

DECEMBER 2009



REVIEW OF

Tampa Electric Company's  
Quality Assurance  
Process  
For  
Distribution Construction

By Authority of  
The State of Florida  
Public Service Commission  
Office of Auditing and Performance Analysis

*Review of*  
**Tampa Electric Company**  
**Quality Assurance Process**  
**for**  
**Distribution Construction**

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**December 2009**

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**The State of Florida**  
**Public Service Commission**  
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# 1.0 Executive Summary

## 1.1 Objectives

At the request of the Florida Public Service Commission's (FPSC) Division of Service, Safety and Consumer Assistance, the Division of Regulatory Compliance conducted a review of Tampa Electric Company (TECO, the company) quality assurance (QA) processes for distribution construction. The purpose was to document and assess how TECO monitors and evaluates distribution construction project quality assurance and safety inspections.

The primary objectives of this review were to determine whether:

- ◆ Adequate operating policies, procedures, and practices are in place to limit risks associated with constructing distribution facilities.
- ◆ Adequate monitoring exists to verify distribution construction is in compliance.<sup>1</sup>

## 1.2 Scope

FPSC staff examined TECO current policies, procedures, practices, and operational controls for monitoring its electric distribution construction processes and compliance. The review involved gaining an understanding of company QA and safety inspection procedures for TECO personnel and contractors. In addition, this review evaluated the effectiveness and adherence to such policies, procedures, practices, and operational controls.

FPSC audit staff's review focused on the following:

- ◆ Company goals and objectives
- ◆ Company practices and procedures
- ◆ Company controls and monitoring

Within these areas, FPSC audit staff evaluated company practices for both TECO construction personnel and its contractors.

The period reviewed by FPSC audit staff is September 2008 through August 2009.

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<sup>1</sup> Unless otherwise specified, the use of "compliance" throughout this review means that distribution facilities are constructed in accordance with all applicable federal, state, and local regulations, the National Electric Safety Code (NESC), and other industry standards.

## 1.3 Methodology

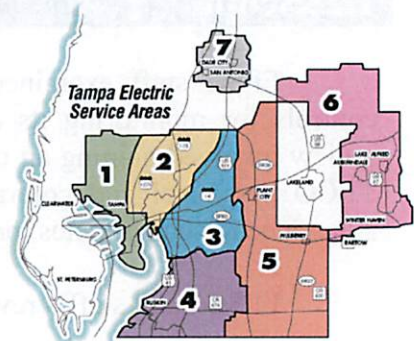
FPSC audit staff prepared its review based upon analysis of TECO responses to document requests, on-site interviews, and telephone conversations with key quality assurance and management personnel. Specific information reviewed included company organizational charts, position descriptions and responsibilities, distribution construction QA policies and procedures, documents, distribution bulletins, internal or external audit reports, contracts, work orders, safety inspection checklists, training programs and manuals, design specifications, National Electrical Safety Code (NESC), and accepted industry standards.

## 1.4 Background and Perspective

The TECO service area extends over 2,000 square miles in west central Florida, including all of Hillsborough County and parts of Polk, Pasco, and Pinellas Counties. The company has 4,400 megawatts of generating capacity and over 667,000 residential, commercial, and industrial customers.

TECO is divided into seven service areas. These service areas are:

1. Western Operations
2. Central Operations
3. Transmission and Eastern Operations
4. South Hillsborough Operations
5. Plant City Operations
6. Dade City Operations
7. Winter Haven Operations



Under Section 366.04(6), Florida Statutes (F.S.), the FPSC has jurisdiction over safety standards for distribution and transmission facilities of Florida public electric utilities, including municipal and cooperative utilities. FPSC Rule 25-6.0345(2), F.A.C., requires that each electric investor-owned utility, municipal utility, and electric cooperative file quarterly with the FPSC a listing of every completed construction work order.

The FPSC Bureau of Safety periodically selects a sample of the work orders for on-site inspection. FPSC engineers then inspect these distribution facilities to verify whether they are constructed in accordance with all applicable requirements; federal, state, and local regulations; and NESC and accepted industry standards. If a variance is identified, the FPSC notifies the utility for corrective action. A follow-up inspection may be conducted to ensure compliance.

TECO uses a combination of its own personnel and outside contractors for distribution construction projects. From September 2008 through August 2009, the company states that it

completed 31,979 distribution construction projects -- 22,850 (71 percent) by TECO personnel and 9,129 (29 percent) by contractors.

Distribution construction QA efforts include work order compliance processes that monitor TECO and contractor projects. While the majority of these projects are completed by TECO personnel, more formal inspection emphasis is actually placed on the monitoring and oversight of contractors while work orders are open. The company states that its processes, coupled with management emphasis on quality assurance, result in compliance with applicable engineering, construction, safety, NESC, and industry requirements.

TECO currently has processes in place to:

- ◆ Inspect 100 percent of employee distribution construction work orders
- ◆ Inspect 100 percent of contractor conduit work orders
- ◆ Inspect 100 percent of contractor overhead/underground service work orders
- ◆ Randomly inspect at least 5 percent of contractor new service work orders approximately every month
- ◆ Randomly inspect at least one completed employee or contractor overhead work order per month in each service area

TECO states that its experienced and knowledgeable personnel, from linemen to senior supervisors and inspectors, have developed expertise from specialized training and certification programs. This expertise ensures that TECO employees designing and constructing distribution facilities have the requisite proficiency to comply with applicable QA regulations and standards.

TECO managers stated that the company has longstanding relationships with four major contractors. These relationships provide TECO with a high level of confidence that all contractor work will be completed timely, meet required specifications, and enhance QA on every job.

Quality assurance oversight and inspection processes for TECO distribution construction are discussed in detail in **Chapter 2**.

## 1.5 Overall Opinion

TECO has adequate operating policies, procedures, and practices in place to limit risks associated with distribution construction facilities. Adequate monitoring exists to verify distribution construction by TECO employees and contractors is in compliance. However, audit staff has identified several concerns and areas of improvement based on its review.

### **Lack of Independence**

TECO distribution construction QA is not an independent review process. Each inspector is subordinate to a service area manager and daily interacts with other assigned service area personnel. Lack of independence may, over time and in varying circumstances, subject inspectors to situations of conflicting loyalties. Adhering to the generally accepted practice of inspector independence would preclude such conflicts.

### **Lack of Formal QA Reports**

TECO does not require formal QA reports. Staff believes TECO should consider requiring service area managers to provide distribution construction QA reports to upper management. Without formal reports, there is increased risk that higher managers misunderstand, misinterpret, and/or fail to be accurately or adequately informed about distribution construction quality assurance. Regular reporting also provides a basis for trending analysis that identifies issues, so that assets (e.g. training and inspectors) can be most efficiently applied.

### **Lack of Standardization**

TECO should employ standardized QA inspection methodologies wherever possible. The company requires its Construction Field Inspectors and Distribution Field Inspectors to document final inspection results, but data is captured in various checklist formats specific to each type of inspector. Creating a standardized inspection format and process, to the extent possible, with tailored augmentations for different inspectors or types of inspections, promotes more thorough QA understanding and analysis. A systematic approach also advances database trend analyses, provides more efficient identification of recurring problems, and leverages implementation of the most appropriate corrective actions.

### **Lack of Independent Third-Party Audits**

TECO should have an independent, third-party distribution construction QA audit conducted at least every three years. TECO states that it had not undergone such an audit and that the last third-party risk analysis was conducted more than six years ago, in early 2003.

### **TECO Contractor Oversight**

TECO should consider reinstating the use of a contractor performance evaluation or report card. Such evaluations could aid TECO in tracking overall contractor performance and quality of work over time and be tailored to focus on specific, embedded construction or safety requirements. A grading system, fed by ongoing field inspection results, could provide a powerful performance trending analysis tool.

### **Post-Completion Work Order Inspection Process**

TECO should adjust the random work order selection process used by the Supervisor of Standards and the Senior Functional Technical Specialist. Staff also notes with concern that the current selection criteria excludes jobs of greater than nine poles. TECO should also consider revising the selection process so that inspections are in proportion to the number of jobs completed by TECO and contractor crews. Though 29 percent of jobs were completed by



contractors during the review period, only 2 of 76 inspections (2.6 percent) were conducted on contractor work orders.

TECO should also have a process to capture deficiency correction dates and follow-up inspection dates. In the current process, after the inspectors complete an inspection, deficiencies are reported to the supervisor of the responsible work crew, the relevant service area manager, and the Director of Transmission & Distribution Operations. At that point, the inspectors have fulfilled their QA requirements and conduct no follow-up check.

Additionally, TECO should devise a process to record the correction date and follow-up inspection date for each NESC-related safety deficiency. TECO notes that it does not rank the severity of its deficiencies, but its inspectors do emphasize NESC violations to the responsible line supervisor so that timely corrections can be made.

TECO should also conduct trending analysis of post-completion inspections results. Such analysis could help identify problems and determine techniques or training to improve results. Such trending analysis could be particularly useful regarding NESC-related deficiencies that have a higher potential to expose employees, contractors, or the public to safety hazards.

## 1.6 Conclusion

Staff believes that adequate policies, procedures, and practices are in place to limit risks associated with constructing distribution facilities. Additionally, staff believes that adequate monitoring exists to verify distribution construction is in compliance. Staff strongly encourages TECO to thoroughly review each concern listed in Section 1.5 to make a determination whether changes to quality assurance structure, methodology, criteria, or process would benefit the company and/or its customers.

## 2.0 Construction Quality Assurance Process

### How many distribution construction work orders did TECO complete during the review period?

During the review period, from September 2008 through August 2009, the company reports that it completed 31,979 distribution construction projects -- 22,850 (71 percent) by TECO personnel and 9,129 (29 percent) by contractors. **EXHIBIT 1** provides the breakdown by service area.

Completed Distribution Construction Work Orders		
TECO Service Area	TECO	Contractors
Central Service Area	5,233	1,507
Dade City Service Area	22	4
Eastern Service Area	3,210	1,672
Plant City Service Area	3,648	1,169
South Hillsborough Service Area	2,322	1,524
Winter Haven Service Area	2,968	663
Western Service Area	5,447	2,590
<b>TOTAL</b>	<b>22,850</b>	<b>9,129</b>

**EXHIBIT 1**

*Source: DR 1.1 (Supplement)*

### Has TECO established goals and objectives for its distribution construction quality assurance programs?

TECO states that it does not have specific company-level goals and objectives for its distribution construction quality assurance program. However, distribution construction goals and objectives are found in some job descriptions, delineating individual QA expectations. The company believes it successfully integrates QA at all organizational levels and into every project by ensuring that distribution construction complies with the General Rules and Specifications, and that each project is completed to exacting design specifications.

The absence of company distribution construction QA goals and objectives may hinder communication of expectations and standards to employees and contractors. Without universally understood goals and objectives, defining QA success and failure at all levels is also more difficult. Establishing distribution construction QA goals and objectives would identify, standardize, and communicate measurable expectations to TECO and its contractors.

## Which departments are responsible for distribution construction QA?

Organizational responsibility for distribution construction QA primarily rests with two TECO departments: Transmission & Distribution Operations and Engineering, and Energy Delivery Engineering. These two departments have incorporated several measures to increase QA awareness. For example, TECO and its contractors must use only approved tools or materials on every job. Distribution construction must also be completed to design specifications and signed off by a qualified inspector to close a work order.

Seven Service Area Managers report to the Director of Transmission & Distribution Operations and Engineering. Each service area has employees responsible for construction distribution QA of work done by TECO crews. In the Western and South Hillsborough service areas, additional personnel are assigned responsibility for distribution construction QA of contractor work crews across all seven service areas.

Managers of Distribution Engineering, Standards, & Design and the Manager of Energy Delivery Environmental & Skills Training report to the Director of Energy Delivery Engineering. These managers provide QA leadership to subordinates conducting post-completion field inspections and to the QA technical training program instructors, respectively.

## What is the TECO QA process?

All TECO inspectors have the responsibility to ensure that completed work fully complies with design or contract specifications. TECO inspectors receive specialized training and attend certification programs, leading to increased QA expertise. The company states that the training ensures that employees designing, constructing, and inspecting distribution system components have the required proficiency to complete all distribution construction jobs in compliance with applicable regulations and industry standards.

### Employee QA

The majority of distribution construction is completed by TECO crews, and the quality of each project is monitored during construction. This oversight is part of the normal duties of the crew leads and line supervisors. They conduct daily crew visits to TECO worksites and may also inspect nearby contractor crews. Supervisors also conduct a safety inspection on each TECO worker at least once per month, exceeding the OSHA requirement. Projects are closed only after the supervisor certifies that work has been completed to design specifications, and a satisfactory completion inspection is performed. The Senior Field Technical Specialist may conduct an additional QA inspection if the work order is among those randomly chosen each month for post-completion inspection. Company management states that these combined efforts increase the degree of attention to quality and job safety.

### Contractor QA

TECO management states that the company closely monitors every contractor project, providing an even higher degree of oversight than for its own crews. Quality of work is evaluated primarily by two types of inspectors, Construction Field Inspectors and the

Distribution Field Inspectors. These inspectors focus on conduit/service cable and distribution line installations, respectively.<sup>2</sup> In addition to daily inspections of contractor sites, the inspectors may also inspect nearby TECO jobs. When a contractor announces completion to specifications, a close-out inspection is conducted by the appropriate inspector. This inspection notes deficiencies and a reinspection is scheduled to verify that the contractor makes timely and complete corrections. The Senior Field Technical Specialist conducts post-completion inspections of randomly chosen contractor work orders each month.

### Post Completion Contractor Inspections

Construction Field Inspectors and Distribution Field Inspectors split responsibility for contractor inspections. From September 2008 through August 2009, there were 9,129 contractor work orders comprising 29 percent of distribution construction projects. TECO required Construction Field Inspectors to inspect 100 percent of contractor conduit work orders (559) and a minimum of five percent of contractor new service installs (5 percent of 2,831) for post-completion verification. Distribution Field Inspectors inspected 100 percent of overhead and underground service construction work orders (2,941). The remaining work orders (2,798) were general maintenance and repair work orders, outside the scope of this review. Inspections of contractor work orders conducted during the review period are shown in **EXHIBIT 2**.

<b>Construction Field Inspector and Distribution Field Inspector Quality Assurance Contractor Inspections</b>					
Type	Work Orders	Construction Field Inspector	Distribution Field Inspector	Percent Required	Percent Completed
Conduit	559	559	n/a	100	100
New Service	2,831	519	n/a	5	18
General maintenance, Grounding, & Service Repair	2,798				
Overhead / Underground Service Construction	2,941	n/a	2,941	100	100
<b>TOTAL</b>	<b>9,129</b>				

**EXHIBIT 2**

*Source: DR 1.11 (Supplement)*

### Overhead Post-Completion Inspections

The Senior Functional Technical Specialist conducts at least one post-completion inspection of a TECO employee or contractor completed overhead distribution work order per month in each service area. These overhead inspections were first conducted during a pilot project in the third quarter of 2007. The company extended the test program into 2008 and the inspection program was permanently adopted in February 2009.

<sup>2</sup> “Conduit” refers to the larger conduit from the substation to a transformer. “Service” is a smaller distribution conduit from the transformer to a residential meter. “Distribution line installations” refer to non-conduit, non-new service, general maintenance, grounding, and repair of service.

Work orders inspected by the Senior Functional Technical Specialist are randomly selected, disregarding whether a particular work order was a TECO or contractor job. The following criteria are used in the selection process:

- ◆ A minimum of one completed work order per month from each service area
- ◆ At least 25 man-hours of construction time in the work order
- ◆ A job that required an engineered design
- ◆ A job using nine poles or fewer<sup>3</sup>

The inspector completes a checklist noting deficiencies and corrective actions required. Digital photos are taken and concerns noted directly on the photograph. The completed checklist and photographs are provided to the supervisor of the completing work crew, the appropriate service area manager, and the Director of Transmission & Distribution Operations for resolution.

Inspection of overhead construction is done from the ground using binoculars. The Supervisor of Standards noted that a lift bucket truck would greatly expedite and improve inspections but that TECO funding constraints makes such an acquisition unlikely. Properly equipping inspectors is vital to successful QA inspections and TECO may wish to consider making appropriate assets more available on an as-needed basis.

FPSC audit staff notes that the Supervisor of Standards and the Senior Functional Technical Specialist do not document dates of corrections or conduct follow-up inspections. After the inspection results are handed off, no further follow-up action is taken by the inspectors. Staff also notes with concern that the present random selection criteria is limited to jobs of nine or fewer poles.

### **What initiatives has TECO undertaken to improve distribution construction quality assurance?**

Recent initiatives aimed at distribution construction QA improvement include:

- ◆ In 2006, TECO created the Contractor Management Department to oversee distribution line contracts and began using a pay schedule based on work units instead of man-hours. Invoices are now paid only after work is satisfactorily completed, inspected, and approved by company inspectors. TECO believes this system increases contractors' desire to meet specifications, to finish jobs quickly but safely, and to correct QA deficiencies as soon as possible.
- ◆ In 2007, TECO senior management determined that using field inspections to verify adherence to specifications would add QA value. The Senior Field

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<sup>3</sup> DR 1-8 (Supplemental) Personnel and equipment constraints limit inspection capabilities and scope, so smaller and medium jobs are selected.

Technical Specialist inspection program was created and a pilot program implemented in the third quarter.

- ◆ In 2008, management implemented field inspection processes system-wide in an effort to make sure TECO crews were building distribution facilities consistently. That fall, TECO installed rugged laptops in crew lead and line supervisors' vehicles to facilitate use of the Geographic Information System.
- ◆ In 2009, Plant City and Dade City service area supervisors began a series of random, post-construction QA audits of overhead projects completed by TECO crews. The project is expected to conclude by the end of 2009. Early in 2010, Transmission & Distribution Operations managers will evaluate results and determine if system-wide implementation will add additional QA value.
- ◆ In September 2009, TECO launched software changes allowing the use of modems for laptops installed in company vehicles. Inspectors can now access remote desktop computers during field visits, improving QA and safety inspections.

## 2.1 Contractor Oversight

Quality assurance oversight of contractor distribution construction projects is the primary responsibility of Construction Field Inspectors and Distribution Field Inspectors. Assigned to the Western and South Hillsborough service areas, respectively, they conduct interim and close-out inspections of contractor projects in all seven service areas. Random post-completion quality assurance inspections are conducted by the Supervisor of Standard, with the Senior Functional Technical Specialist, and by Construction Field Inspectors. A description of the inspectors' reporting structure and responsibilities is in **APPENDIX A**.

### **Does TECO document the construction quality and compliance of projects completed by contractors?**

Yes, the company documents distribution construction QA and compliance with contract specifications. TECO contract management provides the contractor a project work packet during the pre-construction meeting. Each packet contains specific design requirements from the TECO engineer and other items such as a construction order sheet, joint-use sheet (as applicable), original distribution print, and any required permits. Projects must comply with the TECO General Rules and Specifications reference, all applicable federal, state, or local regulations, and NESC and industry standards.

TECO's contract work inspectors ensure compliance with provisions contained in the work packet. The level and frequency of field inspection varies by project. Complex projects may have a field inspector on-site daily and for extended periods; simple projects may be spot checked. Construction Field Inspectors and Distribution Field Inspectors are required to

document inspections and deficiencies on a daily basis, entering the results into a work management database called WorkPro.

### **Does TECO employ adequate management controls and resources to ensure that its contractors are in compliance with applicable construction standards?**

Yes, TECO employs adequate management controls and resources to ensure contractor compliance with applicable construction standards. However, staff believes that there is additional room for improvement in TECO management controls over contractors.

Transmission & Distribution Operations, Energy Delivery Engineering, and Contract Management each provide controls or resources to manage and inspect contractor compliance. TECO reference materials, contract specifications, design plans, and a system of inspectors provide a multi-layered array of compliance controls.

Prior to 2007, TECO used monthly performance report cards to address safety, quality of work, schedule adherence, invoicing and payment, communication, and teamwork. In 2007, TECO assigned responsibility for contractor distribution construction inspections to the Construction Field Inspectors and the Distribution Field Inspectors. QA deficiencies identified by the inspectors are addressed at the worksite, and corrective action is taken immediately whenever possible. Details about each deficiency are entered in the WorkPro database. TECO states that contractor QA awareness improved so, in 2009, the company decided to schedule meetings only on an as-needed basis and to eliminate the use of performance report cards.

TECO also documents its contractor distribution construction QA reviews through the use of its work order inspection process *after* the close of projects. This internal control is further discussed in Section 2.4.

TECO provides contractors with some reference and design manuals. The reference manuals incorporate local, state, and federal regulations, including the NESC and other industry standards. Reference manuals are updated and reprinted annually. Field bulletins are furnished as needed throughout the year for changes in construction regulations, codes, or industry standards. Contractors are required to follow TECO references precisely.

TECO does not provide contractors with distribution construction training or refresher training prior to working on projects. Contractor competency is expected for all required techniques and standards. Prior to the execution of a contract, however, contractors are provided TECO switching and tagging training as well as basic safety training. Line contractors, underground conduit and service contractors, and overhead/underground service contractors are also provided annual updates of reference manuals.

### **Is there an adequate process to monitor contractor construction practices?**

Yes, TECO has an adequate process to monitor contractor construction practices. The QA personnel within Contractor Management, Transmission and Distribution Operations, and

Energy Delivery oversee distribution construction work performed by contractors. They are responsible for managing the daily activities of all contractor services to ensure company-wide program consistency and effectiveness of TECO distribution contractors. Though the present monitoring process is adequate, staff believes that it could be improved by regular internal or external reviews.

### **Work Order Inspection Process To Close Projects**

#### **Construction Field Inspector/Distribution Field Inspector Distribution QA Process**

TECO inspectors make sure on a daily basis that all distribution construction contractor work complies with specifications. The level and frequency of field inspections varies by project. Complex projects may require an on-site inspector daily for an extended period, while simpler projects may be checked less frequently.

Distribution Field Inspectors inspect 100 percent of contractor distribution line projects. Construction Field Inspectors inspect 100 percent of conduit installations.

When a contractor completes a project, believing it to be to specifications, the work packet is returned to the Coordinator Contractor Management with appropriate signatures from the contractor's management staff. The Coordinator Contractor Management audits the work packet and the appropriate inspector, depending on the type of project, verifies that construction meets specifications.

Distribution Field Inspectors document deficiencies on a punch list and assign a severity level to each. This list is returned to the Coordinator Contractor Management who contacts the contractor to make corrections. Once corrections are complete, the Distribution Field Inspector reinspects. The previous punch list is updated to reflect the corrections. If no further deficiencies are noted, the process is complete.

When all compliance issues are remedied, the packet is given to the Coordinator Contractor Management for processing and final input into WorkPro. The completed work packet is then forwarded to Energy Delivery Plant Account and Billing for verification of expenditures and material allocation. It is then returned to the originating service area and maintained for two years. After two years, records are sent to TECO archives for up to six years.

Inspectors will not provide a final sign off on any job until all requirements are met. Once accepted, an as-built drawing is made with the contractor. This as-built includes compliance specification notes and work units charged. The inspector then enters job completion data into WorkPro and retains the records as noted above.

Only Distribution Field Inspectors record severity levels during completion inspections, employing a low-medium-high ranking. No high severity deficiencies were noted on any of the completion inspections during the review period. TECO states that high severity deficiencies are always corrected immediately during the construction process and, therefore, rarely occur in completion inspections.



TECO contends that the correction and reinspection process to close projects does not apply to Construction Field Inspectors of conduit jobs. The nature of conduit construction and multiple inspections during construction make reinspection unnecessary. TECO states that conduit Construction Field Inspectors are also required to sign off at key stages of each project before work can proceed. Therefore, at the time of job completion, there are no corrections or reinspections necessary.

### **Construction Field Inspector/Distribution Field Inspector Contractor Evaluations**

Inspectors complete intermediate checklists during each inspection but are required only to retain the final ones. The information from the final inspection is entered into WorkPro, and the hard copy becomes part of the retained packet. Inspectors do not produce a contractor performance evaluation summary for completed work orders, i.e., a report card, showing contractor compliance for performance items associated with engineering, construction, and safety specifications.

TECO also documents distribution construction QA of its contractors through the use of post-completion work order inspections. This process is discussed in Section 2.4.

## **2.2 TECO Personnel Oversight**

Quality assurance oversight of TECO distribution construction work crews is multi-layered and active in all seven service areas. Real-time, on-site supervision is provided on every project by a variety of supervisors including the Line Crew Lead, Lead Line Supervisors, and Distribution Line Department Supervisors. Random post-completion quality assurance inspections are conducted by the Supervisor of Standards and the Senior Functional Technical Specialist. For a more detailed description of these inspectors, their reporting structure, and responsibilities, see **APPENDIX B**.

### **Does the company employ adequately trained and certified distribution construction personnel?**

Yes, the company has adequately trained and certified distribution construction personnel. TECO requires each of its distribution line personnel to complete a four-year Florida Department of Labor approved lineman certification program. This includes classroom training and an on-the-job apprenticeship. Each distribution area crew consists of certified journeyman and, at times, an apprentice trainee. Each employee is required to maintain certification by attending periodic training refresher courses. When a workman is hired with a journeyman's certification from another utility, TECO requires the individual to attend training courses to become certified in company-specific work methods, manuals, and other items.

TECO also offers Distribution Design Training. This two-year Florida Department of Labor approved program includes familiarization with distribution construction manuals and system design technical issues.

The TECO Skills Training Department is responsible for ensuring that all employees are current in their training cycles. Employee training records are maintained online. Management receives training reminders when an assigned individual is required to attend a course.

TECO Distribution Engineering Department maintains memberships in industry associations including the Southeastern Electric Exchange, National Fire Protection Association, and the Edison Electric Institute. These associations help TECO maintain awareness of proposed and approved revisions to applicable local, state, and federal regulations.

### **How does TECO document the construction quality and compliance of the projects completed by TECO employees?**

The Line Crew Lead is responsible for certification of distribution construction projects. This inspector signs the Work Request General Information Sheet for all jobs, attesting that the work order is constructed according to applicable local, state, and federal regulations; NESC requirements; and accepted industry standards. The Line Crew Lead returns the work order to the service area administrative staff. The work order documentation is completed and closed in WorkPro. It is then maintained according to TECO records retention policy.

Distribution Line Department Supervisor inspection results are typically not documented, and there is no company requirement for them to document their findings. TECO states that deficiencies are immediately brought to the attention of the line crew supervisor and corrected.

The Distribution Engineering and Standards group audited 74 TECO employee overhead work requests from the period of September 2008 through August 2009. TECO states that safety-related problems are reported immediately and corrected the same day. Non-safety deficiencies are corrected by the original line crew as quickly as schedule and workload allow.

TECO states that its overlapping system of inspection allowed crew visits and/or midstream inspections of all 22,850 TECO distribution construction projects conducted during this review period. Each work order also had a completion inspection and sign-off, attesting that all was completed to design specifications, NESC requirements, and applicable QA standards.

### **Does TECO employ adequate controls and resources to ensure compliance with all applicable construction standards?**

Yes, TECO employs adequate controls and resources to ensure it is in compliance. The company believes that it employs sufficient controls to ensure compliance with applicable standards and that overlapping resources are dedicated to the QA process. These resources and controls provide oversight of TECO and contractor work, helping to ensure QA compliance, find errors, and encourage contractors to promptly correct deficiencies. Management states that every distribution design must provide for safe installation, operation, maintenance, replacement of materials/equipment, and meet or exceed industry practices and NESC requirements.

TECO states that its organizational structure ensures employee performance is properly managed, routinely monitored, and frequently evaluated. TECO believes that its distribution construction QA supervisors and inspectors are knowledgeable of construction practices and specifications, as well as industry and NESC standards. TECO employees, within their normal work activities, perform distribution construction QA monitoring and oversight of company work in the field on a real-time basis. Additionally, TECO conducts completion inspections, reinspections of noted deficiencies, and random post-completion inspections.

Specialized engineering and construction training programs within the company help employees and inspectors obtain required technical expertise. This expertise, in turn, leverages distribution construction compliance with applicable regulations, NESC standards, and industry practices.

TECO linemen operate in teams, building cohesion that aids QA efforts associated with distribution construction. Some inspectors conduct distribution construction inspections across all seven service areas. Others have inspection responsibility only within their assigned service area and may have additional, conflicting duties. This conflict raises staff's concerns that some inspectors may not be fully independent or suitably insulated from influence.<sup>4</sup>

Internal policies and specifications are regularly updated to meet or exceed local, state, federal, and industry requirements. TECO-published references are updated annually. Immediate changes to policies, specifications, or references are required to be communicated to the field and management through priority memos.

TECO is a member of various industry associations including the Southeastern Electric Exchange, National Fire Protection Association, and the Edison Electric Institute. These associations keep TECO abreast of revisions to applicable local, state and federal regulations that might impact QA standards.

## 2.3 Work Order Completion Inspection Process

### How does TECO provide distribution construction QA oversight to TECO and contractor work?

#### TECO-Completed Work Orders

TECO states that it has a comprehensive close-out inspection process for work orders executed by company employees. The close-out process is made easier because of on-site supervisors with each work crew, and routine inspections during construction by the lead and line supervisors. At completion, the crew supervisor signs off on the work order, attesting that all engineered design requirements are completed to specifications and fully compliant with

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<sup>4</sup> The Institute of Internal Auditors Standards for the Professional Practices of Internal Auditing, Standard 100.01 states "Internal auditors should be independent to the activities they audit...Independence permits internal auditors to render the impartial and unbiased judgments essential to proper conduct of audits."

applicable NESC or other regulations. Each work order completed by a TECO crew is thereafter subject to random post-completion inspection.

### Contractor-Completed Work Orders

Inspectors close out every contractor work order, providing the final inspection for overhead or underground distribution construction, conduit, and service connections. Any work orders with deficiencies identified by the inspectors during close-out inspections are scheduled for a reinspection. Meanwhile, the contractor work order remains open until all corrections are made and a satisfactory reinspection completed.

### **Does TECO record inspection results?**

Yes, in some instances. TECO requires Construction Field Inspectors and Distribution Field Inspectors to use a checklist and record results daily in the WorkPro system. Supervisors and managers have access to this database and can then perform qualitative or quantitative analysis and trending. Distribution Line Department Supervisors, however, do not regularly use a checklist during their inspections and are not required to input results into the WorkPro system.

During the period of this review, from September 2008 through August 2009, TECO conducted development and final validation testing by Construction Field Inspectors of a new inspection database, the Underground Field Construction database. Testing used data derived from the Central and Western service areas only, the two most densely populated areas with the highest concentration of contractor work orders. TECO reports that validation testing is complete, and the new database will be implemented system-wide in early 2010.

### **What is the scope of contractor work order inspections?**

During the review period TECO inspectors conducted over four thousand field inspections of contractor work orders. A breakdown of the inspections appears in **EXHIBIT 3**.

<b>Contractor Work Orders Completed and Inspected September 2008 – August 2009</b>								
<b>Completed</b>								
	Central	Dade City	Eastern	Plant City	South Hillsborough	Winter Haven	Western	Total
<b>Total</b>	1,507	4	1,672	1,169	1,524	663	2,590	9,129
<b>Inspected</b>								
Overhead	451	0	680	266	237	203	1,104	2,941
Conduit	231	0	67	44	24	35	158	559
Service	262	1	22	24	47	12	151	519
<b>Total</b>	<b>944</b>	<b>1</b>	<b>769</b>	<b>334</b>	<b>308</b>	<b>250</b>	<b>1,413</b>	<b>4,019</b>

**EXHIBIT 3**

*Source: DR 1.7(a)(b)(c)*

## What are the type and frequency of deficiencies found by TECO inspectors?

**EXHIBIT 4** shows the type and frequency of QA deficiencies found across all seven service areas during 2,941 completion inspections by Distribution Field Inspectors during the review period. Forty-eight (1.6 percent) had one or more deficiencies. Fifteen (20.5 percent) of the deficiencies were NESC-related. These are shaded in light blue in **EXHIBIT 4**.

Completion Inspection Deficiencies Distribution Field Inspectors								
Type of Deficiency	Deficiencies, by Service Area							Total
	CSA	DCA	ESA	PCA	SHA	WHA	WSA	
A/L (area light) bracket issue, non-NESC			2				2	4
Change out 40c4 (40', class 4 pole)							1	1
Cutout feeds backwards					1			1
Fuses need to be changed							1	1
Ground wire issues, non-NESC	1		1				8	10
Joint-use facilities to be attached							1	1
L-bracket issue							2	2
Lightning arrester issues							7	7
Move grid/GIS number			1					1
Need cutout brackets							4	4
Need to install OH to UG service							1	1
Need to move guy from back of hot lead					1			1
Need to remove anchor					1		1	2
Need to restore concrete walk							1	1
Need to use brackets around arms							3	3
<b>NESC - Down guy wire issues</b>	1		1				6	8
<b>NESC - Area light issues</b>	1							1
<b>NESC - Need large braces</b>			1					1
<b>NESC - 8' ID birthmark missing/incorrect</b>			1					1
<b>NESC - Pole not deep enough</b>			1				1	2
<b>NESC - Replace small w/ large cross-arms</b>							1	1
<b>NESC - Primary not covered with U-guard</b>							1	1
Opposite phases on same bolt					1			1
Pole to be removed	2		1		3		1	7
Small bell insulators missing/incorrect					1			1
Street light issues			1					1
Switch numbers to be hung and taped							4	4
Tree trimmings left at worksite							1	1
URD takeoffs need to be opposite arms/grids							3	3
<b>Total</b>	<b>5</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>50</b>	<b>73</b>

**EXHIBIT 4**

Source: DR 1.7(a)(b)(c)

**EXHIBIT 5** shows distribution construction deficiencies found in conduit during 389 Central and Western service area QA completion inspections in the Central and Western service areas. Sixty-one (15.7 percent) had at least one deficiency. Seventeen (25.0 percent) were NESC-related deficiencies. These are shaded in light blue in **EXHIBIT 5**.

<b>Completion Inspection Deficiencies In Western and Central Service Areas Construction Field Inspectors – Conduit</b>			
Type of Deficiency	Deficiencies, by Service Area		
	Central	Western	Total
2-wk. notice for bore pipe but got it a day late		1	1
3' section of curb broken		1	1
Cable cutting errors	4		4
Contractor completion does not equal man-hours reported	1		1
Crew did not show up / showed up late	4	1	5
Crew took too long to complete job	1		1
Equipment malfunction	11	3	14
Hand dig required; machine used, causing damage	2		2
Improper bore damaged street light, wire/conduit	1		1
Improper restoration / jobsite not cleaned up	4	4	8
<b>NESC - Directional boring issues</b>	4	2	6
<b>NESC - 90°, 4" in wrong location</b>	1		1
<b>NESC - Incorrect pad grade/depth</b>		2	2
<b>NESC - Left pit open</b>	1		1
<b>NESC - Need proper galvanized 90</b>	2		2
<b>NESC - Need to redo asphalt in roadway</b>	1		1
<b>NESC - Pad not level/crew late for outage</b>	1		1
<b>NESC - Primary not properly installed</b>	1		1
<b>NESC - Transformer facing wrong direction</b>	1		1
<b>NESC - Water line under road marked but hit</b>		1	1
Missed commitment because of bore delayed		1	1
Need to remove old conduit		1	1
Need to restore landscaping or sod	2		2
No closed signs	1		1
No notification of doing job	1		1
Reclaimed water line hit		1	1
Security footer removed / not replaced	1		1
Sewer line hit, causing void in road		1	1
Two trips to jobsite; forgot design print		1	1
Transformer location not restored	1		1
Unnecessary hours spent unclogging bore	1		1
Water/sewer lines marked but hit		1	1
<b>Total</b>	<b>47</b>	<b>21</b>	<b>68</b>

**EXHIBIT 5**

Source: DR 1.7 (a)(b)(c)

These results are part of a pilot program recently developed for tracking Construction Field Inspector completion inspections. The program was tested in the Central and Western service areas only. The company expects to implement the system in all remaining service areas for capturing Construction Field Inspector conduit inspection results in the first quarter of 2010.

## 2.4 Post-Completion Work Order Inspection Process

### What is the TECO post-completion work order inspection process?

Two additional layers of distribution construction QA involve post-completion work order inspections. These inspections, conducted by Construction Field Inspectors and the Senior Functional Technical Specialist, determine compliance with design specifications and applicable standards for projects completed by both TECO personnel and contractors. The Supervisor of Standards frequently accompanies and assists the Senior Functional Technical Specialist.

#### Construction Field Inspectors (Conduit)

Like Distribution Field Inspectors, Construction Field Inspectors of conduit do not have post-completion roles. Deficiencies found during close-out inspections are reinspected until corrected and the work order is then closed. These reinspections may actually occur after the originally scheduled completion date.

#### Construction Field Inspectors (Service)

During the review period, 2,831 new service work orders were completed. The preponderance of post-completion inspections occurred in the Central and Western service areas and the results were included in a pilot program for tracking Construction Field Inspector post-completion inspections. This system was tested in the Central and Western service areas only. , TECO expects to implement this system across all service areas in the first quarter of 2010. **EXHIBIT 6** depicts the number and types of deficiencies found during the post-completion inspections.

TECO requires that five percent of new service work orders are randomly selected for post-completion inspection. Though 142 would meet the criteria, inspectors actually performed 413 inspections in Central and Western service areas and an additional 106 inspections in the other five service areas.<sup>5</sup> Of those in the Central and Western service areas, 82 (19.9 percent) had at least one deficiency and ninety-four of 153 deficiencies (61.4 percent) found were NESC-related. These deficiencies are shaded in light blue in **EXHIBIT 6**.

#### Distribution Field Inspectors (Line)

Distribution Field Inspectors have no post-completion inspection role. Contractor work orders with deficiencies noted during initial close-out inspections are reinspected until corrected, and the work order is then closed. These reinspections may actually occur after the originally scheduled completion date.

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<sup>5</sup> Inspections in the other five service areas: DCA (1), ESA (22), PCA (24), SHA (47), and WHA (12).

**Post-Completion Inspection Deficiencies  
In Western and Central Service Areas  
Construction Field Inspectors – Services**

Type of Deficiency	Deficiencies, By Service Area		
	Central	Western	Total
17" at pole		1	1
Cable usage issue, non-NESC		1	1
Coupling above grade, non-NESC		2	2
Grounding issues, non-NESC	1		1
Jobsite needs to be restored	1	21	22
Meter installation delayed		1	1
Need clamp at bottom of pipe		2	2
NESC - Bore pipe in front of secondary		1	1
NESC - Cables not properly joined	5		5
NESC - Conduit issues	3	7	10
NESC - Coupling issue	1		1
NESC - Footer issues	1		1
NESC - Grounding issues	3		3
NESC - Inhibitor issues	7	4	11
NESC - Junction box issues	8	13	21
NESC - Need transformer on primary side	1		1
NESC - No clamp on pole at ground		1	1
NESC - No drip loop	1	4	5
NESC - Orange touching primary		1	1
NESC - Riser issues	5	14	19
NESC - Roll pipe kinked in transformer	1		1
NESC - Service touching primary		2	2
NESC - Wire exposed in meter can		4	4
NESC - Wire stripped too far	7		7
Need schedule 40 pipe/install to grade		1	1
Other conduit issues, non-NESC	3		3
Other junction box issues, non-NESC	2	2	4
Other riser issues, non-NESC	3	2	5
Overhead service issue		1	1
Panel not squared up when removed	1		1
Power outage		1	1
Question on cables not properly joined		1	1
Question on time of transfer		1	1
Rebilled 3 hrs. instead of 4 hrs.		1	1
Schedule A pipe above grade		1	1
Service replaced		1	1
Service wires too long	1		1
Sod replacement inadequate		2	2
Took too long to complete	2		2
Tree trimming		1	1
Used H block for one service		2	2
<b>Total</b>	<b>57</b>	<b>96</b>	<b>153</b>

**EXHIBIT 6**

*Source: DR 1.7 (a)(b)(c)*



**Supervisor of Standards and the Senior Functional Technical Specialist**

**EXHIBIT 7** shows the overhead contractor work orders inspected by the Supervisor of Standards and the Senior Functional Technical Specialist. These work orders were randomly chosen from a pool containing all completed TECO and contractor work orders.

Post-Completion Overhead Inspections (Contractor) September 2008 – August 2009								
Completed								
	Central	Dade City	Eastern	Plant City	South Hillsborough	Winter Haven	Western	Total
<b>Total</b>	1,507	4	1,672	1,169	1,524	663	2,590	9,129
Inspected								
Post-Completion Random Overhead	0	0	1	0	1	0	0	2
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>

**EXHIBIT 7**

*Source: DR 1.7(a)(b)(c)*

**EXHIBIT 8** shows the TECO-completed overhead work orders inspected by the Supervisor of Standards and the Senior Functional Technical Specialist.

Post-Completion Overhead Inspections (TECO) September 2008 – August 2009								
Completed								
	Central	Dade City	Eastern	Plant City	South Hillsborough	Winter Haven	Western	Total
<b>Total</b>	5,233	22	3,210	3,648	2,322	2,968	5,447	22,850
Inspected								
Post-Completion Random Overhead	13	6	12	11	10	9	13	74
<b>Total</b>	<b>13</b>	<b>6</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>13</b>	<b>74</b>

**EXHIBIT 8**

*Source: DR 1.7(a)(b)(c)*

**EXHIBIT 9** lists overhead distribution construction deficiencies found by the Supervisor of Standards and the Senior Functional Technical Specialist. These inspectors conducted 76 inspections during the review period, finding a total of 200 deficiencies. Only 17 of the 76 inspections (22.4 percent) had no deficiencies. NESC-related deficiencies accounted for 27 of the 200 deficiencies (13.5 percent) noted during inspections. NESC-related deficiencies are shown shaded in light blue in **EXHIBIT 9**.

Contractor-completed distribution construction work orders represented 29 percent of the total number of work orders during this review period. However, only 2 of the 76 inspections (2.6 percent) conducted by these inspectors were on contractor-completed work. Staff believes that TECO should devise a means that more proportionally represents contractor work orders in these inspections.

Post-Completion Overhead Inspection Deficiencies								
Type of Deficiency	Deficiencies, by Service Area							Total
	CSA	DCA	ESA	PCA	SHA	WHA	WSA	
#2 stranded copper needed in top of cutout	1							1
#2 top tie used on neutral	1					1		2
Arrester issues			2	3	1		1	7
Change to spec in field not documented	1							1
Down guy wire issues, non-NESC	2	2	1	4	3	1	1	14
Conduit issues, non-NESC	2	1	2	1		1	1	8
Grounding issues, non-NESC	1			1			6	8
Hand hole (junction box) issues	3		2	2		4	1	12
H block (squeeze on) crimped too close							1	1
Incorrect / Insufficient clamps							2	2
L-bracket issue				2			3	5
Molding issue, non-NESC	1			1	1			3
Need clevis on neutral due to hard angle						1		1
Need line guards installed	2		1	2	2		1	8
Need more mounting strap			1					1
Need to remove plastic cushion on B phase			1					1
<b>NESC - Down guy wire issues</b>	2		1	5		4	1	13
<b>NESC - Grounding issues</b>	2		1		1			4
<b>NESC - Need to extend conduit</b>	3							3
<b>NESC - No molding</b>			1					1
<b>NESC - Pole not deep enough</b>				2				2
<b>NESC - Joint-use facilities too close</b>	1						1	2
<b>NESC - Wrong primary splices</b>				1		1		2
Neutral needs to be repulled / reconnected						1		1
Neutral missing full eye nut		1	1	1		2		5
No cable tags	1							1
No pole top pin, B phase conductor			1					1
No insulated wire	1		1		1		3	6
No metal gain on set of double arms				1				1
No spool bolt to secure neutral	2		1					3
No spreader riser support	1							1
No staple or lag screw in cutout bracket	2							2
Old facilities not removed				1	1	1		3
Other pole issues	11	1	4	12	7	5	10	50
Other street light issues	2			1	1		1	5
Preform inadequate		1				1		2
Primary not tied tight enough to insulator							1	1
Tap from cutout installed too tight							1	1
Transformer tapped to incorrect phase	2							2
Wildlife protector inadequate	1						1	2
Wires do not appear to be brushed		2	2	5			1	10
Wrong size bolts used for transformer						1		1
<b>Total</b>	<b>45</b>	<b>8</b>	<b>23</b>	<b>45</b>	<b>18</b>	<b>24</b>	<b>37</b>	<b>200</b>

**EXHIBIT 9**

Source: DR 1.9(a)(b)(c)

## 2.5 Independent Audit Oversight

### **Does the TECO Internal Audit Department periodically examine its distribution quality control assessment processes?**

TECO states that it has not conducted traditional independent internal audits of its QA processes during the last 36 months. FPSC audit staff notes that TECO identifies and evaluates risks through the combined efforts of its Transmission and Distribution Operations and Energy Delivery quality assurance personnel. Frequent in-progress and completion inspections of contractor work, post-completion inspections of randomly selected work orders, and inspections of TECO work orders contribute to the overall internal QA assessment.

### **Have TECO distribution construction quality control processes been reviewed by external audit organizations?**

No, not during the period under review. TECO states that no risk analysis audits or evaluations have been conducted by an independent third-party during the last 24 months. The company last participated in a third-party risk assessment more than six years ago, in early 2003. Instead of formal distribution construction QA audits, TECO states that thoroughly reviewing work orders to identify issues and provide feedback as quickly as possible to TECO or contractor workers suffices.

TECO maintains that it identifies, evaluates, and manages risk to its distribution construction projects by using several risk management techniques. TECO develops, and updates as needed, construction standards and design specifications for all distribution equipment and structures in accordance with the NESC, state and local ordinances, and good engineering practices. The company's distribution system is constructed by its trained employees and qualified contractors. When using TECO work crews for distribution construction, the company employs the following risk management techniques:

- ◆ Periodic construction standards training is provided to employees.
- ◆ Random inspections are conducted on completed projects to ensure safe and reliable operation.
- ◆ Identified deficiencies are to be promptly rectified.
- ◆ When using contractors for distribution construction, TECO employs the following risk management techniques:

- A selection process to make sure every potential contractor has the requisite construction experience and capability, an established safety program, and is able to assume and manage included risk.
- Random inspections are conducted on completed construction projects to ensure each meets design, safety, NESC and other industry standards for safe, reliable operation.
- Distribution construction QA issues will be identified and promptly rectified.

TECO states that its risk analysis studies and evaluations are integral to its inspection and QA processes. Corrective actions are implemented as quickly as possible for any noted deficiencies. If additional training is required to mitigate risk, appropriate training is planned and scheduled. If construction standards have not been met, the crew responsible for the deficiency is notified of the issue and makes the necessary correction.

Staff believes that, while TECO's efforts might be a good beginning, much can be done to improve independent audit oversight of distribution construction quality assurance. Staff recognizes that TECO is not bound by the Government Accounting Office standard for auditing<sup>6</sup> but believes this standard is a reasonable guide, specifically that a third-party independent audit at least every three years seems prudent. At a minimum, staff believes that TECO should consider strengthening inspector independence and engaging an outside auditing agency for a thorough review of its distribution construction QA program.

#### FPSC Bureau of Safety Reviews

From September 2008 through August 2009, FPSC safety engineers conducted field inspections on 120 work orders completed by either contractors or TECO personnel. These projects had a total of 1,355 possible inspection variance points. FPSC inspectors found 65 variances, including 33 electrical-related and 32 communications-related variances caused by other utilities.

TECO states that FPSC Bureau of Safety Review inspection results are discussed with the company. These results are then sent to the appropriate service area for correction. Appropriate management and supervisory personnel in each service area review the inspection results quarterly. Subsequent to their review, feedback is provided to TECO crews, contractors, and third-party attachers. Information pertaining to any corrections made is communicated back to the FPSC.

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<sup>6</sup> GAO Government Auditing Standard 3.50, Quality Control and Assurance states that each audit organization performing audits or attestation engagements in accordance with generally accepted government auditing standards must: a) establish a system of quality control that is designed to provide the audit organization with reasonable assurance that the organization and its personnel comply with professional standards and applicable legal and regulatory requirements; and, b) have an external peer review at least once every 3 years.  
<http://www.gao.gov/govaud/govaudhtml/d07731g-5.html#pgfld-1034319>

## 3.0 Overall Opinion and Conclusion

### 3.1 Overall Opinion

TECO has adequate operating policies, procedures, and practices in place to limit risks associated with distribution construction facilities. Adequate monitoring exists to verify distribution construction by TECO employees and contractors is in compliance. However, audit staff has identified several concerns and areas of improvement based on its review.

#### Lack of Independence

TECO distribution construction QA is not an independent review process. Each inspector is subordinate to a service area manager and daily interacts with other assigned service area personnel. Lack of independence may, over time and in varying circumstances, subject inspectors to situations of conflicting loyalties. Adhering to the generally accepted practice of inspector independence would preclude such conflicts.

#### Lack of Formal QA Reports

TECO does not require formal QA reports. Staff believes TECO should consider requiring service area managers to provide distribution construction QA reports to upper management. Without formal reports, there is increased risk that higher managers misunderstand, misinterpret, and/or fail to be accurately or adequately informed about distribution construction quality assurance. Regular reporting also provides a basis for trending analysis that identifies issues, so that assets (e.g. training and inspectors) can be most efficiently applied.

#### Lack of Standardization

TECO should employ standardized QA inspection methodologies wherever possible. The company requires its Construction Field Inspectors and Distribution Field Inspectors to document final inspection results, but data is captured in various checklist formats specific to each type of inspector. Creating a standardized inspection format and process, to the extent possible, with tailored augmentations for different inspectors or types of inspections, promotes more thorough QA understanding and analysis. A systematic approach also advances database trend analyses, provides more efficient identification of recurring problems, and leverages implementation of the most appropriate corrective actions.

### Lack of Independent Third-Party Audits

TECO should have an independent, third-party distribution construction QA audit conducted at least every three years. TECO states that it had not undergone such an audit and that the last third-party risk analysis was conducted more than six years ago, in early 2003.

### TECO Contractor Oversight

TECO should consider reinstating the use of a contractor performance evaluation or report card. Such evaluations could aid TECO in tracking overall contractor performance and quality of work over time and be tailored to focus on specific, embedded construction or safety requirements. A grading system, fed by ongoing field inspection results, could provide a powerful performance trending analysis tool.

### Post-Completion Work Order Inspection Process

TECO should adjust the random work order selection process used by the Supervisor of Standards and the Senior Functional Technical Specialist. Staff also notes with concern that the current selection criteria excludes jobs of greater than nine poles. TECO should also consider revising the selection process so that inspections are in proportion to the number of jobs completed by TECO and contractor crews. Though 29 percent of jobs were completed by contractors during the review period, only 2 of 76 inspections (2.6 percent) were conducted on contractor work orders.

TECO should also have a process to capture deficiency correction dates and follow-up inspection dates. In the current process, after the inspectors complete an inspection, deficiencies are reported to the supervisor of the responsible work crew, the relevant service area manager, and the Director of Transmission & Distribution Operations. At that point, the inspectors have fulfilled their QA requirements and conduct no follow-up check.

Additionally, TECO should devise a process to record the correction date and follow-up inspection date for each NESC-related safety deficiency. TECO notes that it does not rank the severity of its deficiencies, but its inspectors do emphasize NESC violations to the responsible line supervisor so that timely corrections can be made.

TECO should also conduct trending analysis of post-completion inspections results. Such analysis could help identify problems and determine techniques or training to improve results. Such trending analysis could be particularly useful regarding NESC-related deficiencies that have a higher potential to expose employees, contractors, or the public to safety hazards.

## **3.2 Conclusion**

Staff believes that adequate policies, procedures, and practices are in place to limit risks associated with constructing distribution facilities. Additionally, staff believes that adequate monitoring exists to verify distribution construction is in compliance. Staff strongly encourages TECO to thoroughly review each concern listed in Section 3.1 to make a determination whether

changes to quality assurance structure, methodology, criteria, or process would benefit the company and/or its customers.

## 4.0 Appendices

### 4.1 Appendix A – Oversight of Contractor Crews

Oversight of contractor distribution construction projects spans all seven TECO service areas. It is the primary responsibility of two types of inspectors, Construction Field Inspectors and Distribution Field Inspectors. Random post-completion quality assurance inspections are also conducted by Supervisor of Services with the Senior Functional Technical Specialist, and also by Construction Field Inspectors (Services). Those responsible for field oversight of contractor distribution construction include:

- ◆ Construction Field Inspectors. These inspectors are assigned to the Western service area but cover all seven service areas. They report to the Western service area manager and perform daily QA and work order closeout inspections. Construction Field Inspectors inspect 100 percent of contractor conduit work orders and a minimum of five percent of new service installs as part of the post-completion verification process.
- ◆ Distribution Field Inspectors. The Distribution Field Inspectors are assigned only to the South Hillsborough service area but cover all seven service areas. They report to the South Hillsborough service area manager. The Distribution Field Inspectors conduct daily and closeout inspections for contractor distribution construction projects other than conduit and services.
- ◆ The Supervisor of Standards supervises the Senior Functional Technical Specialist. Together they conduct random, post-completion inspections of contractor overhead distribution construction work orders in all seven service areas, with a minimum requirement of one inspection per service area per month. The Supervisor of Standards reports to the Manager of Distribution Engineering, Standards, & Design.

### 4.2 Appendix B – Oversight of TECO Crews

Oversight of TECO distribution construction work crews is multi-layered and active in all seven service areas. Real-time, on-site supervision occurs daily on all projects. Oversight is provided by supervisors. Random post-completion quality assurance inspections are also conducted. Those responsible for on-site TECO distribution construction QA include:

- ◆ Line Crew Lead is the crew boss and the first line of QA defense. Line Crew Leads are assigned to all seven service areas. The Line Crew Lead provides QA and safety oversight for TECO workers. As work crew supervisors, they are responsible for building the power line according to the General Rules and Specifications and Safe Work Practices manuals.



- ◆ Lead Line Supervisors oversee the work of the Line Crew Lead and are assigned to each service area. They report to the service area managers. Lead Line Supervisors conduct daily distribution construction QA inspections for TECO work crews working in the service area.
- ◆ Distribution Line Department Supervisors work out of each service area and also report to the service area managers. They perform daily quality, safety, and training inspections of TECO work done in the service area. Distribution Line Department Supervisors may assist in other service areas during periods of increased workload.
- ◆ The Supervisor of Services supervises one Senior Functional Technical Specialist. Together, they perform random, post-completion inspections of completed TECO projects in all seven service areas. The Supervisor of Services reports to the Manager of Distribution Engineering, Standards, & Design. The Supervisor of Services is also responsible for publication and revision of distribution construction QA manuals.<sup>7</sup>

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<sup>7</sup> Includes the General Rules and Specifications (GRS), Overhead; General Rules and Specifications, Underground; Energy Distribution Engineering Technical Manual; Approved Materials Catalog; Energy Delivery Standards Approved Tool Catalog; Safe Work Practices; and the Emergency Restoration Manual.

## 5.0 Company Comments

The following comments are provided by TECO and included in their entirety.

### 5.1 TECO Comments

Tampa Electric agrees with the overall opinion of the Florida Public Service Commission's Office of Auditing and Performance Analysis that the company has:

- Adequate policies, procedures and practices in place to limit risks associated with constructing distribution facilities, and
- Adequate monitoring to verify that distribution construction by company employees and contractors is in compliance.

The company will thoroughly review all the concerns listed in the report to determine whether adjustments to its distribution construction quality assurance practices will provide tangible, cost-effective benefits for the company and its customers. In addition, the company submits the following comments in response to the report.

It is Tampa Electric's goal to assure that customers receive reliable service. Constructing distribution facilities in compliance with all applicable codes and regulations, including the National Electric Safety Code, is just one way that Tampa Electric strives to achieve this goal. Tampa Electric's employees and contractors understand that distribution facilities must be constructed in a manner that adheres to applicable codes and regulations. Current construction manuals and requisite training are monitored, updated and provided regularly. Standards for inspections are communicated to employees consistently and are integral components of job descriptions and performance reviews and overall job expectations. Inspections of contractor and employee work are designed to ensure that completed work complies with design or contract specifications. Contractor payments for completed work are predicated on proper construction done in a timely manner.

Tampa Electric's contractor oversight is comprehensive and documentation of distribution construction quality assurance and compliance is regimented. The company recognizes that some standardization among various inspection reports may be possible and the company will evaluate methods which facilitate trend analyses and the identification of recurring problems. Additionally, greater reporting consistency of deficiencies across the various types of contractor work may aid in this endeavor. Management decisions will likely be augmented through this effort.

Oversight of Tampa Electric's distribution construction work crews is multi-layered across the entire service area. The company's trained and certified personnel work under adequate controls and resources to ensure distribution construction is compliant with codes, regulations and standards. The entire company is held accountable to specific corporate values and every employee is given an annual review of these values, which includes integrity.

Violations of these requirements would be viewed as a violation of the company's corporate values, which could result in employee dismissal. Therefore, the company believes the multi-layered approach for adherence to construction requirements across its service areas is appropriate.

A concern was noted within the report that Tampa Electric had not had an independent, third-party distribution construction QA audit. Tampa Electric wishes to note that an audit of the company's distribution construction process is anticipated for 2010.

Tampa Electric is committed to the safe, reliable delivery of electric service to its customers. Adequate distribution construction practices with appropriate quality assurance controls is a key element of the company's commitment. To that end, Tampa Electric appreciates the thorough work of the Commission audit staff and will endeavor to review its concerns and identify adjustments to the company's distribution construction practices that could provide tangible, cost-effective benefits.