criteria, except between 1993 and 2004 when it used Grade C construction in a portion of its territory. Accordingly, FPL's distribution facilities already meet, and in most cases exceed, the minimum requirements of the NESC. FPL's Plan to adopt the NESC's EWL criteria for all new construction, major planned work, critical infrastructure facilities (CIF), and incremental hardening grossly and unnecessarily exceeds the requirements of the NESC.

Q. Does the Company's Plan address the extent to which it is adopting the EWL standards specified by Figure 250-2(d) of the 2007 edition of the NESC?

A. Yes. FPL's Plan at page 3 highlights the Company's plan for hardening its distribution system and states that the Company will apply the NESC EWL criteria to existing and new feeders as well as any associated laterals directly serving CIF, critical poles and designated interstate highway crossings, and to all new overhead facilities, major planned work, relocation projects and daily work activities. It also states that it will

"incrementally harden"—i.e., apply standards up to and including EWL—certain feeders serving community needs such as grocery stores, gas stations and pharmacies.

Q. Does the Company's plan meet the desired objectives of enhancing reliability and reducing restoration costs and outage times in a prudent, practical and cost-effective manner?

A. No.

Q. Please explain your answer.

A. FPL's Plan is not prudent, practical or cost effective. It will dramatically increase costs without adequate assurance of a commensurate improvement in storm performance or storm restoration. FPL has proposed to spend hundreds of millions of dollars to build and rebuild its distribution system to EWL criteria. The plan is applied not only to all of FPL's coastal service territory, but also to its entire inland service territory. It estimates that it will spend up to $61.5 million on hardening efforts in 2007, $125 million in 2008 and another $150 million in 2009 (Plan at 4; Miranda Test. at 14-15), for a combined three year cost of nearly $300 million dollars. These expenditures will be in addition to substantial yearly expenditures that FPL will make on other storm hardening activities which include another $40 million for the distribution pole inspection program and another $90 million on the 10 storm preparedness initiatives, resulting in a total expenditure of almost $500 million. By comparison, Tampa Electric Company's ("TECO") projected expenditures for all of its storm hardening efforts combined for 2007, 2008 and 2009 do not exceed $100 million. Another way of looking at the proposed cost is the cost differential that FPL provides for a Grade B wood pole versus an EWL concrete pole—as much as $8,000 per pole. *See* FPL's Response to Florida Cable Telecommunications Association First Set of Interrogatories, No. 5.

At the same time FPL proposes to spend nearly $500 million on hardening, it acknowledges that it does not yet have a clear sense of the benefits that its investment will generate. FPL's Plan states "it is impossible at this time to estimate the full extent of the benefits with any precision." Plan at 25. Mr. Miranda states in his testimony, "FPL does not have sufficient information at this time to distinguish between the benefits attributable to one type of hardening activity versus another," and "there is little directly measured data on the improved resilience." Miranda Test. at 16. Notwithstanding these uncertainties, in response to Staff Interrogatory Number 38, FPL estimates that over an analytical study period of 30 years, the net present value of restoration costs savings per mile of hardened feeder could be as little as 45 percent of the cost to harden that mile of feeder. Miranda Test. at 18; FPL's Response to Public Service Commission Staff's First Set of Interrogatories, No. 38. In other words, FPL might only recover a benefit of half of every dollar spent on storm restoration. Moreover, as further discussed below, even these minimal perceived benefits are highly suspect, and the Plan as currently expressed might actually have some adverse effects on system reliability and storm recovery.

Q. Does the "The Process to Engage Third Party Attachers" lessen your concerns stated above?

A. Yes. That agreement sets forth a mutually satisfactory process for continuing the dialogue between utilities and third party attachers, including reasonable advance notice to, and a process for incorporating feedback from, third party attachers. This goes a long way toward alleviating my concerns about the level of required detail that currently is missing from FPL's Plan.

Q. Does the NESC require EWL criteria for distribution poles that are 60 feet or less in height?

A. No. Rule 250C of the 2007 NESC contains the EWL standard and describes the application of the extreme wind loading required in Rule 250A1 on poles and their supported facilities, including wires, transformers, etc. for purposes of determining the required strength of the pole. The current edition of the NESC exempts from the EWL criteria any structure and its supported facilities that are 60 feet or less above ground. As a clarifying point, only Rule 250C specifies when extreme wind loading is required, not Figure 250-2(d), which is the NESC provision referenced in F.A.C. 25-6.0342. Figure 250-2(d) specifies three-second gust wind speeds for Florida, which are then referenced in Rule 250C.

Q. How does the NESC take into account the effect of wind speeds on distribution poles in Florida?

A. Rule 250B and Table 250-1 require that in the light loading district, which includes Florida, nine pounds per square foot of wind pressure be applied to the design of all poles 60 feet or less in height. Nine pounds of pressure is equivalent to winds of up to 60 miles per hour. This standard thus takes into account the higher wind speeds expected to be experienced in Florida. By comparison, the NESC requires that four pounds per square foot of wind pressure be assumed in the medium and heavy loading districts north of Florida. Four pounds of pressure is equivalent to wind speeds of approximately 40 miles per hour.

Q. What is the history and purpose of the exemption for poles 60 feet or less in height?

A. The EWL standard always has been limited to poles exceeding 60 feet in height. When originally adopted in the 1977 NESC edition, the rule was worded only to apply to poles exceeding 60 feet. The language of the rule was modified in the 1984 NESC edition and a specific exemption was added for poles 60 feet or less in height. The rule currently states "If no portion of a structure or its supported facilities exceeds 60 feet above ground or

water level, the provisions of this rule are not required, except as specified in Rule 261A1c, 261A2e, or 261A3d." These three rules require that poles below 60 feet high be strong enough to withstand extreme wind loads applied to the structure alone, without conductors. This is not a problem for round wood or common concrete poles.

The NESC committee responsible for strengths and loadings of overhead electrical systems has considered on numerous occasions whether to apply EWL criteria to distribution lines 60 feet or less in height. In fact, during each of the last two code cycles, the NESC committee considered proposed changes that would have required application of EWL to distribution systems of any height. The utility industry resoundingly agreed in comments submitted to the committee that most distribution pole failures in extreme weather events are the result of secondary damage effects from trees and debris, not wind alone, and that the system would have failed even if designed to the significantly more expensive EWL criteria. Based largely on this feedback from the field, the NESC committee retained the EWL exemption for structures 60 feet and less in the 2007 Code.

Q. Do any of the other Florida IOUs that have filed storm hardening plans embrace the EWL standard as FPL has done?

A. No. No other utility is planning to take this approach. The other utilities have proposed taking a targeted approach that would allow the evaluation of the performance of "hardened" system components in future storms so that any improvements in system performance or degradation could be quantified so that a reliable cost/benefit analysis could be performed. Indeed, Progress Energy Florida ("PEF"), Gulf Power ("Gulf") and TECO all have stated that EWL is not the right standard for poles less than 60 feet tall. For example, TECO's Plan states, "Tampa Electric's experience continues to show that there is no substantial evidence that building distribution structures to extreme wind construction Grades will prevent damage from falling trees, tree limbs and flying debris

during major storm events." TECO 2007-2009 Storm Hardening Plan at 15. According to Gulf's witness, Edward J. Battaglia, in his filing in support of its storm hardening plan, Gulf decided not to adopt the NESC EWL standards for all of its existing overhead distribution facilities because it is not cost effective to do so, stating, "Gulf's experience is that wind-blown debris is the predominant cause of damage versus pure wind." Battaglia Test. at 15. Furthermore, Jason Cutliffe, on behalf of PEF explained "the EWL standard would have no appreciable benefit for PEF's distribution poles with respect to preventing wind-caused damage" and "other coastal utilities and utilities that experience tornados, [support] the fact that the EWL standard has no appreciable wind damage prevention benefit for their distribution poles." Cutliffe Test. at 6. Mr. Mickey Gunter, who serves as a member of NESC Subcommittee 4 (Overhead Lines-Clearances,) 7 (Underground lines) and the Interpretations committee, also filing testimony on behalf of PEF, stated, "I agree with the 217 others who supported the rejection of eliminating the 60 foot exemption and retaining it in the 2007 NESC edition because eliminating the 60 foot exemption would yield unnecessary costs without significantly improving or increasing safety." Gunter Test. at 7.

Q. In your opinion, does it make sense to apply EWL to poles less than 60 feet tall?

A. In general, no. However, there is consensus in Florida that the standard is appropriate for Interstate highway line crossings and pilot projects to research the possible advantages and disadvantages of EWL standards being applied to distribution lines less than 60 feet high. The common causes of hurricane related pole failures are falling trees, flying building debris, soft soil made worse by heavy rains, weak guy failure, rotten pole failure, and finally wind force on poles, lines and attachments. Another common cause of wood pole failures is cascading of solid (strong) poles because an adjacent pole breaks in high wind because of flying debris, rot or another defect.

I have included as Exhibit MTH-4 to my testimony an affidavit filed by Dr. Larry Slavin on behalf of Verizon in FPSC Dockets 060173-EU and 060172-EU. Dr. Slavin is the current Chairman of the NESC Subcommittee 5, responsible for issues relating to overhead lines strength and loading. Dr. Slavin served on the NESC subcommittee that considered and rejected adopting the EWL for distribution poles. As Dr. Slavin testified in those dockets, the application of EWL to distribution poles is not prudent or cost effective. Slavin Affidavit § 3.1. He also points out that its application may have the unintended consequences of increasing vehicular injuries and deaths resulting from cars hitting a greater number of heavier poles, increased storm restoration delay resulting from more pole failures and harder to replace poles, and creating a steep learning-curve for engineers not yet trained in these types of applications. *Id.* § 4.2. For example, Dr. Slavin explains that increasing the number of poles, such as FPL intends to do to build to EWL, can multiply the number that are knocked down by flying debris during high wind. *Id.* Dr. Slavin and I are also of like mind that EWL should be applied to distribution poles, if at all, on a limited "trial" or pilot project basis.

Q. Would application of EWL criteria address all of the wind speed issues FPL is seeking to remedy?

A. No. Tornados and micro bursts within hurricanes have winds in excess of "extreme wind design speeds" which can and frequently do break poles which meet extreme wind criteria. These extremely strong winds create much more costly damage to lines designed to EWL than lines designed to Grade B or C. Moreover, there is no evidence that EWL design will reduce service interruptions. In fact, there is a strong likelihood that building to EWL criteria will cause significant delays in repairing and restoring service in areas hit by tornados.

Q. How so?

A. FPL plans for building to EWL include shortening spans by setting poles more frequently, and replacing many round wood poles with square concrete IIIH poles. In addition to the points raised by Dr. Slavin, there is evidence to suggest that concrete poles will diminish wind load resistance for attached lines. For square cross-section poles the NESC requires the use of a 1.6 load factor for wind loads on the pole itself as compared to a 1.0 load factor for wind loads on a wood pole which is round. With increasing wind speed, more of the square pole's ultimate strength is consumed to resist wind load on the pole itself and less is available to resist wind load on the overhead wires and other equipment. What this means is that if a comparable square pole and a round pole are both designed to a specific wind speed, such as 105 mph (the lowest included in the FPL plan), the square pole will be more likely to fail than the round pole at wind speeds in excess of the design. In other words, if lines in areas of Florida designed to 105 mph or 130 mph winds actually saw winds of 145 mph, square poles would be expected to have higher failure rates than comparably designed round poles. After a storm event, the concrete pole industry cannot easily provide the large quantity of poles that may be required in a few days. In addition, the installation of the heavier concrete poles requires equipment with more lifting capacity than a standard power company line truck, so there could be a lack of adequate equipment to make timely repairs. *See* Comments of the North American Wood Pole Association filed in Docket 070301, filed June 20, 2007.

Q. Does FPL base its decision to adopt EWL for all construction on any statistically reliable data?

A. In support of its decision to expand greatly the use of EWL, FPL relies heavily on "extensive analyses that FPL conducted either directly, or with the aid of external resources, such as KEMA Incorporated," including forensic observations of how the system performed during Hurricane Wilma. Plan at 6 (referring to Technical Report: Post

Hurricane Wilma Engineering Analysis, KEMA Final Report for FP&L, Project No. 05-349 (Jan. 12, 2006)) ("KEMA Report"); Miranda Test. at 16-17. Based on that analysis it concludes that the root cause of pole breakage was wind in Hurricane Wilma, and that FPL's transmission poles built to extreme wind loading, performed well overall. Plan at 12. Mr. Miranda, in his testimony, also relies on the KEMA Report to estimate the improved resilience of hardened distribution facilities. Miranda Test. at 17.

Q. Do you agree that the information reported by KEMA supports improved resilience of hardened distribution facilities?

A. No, not conclusively. The KEMA Report is a lengthy detailed report and analysis which contains several significant disclaimers and explanations of assumptions made. For example:

- At page 50 in Section 7.1, the KEMA Report states "Specific additions to this forensic study and data collection process together with improved accuracy in the pole population data would enable more specific and targeted engineering solutions."
- At page 58 in Section 7.2.5, the KEMA Report states: "FPL verbally confirms that assignment of root causes is a personal judgment call irrespective of the pole ownership."
- At page 77 in Section 7.4, the KEMA Report states "Design overload is not a major contributor to poles breaking during Hurricane Wilma. Focusing on the 53 FPL owned poles broken by the suspicion of design overload as a contributing factor, most of these were multiple breaks investigated by one inspector." Here KEMA is discrediting the "personal judgment call" of the "one inspector" that actually investigated those breaks.

- The "Forensic Data" the KEMA analysis is based on is questionable. The forensic data was gathered on mostly feeder poles while FPL has mostly lateral poles. KEMA concluded from the forensic data that 52% of the poles broken were by wind only. However, it also found that as much as 85% of the broken poles were "multiple failures" which is also known as cascading. One defective pole or guy wire can allow one pole to break and take down several solid poles which would not have fallen otherwise. Cascading can be started by trees or flying debris hitting facilities on one pole.
- At page 77 in Section 7.4, the KEMA Report states that "the counties and areas with highest pole failure rates coincide with the areas with highest wind speeds and are bordering ***open*** areas in the path of Hurricane Wilma." (emphasis added) This finding validates the well known fact that trees and buildings shelter lines from winds whereas open areas do not. This sheltering effect of course results in trees falling and flying debris as the wind force increases. The trees and flying debris can and do frequently break poles designed to EWL standards.
- At page 59 in Table 7-7, KEMA reports that 66% of feeder pole failures were mostly cascading failures and were caused by wind only. However, the "wind only" determination was based upon the personal judgment calls of the inspectors. A better forensic analysis would have sought to determine the cause or causes of the cascading failures which accounted for "85% of the recorded failures." The same Table 7-7 attributes only 12% of the lateral pole failures to wind only, 33% is attributed to tree and 47% to presence of deterioration. Lateral lines are the smaller lines which serve such areas as neighborhoods where more trees and

buildings are common. Significantly, 55% of FPL poles broken during Wilma were lateral poles.

- At page 68, the KEMA Report refers to a group of "wind only" failures where "half of them fell to the east and half of them fell to the west." That is consistent with an embedded tornado-type wind for which EWL would not likely provide adequate protection.
- At page 80, KEMA concludes, "Wind was the predominant root cause of pole breakage in general and tree breakage causing pole breakage in particular."

In sum, nothing in the KEMA Report suggests that EWL is justified for distribution poles in Florida; in fact, the KEMA Report concludes that FPL poles are not actually completely up to the Grade B standard. Osmose found a 5.63% defective pole rate in 2006 which failed to meet the Grade B strength required. The report also strongly establishes that pole breakage rates in Wilma were greatest in open areas where multiple breaks (cascading) were commonplace. I conclude that good maintenance of poles, guy wires and the right-of-way (i.e., trimming vegetation) together with additional storm guying, especially in open areas, is the best preventive strategy for cascading failures. Certainly more detailed forensic analysis of a better quality in the future would be very valuable.

Q. In his testimony, Mr. Miranda also relies upon an independent analysis prepared by Davies Consulting Inc. in February 2006 and states that the results of this analysis support the Company's decision to use EWL criteria for all new construction. Do you agree?

A. No. This study shows that stronger hurricanes generally result in more downed poles. There are far too many variables at issue however to conclude that EWL will decrease pole failures. For example, a significant percentage of outages were caused by falling

trees, rotten poles, cascading breaks, imbedded tornados, etc. It does not support a finding that building to EWL will result in fewer downed poles.

Q. In his testimony, Mr. Miranda states that two key conclusions drawn by FPL from its own 2004 and 2005 storms experience and forensic data form the basis for FPL's Plan: (1) wind was the predominant cause of distribution pole breakage in Hurricane Wilma; and (2) FPL's transmission structures, which are built to EWL criteria, performed well overall in Hurricane Wilma. He states that the failure rate for transmission structures was only .1% of FPL's system versus a failure rate of 1% for distribution. Do you have any thoughts about this?

A. Yes. First, the forensic data was gathered by FPL "inspectors." The determination of the cause of each broken pole was based on the personal judgment of the particular inspector. KEMA recommended, and FPL apparently agreed that the subjective nature of the inspectors' judgment as to the cause of individual pole failures was not fully reliable because the Report states that the quality of forensic data can and will be improved in future storms. KEMA Report at 50, 58; Table 7-8 legend at 60. While the root cause of most distribution pole failures was said to be wind, an even more fundamental question which should be answered is, "what are the common causes of cascading failures of solid distribution poles?" The conclusion that *wind only* caused most of the pole failures is questionable, as KEMA itself found that "wind was the predominant root cause of pole breakage in general *and tree breakage causing pole breakage in particular*." KEMA Report at 80 (emphasis added).

Second, transmission lines are taller and frequently placed in wide right-of- ways. They therefore have much less tree and tree limb exposure. The very serious transmission structure failures which FPL did experience were cascading of multiple structures caused by defects on one or two structures. The cascading also involved one transmission line

falling on another one. Intervening in cascading failures of transmission lines and distribution lines should be a high priority.

Q. Do you think it is prudent, practical or cost effective for FPL or any other Florida utility ever to use EWL criteria for any poles 60 feet or less in height?

A. Yes. I believe it is prudent, practical and cost effective to use EWL criteria for limited pilot projects with wind speed measuring devices to enable the utilities to collect forensic data about the costs and benefits of building to this standard in Florida. I also believe that it would be prudent, practical and cost effective to apply EWL criteria to certain crossings that currently require Grade B construction as all four utilities have stated they plan to do.

Q. Why does it make sense to apply EWL to these crossings if the benefits are not yet known and are suspect?

A. These are the equivalent of limited pilot projects for critical infrastructure facilities. Interstate and Turnpike crossings by overhead distribution lines usually are important circuits for reliability of the power system, but more critically these highways are extremely important evacuation, emergency response and hurricane recovery routes. The most cost effective way to strengthen these crossings to EWL standards is storm guying where possible, which is what FPL plans to do. The crossings also seldom have tree exposure and if they do, the tree risk should be isolated or removed from the section of line which is storm guyed to EWL and crossing the thoroughfare.

The additional cost is prudent, practical and cost effective for these important highways and evacuation routes in Florida. Moreover, the effect of building crossings to EWL can be studied over time to determine the benefits.

Deployment Strategy

Q. Does the Plan adequately describe the Company's deployment strategy?

A. No.

Q. Please explain.

A. Rule 25-06.0342(4), F.A.C. regarding the deployment strategy is quite specific about the level of detail required in the storm hardening plans. The Rule requires each utility to explain the systematic approach it will follow to achieve the desired objectives. The deployment strategy details that must be included in each storm hardening plan are broken down into subsections (a) thru (e).

Q. With respect to subsection (a): Does the Plan include a description of the facilities affected, including technical design specifications, construction standards, and construction methodologies employed?

A. Yes. FPL has developed technical design specifications, "Design Guidelines" and a "Quick Reference Guide" which allow field engineers to more easily assess field conditions including pole strength requirements. The design guidelines also include some cable attachment specifications. FPL has done a very good job of developing these deployment details except for two crucially important aspects.

Q. What are those two critical considerations?

A. First, as I explained before, FPL applies EWL loading to its entire service territory. The overwhelming agreement among commentators in all four storm hardening plan dockets presently under consideration is that EWL standards for common distribution lines are not known to be practical, prudent or cost-effective. This is especially true in areas where trees and buildings are near the lines where flying debris causes the most damage during high winds regardless of the application of EWL construction.

The second deployment deficiency is that the guying effects of other power lines, communications cables and guy wires are not taken into account by FPL in calculating the strength of poles except for the application of storm guying.

Q. Why do you believe that FPL should not apply the EWL standard to distribution lines throughout its system?

A. There are many reasons which have already been discussed. The KEMA Report on forensic information gathered by FPL after Wilma noted in several places that severe damage involving cascading failures of poles was in open areas, in areas near the coast and in areas where trees caused poles to break. Rotten or deteriorated poles caused many failures and logically initiated cascading failures of other poles. If EWL is applied to more than pilot projects and Interstate crossings by FPL, the areas where it is applied should be justified on the basis of well described criteria including that they are located near the coast where the winds are normally the highest and in open areas where the lines are not sheltered from the direct effects of the wind. In addition, before changing out a pole with a stronger class wood pole or concrete pole, the guying effects of other lateral lines and guy wires on the poles should be taken into consideration.

Q. What do you mean by the guying effects of other lateral lines and guy wires on the poles?

A. Poles or any tower can be designed to be held upright by as few as three guy wires when nothing else is attached. A guy wire is a strong steel wire which is attached to a pole near the height on the pole where the pole needs additional support. The other end of the guy may be attached to a strong steel anchor in the ground or to another pole in the direction that the pull of the guy is needed. The requirements are that the guys and their anchors must have enough strength to overcome the horizontal force of wind on the structure. The structure must have enough strength to withstand the vertical load, if any, of the guys' downward component of pull on the tower. The horizontal component of the pull of the guys is what must equal or exceed the applied force of the wind.

Power lines near the top of the poles create the effect of having two sets of "guys" attached to the poles. These wires are much stronger than the tension at which they are

strung from pole to pole. The amount that the strength of each of these wires exceeds the pounds of tension on the wire is available to help strengthen the pole in that direction. This is the same effect on pole strength as guying. The lines are either straight through, turn an angle or stop on each pole. The straight line poles are called tangent structures, the angles are angle structures and the last ones are called dead end poles.

A tangent structure must have enough strength to withstand the force of the assumed speed of the wind for which it is designed. The wind direction must be assumed to be that which results in the most load on the pole. For a tangent pole with no other wires or guys attached the worst direction is perpendicular to the line because of the ability (guying effect) of the line to support the pole in two directions as stated above. The wind force is based on the exposed surface area of the structure and all of its attachments. This strength may be provided by the structure alone or other support such as guy wires and other electric wires and cables attached to the pole. These other attachments leave individual poles in various directions and at different heights. All of these attachments must have greater strength than the tension under which they operate. The operating tensions and strength of various wires and cables generally is known and the tension depends on the distance to the next pole. The amount that the strength of any attachment exceeds its operating tension produces a guying effect on the pole.

Angle poles are similar to a tower which is guyed three ways. The line provides guying effects in two directions and the third is provided by a guy and anchor, a horizontal guy wire to another pole or another line leaving the pole and acting as a guy. A dead end pole normally is strengthened in one direction by the power lines and by a guy wire or guy wires in the opposite direction. Dead end poles can be guyed if space is available by two guys whose anchors are spread apart enough to effectively storm guy the pole. The horizontal component of all of these guying effects can and often does make a common

diameter pole strong enough to meet EWL standards. Two photographs from the CIF projects at the Lake City Veterans Administration Hospital (Columbia County) and the Lee County Memorial Hospital (Fort Myers) attached as MTH-2, illustrate this point.

Q. Do you have an understanding of how FPL considers these guying effects on poles?

A. FPL states in its plan (and Mr. Miranda has confirmed orally) that "storm guying" is one of the first "tools" considered for use in designing to EWL standards by FPL. Mr. Miranda also has committed to evaluating the feasibility of adding a methodology into its engineering procedures to account for the *guying effects* of other lines, cables and guys on poles in its consideration of the strength of a given pole. However, my understanding of FPL's current practice is that it does not take into account guying effects of lateral lines, cables and guys on the pole, and I have not received any indication to date that FPL has reached a decision to change its current practice. As a result of FPL's failure to take into account the guying effect of lateral lines, cables and guys, many pole assemblies strong enough to meet EWL standards are being changed out unnecessarily by FPL at great expense. *See* MTH-2.

Q. With respect to subsections (b), (c), (d) and (e) of Rule 25-06.0342, F.A.C., does the Company's deployment strategy as set forth in the Plan satisfy the requirements of the Rule?

A. No. The Plan does not adequately describe the communities and areas within the service area where improvements are to be made. The Plan also fails to provide a detailed description of the extent to which joint use facilities are involved, an estimate of the costs and benefits to the utility including the effect on storm restoration and power outages, or an estimate of the costs and benefits to third party attachers.

The Plan has some detail for 2007 which has been supplemented. However, even for 2007 the Plan and supplements do not provide the level of detail required to enable third

party attachers to provide valuable input, which input FPL must seek, attempt in good faith to accommodate, and include as the basis for its assessment of the cost impact on third party attachers. Specifically, while the Plan provides a list of the CIF and interstate crossings affected in 2007, it does not include the necessary engineering details upon which cable operators can provide meaningful input. Engineering details of the CIF projects pertaining to power line work were provided for the remaining 2007 CIF projects in August, 2007. Much of the work had already been completed for the first engineering plans provided before the plans were delivered. As a result, third party attachers were not able to communicate concerns about these projects until it was too late. FPL also provided a list of CIF projects to be done in 2008 and 2009 in August, 2007. However, the information received to date still is inadequate to meet the requirements of the rule.

In addition, FPL's Plan does not provide sufficient details about its deployment of EWL for new construction, major planned work, relocations, daily work or incremental hardening. Further, the estimate of costs of hardening set forth in the Plan for 2007- 2009 ("approximately $40-70 million" for 2007, $75 to $125 million for 2008, and $100 to $150 million for 2009) and revised in Mr. Miranda's testimony based on actual expenditures in 2007 to date are far too wide-ranging to be useful. As set forth above, the perceived "benefits" of the Plan are entirely speculative. *See* Plan at 6 ("FPL's planning and budgeting process cannot provide equivalent detail at this time about deployment plans for 2008 and 2009.") and at 7 ("Of course, FPL's ability to identify and estimate benefits from storm hardening are necessarily incomplete and imprecise at this time.")

Moreover, FPL has not clearly stated what the impact will be on average make-ready costs or annual pole rents. Indeed, in response to FCTA Interrogatory No. 2, FPL states "FPL does not know the impact (or incremental cost difference) for make-ready that Storm Hardening will have on 3rd party attachers. However, make-ready costs are likely

to increase as a result of the construction set forth in FPL's Plan." FPL's Response to Florida Cable Telecommunications Association's First Set of Interrogatories, No. 2. FPL does state that the cost differential of a wood pole and EWL concrete pole could be as much as $8,000. FPL's Response to Florida Cable Telecommunications Association's First Set of Interrogatories, No. 5. FPL estimates that it will replace 2,100 poles in 2007 alone (70% of which are likely to be joint use poles) and that it will set 700 intermediate poles. FPL's Response to Florida Cable Telecommunications Association's First Set of Interrogatories, Nos. 8 and 9. So, the impact on cable operators potentially could be staggering but as of yet, there is no reliable information on which to base an assessment.

While FPL's Plan contains some useful detail about the CIF projects planned for 2007, the necessary detail is completely lacking for years 2008 and 2009, as required by the Rule. Indeed, according to FPL, "Details of this level for 2008 and 2009 are not available at this time." *Id.* Neither the Plan nor the supplemental disc provide any information about FPL's deployment plans for 2008 and 2009 concerning new construction, major planned work, relocations, or incremental hardening. Similarly, there is no information about the extent to which the electric infrastructure improvements planned for 2008 and 2009 involve joint use facilities on which third-party attachments exist. And, as stated above, the cost estimates for 2008 and 2009 are too vague and wide-ranging to be useful.

Q. Can you provide an assessment of the costs and benefits of the Company's Plan on third party attachers at this time?

A. The Company's Plan does not yet include enough information about the costs and benefits of its storm hardening plan to enable me to provide a specific estimate of the costs and benefits that the Company's plan will have on third party attachers. The Company's Plan provides cost estimates for 2007, 2008 and 2009 on a project annual basis. It would be

helpful to have more details about these costs including, if possible, an estimate of the incremental costs per mile and more details about the plant with third party attachments that will be impacted by these costs. The Company provided some additional cost information detail in its responses to discovery requests submitted in this Docket. I am currently analyzing this additional information and am not able to assess its usefulness at this time.

I can say that the costs that may be recovered from cable operators are tightly prescribed by the FCC. Under the federal scheme, FCTA members pay both make-ready costs—i.e., the cost of making the pole ready for its attachments (including the cost of rearranging existing facilities on the pole, guying the pole to increase strength, or replacing the pole where necessary)—and annual rent pursuant to the FCC's rate formula, which assures that pole owners receive the fully allocated costs of accommodating the attachment. The annual pole attachment rent is determined by multiplying the percentage of the total usable space occupied by the pole attachment by the sum of the operating expenses and actual capital costs of the utility attributable to the entire pole. In addition, depending upon the circumstances, cable operators may incur the cost of transferring their facilities to a new pole.

It is clear that cable operators will incur significant additional costs as a result of the Company's Plan. They will incur costs related to transferring their facilities to poles that are replaced due to storm hardening. In my experience transfer costs can be as little as $100 for a wood distribution pole but would be significantly more for transferring to a concrete or steel pole, and the costs quickly escalate to the tens of thousands where splicing or new cable runs are required. Annual pole rental rates will increase, possibly significantly. Costs attendant to making the pole ready for third party attachments—including the cost of pre-construction strength—will increase. The number of cable

operator attachments on which rents are paid will increase as additional poles are set in existing spans. Cable operators will incur higher costs as a result of constructing to Grade B or EWL. In addition, third party attachers likely will experience significant delays in provisioning service to customers as a result of the new processes and standards the Company is adopting in connection with storm hardening. Given the competitiveness in the communications service markets any delays likely will result in lost customers.

From the information I have seen thus far I do not see a corresponding benefit to third party attachers resulting from the majority of the storm hardening activities. As set forth above, I fear that building to EWL may actually increase storm related outages and recovery times. I also do not see a benefit from the Company's increased emphasis on the strength and loading impact of third party attachments. I strongly believe that limited pilot projects are necessary to better inform the cost benefit analysis. I also believe that more detailed information about the specific design and construction criteria that will be used, and the specific joint use poles that will be impacted, will better enable third party attachers to assess the costs and benefits to their operations.

Q. Is the Company's deployment strategy prudent, practical and cost-effective?

A. From the information that is provided by FPL and from what I have observed personally, I cannot conclude that FPL's deployment strategy is prudent, practical or cost-effective. The FPL plan proposes to harden the distribution system on a massive system wide scale by increasing the number of structures per mile and/or increasing the individual pole strength, for example, by replacing sound wood poles with a mix of larger wood and concrete poles and adding many more poles between existing poles. By ignoring the beneficial guying effects of other power lines, guys and cables on the poles which FPL evaluates for EWL projects as stated above, FPL's deployment strategy is not prudent, practical, or cost effective for EWL projects which may be approved by the Commission.

FPL does not target its EWL plans to areas near the coast or in open areas where lines are not sheltered from direct wind effects. EWL construction is completely inappropriate where large trees near enough to fall on the line exceed the height of the line and the negative effects of more and higher cost poles are likely to outweigh the benefits.

Q. Do you know of a power industry definition for "near lines or open areas"?

A. No. The NESC generally does not define common language terms. Such terms are expected to be defined by reference to normal dictionary meanings. Moreover, the NESC exemption from EWL criteria for poles 60 feet or less in height is based in part upon the fact that shorter poles are more protected (than taller poles) by trees up to wind speeds greater than 60 miles per hour at which point they are more susceptible (than taller poles) to damage caused by falling trees. The poles for which the NESC applies EWL criteria, poles taller than 60 feet, are typically taller than the trees. In contrast to the approach specified by the NESC, FPL proposes to apply EWL standards to its entire territory so FPL should provide guidance to its engineers with respect to trees near the lines and what open areas are. If FPL does not, many of the stronger and more numerous poles installed under FPL's plan will be broken by large trees towering above many of the lines being hardened to EWL when those trees are blown over by the very wind for which the hardened line was designed. Two photographs from the CIF projects at the Lake City Veterans Administration Hospital (Columbia County) and the Lee County Memorial Hospital (Fort Myers) attached as MTH-3, illustrate this point. These pictures are examples of instances in which FPL set new EWL hardened poles near large trees, and in one case, where such trees are actually towering above the line.

Q. Earlier you stated that FPL's plan actually may impact adversely the ability of FPL's distribution system to withstand extreme weather and hinder storm restoration. Can you explain what you consider to be some of these possible adverse effects?

A. Yes. One of the most certain is the one just discussed where more poles and more costly poles are added under or near tall tree canopies. FPL is also using large class wood poles and concrete poles which will be needed in large numbers after another major hurricane impacts FPL territory. To avoid extreme delays in restoration FPL will have to stock large quantities of these poles which are not traditionally available from most pole vendors' inventory. Normal emergency response crews that rush to Florida from all across the country are not capable of setting concrete poles. Special heavy lifting equipment must be used or, as is more likely, many wood poles will be temporarily used at great extra expense when the temporary wood poles later are replaced again by concrete. The traffic safety issue was addressed by Dr. Slavin as well as the fact that more severe weather such as tornados can break even the stronger and more numerous poles built to EWL creating more hazards for motorists and more cost to replace the poles. FPL has neglected to emphasize some of the common system improvements mentioned above to improve resilience and speed up restoration short of using EWL. The extremely high cost of FPL's total plan, which includes many speculative benefits and has significant negative effects not addressed in the plan, will have a negative effect for rate payers and third party attachers..

Q. Are there alternatives to building to EWL that strengthen power lines and improve their resilience to storm winds and reduce storm restoration expenses?

A. Yes. There are many proven distribution power system initiatives and storm recovery preparations other than replacing poles and building to standards that exceed the NESC that can produce greatly increased electric service reliability, decreased storm damage, and reduced restoration time and expense. For example, according to the FPL Reliability Report filed with the Commission on March 1, 2007, of the 96,000 FPL poles that were inspected, 3.5 percent did not meet Grade C Strength and 9 percent were non-compliant

with Grade B Standards. This suggests that rather than building to extreme wind design criteria on such a grand scale, FPL should focus on strengthening these poles which do not conform to its reported Grade B construction standard for distribution poles. Ensuring that poles are not rotten or otherwise defective should significantly assist in efforts to prevent storm outages and in storm restoration. Rotten poles in particular are a serious problem in high wind situations because they can cause a cascading effect, which breaks several adjacent sound poles.

In addition, many other proven distribution power system initiatives and storm recovery preparations can produce greatly increased electric service reliability, decreased storm damage, and reduced restoration time and expense. Storm hardening initiatives for overhead electric power distribution lines which are prudent, practical and cost effective should include:

- Small conductor replacement projects to decrease line breakage during storms. Indeed, many more outages in hurricanes involve broken wires than broken poles, especially in the impacted areas outside the central path of strong storms. These projects should be coordinated with pole inspections and vegetation management and include major maintenance and guying improvements.
- Right of way access improvement projects for lines which are inaccessible due to ditches, fences, small roadways, etc., including removing or providing access across such strategic obstacles to line sections. This will allow repair crews to access lines much more quickly during emergencies.
- The use of specialized equipment and or contractors for work in difficult right of way conditions such as back lot line, off road or swampy area lines for more efficient restoration.

- Pole inspection with strengthening or replacement or guying of deteriorated or overloaded poles. All deteriorated, broken or missing guys should be replaced. All buried anchor heads should be extended to above grade or water levels to prevent guy wires from rusting off.
- Installation of storm guying projects for line segments where it is feasible, including lines where poles are subject to lean over in soft soil during high winds. Larger poles do little to solve the problem of leaning in soft soil without guying.
- Adding line segment sectionalizing switches, breakers and fuses as needed to isolate sections of line which sustain heavy storm damage. This can greatly improve time to restore power to lightly damaged main line segments before all major storm damage in an area is repaired.
- Updating automatic electric primary circuit coordination of breakers and line sectionalizing fuses, and adding devices as appropriate to assure automatic line sectionalizing initially and facilitate power restoration after storms pass.
- Converting selected distribution systems' voltage from 12 or 13 kV to 25 kV. Four times the electric power can be delivered by the same circuit if the voltage is doubled. Higher distribution voltage decreases the need for larger primary wire sizes and multiple circuits as electric system load grows. The long-term effect on wind loading is positive, and there are many other economic benefits of 25 kV systems.
- Developing an improved procedure to avoid cutting of fiber optic cables by debris clearing and electric repair crews. In many instances fiber optic circuits have survived the hurricanes, still functional, but on the ground in places only to be cut repeatedly by others' restoration efforts.

Third Party Attachment Standards And Procedures

Q. Does the Company maintain standards and procedures for attachments by others that meet or exceed the NESC?

A. Yes. FPL's attachment standards and procedures for third party attachments included in its Plan require compliance with the provisions of the NESC that are relevant to this proceeding, which, as I have stated above, are Sections 24-26 relating to strength and loading requirements including the effect of wind on the poles and attachments. *See e.g.*, Plan Addendum, FPL Attachment Standards and Procedures, at 4, 6, 7, ("It is the responsibility of the attacher to ensure that attachments are designed and constructed in accordance with the National Electrical Safety Code."), 10, and 15.

Q. Do the third party attachment standards and procedures included in the Company's Plan assure as far as reasonably practicable that third party attachments don't impair electric service reliability or overload the pole, and are constructed, maintained and operated in accordance with generally accepted engineering practices for the IOU's service territory?

A. No.

Q. Why not?

A. First, FPL includes in its Plan submitted to the FPSC for approval certain terms and conditions governing third party attachments that are not related to the Commission's overall objective of enhancing electric reliability or reducing restoration costs i.e., storm hardening, and thus are beyond the scope of this proceeding and should not be approved by this Commission. Only standards and procedures that concern the loading impact of third party attachments on the strength of poles relate to storm hardening and should be in

the plans. Second, some of the attachment standards and procedures that arguably relate to storm hardening are not *reasonably practicable* as required by the Rule.

Q. Please explain which terms and conditions governing third party attachments included in FPL's Plan are not related to the overall storm hardening objective.

A. FPL includes requirements for attachment clearances in Section II.B. (pp. 7-8) of the FPL Attachment Standards and Procedures but these clearance requirements do not relate to storm hardening. Similarly, Sections III.B., III.C. and III.D. of the FPL Attachment Standards and Procedures all contain specific attachment process provisions, including application and permitting requirements and costs. These should not be included or approved by the Commission. As set forth above, the relevant provisions of the NESC are Sections 24-26 relating to strength and loading requirements including the effect of wind on the poles and attachments. Indeed, some of the provisions in FPL's attachment standards and procedures constitute rates, terms and conditions of attachment which are governed by pole attachment agreements between the parties and fall within the jurisdiction of another regulatory body, particularly the FCC, which under statute has exclusive authority to regulate the "rates, terms and conditions for pole attachments to provide that such rates, terms and conditions are just and reasonable" in non-certified states such as Florida.

Q. Which of FPL's attachment standards and procedures concern storm hardening?

A. Only those provisions pertaining to the loading effect of third party attachments on the pole are relevant to the concerns raised in this proceeding. The attachment standards relating to cable diameter, weight, installed tension and guying standards as well as identifying the poles affected are relevant.

Q. Are FPL's provisions pertaining to the loading effect of third party attachments *reasonably practicable*?

A. No. Although, FPL's approach to loading of third party attachments is the most reasonably practical approach being presented by the four IOUs presenting storm hardening plans at this time.

Q. Please explain your answer.

A. I agree with FPL's approach to considering the loading impact of new attachments. When a third party attacher seeks to attach a new cable to a pole, FPL allows third party attachers to work with its outside contractor, Alpine, to assess the load of the new "attachment." According to the guidelines developed by Alpine, "The wind loading portion of an attachment permit does not need to be excessively burdensome. The goal of the wind load calculations is to know that all the poles have sufficient strength for the proposed attachments. One way to prove that all poles have adequate strength is to include a calculation sheet for each pole. ***Another way is to use one calculation sheet to show that a number of poles with similar characteristics meet the wind loading requirements.***" FPL Permit Application Process Manual at 28 (emphasis added). In other words, FPL is saying that the analysis can be performed on the worst case pole in a given string of poles having similar characteristics. It is my understanding that this is what is typically done by Alpine in the field. This is acceptable engineering practice.

However, I do not agree with other aspects of FPL's strength and loading requirements for overlashing.

Q. Please explain what is meant by "overlashing."

A. What a cable operator initially attaches to the pole (i.e., a "new attachment") is not usually the coaxial or fiber conductor itself, but a steel wire support strand attached to the pole with a clamp and through bolt. The operator then places communications conductors parallel to the strand and secures them by wrapping the strand and the conductor(s) with a thin steel filament called a lashing wire applied by a lashing machine. The cables are not

wrapped around the support strand. Through the life of the plant, the cable operator may alter that plant, including by *lashing* additional conductors to the existing strand, i.e., overlashing. For example, growing neighborhoods may be served by lashing additional or rerouted trunk cables to the existing strand, using another filament lashing the new line to the existing strand. More often, in today's applications, fiber optic sheath is "overlashed" to the coaxial cables in order to increase bandwidth and to provide capacity to offer new services. In addition, operators use overlashing in emergency situations to repair customer outages. Overlashing is used to eliminate amplifiers (which are potential points of failure); to expand channel capacity; and to provide capacity for additional services.

Overlashing does not use more pole space, because the same strand remains attached to the same licensed position on the pole. Indeed, it is common for more than one cable to be held in place by lashing it to an already existing and already licensed strand or messenger.

Q. What aspects of FPL's Plan that relate to overlashing are not reasonably practicable?

A. FPL's Plan states that permitting is required for overlashing where the resulting bundle is heavier than the existing attachment or has an increased diameter over that of the existing attachment. Plan Addendum, FPL Third Party Attachment Standards and Procedures, p. 5. In my experience, this is not reasonably practicable.

Q. Why not?

A. In my experience third party attachments do not significantly increase the load on poles, and overlashing has only a very small incremental effect on the already attached strand and cable assembly. Rather, power lines, hardware for attaching lines to poles and power apparatus such as transformers, fused switches, lightning arrester assemblies, outdoor lights and many other power company attachments usually account for most of the wind

load on a pole because they have a larger cross sectional area and are attached to the top part of poles.

Wind load is a product of the surface area exposed to the wind multiplied times the force of the assumed wind and also multiplied times the pole height from the fixed point (often the ground line or the lowest guy wire) on the pole. As stated above, today's overlashing typically is of fiber optic sheath—a very light weight material that is quite small in diameter. A common fiber optic cable is .59" diameter and weighs .05 pounds per foot. It is telling that FPL produced no information in response to FCTA's discovery requests for information related to pole failures caused by overlashing. *See* FPL's Response to Florida Cable Telecommunications Association's First Set of Interrogatories, No. 20.

Q. You said above that there are certain aspects of FPL's requirements for overlashing that *are* reasonably practicable. Please explain.

A. My understanding is that even though FPL's Plan states that permits are required for overlashing, FPL's actual practice is more of a notification process and not "prior approval." This is significant because it is my understanding that "approval" or "permitting" is a term and condition of attachment that is regulated by the FCC and that the FCC has ruled that it is not reasonable for pole owners to require permitting for overlashing or even to require prior approval after a 30 day notice period because this unreasonably delays the provisioning of important services. I also find reasonable the fact that FPL does not require approval or notice for overlashing that does not result in added weight or increased bundle size. If there is no increased size or weight—for example, where a cable operator replaces existing conductors or equipment with fiber sheath—no notice should be required. FPL agrees. In addition, FPL allows cable operators or third parties hired by cable operators to assess the loading impact of overlashing on the pole,

and the loading impact can be assessed on a worst case pole for poles with similar characteristics. In these respects, FPL's practices concerning overlashing are reasonable and much more so than the storm hardening plans being submitted by other utilities.

Q. What do you propose as a prudent, practical and cost effective solution for overlashing?

A. I recommend that cable operators be permitted to overlash existing strand provided that they assess the loading impact on the pole within 30 days of overlashing. To the extent that the loading analysis demonstrates that the overlashing brings the pole out of compliance (or, as is more likely to be the case when poles are found to be overloaded, that the pole was already out of compliance) the operator should notify the pole owner, and make-ready should be planned.

Q. Is this ever done?

A. Yes, all the time. In fact, other Florida utilities, including TECO, have been doing this in practice for years. Other Florida utilities have not performed any loading analysis on the poles caused by overlashing. Tellingly, of the four utilities that filed storm hardening plans on May 7, 2007, not one has pointed to a single instance in which overlashing has caused a pole failure.

Q. Are you suggesting that overlashing should be permitted to bring a pole out of compliance?

A. No. First, it is highly unlikely that the incremental wind load caused by overlashing will bring the pole out of compliance. The strand-supported coaxial cable that typically comprises the initial attachment is itself one of the attachments that contributes the least to the wind loading of the pole. The wind load is determined by the diameter and length of wires and cables attached to poles as well as the diameter of the pole and the area of equipment on the pole. The area of each attachment is multiplied times the wind force and its attachment height. The wind load is expressed in foot pounds which causes a

mechanical "moment" on the pole at the ground line. The final step in the calculation is to multiply the wind load on each attachment times the height of the attachment above ground i.e., the moment arm.

Coaxial cables, used by cable television companies, are smaller and lighter than the common multi-conductor copper communications cables used by telecommunications carriers. Moreover, initial attachment of strand-supported cable plant is handled through the application and makeready process where the pole strength is evaluated and determined to be adequate. Even lighter than coaxial cables, however, are the fiber optic conductors which are most commonly used for cable television construction today. Indeed, .59-inch fiber optic conductors weigh only 50 pounds per 1000 feet.

In contrast, there are typically three power wires attached to the top of poles (primary voltage wires) with the neutral and secondary wires a few feet below the primaries but at least 40 inches above the highest communication cable. These wires frequently weigh more than coaxial cable. Power equipment mounted on poles above communications cables also adds wind load as well as the surface area of the pole itself. All of the power lines and equipment wind loads have to be multiplied times the longer moment arm determined by their higher attachment points above ground.

For all of these reasons and more, the loading effect of cable plant is often treated as insignificant in utility practice. The loading effect of overlashing is even less significant. In my experience, I have found no instance in which overlashed fiber was the "straw that broke the camel's back" by pushing an otherwise compliant pole into violation of applicable loading criteria.

Second, any slight non-compliance that might possibly be caused by overlashing could be quickly remedied. Attachers would be required to notify the pole owner within 30 days of overlashing and/or would assess the loading on the poles themselves.

Q. In your experience does the relative placement of cable operators' strand and overlash in the communications space on the poles have any beneficial effect on the stability of the pole or ability to withstand wind and other forces?

A. Yes it can.

Q. Would you please explain?

A. Cable plant is deployed similar to power and telephone plant on pole lines. However, due to the needs of each utility the cable television lines often turn or "pull off" the power pole at locations where the power lines do not turn. This pull off must be guyed unless it pulls off in two opposite directions as at some street crossings. These pull off cable lines with their steel messenger wires provide guying effects on the affected poles which strengthen the pole substantially because the pole is supported at 18 to 22 feet high. It is the same effect as storm guying. This helps keep the poles in a run stable and minimizes cascading as the strand helps keep the lateral poles from pulling down adjacent poles, thus keeping the circuits intact and causing fewer outages, unless of course there is a tree collapse, in which event it is likely no design feature could keep the facilities from being damaged. *See* MTH–2.

Q. Is your suggested approach consistent with the NESC?

A. Yes. The NESC is a performance standard. The NESC rules provide for what is to be accomplished. The utilities covered by the NESC, including power and communications companies, all have practicable industry practices and reasonable engineering guidelines available to assure compliance with the rules. An exhaustive engineering loading analysis on every pole is not necessary or practicable every time a communication or power attachment is added or modified on a pole. Indeed, given the delays and expense associated with a full engineering loading analysis for overlashing, and the likelihood that

the overlash will not be a factor contributing to any overload, any such requirement would not be cost-effective, prudent or practical.

Q. Is this consistent with generally accepted engineering practices for the utility's service territory?

A. Yes. Several Florida pole owners and pole owners throughout the southeast allow cable operators to overlash existing strand and notify the pole owner after the fact. Moreover, this is similar to what FPL itself allows for drop poles. It is common practice throughout the industry to allow cable operators to notify pole owners after the fact that they have attached to a "drop" pole—i.e., an oftentimes shorter pole used to carry a few service lines to a residence or business.

Q. You have said that the loading impact of most overlashing is *de minimis*. Are there situations in which overlashing could significantly increase the weight or bundle size of the existing attachment?

A. Yes. There are situations where overlashing could increase the weight or bundle size in a meaningful way such as when the resulting bundle size is significantly increased.

Q. Do you think that even overlashing resulting in significantly increased size bundles should be allowed without prior notice?

A. At a minimum, I think there should be some incremental load for overlashing that does not require a full blown loading analysis. New York takes this approach, for example. For incremental loads caused by overlashing existing strand that exceed an agreed upon threshold, I believe that a loading analysis can be performed by the attaching entity with the results provided to the pole owner.

Q. What do you think should form the basis of an "agreed upon threshold?"

A. The rule adopted by the New York PSC provides that "a predetermined limited amount of overlashing, that is not a substantial increase to existing facilities, shall be allowed,"

without notification and allows the attacher itself to make the determination. Specifically, "[a]n Attacher, [sic] whose facility has a pre-existing NESC calculated span tension of no more than 1,750 lbs., shall be allowed to overlash a pre-determined maximum load of not more than 20% to the existing communications facility. Existing facilities with an NESC calculated span tension of less than 1,000 lbs. shall be allowed a pre-determined overlash of up to 40% of such pre-existing facilities." *Proceeding on Motion of the Commission Concerning Certain Pole Attachment Issues*, Order Adopting Policy Statement on Pole Attachment, 2004 N.Y.P.U.C. LEXIS 306, *30 (N.Y.P.U.C. rel. Aug. 6, 2004). If the attacher "determines that the addition of equipment and loading is greater than the pre-determined limits, further assessment of the overlashed facility for its impact on the overall pole loading is required to assure that the pole limits are not exceeded." *Id.* In those cases, the attacher would be required to "provide the pole Owner with a 'worst case' pole analysis from the area to be overlashed, to be sure that the additional facilities will not excessively burden the pole structures." *Id.*

Third Party Input

Q. In establishing its Plan did the Company seek input from and attempt in good faith to accommodate concerns raised by third party attachers?

A. Yes and no. The Company did seek input from third party attachers. It submitted its Plan to the attaching parties and asked for feedback. However, because of the limited information provided by the company in the Plan concerning the projects for 2008 and 2009, the incremental costs associated with storm hardening, the joint use poles that would be impacted and the specific design and construction criteria the Company would be using on joint use poles, third party attachers were unable to identify all of their concerns or to provide a cost/benefit assessment of the Plans on third party attachments.

The cable operators did provide specific feedback concerning the Company's attachment standards and procedures for third party attachments, and FPL did make some small changes based on this feedback. While the level of input that third party attachers have been able to provide to date does not meet the requirements of the rule, there is hope.

Q. Why is that?

A. FPL continues to provide updated information. As set forth above, FPL provided two discs in August with additional details about its projects for 2007, 2008 and 2009. In addition, FPL has stated that for its critical infrastructure facility and community storm hardening projects it will hold pre-design meetings with all attachers to facilitate and coordinate the best and most efficient method to harden the facilities. "During these meetings, FPL will discuss its preliminary plan allowing attacher's [sic] to provide input and offer alternatives. This should also provide attachers more time to plan for the upcoming construction." FPL's Response to Florida Cable Telecommunications Association's First Set of Interrogatories, No. 13. And for smaller and everyday projects, FPL has committed to providing attachers with advance notice and an opportunity to "contact FPL prior to work being initiated." *Id.* In addition, the pole owners and FCTA have agreed to a "Process to Engage Third Party Attachers" (MTH-5) that was developed by TECO. This Process is intended to provide a mechanism for giving the level of engineering detail necessary for parties to assess the economic impact of the plan and to provide input as to the specific methodologies being employed, as required by the Rule. This Process, combined with on-site meetings and prior notifications promised by FPL, should alleviate concerns about the level of required detail that currently is missing from the Plan and the ongoing need for third-party attachers' participation.

Q. Does that conclude your testimony?

A. Yes.

CURRICULUM VITAE
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Registered Professional Engineer (Electrical) GA#10724 (1976)
Registered Professional Engineer (Electrical) FL #51788 (1997)

EDUCATION: B.S. Industrial Engineering (Co-op) GA TECH, 1970

WORK EXPERIENCE:

1959-	Worked part-time with Harrelson Electric Co., owned by my father.
1963	W. T. Harrelson, doing residential, commercial, & industrial electrical and repair work in McRae, GA.
Dec. 1963- Mar. 1970	Co-op student of Georgia Power Co. in Electric Distribution Operating, McRae, GA, & Commercial Sales, North Atlanta.
Apr. 1970- Jan. 1972	Lieutenant in U. S. Army Air Defense, Minneapolis, MINN, & Yong Son, KOREA. Served as Battery Commander, Korea. Military Status: Inactive, Army Reserves; Rank: Captain.
Feb. 1972- June 1974	Operating Engineer, Brunswick, Georgia Power Co.; Designing, operating, and maintaining distribution system and operating transmission system.
June 1974- Feb. 1976	Senior Commercial Marketing Engineer, Brunswick. Selling wise use of electricity to new and existing commercial customers in Brunswick area. This included lighting design to I.E.S. standards, and consultations regarding the National Electrical Code.
Feb. 1976- June 1978	Operating Engineer, St. Simons Island, Ga. Power; Designing, operating, & maintaining distribution system & operating transmission system.
June 1978- May 1986	District Engineer; Supervised engineering and operation of Brunswick District of Ga. Power Co., including Kingsland Operating Headquarters.

May 1986-Sept. 1989 — Area Manager, McRae, Ga. Power Co; Restructure McRae, Eastman, Hazlehurst into area operation, and supervise and coordinate all company activities in the area.

Sept. 1989-April 1992 — District Power Delivery Manager, Milledgeville District; Manager of Engineering, Construction, & Maintenance of the electric distribution system and operation of the transmission & distribution system.

Note: During 28 years with Georgia Power Company, I was involved with claims, damage and accident investigations. From 1978 through 1992, I was in charge of these activities at my location.

April 1,1992 — Resigned from Georgia Power Company, Reason for leaving: Early retirement incentive package gave excellent opportunity to pursue independent consulting engineer goals.

April 1,1992 to present — Electric Utility Consulting Engineer.
Investigated accidents and testified in matters involving the National Electrical Safety Code, OSHA regulations, utility company safety manuals, employee training courses, accepted good work practices, and the National Electrical Code. These cases have involved electrical contact, flash, and burn injuries, collisions with poles and guy wires, falls from poles, etc., hydraulic oil fires, crushing injuries, property losses from fires, stray voltage, etc. The companies involved have been electric, telephone, cable TV, and product manufacturing companies.

I do management consulting and safety and engineering training for electric cooperatives, engineering consulting companies and private industry

I do electric power line inspections for electric cooperatives as required by the Rural Utility Service.

I inspect power lines and communications lines built jointly for National Electrical Safety Code compliance. I teach N.E.S.C. compliance and train field engineers and technicians in joint use compliance. I assist CATV, Power, and Telephone companies in interpreting the NESC and applying its rules to joint use of utility poles.

OTHER COURSES AND SEMINARS:

1974 — 13 weeks Commercial Sales Training by Ga. Power Co., including interior & exterior lighting design, & National Electrical Code.

1975 — 1 week General Electric Outdoor Lighting School, Hendersonville, NC.

1976 — 8 weeks Electric Operations Training by Ga. Power Co.

1977	1 week Principles of Leadership Training, Ga. Power Co.
1979	1 week Basic Management Training by Ga. Power Co.
1980-1985	Served as "Leader" of Engineering Dept Quality Circle.
1981	1 week Communications-General Training by Ga. Power Co.
1982	1 week Human Relations Skills Training by Ga. Power Co.
1987	3 days Interpersonal Skills Seminar by Ga. Power Co.
1988	1 week Management Grid School, Mobile, AL, Training by Southern Co.
1988	13 weeks Community Leadership Class sponsored by University of GA Cooperative Extension Service and Telfair County.
1989	1 week Negotiating Edge Seminar, Athens, GA., Training by Ga. Power Co. and Susan Wise
1989	Basic Economic Development Course, GA Institute of Technology
1990	3 months- Committee assignment (met bi-weekly) to formulate Ga. Power Company Guarantee Policy
1991	6 months-Committee assignment (met bi-weekly) to develop "District Operations Performance Measurement" facilitated by Ernst & Young Co.
1991	3 months-Committee assignment (met bi-weekly) to assess Georgia Power Company Marketing Dept Readiness for Incentive pay.
1992	1 week advanced Negotiating Skills Seminar, Peachtree City, Training by Ga. Power Co. & The Executive Speaker, Inc.
1992	1 day IEEE Seminar on 1993 National Electrical Safety Code
1993	2 day NRECA Safety Accreditation Team Training & Testing Seminar
1994	3 day Seminar-The Development & Application of the National Electrical Safety Code by Allen Clapp
1995	2 day ILCI (International Loss Control Institute, Inc.) Seminar on accident investigation
1996	1 day IEEE Seminar - "Changes in me 1997 NESC."
1997	3 day Seminar - "Application of 1997 NESC."

MEMBERSHIPS AND AFFILIATIONS:

1970-present	Member, Georgia Tech Alumni Association
1974-present	Member, Georgia & National Society of Professional Engineers
1978-1986	Member, Glynn County GA Electrical Inspection Board
1992-present	Member, Telfair Co. Chamber of Commerce
1992-present	Member, Institute of Electrical & Electronics Engineers (IEEE)
1993-2002	Board Member, Telfair County Industrial Development Authority

1993-2002	Member, Illuminating Engineering Society of North America (IECNA)
1993-present	Rural Electric Safety Accreditation Program (RESAP) certified accreditation inspector
1994-present	Member, National Fire Protection Association

TESTIMONY BY MICHAEL T. HARRELSON, P. E.

1. 5-2006 to 8-2007 **Florida Public Service Commission for FCTA**
Michael Gross Attorney — Written comments and
Maria Browne, Attorney — verbal comments
Beth Keating, Attorney

2. 4-27-06 & 5-1-06 **FCTA, et. al vs. Gulf Power Company Before the FCC**
Testimony

John Seiver
Cole, Raywid & Braverman, L.L.P.
1919 Pennsylvania AVE, NW – Suite 200
Washington, D.C. 20006

3. 3-31-06 **FCTA, et. al vs. Gulf Power Company Before the FCC** — Written Testimony

John Seiver
Cole, Raywid & Braverman, L.L.P.
1919 Pennsylvania AVE, NW – Suite 200
Washington, D.C. 20006

4. 3-16-06 & 3-21-06 **FCTA, et. al vs. Gulf Power Company Before the FCC** — Deposition Testimony

John Seiver
Cole, Raywid & Braverman, L.L.P.
1919 Pennsylvania AVE, NW – Suite 200
Washington, D.C. 20006

5. 3-13-06 **Comcast of Arkansas v. Entergy Arkansas Before the FCC** — Deposition Testimony

John D. Thomas
Hogan & Hartson LLP
555 Thirteenth ST, NW

Washington, D.C. 20004

6. 4-16-05 **Louisiana Public Service Commission** Written Testimony

For LCTA

John D. Thomas
Cole, Raywid & Braverman, L.L.P.
1919 Pennsylvania Ave., NW - Suite 200
Washington, D.C. 34358

7. 2-15-05 **CTA Arkansas vs. Entergy** FCC Written Testimony

John D. Thomas -- *for Plaintiff*
Cole, Raywid & Braverman, L.L.P.
1919 Pennsylvania Ave., NW - Suite 200
Washington, D.C. 34358

8. 1-10-05 **Clinton vs. Florida Keys Electrical Cooperative, Inc.** Deposition & Trial

Sixteenth Judicial Circuit Court in and for Monroe Co., Florida

Eric Peterson -- *For Defendant*
Peterson Benard
P. O. Drawer 15700
700West Palm Beach, FL 33416

H. Clay Roberts -- Plaintiff
Proenza, Roberts, Hurst, P.A.
2900 W 28th Terrace, Suite
Miami, Florida 33133

9. 12-03-04 **MEAG vs. Goodman** Testified at Hearing

Mr. Robert Wilmot -- *For Plaintiff*
P. O. Draw 1287
Tifton, GA 31793

MEAG Power Company right-of-way encroachment suit to clear transmission line

right-of-way of mobile homes.

10. 10-22-04 **Caldwell vs. Howard Industries, No. 4:03-cv-198-3**
Deposition

United States District Court, Middle District of Georgia, Columbus Division

Lester Tate -- *For Plaintiff*
Akin & Tate
P. O. Box 878
Cartersville, GA 30120

William T. Mitchell, Defense
Cruser & Mitchell, LLP
3500 Parkway Lane
Norcross, GA 30092

11. 6-23-04 Comcast Cable vs. Pacificorp
Deposition

Angela W. Adams -- *For Claimant*
Ballard Spahr Andrews & Ingersoll, LLP
One Utah Center, Suite 600
201 Main Street
Salt Lake City, Utah 84111-2221

12. 6-8-04 Saffold vs. Aldrich Rent-All
Deposition

Heather B. Bush -- *For Defendant*
Peterson Bernard
1550 Southern Boulevard, Suite 300
West Palm Beach, Florida 33416

13. 9-04-03 Perkins v. Georgia Power Company and Altec
Deposition

Attorneys Langston Bass and Hugh McNatt
Defendant
State Court Candler Co., GA

Contractor Lineman contacted 27,000 volts hand-to-band. He was not wearing rubber gloves. He lost both arms. He sued Altec for inadequate bucket truck design and GA Power for inadequate planning and supervising of work. *Settled out of Court.*

14. 5-02-03 McKeown v. CHELCO, et al Deposition & Trial

Attorney Alan E. Horkey -- *For Defendant*
700 S Palofex Street, Suite 170
Pensacola, Florida 32501
Circuit Court, Walton Co., FL

A teen-aged boy hit power pole with pick-up truck in rain on a curve. He had a severe head injury. He sued electric co-op, claimed they should have moved the pole since it had been hit twice before. Pole location complied with code and DOT guidelines. *Jury verdict gave court cost only to plaintiff.*

15. 11-09-01 Duffie vs. Clay Electric Co-op & Cox Cable et al Deposition & Arbitration

Attorney Craig Cooley -- *For Defendant*
200 East Robinson Street, Suite 555
Orlando, Florida 32801
Circuit Court Alachua Co., FL

A motorcycle rider hit a power line which fell across a U. S. Highway. A contributing factor was that a Cox Cable anchor had been improperly installed. This allowed a Clay

Electric Co-op pole to break in four pieces. *Settled at arbitration by Clay, Cox and two Cox sub-contractors.*

16. 12-13-00 Darley vs. Amusements of America, Inc.
Deposition

Attorney Robert R. Gunn -- *For Defendant*
P. O. Box 1606
Macon, GA 31202
State Court, Bibb County, GA

A young man got electric shock when he took hold of a metal rail on the platform of an amusement ride. *Settled*

17. 11-21-00 Causey vs. Okefenoke REMC
Deposition

Attorney Mark Barber -- *For Defendant*
136 N Fairground Street, Suite 100
Marietta, GA 30060
Superior Court, Brantley Co., GA

An onlooker was killed by burning transformer oil. He was watching a lineman attempt to stop an oil leak when the explosion and fire occurred. *Settled*

18. 10-18-00 Malin vs. McElmurray & Oellerich Electrical Service Deposition & Trial

Attorney David Bell -- *For Plaintiff*
P.O. Box 1011
Augusta, GA 30903
Superior Court, Richmond Co., GA

A young man was killed while cleaning pipes in a milking barn when he touched a light fixture which was not grounded. *Jury verdict for $1,000.000.00*

19. 10-04-00 Moses vs. Bill's Dollar Store, et al Deposition & Trial

Attorney David Bell -- *For Plaintiff*
P.O. Box 1011
Augusta, GA 30903
State Court, Gwinnett Co., GA

A gas company employee was killed when he touched a metal rack which held an air conditioning unit. The unit was not grounded. *Settled*

20. 1-25-00 Byrd vs. Glades Electric Co-op
Deposition

Attorney Robert Swartz -- *For Defendant*

Ft. Lauderdale, Florida
Circuit Court, Glades Co., FL

A flatbed truck crane operator was killed when he put the steel cable into a 7200-volt line. He jumped clear of the truck, then attempted to get in the cab and was electrocuted. *Settled.*

21. 9-10-99 Scruggs vs. Georgia Power Company
Deposition

Attorney Rowland Dye -- *For Defendant*
P. O. Box 2426
Augusta, GA 30903
State Court, Georgia

A truck hit a low power line service which had been previously hit by an over-height load of hay. *Settled.*

22. 3-12-97 Price vs. City of Thomasville Deposition & Trial

Attorney Hugh McNatt -- *For Defendant*
Vidalia, GA
Federal Court, Albany, GA

A contractor lineman was badly burned and electric shocked when he lost control of a large wire and violated several other safe-work practices. *Settled.*

23. 12-06-96 Dennard vs. Altec
Deposition

Attorney Lester Tate -- *For Plaintiff*
P. O. Box 878
Cartersville, GA 30120

A lineman's hand was crushed when it was caught between the control lever of his bucket truck and the bottom of a transformer. The control levers were poorly designed. *Settled.*

24. 7-17-96 Raulerson vs. Okefenoke REMC
Deposition

Attorney Richard Rumrell -- *For Defendant*
One Hundred BLDG, Suite 250
Jacksonville, FL 32256
Circuit Court, Duval Co., FL

A laborer was killed when the electric meter pole he was setting contacted a 14,400-:volt power line. Telephone drop wires and cable television were a factor in making the power line lower. *Settled.*

25. 7-02-96 McCoy vs. Coach & Campers of Atlanta
Deposition

Attorney Nikolai Makarenko, Jr, -- *For Defendant*
100 Galleria Parkway, Suite 1510

Atlanta, GA 30309
State Court, Dekalb Co, GA

A customer separated his shoulder when the RV home shocked him. He was on the ladder on back, touched a grounded chain link fence and fell. The electric circuit to the RV was not grounded. *Settled.*

26. 6-07-96 Habeishi vs.Greystone Power Corp. Deposition & Trial

Attorneys Tisinger, Tisinger, Vance & Greer -- *For Defendant*
P.O. Box 2069
Carrollton, GA 30117
Federal Court, Northern District, GA

The electric power was off to a traffic signal because an electrical connection failed. It had been made improperly by Fulton County Traffic Dept. Two cars collided in the intersection killing both wives of the two drivers. *Jury Verdict $7,000,000.00!*

27. 5-16-96 Crossin vs. Central Illinois Light Co.
Deposition

Attorney Richard Glisson - *For Plaintiff*
837 South Fourth Street
Springfield, Illinois 62705
Circuit Court, Sahgamon Co., Illinois

A lineman was electrically shocked when he disconnected a ground wire at the top of a joint transmission and distribution pole. A transformer was connected to the pole ground. The ground was burned open before it connected to the distribution neutral. *Settled.*

28. 3-16-95 Lockhart vs. TCI Cable & BellSouth Deposition & Trial

Attorney M. Francis Stubbs - *For Plaintiff*
P. O. Box 9
Reidsville, GA 30453
Superior Court, Toombs Co., GA

A young man was killed when he struck a TCI guy wire with his neck while riding a motorcycle. The guy wire was abandoned but not maintained in a safe condition. The young man was violating the law by riding off the roadway. *Jury Verdict Defendant's Verdict.*

29. 9-21-94 Vandevender vs. Klein Tools, Inc. Deposition & Arbitration

Attorney Michael Smith - *For Defendant*
240Third ST
Macon, GA 31201
Federal Court, Middle District, GA

A truck operator was badly shocked and burned when he removed his rubber gloves and touched a bucket truck while a hot 7200-volt line was on the ground nearby. He sued Klein Tool Company claiming the grip used broke the wire allowing it to fall. *Arbitration-Defendant's ruling 2 to I.*

30. 8-24-94 Underwood vs. Georgia Power Company
Deposition

Attorney Rowland Dye — *For Defendant*
P.O. Box 2426
Augusta, GA 30903
State Court, Emanuel Co., GA

A laborer attempted to use a 20-foot re-bar to unclog a grain bin auger. He contacted a 7200-volt. power line with the metal bar and lost one arm and had serious burns. He claimed the line was too close. The line complied with the NESC. *Settled.*

31. 4-20-93 Buckner vs. Colquitt Electric Co-op
Deposition

Attorney John Austin — *For Defendant*
400 Perimeter Center Terrace, Suite 1050
Atlanta, GA 30346
Superior Court, Colquitt Co, GA

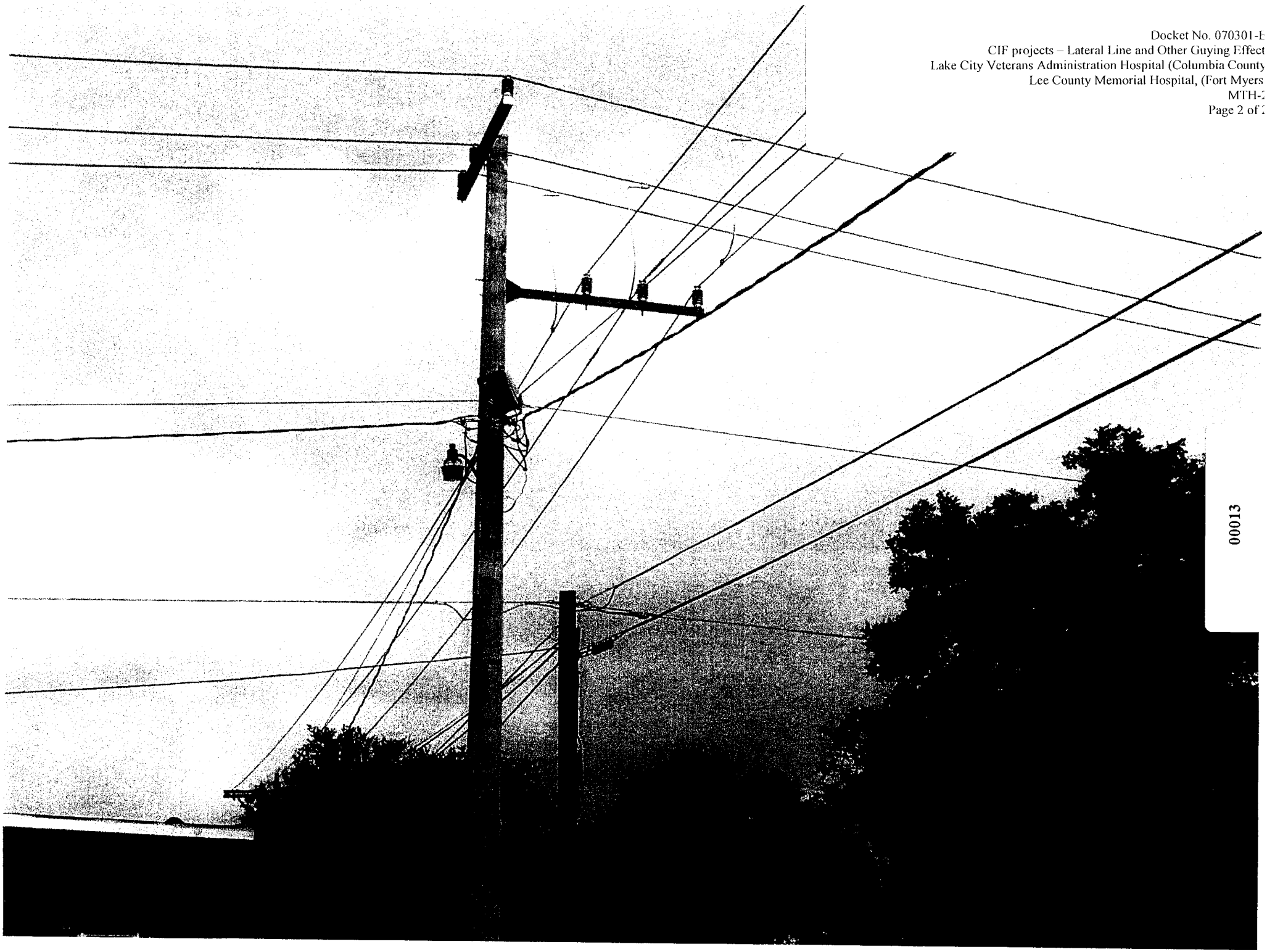
A laborer was shocked and fell from a pecan tree. He was using a 20-foot long aluminum pole to knock pecans from the limbs. *Settled.*

32. 8-05-90 Lockett vs. Georgia Power Company Deposition & Trial

Attorney Hugh McNatt — *For Defendant*
Vidalia, GA
Superior Court, Telfair Co., GA

Three laborers were raising an aluminum extension ladder under a 7200-volt power line. One was killed, one shocked, one was not hurt. The power line complied with the NESC. *Jury Verdict paid funeral expenses only.*

00012



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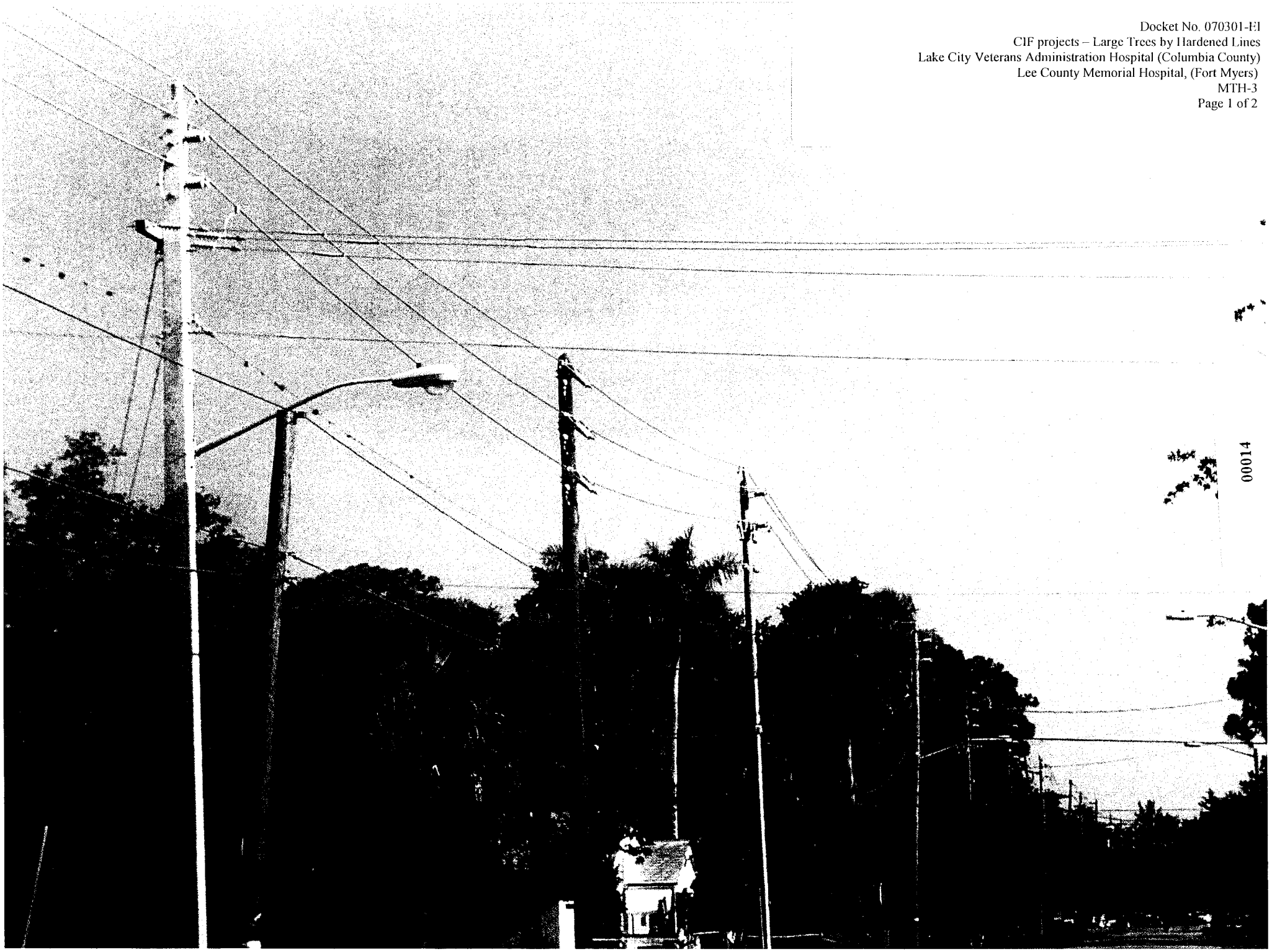
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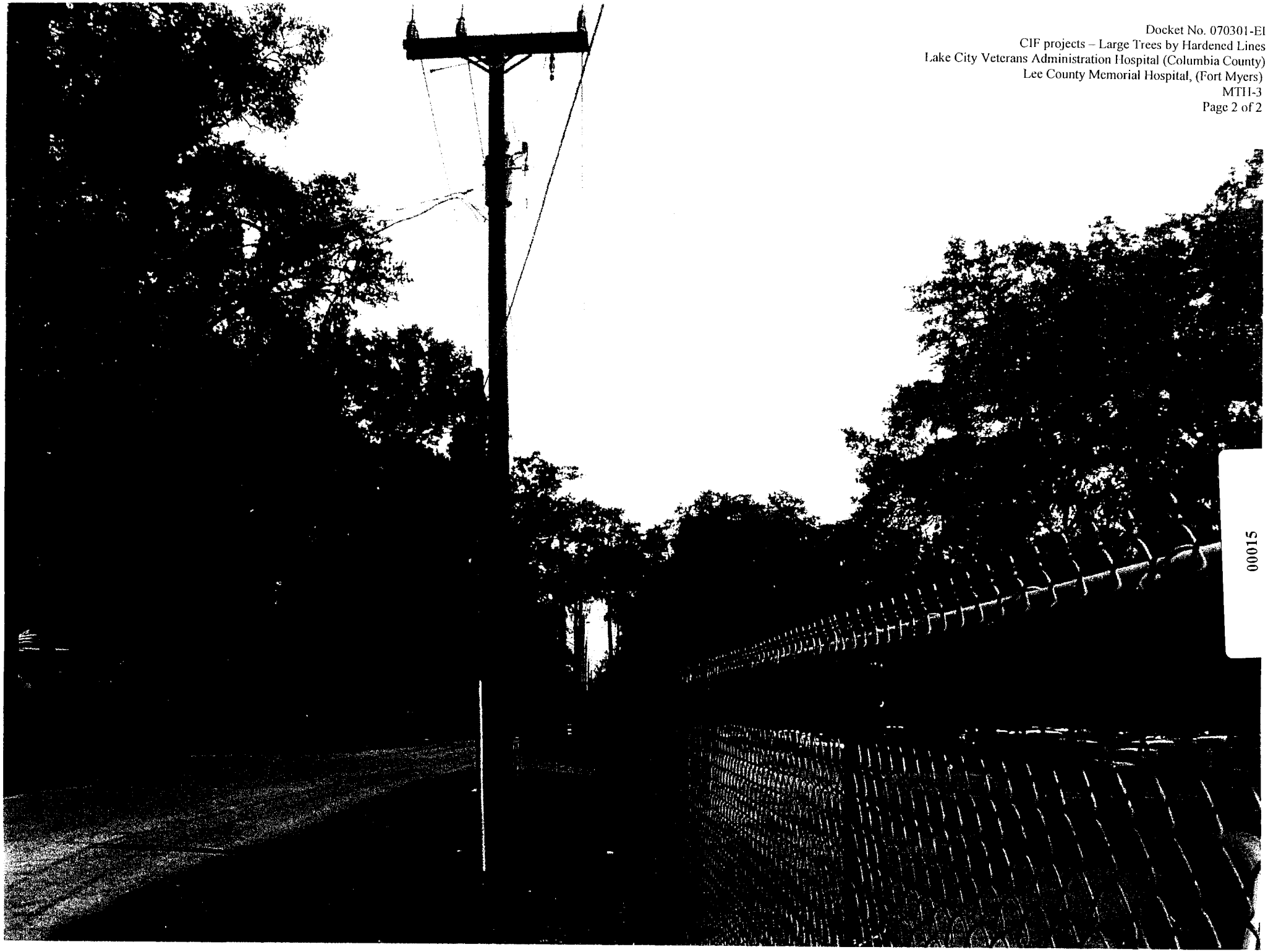

00015

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Proposed amendments to rules regarding overhead electric facilities to allow more stringent construction standards than required by National Electric Safety Code	Docket No. 060173-EU
and	
In re: Proposed rules governing placement of new electric distribution facilities underground, and conversion of existing overhead distribution facilities to underground facilities, to address effects of extreme weather events	Docket No. 060172-EU Filed: August 11, 2006

AFFIDAVIT OF DR. LAWRENCE M. SLAVIN

The undersigned, being duly sworn, states as follows:

1. I am currently Principal of Outside Plant Consulting Services, Inc. Previously, I had an extensive career at Lucent (formerly AT&T), Bell Telephone Laboratories and Telcordia Technologies (formerly Bellcore). My career at Bell Laboratories, at which I was selected to be a Distinguished Member of Technical Staff, spanned more than 28 years (1961-1989), primarily in telecommunications product design and development. During the subsequent 12 years (1990-2001), I was a member of Telcordia's research and professional service organizations, and served as Director of the Network Facilities, Components, and Energy Group, responsible for requirements, testing, and analysis of outside plant media, components, and powering for telecommunications applications, as well as related installation and construction guidelines.

2. I received my Ph.D in mechanical engineering from New York University in 1969, my Master of Science in engineering mechanics from New York University in 1963 and my Bachelor of Science in mechanical engineering from The Cooper Union for the Advancement of Science & Art in 1961.

3. I have been an active member of NESC Subcommittee 5 since 1998, including the development of the 2002 edition of the NESC and the recently issued 2007 edition. Subcommittee 5 (Overhead Lines – Strength & Loading) is directly responsible for specifying the storm loads and associated structural strength requirements referenced by the PSC. I am Chair of Working Group 5.7 (Seminars and Presentations; Subcommittee 5), and have served on Working Group 5.2 (Complete Revision of Sections 25 and 26; Subcommittee 5), and on the immediately relevant Working Group 5.8 (Application of Extreme Wind to All Structures; Subcommittee 5). I have also been Chair of Working Group 4.10 (New Ice Loads and Clearances; Subcommittee 4, Overhead Lines – Clearances), and serve on as the Accredited Standards Committee ASC-O5 (responsible for *ANSI O5.1, Wood Poles, Specifications and Dimensions*).

4. As Chair of WG 5.7, I have been responsible for organizing and coordinating the following industry information sessions, as well as providing some of the associated technical presentations:

- ***Panel Session: Structural Reliability-Based Design of Utility Poles and the National Electrical Safety Code*, 2003 IEEE Transmission & Distribution Conference and Exposition, 2003**
- ***Panel Session on National Electrical Safety Code (NESC), 2002 Edition, ANSI C2*, 2001 IEEE Transmission & Distribution Conference and Exposition, 2001**

- ***Panel Session on Proposed Changes to Strength & Loading Requirements for the 2002 Edition of the National Electrical Safety Code (NESC)*, IEEE Power Engineering Society, Towers, Poles & Conductors (TP&C) Subcommittee Meeting, 2000**

I will be chairing a panel session regarding the strength and loading requirements of the 2007 edition of the NESC, and presenting related technical information, at the TP&C Subcommittee Meeting in January 2007.

5. Appendix 1 attached to this Affidavit is a report I have prepared concerning proposed Rule 25-6.034 that is being considered in this proceeding. As I discuss in detail in the report, the proposed rule's requirement that electric utilities be guided by the extreme wind loading standards specified in the 2002 edition of the NESC could result in substantially higher facilities costs and lead to significant unintended consequences. Accordingly, I recommend that this requirement not be included in the proposed rule, or (if this recommendation is not accepted), that certain limitations be adopted.

6. Appendix 2 attached to this Affidavit provides more detailed information concerning my career in the telecommunications and related utility industries, including my activities in relevant professional organizations, such as the Main Committee and several Subcommittees for the NESC.

Further Affiant sayeth naught.

Lawrence M. Slavin

Subscribed and sworn to before me this 10 day of August, 2006.

Notary Public, State of NJ

My commission expires:
May 6, 2009

JENNIFER L. OSORIO
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES MAY 6, 2009

APPENDIX 1

Report Concerning Proposed Rule 25-6.034 As It Relates to Extreme Wind Loading Requirements

1. Introduction

This note provides comments regarding the proposed Florida Public Service Commission (PSC) Rule 25-6.034 to require that the extreme wind loading of the 2002 edition of the National Electrical Safety Code (NESC) be reflected in the design of electric utility-owned poles, including those with third-party (telecommunications) attachments. In particular, NESC-2002 Figure 250-2(d), part of NESC Rule 250C, is cited as a guide. The stated objective of the PSC is to "enhance reliability and reduce restoration costs and outage times" due to hurricane events, such as recently experienced during Hurricane Wilma. The present comments discuss the NESC rules (2002 edition), as applicable to the State of Florida, recent relevant discussions and decisions within the NESC Committee, and the impact of adopting the Extreme Wind Loads of Rule 250C throughout Florida.

2. NESC-2002

The NESC is an American National Standards Institute (ANSI) standard based upon a consensus of those substantially concerned with its scope and provisions, including the Institute of Electrical and Electronic Engineers (IEEE), which also acts as the Secretariat. Other members of the NESC Committee include organizations representing providers of electric power or communications service, their suppliers, and other affected or interested parties. The NESC includes various provisions for the safeguarding of persons from hazards from the installation, operation, and maintenance of electric supply and communication lines and equipment. The rules contain the basic provisions that are considered necessary for the safety of employees and the public.

In general, adherence to the NESC is voluntary; however, many commissions throughout the United States routinely adopt the latest edition, or specific editions, for application within their jurisdictions. For example, the Florida PSC has adopted the 2002 edition.

Sections 25 and 26 of the NESC provide the required strengths and loadings of utility poles and other structures. Section 25 specifies the type storm loads that Grade B or C utility lines are required to withstand. ("Grades of Construction" are discussed below.) Section 26 specifies the required strengths of the structures, as subject to the storm loadings specified in Section 25. (Most of Section 26 -- *e.g.*, Rule 261 -- applies to Grade B or C construction.) Two types of storms are specified -- (1) Combined Ice and Wind Loading (Rule 250B) and (2) Extreme Wind Loading (Rule 250C).

2.1 Combined Ice and Wind (Rule 250B)

Rule 250B refers to the Loading District map, NESC Figure 250-1, reproduced below. The three loading districts in the United States (Heavy, Medium and Light) specify the amount of radial ice buildup and a concurrent wind pressure. The Heavy and Medium districts in the north and central portions of the United States are subject to ½ and ¼ -

inch radial ice buildup, respectively, on all power and communications wires, cables, and conductors, and a concurrent wind pressure corresponding to 40 m.p.h.. The Light district in the southerly portion of the country, including Florida, is assumed to experience no ice buildup, but a wind pressure corresponding to 60 m.p.h. The latter wind speed, although only 50% greater than that assumed in the rest of the country, corresponds to a wind pressure of more than twice that in the Heavy or Medium districts, due to the strong (non-linear) dependence of the wind force on wind speed.[1] However, the lower pressure in the Heavy or Medium district is applied to a greater "sail area" due to the ice buildup on the wires and conductors. Depending upon the wire or conductor diameters, and the ice buildup levels, the resultant transverse loads in the "Light" district may exceed that in the so-called "Heavy" or "Medium" areas. In addition, the application of Rule 250B requires "overload" factors to be applied to the calculated wind forces to provide a conservative margin of safety when selecting appropriate pole sizes. A factor of 2-to-1 is applied to the common Grade C construction, and a factor of 4-to-1 is applied to Grade B construction, where required.[2] (See Section 2.3.) This procedure results in a fairly robust design that experience has shown to provide reliable, safe service.

PART 2. SAFETY RULES FOR OVERHEAD LINES

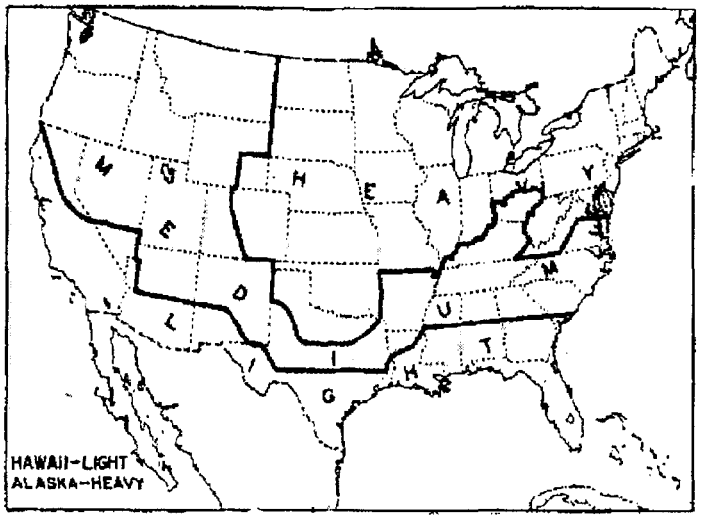

Fig 250-1
General Loading Map of United States
with Respect to Loading of Overhead Lines

[1] The wind pressure, or force, is proportional to the square of the wind speed.
[2] The present discussion assumes "tangent" pole lines, without significant corner angles where guys may be required. For such tangent lines, the transverse wind loads typically represent the critical design condition.

Rule 250B applies to all Grade B or C structures, regardless of height, and is typically used by most utilities to determine the strength requirements for distribution poles.

2.2 Extreme Wind (Rule 250C)

NESC Rule 250C refers to various wind maps, of which Figure 250-2(d), including the state of Florida, is reproduced below. The wind speeds[3] vary from approximately 95 m.p.h. (interpolated) in the north of the state to as much as 150 m.p.h. at the southern tip. The minimum 95 m.p.h. speed corresponds to a wind pressure of 2½ times that of the 60 m.p.h. wind assumed in the Light loading district. The maximum 150 m.p.h. speed corresponds to a wind pressure of more than six times that due to the 60 m.p.h. wind. However, the corresponding overload factors for Rule 250C are lower than that of Rule 250B, somewhat reducing the wide divergence in pole strength requirements. Nonetheless, if applicable, the impact on pole strength and sizes in Florida, and on utility construction practices and costs, would be major, as discussed in detail in Section 4. For various reasons, as discussed in Section 3.1, the NESC only applies Rule 250C to structures exceeding 60 feet in height above ground. This effectively exempts the vast majority of distribution poles. For cases where both Rule 250B and 250C apply, the larger effective loads would determine the required pole strength.

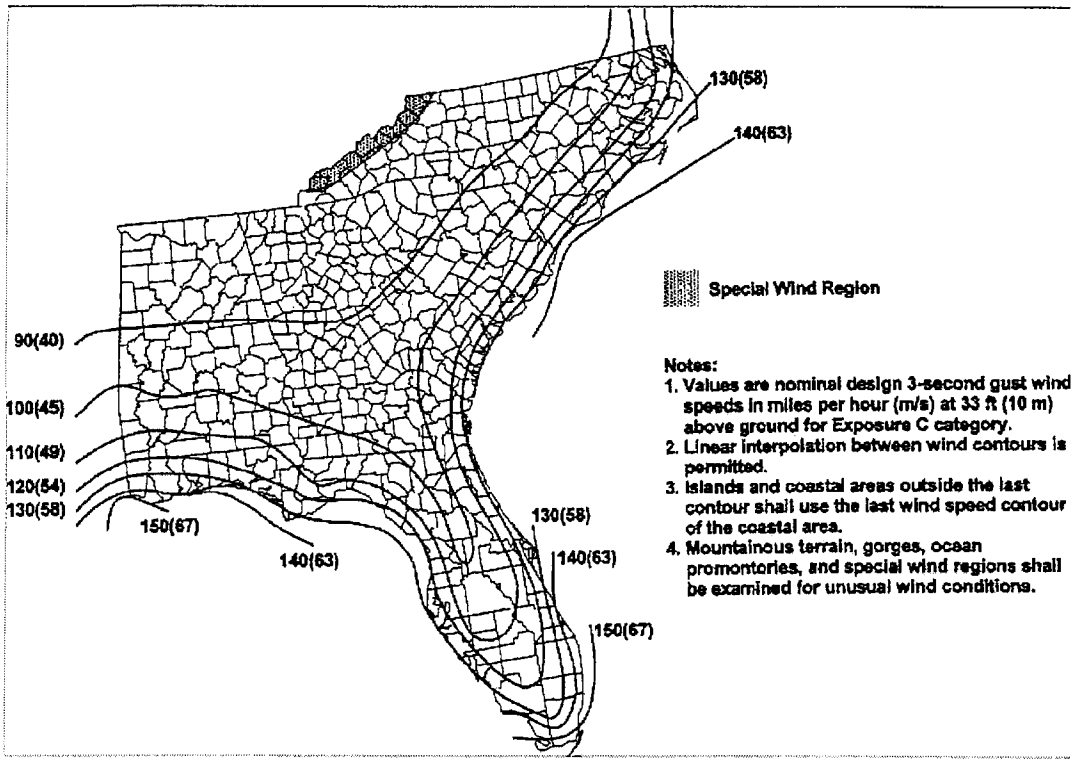

Fig 250-2(d)
Eastern Gulf of Mexico and Southeastern US Hurricane Coastline

[3] Figure 250-2(d) refers to "3-second gust wind speeds", which is approximately 20% greater than the 1-minute average wind speed used as the basis for categorizing hurricane levels by the Saffir-Simpson Hurricane Scale.

2.3 Grades of Construction

Section 24 of the NESC defines three Grades of Construction intended to distinguish between various situations, requiring varying levels of reliability, as implemented by the overload factors described above. In general, these grades depend upon the combination of voltage levels present in the power and communications conductors supported on the same poles, as well as various details, as specified. Most distribution poles carrying "primary power" (> 750 volts) at the upper portion of the pole, and communications cables below, are in the Grade C category. If the adjacent lines cross railroads tracks or limited access highways, a greater reliability level is required, corresponding to Grade B. Most power utility-owned poles are in the Grade C category.

The third grade of construction is Grade N, and applies if the voltages do not exceed 750 volts, corresponding to the lowest level of reliability.[4] This includes joint-usage poles supporting only "secondary power" (< 750 volts) or poles supporting only telecommunications cables.

The NESC does not provide specific storm loading or strength requirements for Grade N structures. NESC Section 25 (Loadings for Grades B and C) is not applicable to Grade N, and Section 26 (Rule 263) only states that "[t]he strength of Grade N construction need not be equal to or greater than Grade C" and that "[p]oles used for lines for which neither Grade B nor C is required shall be of initial size or guyed or braced to withstand expected loads, including line personnel working on them." This lack of specificity for Class N poles allows wide variability in application with respect to selecting appropriate pole strengths to withstand storms.

2.4 Required Strength & Pole Class

Based upon the wind pressures corresponding to the storm loads, as applicable, an appropriate strength pole may be selected. Wood pole sizes and strengths are specified in *ANSI O5.1, Wood Poles, Specifications and Dimensions*. ANSI-O5.1 provides a pole classification system based upon the ability of a pole to withstand lateral loads placed near the top of the pole, in a cantilever situation, such as may correspond to transverse wind loads on a pole with attachments. For example, a popular size Class 4 pole would typically (on the average) withstand a lateral load of 2,400 lbs applied 2 feet from the tip of the pole. A Class 3 pole is stronger, and would withstand 3,000 lbs. Within poles of Class 1 - 10, lower class number poles correspond to stronger (*i.e.*, larger diameter) poles. (Poles of strength greater than Class 1, are classified as H1, H2, and so on) with strength increasing with the H-number.)

Thus, a pole may be described as that supporting a specific "grade" of construction, corresponding to a level of required reliability (Grade B or C), or by a "class" size which is selected to match the strength needed to achieve the required reliability level. The strength is determined and calculated based upon the specified loading details (ice buildup and/or wind speed), the number and size (diameter) of the attachments to the pole, the span length between adjacent poles, and the grade of construction (via the overload factors discussed above).

[4] Grade B applies if the adjacent lines cross railroads tracks or limited access highways.

3. Upcoming and Future Editions of NESC

The 2007 edition of the NESC has recently been issued (August 2006) and is effective as of February 2007. Regarding storm loadings, several significant changes were introduced. Although Rule 250B was left unchanged, a new Rule 250D was added: "Extreme Ice with Concurrent Wind Loading." Similar to Rule 250C, Extreme Wind Loading, Rule 250D would only apply to structures exceeding 60 feet in height, exempting most distribution poles. In any case, this storm load would not have an impact in Florida due to the low associated ice (0-in.) and concurrent wind (30 m.p.h.) loads.

It is particularly interesting that Rule 250C has been modified for the common Grade C construction applications. In previous editions, the overload (design) factors for Grade B and C construction were the same, in spite of the greater implied reliability for the Grade B situations. This inequity was corrected in the 2007 edition by a *reduction* of as much as 25% in the effective design loads for Grade C construction. Thus, in contrast to possibly extending the Extreme Wind Loading to a larger category of structures and applications (*e.g.*, poles ≤ 60 feet height) the NESC requirements, where applicable, have been reduced. Nonetheless, there had been extensive effort and discussions regarding the possible extension of Rule 250C to structures of all heights, as described below.

3.1 Extreme Wind Loading -- Discussions

There is a seemingly eternal debate within the NESC Committee to consider eliminating the 60-foot exemption -- so that poles of all heights would then be subject to extreme wind loading. Such a revision was discussed within the NESC Committee with regard to the 2007 edition but, once again, was rejected. In fact, as described above, where applicable -- *i.e.*, poles taller than 60 feet -- the design requirement for Extreme Wind was actually reduced in severity for Grade C construction.

The rationale for rejecting consideration of extreme winds for "distribution" poles (*i.e.*, poles < 60 feet tall) is that the vast majority of industry experiences indicate that almost all damage to such lines is caused by wind-blown debris such as falling branches, and not by the wind forces acting directly on the wires and poles. In that case, little would be gained by attempting to design such poles to withstand the direct hurricane wind forces. The NESC Loading Section (NESC Section 25) does not explicitly use the term "distribution" when referring to these applications, but the 60-foot height threshold was chosen intentionally to exclude the vast majority of such poles. (In contrast, taller structures, such as critical transmission towers, would benefit from such a requirement.) In addition, to the best of my knowledge, the NESC Committee has never discussed extending any of the storm loads of Section 25 of the NESC (*i.e.*, Combined Ice and Wind or Extreme Wind) to Grade N applications, including telecommunications-only poles or joint-use poles with only secondary power (< 750 volts). Thus, the proposal of the PSC to extend Rule 250C to all distribution poles, regardless of height or grade of construction, would appear to be a major departure from present considerations in the NESC Committee, or industry in general. Thus, it would not appear to be "reasonably practical, feasible, and cost-effective" (to quote from proposed Rule 25-6.034(5)) to attempt to apply Rule 250C to Grade N joint-use distribution poles.

Related discussions within the NESC Committee to extend the Extreme Wind loading to structures of all heights (including distribution poles), focused on a particular change proposal, developed within Working Group 5.8, that would limit the impact of such an otherwise potentially dramatic change. In particular, for the Light Loading District portion of the country, which includes Florida, there would be no impact for distribution structures. However, based upon a multitude of industry comments objecting to even this diluted version of an Extreme Wind requirement for distribution poles throughout the country, this proposed change was not incorporated into the 2007 edition. It may be expected that this (rejected) change proposal will serve as a starting point for similar considerations for the 2012 edition of the NESC.

3.2 Future NESC Meetings (2012 Edition)

Although the 2007 edition of NESC is being issued essentially as this report is being written, efforts on the development of the subsequent 2012 edition are already being anticipated by Subcommittee 5. Due to the general interest in the effects of storm loads, such as hurricanes, and the effort required to properly consider the various aspects, Subcommittee 5 typically begins its meetings considerably earlier in the code cycle than most other subcommittees. Thus, initial meetings for development of the 2012 edition probably will begin in 2007. As a precursor, Working Group 5.7 of Subcommittee 5 (chaired by myself) will hold a panel session in January 2007 for the benefit of interested members of the power industry (IEEE Power Engineering Society, TP&C Subcommittee). The panel session will address the changes adopted in the 2007 edition, but will also discuss some of the proposals that were not accepted. The proposed (rejected) changes to Rule 250C, including the proposed extension to distribution structures, will be of particular interest, and will likely generate comments to be considered in the development of the 2012 edition.

4. Impact of Extending Rule 250C

The unlimited application of Rule 250C to all poles would have a major impact on the cost and operations of the utilities and the third party attachers, and would likely significantly affect the system reliability and restoration efforts, as well as public safety -- albeit not necessarily in the manner expected by the PSC.

4.1 System Cost

For electric utility-owned joint-use Grade N, Grade B or Grade C pole applications, the additional pole costs will depend upon the extent to which the proposed Extreme Wind load would exceed "reasonable" (albeit non-mandated) Grade N loads, and the already required Combined Ice and Wind load for Grade B or C applications for poles not exceeding 60 feet in height. Any increased strength requirement leads to stronger (larger diameter) poles, or a correspondingly greater number of poles (resulting in shorter span lengths), both of which would obviously be more expensive.

Figure 1 illustrates the relative pole strength in comparison to that currently required for the common Grade C joint-usage distribution application; *e.g.*, including primary power

(> 750 volts) with telecommunications cables mounted below the power cables.[5] Assuming the pole does not exceed 60 feet in height (65 feet in length[6]), such a pole must be designed to the present Combined Ice and Wind Loading (NESC Rule 250B, Figure 250-1, Tables 250-1, 253-1 and 261-1A). For present purposes, a tangent line (no corner angles) is assumed, for which the design is based upon the ability to withstand the transverse wind loading. For Florida, located in the NESC Light Loading District (Figure 250-1), this corresponds to a wind speed of approximately 60 m.p.h., but with an additional overload/design factor of approximately 2-to-1 for Grade C, and 4-to-1 for Grade B. For Grade N, a 1-to-1 design factor is conveniently ("reasonably") assumed. For the proposed application of Extreme Wind requirements (NESC Rule 250C), the wind-speed for Florida ranges from less than 100 m.p.h. (assumed to be 95 m.p.h.) in north-central area, to as much as 150 m.p.h. at the southern tip.[7]

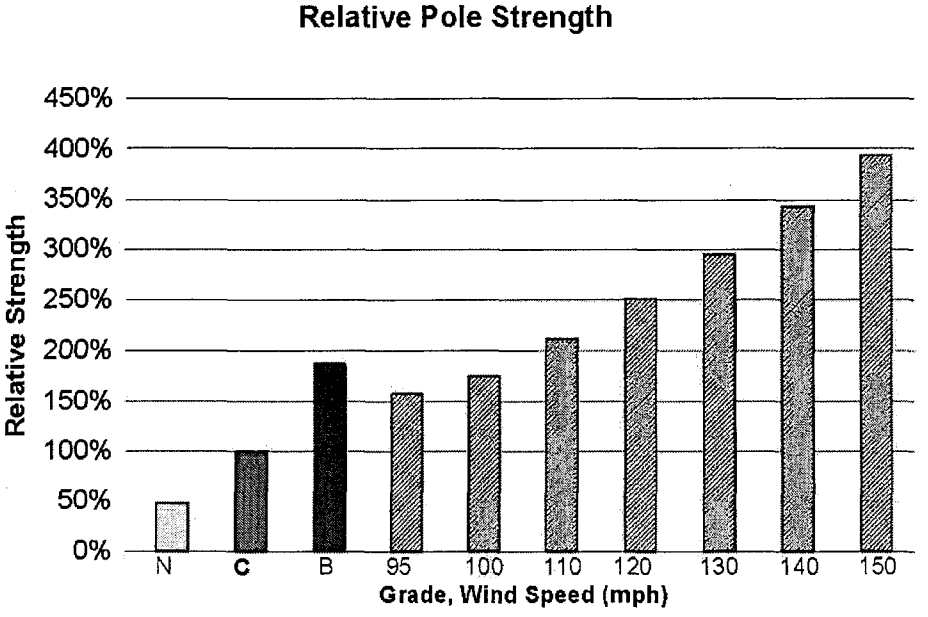

Figure 1
Relative Distribution Pole Strength vs. Typical Grade C Strength Requirements (NESC-2002)

The three solid bars to the left side of Figure 1, labeled "N", "C" and "B", depict the relative magnitude of the present required pole strength for a Grade N, Grade C, or

[5] Grade B construction would typically be limited to special situations (such as railroad crossings and limited access highways).
[6] Wood poles are available in 5 foot increments, and are buried at a depth of 10% the length plus 2 feet, with a slightly greater depth for poles shorter than 40 feet; *e.g.*, a 40-foot pole is buried at a depth of 6 feet, resulting in a 32 feet height above ground. (See ANSI-O5.1 wood pole standard.)
[7] A pole length of 40 feet is assumed. This parameter has only a minor effect on the results.

Grade B application. The seven cross-hatched bars to the right depict the relative magnitude of the required pole strength (which under the proposed rule would be the same for Grade N, C and B poles) due to Extreme Wind loads, at the wind speed indicated, should Rule 250C be directly extended to such applications. The results in Figure 1 thus show that the increased loading for an otherwise Grade C pole may be *increased* by a minimum of 50% (95 m.p.h.) or possibly as much as 300% (150 m.p.h.). In other words, the required strength, or number of poles, would be at least 1½ times -- and possibly as much as four times -- that currently required. For a Grade N pole application, the required strength would be at least three times -- and possibly as much as eight times -- a present reasonable design requirement. For the less common Grade B applications, the impact would not be realized for wind speeds less than 110 m.p.h. Nonetheless, significant strength increases would be required for wind speeds exceeding 110 m.p.h., which are characteristic of significant portions of Florida, as shown in Figure 250-2(d).

Figure 2 illustrates the corresponding pole class that would be required, assuming a Class 4 pole is necessary for the reference Grade C application, and the same number of poles (or span length) is maintained. Similar to Figure 1, the three solid bars to the left side of Figure 2 depict the representative pole class for a Grade N, Grade C, or Grade B application. The seven cross-hatched bars to the right depict the required class pole corresponding to the PSC proposed application of the Extreme Wind loads (which would be the same for Grade N, C and B poles). A minimum increase of three class sizes (to Class 1) for Grade C would be required for the minimum 95 m.p.h. wind, and as much as eight class sizes (to Class H5) for the 150 m.p.h. case. A Class 7 pole would otherwise suffice for the Grade N construction. As above, the Grade B applications would be affected to a lesser degree, but the increased size would still be significant for wind speeds above 110 m.p.h.

The increased pole material costs, including shipping and storage, are directly related to the number of poles or pole size (class). For larger, stronger poles, increased installation costs for the heavier poles may also be anticipated. Furthermore, the availability of such larger size (diameter) poles may be an issue.

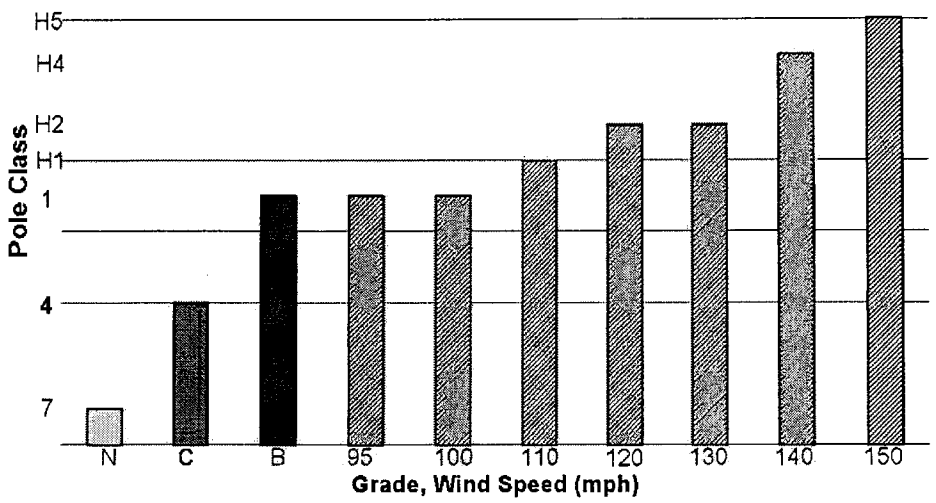

Figure 2
Required Distribution Pole Class vs. Typical Grade C Strength Requirements (NESC-2002)

4.2 Unintended Consequences

The imposition of the Extreme Wind requirement may result in unfortunate "unintended consequences," as sometimes occurs when changing long-standing practices that have generally been deemed successful. For example, as discussed above, the increased pole strength requirement would result in significantly stronger (stouter) poles or a larger number of more conventional size poles, corresponding to shorter spans. Such a practice would have a direct and negative impact on vehicular safety, and conflict with the objectives of the U.S. Department of Transportation, and presumably that of the DOTs of many states. The U.S. DOT is attempting to minimize the number of utility poles in order to reduce the incidence and severity of vehicular accidents. A greater number of poles, or stouter poles, would be contrary to such objectives. Thus, an attempt to modify a national safety code (*i.e.*, the NESC) to accomplish one objective may actually compromise public safety.

Other unintended consequences may also result from the introduction of the proposed Extreme Wind loading, due to a possible significant increase in the number of installed distribution poles along a given route. The June 8, 2006 Florida PSC Memorandum (page 5, Rollins) describes the likelihood that the supposedly less loaded individual poles would nonetheless be damaged in a hurricane, caused by the wind-blown debris and branches, resulting in the much more difficult, and time-consuming, recovery process to repair or reinstall many more poles.

Still another negative consequence relates to the engineering support associated with the implementation of the proposed Extreme Wind loads. The determination of the corresponding wind force is considerably more complicated than that of the existing transverse wind force based upon the present required Combined Ice and Wind loading. While such calculations are generally within the capability of experienced transmission engineers, with civil engineering training, they are beyond that of most distribution engineers. Indeed, one of the change proposals submitted for the 2007 edition was an attempt to simplify the engineering implementation of the Extreme Wind loads for even the applicable transmission applications. Although new or available software packages may alleviate the burden, there will be inevitable confusion and delays -- as well as possible errors in implementation -- in the design and installation of new facilities (including Verizon's fiber-optic networks), to the detriment of the consumers.

5. Recommendations

My primary recommendation is that the Commission not alter the manner in which the NESC's extreme wind loading standards are applied. The NESC is a well-respected document that is generally recognized as having served the industry and public well. For this reason, the NESC Committee (*e.g.*, Subcommittee 5, Strength & Loading) generally attempts to introduce significant changes in a gradual, evolutionary manner, in order to avoid or minimize the potential impact, including unintended negative consequences such as described above (Section 4.2). Thus, previous discussions within the NESC Committee (see Section 3.1 above) to extend the Extreme Wind loading to structures less than 60 feet tall (distribution poles), focused on a particular change proposal, developed within Subcommittee 5, that would limit the impact of such an otherwise potentially dramatic change. In particular, for the Light Loading District portion of the country, which includes Florida, the impact would have been insignificant. Nonetheless, based upon a multitude of industry comments objecting to even this diluted version of an Extreme Wind requirement for distribution poles throughout the country, this proposed change was not incorporated into the 2007 edition of the NESC.

Ideally, the Florida PSC should wait until the next code cycle of the NESC (2012 edition) before encouraging or requiring consideration of the NESC Extreme Wind loading. The related discussions within the NESC Committee during the development process would take into account the experiences during Hurricane Wilma, as well as other recent serious storms. Florida Power & Light, in particular, is well-represented on NESC Subcommittee 5. If the Florida PSC decides to change how the NESC's Extreme Wind loading standards are applied, it should be very cautious in the manner in which such a dramatic, controversial change is introduced. At the least, the Commission should attempt to limit the otherwise dramatic impact to as small a category of facilities as possible, or to reduce the magnitude of the impact. Thus, my alternative recommendation, in the event the Commission moves in this direction, is as follows:

- The proposed PSC rule should limit its scope to Grade B or Grade C applications of electric-only or joint-use poles owned by the electric utilities. Thus, Grade N applications -- which include joint-use poles with only secondary power (< 750

volts), as well as several categories of electric-only poles -- should be explicitly excluded from the proposed application of Rule 250C.

- The application of the NESC Extreme Wind load, as presently specified in NESC-2002, Rule 250C, should be modified to limit the quantitative impact to the affected distribution poles. For example, the reduced loads for Grade C construction incorporated into the latest (2007) edition of the NESC should be explicitly cited as consistent with the intent of PSC Rule 25-6034. For Grade C construction, the corresponding wind forces are reduced by as much as 25% compared to NESC-2002. NESC-2007 is being issued in August 2006, and is effective within six months (February 2007).
- The proposed PSC rule, preferably as modified above, should be applied on a trial basis, initially limited to a specified geographic area and a defined period (*e.g.*, 1-2 years), in order to better understand the potential benefits and consequences of such a rule.

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www.outsideplantconsulting.com

APPENDIX 2
About Outside Plant Consulting Services, Inc. (OPCS)
(Dr. Lawrence M. Slavin)

Outside Plant Consulting Services, Inc. (OPCS) was established in the year 2002 to help meet the needs of the telecommunications and power industries in establishing standards, guidelines and practices for outside plant facilities and products. The OPCS Group provides related support services for field deployment, and product evaluation and analysis. Dr. Lawrence (Larry) M. Slavin, Principal of OPCS, has extensive experience and expertise in such activities, based upon his many years of service at AT&T/Lucent Bell Telephone Laboratories (Distinguished Member of Technical Staff) in telecommunications product design and development, followed by a career at Telcordia Technologies (Bellcore) in its research and professional service organizations.

As Principal Consultant and Manager/Director of the Network Facilities, Components, and Energy Group at Telcordia, Dr. Slavin was responsible for professional services related to the telecommunications industry. These activities included technical leadership in developing installation and construction practices and "generic requirements" documents, introducing new construction methods, and performing analyses on a wide variety of technologies and products (such as poles, duct, wire and cable, electronic equipment cabinets, flywheel energy storage systems and turbine-generators). Throughout his long career, he has had a leading role in the evolution of many telecommunications related fields and disciplines -- including aerial and buried plant design and reliability; advanced construction and cable and duct placement techniques; copper pair, coaxial, and fiber-optic technology; flywheel energy storage systems; physical design and development of hardware and electronic and electro-optic systems (such as the "SLC 96" digital loop carrier); cable media and equipment reliability studies; exploratory fiber-optic hardware development; and systems engineering.

Dr. Slavin is a member of several subcommittees of the National Electrical Safety Code Committee, responsible for specifying safety standards for aerial and buried telecommunications and power facilities in the United States. He is also an active member and participant on the Accredited Standards Committee ASC-O5 ("ANSI-O5") for wood poles and products, as well as on several related committees of the American Society of Civil Engineers. In addition, Dr. Slavin is a Charter Member of the North American Society for Trenchless Technology, has been instrumental in the development of directional drilling standards, and directly supports training activities for the directional drilling industry at the Center for Underground Infrastructure and Research and Education (CUIRE) at Michigan State University. Specific present and recent industry activities are listed below.

Industry Activities

- **National Electrical Safety Code Committee**
  - Represents the national telephone industry, via Alliance for Telecommunications Industry Solutions, ATIS
  - Executive Subcommittee
  - Main Committee
  - Subcommittee 4 (Overhead Lines – Clearances)
  - **Subcommittee 5 (Overhead Lines – Strength & Loading)**
  - Subcommittee 7 (Buried Lines)
- **Accredited Standards Committee ASC-O5**
  - ***ANSI O5.1, Wood Poles, Specifications and Dimensions***
  - *ANSI O5.2, Wood Products, Structural Glued Laminated Timber for Utility Structures*
  - *ANSI O5.3, Wood Products, Solid Sawn-Wood Products and Braces*
- **Pole Reliability Based Design (RBD) Committee, ASCE**
  - ***Reliability-Based Design of Utility Pole Structures***
- **Distribution Pole Standard Committee, ASCE**
- Committee F17 on Plastic Piping Systems, ASTM
  - Subcommittee F17.67 on Trenchless Plastic Pipeline Technology
  - Task Group Leader for development of HDD Standard ASTM F1962
  - *ASTM F1962, Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings*
- Trenchless Installation of Pipelines (TIPS) Committee, ASCE
  - *ASCE Manual of Practice for Pipe Bursting Projects*
- Center for Underground Infrastructure and Research and Education (CUIRE) at Michigan State University
  - Industry Advisory Board
- Trenchless Technology Center, Louisiana Tech University
  - Industry Advisory Board
- North American Society for Trenchless Technology (NASTT)
  - Charter Member
  - Chair of Directional Drilling Subcommittee
- Missouri Western State College
  - HDD Steering Committee

PROCESS TO ENGAGE
THIRD PARTY ATTACHERS

1. The electric utility and third-party attachers will engage in a continuous dialogue on the status of the electric utility's storm hardening plans. A third-party attacher that wishes to be part of this process ("Participant") shall provide notification in writing to the electric utility, providing the name and address of the person designated to receive communications from the electric utility. The electric utility may, no more than once a year, request that Participants confirm that they wish to continue being part of the process and update the name and address of the person designated to receive communication.

2. By September 5 of each year, the electric utility shall provide the Participants with a list of the projects identified in the electric utility's approved storm hardening plan on file with the Commission ("Plan") that the electric utility proposes to undertake in the following calendar year, pending internal budget approval. The electric utility shall provide the Participants with a list of such projects receiving final budget approval promptly as it becomes available.

3. Prior to engineering a job relative to a storm hardening project identified in its Plan, the electric utility shall initiate a meeting with Participants to discuss the electric utility's preliminary ideas for the scope of work ("Pre-Design Meeting"). At the Pre-Design Meeting, the electric utility shall (a)

identify the poles involved; (b) identify whether the electric utility plans to replace poles, change from wood poles to poles of another material (*e.g.*, steel or concrete), place poles in locations different from the existing poles, relocate overhead facilities or underground existing aerial facilities, and; (c) provide the projected commencement date; (d) upon request by a Participant, provide other available information that would enable the Participants to make necessary preparations and evaluate whether to seek dispute resolution pursuant to Rule 25-6.0342(7). During this pre-design phase of a project, the electric utility shall also seek input from Participants as required by Rule 25-6.0342(6).

4. The electric utility shall provide Participants with final engineering plans promptly upon completion. Prior to beginning construction, the electric utility shall initiate a meeting with Participants to discuss coordination of work and a construction schedule.

5. Information submitted to Participants pursuant to section 2, 3 or 4 above regarding projects identified in the electric utility's Plan will not be docketed unless a protest is filed in accordance with Rule 25-6.0342(7), or it is otherwise deemed necessary by the Commission.

6. If the electric utility seeks to amend its Plan by, for example, adding a project not previously identified in its Plan, it shall file a petition with the Commission requesting that the Plan be modified in accordance with Rule 25-6.0342(2).

7. The electric utility will file with the Commission by March 1 each year a status report of its implementation of its Plan. Included in this status report shall be the name of storm hardening projects commenced and/or completed by the electric utility, the routes and circuits affected, and any comments on the project received from third-party attachers.