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FEDERAL EXPRESS

April 28, 2017

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, Pennsylvania 17120

RECEIVED

APR 28 2017

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

**Re: PPL Electric Utilities Corporation
2016 Annual Reliability Report
Docket No. ~~E-00030161~~**

M-2016-2522508

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") is an original of PPL Electric's 2016 Annual Reliability Report to the Pennsylvania Public Utility Commission. This report is being filed pursuant to the Commission's regulations at 52 Pa. Code § 57.195(a).

As required by the Commission's regulations, copies of the enclosed report have been served upon the Office of Consumer Advocate ("OCA") and the Office of Small Business Advocate ("OSBA").

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on April 28, 2017, which is the date it was deposited with an overnight express delivery service as shown on the delivery receipt attached to the mailing envelope.

In addition, please date and time-stamp the enclosed extra copy of this letter and return it to me in the envelope provided.

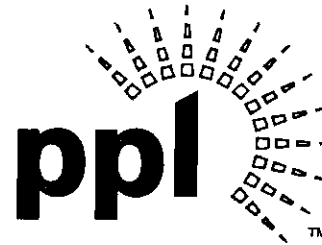
If you have any questions regarding the enclosed report, please call me or B. Kathryn Frazier, PPL Electric's Regulatory Affairs Manager at (610) 774-3372.

Very truly yours,

Kimberly A. Klock

Enclosures

cc: Tanya J. McCloskey, Esquire
Mr. John R. Evans
Mr. Daniel Searfoorce



PPL Electric Utilities

**PPL Electric Utilities Corporation
2016 Annual Reliability Report
to the
Pennsylvania Public Utility Commission**

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APR 28 2017

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

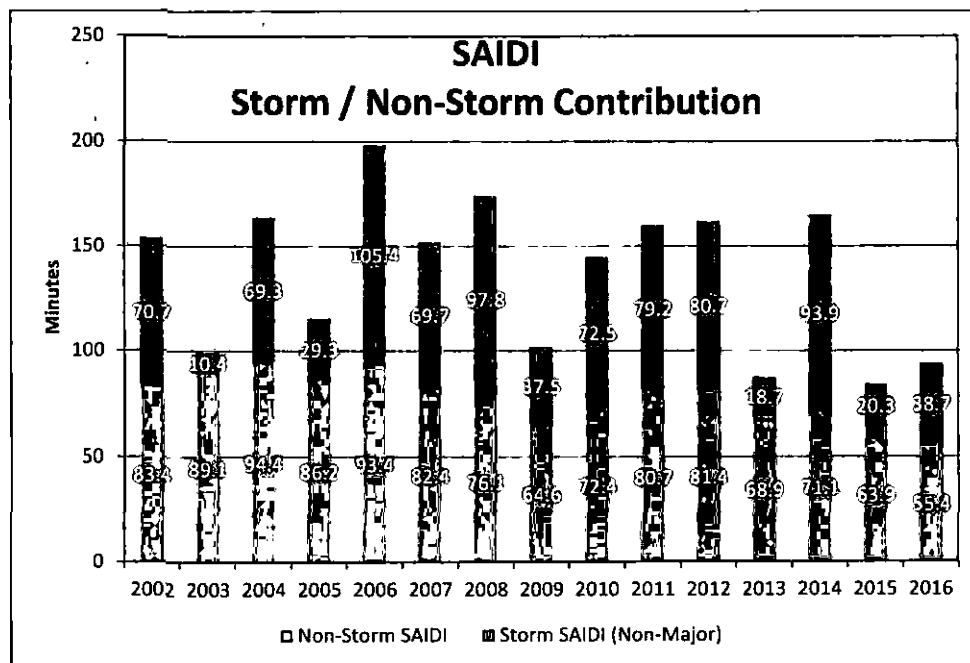
May 1, 2017

1) ***An overall current assessment of the state of the system reliability in the EDC's service territory including a discussion of the EDC's current programs and procedures for providing reliable electric service.***

In 2016, PPL Electric recorded its lowest non-storm SAIFI and SAIDI values as far back as records are kept (1994). A modest storm season prevented 2016 from being the best overall reliability year ever. In 2016, overall SAIFI was 21% below the established benchmark level, SAIDI 34% below, and CAIDI 17% below. All metrics were well within the 12 and 36 month standards.

Since 2013, with the exception of the 2014 ice storm, PPL Electric customers have generally enjoyed their best reliability ever. The company attributes this improved level of performance to:

- A more aggressive three-phase tree trimming standard implemented in 2013
- Significant investment in Distribution Automation technology
 - Continued investment in the Smart Grid Initiative
 - Increased leverage of our Distribution Management System (DMS)
 - The full implementation of Fault Isolation and System Restoration (FISR) technology
- Other new, well-targeted reliability investments including fusing and storm hardening
- An increasing focus on remediating momentary outages before they become permanent outages
- A focus on making optimal, data-driven asset investment decisions



It is PPL Electric's mission to achieve and maintain best in class levels of electric delivery service to its customers in a cost effective manner. Maintenance programs are one of the key elements that focus on maintaining system and circuit reliability, equipment performance, and interruption prevention. The scope of these maintenance programs, procedures, and activities covers all areas of the electrical infrastructure.

These programs include:

Transmission

Transmission inspection programs include aerial and foot patrols. These patrols focus on comprehensive inspections, routine inspections, and identification of emergency work. They also include inspection of all equipment, including poles, arms, line switches, interrupters, arresters, grounding, guying, anchors, and other key transmission components.

Substation

Substation maintenance programs include inspections and overhauls of equipment, such as breakers, disconnects, power cables, and security equipment. Some equipment is maintained on a time basis; other equipment is condition-monitored. These two methods help ensure that maintenance work is performed in a cost-effective manner. Besides time and condition-based maintenance, thermo-graphic inspections help ensure that substation equipment does not operate at elevated temperature levels for an extended period of time, which could lead to equipment failure

Distribution

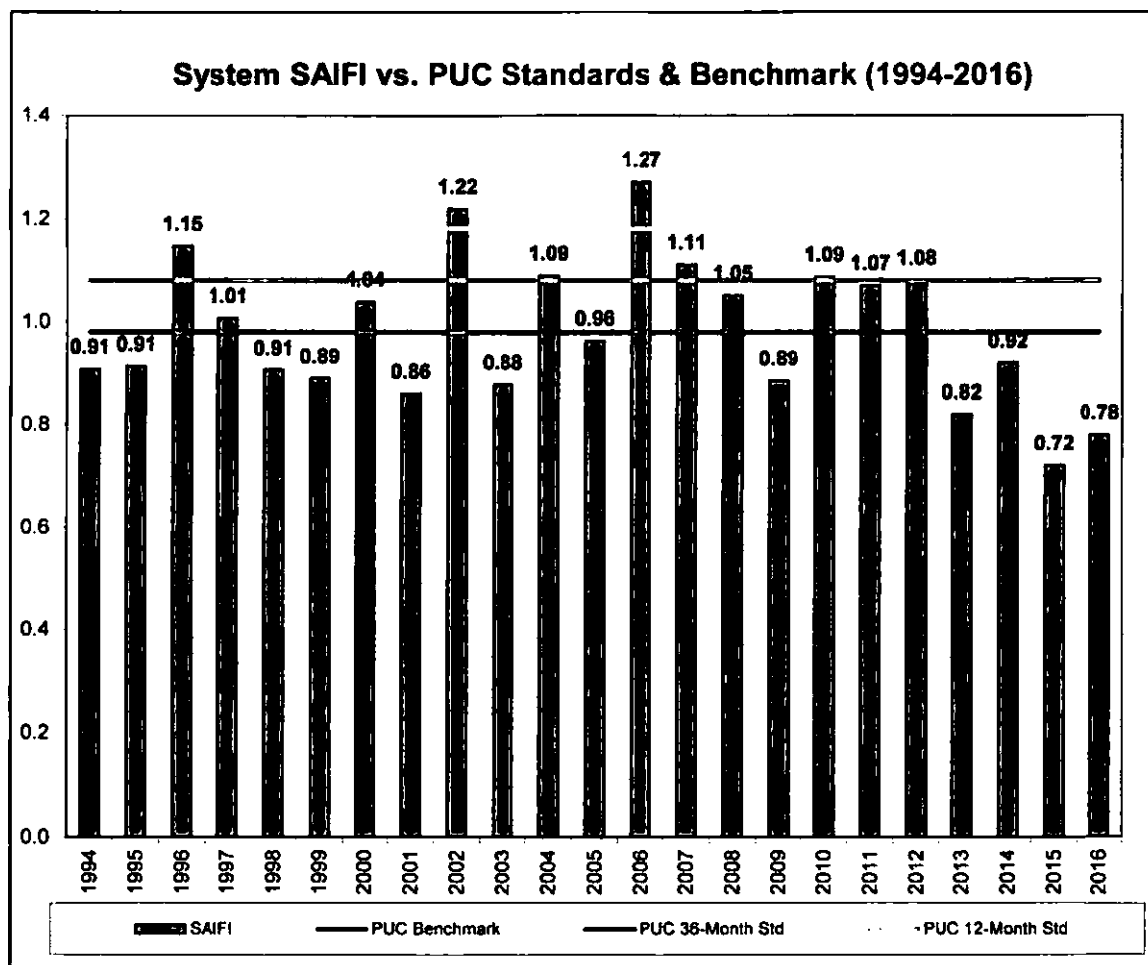
Distribution programs encompass many maintenance aspects similar to transmission and substations, and also include load surveys that help engineers determine peak load requirements, circuit analyses for the identification of lines requiring maintenance work, voltage relief, or other capital improvements. Overhead line inspections can identify damaged or deteriorated equipment that can be repaired or replaced. In addition, distribution maintenance includes inspections of poles, voltage regulators, line switches, capacitors, and other key distribution equipment. PPL Electric also tests underground cable to determine if the cable needs to be replaced, repaired or cured to prevent future failures.

Vegetation

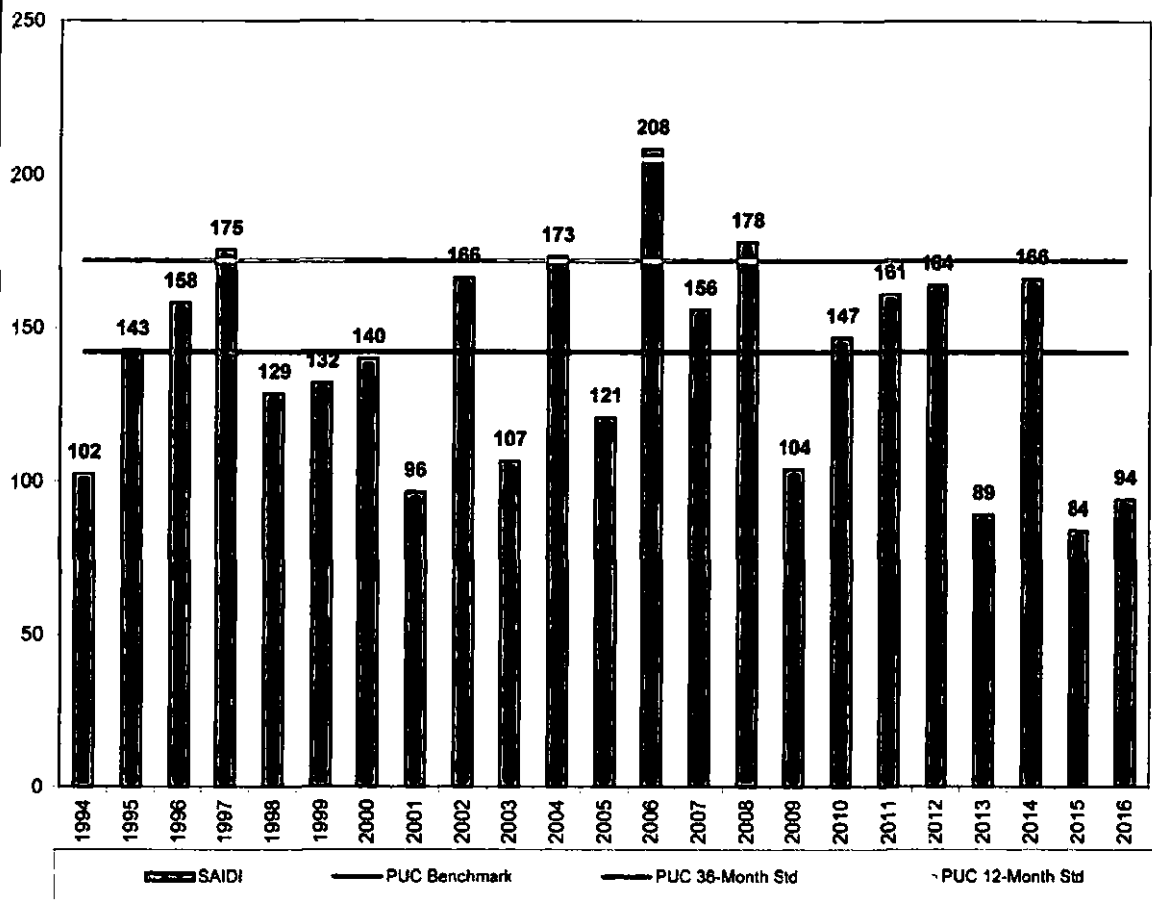
The vegetation on PPL Electric's transmission and distribution rights-of-way (ROW) is maintained utilizing a combination of several management techniques. These include tree pruning, tree removal, re-clearing and herbicide application. Lines are field-surveyed on a regular basis. The work is scheduled and budgeted based on the conditions observed and past performance. Outside of the ROW, danger trees with the potential to fall into the ROW are removed when possible.

Each of these programs is more fully described in Appendices A through D.

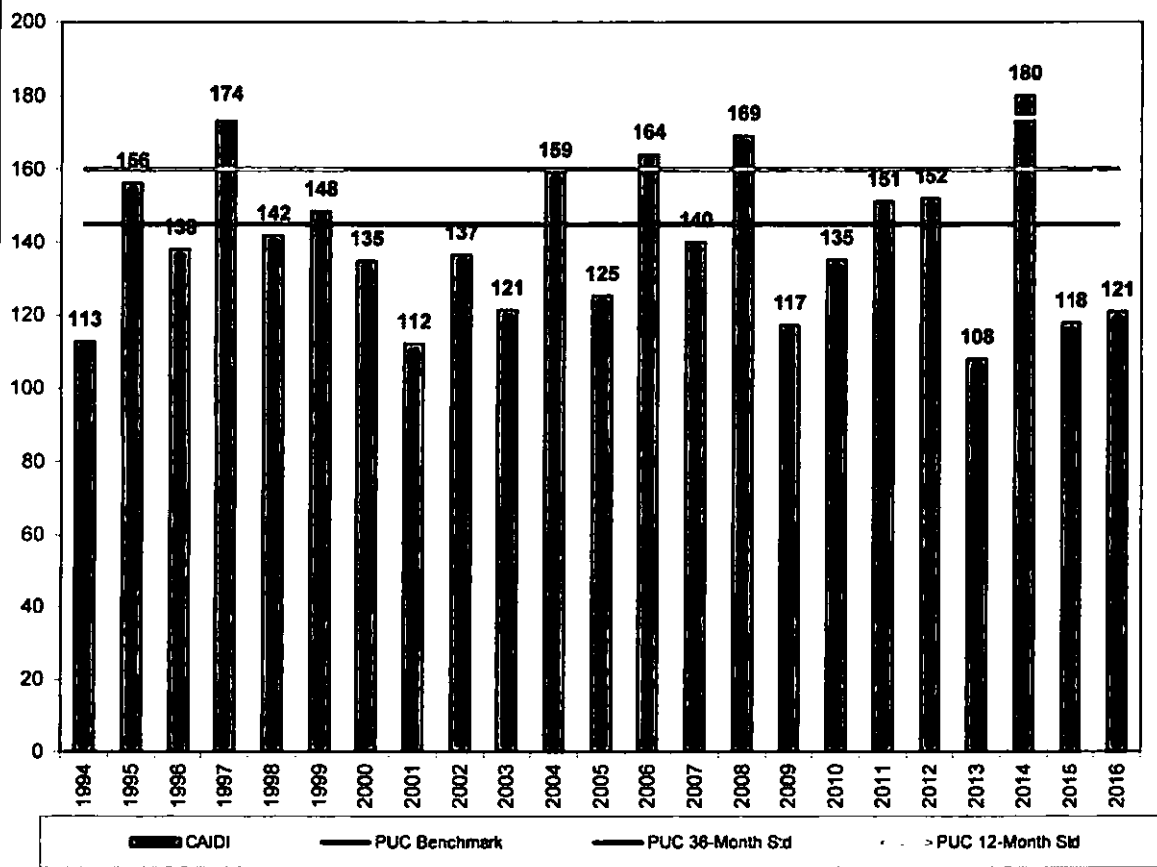
From 1999 through 2012, SAIFI, CAIDI and SAIDI generally have been maintained near benchmark levels and below the 36-month standard levels since the benchmark years of 1994 through 1998, as evidenced by the following three charts. Since 2013, marked improvement can be seen across all reliability measures, with 2014 somewhat distorted by ice storm Nika, which inflicted heavy damage but was not classified as a major event because of its geographic concentration.



System SAIDI vs. PUC Standards & Benchmark (1994-2016)



System CAIDI vs. PUC Standards & Benchmark (1994-2016)



- 2) *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.*

No major events occurred in 2016.

- 3) *A table showing the actual values of each of the reliability indices (SAIFI, CAIDI, SAIDI, and if available, MAIFI) for the EDC'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 interruptions, the number of customers affected, and the customer minutes of interruption. If MAIFI values are provided, the number of customer momentary interruptions shall also be reported.*

<i>Year</i>	2014	2015	2016¹	3 Yr. Avg.
SAIFI (Benchmark = 0.98; Rolling 12-month Std. = 1.18; Rolling 3-yr. Std. = 1.08)	0.918	0.717	0.777	0.804
CAIDI (Benchmark = 145; Rolling 12-month Std. = 174; Rolling 3-yr. Std. = 160)	180.7	117.6	121.0	140
SAIDI (Benchmark = 142; Rolling 12-month Std. = 205; Rolling 3-yr. Std. = 172)	165.9	84.3	94.0	114.7
MAIFI	3.3	4.2	7.3	4.9
Customers Served²	1,399,535	1,405,213	1,411,897	1,405,548
Number of Sustained Customer Interruptions (Trouble Cases)	17,389	14,973	17,473	16,611
Number of Customers Affected³	1,284,617	1,007,983	1,097,145	1,129,915
Customer Minutes of Interruptions	232,210,564	118,547,920	132,840,591	161,199,691
Number of Customer Momentary Interruptions	4,559,374	5,886,251	10,246,275	6,897,300

¹ Any slight variations from data provided previously are the result of error corrections.

² PPL Electric calculates the annual indices using customers served at the end of the period. This is consistent with the method used to calculate PPL Electric's benchmarks.

³ The data reflects the number of customers interrupted for each interruption event summed for all events, also known as customer interruptions. If a customer is affected by three separate cases of trouble, that customer represents three customer interruptions, but only one customer interrupted.

- 4) *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.*

The table shows a breakdown of service outage causes for 2016.⁴ The top three causes (Equipment Failure, Tree Related, and Animals), based on percent of cases, are highlighted in the table. Service interruption definitions are provided in Appendix E. PPL Electric has maintenance programs to address controllable service outages. Those programs are detailed in Appendices A through D.

Cause Description	Trouble Cases ⁵	Percent of Trouble Cases	Customer Interruptions ⁶	Percent of Customer Interruptions	Customer Minutes	Percent of Customer Minutes
Animals	3,635	20.8%	51,894	4.7%	3,539,796	2.7%
Contact / Dig-In	157	0.9%	15,021	1.4%	1,126,288	0.8%
Directed by Non-PPL Authority	224	1.3%	11,667	1.1%	738,274	0.6%
Equipment Failures	5,094	29.2%	349,458	31.9%	35,756,218	26.9%
Improper Design	-	0.0%	-	0.0%	-	0.0%
Improper Installation	18	0.1%	21,452	2.0%	316,812	0.2%
Improper Operation	7	0.0%	6,452	0.6%	150,361	0.1%
Nothing Found	1,178	6.7%	67,936	6.2%	4,820,280	3.6%
Other Controllable	126	0.7%	29,442	2.7%	1,065,147	0.8%
Other Non Control	248	1.4%	13,375	1.2%	1,637,693	1.2%
Other Public	56	0.3%	4,662	0.4%	346,481	0.3%
Tree Related	6,015	34.4%	406,209	37.0%	71,468,626	53.8%
Unknown	1	0.0%	1,240	0.1%	118,383	0.1%
Vehicles	714	4.1%	118,337	10.8%	11,756,233	8.8%
Total	17,473	100.0%	1,097,145	100.0%	132,840,592	100.0%

⁴ Any slight variations from data provided previously are the result of error corrections.

⁵ Cases of trouble are the number of sustained customer service interruptions (i.e., service outages).

⁶ The data reflects the number of customers interrupted for each interruption event summed for all events, also known as customer interruptions. If a customer is affected by three separate cases of trouble, that customer represents three customer interruptions, but only one customer interrupted.

Analysis of causes contributing to the majority of service interruptions:

Weather Conditions: PPL Electric records weather conditions, such as wind or lightning, as contributing factors to service interruptions, but does not code them as direct interruption causes. Therefore, some fluctuations in cause categories, especially tree- and equipment-related causes, are attributable to weather variations. For the current reporting period, weather was considered a significant contributing cause in 51% of cases, 47% of customer interruptions, and 68% of CMI.

Tree Related: PPL Electric has recently increased funding to more aggressively address outside the right of way danger trees. For trees within the right-of-way, PPL Electric has implemented a more aggressive trimming strategy. We are in year four of a five year cycle for the new standard.

Animals: Animals accounted for approximately 21% of PPL Electric's cases of trouble. Although this represents a significant number of cases, the effect on SAIFI and CAIDI is small because approximately 79% of the number of cases of trouble was associated with individual distribution transformers. However, when animals contacts substation equipment, the effect may be widespread and potentially can interrupt thousands of customers on multiple circuits. In addition to guarding new distribution transformers and substations, in 2009, PPL Electric initiated distribution and substation animal guarding programs to focus systematically on protecting existing facilities most at risk of incurring animal-caused interruptions.

Vehicles: Although vehicles cause a small percentage of the number of cases of trouble, they accounted for a large percentage of customer interruptions and customer minutes, because main distribution lines generally are located along major thoroughfares with higher traffic densities. In addition, vehicle-related cases often result in extended repair times to replace broken poles. Service interruptions due to vehicles are on the rise as a result of an increasing number of drivers and vehicles on the road. PPL Electric has a program to identify and relocate poles that are subject to multiple vehicle hits.

Equipment Failure: Equipment failure is one of the largest single contributors to the number of cases of trouble, customer interruptions and customer minutes. However, approximately 40% of the cases of trouble, 37% of the customer interruptions and 46% of the customer minutes attributed to equipment failure were weather-related and, as such, are not considered to be strong indicators of equipment condition or performance.

5) Specific remedial efforts taken to date and planned for circuits that have been on worst performing 5% of circuits list for a year or more.

Twelve PPL Electric circuits have been on the worst performing circuit list for a year or more.

Circuit 10903 -- COOPERSBURG 09-03

Remedial Actions

- In 2016, single-phase fusing was installed.
- In 2016, three locations received three-phase fusing or disconnect switch installations.
- In 2017, relocating four spans of overhead line and an underground rebuild will be investigated.
- In 2017, installing a recloser or three phase fusing is being investigated.

Circuit 12701 -- MACUNGIE 27-01

Remedial Actions

- In 2016, a new reliability substation was built to split the MACUNGIE 27-01 and reduce customer outage exposure. Additional remote sectionalizing devices were also installed.
- In 2016, a Smart Grid device was installed on this circuit.
- In 2017, several poles that had multiple vehicle strikes will be evaluated for relocation.
- In 2018, a section of three-phase conductor will be relocated to a more accessible location.

Circuit 14403 -- SOUTH SLATINGTON 44-03

Remedial Actions

- In 2016, additional fusing was installed.
- In 2016, hotspot tree trimming was performed.
- In 2016, two large single-phase taps were reviewed for improved sectionalizing capability.
- In 2018, line extensions at two single-phase locations will be completed.
- In 2018, full circuit trimming will be performed.
- In 2018, two sections of difficult-to-access conductor will be relocated to more accessible locations.

Circuit 16102 -- BINGEN 61-02

Remedial Actions

- In 2016, fusing was installed at two locations.
- In 2016, fusing or disconnect switches were evaluated for two three-phase locations, and will be installed in 2017.
- In 2017, fusing will be installed at three additional locations.
- In 2017, two switches will be evaluated for upgrade to protective devices.
- In 2017, an automated switch will be installed as part of the Smart Grid Initiative.

Circuit 20403 -- ASHFIELD 04-03

Remedial Actions

- In 2016, a framing issue was remediated.
- In 2016, Fault Isolation and System Restoration (FISR) was activated on this circuit.
- In 2016, concrete barriers were installed to protect the substation from vehicle strikes.
- In 2017, feeding a long span of radial single-phase line from a different source will be evaluated.
- In 2017, single-phase fusing will be installed at multiple locations.
- In 2017, three-phase fusing will be installed at one location.
- In 2017, a single-phase recloser and additional fusing will be installed.

Circuit 24602 -- VARDEN 46-02

Remedial Actions

- In 2016, FISR automatic switching was enabled.
- In 2016, new fusing was installed at nine locations.
- In 2016, an Expanded Operational Review was performed.
- In 2017, a sectionalizing device with remote operational capability will be installed as part of the Smart Grid Initiative.
- In 2017, animal guarding was installed at several locations.
- In 2017, a new switch and fault indicator will be evaluated for this circuit.
- In 2017, a section of difficult-to-access single phase will be evaluated for relocation.
- In 2018, full circuit trimming will be performed.

Circuit 28301 -- NEWFOUNDLAND 83-01

Remedial Actions

- In 2015, series fusing was installed to reduce exposure to approximately 160 customers.
- In 2016, FISR automatic switching was enabled.
- In 2016, a Smart Grid recloser was installed.
- In 2016, a single-phase recloser was installed on this circuit.
- In 2016, additional single-phase fusing was installed at two locations.
- In 2017, full circuit tree trimming was performed on this circuit.
- In 2017, a section of single-phase will be relocated and reconductored to increase road accessibility.

Circuit 28803 -- LAKEVILLE 88-03

Remedial Actions

- In 2016, thirty six porcelain transformer fuse cutouts were replaced.
- In 2016, FISR was activated on this circuit.
- In 2017, full circuit trimming will be performed.
- In 2017, an automated three-phase recloser will be installed.
- In 2017, a new disconnect switch will be installed.
- In 2017, animal guarding will be added at multiple locations.

Circuit 41801 -- GOWEN CITY 18-01

Remedial Actions

- In 2016, full circuit trimming was performed.
- In 2016, FISR was activated on this circuit.
- In 2016, a non-communicating sectionalizing device was replaced with an automated vacuum recloser as part of the Smart Grid Initiative.
- In 2016, a recloser was replaced.
- In 2016, cross arms and poles were replaced at multiple locations.
- In 2016, single-phase fusing was installed at multiple locations.
- In 2017, an Expanded Operational Review will be performed.

Circuit 46001 -- BERWICK 60-01

Remedial Actions

- In 2016, FISR was activated on this circuit.
- In 2016, full circuit trimming was performed.
- In 2016, a new single-phase recloser was installed.
- In 2016, the circuit breaker for this feeder was replaced.
- In 2017, a tie line to the BERWICK 60-03 will be evaluated.
- In 2017, an additional tie line will be evaluated.
- In 2017, a hydraulic recloser will be replaced with a triple-single recloser.
- In 2017, a section of difficult-to-access conductor will be relocated.
- In 2017, two new remotely operable sectionalizing devices will be added to this circuit.

Circuit 61801 -- E ELIZABETHTOWN 18-01

Remedial Actions

- In 2016, single-phase fuses were added at multiple locations.
- In 2016, FISR automatic switching was enabled.
- In 2016, an additional manual switch was installed.
- In 2016, a tie line was built between EAST ELIZABETHTOWN 18-01 and RHEEMS 60-01 lines.
- In 2016, one manual switch was replaced with an automated vacuum recloser as part of the Smart Grid Initiative.
- In 2016 a manual switch was replaced.
- In 2016, a new sectionalizing device was installed near the substation.
- In 2016, additional single-phase fusing was added at six locations.
- In 2016, new circuit breakers were installed on all circuits at this substation. New disconnect switches were also installed on the 18-01 getaway.
- In 2017, a section of single-phase line will be evaluated for re-sourcing.
- In 2018, full circuit trimming will be performed.
- In 2018-2019, 1.5 miles of copper conductor will be reconductored.

Circuit 64201 -- KINZER 42-01

Remedial Actions

- In 2016, a new sectionalizing device was installed on this circuit.
- In 2016, FISR automatic switching was enabled.
- In 2016, a voltage regulator was replaced on this circuit.
- In 2016, a manual switch was replaced with an automated vacuum recloser as part of the Smart Grid Initiative.
- In 2016, single-phase fuses were added at multiple locations.
- In 2017, an Expanded Operational Review will be performed.
- In 2017, the installation of guide rails to reduce vehicle-hit exposure will be investigated.
- In 2018, full circuit trimming and hazard tree removal will be performed.
- In 2018, a non-automated hydraulic recloser will be replaced with an automated model.
- In 2019, a new line and terminal at a neighboring substation will improve tie capability.

Circuit 65603 -- QUARRYVILLE 56-03

Remedial Actions

- In 2016, FISR automatic switching was enabled for all circuits at this substation.
- In 2016, full circuit trimming was performed.
- In 2016, four locations received single-phase fuses.
- In 2016, additional underground cable testing and curing was performed.
- In 2016, an additional switch was installed on this circuit.
- In 2017, fusing will be added at three locations.
- In 2017, a new line and terminal will be constructed to split this circuit. This will also add an additional tie point.
- In 2017, two new Smart Grid devices will be installed.
- In 2017, underground cable curing will be performed.
- In 2017, new relays will be installed on all existing circuits.
- In 2017, a new recloser will be installed on one of the ties.

- 6) *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.*

Inspection & Maintenance Goals/Objectives	2016 Budget	2016 Actual	Variance (%)
Transmission C-tag poles (# of poles)	195	222	13.8%
Transmission arm replacements (# of sets)	150	114	-24.0%
Transmission air break switch inspections (# of switches)	8	8	0.0%
Transmission lightning arrester installations (# of sets)	1,716	1,860	8.4%
Transmission structure inspections (# of structures)	1,809	1,806	-0.2%
Transmission tree side trim-Bulk Power (linear feet)	NA		NA
Transmission herbicide-Bulk Power (# of acres)	NA		NA
Transmission reclearing (# of miles) BES Only	326	326	0.0%
Transmission reclearing (# of miles) 69 kV	769	810	5.3%
Transmission reclearing (# of miles) 138 kV	59	71	20.3%
Transmission danger tree removals-Bulk Power (# of trees)	326	326	0.0%
Substation batteries (# of activities)	654	666	1.8%
Circuit breakers (# of activities)	579	504	-13.0%
Substation inspections (# of activities)	4,545	4,595	1.1%
Transformer maintenance (# of activities)	745	736	-1.2%
Distribution C-tag poles replaced (# of poles)	1,424	1,521	6.8%
C-truss distribution poles (# of poles)	4,600	4,793	4.2%
Capacitor (MVAR added)	410	504	22.9%
OCR Replacements (# of)	99	94	-5.1%
Distribution pole inspections (# of poles)	68,237	68,384	0.2%
Distribution line inspections (hours)	12,944	8,057	-37.8%
Group re-lamping (# of lamps)	15,272	15,272	0.0%
Test sections of underground distribution cable	1,174	1,174	0.0%
Distribution tree trimming (# of miles)	6,579	6,542	-0.6%
Distribution herbicide (# of acres)	NA		NA
Distribution >18" removals within R/W (# of trees)	NA		NA
Distribution hazard tree removals outside R/W (# of trees)	NA		NA
LTN manhole inspections (# of)	553	526	-4.9%
LTN vault inspections (# of)	821	801	-2.4%
LTN network protector overhauls (# of)	91	85	-6.6%
LTN reverse power trip testing (# of)	51	56	9.8%

Explanation of variances greater than 10%:

Transmission C-tag poles: More c-tag poles were completed than budgeted to mitigate risk. Additionally, contractors gained efficiency throughout the year.

Transmission arm replacements: Outage constraints caused work to be deferred into 2017.

Transmission Reclearing: Approximately 10 miles of line needed less work than expected so additional scope was advanced.

Circuit breakers Activities: Outage restraints caused work to be deferred to 2017.

Capacitors: Additional work identified as inspections of capacitors completed resulting in more work execution than budget.

Distribution Line Inspections: Bundling this work with daytime crews and using it as job jar work during inclement weather enabled efficiencies resulting in less actual hours than the budgeted unit rate.

- 7) *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 EDC's own functional account code or FERC account code as available. Explanations of any variances 10% or greater shall be included.*

The following table provides operation and maintenance expenses for PPL Electric, as a whole, and includes the work identified in the response to Item (6).

Activity	2016 Budget (\$000)	2016 Actual (\$000)	Variance (%)
Provide Electric Service	6,350	7,387	16.3%
Vegetation Management	58,256	61,687	5.9%
Customer Response	67,345	61,715	-8.4%
Reliability Maintenance	48,048	49,482	3.0%
System Upgrade	4,182	6,607	58.0%
Customer Service/Accounts	130,661	129,699	-0.7%
Others	42,636	45,834	7.5%
Total O&M Expenses	357,478	362,412	1.4%

Explanation of variances of 10% or greater:

Provide Electric Service: This activity was over budget due to change-of-service work for customers exceeding the original budget.

System Upgrade: This activity was over budget due to unplanned charges from a large transmission reliability project.

- 8) *A comparison of budgeted versus actual transmission and distribution capital expenditures for the year being reported on in total and detailed by the EDC's own functional account code or FERC account code as available. Explanations of any variances 10% or greater shall be included.*

The following table provides capital expenditures for PPL Electric, as a whole, which includes transmission and distribution activities.

Activity	2016 Budget (\$000)	2016 Actual (\$000)	Variance (%)
New Service/Revenue	89,270	75,795	-15.1%
System Upgrade	545,351	547,369	0.4%
Reliability & Maintenance	415,835	427,384	2.8%
Customer Response	12,335	11,738	-4.8%
Other	25,328	24,227	-4.3%
Total	1,088,119	1,086,514	-0.1%

Explanation of variances of 10% or greater:

New Service/Revenue: This activity was under budget due to large project request volume coming in under the projected budget.

Quantified transmission and distribution inspection and maintenance goals/objectives for the current year detailed by system area (that is, transmission, substation and distribution).

Inspection & Maintenance Goals/Objectives	2017 Budget
Transmission	
Transmission C-tag poles (# of poles)	354
Transmission arm replacements (# of sets)	749
Transmission air break switch inspections (# of switches)	0
Transmission lightning arrester installations (# of sets)	0
Transmission structure inspections (# of activities)	33,291
Transmission tree side trim-Bulk Power (linear feet)	N/A
Transmission herbicide-Bulk Power (# of acres)	N/A
Transmission reclearing (# of miles) BES Only	0
Transmission reclearing (# of miles) 69 kV	0
Transmission reclearing (# of miles) 138 kV	0
Transmission danger tree removals-Bulk Power (# of trees)	0
Substation	
Substation batteries (# of activities)	660
Circuit breakers (# of activities)	980
Substation inspections (# of activities)	3,953
Transformer maintenance (# of activities)	169
Distribution	
Distribution C-tag poles replaced (# of poles)	1,480
C-truss distribution poles (# of poles)	3,160
Capacitor (MVAR added)	404
OCR Replacements (# of)	78
Distribution pole inspections (# of poles)	60,080
Distribution line inspections (hours)	6,761
Group re-lamping (# of lamps)	13,994
Test sections of underground distribution cable	N/A
Distribution tree trimming (# of miles)	4,997
Distribution herbicide (# of acres)	N/A
Distribution > 18" removals within R/W (# of trees)	N/A
Distribution hazard tree removals outside R/W (# of trees)	N/A
LTN manhole inspections (# of)	426
LTN vault inspections (# of)	767
LTN network protector overhauls (# of)	50
LTN reverse power trip testing (# of)	35

10) Budgeted transmission and distribution operation and maintenance expenses for the current year in total and detailed by the EDC's own functional account code or FERC account code as available.

The following table provides budgeted operation and maintenance expenses for PPL Electric, in total, and includes the work identified in the response to Item (9).

Activity	2017 Budget (\$000)
Provide Electric Service	5,218
Vegetation Management	53,672
Customer Response	59,332
Reliability Maintenance	35,493
System Upgrade	-1,026
Customer Service/Accounts	128,214
Others	36,736
Total O&M Expenses	317,638

11) Budgeted transmission and distribution capital expenditures for the current year in total and detailed by the EDC's own functional account code or FERC account code as available.

The following table provides budgeted capital expenditures for PPL Electric, in total, and includes transmission and distribution activities.

Activity	2017 Budget (\$000)
New Service/Revenue	74,357
System Upgrade	637,015
Reliability & Maintenance	408,571
Customer Response	11,854
Other	16,292
Total	1,148,089

12) Significant changes, if any, to the transmission and distribution inspection and maintenance programs previously submitted to the Commission.

No significant changes were made to PPL Electric's Inspection, Maintenance, Repair and Replacement Plan for 2017-2018 submitted to the Commission.

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PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU**Appendix A*****PPL Electric Utilities Corporation
Transmission Programs & Procedures***

Program	Activity
Helicopter Inspections – Routine	Aerial linemen perform annual routine transmission line patrols from a helicopter. They identify damaged or deteriorated equipment. Engineers review the findings and develop plans for repair or replacement.
Helicopter Inspections – Comprehensive	Aerial linemen perform an overhead comprehensive inspection of transmission line facilities on a four year cycle. Detailed condition reports with close up digital photos are prepared for each specific component problem found along the transmission line and right of way. Engineers review the findings and schedule corrective maintenance as needed.
Helicopter Inspections – Emergency	Aerial linemen perform patrols of transmission lines that operate abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Because of the nature of this work, corrective actions are usually expedited.
Field Inspections – Emergency	Line personnel perform emergency foot patrols to inspect transmission lines that operated abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Due to the nature of this damage, corrective actions are generally expedited.
Wood Pole – Inspection, Treatment, Replacement, Trussing (reinforcement)	Line personnel examine wood poles for deterioration and measure the degree of rot. Based on the results, the pole is either scheduled for a future inspection, reinforcement for extended life, or replacement.
Equipment Maintenance	During helicopter and foot patrols, equipment and facilities are identified that require repairs. Based on need and criticality, repairs are either scheduled or completed as soon as possible.
Planned Replacement Programs	Line personnel and aerial linemen have completed the planned replacement of all deteriorated spacers and dampers on 500kV circuits. Line personnel also replace deteriorated wood arms identified during condition monitoring inspections.
Line Switches – Maintenance & Inspection	Line personnel inspect, maintain, and perform operational tests on 138kV and 69kV line air break switches to assure proper operation.

Appendix A

Program	Activity
Line Switch Upgrades	Line personnel install lightning arresters on 138kV and 69kV line switches to increase system reliability.
Circuit Analysis	Engineers analyze circuit loading and performance to identify areas needing increased line capacity or improved line reliability.

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Appendix BPA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU***PPL Electric Utilities Corporation
Substation Programs & Procedures***

Program	Activity
Load Survey	Automatic monitoring devices such as Supervisory Control and Data Acquisition (SCADA) provide continuous, real-time loading information. Engineers review equipment loading and identify facilities and transfer capabilities approaching capacity limits. A portion of the load may be supplied from a different source, the existing facilities may be upgraded, new lines and equipment may be added, or a new substation may be built to address capacity deficiencies.
Substation Inspection/Repair	Electricians inspect substations for security and equipment reliability on a time based maintenance cycle. They attempt to identify and correct potential equipment problems before a failure or interruption of service occurs.
Equipment Service	Electricians perform operational tests on power transformers, load tap changers (LTC), voltage regulators, circuit breakers, circuit switchers, vacuum switches, air break switches and transformer protective switches on a time based maintenance cycle to assure that equipment is operating within established parameters. Equipment serviced includes batteries, battery chargers, protective relays, HV fuses and high-speed automatic grounding switches. Depending on the type of equipment, "service" can include actions other than operational testing.
Inspection & Overhaul	Electricians inspect and overhaul circuit breakers, wave traps, ground switches, stick-operated disconnects, gang-operated disconnects and motor-operated disconnects on a time based maintenance cycle to assure proper operation.
Insulation Testing	Electricians perform power factor testing on power transformer, potential transformers, lightning arresters, current transformers, circuit breakers and power cables on a time based maintenance cycle. Testing also includes other instrument transformers (CCVTs, coupling capacitors, potential devices, etc.). They also perform high-potential testing on air and vacuum circuit breakers to assure proper operation.
Condition Monitoring of Station Equipment	Technicians perform dissolved gas-in-oil, dielectric, oxygen, and oil acidity tests for oil in power transformers and impedance and capacity tests on station batteries to assure equipment is within normal parameters. Periodically, AC power factor tests, hi-potential tests, contact resistance tests and motion tests are performed on circuit breakers. Oil dielectric testing is conducted for oil circuit breakers.

Appendix B

Program	Activity
Thermographic Inspections	Technicians perform thermography surveys of substation facilities to identify components operating at elevated temperature. Based on the findings, engineers develop plans to repair or replace the component(s) prior to failure.
Minor Improvements	Maintenance activities may identify conditions where additions or upgrades are needed to assure reliability. Engineers evaluate the need and develop action plans and schedules to complete the work.
DC Station Service Improvements	Repairmen identify deteriorated station batteries, battery chargers and battery components. Engineers schedule repair or replacement as necessary.
Capacitor Bank Protection	Engineers monitor the need for synchronous closing schemes on vacuum switches on 69kv capacitor banks. They plan and schedule installations as needed.
Area/Regional Supply	Engineers develop specific projects aimed at improving capacity shortfalls or replacing deteriorated or substandard station equipment.
SCADA Replacement	Engineers identify deteriorating substation SCADA equipment and develop plans to repair or replace it.

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Appendix CPA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU***PPL Electric Utilities Corporation
Distribution Programs & Procedures***

Program	Activity
Load Survey – of equipment that is not continuously monitored	Line personnel measure the loading of facilities during peak periods. Engineers use this data for system studies.
Load Survey – by automatic monitoring devices	Automatic monitoring devices such as SCADA provide continuous, real-time loading information. Operators use this data to assure that loads do not exceed design limits. Engineers use this data for system studies.
Circuit Analysis	Engineers analyze circuit voltage profiles to balance loads and to identify areas requiring voltage support to maintain required voltage at the customer facility.
Voltage Regulator – Inspection & Maintenance	Line personnel inspect existing equipment for potential failure, and inspect and maintain controls and tap changers to assure proper operation. Line personnel repair or replace any defective equipment.
Overhead Line Switch – Inspection & Maintenance	Line personnel inspect switch installations to identify cracked or broken insulators / bushings, stuck or misaligned blades, insulation or gasket deterioration or other operational problems. Line personnel repair or replace any defective equipment.
Transformer Maintenance	Engineers analyze customer usage data to identify overloaded transformers. Transformers that are heavily loaded are replaced with higher capacity units or part of the load is transferred to other nearby transformers.
Wood Pole – Inspection, Maintenance, Replacement, Trussing, Fiber Wrap (reinforcement)	Inspectors examine wood poles for deterioration and measure the degree of rot. Based on the results, the pole is either scheduled for a future inspection, reinforcement for extended life or replacement.
Overhead Line Inspection	Line inspectors examine overhead facilities to identify damaged, deteriorated or substandard equipment. Line personnel repair or replace any defective equipment. Includes visual and thermo-graphic inspections.
Circuit Performance Review	Engineers use the PPL Electric's Circuit Performance Index to ascertain the need for additional circuit reviews / inspections.

Appendix C

Program	Activity
Underground Primary Cable – Testing, Maintenance, Replacement, Curing	Line personnel perform insulation and neutral tests on cable in residential developments with potential problems to identify deteriorated cable. Based on the results, the cable is placed back in service, repaired or replaced.
LTN Maintenance	Electricians will inspect, service, maintain and overhaul LTN vaults, manholes, cables, transformers, low voltage network protectors and primary transformer disconnect switches. Based on results, defective equipment is either repaired or replaced.
Public Damaged Facilities Review	A program aimed at identifying the locations of facilities that have been damaged by public contact more than once. Technicians evaluate those installations and, if relocation is possible, schedule work to move the facilities.
Underground Service Cable	Engineers resolve customer service problems that are due to deteriorated service conductors.
Oil Circuit Reclosers	Line personnel replace in-service oil circuit reclosers on a time based maintenance cycle. Removed units are overhauled, tested and returned to service.
Line Protection Equipment	Engineers perform load calculations to identify line protection devices that are approaching their capacity limits. Devices are replaced or upgraded to assure that they function properly.
Capacitor Installation	Engineers perform voltage profiles to determine the need, location and size of any new voltage support equipment required to maintain adequate service voltage levels at customer facilities and provide needed reactive support for system stability. Line personnel install the required equipment.
Upgrade System Facilities	Engineers determine the need for additional capacity and design new and upgraded facilities to assure system reinforcements are constructed by the time they are needed.

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Appendix D

PA PUBLIC UTILITY COMMISSION **PPL Electric Utilities Corporation**
SECRETARY'S BUREAU ***Vegetation Programs & Procedures***

Program	Activity
Tree Pruning	Tree pruning is scheduled based on field conditions observed and/or a system prioritization process. All pruning is done in accordance with <u>American National Standard for Tree Care Operations-Tree, Shrub and Other Woody Plant Maintenance – Standard Practices (ANSI A300)</u> . All circuits are fully trimmed on a 4 year cycle (south) or a 5 year cycle (north), with intermediate work performed on an as-needed basis.
Danger Tree Removal	Trees located both within the right-of-way corridor and outside the right-of-way that may be a threat to line performance/ safety are removed when it is feasible to do so.
Herbicide Application	Tall-growing, undesirable vegetation growing within the rights-of-way corridors is selectively treated with herbicides. Low-growing vegetation that does not represent a hazard to the safe, reliable operation of PPL Electric's facilities is preserved wherever possible.
Reclearing	Tall-growing, undesirable vegetation growing within the rights-of-way corridors is selectively removed in those situations where herbicides can't be utilized. Low-growing vegetation that does not represent a hazard to the safe, reliable operation of PPL Electric's facilities is preserved wherever possible.

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Appendix EPA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU***PPL Electric Utilities Corporation
Service Interruption Definitions***

Trouble Definitions: After field investigations and repairs are complete, PPL Electric linemen report the cause of each case of trouble. The definitions of the cause codes appear below. Note that while internal codes allow vegetation caused outages to be separated into trimming related and not trimming related, these categories are generally merged for internal reporting purposes as well as on page 8 of this report.

Improper Design	Controllable	When an employee or agent of PPL Electric is responsible for an error of commission or omission in the engineering or design of the distribution system.
Improper Installation	Controllable	When an employee or agent of PPL Electric is responsible for an error of commission or omission in the construction or installation of the distribution system.
Improper Operation	Controllable	When an employee or agent of PPL Electric is responsible for an error of commission or omission in the operation or maintenance of the distribution system.
Trees –Trimming Related	Controllable	Outages resulting from conductors contacted by tree growth within the clearance zone defined by the current trimming specification (within the Right-of-Way).
Trees – Not Trimming Related	Non-Controllable	Outages due to trees, but not related to lack of proper tree trimming maintenance. This includes danger timber blown into PPL Electric facilities, and trees or limbs felled by the public.
Animals	Controllable	Any outage caused by an animal directly or indirectly coming in contact with PPL Electric facilities. This includes birds, squirrels, raccoons, snakes, cows, etc.
Vehicles	Public	When cars, trucks or other types of vehicles or their cargoes strike facilities causing a problem.
Contact/Dig-in	Public	- When work in the vicinity of energized overhead facilities results in interruptions due to accidental contact by cranes, shovels, TV antennas, construction equipment (lumber, siding, ladders, scaffolding, roofing, etc.). - When contact is made by a non-employee with an underground facility causing interruption.

Appendix E

Equipment Failure	Controllable	• Outages resulting from equipment failures caused by corrosion or contamination from build-up of materials, such as cement dust or other pollutants. • Outages resulting from a component wearing out due to age or exposure, including fuse tearing or breaking. • Outages resulting from a component or substance comprising a piece of equipment failing to perform its intended function. • Outages resulting from a failure that appears to be the result of a manufacturer's defect or cannot be described by any other code indicating the specific type of failure.
Directed by Non-PPL Authority	Non-Controllable	• Interruptions under the control of a PPL Electric switchman or direction of a PPL Electric System Operator for the purpose of dropping load or isolating facilities upon request during emergency situations. • Interruptions which cannot be postponed or scheduled for a later time, and include situations like load curtailment during system emergencies, and requests of civil authorities such as fire departments, police departments, civil defense, etc. for interruption of PPL Electric facilities.
Other – Controllable (Lineman provides explanation)	Controllable	• Interruptions caused by phase to phase or phase to neutral contacts, resulting from sleet or ice dropping off conductors, galloping conductors, or any other phase to phase or phase to neutral contact where weather is a factor. • Interruptions resulting from excessive load that cause that facility to fail. • When restoration of service to a facility, which had been interrupted for repairs or other reasons, causes an additional interruption to another facility which had not been involved in the initial interruptions. • Controllable interruptions or Power Service Problems whose cause is not described by one of the previous controllable cause codes.
Nothing Found	Non-Controllable	• When no cause for the interruption can be found. • When there is no evidence of equipment failure, damage or contact after line patrol is completed. This could be the case during a period of heavy thunder and lightning, when a line fuse blows or a single phase OCR locks open. • When closed for test, the fuse holds or the OCR remains closed. A patrol of the tap reveals nothing.

Appendix E

Other Public (Lineman provides explanation)	Public	• All outages resulting from gunfire, civil disorder, objects thrown, or any other act intentionally committed for the purpose of disrupting service or damaging company facilities.
Other – Non-Controllable (Lineman provides explanation)	Non-Controllable	• Any outage occurring because of a fire, flood or a situation that develops as a result of a fire or flood. Do not use when facilities are de-energized at the request of civil authorities. • When an interruption is caused by objects other than trees, such as kites, balls, model airplanes, roofing material, or fences, being accidentally blown or thrown into overhead facilities. • All problems caused by contact of energized equipment with facilities of other attached companies or by trouble on customer owned equipment. • Interruptions or Power Service Problems whose cause is not described by one of the previous non-controllable cause codes, but is not affected by a PPL Electric employee's decisions.

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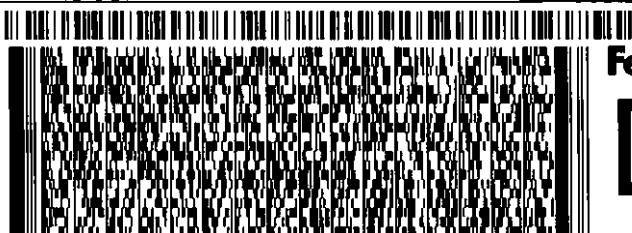
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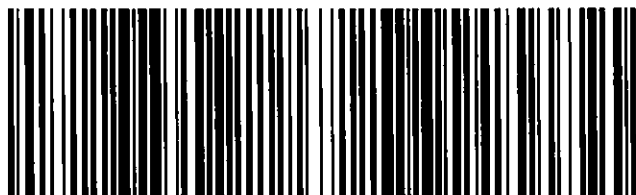
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