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**FEDERAL EXPRESS**

April 30, 2013

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

**RECEIVED**

**APR 30 2013**

PA PUBLIC UTILITY COMMISSION  
SECRETARY'S BUREAU

**Re: PPL Electric Utilities Corporation  
Quarterly Reliability Report for the  
Period Ended March 31, 2013  
Docket No. L-00030161**

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") are an original and five (5) copies of PPL Electric's Quarterly Reliability Report for the Period Ended March 31, 2013. Also enclosed, in a sealed envelope, is a copy of the report containing competitively sensitive and proprietary information. The Company hereby requests that the Commission treat that information, and the report containing the information, as privileged and confidential. The report is being filed pursuant to the Commission's Final Rulemaking Order adopted May 7, 2004 in the above-captioned docket.

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on April 30, 2013, 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 this document, please call me or B. Kathryn Frazier, PPL Electric's Regulatory Affairs Manager at (610) 774-3372.

Very truly yours,

Paul E. Russell

Enclosures

cc: Mr. Darren Gill  
Mr. Daniel Searfoorce



**PPL Electric Utilities**

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

*April 2013*

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**PA PUBLIC UTILITY COMMISSION  
SECRETARY'S BUREAU**

***1) A description of each major event that occurred during the preceding quarter, 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.***

There were no major events during the first quarter of 2013.

- 2) **Rolling 12-month reliability index values (SAIFI, CAIDI, SAIDI, and if available, MAIFI) for the EDC's service territory for the preceding quarter. 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 report shall also include the number of customer momentary interruptions.**

The following table provides data for the 12 months ended March 31, 2013<sup>1</sup>.

<b>SAIFI (Benchmark = 0.98; Rolling 12-month Std. = 1.18)</b>	1.11
<b>CAIDI (Benchmark = 145; Rolling 12-month Std. = 174)</b>	152
<b>SAIDI (Benchmark = 142; Rolling 12-month Std. = 205)</b>	168
<b>MAIFI<sup>2</sup></b>	4.07
<b>Average Number of Customers Served<sup>3</sup></b>	1,393,644
<b>Number of Sustained Customer Interruptions (Trouble Cases)</b>	16,396
<b>Number of Customers Affected<sup>4</sup></b>	1,544,791
<b>Customer Minutes of Interruptions</b>	234,722,836
<b>Number of Customer Momentary Interruptions</b>	5,674,011

During the 1st quarter there were no (0) PUC major events, no (0) PUC Reportable storms, and one (1) other storm that required the opening of one or more area emergency centers to manage restoration efforts.

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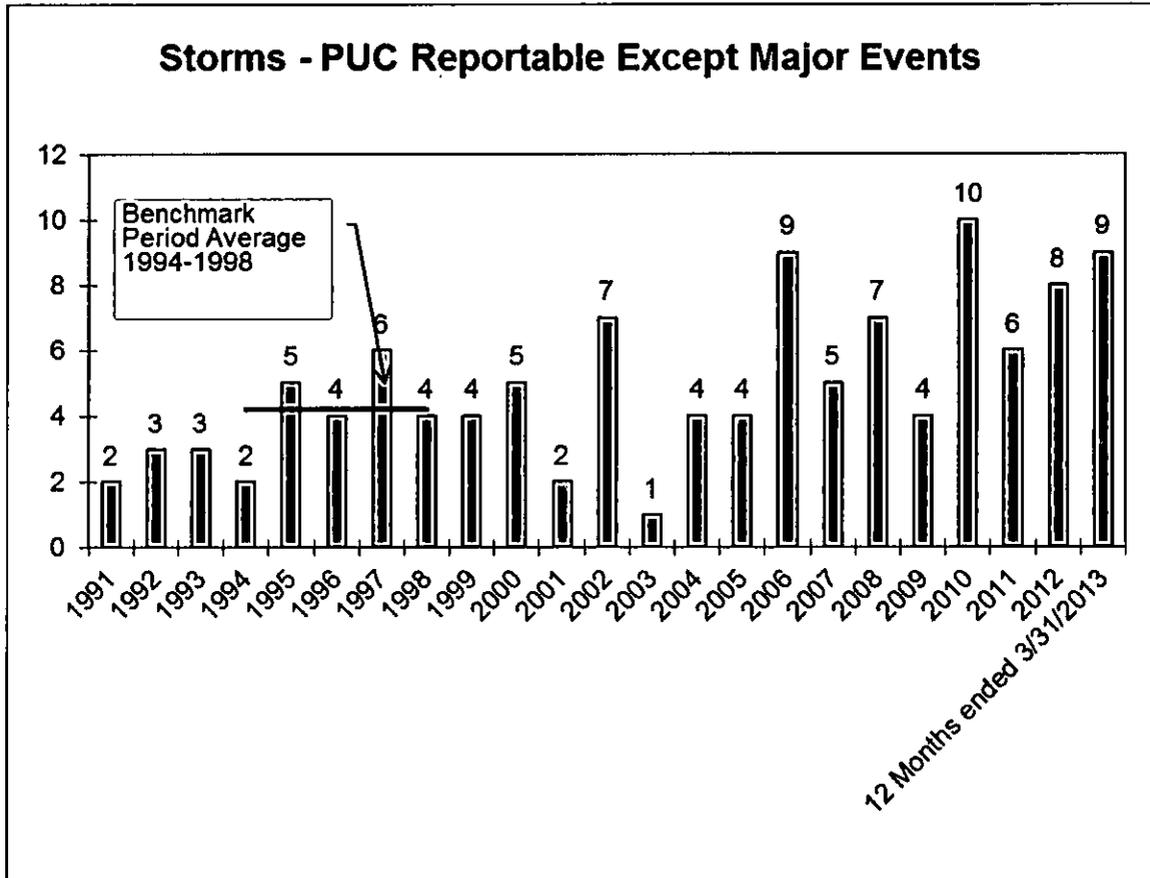
<sup>1</sup> Non-PPL Electric problems are excluded here, but may be found in Item 5.

<sup>2</sup> MAIFI data is obtained at the substation breaker and does not include momentary interruptions at lower level devices.

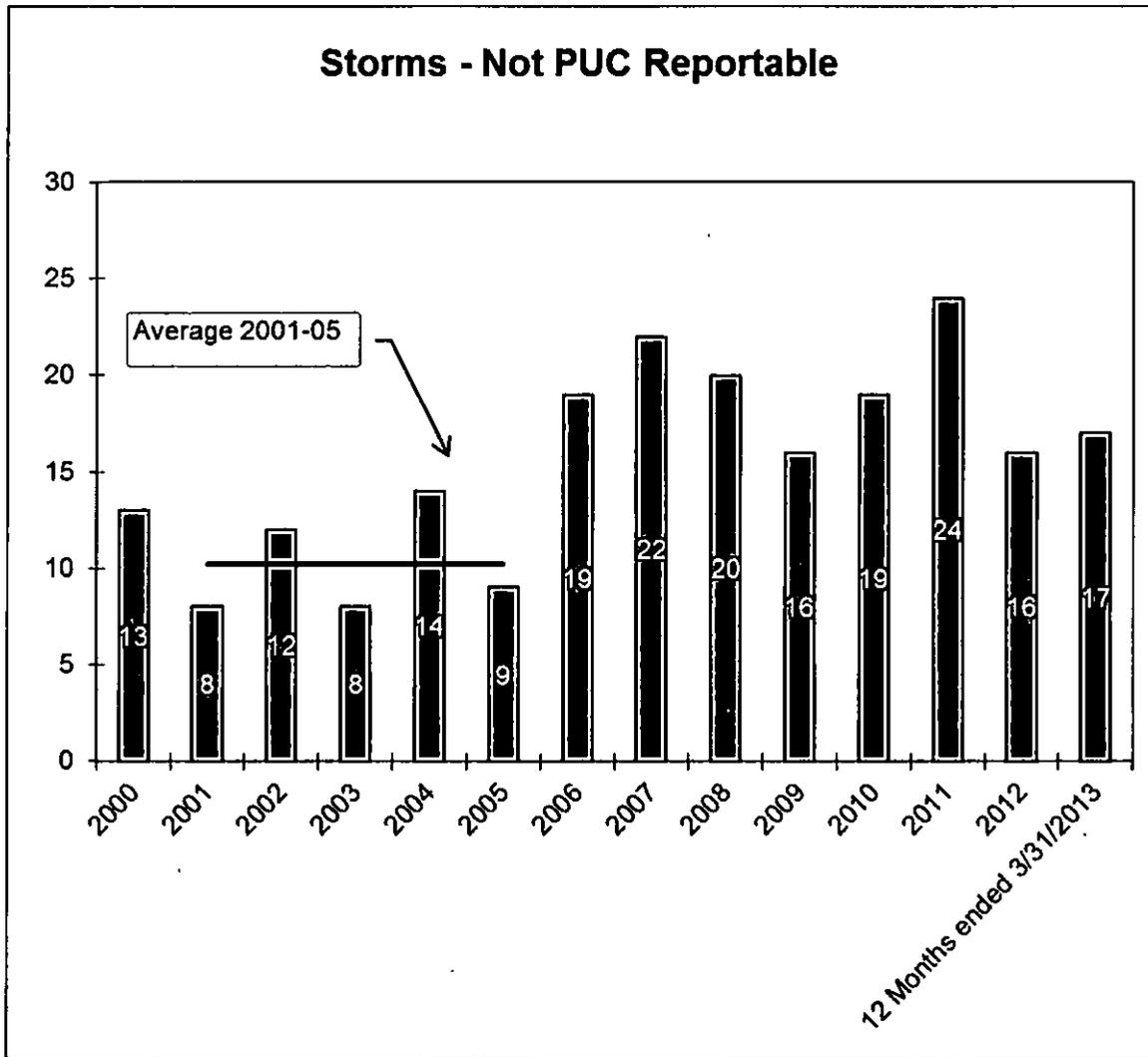
<sup>3</sup> PPL Electric calculates the annual indices using customers served at the end of the period. This is consistent with the method used to calculate PPL Electric's benchmarks.

<sup>4</sup> 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.

Specifically, during the 12-month reporting period, there was one (1) PUC major event and nine (9) PUC-reportable storms ( $\geq 2,500$  customers interrupted for  $\geq 6$  hours) other than major events.



In addition, there were seventeen (17) storms that were not reportable, but which did require the opening of one or more area emergency centers to manage restoration efforts.



3) **Rolling 12-month reliability index values (SAIFI, CAIDI, SAIDI, and if available, MAIFI) and other pertinent information such as customers served, number of interruptions, customer minutes interrupted, number of lockouts, and so forth, for the worst performing 5% of the circuits in the system. An explanation of how the EDC defines its worst performing circuits shall be included.**

The following table provides reliability index values for the worst performing 5% of the circuits in the system for the 12 months ended at the current quarter. An explanation of how PPL Electric defines its worst performing circuits is included in Appendix A.

WPC Rank	Feeder ID	SAIFI	CAIDI	SAIDI	MAIFI <sup>5</sup>	Customers	Cases of Trouble <sup>6</sup>	Customer Minutes Interrupted	CPI
1	25101	87.25 <sup>7</sup>	157.55	13,733	10.29	24	3	329,599	6,835
2	28701	3.09	1,002.2	3,100.2	2.12	805	18	2,495,695	1,173
3	25502	8.51	85.09	724.00	7.25	486	20	351,862	1,023
4	28302	5.14	164.88	847.14	4.36	2,791	84	2,364,374	968
5	11406	3.05	267.55	815.83	4.04	1,016	12	828,881	967
6	18501	4.70	185.87	874.13	3.01	1,458	35	1,274,483	965
7	53601	6.75	82.68	558.24	1.01	1,116	37	622,992	886
8	53302	5.28	122.46	646.85	3.06	358	13	231,574	856
9	67803	4.59	242.48	1,113.0	10.09	1,964	32	2,185,971	843
10	22601	6.52	87.90	573.11	4.89	1,054	49	604,058	797
11	51401	5.18	84.17	436.40	1.00	465	11	202,925	781
12	53901	4.57	117.41	537.10	4.13	1,185	26	636,467	778
13	28001	4.93	100.31	494.60	1.01	1,770	53	875,442	778
14	24401	2.45	731.57	1,792.0	5.80	1,230	36	2,204,217	776
15	16802	4.87	97.42	474.07	11.42	866	30	410,543	756
16	24103	4.46	96.46	430.28	3.14	1,079	11	464,269	741
17	67802	3.35	145.85	489.14	3.01	164	6	80,219	733
18	43101	3.41	279.18	951.50	3.02	1,438	30	1,368,251	727
19	16301	3.21	96.50	309.41	1.00	1,789	28	553,542	720
20	45402	3.45	298.51	1,030.0	8.65	1,600	53	1,648,077	714
21	13902	4.13	145.81	602.81	16.89	1,854	22	1,117,608	708
22	20403	3.64	109.88	399.93	0.00	1,910	41	763,862	707
23	47502	3.64	232.04	845.32	3.06	790	25	667,804	692
24	25801	3.04	390.23	1,185.5	0.00	1,811	36	2,147,029	689
25	21603	12.02	83.22	1,000.0	1.00	183	2	183,010	682
26	62604	3.99	96.88	386.43	3.05	1,344	12	519,355	678

<sup>5</sup> MAIFI data is obtained at the substation breaker and does not include momentary interruptions at lower level devices.

<sup>6</sup> Cases of trouble are the number of sustained customer service interruptions.

<sup>7</sup> Circuit 25101 has only 24 customers but was carrying Throop 61-04 (a much larger circuit) during one interruption, resulting in exceptionally high circuit SAIFI and circuit SAIDI values.

WPC Rank	Feeder ID	SAIFI	CAIDI	SAIDI	MAIFI <sup>5</sup>	Customers	Cases of Trouble <sup>6</sup>	Customer Minutes Interrupted	CPI
27	55401	3.19	251.21	801.12	1.99	2,163	22	1,732,829	671
28	43102	3.29	231.31	761.64	9.58	977	19	744,122	663
29	47704	3.34	446.37	1,490.3	1.00	735	33	1,095,394	660
30	60406	9.39	127.94	1,201.6	4.04	204	1	245,127	655
31	25501	3.25	157.06	509.96	6.04	1,649	37	840,920	653
32	11405	4.21	94.14	396.09	7.18	1,862	20	737,528	645
33	43302	5.71	264.77	1,511.0	2.02	174	8	262,914	636
34	60502	4.37	110.90	484.28	0.00	1,879	25	909,969	621
35	55507	2.01	95.35	191.92	2.14	1,011	12	194,032	619
36	27501	1.29	1,040.4	1,341.2	5.73	1,245	18	1,669,855	615
37	53602	4.56	75.86	346.04	11.57	2,179	66	754,019	609
38	67402	3.31	169.15	560.00	0.00	1,317	28	737,514	601
39	29301	2.11	28.30	59.76	4.05	402	7	24,024	601
40	24402	3.21	243.72	783.18	6.14	492	17	385,324	596
41	22602	4.49	69.38	311.26	4.07	1,538	34	478,711	591
42	43001	3.80	153.83	584.84	8.27	979	53	572,563	589
43	13503	3.19	151.08	482.06	8.34	1,426	18	687,414	570
44	56802	5.32	73.09	389.18	6.18	1,402	34	545,631	568
45	53501	3.91	124.51	486.97	1.99	2,141	45	1,042,613	566
46	16202	2.20	503.36	1,104.9	3.15	1,465	14	1,618,806	565
47	43202	2.31	212.97	491.80	5.12	1,135	36	558,197	565
48	16801	3.45	118.69	409.34	3.10	1,602	33	655,770	559
49	46503	1.20	1,045.3	1,251.5	1.99	436	8	545,660	556
50	22002	4.16	102.91	428.23	0.00	1,401	36	599,945	554
51	28501	1.00	1,267.8	1,267.8	3.35	1	1	1,268	554
52	23401	4.04	110.35	445.71	7.03	1,735	54	773,303	552
53	47703	2.72	299.49	815.53	2.05	1,383	39	1,127,872	550
54	24102	3.50	82.17	287.67	3.14	553	8	159,079	541
55	64202	3.27	212.16	694.25	0.00	1,021	23	708,824	537
56	10205	3.26	208.59	679.23	4.21	2,837	22	1,926,982	534
57	24301	2.14	462.84	989.85	6.26	1,695	8	1,677,793	521
58	26001	3.01	225.09	677.59	4.05	1,355	50	918,137	508

PPL Electric’s Circuit Performance Index (“CPI”) is derived from the frequency and duration of service interruptions that occurred during the specified time period. Improving a circuit’s CPI depends upon reducing either the service interruption frequency or the duration of interruptions, or both. When a new circuit appears among the 5% worst performing, the first step undertaken is to perform a “circuit outage data analysis.” This consists of analyzing the actual service interruptions, which occurred during the time span, to determine whether there are causal patterns or geographic patterns for which corrective actions are feasible that would improve the circuit’s CPI.

PPL Electric currently is implementing improvements to its Worst Performing Circuit program.

**4) *Specific remedial efforts taken and planned for the worst performing 5% of the circuits identified in paragraph (3).***

**01 Circuit ID: 25101, Jessup 51-01**

Performance Analysis

One major outage significantly affected this circuit's reliability during the past four quarters. On July 15, 2012, a transmission outage affected the Jessup substation, interrupting 2,066 customers for up to 154 minutes, and resulting in 318,143 CMI.

In total, the Jessup 51-01 circuit had 3 outages between the months of March 2012 and April 2013. The causes of these outages include: tree related (2), and transmission related (1).

Remedial Actions

- The Jessup 51-01 Circuit performance Index (CPI) score is almost entirely attributable to the transmission outage of July 15, 2012, which interrupted over 47,000 customers in total. No component of the Jessup 41-01 circuit was attributable to that outage. The circuit itself is short (1/2 mile) and has a good reliability history. At this time no specific remedial action is required on the Jessup 51-01. The circuit will be reviewed again at the Northeast Quarter 1 Worst Performing Circuit meeting.

**02 Circuit ID: 28701, HAMLIN 87-01**

Performance Analysis

Three major power outages significantly affected this circuit's reliability in the past four quarters. On July 26, 2012 a tree from outside the right of way caused the 87-01 breaker to trip to lockout. This outage affected 816 customers for up to 2,888 minutes resulting in 2,357,155 CMI.

On May 14, 2012 a tree from outside the right of way caused the 87-01 breaker to trip to lockout. The outage affected a total of 813 customers and lasted 137 minutes, resulting in 75,285 CMI.

On June 12, 2012, a tree from outside the right of way caused the 87-01 circuit breaker trip to lockout. This outage affected 816 PPL customers and lasted 201 minutes resulting in 58,009 CMI.

In total, the 87-01 12 kV line had 18 outages between the months of March 2012 and April 2013. The primary causes of these outages include equipment failures (7), tree related (5), animal contacts (5), and vehicle hits (1).

### Remedial Actions

- A project is planned to replace OCR 28/61 and LBAS 60/47 with a new automated VCR and automated switch respectively. These projects will reduce outage durations and allow for more rapid switching of the Hamlin 87-01 circuit, and will be in service in 2014.
- A project is planned to transfer a single phase tap that has historically caused circuit breaker outages due to protection issues. This project will reduce future circuit breaker outages caused by this single phase tap and will be in service in 2013.
- The entire Hamlin 87-01 line will be trimmed in the early part of 2014.
- The Hamlin circuit will be evaluated for animal guarding in 2013.

### **03 Circuit ID: 25502, MADISONVILLE 55-02**

#### Performance Analysis

Three major power outages significantly affected this circuit's reliability in the past four quarters. On December 5, 2012 a tree from outside the right of way caused the 55-02 breaker to trip to lockout. This affected 589 customers for up to 528 minutes, resulting in 78,248 CMI.

On July 27, 2012 the 55-02 breaker tripped to lockout. Due to abnormal sectionalizing of the 12kV system at the time, the outage affected 2,138 customers for up to 35 minutes, resulting in 75,835 CMI.

On July 15, 2012 the transmission line feeding the Madisonville substation experienced an outage. This outage affected 506 customers for up to 133 minutes, resulting in 67,338 CMI.

In total, the 55-02 circuit line had 20 outages between the months of March 2012 and April 2013. The primary causes of these outages include: tree related (10), equipment failures (6), other/nothing found (3), and animal contacts (1).

#### Remedial Actions

- The entire Madisonville 55-2 line will be trimmed in the early part of 2014.
- Targeted tree trimming will be performed for 0.9 miles of single phase conductor in 2013.

## **04 Circuit ID: 28302, NEWFOUNDLAND 83-02**

### Performance Analysis

Four major power outages significantly affected this circuit's reliability in the past four quarters. On December 9, 2012, a vehicle hit on the 83-02 circuit caused the OCR at 68030N41881 to trip open affecting 1,724 customers for up to 680 minutes. The total CMI for this outage was 1,098,974.

On May 4, 2012, the 83-02 breaker tripped to lockout affecting 2,813 customers for up to 98 minutes, resulting in 271,925 CMI.

On September 18, 2012, a tree from outside the right of way caused the 83-02 breaker to trip to lockout affecting 99 customers for a total of 1,277 minutes, resulting in 126,402 CMI.

On March 29, 2013, a vehicle hit on the 83-02 line caused the OCR at 66696N42397 to trip open affecting 665 customers for a total of 475 minutes, resulting in 107,411 CMI.

In total, the 83-2 12 kV line had 84 outages between the months of March 2012 and April 2013 (44 of which affected five or fewer customers). The primary causes of these outages include: tree related (37), equipment failures (19), animal contacts (17), vehicle hits (6), and other/nothing found (5).

### Remedial Actions

- Super project number 33013 will create a new tie between Newfoundland 83-02 and Tafton 80-01 Tie Line. This project will improve sectionalizing and transfer capability which will reduce outage duration and restoration times. The project's scheduled in service date is June 30, 2013.
- A total of 1.8 miles of targeted tree trimming is scheduled for the 83-02 line.
- Super project number 33101 which is to build a new Ledge Dale substation is set to be completed in June of 2013. This will move 1,336 customers off of the Tafton 80-01 line to a new line out of the new Ledge Dale Substation. This project increases reliability and transfer capability of customers now on the Tafton 80-01 line. The project's scheduled in service date is June 30, 2013.
- Super project number 35101 will construct a new 69/12 kV substation at Angels and is scheduled to be in service November 30, 2014. When constructed, the Angels Substation project will create greater operational flexibility, reduce outage exposure, and increase automation for customers that are currently on the Newfoundland 83-2 12kV circuit.
- A reliability preservation project will construct a new tie line between the Newfoundland 83-02 and North Coolbaugh 88-01 lines. This will increase the reliability and transfer capability of the 83-02 circuit. The project has a required in-service date of November 30, 2015.

## **05 Circuit ID: 11406, Farmersville 14-06**

### Performance Analysis

During the past twelve months there have been three circuit breaker lockouts that interrupted all 1,028 customers on this line. The first, in April of 2012, while a crew was at the substation performing scheduled work; improper operation of a control handle caused the entire substation to experience an interruption.

In July of 2012, there were two circuit breaker lockouts. Both caused by a trees falling on the line from outside the right-of-way during inclement weather. Sectionalizing and restoration was delayed during the second outage due to an adjacent “tie” circuit also being out of service due to the weather.

In addition to these large outages, there have been nine small outages involving distribution transformers or single phase tap fuses. All of these outages affected fewer than 10 customers, less one, which affected 23. These outages can be attributed to equipment failures and trees falling onto overhead lines.

In summary, there have been 12 outages on the 14-06 circuit during the last 12 months contributing to the CPI of 967. The causes have been tree related (7), equipment failures (4), and improper operation of equipment (1).

### Remedial Actions

- Four new single phase tap fuses will be installed during 2013.
- Two new reclosers will be installed on the line to isolate problem pockets from interrupting the entire line. The first is scheduled to be completed in June of 2013, and the other in December 2013.
- Two existing manually controlled switches will have automation installed on them in December of 2013.
- Three-Phase Load Break Disconnects will be installed on a tap near the end of the line in December 2013.
- The entire circuit was last trimmed in 2010 and will be trimmed again in 2014.
- This circuit will have distribution automation implemented in 2014.

## **06 Circuit ID: 18501 CANADENSIS 85-01**

### Performance Analysis

A single major tree related outage and two equipment failure outages significantly affected this circuit's reliability in the past four quarters. On May 4, 2012, an operation of the 85-01 breaker relay caused the 68-02 breaker to trip to lockout, interrupting 1,463 customers for up to 96 minutes, resulting in 833,358 CMI.

On July 15, 2012, a tree from outside the right of way caused the 85-01 OCR at grid 68216N37652 to trip to lockout. This outage affected 93 customers for up to 122 minutes, resulting in 79,483 CMI.

On September 18, 2012, a tree from outside the designated right of way caused the 85-01 breaker to trip to lockout. This outage affected 1,534 customers for up to 1,842 minutes, resulting in 139,219 CMI.

In total, the Canadensis 85-01 circuit had 28 outages between March 2012 and April 2013. The primary causes of these outages include: tree related (14), animal contacts (3), equipment failures (8), and vehicle hits (3).

### Remedial Actions

- The Canadensis 85-01 12 kV line is part of PPL's 2013 Smart Grid Pocono Project, scheduled to be complete December 2013. This project will strategically add and upgrade sectionalizing devices on the circuit to reduce future outage durations and improve the overall sectionalizing capability in the area.
- A full line inspection is scheduled for May 30, 2013, that will be used to identify improvements that will reduce potential outages on line.
- Approximately 1.1 miles of spot tree trimming will be performed on this circuit in 2013 in order to prevent tree related outages.
- Nine CEMI 5 customers will be relocated to a more reliable source (Canadensis 85-02 line). The project is set to be complete by end of year 2014.

## **07 Circuit ID:53601, DALMATIA 36-01**

### Performance Analysis

Five major circuit breaker operations significantly affected this circuit's reliability in the past four quarters. Equipment failure is the most common outage cause.

On May 18, 2012, the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal when contractor's rigging broke loose making contact with one phase of the Sunbury-Dauphin 69kv line. This outage affected approximately 10,220 customers at Halifax, Dalmatia, and Elizabethville substations. 1,143 customers on the Dalmatia 36-01 were interrupted for up to 79 minutes, resulting in 90,297 CMI.

On June 6, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 1,128 customers on the Dalmatia 36-01 were interrupted for up to 63 minutes, resulting in 70,398 CMI.

On November 10, 2012, a three phase VCR failed and caused the 36-01 circuit breaker trip to lockout interrupting 1,193 customers for up to 116 minutes, resulting in 114,945 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 1,196 customers on the Dalmatia 36-01 were interrupted for up to 54 minutes, resulting in 64,118 CMI.

On January 16, 2013, a squirrel caused a pole top fire after making contact with a distribution transformer. The pole top fire caused the circuit breaker to trip and interrupted 1,197 customers for up to 223 minutes, resulting in 155,894 CMI.

In total, the Dalmatia 36-01 12 kV line had 37 outages between April 2012 and March 2013. The causes of these outages include: equipment failures (15), tree related (10), animal contacts (5), nothing found (4), vehicles (2), and contact / dig-in (1).

### Remedial Actions

- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. Nineteen sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.
- Additional single phase fusing is scheduled to be installed on a problematic tap by June 1, 2013.
- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. No trouble spots were identified.

- In October 2012, a patrol was completed on a three mile section of line along Route 147 near Herndon to identify possible locations for sectionalizing devices. No new sectionalizing locations were found. The customer count distribution and most common trouble locations limit potential reliability savings. Three phase outages are limited to 350 customers on this particular 3 mile radial tap.
- An existing 5.5 mile tie with Elizabethville substation is scheduled to be reconducted by December 2015. The tie is currently load limited due to conductor size.

## **08 Circuit ID:53302, GRATZ 33-02**

### Performance Analysis

Five circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Equipment failures were the most common outage cause.

On June 6, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 359 customers on the Gratz 33-02 were interrupted for up to 210 minutes, resulting in 74,830 CMI.

On September 7, 2012 the Eldred-Pine Grove transmission 69kV line tripped and remained open at Eldred terminal while the line was abnormal carrying Williamstown, Lykens, and Gratz substations for scheduled work. The Eldred RTU was down for Verizon work when the line tripped. Lightning analysis indicated a strike to the line directly adjacent to Frailey substation. Had the RTU been in service without a green tag applied, the lightning strike would have only been a momentary outage. 363 customers on the Gratz 33-02 were interrupted for up to 6 minutes, resulting in 2,178 CMI.

On November 8, 2012, the 3 phase VCR being used as a breaker tripped and did not reclose through SCADA for test. After nothing was found during a field patrol, the VCR was closed manually and held. The outage interrupted 376 customers for up to 142 minutes, resulting in 51,356 CMI.

On November 15, 2012, the three phase VCR being used as a breaker failed. The outage interrupted 376 customers for up to 213 minutes, resulting in 77,955 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 374 customers on the Gratz 33-02 were interrupted for up to 54 minutes, resulting in 19,949 CMI.

In total, the Gratz 33-02 circuit line had 13 outages between April 2012 and March 2013. The causes of these outages include: equipment failures (6) nothing found (5), and tree related (2).

## Remedial Actions

- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. Two overheating load break cutouts were subsequently replaced.
- The Gratz 33-02 line was last trimmed during its four year vegetation management cycle trimming in September 2012.
- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. 19 sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.

## **09 Circuit:67803, West Lancaster 78-03**

### Performance Analysis

The West Lancaster 78-03 line has approximately 1,986 customers across 36 circuit miles. The largest contributor to the CPI (Circuit Performance Index) has been SAIDI. Of the top 10 outages in the past year, four occurred on the same day (July 7, 2012) due to a severe T&L storm. That storm resulted in over 975,000 CMI.

Four of the other interruptions were caused by trees from outside the right of way, for a total of 603,868 CMI. One was caused by a vehicle hit that interrupted 1,992 customers for 602 minutes and one was caused by an equipment failure that impacted 1,973 customers for 141 minutes. The West Lancaster 78-03 circuit had not previously been on the Worst Performing Circuit list.

### Remedial Actions

- Hot spot tree trimming was done on various line sections of the circuit on the following dates: 6/23/2012, 7/21/2012, 7/28/2012, 8/18/2012, 10/06/2012, and 1/24/2013.
- Full circuit tree trimming is scheduled for 2014.
- Additional switches were installed at grid 38703S25381 on March 5, 2013, to minimize the number of customers affected by interruptions.
- Existing sectionalizing and tie devices will be automated in 2015 as part of PPL's Smart Grid program.
- The Transformer #1 Circuit Breaker will be replaced in 2015 to increase the capability of the substation which will help minimize the number of customer affected by interruptions.
- The underground primary cable in the Woodgate URD will be cable cured sometime in 2015. This should greatly reduce the chances of having an UG cable failure in the development.
- A thermography inspection on the overhead 2 and 3 phase sections of the circuit was completed on January 30, 2013. Only one issue was found. During the scan, a phase wire was found resting on an alley arm on the 3 phase line. It was fixed later that same day.

## **10 Circuit ID: 22601 KIMBLES 26-1**

### Performance Analysis

Two major power outages significantly affected this circuit's reliability in the past four quarters. On July 23, 2012, a tree from outside the right of way caused the OCR at 70711N48750 to trip to lockout affecting 1,455 customers for a total of 155 minutes. The total CMI for this outage was 195,170.

On July 26, 2012 a tree from outside the right of way caused the OCR at 71184N49217 to trip to lockout affecting 89 customers for up to 1,315 minutes, resulting in 94,238 CMI.

In total, the 26-1 12 kV line had 49 total outages between the months of March 2012 and April 2013. The primary causes of these outages include tree related (25), animal contacts (10), equipment failures (8), other/nothing found (5), and vehicle hits (1).

### Remedial Actions

- PPL work order number 43047274 will replace a normally open manual tie device with an automated device. This will help decrease outage times and restoration times. The device is scheduled to be in service by June 20, 2014.
- The new Hawley 69/12kV substation was completed in August 2012. The new substation transferred approximately 687 customers off the Kimbles 26-1 12kV line. In addition to improving reliability for the transferred customers, the new substation line will reduce outage durations for the remaining customers through expanded sectionalizing capability.
- PPL conducted an audit of all animal outage locations to ensure animal guards were installed post restoration. This audit was completed February 28, 2013.
- The circuit is currently being evaluated for additional tree trimming.

## **11 Circuit ID:51401, LYKENS 14-01**

### Performance Analysis

Four circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Equipment failures and tree contacts from outside the right of way were the most common outage causes.

On June 6, 2012, the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 464 customers on the Lykens 14-01 were interrupted for up to 150 minutes, resulting in 67,313 CMI.

On May 14, 2012 a tree from outside the right of way caused the Lykens 14-01 breaker to trip to lockout. This outage affected 483 customers for up to 87 minutes, resulting in 37,654 CMI.

On July 15, 2012 a phase wire came down and caused the Lykens 14-01 breaker to trip to lockout. This outage affected 482 customers for up to 203 minutes, resulting in 61,121 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 482 customers on the Lykens 14-01 were interrupted for up to 50 minutes, resulting in 23,869 CMI.

In total, the Lykens 14-01 circuit had 11 outages between April 2012 and March 2013. The causes of these outages include: equipment failures (5), tree related (5), and nothing found (1).

### Remedial Actions

- In February, 2013, a project was initiated to install a new 3 phase VCR and remote operator controlled switch. This project is scheduled to be in service in June, 2013.
- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. No trouble spots were identified.
- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. Nineteen sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.

## **12 Circuit ID: 53901, HALIFAX 39-01**

### Performance Analysis

Four circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Equipment failures were the most common outage cause.

On May 18, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal when contractor's rigging broke loose making contact with one phase of the Sunbury-Dauphin 69kv line. This outage affected approximately 10,220 customers at Halifax, Dalmatia, and Elizabethville subs. 1,182 customers on the Halifax 39-01 were interrupted for up to 75 minutes, resulting in 89,158 CMI.

On June 6, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 1,184 customers on the Halifax 39-01 were interrupted for up to 62 minutes, resulting in 73,242 CMI.

On July 27, 2012 a three phase VCR failed after a tree made contact and caused the 39-01 circuit breaker trip to lockout interrupting 1,186 customers for up to 1,335 minutes, resulting in 272,630 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 482 customers on the Halifax 39-01 were interrupted for up to 50 minutes, resulting in 23,869 CMI.

In total, the Halifax 39-01 12 kV line had 26 outages between April 2012 and March 2013. The causes of these outages include: equipment failures (12), tree related (8), nothing found (3), animal contacts (2), and contact / dig-in (1).

#### Remedial Actions

- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. Secondary connections were replaced at one location.
- The Halifax 39-01 circuit was last trimmed during its four year vegetation management cycle in November 2012.
- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. Nineteen sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.
- An existing 2 mile tie with Benvenue substation is scheduled to be reconducted by December 2015. The tie is currently load limited due to conductor size.

### **13 Circuit ID:28001, TAFTON 80-1**

#### Performance Analysis

One major power outage significantly affected this circuit's reliability in the past four. On December 21, 2012 an equipment failure caused the OCR at 69076N46137 to trip to lockout affecting 1,344 customers for up to 362 minutes. The total CMI for this outage was 485,937.

In total, the 80-01 circuit had 53 total outages between the months of March 2012 and April 2013. The primary causes of these outages include equipment failures (17), tree related (16), animal contacts (12), other/nothing found (6), and vehicle hits (2).

#### Remedial Actions

- Super project number 33013 will create a new tie between the Newfoundland 83-2 and Tafton 80-1 circuit. This project will improve sectionalizing and transfer capability which will reduce outage duration and restoration times. The project is required in service by June 30, 2013.
- Super project number 33101 which is to build a new Ledge Dale substation is set to be completed in June of 2013. This will move 1,336 customers off of the Tafton 80-1 circuit

to a new circuit out of the new Ledgesdale Substation. This project increases reliability and transfer capability of customer now on the Tafton 80-01 circuit.

## **14 Circuit ID:24401, TINKER 44-01**

### Performance Analysis

Three major power outages significantly affected this circuit's reliability in the past four quarters. On July 26, 2012, a tree from outside the right of way caused the OCR at 62579N58206 to trip to lockout affecting 836 PPL customers for up to 1,720 minutes. The total CMI for this outage was 1,411,435.

On July 26, 2012, a tree from outside the right of way caused a device at 61932N58130 to operate affecting 264 PPL customers for a total of 1,540 minutes. The total CMI for this outage was 406,373.

On July 7, 2012 an equipment failure caused the 44-1 breaker to trip to lockout affecting 1,319 customers for a total of 78 minutes. The total CMI for this outage was 102,829.

In total, the 44-1 circuit had 36 outages between the months of March 2012 and April 2013. The primary causes of these outages include equipment failures (14), tree related (16), animal contacts (4), and other/nothing found (2).

### Remedial Actions

- Three phase voltage regulators will be installed in order to improve the capabilities of the existing Honesdale 34-1 to Tinker 44-1 tie line. These improvements will enhance sectionalizing capability in the area and reduce future outage durations. The required in service date for the voltage regulators is November 30, 2015.
- The circuit will be evaluated for additional tree trimming.

## **15 Circuit ID:16802, BENVENUE 68-02**

### Performance Analysis

Three circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Tree contacts from outside the right of way were the most common outage cause.

On April 17, 2012, a vehicle pole hit interrupted a VCR serving 1,403 customers for up to 204 minutes, resulting in 51,942 CMI.

On June 3, 2012, multiple tree contacts interrupted the circuit breaker during a period of heavy wind and rain. A section of customers from the adjacent Rockville 65-04 were abnormally transferred to Benvenue 68-02 at this time. This outage interrupted 3,392 customers for up to

343 minutes, resulting in 287,511 CMI. Restoration times were delayed due to multiple trouble locations and adjacent circuits experiencing trouble.

On December 22, 2012, a circuit breaker trip interrupted 1,471 customers for up to 164 minutes, resulting in 61,985 CMI. Nothing was found during a field patrol. The circuit breaker was closed for test and held.

In total, the Benvenue 68-02 12 kV line had 34 outages between April 2012 and March 2013. The causes of these outages include: tree contacts from outside the right of way (11), animal contacts (8), equipment failures (7), nothing found (4), vehicles (3), other-non controllable (1).

#### Remedial Actions

- A section of single phase was extended to serve a development of CEMI customers from a source closer to the substation in November 2012.
- An expanded operation review was completed in December 2012. Three phase swaps were completed to better balance loading on the circuit breaker.
- A telemetric VCR and remote operator controlled switch were installed in November 2011 to allow faster transfer of approximately 750 customers to the Rockville 65-04.
- The Benvenue 68-02 line was last trimmed during its four year vegetation management cycle in September 2012.
- A recloser is scheduled to be relocated further downstream by March 2014 to mitigate coordination issues with the circuit breaker.
- An existing 2 mile tie with Halifax substation is scheduled to be reconducted by December 2015. The tie is currently load limited due to conductor size.
- This circuit is being evaluated for additional animal guarding.

### **16 Circuit ID: 24103, EAST HAZLETON 41-03**

#### Performance Analysis

The entire circuit was interrupted four times over the past four quarters. On August 9, 2012, transformer fuses at the substation operated during a period of thunder and lightning. This led to the interruption of 1,074 customers for up to 46 minutes, resulting in 49,211 CMI.

On November 13, 2012, a vehicle contacted communication company cables causing poles to come down which led to the circuit breaker tripping to lockout. This led to an interruption of 1,158 customers for up to 774 minutes, resulting in 203,916 CMI.

On November 24, 1012 equipment failure on the circuit caused the circuit breaker to trip to lockout. This led to an interruption of 1,158 for 116 minutes, resulting in 134,340 CMI.

On January 20, 2013 the transmission line serving the substation tripped to lockout due to a customer equipment issue. This led to the interruption of 1,155 customers for up to 34 minutes, resulting in 39,270 CMI.

In total, the East Hazleton 41-03 experienced 10 outages between April 2012 and March 2013. The causes include equipment failure (7), vehicle hits (2), tree related (1), and no cause found (1).

#### Remedial Actions

- The failed equipment that caused the November 24, 2012 outage has been replaced.
- Detailed analysis of reliability improvements for this circuit will be conducted during the second quarter of 2013.

### **17 Circuit ID: 67802, WEST LANCASTER 78-02**

#### Performance Analysis

The West Lancaster 78-02 circuit has approximately 165 customers across 5 circuit miles. The largest CPI (Circuit Performance Index) contributor has been the percentage of customers with greater than 3 interruptions. Over the past year, there have been 6 outages on this line. Three of those outages were due to the circuit breaker opening; one time due to an equipment failure, one time due to trees from outside the trimming right of way and one time where nothing was found. These outages resulted in 53,698 CMI. The next highest CMI outage occurred on 9/8/2012 for 1,133 minutes due to an equipment failure.

The circuit was last trimmed in 2012. The West Lancaster 78-02 circuit has not appeared on the Worst Performing Circuit (WPC) list since 2008.

#### Remedial Actions

- Full circuit tree trimming is scheduled for 2016.
- An Expanded Operational Review was conducted on the line on 12/30/2011. Everything was found to be in proper form.
- A thermographic inspection on the overhead 2 and 3 phase sections of the circuit was completed early 2/2013. No problems or issues were found.
- A line inspection on the overhead 2 and 3 phase sections of the circuit was completed early 2013. Two spans of damaged primary wire were found. The needed repairs are expected to be completed by the end of 2Q, 2013.

## **18 Circuit ID: 43101, SOUTH MILTON**

### Performance Analysis

On May 3, 2012 and June 22, 2012 all customers on this circuit were out of service due to lightning strikes which caused the 69kV fuses at the substation to operate.

On July 7, 2012 the 43101 circuit breaker tripped to lockout due to trees taking down wires.

These three outages were responsible for approximately 94% of the total customer minutes interrupted on this circuit over the past 12 months. This circuit was not a WPC before the second quarter of 2012.

### Remedial Actions

- The circuit breaker that failed to clear the fault caused by the lightning strikes is scheduled to be replaced in Q3 2013.
- An Expanded Operational Review of this circuit is scheduled for 2013.
- As part of the Smart Grid Initiative, existing reclosers and ROCS will be upgraded. This work is planned for 2014.
- On June 29, 2012 this circuit was patrolled. The patrol revealed that the conductor was “bird caging” in several spots along Route 15. The damaged conductor was replaced in December 2012. A static wire was mounted above the three phase for lightning protection.
- On September 18, 2012 a Helicopter Patrol of the Susquehanna River crossing section of this circuit revealed that the conductor was “bird caging” in several spots and that there were also several broken strands. This conductor was replaced in December 2012.

## **19 Circuit ID: 16301, ALTON PARK 63-01**

### Performance Analysis

During the past twelve months there have been three circuit breaker lockouts that interrupted all 1,821 customers on this line. The first two, on June 20<sup>th</sup>, 2012, were caused by a failure of the circuit breaker at the substation. On October 6<sup>th</sup>, 2012, an animal contacted the substation transformer causing severe damage to the transformer. This caused the third interruption to all customers on the 63-01 circuit.

In addition to these large outages, there have been several small outages involving distribution transformers or single phase tap fuses and reclosers. All of these outages affected fewer than 75 customers. These outages can be attributed to equipment failures, trees falling onto overhead lines, and animals contacting distribution transformers.

There have been 27 outages on the 63-01 during the last 12 months contributing to the CPI of 720. The causes have been equipment failures (9), tree related (9), animal contact (6), nothing found (2), and contact/dig-in (1).

#### Remedial Actions

- Two new single phase tap fuses will be installed on the line to isolate outages to smaller pockets of customers. These installations are scheduled for June 2013.
- Installing a new ROCS switch with fault indicators to isolate outages at the end of the line. This is scheduled to be completed in December of 2013.
- Two existing manually controlled switches will have automation installed on them allowing the System Operator to sectionalize and restore from the operations center. This will drastically reduce outage durations. These actions are scheduled for completion in December of 2013.
- An existing OCR will be replaced with an intelligent VCR that can be controlled by the System Operator for sectionalizing and restoration during an outage. This is scheduled for December 2013.
- The entire circuit was last trimmed in 2009 and is scheduled for comprehensive trimming again in 2013.

### **20 Circuit ID: 45402, WEST BLOOMSBURG 54-02**

#### Performance Analysis

On July 7, 2012, 540 customers downstream from VCR 38029N29537 experienced a 2 day outage when trees outside of the right of way fell on conductors during a severe thunder and lightning storm that affected Columbia and Northumberland counties . On July 26, 2012 a majority of the customers on this circuit experienced an outage when trees outside of the right of way fell on conductors during a thunder and lightning storm. These two outages accounted for approximately 84% of the total customer minutes interrupted over the past 12 months.

#### Remedial Actions

- A work order was created to replace two reclosers that had coordination problems in the past. New VCRs with new controls will be installed. Series fusing and solid blade disconnects to provide additional sectionalizing will also be installed. WO 42137123 is scheduled to be completed by May 31, 2014.
- A work order was initiated to install slot fusing on single phase taps. WO 43012775 is scheduled to be completed by December 31, 2013.
- On February 11, 2013 and Infrared Inspection of this circuit was completed. There were no reliability concerns identified.

- The circuit has been patrolled by Line Maintenance Inspectors and other PPL Electric personnel on a regular basis.
- As part of the Distribution Circuit Improvement Plan PPL Electric proactively replaced the “Stem Style” secondary connections to the Overhead Transformers with the more reliable “Block Style” connections.

## **21 Circuit ID: 13902, SEIDERSVILLE 39-02**

### Performance Analysis

During the past twelve months there have been three circuit breaker lockouts that interrupted all 1,975 customers on this line. The first two, in May-June 2012, were caused by trees falling onto the overhead lines. The third was caused by an equipment failure when two spans of overhead wire came down.

In addition to these circuit breaker lockouts, there have been several other outages involving reclosers, distribution transformers, or single phase tap fuses. Trees falling from outside the right-of-way have been the largest contributor to outages on this circuit.

There have been 22 outages on the 39-02 circuit during the last 12 months contributing to the CPI of 708. The causes have been equipment failures (10), tree related (8), vehicle hit (2), animal contact (1), and nothing found (1).

### Remedial Actions

- In August of 2012 about 100 customers at the end of the circuit were transferred to an adjacent feeder so that they would no longer experience outages upstream on the 39-02 circuit.
- Spot trimming was started in mid-late 2012 and was completed in February of 2013. This trimming addressed danger trees and overgrown areas that were contributors to past outages.
- In early 2013, two new single phase tap fuses were installed, reducing exposure to circuit breaker lockouts caused by faults on small single phase taps. Three additional fuses will be installed by the end of 2013.
- Two new reclosers that will split the line into two isolated sections are scheduled for completion in November 2013. These new devices will separate two parts of the circuit so that a heavily wooded section no longer influences the majority of the customers in a more populated area.
- In July 2013, a new recloser will be installed on a three phase tap near the end of the line that was a cause of a tree related outage in 2012.

- A section of line that runs through a wooded area will be reconducted with XLP covered conductor to reduce the number of permanent and momentary outages on the line. This will be completed by June 2013.
- In 2014, distribution automation will be implemented on this circuit which will allow for automatic sectionalizing and restoration of customers.
- The entire circuit was last trimmed in 2009 and is scheduled for comprehensive trimming again in 2013.

## **22 Circuit ID: 20403, ASHFIELD 04-03**

### Performance Analysis

This circuit experienced three significant tree related outages that adversely impacted its reliability over the past four quarters. On July 7, 2012 a tree from outside the right of way contacted the circuit, causing a recloser to trip to lockout. This interrupted 1,494 customers for up to 1550 minutes, resulting in 220,514 CMI.

On July 20, 2012 trees from outside PPL's right of way contacted the circuit, causing a recloser to trip to lockout. This interrupted 1,947 customers for up to 234 minutes, resulting in 139,303 CMI.

On September 18, 2012 the circuit breaker was intentionally interrupted to remove a tree that had fallen onto the wire. This interrupted 2,426 customers for 7 minutes. It should be noted that the Ashfield 04-03 was carrying a portion of an adjacent circuit at the time of the outage, resulting in additional customers experiencing the interruption. In total, the Ashfield 04-03 experienced 41 outages between April 2012 and March 2013. The causes include tree related (18), equipment failures (11), animal contact (5), no cause found (3), public contact (2), other (2).

### Remedial Actions

- An analysis of the sectionalizing capability of this circuit was completed in February, 2013. It was determined that the sectionalizing capability on the main three phase portion of the line is adequate and no action is necessary. In addition, the single phase taps were also analyzed and found to be adequate.
- Hot spot tree trimming was completed in March, 2013

## **23 Circuit ID: 47502, NEW COLUMBIA 75-02**

### Performance Analysis

All of the customers served by the NECO 69kV substation were out of service when an animal contact at the sub caused an outage on April 1, 2012. The NECO 47502 was carrying the NECO 47501 at the time.

On July 26th 2012 all of the customers served by the NECO 47502 were out of service for over 42 hours when trees outside of the right of way fell on conductors during a thunder and lightning storm. These two outages resulted in approximately 585,000 customer minutes interrupted which was approximately 95% of the total over the past 12 months.

### Remedial Actions

- A work order was initiated to Install Solid Blade Disconnect at grid 24041N33244 to add additional sectionalizing capability. WO 43012775 is scheduled to be completed by June 15, 2013.
- On September 14, 2012 a request was made to the CEMI Task Force to secure funding to remove hazard trees and trim downstream of the White Deer Tap two phase OCR at grid 24289N32928. This work was completed on November 23, 2012.
- On February 20, 2013 and Infrared Inspection of this circuit was completed. There were no reliability concerns identified.

## **24 Circuit ID: 25801, SULLIVAN TRAIL 58-01**

### Performance Analysis

This circuit experienced three significant outages that adversely impacted its reliability over the past four quarters. On July 26, 2012 trees from outside the right of way contacted the circuit causing the circuit breaker to trip to lockout. This interrupted 1,955 customers for up to 1,871 minutes, resulting in 1,751,160 CMI.

On October 1, 2012 a vehicle contact caused a recloser to trip to lockout. This interrupted 810 customers for up to 525 minutes, resulting in 64,558 CMI.

On October 19, 2012 a tree from outside the right of way contacted the circuit causing a recloser to trip to lockout. This interrupted 814 customers for up to 262 minutes, resulting in 55,286 CMI.

In total, the Sullivan Trail 58-01 circuit experienced 36 outages between April 2012 and March 2013. The causes include tree related (14), equipment failure (7), animal contact (6), other (4), no cause found (2), public contact (1).

## Remedial Actions

- Several projects were analyzed by Distribution Planning, which compared the alternatives of building a 3-phase loop, replacing manual switches with remote-controlled switches, and transferring customers to another feeder. This analysis was completed on September 29, 2011 and it was determined that the duration of outages could be reduced by improving sectionalizing capability.
- A project has been developed to install a new remote controlled recloser, upgrade an existing recloser to have remote control capability, and upgrade an existing switch to have remote control capability. These devices are planned for installation by December, 2014.
- A project to further analyze the feasibility of building a tie to provide capability to transfer customers in the event of an outage is underway. This analysis will be completed by June 30, 2013.
- This circuit is scheduled for trimming in 2013.

## **25 Circuit ID: 21603, EYNON 16-03**

### Performance Analysis

A single major outage significantly affected this circuit's reliability in the past four quarters. On May 1, 2012, there was an equipment failure on the overhead primary conductor which caused the 16-03 circuit breaker to trip to lockout, interrupting 2,178 customers for up to 90 minutes, resulting in 181,894 CMI.

In total, the Eynon 16-3 circuit line had 2 outages between the months of March 2012 and April 2013. The causes of these outages include: directed by non-PPL Authority (1), and equipment failure (1).

### Remedial Actions

- The circuit will be investigated during the Northeast Quarter 1 Worst Performing Circuit meeting to identify and enact items to mitigate future outages.

## **26 Circuit ID: 62604, ENGLSIDE 26-04**

### Performance Analysis

The Engleside 26-04 circuit has approximately 1,354 customers across 23 circuit miles. The largest CPI (Circuit Performance Index) contributor has been the percentage of customers with greater than 3 interruptions.

On June 10, 2012, and again on September 8, 2012, approximately 1,200 customers were interrupted due to equipment failure for a total of 355,728 CMI.

On June 21, 2012, the line needed to be de-energized for safety reason and interrupted 1,354 customers for up to 67 minutes. On June 22, 2012, the circuit breaker experienced an improper operation and interrupted 1,354 customers for 12 minutes. These two interruptions resulted in a total CMI of 108,415.

On July 7, 2012, during a severe T&L storm, 63 customers were interrupted for up to 1,500 minutes due to a tree from outside the right of way falling on the line. This is the first time the Engleside 26-4 circuit has been on the worst performing circuit list.

#### Remedial Actions

- Animal guarding will be installed on the substation in late 2013.
- Full circuit tree trimming is scheduled to start in April 2014.
- A thermography inspection on the overhead 2 and 3 phase sections of the circuit was completed in late January, 2013. No problems or issues were found.

### **27 Circuit ID: 55401, SOUTH HERSHEY 54-01**

#### Performance Analysis

A circuit breaker outage along with three large customer count recloser outages significantly affected this circuit's reliability in the past four quarters. Equipment failures and tree contacts from outside the right of way were the most common outage causes.

On April 22, 2012, a pole top fire interrupted a VCR serving 1,653 customers for up to 312 minutes, resulting in 122,550 CMI.

On June 29, 2012, multiple trees interrupted the circuit breaker during a period of heavy wind and rain. This outage interrupted 2,173 customers for up to 989 minutes, resulting in 1,300,252 CMI. Restoration times were delayed due to multiple trouble locations and adjacent circuits experiencing trouble as well.

On September 18, 2012, a phase conductor came down and interrupted a recloser serving 1,064 customers for up to 177 minutes, resulting in 188,030 CMI.

On January 30, 2013, animal contact caused a recloser to interrupt 1,666 customers for up to 46 minutes, resulting in 63,139 CMI.

In total, the South Hershey 54-01 circuit had 22 outages between April 2012 and March 2013. The causes of these outages include: equipment failures (6), tree related (8), animal contacts (6), nothing found (1), Other-Public (1).

#### Remedial Actions

- The South Hershey 54-01 circuit is scheduled to be trimmed by May 2013 as part of its four year vegetation management cycle trimming
- A protection device review was completed around the triangle of Route 39, N Hanover St. and E Canal St in November 2012. As a result of the study, a new telemetric device is planned for installation by December 2013.
- A new substation, West Hershey, is scheduled for construction by May 2014. The new substation will increase transfer capability in the area as well as reduce customer counts and circuit miles on the South Hershey 54-01.

## **28 Circuit ID: 43102, SOUTH MILTON 31-02**

### Performance Analysis

On May 3, 2012 and June 22, 2012 all of the customers on this circuit were out of service due to lightning strikes on the 31-01 circuit which caused the 69kV fuses at the substation to operate.

These two outages were responsible for approximately 70% of the total customer minutes interrupted on this circuit over the past 12 months. This circuit has not been a WPC since 2005.

### Remedial Actions

- The 31-01 circuit breaker that failed to clear the fault caused by the lightning strikes is scheduled to be replaced in Q3 2013.
- An Expanded Operational Review of this circuit is scheduled for 2013.
- As part of the Smart Grid Initiative existing reclosers and ROCS will be upgraded and a new sectionalizing device will be added. This work is planned for 2014.

## **29 Circuit ID: 47704, BLOOMSBURG 77-04**

### Performance Analysis

In July, 2012, the 77-04 was carrying a portion of the Millville 32-01 for a SCADA installation at the Millville Substation. On July 7, 2012 a loop burned open on the 32-01 circuit and caused an OCR on the 77-04 circuit to operate to lockout. On July 15, 2012 the circuit breaker opened due downed conductors on the Millville 32-01 circuit, which was still being carried by the 77-04 circuit. These two outages, which occurred during an abnormal configuration, accounted for approximately 90% of the total customer minutes interrupted over the past 12 months.

### Remedial Actions

- Project B15410 will add a new ROCS device that will allow system operators to remotely transfer customers from the 77-04 circuit to the 77-03 circuit. This project has a required in service date of November 2015.
- On February 11, 2013, an infrared inspection of this circuit was completed. There were no reliability concerns identified.
- The SCADA installation at the Millville substation was completed on July 26, 2012.

## **30 Circuit ID: 60406, DILLERVILLE 04-06**

### Performance Analysis

The Dillerville 04-06 circuit has approximately 184 customers across 1.6 circuit miles. The largest contributor to the CPI (Circuit Performance Index) is SAIDI. On September 18, 2012, the circuit breaker opened and interrupted over 1,900 customers due to a tree that fell into the line. This resulted in 245,127 CMI. At the time, the Dillerville 04-06 line, which usually only supplies 184 customers, had over 1,800 customers on it because it was being used to supply an adjacent circuit (the Rohrerstown 58-02). The circuit was last trimmed in 2012. The Dillerville 04-06 circuit has only been on the Worst Performing Circuit list one time over the last 10 years, during Q4 2009.

### Remedial Actions

- To minimize the effect of a similar occurrence, there is a CEMI project (WO 42031418) being built in 2013 on that adjacent circuit, which is the Rohrerstown 58-02 line, that would greatly minimize the number of customers affected by interruptions.
- A thermography inspection on the overhead 2 and 3 phase sections of the circuit was completed on 6/1/2012. No problems or issues were found.
- The circuit was inspected on October 30, 2012. During the line inspection, two locations were found on the overhead primary conductor where the Arc Protection Devices (APD's) were missing. A work order was written and the APDs were re-installed. Replacing these ADPs will minimize a potential outage due to a lightning strike. A capacitor bank fuse was also found to be open. The capacitor bank was tested, the needed repairs were made, the fuse reclosed, and the bank was placed back in service to help maintain voltage on the line.
- On April 5, 2012, a tie load break air switch was moved to a more desirable location from a location that obstructed the proper movement and operation of the switch handle. Moving this switch will help to restore customers more quickly in case of an outage.
- In early 2012, an Expedited Operational Review (EOR) was conducted on the line. Everything was found to be in proper form.

## **31 Circuit ID: 25501, MADISONVILLE 55-1**

### Performance Analysis

Three major power outages significantly affected this circuit's reliability in the past four quarters. On July 15, 2012 an equipment failure caused the 55-01 breaker to trip to lockout affecting 1,639 customers for up to 133 minutes. The total CMI for this outage was 218,790.

On July 27, 2012 a tree from outside the right of way caused the OCR at 62836N46215 to trip to lockout affecting 536 customers for up to 294 minutes. The total CMI for this outage was 157,836.

On July 26, 2012 a tree from outside the right of way caused the 55-1 breaker to trip to lockout affecting 1,741 customers for up to 80 minutes. The total CMI for this outage was 139,297.

In total, the 55-01 circuit had 37 outages between the months of March 2012 and April 2013. The primary causes of these outages include tree related (22), equipment failures (8), and animal contacts (7).

### Remedial Actions

- The circuit will be investigated during the Northeast Quarter 1 Worst Performing Circuit meeting to identify and implement action items to improve performance.
- The circuit is currently being evaluated for additional tree trimming.

## **32 Circuit ID: 11405, FARMERSVILLE 14-05**

### Performance Analysis

During the past twelve months there have been four circuit breaker lockouts each of which interrupted all 1,885 customers on this line. The first two were in April 2012, one by equipment failure, the other by improper operation of a control handle by a crew at the substation. The third outage occurred in July when loops burnt open in two locations on the line. The final outage was caused by a crew that contacted the line while completing planned work. There was one additional large outage when an OCR carrying 300 customers tripped out. The line was patrolled but no cause was found.

In addition to these large outages, there have been several other outages involving reclosers, distribution transformers, or single phase tap fuses. Equipment failures and trees falling from outside the right of way have been the largest contributors to outages on this circuit.

In summary, there have been 20 outages on the 14-05 circuit during the last 12 months contributing to the CPI of 645. The causes have been equipment failures (8), tree related (6), animal contact (2), other (2), improper operation of equipment (1), and nothing found (1).

### Remedial Actions

- The entire circuit was last trimmed in 2012 and is scheduled for comprehensive trimming again in 2016.
- This circuit is new to the WPC list and will be reviewed at the next Lehigh Region WPC meeting on May 10<sup>th</sup>, 2013. At this meeting remedial actions will be reviewed and placed into the budget for future completion.
- Distribution Automation will be implemented on this circuit in 2014. Existing manually controlled devices will be replaced with intelligent, electronic devices so that customers can be quickly sectionalized and restored in the event of a fault on the line.

### **33 Circuit ID: 43302, WATSON 33-02**

#### Performance Analysis

On May 5, 2012 all of the customers on this circuit were out of service due to a vehicle hit. At the time of the outage this circuit was carrying a portion of the 75-02 circuit. This outage was responsible for 250,000 customer minutes interrupted which was approximately 95% of the total CMI over the past 12 months.

#### Remedial Actions

- No long term plan is required at this time. Reliability engineers will continue to monitor this circuit's performance.

### **34 Circuit ID: 60502, NORTH MANHEIM 05-02**

#### Performance Analysis

The North Manheim 05-02 line has approximately 1,898 customers across 78 circuit miles. The largest contributor to the CPI (Circuit Performance Index) is SAIDI. During the past 12 months there have been 25 outages interruptions on this circuit. Five of the largest outages occurred during wind storms, and one during a T&L storm.

Four outages were caused by trees from outside the right of way for a total of 603,477 CMI, two were caused by vehicle hits for a total CMI of 212,017. The circuit was last trimmed in the fourth quarter of 2012. All of the largest ten outages occurred prior to the circuit being trimmed.

#### Remedial Actions

- A thermography inspection on the overhead 2 and 3 phase sections of the circuit was completed in January, 2013. No problems or issues were found.

- A line inspection on the overhead 2 and 3 phase sections of the circuit was completed on February 23, 2011. No problems or issues were found.
- Existing and new sectionalizing and tie devices will be installed and automated in 2014 as part of PPL's Smart Grid program.

### **35 Circuit ID: 55507, HERSHEY 55-07**

#### Performance Analysis

Three large recloser outages significantly affected this circuit's reliability in the past four quarters. Tree contacts from outside the right of way were the most common outage cause.

On May 27, 2012 a tree from outside the right of way made contact with the line and interrupted a recloser serving 1,043 customers for up to 204 minutes, resulting in 98,434 CMI.

On June 29, 2012 a tree from outside the right of way made contact with the line during a period of heavy wind and rain. This outage interrupted 443 customers for up to 120 minutes, resulting in 53,364 CMI. Restoration times were delayed due to multiple trouble locations in the Hershey area.

On January 12, 2013 an equipment failure interrupted a three phase recloser serving 462 customers for up to 163 minutes, resulting in 33,061 CMI.

In total, the Hershey 55-07 circuit line had 12 outages between April 2012 and March 2013. The causes of these outages include: tree related (5), equipment failures (4), and other-non controllable (3).

#### Remedial Actions

- After a string of connector and crimp failures during a prolonged abnormal circuit configuration, patrols were completed during June and July 2012 to identify hot spots on the line. Over 40 various connectors and crimps were identified and replaced in early August 2012. There has not been a failure since.
- The Hershey 55-07 is scheduled to be trimmed by May 2013 as part of its four year vegetation management cycle trimming
- A new substation, West Hershey 69-13 kV, is scheduled for construction by May 2014. This project will reconfigure the Hersey 55-7 and reduce the circuit miles and customer counts.
- Several remote operator controlled devices will be added to the line and surrounding area.

## **36 Circuit ID: 27501, WEISSPORT 75-01**

### Performance Analysis

This circuit experienced two significant tree related outages that adversely impacted reliability over the past four quarters. On July 26, 2012 a tree from outside the right of way contacted the circuit causing a recloser to trip to lockout. This interrupted 727 customers for up to 4,462 minutes, resulting in 1,552,346 CMI.

On May 28, 2012 a tree from outside the right of way contacted the circuit causing a recloser to trip to lockout. This interrupted 226 customers for up to 223 minutes, resulting in 50,371 CMI.

In total, the Weissport 75-01 experienced 18 outages. The causes include equipment failure (6), tree related (8), no cause found (2), animal contact (1), directed by non-PPL authority (1).

### Remedial Actions

- A project was developed to install a new recloser to reduce outage exposure. This recloser is planned to be installed by December, 2013.
- This circuit is currently being evaluated for additional tree trimming.

## **37 Circuit ID: 53602, DALMATIA 36-02**

### Performance Analysis

Three major circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Equipment failures were the most common outage cause.

On May 18, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal when contractor's rigging broke loose making contact with one phase of the Sunbury-Dauphin 69kv line. This outage affected approximately 10,220 customers at Halifax, Dalmatia, and Elizabethville subs. 2,166 customers on the Dalmatia 36-02 were interrupted for up to 93 minutes, resulting in 190,818 CMI.

On June 6, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 2,173 customers on the Dalmatia 36-02 were interrupted for up to 64 minutes, resulting in 137,160 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 2,350 customers on the Dalmatia 36-02 were interrupted for up to 56 minutes, resulting in 131,107 CMI.

In total, the Dalmatia 36-02 circuit had 66 outages between April 2012 and March 2013. The causes of these outages include: tree related (23), equipment failures (21), animal contacts (9), nothing found (5), vehicles (2), contact / dig-in (2), directed by non-PPL authority (1), other-controllable (1), other-non controllable (1), other-public (1).

### Remedial Actions

- The Dalmatia 36-02 circuit was last trimmed during its four year vegetation management cycle in late 2010.
- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. A primary connection, pin insulator, and secondary stem connectors were all replaced shortly after being identified.
- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. 19 sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.
- About half a dozen various distribution equipment repairs were identified and completed after line patrols in late 2012. The work included replacing a cross arm, guy wire, bolts, and a strand of damaged-primary.
- Additional radio communication is scheduled to be added to a recloser and normally open air break by September 2013. This will allow remote operator controlled switching for approximately 200 customers.
- A new 69-12 kV substation in the Meiserville area is scheduled for construction. The project will significantly reduce customer counts and circuit miles on the Dalmatia 36-02 circuit as well increase transfer capability in the area. The substation was originally intended to go into service in November 2012 but has been delayed by land acquisitions and condemnation proceedings. If a successful resolution can be reached with outstanding property owners by the mid-2013, the new substation will be scheduled for completion by fourth quarter 2014.

## **38 Circuit ID: 67402, WAKEFIELD 74-02**

### Performance Analysis

The Wakefield 74-02 circuit has approximately 1,330 customers across 86 circuit miles. The largest contributor to the CPI (Circuit Performance Index) was SAIDI. Of the top 10 outages in the past year, the outage that contributed the most to the CPI occurred on October 19, 2012. This was a transmission outage that was caused by a tornado that touched down in the Lancaster region with wind gusts over 110 MPH. This one outage resulted in over 411,000 CMI.

Four of the other outages were caused by trees from outside the right of way for a total of 153,617 CMI, one outage was due to an equipment failure for a total of 41,574 CMI, and two outages were due to vehicle hits for a total CMI of 18,463. The circuit was last trimmed in 2011.

#### Remedial Actions

- A line inspection on the overhead 2 and 3 phase sections of the circuit was completed on April 20, 2011. A few minor problems were detected and remediated.
- Full circuit tree trimming is scheduled for 2015.
- Existing sectionalizing and tie devices will be automated in 2015 as part of PPL's Smart Grid program.

### **39 Circuit ID: 29301, DAPPERS 93-01**

#### Performance Analysis

A single major outage significantly affected this circuit's reliability in the past four quarters. On December 8, 2012, there was an equipment failure on the 93-01 VCR (acts as a line circuit breaker), interrupting 410 customers for up to 26 minutes, resulting in 10,906 CMI.

In total, the Dappers 93-01 circuit had 7 outages between the months of March 2012 and April 2013. The primary causes of these outages include: animal contact (2), and equipment failure (2), and tree related (3).

#### Remedial Actions

- The circuit will be investigated during the Northeast Quarter 1 Worst Performing Circuit meeting to enact all necessary action items to mitigate outages in the future.

### **40 Circuit ID: 24402, TINKER 44-02**

#### Performance Analysis

Two major tree related outages significantly affected this circuit's reliability in the past four quarters. On June 29, 2012, a tree from outside the right of way came in contact with the overhead primary conductor and caused the 44-02 breaker to trip to lockout, interrupting 493 customers for up to 324 minutes, resulting in 124,059 CMI.

On July 26, 2012 a tree from outside the right of way came in contact with the overhead primary conductor and caused the 44-02 OCR at grid 60057N57719 to trip to lockout. This outage affected 63 customers for up to 1,452 minutes, resulting in 91,492 CMI

In total, the 44-02 circuit had 17 outages between the months of March 2012 and April 2013. The primary causes of these outages include equipment failures (5), tree contacts from outside the right of way (6), animal contacts (5), and vehicle contacts (1).

### Remedial Actions

- PPL will be trimming the entire Tinker 44-02 line in the early part of the 2014 calendar year.

## **41 Circuit ID: 22602 KIMBLES 26-2**

### Performance Analysis

Two major outages significantly affected this circuit's reliability in the past four quarters. On September 18, 2012, a tree from outside the right of way came in contact with the overhead primary conductor and caused the 26-02 OCR at grid 71891N48569 to trip to lockout, interrupting 1,149 customers for up to 151 minutes, resulting in 166,167 CMI.

On December 8, 2012 an equipment failure caused the 26-02 breaker to trip to lockout. This outage affected 1,614 customers for up to 27 minutes, resulting in 43,578 CMI.

In total, the Kimbles 26-02 circuit had 31 outages between March 2012 and April 2013. The causes of these outages include: tree related (12), equipment failures (7), and animal contacts (12).

### Remedial Actions

- 56 customers will be moved from the Kimbles 26-02 to the Bohemia 20-02 line.
- A new line and terminal will be installed at Twin Lakes substation. The line and terminal will both transfer 944 customers from and provide a new tie to the Kimbles 26-02 line. This project will significantly improve sectionalizing capability and reduce outage duration times for customers currently on the Kimbles 26-02 line. The required in service date for the project is May 31, 2014.
- PPL has completed tree trimming the entire Kimbles 26-02 circuit in 2012.

## **42 Circuit ID: 43001, ALLENWOOD 30-01**

### Performance Analysis

The Lycoming 69kV Bus #1 opened on July 15, 2012 and left all 1014 customers on this circuit out of service for 2 hours and 45 minutes. On July 26, 2012 the OCR at the Allenwood substation operated to lockout when trees outside of the right of way fell on conductors during a severe thunder and lightning storm. This outage left all 1,014 customers on this circuit out of service for more than 5 hours. These two outages were responsible for approximately 77% of the total customer minutes interrupted over the last 12 months.

### Remedial Actions

- Ten spans of new single phase on Devitt Camp RD will be built to feed high CEMI count customers from another tap and remove an inaccessible line. This project is scheduled for 2014.
- A new substation, Great Stream, will improve customer reliability by supplying the Allenwood area from a networked 69 kV source, reduce the customer count on the Allenwood 30-01 circuit, and add remote transfer capability between the 30-01 circuit and a the new circuit from the Great Stream Substation. This project is scheduled for 2017.

### **43 Circuit ID: 13503 MCMICHAELS 35-03**

#### Performance Analysis

Two major tree related outages and one equipment failure significantly affected this circuit's reliability in the past four quarters. On August 1, 2012, a tree from outside the right of way caused the 35-03 OCR at grid 63701N29648 to trip to lockout, interrupting 844 customers for up to 52 minutes, resulting in 43,508 CMI.

On September 18, 2012 a tree from outside the right of way caused the 35-03 breaker to trip to lockout. This outage affected 1,487 customers for up to 1,616 minutes, resulting in 385,697 CMI.

On November 13, 2012 a tree from outside the right of way caused the 35-03 OCR at grid 63182N31101 to trip to lockout. This outage affected 669 customers for up to 115 minutes, resulting in 99,908 CMI.

In total, the McMichaels 35-03 circuit had 14 outages between March 2012 and April 2013. The primary causes of these outages include: vehicle contacts (1), equipment failures (6), animal contacts (3), and tree related (4).

#### Remedial Actions

- The McMichaels 35-03 circuit is part of PPL's 2013 Smart Grid Pocono Project scheduled to be complete December 2013. This project will add and upgrade sectionalizing devices on the line to reduce future outage durations for all customers on the circuit and improve the overall sectionalizing capability in the area.

### **44 Circuit ID: 16802 WAGNERS 68-02**

#### Performance Analysis

Two major tree related outages and one equipment failure outage that significantly affected this circuit's reliability in the past four quarters. On March 15, 2012, a failure of an underground primary conductor caused the 68-02 OCR at grid 60443N35226 to trip to lockout, interrupting 144 customers for up to 902 minutes, resulting in 72,903 CMI.

On July 27, 2012 a tree from outside the right of way caused the 68-02 OCR at grid 60879N35603 to trip to lockout. This outage affected 713 customers for up to 417 minutes, resulting in 138,666 CMI.

On November 24, 2012 a tree from outside the right of way caused the 68-02 breaker to trip to lockout. This outage affected 913 customers for up to 80 minutes, resulting in 72,903 CMI.

In total, the Wagners 68-02 circuit had 28 outages between March 2012 and April 2013. The causes of these outages include: tree related (17), animal contacts (3), equipment failures (5), and vehicle hits (3).

#### Remedial Actions

- The Wagners 68-02 circuit is part of PPL's 2013 Smart Grid Pocono Project. This project will reduce outage durations for all customers on the line and improve overall sectionalizing capability in the future.
- PPL will be trimming the entire Wagners 68-02 line in the early part of the 2013 calendar year.
- PPL is currently undergoing an Expanded Operational Review (EOR) of the circuit. This review will be completed by August 2013.

### **45 Circuit ID: 53501, Elizabethville 35-01**

#### Performance Analysis

Three major circuit breaker outages significantly affected this circuit's reliability in the past four quarters. Equipment failures were the most common outage cause.

On May 18, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal when contractor's rigging broke loose making contact with one phase of the Sunbury-Dauphin 69kv line. This outage affected approximately 10,220 customers at Halifax, Dalmatia, and Elizabethville subs. 2,141 customers on the Elizabethville 35-01 were interrupted for up to 76 minutes, resulting in 162,716 CMI.

On June 6, 2012 the Sunbury-Dauphin 69kV line tripped to lockout at the Dauphin terminal due to a broken cross arm. This outage affected approximately 10,500 customers at Halifax, Dalmatia, Elizabethville, Lykens, and Gratz substations. 2,144 customers on the Elizabethville 35-01 were interrupted for up to 62 minutes, resulting in 131,835 CMI.

On December 7, 2012 the Sunbury-Dauphin 69kV line was interrupted due to a failed conductor. The outage affected approximately 17,285 customers on Dalmatia, Lykens, Elizabethville, Gratz, and Millersburg substations. 2,220 customers on the Elizabethville 35-01 were interrupted for up to 55 minutes, resulting in 123,654 CMI.

In total, the Elizabethville 35-01 circuit had 45 outages between April 2012 and March 2013. The causes of these outages include: tree contacts (17), equipment failures (13), animal contacts (6), nothing found (4), vehicles (2), contact / dig-in (1), other-controllable (1), and other-public (1).

#### Remedial Actions

- A comprehensive helicopter patrol of the Sunbury-Dauphin 69 kV line was completed on June 21, 2012. 19 sets of critical C-Tag arms were identified and replaced by July 25, 2012. An additional 68 sets of heavy rot C-Tag arms were also identified and replaced by December 14, 2012.
- An infrared inspection was completed on all 2 and 3 phase primary overhead lines in March 2012. Nothing was found.
- The Elizabethville 35-01 line is scheduled to be trimmed by October 2013 as part of its four year vegetation management cycle.
- Radio communication is scheduled to be added to a recloser and normally open air break by September 2013. This will allow remote operator controlled switching between Elizabethville and Millersburg substations.

### **46 Circuit ID: 16202, POCONO FARMS 62-2**

#### Performance Analysis

One major tree related outage significantly affected this circuit's reliability in the past four quarters. On September 18, 2012, a tree from outside the right of way contacted the primary conductor and caused the 62-02 breaker to trip to lockout, interrupting 1,634 customers for up to 1,245 minutes, resulting in 1,584,337 CMI.

In total, the Pocono Farms 62-02 circuit had 12 outages from March 2012 and April 2013. The primary causes of these outages include: animal contacts (3), vehicle contacts (2), equipment failures (5), and tree related (2).

#### Remedial Actions

- The Pocono Farms 62-02 circuit is part of PPL's 2013 Smart Grid Pocono Project scheduled to be complete December 2013. This project will be strategically adding and upgrading sectionalizing devices on the line to reduce future outage durations for all customers on the line and improve the overall sectionalizing capability in the area.
- A new line and terminal will be built at the North Coolbaugh Substation. The line and terminal will provide a new tie to the Pocono Farms 62-02 line. This project will improve sectionalizing capability in the area and reduce outage duration times for customers on

the Pocono Farms 62-02 circuit in the future. The required in service date for the project is November 30, 2015.

- PPL will be trimming the entire Pocono Farms 62-02 circuit in the early part of the 2013 calendar year.

## **47 Circuit ID: 43202, MILVILLE 32-02**

### Performance Analysis

On November 3, 2012, 906 customers downstream of OCR 33570N35077 were out of service for 2 and a half hours when a tree outside of the right of way fell on conductors. On December 12, 2012, 416 customers downstream from VCR 34040N36412 experienced a 9 hour outage when trees outside of the right of way fell on conductors. The aforementioned outages accounted for approximately 70% of the total customer minutes interrupted over the past 12 months.

### Remedial Actions

- A project has been initiated to build new single phase along Hill Road so that inaccessible line can be removed. This project is scheduled to be completed by December 31, 2013.
- A project has been initiated to build approximately 2100 feet of new single phase along Hall RD to serve customers that experience frequent interruptions from a more reliable tap, and remove inaccessible line. This project is scheduled to be completed by December 31, 2014.
- As part of the Smart Grid Initiative, existing Reclosers and ROCS will be upgraded. This work is planned for 2014.
- Since this circuit was not a WPC in the previous quarter PPL will review this circuit at the next WPC meeting for additional improvements.

## **48 Circuit ID: 16801 WAGNERS 68-1**

### Performance Analysis

Three major tree related outages significantly affected this circuit's reliability in the past four quarters. On July 26, 2012, a tree from outside the right of way came in contact with the overhead primary conductor and caused the 68-01 OCR at grid 62779N35302 to trip to lockout, interrupting 706 customers for up to 1,173 minutes, resulting in 211,169 CMI.

On September 18, 2012 a tree from outside the right of way came in contact with the overhead primary conductor and interrupted 1,471 customers for up to 444 minutes, resulting in 168,481 CMI.

On November 24, 2012 a tree from outside the right of way caused the 68-01 breaker to trip to lockout. This outage affected 1,657 customers for up to 78 minutes, resulting in 129,428 CMI.

In total, the Wagners 68-01 circuit had 23 outages between March 2012 and April 2013. The primary causes of these outages include: tree related (13), equipment failures (6), and animal contacts (4).

#### Remedial Actions

- The Wagners 68-01 circuit is part of PPL's 2013 Smart Grid Pocono Project. This project will reduce outage durations for all customers on the line and improve overall sectionalizing capability in the future.
- PPL EU is currently undergoing an Expanded Operational Review (EOR) of the circuit. This review will be completed by August 2013.
- The entire Wagners 68-01 circuit will be trimmed in the early part of the 2013 calendar year.

### **49 Circuit ID 46503, LOCK HAVEN 65-03**

#### Performance Analysis

On July 26, 2012, during a thunder and lightning storm, the circuit breaker tripped to lockout due to trees outside the right of way taking down wires. This outage was responsible for approximately 97% of the total customer minutes interrupted on this circuit over the past 12 months. This circuit has not been a WPC since 2004. PPL will continue to monitor this circuit's performance.

#### Remedial Actions

- A new sectionalizing device will be added at grid: 08877N34924.

### **50 Circuit ID:22002, BOHEMIA 20-02**

#### Performance Analysis

Three major outages significantly affected this circuit's reliability in the past four quarters. On July 17, 2012, a tree from outside the right of way came in contact with the overhead primary conductor and caused the 20-02 breaker to trip to lockout, interrupting 1,389 customers for up to 144 minutes, resulting in 140,827 CMI.

On August 11, 2012 a tree from outside the right of way came in contact with the overhead primary conductor and caused the 20-2 OCR at grid 73431N49591 to trip to lockout. This outage affected 636 customers for up to 212 minutes, resulting in 79,329 CMI.

On November 13, 2012 a tree from outside the right of way came in contact with the overhead primary conductor and caused the same 20-2 OCR at grid 73431N49591 to trip to lockout. This outage affected 303 customers for up to 502 minutes, resulting in 152,076 CMI.

In total, the Bohemia 20-2 circuit had 33 outages between March 2012 and April 2013. The causes of these outages include: tree related (13), equipment failures (7), animal contacts (11), and vehicle contacts (2).

#### Remedial Actions

- Install a new tie line between the Bohemia 20-2 and Twin Lakes 81-02 circuits. The new tie will significantly improve sectionalizing capability and reduce outage duration times for customers currently on both the Bohemia 20-02 and Twin Lakes 81-02 circuits. The required in service date for the project is May 31, 2014.
- Install a new line and terminal at the Bohemia substation. The new circuit will transfer over 700 customers from the 20-02 line. It will also improve sectionalizing capability and reduce outage duration times for customers currently on the Bohemia 20-02 line. The required in service date for the project is November 30, 2013.
- The entire Bohemia 20-02 circuit was trimmed in 2012.

### **51 Circuit ID: 28501, Fabri-Kal 85-01**

#### Performance Analysis

This circuit experienced one long duration interruption over the past 4 quarters. This circuit serves one customer and has minimal outage exposure. On July 7, 2012 an equipment issue at the substation led to the interruption of one customer for 1,268 minutes, resulting in 1,268 customer minutes interrupted. This is the only outage the circuit has experienced in the previous four quarters.

#### Remedial Actions

- The equipment in the substation that caused the outage has been repaired.

### **52 Circuit ID: 23401, HONESDALE 34-1**

#### Performance Analysis

Two major equipment related outages significantly affected this circuit's reliability in the past four quarters. On May 4, 2012, an unintentional substation relay operation caused the 34-01 breaker to trip to lockout, interrupting 1,741 customers for up to 100 minutes, resulting in

174,222 CMI. Substation crews identified and resolved the issues with the relay during outage restoration.

On July 26, 2012 an equipment failure on the overhead primary conductor caused the 34-01 OCR at grid 67208N53876 to trip to lockout. This outage affected 530 customers for up to 216 minutes, resulting in 89,422 CMI.

In total, the Honesdale 34-1 circuit had 48 outages between March 2012 and April 2013. The primary causes of these outages include: tree contacts from outside the right of way (20), equipment failures (16), and animal contacts (12).

#### Remedial Actions

- PPL will be trimming the entire Honesdale 34-01 circuit in the early part of the 2013 calendar year.
- Three phase voltage regulators will be installed in order to improve the capabilities of the existing Honesdale 34-01 to Tinker 44-01 tie line. These improvements will enhance sectionalizing capability in the area and reduce future outage durations for PPL customers. The required in service date for the voltage regulators is November 30, 2015.
- A new tie line between the Honesdale 34-1 and East Carbondale 12-3 circuits will be built in order to enhance the sectionalizing capability in the area. The tie will also reduce the duration of future outages for customers on both the Honesdale 34-1 and East Carbondale 12-3 circuits in the future.

### **53 Circuit ID: 47702, BLOOMSBURG 77-03**

#### Performance Analysis

On July 7, 2012 the 77-03 circuit breaker operated to lockout due to trees outside the right of way falling on conductors. On August 20, 2012 the 47703 circuit breaker tripped and failed to automatically reclose due to a closing coil malfunction. The circuit was patrolled prior to attempting to reclose the circuit breaker and no problems were found. These two outages accounted for approximately 82% of the total customer minutes interrupted over the past 12 months.

#### Remedial Actions

- A new ROCS device will be installed that will allow system operators to remotely transfer customers from the 77-04 to the 77-03 circuit. This project has a required in service date of November 2015.
- On February 11, 2013 an infrared inspection of this circuit was completed. There were no reliability concerns identified.

- The SCADA installation at the Millville substation was completed on July 26, 2012 and the portion of the Millville 32-02 was transferred back to Millville

## **54 Circuit ID: 24102, EAST HAZLETON 41-02**

### Performance Analysis

The circuit experienced four large outages over the past four quarters. On August 9, 2012 transformer fuses at the substation operated during a period of thunder and lightning. This led to the interruption of 552 customers for 50 minutes, resulting in 27,545 CMI.

On August 21, 2012 a tree from outside the right of way contacted the circuit causing a broken cross-arm and wires down. This led to the interruption of 343 customers for 291 minutes, resulting in 77,047 CMI.

On January 20, 2013 the transmission live serving the substation tripped to lockout due to a customer equipment issue. This led to the interruption of 584 customers for 34 minutes, resulting in 19,856 CMI.

On February 26, 2013 an equipment failure led to the interruption of 364 customers for 333 minutes, resulting in 28,791 CMI.

In total, the East Hazleton 41-02 experienced 8 outages between April 2012 and March 2013. The causes include equipment failure (5), tree related (1), and no cause found (2).

### Remedial Actions

- Detailed analysis of reliability improvements for this circuit will be conducted in the second quarter of 2013.

## **55 Circuit ID: 64202, KINZER 42-02**

### Performance Analysis

The Kinzer 42-02 circuit has approximately 1,015 customers across 87 circuit miles. The largest contributor to the CPI (Circuit Performance Index) is SAIDI. Of the top 10 outages in the past year, the outage that contributed the most to the CPI occurred on October 19, 2012. This was a transmission outage that was caused by a tornado that touched down in the Lancaster region with wind gusts over 110 MPH. This one outage resulted in over 558,164 CMI.

Three of the other outages were caused by trees from outside the right of way for a total CMI of 116,548, two outages occurred where nothing was found for a total CMI of 18,300, two were caused by vehicle hits for a total CMI of 3,502 and one was caused from trees that were not adequately trimmed for a total CMI of 2,322. Three of these outages, including the transmission outage, occurred during T&L and/or wind storms. The circuit was last trimmed in 2008. The line was a Worst Performing Circuit 9 times over the last 34 quarters, with the last being in 2011.

### Remedial Actions

- A line inspection on the overhead two and three phase sections of the circuit was completed on March 31, 2011. A few minor problems were detected and fixed.
- Full circuit tree trimming is scheduled to start in early 2013.
- Existing sectionalizing and tie devices will be automated in 2015 as part of PPL's Smart Grid program.
- An Expanded Operational Review on the circuit will be completed by December 2013.

## **56 Circuit ID: 10205, ALLENTOWN 02-05**

### Performance Analysis

During the past twelve months there have been three circuit breaker lockouts that interrupted all 2,929 customers on this line. The first was in July 2012, when primary and neutral conductors fell causing the circuit breaker to open. The second outage occurred later in July when a tree was found on the three phase line. The third was caused by a transmission outage. There was one additional large outage when crews requested an outage of 170 customers so that repairs could be made to a pole after a vehicle accident.

In addition to these large outages, there have been several other outages involving distribution transformers and single phase tap fuses. Equipment failures have been the largest contributor to outages on this circuit.

There have been 22 outages on the 02-05 during the last 12 months. The causes have been equipment failures (9), tree related (4), animal contact (4), vehicle hit (2), nothing found (2), and other (1).

### Remedial Actions

- The entire circuit was last trimmed in 2010 and is scheduled for comprehensive trimming again in 2014.
- This circuit is new to the WPC list and will be reviewed at the next Lehigh Region WPC meeting on May 10<sup>th</sup>, 2013. At this meeting remedial actions will be reviewed and placed into the budget for future completion.

## **57 Circuit ID: 24301, RIVER 43-1**

### Performance Analysis

This circuit experienced one significant outage due to equipment failure that adversely impacted its reliability over the past four quarters. On December 21, 2012 an equipment issue caused the circuit breaker to trip to lockout. This interrupted 3,510 customers for up to 770 minutes, resulting in 1,673,131 customer minutes interrupted. It should be noted that the River 43-01 was

carrying all the load and an additional 1.726 customers from an adjacent circuit at the time of this outage due to planned work. In total, the River 43-01 experienced 8 outages from April 2012 to March 2013. The causes include equipment failures (3), animal contacts (3), tree contact (1), vehicle contact (1).

#### Remedial Actions

- A line patrol was conducted to identify maintenance items on this circuit. Work orders were created to address the issues that were identified. The maintenance work is scheduled to be completed by December, 2013.

### **58 Circuit ID: 26001 WESTDAMASCUS 60-1**

#### Performance Analysis

Two major tree related outages significantly affected this circuit's reliability in the past four quarters. On July 26, 2012, a tree from outside the right of way came in contact with the overhead primary conductor and caused the 60-01 OCR at grid 69934N58856 to trip to lockout, interrupting 130 customers for up to 1,416 minutes, resulting in 161,731 CMI. On the same day, another tree from outside the right of way came in contact with the overhead primary conductor and caused the OCR at grid 71373N59525 to trip to lockout. This outage affected 74 customers for up to 1,823 minutes, resulting in 134,851 CMI.

In total, the West Damascus 60-01 circuit had 6 outages between September 2012 and January 2013. The causes of these outages include: equipment failures (5), and vehicle contacts (1).

#### Remedial Actions

- A project is being initiated to install a new tie line between the West Damascus 60-1 and 60-2 circuits. The tie will improve sectionalizing capability in the area and reduce outage duration times for customers on both the 60-1 and 60-2 circuits in the future. The required in service date for the project is November 30, 2015.
- PPL EU completed tree trimming the entire West Damascus 60-01 circuit in 2012.
- A project is underway to relocate a section of inaccessible three phase line to the road between grid blocks 675N579 and 678N578 in order to provide improved reliability to customers in the future.

5) A rolling 12-month breakdown and analysis of outage causes during the preceding quarter, 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 following table shows a breakdown of service interruption causes for the 12 months ended at the current quarter. The top three causes (Equipment Failures, Tree Related, and Animals), which are based on the percent of cases of trouble, are highlighted in the table. Service interruption definitions are provided in Appendix B. PPL Electric's maintenance programs focus on corrective actions to address controllable service interruptions (e.g., trees and equipment failure).

Cause Description	Trouble Cases <sup>8</sup>	Percent of Trouble Cases	Customer Interruptions <sup>9</sup>	Percent of Customer Interruptions	Customer Minutes	Percent of Customer Minutes
Animals	2,746	16.75%	48,223	3.12%	4,066,244	1.73%
Contact/Dig-In	143	0.87%	21,416	1.39%	2,255,592	0.96%
Directed by Non-PPL Authority	208	1.27%	10,886	0.70%	1,237,863	0.53%
Equipment Failures	5,420	33.06%	539,718	34.94%	65,805,733	28.04%
Improper Design	2	0.01%	1,384	0.09%	207,820	0.09%
Improper Installation	2	0.01%	137	0.01%	28,383	0.01%
Improper Operation	22	0.13%	21,781	1.41%	763,844	0.33%
Nothing Found	1,382	8.43%	101,103	6.55%	7,819,540	3.33%
Other-Controllable	80	0.49%	6,547	0.42%	345,358	0.15%
Other-Non Control	410	2.50%	106,258	6.88%	8,521,902	3.63%
Other-Public	55	0.34%	4,466	0.29%	381,653	0.16%
Tree Related	5,131	31.30%	508,952	32.95%	122,147,295	52.05%
Vehicles	795	4.85%	173,920	11.26%	21,141,610	9.01%
<b>Total</b>	<b>16,396</b>	<b>100.00%</b>	<b>1,544,791</b>	<b>100.00%</b>	<b>234,722,836</b>	<b>100.00%</b>

<sup>8</sup> Cases of trouble are the number of sustained customer service interruptions (i.e., service outages).

<sup>9</sup> 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. PPL Electric has experienced an elevated level of both reportable and non-reportable storms during this reporting period.

**Tree Related:** Although their effect on reliability is significant, tree outages not related to trimming generally are caused by trees falling from outside of PPL Electric's rights-of-way, and generally are not controllable. For trees within the right-of-way, PPL Electric is currently implementing a more aggressive trimming strategy.

**Animals:** Animals accounted for about 16.8% 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 80% of the number of cases of trouble was associated with individual distribution transformers. However, when animal contacts affect 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. All substations are scheduled to be animal guarded by 2017.

**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 43% of the cases of trouble, 41% of the customer interruptions and 57% of the customer minutes attributed to equipment failure were weather-related and, as such, are not considered to be indicators of equipment condition or performance. In 2009, to help reduce the risk of incurring interruptions due to equipment failures, PPL Electric initiated an Asset Optimization Strategy project to assess equipment health and generate a long-term plan for proactive infrastructure replacement and enhanced maintenance practices. It is anticipated that, over time, this strategy will improve reliability performance as it pertains to PPL Electric's distribution, substation and transmission assets.

**Nothing Found:** This description is recorded when the responding crew can find no cause for the interruption. That is, when there is no evidence of equipment failure, damage, or contact after a line patrol is completed. For example, during heavy thunderstorms, when a line fuse blows or a single-phase OCR locks open and when closed for test, the fuse holds, or the OCR remains closed, and a patrol reveals nothing.

6) *Quarterly and year-to-date information on progress toward meeting transmission and distribution inspection and maintenance goals/objectives. (For first, second and third quarter reports only.)*

Inspection & Maintenance Goals/Objectives	Annual Budget	1st Quarter		Year-to-date	
		Budget	Actual	Budget	Actual
<b>Transmission</b>					
Transmission C-tag poles (# of poles)	307	52	44	52	44
Transmission arm replacements (# of sets)	104	6	0	6	0
Transmission air break switch inspections (# of switches)	51	8	2	8	2
Transmission lightning arrester installations (# of sets)	0	0	0	0	0
Transmission pole inspections (# of poles)	1600	298	443	298	443
Transmission tree side trim-Bulk Power (linear feet)	N/A				
Transmission herbicide-Bulk Power (# of acres)	N/A				
Transmission reclearing (# of miles) BES Only	400.09	97.75	212.27	97.75	212.27
Transmission reclearing (# of miles) 69 kV	857.67	144.84	216.59	144.84	216.59
Transmission reclearing (# of miles) 138 kV	0	0	0	0	0
Transmission danger tree removals-Bulk Power (# of trees)	N/A				
<b>Substation</b>					
Substation batteries (# of activities)	654	424	422	424	422
Circuit breakers (# of activities)	995	303	270	303	270
Substation inspections (# of activities)	4439	1322	1319	1322	1319
Transformer maintenance (# of activities)	1440	390	380	390	380
<b>Distribution</b>					
Distribution C-tag poles replaced (# of poles)	1,344	200	231	200	231
C-truss distribution poles (# of poles)	3,851	716	236	716	236
Capacitor (MVAR added)	20	0	3	0	3
OCR replacements (# of)	750	193	191	193	191
Distribution pole inspections (# of poles)	90,000	13,500	13,521	13,500	13,521
Distribution line inspections (# of miles)	6,091	1,142	1,859	1,142	1,859
Group re-lamping (# of lamps)	18,379	0	0	0	0
Test sections of underground distribution cable	560	120	106	120	106
Distribution tree trimming (# of miles)	6306.38	1531.17	1347.04	1531.17	1347.04
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)	711	180	151	180	151
LTN vault inspections (# of)	738	186	189	186	189
LTN network protector overhauls (# of)	63	34	24	34	24
LTN reverse power trip testing (# of)	136	35	31	35	31

- 7) *Quarterly and year-to-date information on budgeted versus actual transmission and distribution operation and maintenance expenditures in total and detailed by the EDC's own functional account code or FERC account code as available. (For first, second and third quarter reports only.)*

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

Activity	1st Quarter		Year-to-date	
	Budget (\$000)	Actual (\$000)	Budget (\$000)	Actual (\$000)
Provide Electric Service	2,266	2,103	2,266	2,103
Vegetation Management	7,960	9,316	7,960	9,316
Customer Response	14,713	14,208	14,713	14,208
Reliability & Maintenance	22,666	16,258	22,666	16,258
System Upgrade	159	170	159	170
Customer Services/Accounts	28,370	27,581	28,370	27,581
Others	17,765	15,056	17,765	15,056
<b>Total O&amp;M Expenses</b>	<b>93,899</b>	<b>84,692</b>	<b>93,899</b>	<b>84,692</b>

- 8) *Quarterly and year-to-date information on budgeted versus actual transmission and distribution capital expenditures in total and detailed by the EDC's own functional account code or FERC account code as available. (For first, second and third quarter reports only.)*

The following table provides the capital expenditures for PPL Electric, as a whole, which includes transmission and distribution ("T&D") activities.

	1st Quarter		Year-to-date	
	Budget (\$1,000s)	Actual (\$1,000s)	Budget (\$1,000s)	Actual (\$1,000s)
New Service/Revenue	21,958	22,015	21,958	22,015
System Upgrade	127,383	101,883	127,383	101,883
Reliability & Maintenance	68,212	71,338	68,212	71,338
Customer Response	3,315	2,841	3,315	2,841
Other	5,829	4,574	5,829	4,574
<b>Total</b>	<b>226,697</b>	<b>202,651</b>	<b>226,697</b>	<b>202,651</b>

- 9) *Dedicated staffing levels for transmission and distribution operation and maintenance at the end of the quarter, in total and by specific category (for example, linemen, technician and electrician).*

The following table shows the dedicated staffing levels as of the end of the quarter. Job descriptions are provided in Appendix C.

<b>Transmission and Distribution (T&amp;D)</b>	
Lineman Leader	69
Journeyman Lineman	211
Journeyman Lineman-Trainee	92
Helper	14
Groundhand	3
Troubleman	51
<b>T&amp;D Total</b>	<b>440</b>
<b>Electrical</b>	
Elect Leaders-UG	5
Elect Leaders-Net	8
Elect Leaders-Sub	25
Journeyman Elect-UG	26
Journeyman Elect-Net	15
Journeyman Elect-Sub	56
Journeyman Elect Trainee-UG	2
Journeyman Elect Trainee-Net	18
Journeyman Elect Trainee	28
Helper	12
Laborer-Network	0
Laborer-Substation	0
<b>Electrical Total</b>	<b>195</b>
<b>Overall Total</b>	<b>635</b>

***PPL Electric Utilities Corporation  
Worst Performing Circuit Definition***

PPL Electric uses a Circuit Performance Index (CPI) to define the worst performing circuits on its system. The CPI covers about 1,100 feeders across the PPL Electric service area.

The CPI is derived using the following statistics and weighting factors:

- SAIDI - 35%
- SAIFI - 30%
- Fraction of customers interrupted more than three times - 20%
- Fraction of customers with an interruption over four hours - 15%

Major Events, momentary interruptions, and planned prearranged jobs are excluded.

The CPI values are obtained by multiplying the individual feeder statistics by coefficients based on the 5-year period, 2001-2005. Average values over this period were:

- SAIDI – 121.9 per customer per year
- SAIFI – 0.929 per customer per year
- Fraction of customers interrupted more than three times - 4% per feeder per year
- Fraction of customers with an interruption over four hours - 10% per feeder per year

A hypothetical feeder with the values of SAIDI, SAIFI, and the fraction of customers interrupted more than three times, and the fraction of customers with an interruption over four hours, equal to the 5-year averages would have a CPI value of 100. Any variations in the values of the above criteria would affect the CPI values in accordance with the weighting factors.

***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. This information is electronically recorded as a “cause code” number when the job record is closed. PPL Electric cause codes are subdivided into four general classifications: Controllable, Non-Controllable, Public and Non-PPL Electric. The definitions of the cause codes are:

10 – Improper Design	Controllable	<ul style="list-style-type: none"><li>• 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. (Facility Records personnel use only)</li></ul>
11 – Improper Installation	Controllable	<ul style="list-style-type: none"><li>• 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. (Facility Records personnel use only)</li></ul>
12 – Improper Operation	Controllable	<ul style="list-style-type: none"><li>• 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. (Facility Records personnel use only)</li></ul>
30 – Trees – Trimming Related <sup>10</sup>	Controllable	<ul style="list-style-type: none"><li>• Outages resulting from conductors contacted by tree growth within the clearance zone defined by the current trimming specification (within the Rights-of-Way).</li></ul>
35 – Trees – Not Trimming Related	Non-Controllable	<ul style="list-style-type: none"><li>• 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.</li></ul>
40 – Animals	Controllable	<ul style="list-style-type: none"><li>• Any outage caused by an animal directly or indirectly coming in contact with PPL Electric facilities. This includes birds, squirrels, raccoons, snakes, cows, etc.</li></ul>
41 – Vehicles	Public	<ul style="list-style-type: none"><li>• When cars, trucks or other types of vehicles or their cargoes strike facilities causing a problem.</li></ul>

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<sup>10</sup> The title and description of this code have been revised for clarity. The purpose and application of the code have not changed.

## Appendix B

51 – Contact/Dig-in	Public	<ul style="list-style-type: none"> <li>• 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.).</li> <li>• When contact is made by a non-employee with an underground facility causing interruption.</li> </ul>
60 – Equipment Failure	Controllable	<ul style="list-style-type: none"> <li>• Outages resulting from equipment failures caused by corrosion or contamination from build-up of materials, such as cement dust or other pollutants.</li> <li>• Outages resulting from a component wearing out due to age or exposure, including fuse tearing or breaking.</li> <li>• Outages resulting from a component or substance comprising a piece of equipment failing to perform its intended function.</li> <li>• Outages resulting from a failure that appears to be the result of a manufacturer’s defect or can not be described by any other code indicating the specific type of failure.</li> </ul>
77 – Non-PPL Electric Problem – Other	Non-PPL Electric	<ul style="list-style-type: none"> <li>• Where no PPL Electric or customer facilities were affected, and no repair or restoration was carried out on PPL Electric equipment.</li> </ul>
78 – Non-PPL Electric Problem – Customer Facility	Non-PPL Electric	<ul style="list-style-type: none"> <li>• Where no PPL Electric facilities were affected, and no repair or restoration was carried out on PPL Electric equipment.</li> </ul>
80 – Scheduled Outage <sup>11</sup>	Controllable	<ul style="list-style-type: none"> <li>• Interruptions under the control of a PPL Electric switchman or direction of a PPL Electric System Operator for the purpose of performing <u>scheduled</u> maintenance, repairs and capacity replacements for the safety of personnel and the protection of equipment.</li> <li>• Includes requests from customers for interruption of PPL Electric facilities.</li> </ul>

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<sup>11</sup> Interruptions under the control of a PPL Electric switchman or the direction of a PPL Electric System Operator for the purpose of isolating damaged facilities to make repairs are reported using the initial cause of the damage when the interruption is taken immediately, but are reported as a scheduled outage when the interruption is postponed.

## Appendix B

85 – Directed by Non-PPL Electric Authority	Non-Controllable	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>
90 – Other – Controllable (Lineman provides explanation)	Controllable	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Interruptions resulting from excessive load that cause that facility to fail.</li> <li>• 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.</li> <li>• Controllable interruptions or Power Service Problems whose cause is not described by one of the previous controllable cause codes.</li> </ul>
96 – Nothing Found	Non-Controllable	<ul style="list-style-type: none"> <li>• When no cause for the interruption can be found.</li> <li>• 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.</li> <li>• When closed for test, the fuse holds or the OCR remains closed. A patrol of the tap reveals nothing.</li> </ul>
98 – Other Public (Lineman provides explanation)	Public	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

## Appendix B

99 – Other – Non-Controllable (Lineman provides explanation)	Non-Controllable	<ul style="list-style-type: none"><li>• 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.</li><li>• 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.</li><li>• All problems caused by contact of energized equipment with facilities of other attached companies or by trouble on customer owned equipment.</li><li>• 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.</li></ul>
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***PPL Electric Utilities Corporation  
Job Descriptions***

***Transmission and Distribution***

Groundhand	<ul style="list-style-type: none"><li>• Performs manual labor and assists employees in higher job classifications.</li></ul>
Helper	<ul style="list-style-type: none"><li>• Performs semi-skilled labor at any work location on de-energized overhead and underground transmission, and distribution facilities to prepare the employee for entrance into the Journeyman Lineman Apprenticeship Program.</li></ul>
Journeyman Lineman	<ul style="list-style-type: none"><li>• Works by himself or as part of a crew on the maintenance, operation, and construction activities of the transmission and distribution systems associated with, but not limited to, PPL Electric facilities.</li></ul>
Journeyman Lineman-Trainee	<ul style="list-style-type: none"><li>• Works by himself or as part of a crew on the maintenance, operation, and construction activities of the transmission and distribution systems associated with, but not limited to, PPL Electric facilities.</li></ul>
Lineman Leader	<ul style="list-style-type: none"><li>• Responsible for completing assigned work by directing one or multiple groups of employees involved in the maintenance, operation, and construction activities of the transmission and distribution systems associated with, but not limited to, PPL Electric facilities.</li><li>• Engage in and perform work along with providing the necessary leadership, all-around knowledge, initiative, judgment, and experience to produce a quality job.</li><li>• Performs all the direct duties of the Journeyman Lineman when not acting as a Lineman Leader.</li></ul>
Troubleman	<ul style="list-style-type: none"><li>• Investigates and resolves trouble calls, voltage abnormalities on transmission and distribution systems associated with, but not limited to, PPL Electric facilities.</li></ul>

***Electrical***

<p>Electrician Leader</p> <ul style="list-style-type: none"> <li>- Substation</li> <li>- Network</li> <li>- Underground</li> </ul>	<ul style="list-style-type: none"> <li>• Responsible for completing assigned work by directing one or multiple groups of employees involved in the construction and maintenance activities of the transmission and distribution systems associated with, but not limited to, PPL Electric facilities.</li> <li>• Engage in and perform work along with providing the necessary leadership, all-around knowledge, initiative, judgment, and experience to produce a quality job.</li> <li>• Performs all direct duties of the Journeyman Electrician when not acting as a leader.</li> </ul>
<p>Helper</p> <ul style="list-style-type: none"> <li>- Substation</li> <li>- Network</li> <li>- Underground</li> </ul>	<ul style="list-style-type: none"> <li>• Performs manual labor at any work location including those areas containing non-exposed energized electrical equipment, and to prepare the employee for entrance into the Apprenticeship Program.</li> </ul>
<p>Laborer</p> <ul style="list-style-type: none"> <li>- Substation</li> <li>- Network</li> <li>- Underground</li> </ul>	<ul style="list-style-type: none"> <li>• Performs manual labor and assists employees in higher job classifications.</li> </ul>
<p>Journeyman Electrician</p> <ul style="list-style-type: none"> <li>- Substation</li> <li>- Network</li> <li>- Underground</li> </ul>	<ul style="list-style-type: none"> <li>• Normally under limited supervision performs and is responsible for work associated with, but not limited to, PPL Electric facilities involving the highest degree of skill in construction and maintenance work associated with substations, LTN or underground distribution and transmission.</li> <li>• Uses microprocessor based equipment for troubleshooting and revising relay logic and its control systems related to the Field Services electrical discipline.</li> </ul>
<p>Journeyman Electrician - Trainee</p> <ul style="list-style-type: none"> <li>- Substation</li> <li>- Network</li> <li>- Underground</li> </ul>	<ul style="list-style-type: none"> <li>• Normally under limited supervision performs and is responsible for work associated with, but not limited to, PPL Electric facilities involving the highest degree of skill in construction and maintenance work associated with substations, LTN or underground distribution and transmission.</li> <li>• Uses microprocessor based equipment for troubleshooting and revising relay logic and its control systems related to the Field Services electrical discipline.</li> </ul>

From: (610) 774-4254  
Paul E Russell  
PPL Corporation  
2 N 9th Street

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Allentown, PA 18101

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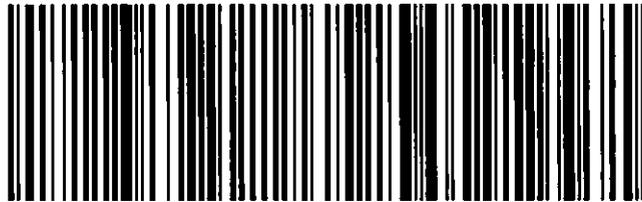
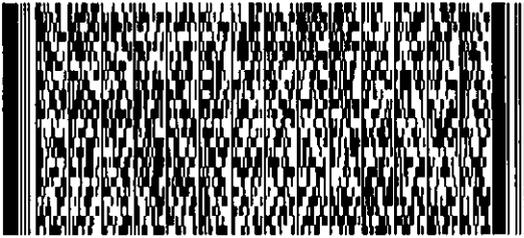
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3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning:** Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.