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PECO
An Exelon Company

May 1, 2017

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
P. O. Box 3265
Harrisburg, Pennsylvania 17120

Re: PECO 2016 Annual Electric Reliability Report - PUC Docket No. M-2016-2522508

Dear Secretary Chiavetta:

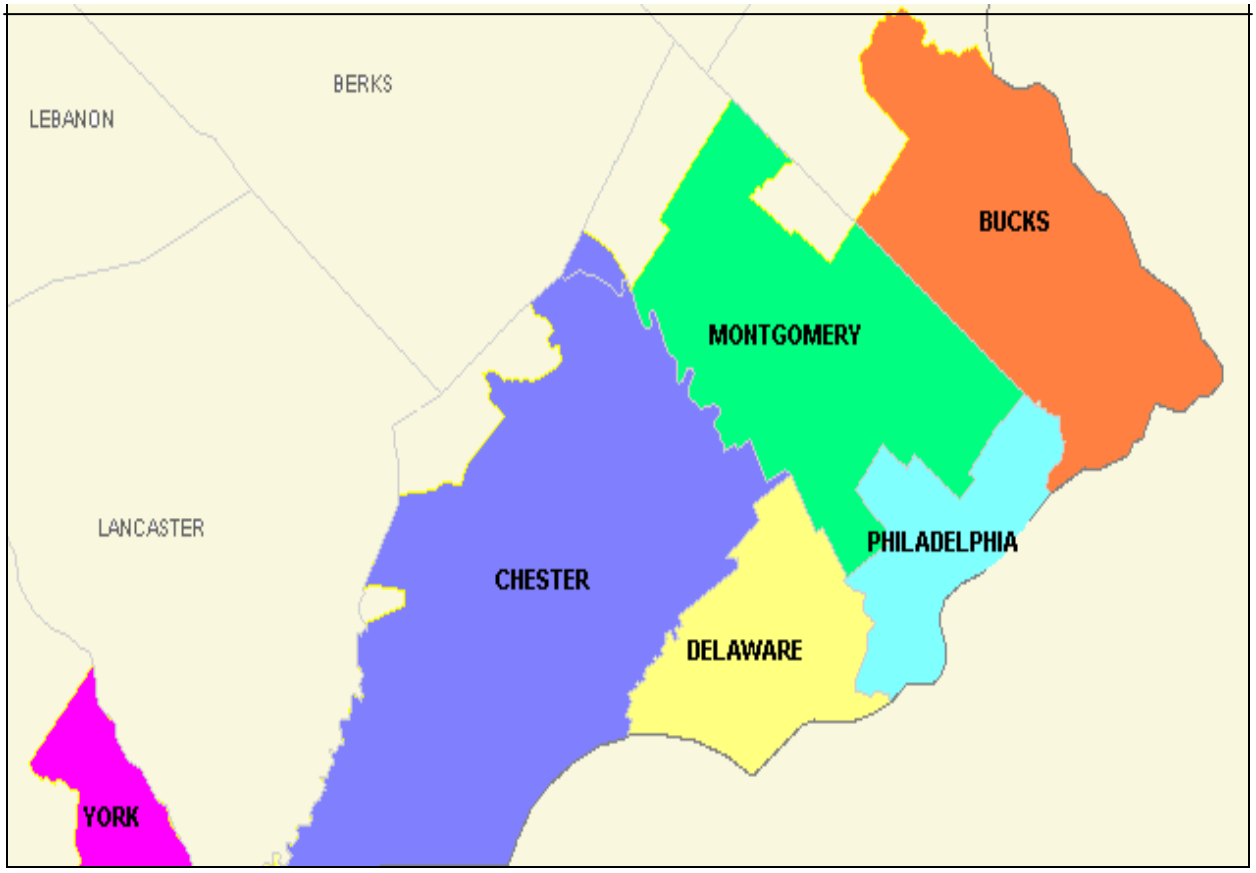
Enclosed is PECO's 2016 Annual Reliability Report for the period ending December 31, 2016, submitted pursuant to the Electric Service Reliability Regulations at 52 Pa. Code Chapter 57.

If you have any questions regarding this matter, please call me at 215-841-5777.

Sincerely,

Enclosure

2016
Electric Distribution Company
Annual Reliability Report



May 1, 2017

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INTRODUCTION

PECO Energy ("PECO") is submitting this report to the Pennsylvania Public Utility Commission (the "Commission") in accordance with 52 Pa Code 5.423.

PECO is committed to providing safe and reliable electric service to its customers. PECO serves approximately 1.6 million electric customers covering nearly 2,000 square miles in Bucks, Montgomery, Delaware, Chester, York and Philadelphia Counties, including the City of Philadelphia.

SAIFI, CAIDI and SAIDI for 2016 were all better than their respective Benchmarks and Standards established by the Commission for 12-month averages. The three-year average values of SAIFI, CAIDI, and SAIDI for 2014 through 2016 were all better than their respective levels since Benchmarks were established in 1999, and were all better than the Commission's Benchmarks and Standards for three-year averages.

B1: Section 57.195(b)(1)

"The annual reliability report shall include … an overall current assessment of the state of the system reliability in the electric distribution company's service territory including a discussion of the electric distribution company's current programs and procedures for providing reliable electric service."

Current Assessment:

SAIFI, CAIDI and SAIDI for 2016 were all better than the Benchmarks and Standards established by the Commission for 12-month averages.

Programs and Procedures:

PECO Energy continues to stress excellence in fundamentals:
- Safety of our employees and the public
- Emergency response and daily operation
- Thorough preventive and corrective maintenance
- Appropriate capacity and design
- Adequate bulk supply
- Appropriate investment
- Enhanced use of automation and new technologies
- Integration of advanced meter infrastructure (AMI, smart meters) into reliability processes

PECO Energy's program for providing reliable electric service is multifaceted. It starts with a transmission and distribution system that is designed and built to reliable standards. Under a formal, comprehensive, predictive and preventive maintenance program, equipment receives maintenance to ensure its safe, reliable operation. Vegetation in the proximity of the system is pruned and controlled via a funded, well-managed program that protects the electric facilities while respecting the beauty and environmental importance of the vegetation. In 2016, PECO launched its System 2020 Long-term Infrastructure Improvement Plan, with additional capital investments to construct reliability-related improvements over the period 2016 to 2020 focused on storm hardening and resiliency, cable replacements, and substation retirements with related distribution system upgrades.

The transmission and distribution system is operated around-the-clock, every day, from control centers where trained personnel use modern monitoring and control equipment to ensure that equipment is run within its load rating and other technical constraints.

When interruptions to electric service do occur, calls and instant reports from smart AMI meters are noted in a computer-aided outage management system, which associates calls and meter reports with information about the distribution system configuration to construct probable trouble groupings. These outage reports quickly appear on the screens for the operations center personnel. First response personnel are on the system at all times to make trouble locations safe and quickly restore service. The current outage management system has kept pace with technology through upgrades made available by the manufacturer and has been enhanced with information from the Advanced Meter Operating System.

PECO continues to install and upgrade the latest proven and cost-effective technology in support of reliability and safe, efficient operations. Recent examples include computers in the vehicles of field workers, smart electronic meters with communications and diagnostic capabilities, electronically-controlled switching and communication equipment to automatically reroute power around problem areas, a new geographic information system (GIS), and a state-of-the-art central distribution system management computer system.

Should a storm or other emergency arise, an appropriate emergency response team is assembled via group pager and cell-phone notification. The trained team performs per the specifications of a thorough, documented, tested emergency response procedure, quickly escalating the magnitude of the response when required, and communicating with the public and government agencies. If necessary, pre-established agreements with local contractors and neighboring utilities are exercised to augment PECO Energy's workforce. In 2012, PECO augmented its existing mutual assistance agreement with the Mid-Atlantic Mutual Assistance Group by joining the Southeastern Electric Exchange, increasing its ability to respond to major storms. After each significant emergency event, the groups involved evaluate the response. Strengths and weaknesses are identified, action plans are constructed, and individuals are tasked with bringing about the necessary changes to facilities, the organization, the procedures, and the understanding of the procedures by the work force. Management tracks each action item and demands timely completion to ensure continuous improvement.

Seasonal emergency response drills are carefully planned and carried out, followed by critiques and improvements to ensure that the entire organization can function properly when called upon for actual emergencies.

Management sets clearly-defined, challenging reliability goals, communicates them to the work force, demands meaningful action plans, monitors progress, holds the organization accountable for results, and attaches incentive compensation for employees to the achievement of the goals. Full-time engineering professionals monitor and analyze reliability trends and changes, and institute capital upgrades and improvements to maintenance, design, construction and/or operations to ensure that customers continue to enjoy reliable electric service.

B2: Section 57.195(b)(2)

"The annual reliability report shall include… a description of each major event that occurred during the year being reported on, including the time and duration of the event, the number of customers affected the cause of the event and any modified procedures adopted in order to avoid or minimize the impact of similar events in the future."

PECO had no major events in 2016.

B3: Section 57.195(b)(3)

"The report shall include… a table showing the actual values of each of the reliability indices (SAIFI, CAIDI, SAIDI, and if available, MAIFI) for the electric distribution company's service territory for each of the preceding 3 calendar years. The report shall include the data used in calculating the indices, namely the average number of customers served, the number of sustained customer minutes interruptions, the number of customer affected, and the minutes of interruption. If MAIFI values are provided, the number of customer momentary interruptions shall also be reported. "

	SAIFI	CAIDI	SAIDI	MAIFI
2016	1.00	106	106	0.57
2015	0.72	84	61	0.42
2014	0.86	96	82	0.44
2013	0.69	91	63	0.40

	SAIFI	CAIDI	SAIDI	MAIFI
2014 – 2016 Average	0.86	95	83	0.48
Benchmark	1.23	112	138	N/A
3-Year Average Standard	1.35	123	167	N/A

	2016	2015	2014	2013
Number of customers served *	1,623,365	1,703,911	1,718,220	1,706,148
Sustained customer minutes	171,632,179	103,264,966	141,648,235	108,211,457
Number of customers affected	1,623,883	1,231,426	1,481,044	1,182,901
Number of customer momentary interruptions	932,692	717,214	763,746	678,522

***Customer Count reflects a reduction due to the removal of inactive customer accounts*

At the end of 2015, PECO updated its geographic information system (GIS) to pass only premises with active accounts to the outage management system (OMS). As a result, the value of Customers Served went down with the removal of inactive premises from OMS. Since average customer counts must appear in quarterly and annual reports, PECO's average number of customers served will decline each quarter until the end of 2016, when no more inactive accounts are included in averages.

B4: Section 57.195(b)(4)

"The report shall include… a breakdown and analysis of outage causes during the year being reported on, including the number and percentage of service outages, the number of customers interrupted and customer interruption minutes categorized by outage cause such as equipment failure, animal contact, tree related, and so forth. Proposed solutions to identified service problems shall be reported."

Cause	Service Outages	% of Service Outages	Customer Interruptions	% of Customer Interruptions	Customer Minutes
Animal	1,403	10.10%	50,483	3.10%	3,393,774
Contact/Dig-In	111	0.80%	13,117	0.80%	862,607
Equipment Failure	5,179	37.50%	613,365	37.80%	58,131,881
Lightning	349	2.50%	43,707	2.70%	6,209,188
Other	1,600	11.60%	150,757	9.30%	9,358,741
T&S	15	0.10%	51,852	3.20%	2,159,681
Unknown	592	4.30%	48,261	3.00%	3,635,566
Vegetation-Broken/Uprooted	3,186	23.00%	456,643	28.10%	62,603,110
Vegetation-Ingrowth	1,023	7.40%	135,769	8.40%	19,897,853
Vehicles	373	2.70%	59,929	3.70%	5,379,778

The largest contributors to customer interruptions were equipment failure and tree-related interruptions. The leading groups within the equipment failure category were aerial equipment and underground equipment. Equipment is replaced based on observed trends under reliability programs and the System 2020 Long-term Infrastructure Investment Plan. Most customer interruptions caused by trees came from broken branches and tree trunks or uprooted trees (28.1% of all customer interruptions), as opposed to ingrowth (8.4% of all outage customer interruptions). PECO has continued to supplement its regularly scheduled vegetation management cycle with mid-cycle and a hazard tree removal program.

B5: Section 57.195(b)(5)

“The reports shall include… a list of the major remedial efforts taken to date and planned for circuits that have been on the worst performing 5% of circuits list for a year or more.”

See Appendix A

B6: Section 57.195(b)(6)

"The report shall include… a comparison of established transmission and distribution inspection and maintenance goals/objectives versus actual results achieved during the year being reported on. Explanations of any variances shall be included**."**

General Statement on Maintenance Programs Work Prioritization and Scheduling

PECO Energy develops its annual T&D maintenance plan to conform to company established maintenance cycles and based on current program priority determined by safety, risk and reliability evaluations. Resources may be reallocated during the maintenance period depending on impact of key performance areas. There is an adherence to schedule grace period equivalent to 25% of the maintenance cycle length to allow for scheduling and bundling of work.

PECO Energy's Distribution Inspection and Maintenance Plan vs. Actual Work for 2016

Maintenance Program	Planned Tasks	Completed Tasks
Recloser Inspections (Number of reclosers inspected)	199	394
Circuit Patrol & Thermography (Number of circuits inspected)	966	1,932
Pole Inspections (Number of poles inspected)	32,763	39.262
Padmount Transformer Inspections (Number of maintenance tasks performed (e.g. visual inspection, functional testing)	9,733	16,739
Below Ground Transformers (Number of maintenance tasks performed (e.g. visual inspection, functional testing)	1,737	2,867
Substation Inspections (Number of maintenance tasks performed (e.g. visual inspection, predictive/diagnostic maintenance, preventive maintenance) for a variety of substation components)	1,320	1,388
Unit Substations (Number of maintenance tasks performed (e.g. calibration, trip testing)	3,070	3,194

Vegetation Management Preventive Maintenance Program

Maintenance Program	Miles Planned	Miles Completed
Distribution Lift & Manual Trimming	2,708	3,307
Transmission Trim & Removal	160	160

B7: Section 57.195(b)(7)

"The report shall include…a comparison of budgeted versus actual Transmission and Distribution operation and maintenance expenses for the year being reported on in total and detailed by the electric distribution company's own functional account code or FERC account code as available. Explanations of any variances 10% or greater shall be included."

Operation and Maintenance Expenses

Functional Account Code	Budget	Actual	Variance
New Business Connections	$1.1	$1.9	($0.8)
Capacity Expansion	$0.8	$1.0	($0.2)
System Performance	$51.2	$48.9	$2.3
Facility Relocation	$1.5	$1.3	$0.2
Maintenance	$188.6	$187.9	$0.7
Category Totals	$243.2	$241.0	$2.2
Budgeted T&D O&M Expenses		$243.2 million	
Actual T&D O&M Expenses		$241.0 million	
Variance		$2.2 million	
Percent Variance		0.9%	

"Explanations of any variances 10% or greater shall be included"

- **New Business Connections –** Over budget due to increased residential development and commercial projects.
- **Capacity Expansion** – Over budget due to revised estimates for substation work.
- **Facility Relocation –** Under budget due to reduced scope of work on various relocation projects.

B8: Section 57.195(b)(8)

"The report shall include… a comparison of budgeted versus actual Transmission and Distribution capital expenditures for the year being reported on in total and detailed by the electric distribution company's own functional account code or FERC account code as available. Explanations of any variances 10% or greater shall be included."

Capital Expenses

Functional Account Code	Budget	Actual	Variance
New Business Connections	$56.1	$55.8	$0.3
Capacity Expansion	$105.8	$100.5	$5.3
System Performance	$136.7	$145.2	($8.5)
Facility Relocation	$14.0	$13.8	$0.2
Maintenance	$99.4	$95.7	$3.7
Category Totals	$412.0	$411.0	$1.0
Budgeted Capital Expenses		$412.0 million	
Actual Capital Expenses		$411.0 million	
Variance		$1.0 million	
Percent Variance		0.2%	

"Explanations of any variances 10% or greater shall be included"

- No variances greater than 10% by category

.

B9: Section 57.195(b)(9)

"The report shall include… quantified Transmission and Distribution inspection and maintenance goals/objectives for the current calendar year detailed by system area (i.e., transmission, substation, and distribution)."

PECO Energy's 2017 Transmission and Distribution Inspection and Maintenance Plan
Per 52 Pa Code Chapter 57.198, PECO's Biennial Inspection, Maintenance, Repair and Replacement plan filed September 29, 2014.

Maintenance Program	Units (Planned) Annual
Recloser Inspections (Number of reclosers inspected)	200
Circuit Patrol & Thermography (Number of circuits patrolled)	966
Pole Inspections (Number of poles visually inspected)	32,764
Padmount Transformers (Number of transformers visually inspected)	9,733
Below Ground Transformers (Number of transformers visually inspected)	1,738
Substations (Number of substations inspections performed.(e.g. visual inspection, reading of currents, voltages, temperature etc) for a variety of substation components)	1,320
Unit Substations (Number of unit substations inspections performed .(e.g. visual inspection, reading of currents, voltages, temperature etc) for a variety of substation components)	3,060

Vegetation Management Preventive Maintenance Program

Maintenance Program	Miles Planned
Distribution Lift & Manual Trimming	2,636
Transmission Trim & Removal	193

B10: Section 57.195(b)(10)

"The report shall include… budgeted transmission and distribution operation and maintenance expenses for the current year in total and detailed by the electric distribution company's own functional account code or FERC account code as available".

Functional Account Code	2017 O&M Budget
New Business Connections	$1.6 million
Capacity Expansion	$0.8 million
System Performance	$54.9 million
Facility Relocation	$1.4 million
Maintenance	$191.6 million
Category Totals	$250.3 million

B11: Section 57.195(b)(11)

"The report shall include… budgeted transmission and distribution capital expenditures for the current year in total and detailed by the electric distribution company's own functional account code or FERC account code as available"

Functional Account Code	2017 Capital Budget
New Business Connections	$51.7 million
Capacity Expansion	$98.9 million
System Performance	$215.3 million
Facility Relocation	$15.8 million
Maintenance	$97.5 million
Category Totals	$479.2 million

B12: Section 57.195(b)(12)

"The report shall include… significant changes, if any, to the Transmission and Distribution inspection and maintenance programs previously submitted to the Commission."

Approved Changes to PECO Energy's T&D Maintenance Programs

APPENDIX A

The following circuits were on our worst performing 5% of circuits list for a year or more:
As of the date of this report, analysis of these circuits continues. Information on remedial efforts taken and planned in addition to the details provided on the following pages will be included in future quarterly reliability reports.

BRADFORD_342
BUCKINGHAM_344
BYBERRY_148
CEDARBROOK_133
CRESCENTVILLE_134
GLADWYNE_138
GOSHEN_351
LARCHMONT_001
LARCHMONT_007
LINE_116_00BM
LINE_1300CR
LINE_132_00WO
LINE_189_00EM
LINE_2252
MARSHALLTON_002
MIDDLETOWN_352
NEWTOWN_SQUAR_131
NEWTOWN_SQUAR_133
NORTH_WALES_342
NORTH_WALES_361
PEACH_BOTTOM_361
RICHMOND_138
SOLEBURY_001
THOMSON_004
WEST_BUCK_002

Below are the efforts taken to date and planned for these circuits:

BRADFORD_342

Chester County

Completed:

Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Perform regularly schedule tree clearance

Planned:

Remedial efforts completed

BUCKINGHAM_344

Bucks County

Completed:

Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Trimmed select areas of circuit
Installed additional fuses
Performed regularly schedule tree clearance
Replaced recloser

Planned:

Remedial efforts completed

BYBERRY_148

Bucks County

Completed:

Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed additional fuses
Installed wildlife protection
Replaced cable
Trimmed select areas of circuit
Test/repair recloser settings

Planned:

Complete reliability corrective workorders
Install wildlife protection

CEDARBROOK_133
Montgomery County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed tripsaver
Installed 4 reclosers
Installed wildlife protection
Replaced cable
Upgraded service wires
Planned:
Remedial efforts complete

CRESCENTVILLE_134
Philadelphia County
Completed:
Inspected circuit and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Install (3) three phase reclosers
Upgrade wildlife protection
Upgrade secondary wires

GLADWYNE_138
Delaware County
Completed:
Inspected circuit and with thermographic camera
Completed reliability corrective workorders
Installed wildlife protection
Installed tree wire
Performed regularly schedule tree clearance
Planned:
Install tree wire

GOSHEN_351
Chester County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Reconfigure URD

LARCHMONT_001
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Upgraded service wires
Completed reliability corrective workorders
Installed faulted circuit indicators
Repair/Replace switch
Reconfigure and fuse circuit section
Planned:
Complete reliability corrective workorders
Install 3 reclosers on supply line

LARCHMONT_007
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Remedial efforts complete

LINE_116_00BM
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Install (3) 3 phase recloser

LINE_1300CR
Chester County
Completed:
Completed reliability corrective workorders
Inspected circuit visually and with thermographic camera
Inspect / Test recloser operation
Inspected selected areas of circuit for vegetation issues and corrected as needed
Planned:
Remedial efforts complete

LINE_132_00WO
Bucks County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Reconfigure URD
Planned:
Remedial efforts complete

LINE_189_00EM
Bucks County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed 3 phase recloser
Planned:
Complete reliability corrective workorders
Reconfigure URD

LINE_2252
Philadelphia County
Completed:
Completed reliability corrective workorders
Install switch
Replaced cable
Installed VFI's
Planned:
Install switch
Complete reliability corrective workorders

MARSHALLTON_002
Chester County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed additional fuses
Installed express main
Planned:
Remedial efforts complete

MIDDLETOWN_352
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Replace recloser
Complete reliability corrective workorders

NEWTOWN_SQUARE_131
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed lightning protection
Performed regularly schedule tree clearance
Replaced cable
Planned:
Complete reliability corrective workorders

NEWTOWN_SQUARE_133
Chester County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Replaced cable
Planned:
Perform regularly schedule tree clearance

NORTH WALES_342
Montgomery County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Planned:
Reconfigure URD
Complete reliability corrective workorders

NORTH WALES_361
Montgomery County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective workorders
Installed additional fuses
Planned:
Remedial efforts complete

PEACH BOTTOM_361
York County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective work orders
Test / Inspect recloser operation
Planned:
Complete reliability corrective work orders
Install 1-34kv recloser

RICHMOND_138
Philadelphia County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective work orders
Installed wildlife protection
Planned:
Complete reliability corrective work orders
Install (3) 3 phase reclosers

SOLEBURY_001
Bucks County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective work orders
Installed tree wire
Installed additional fuses
Planned:
Complete reliability corrective work orders

THOMSON_004
Delaware County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective work orders
Planned:
Complete reliability corrective work orders

WEST_BUCK_002
Bucks County
Completed:
Inspected circuit visually and with thermographic camera
Inspected selected areas of circuit for vegetation issues and corrected as needed
Completed reliability corrective work orders
Installed additional fuses
Installed tree wire
Upgraded secondary wires
Planned:
Complete reliability corrective work orders

APPENDIX B

New Business

This work category includes all the facility work required to add a new customer or to increase the load to an existing customer. The facility work will include the facilities required to directly connect the customer to the system and the upgrade/replacement of any existing facility to serve the requested additional load.

Capacity Expansion

This work category includes only capacity work generated by the system design engineer to prevent system failure and to assure the delivery of voltage as specified in the tariff. The addition of new substations and substation enlargements for future load growth will also be included in this project.

System Performance

This work category includes projects designed to upgrade, modify or improve the performance of the distribution system. Also included in this category are indirect costs in support of all categories and one-time accounting adjustment items.

Facility Relocation

This work category includes all requests for relocation of PECO facilities including municipal as well as customer related relocation requests.

Maintenance

This work category includes work performed to repair and restore equipment to its normal state of operation, along with planned preventive maintenance work such as visual and thermographic inspections and tree trimming around transmission and distribution lines.

Storm Funds

Incremental costs (primarily; overtime, contractors, mutual assistance, and meals) incurred while responding to major storms (storms that meet customer outage and duration criteria).