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E-FILE

October 29, 2021

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

Re: PPL Electric Utilities Corporation
Quarterly Reliability Report for the
Period Ended September 30, 2021
Docket No. M-2016-2522508

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") is the **NON-CONFIDENTIAL** version of PPL Electric's Quarterly Reliability Report for the Period Ended September 30, 2021 ("Quarterly Reliability Report"). The report is being filed pursuant to 52 Pa. Code § 57.195(d).

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on October 29, 2021, which is the date it was filed electronically with the Commission's E-Filing System.

A proprietary and confidential version of this report has also been filed with the Commission on this date via overnight delivery.

If you have any questions regarding this document, please call me or Nikki Jones, PPL Electric's Director of Public Affairs, at (717) 603-4029.

Respectfully submitted,

Kimberly A. Klock

Enclosures

cc via email: Darryl Lawrence, Esquire
Steven Gray, Esquire
Mr. Daniel Searfoorce
Mr. John Van Zant

PPL Electric Utilities Corporation

Quarterly Reliability Report

to the

Pennsylvania Public Utility Commission

October 2021

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.

No major events occurred during the third quarter of 2021.

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 ending September 30, 2021.

SAIFI	BM 0.98	0.91
	STD 1.18	0.91
CAIDI (Benchmark = 145; Rolling 12-month Std. = 174)	BM 145	194
	STD 174	194
SAIDI (Benchmark = 142; Rolling 12-month Std. = 205)	BM 142	176
	STD 205	176
MAIFI		3.7
Average Number of Customers Served [1]		1,442,772
Number of Sustained Customer Interruptions (Trouble Cases)		23,494
Number of Customers Affected [2]		1,313,367
Customer Minutes of Interruptions (CMI)		254,749,035
Number of Customer Momentary Interruptions		5,291,128

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

[2] 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.

During the third quarter, there were no (0) PUC major events, seven (7) PUC reportable events, and eleven (11) other storms that required the opening of one or more area emergency centers to manage restoration efforts. Of the 80 quarters in our data going back to 2002, Q3 of 2021 had the most PUC storms, the most total storms, and the most CMI of any quarter.

Trouble Quarter	Customers Interrupted	CMI	CI Rank	CMI Rank	PUC Storms	Total Storms	PUC Storm Rank	Total Storm Rank
2021-Q3	527,095	128,944,309	4	1	7	18	1	1
2012-Q3	595,191	125,168,383	1	2	4	11	2	5
2004-Q3	497,716	114,709,068	6	3	2	5	16	39
2018-Q2	423,197	113,575,955	12	4	3	8	8	15
2011-Q3	469,219	95,317,214	9	5	1	17	37	2
2007-Q2	561,041	91,087,659	2	6	3	12	8	4
2014-Q1	323,938	89,922,970	39	7	2	4	16	51
2006-Q3	501,867	83,335,404	5	8	2	13	16	3
2008-Q4	361,946	82,651,414	30	9	2	5	16	39
2014-Q3	363,657	77,671,367	28	10	2	6	16	29
2002-Q4	391,721	73,326,947	19	11	3	4	8	51

PPL Electric's second quarter reliability performance for SAIFI and SAIDI was within the PUC standard, with SAIFI also within the PUC benchmark. PUC CAIDI was outside of both standard and benchmark values due to the increased storm frequency and intensity experienced in 2021. Smart Grid technology and automation benefit SAIFI and SAIDI but have a negative impact on CAIDI. While PUC CAIDI is elevated, IEEE CAIDI, which is normalized for weather performance, is only slightly above 2nd quartile among large utility performance nationally.

Because weather has a significant impact to volatility in reliability metrics, PPL Electric's IEEE Metrics are shown below. The IEEE 1366 standard is a widely used methodology that allows for weather normalized performance evaluation that better reflects system performance during non-major storm events. The table below lists PPL Electric's IEEE performance metrics compared to the performance quartiles for large utilities nationally, as issued by the IEEE annual reliability survey. This survey comprises some 100 utilities serving 85 million customers across the country.

	IEEE CAIDI	IEEE SAIFI	IEEE SAIDI
2018	112	0.74	82.5
2019	113	0.66	74.3
2020	99	0.69	68.6
Rolling 12 Months Ending 9/30/21	124	0.66	83
IEEE First Quartile Ceiling	98	0.82	84
IEEE Second Quartile Ceiling	108	1.06	103

Rolling 12-month reliability index values (SAIFI, CAIDI, SAIDI, CMI, 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	SAIDI	CAIDI	SAIFI	MAIFI	Customers	Cases of Trouble	Customer Minutes Interrupted (CMI)
1	46001	377	109	3.47	4.0	2,363	82	892,522
2	55001	2049	390	5.25	23.7	1,307	407	2,678,597
3	56501	392	187	2.09	9.7	2,345	36	920,554
4	47704	396	144	2.76	8.3	1,389	129	550,307
5	22602	326	66	4.98	9.0	597	25	194,750
6	20403	652	188	3.47	13.1	1,954	132	575,803
7	45602	308	66	4.66	6.1	1,631	61	503,226
8	45302	929	236	3.93	8.7	1,221	90	1,135,444
9	20601	458	146	3.13	26.2	1,474	81	675,154
10	56504	464	203	2.29	12.5	1,998	131	928,682
11	45402	971	201	4.83	14.9	1,642	156	1,594,860
12	26001	913	291	3.14	6.2	1,422	92	1,299,143
13	40101	172	120	1.44	9.7	2,161	59	373,410
14	29402	362	147	2.46	1.9	1,696	54	615,247
15	45303	492	133	3.70	4.0	1,347	44	663,070
16	26604	598	410	1.46	15.5	2,418	120	1,447,218
17	26401	176	118	1.49	19.8	2,218	105	391,473
18	52402	345	169	2.04	7.8	1,681	110	580,390
19	18502	345	259	1.33	18.0	1,874	122	648,181
20	47002	267	167	1.60	4.6	2,007	121	536,523
21	53901	385	268	1.43	13.6	1,339	60	515,906
22	21901	369	117	3.15	4.4	2,587	117	956,237
23	56802	403	204	1.97	4.5	1,538	99	620,381
24	25801	243	126	1.93	3.5	1,828	84	444,631

WPC Rank	Feeder ID	SAIDI	CAIDI	SAIFI	MAIFI	Customers	Cases of Trouble	Customer Minutes Interrupted (CMI)
25	53601	464	278	1.67	0.7	1,121	51	520,195
26	22003	261	177	1.48	5.9	1,403	42	366,359
27	17802	368	108	3.40	14.5	1,953	94	720,333
28	46302	775	232	3.35	3.4	1,093	93	847,124
29	47001	118	102	1.16	1.0	2,507	124	296,609
30	51502	133	96	1.38	10.1	1,925	14	256,504
31	45902	614	194	3.16	17.2	1,348	100	828,860
32	43401	1132	190	5.96	9.5	998	91	1,130,076
33	52401	463	254	1.82	1.4	1,298	78	601,073
34	44802	261	135	1.94	0.6	1,581	54	413,180
35	14403	231	183	1.27	2.2	2,586	113	597,829
36	12301	214	127	1.69	17.5	1,468	58	314,757
37	55408	402	269	1.49	3.8	1,161	17	467,870
38	22406	784	388	2.02	12.0	969	72	760,132
39	16005	454	74	6.10	3.5	1,127	30	512,338
40	40502	209	116	1.80	2.8	1,954	66	409,309
41	42401	549	118	4.64	4.9	717	68	394,112
42	58101	324	103	3.15	4.4	869	14	281,786
43	27101	231	156	1.49	3.2	1,841	65	425,868
44	45002	505	487	1.04	2.3	1,954	69	986,888
45	46504	391	450	0.87	3.0	1,929	46	754,875
46	46004	418	278	1.50	7.4	2,070	44	866,619
47	43701	435	160	2.72	1.4	988	22	429,814
48	47502	299	93	3.22	4.1	821	31	246,097
49	56803	272	172	1.58	3.5	1,271	80	345,906
50	43201	539	128	4.21	7.6	975	86	526,285
51	40901	128	80	1.60	3.1	1,941	52	248,717
52	46802	425	345	1.23	2.9	1,949	95	828,578
53	28602	317	135	2.34	4.1	1,945	65	617,794
54	17803	274	174	1.58	8.2	1,621	63	444,824
55	18001	1065	275	3.87	1.6	683	47	727,834
56	11506	225	63	3.55	5.6	1,314	79	296,347
57	41602	487	140	3.47	5.6	841	82	409,946
58	42902	274	116	2.37	11.7	1,201	46	330,222
59	54601	145	101	1.43	11.2	1,692	29	245,637
60	54701	459	202	2.27	0.9	1,121	42	514,558
61	22601	218	110	1.97	16.9	1,232	42	268,844
62	64304	289	173	1.67	17.3	1,427	39	412,957
63	13503	178	91	1.96	14.4	1,485	33	265,414

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

01 Circuit 46001 -- BERWICK 60-01

Performance Analysis

The BERWICK 60-01 circuit experienced three outages of over 100,000 CMI between October 2020 and September 2021.

On October 26, 2020, an equipment failure occurred on an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 2,362 customers for up to 1,854 minutes resulting in 2,020,159 CMI.

On June 14, 2021, during a period of heavy rain, a tree contacted a pole or pole arm causing a recloser to trip to lockout. This outage affected 937 customers for up to 225 minutes resulting in 187,513 CMI.

On July 11, 2021, during a period of heavy rain, an equipment failure occurred on an overhead splice causing a recloser to trip to lockout. This outage affected 941 customers for up to 203 minutes resulting in 190,637 CMI.

In total, the BERWICK 60-01 circuit had 54 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (33); equipment failure (11); nothing found (6); animal contacts (4).

Remedial Actions

- In 2021, a section of difficult-to-access to conductor will be relocated and the customers transferred to another circuit.
- In 2021, the section of conductor that experienced the large failure in 2020 will be reconductored.
- In 2021, an alternate feed will be evaluated for the customers who experienced the large outage in 2020.
- In 2021, additional fusing will be installed.
- In 2022, full circuit trimming will be performed.
- In 2022, an additional single-phase recloser will be installed.

02 Circuit 55001 -- NEWPORT 50-01

Performance Analysis

The NEWPORT 50-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On April 1, 2021, during a period of strong wind, a tree contacted an overhead conductor causing an interruption. This outage affected 1,391 customers for up to 191 minutes resulting in 110,888 CMI.

In total, the NEWPORT 50-01 circuit had 96 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (62); equipment failure (26); vehicles (3); animal contacts (2); nothing found (2); other (1).

Remedial Actions

- In 2020, three single-phase reclosers were installed.
- In 2020, three fuses were installed.
- In 2020, full circuit trimming was performed.
- In 2020, a section of single-phase was resourced.
- In 2020, a Proactive Circuit Analysis was performed with several minor remediations implemented.
- In 2021, an additional single-phase recloser was installed.
- In 2021, two additional fuses were installed with three more to follow.
- In 2021, reconductoring will be evaluated for a section of single-phase.
- In 2021, reconfiguration will be evaluated for a section of single-phase.
- In 2022, a section of three-phase conductor in a heavily wooded area will be relocated.
- In 2022, a section of single-phase will be reconductored.
- In 2022, an additional three-phase sectionalizing device will be installed.
- In 2023, a section of single-phase will be resourced.

03 Circuit 56501 -- ROCKVILLE 65-01

Performance Analysis

The ROCKVILLE 65-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On October 17, 2020, an equipment failure occurred on an overhead conductor causing an interruption. This outage affected 5,002 customers for up to 316 minutes resulting in 1,254,262 CMI.

In total, the ROCKVILLE 65-01 circuit had 30 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (19); equipment failure (6); animal contacts (3); contact or dig in (1); vehicles (1).

Remedial Actions

- In 2020, 18 locations received animal guarding.
- In 2020, nine new fuses were installed.
- In 2020, ten new single-phase reclosers were installed and will have protection settings optimized in 2021.
- In 2021, an additional Smart Grid device was installed.
- In 2021, an additional tie line was installed.
- In 2021, a section of line was re-sourced.
- In 2021, sections of single-phase and three-phase will be reconductored.
- In 2021, a new three-phase tie will be evaluated.
- In 2022, a new substation and three-phase reconductoring will be evaluated.
- In 2023, three new Smart Grid devices will be installed.

04 Circuit 47704 -- BLOOMSBURG 77-04

Performance Analysis

The BLOOMSBURG 77-04 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 15, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 277 customers for up to 525 minutes resulting in 109,719 CMI.

On July 12, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 253 customers for up to 538 minutes resulting in 122,232 CMI.

In total, the BLOOMSBURG 77-04 circuit had 97 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (61); equipment failure (20); animal contacts (8); nothing found (4); other (4).

Remedial Actions

- In 2020, full circuit trimming was performed.
- In 2021, two single-phase reclosers were installed.
- In 2021, a section of line will be reconductored.
- In 2021, an additional single-phase recloser will be evaluated.
- In 2021, the protection setting on a three-phase device will be evaluated and optimized.
- In 2021, relocation of a section of single-phase conductor will be evaluated.
- In 2021, additional fusing will be installed.
- In 2021, additional sectionalizing capability will be added to this circuit.
- In 2022, a section of conductor in a heavily wooded area will be undergrounded.

05 Circuit 22602 -- KIMBLES 26-02

Performance Analysis

The KIMBLES 26-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On November 17, 2020, an equipment failure occurred on an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 4,168 customers for up to 239 minutes resulting in 560,955 CMI.

In total, the KIMBLES 26-02 circuit had 20 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (10); animal contacts (4); equipment failure (3); vehicles (3).

Remedial Actions

- In 2021, four dissimilar metal connections were remediated.
- In 2021, additional fusing was installed.
- In 2021, additional animal guarding was installed with more to be done.
- In 2021, several Smart Grid communication devices were upgraded.
- In 2021, a new tie line will be constructed.
- In 2021, full circuit trimming was performed.
- In 2021, numerous porcelain cutouts will be replaced.
- In 2021, an additional Smart Grid device will be evaluated.
- In 2021 and 2022, five additional single-phase reclosers will be installed.

06 Circuit 20403 -- ASHFIELD 04-03

Performance Analysis

The ASHFIELD 04-03 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 14, 2021, an unidentified issue occurred with an overhead switch causing a recloser to trip to lockout. This outage affected 2,651 customers for up to 331 minutes resulting in 770,391 CMI.

On July 12, 2021, a vehicle contacted a pole causing a recloser to trip to lockout. This outage affected 1,892 customers for up to 187 minutes resulting in 146,345 CMI.

In total, the ASHFIELD 04-03 circuit had 78 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (52); equipment failure (13); vehicles (5); nothing found (4); animal contacts (3); other (1).

Remedial Actions

- In 2019, full circuit trimming was performed.
- In 2020, additional hot spot trimming was performed.
- In 2020, two and one-half miles of three-phase conductor was rebuilt.
- In 2020, a section of difficult-to-access single-phase was relocated.
- In 2021, three additional single-phase reclosers were installed on this circuit.
- In 2021, an existing recloser was upgraded to a Smart Grid device.
- In 2021, single-phase ties will be evaluated for this circuit.
- In 2021, a section of difficult-to-access conductor will be relocated.
- In 2021, a three-phase tie to the GREENWOOD 20601 will be evaluated.
- In 2022, four additional single-phase reclosers will be installed.
- In 2023, a section of single-phase will be extended.

07 Circuit 45602 -- WOOLRICH 56-02

Performance Analysis

The WOOLRICH 56-02 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On November 1, 2020, during a period of strong wind, a tree contacted an overhead conductor causing a transformer to be interrupted. This outage affected 261 customers for up to 1,228 minutes resulting in 174,881 CMI.

On July 11, 2021, during a period of heavy rain, a tree contacted a pole or pole arm causing a circuit breaker to trip to lockout. This outage affected 1,632 customers for up to 546 minutes resulting in 485,715 CMI.

In total, the WOOLRICH 56-02 circuit had 53 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (38); animal contacts (7); equipment failure (6); vehicles (2).

Remedial Actions

- In 2021, additional animal guarding will be installed.
- In 2022, additional fusing will be installed.
- In 2022, a section of difficult-to-access three-phase will be relocated.

08 Circuit 45302 -- WEST BERWICK 53-02

Performance Analysis

The WEST BERWICK 53-02 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On October 10, 2020, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 466 customers for up to 463 minutes resulting in 161,729 CMI.

On July 11, 2021, during a period of strong wind, a tree contacted an overhead conductor causing an interruption. This outage affected 439 customers for up to 555 minutes resulting in 243,579 CMI.

In total, the WEST BERWICK 53-02 circuit had 61 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (43); equipment failure (8); nothing found (5); animal contacts (3); other (1); vehicles (1).

Remedial Actions

- In 2021, a section of difficult-to-access conductor will be relocated.
- In 2021, additional fusing will be installed.
- In 2022, a section of difficult-to-access conductor will be relocated.
- In 2022, a section of difficult-to-access conductor will be resourced.
- In 2022, full circuit trimming will be performed.
- In 2023, a section of difficult-to-access conductor will be relocated.

09 Circuit 20601 -- GREENWOOD 06-01

Performance Analysis

The GREENWOOD 06-01 circuit experienced five outages of over 100,000 CMI between October 2020 and September 2021.

On July 11, 2021, during a period of heavy rain, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 458 customers for up to 259 minutes resulting in 118,278 CMI.

On September 14, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 989 customers for up to 1,153 minutes resulting in 202,467 CMI.

On November 1, 2020, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 924 customers for up to 575 minutes resulting in 308,063 CMI.

On September 14, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 58 customers for up to 659 minutes resulting in 154,097 CMI.

On February 16, 2021, during a period of heavy rain, an equipment failure occurred on a pole or pole arm causing a recloser to trip to lockout. This outage affected 307 customers for up to 478 minutes resulting in 146,742 CMI.

In total, the GREENWOOD 06-01 circuit had 63 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (38); equipment failure (11); animal contacts (9); nothing found (3); vehicles (2).

Remedial Actions

- In 2020, seven additional fuses were installed.
- In 2020, an adjacent circuit was reconductored to improve transfer capability.
- In 2020, two additional single-phase reclosers were installed.
- In 2020, an existing recloser was replaced with a Smart Grid device.
- In 2020, a section of two-phase conductor was upgraded to three-phase.
- In 2021, an additional single-phase recloser was installed.
- In 2021, additional fusing was installed at six locations.
- In 2021, additional single-phase ties will be evaluated.
- In 2021, full circuit trimming will be performed.
- In 2021, a three-phase tie to the ASHFIELD 20403 will be evaluated.
- In 2023, a section of difficult-to-access single-phase will be relocated.
- In 2023, a section of difficult-to-access single-phase will be de-energized and customers will be transferred to an adjacent feeder.

10 Circuit 56504 -- ROCKVILLE 65-04

Performance Analysis

The ROCKVILLE 65-04 circuit experienced three outages of over 100,000 CMI between October 2020 and September 2021.

On September 7, 2021, a tree contacted an overhead conductor causing an interruption. This outage affected 338 customers for up to 363 minutes resulting in 122,440 CMI.

On August 10, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 163 customers for up to 767 minutes resulting in 105,669 CMI.

On April 23, 2021, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 1,393 customers for up to 377 minutes resulting in 240,231 CMI.

In total, the ROCKVILLE 65-04 circuit had 91 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (68); animal contacts (9); equipment failure (7); other (4); vehicles (2); nothing found (1).

Remedial Actions

- In 2020, eight fuses were installed.
- In 2020, 150 hazard trees were removed.
- In 2020, seven single-phase sectionalizing devices were installed.
- In 2021, one fuse was installed.
- In 2021, additional animal guards will be installed.
- In 2021, additional fusing will be installed.
- In 2021, a section of line will be reconfigured to improve reliability.
- In 2022, a section of single-phase will be relocated underground.
- In 2022, five additional single-phase reclosers will be installed.
- In 2022, full circuit trimming will be performed.

11 Circuit 45402 -- WEST BLOOMSBURG 54-02

Performance Analysis

The WEST BLOOMSBURG 54-02 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 14, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a load break fuse to operate. This outage affected 127 customers for up to 866 minutes resulting in 100,631 CMI.

On August 1, 2021, during a period of heavy rain, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 274 customers for up to 631 minutes resulting in 161,148 CMI.

In total, the WEST BLOOMSBURG 54-02 circuit had 112 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (86); equipment failure (12); animal contacts (6); nothing found (4); other (2); vehicles (2).

Remedial Actions

- In 2021, fault indicators were installed on a section of this circuit and more will be evaluated.
- In 2021, three single-phase reclosers were installed.
- In 2021, undergrounding will be evaluated for a section of this circuit.
- In 2021, hot spot trimming will be evaluated for this circuit.
- In 2021, additional fusing will be installed.
- In 2021, an additional single-phase recloser will be evaluated.
- In 2022, five single-phase reclosers will be installed.
- In 2022, full circuit trimming will be performed.

12 Circuit 26001 -- WEST DAMASCUS 60-01

Performance Analysis

The WEST DAMASCUS 60-01 circuit experienced three outages of over 100,000 CMI between October 2020 and September 2021.

On February 16, 2021, during a period of ice/sleet/snow, a tree contacted a pole or pole arm causing a sectionalizing device to be interrupted. This outage affected 384 customers for up to 543 minutes resulting in 167,308 CMI.

On June 21, 2021, during a period of heavy rain, an equipment failure occurred on a pole or pole arm causing a recloser to trip to lockout. This outage affected 473 customers for up to 330 minutes resulting in 154,426 CMI.

On July 7, 2021, during a period of lightning, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 435 customers for up to 1,329 minutes resulting in 458,643 CMI.

In total, the WEST DAMASCUS 60-01 circuit had 75 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (50); equipment failure (14); animal contacts (6); nothing found (4); vehicles (1).

Remedial Actions

- In 2020, additional animal guarding was installed.
- In 2020, eight additional single-phase reclosers were installed.
- In 2020, full circuit trimming was performed.
- In 2021, the protection setting on this circuit will be evaluated.
- In 2021, a section of single-phase was reconductored and another section evaluated.
- In 2021, numerous porcelain cutouts were replaced.
- In 2021, additional fusing will be installed.
- In 2021, an additional three-phase sectionalizing device will be evaluated.
- In 2021 and 2022, additional single-phase reclosers will be installed.
- In 2023, full circuit trimming will be performed.

13 Circuit 40101 -- HUNTER 01-01

Performance Analysis

The HUNTER 01-01 circuit experienced three outages of over 100,000 CMI between October 2020 and September 2021.

On June 29, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 680 customers for up to 219 minutes resulting in 148,437 CMI.

On May 13, 2021, a vehicle contact caused a recloser to trip to lockout. This outage affected 679 customers for up to 191 minutes resulting in 129,689 CMI.

On August 29, 2021, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 681 customers for up to 363 minutes resulting in 222,560 CMI.

In total, the HUNTER 01-01 circuit had 51 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (37); equipment failure (10); animal contacts (2); nothing found (1); vehicles (1).

Remedial Actions

- In 2020, aerial cable was installed in a heavily wooded area.
- In 2021, a three-phase sectionalizing device will be evaluated.
- In 2021, full circuit trimming will be performed.
- In 2021, a new tie line and three-phase sectionalizing device will be installed.
- In 2021, additional animal guarding will be installed.

14 Circuit 29402 -- BELTZVILLE 69/12 KV 94-02

Performance Analysis

The BELTZVILLE 69/12 KV 94-02 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On July 2, 2021, during a period of heavy rain, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 895 customers for up to 143 minutes resulting in 127,993 CMI.

On July 3, 2021, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 1,384 customers for up to 284 minutes resulting in 310,228 CMI.

In total, the BELTZVILLE 69/12 KV 94-02 circuit had 35 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (14); equipment failure (9); animal contacts (8); vehicles (3); nothing found (1).

Remedial Actions

- In 2021, a three-phase tie to the WEISSPORT 27503 line will be evaluated.
- In 2021, two dissimilar metal connections were remediated on three-phase reclosers.
- In 2022, two reclosers will be installed to split a tap into separate branches.
- In 2022, a Proactive Circuit Analysis will be performed.
- In 2023, full circuit trimming will be performed.

15 Circuit 45303 -- WEST BERWICK 53-03

Performance Analysis

The WEST BERWICK 53-03 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 14, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 745 customers for up to 718 minutes resulting in 103,265 CMI.

On August 19, 2021, an equipment failure occurred on an overhead conductor causing a recloser to trip to lockout. This outage affected 2,275 customers for up to 413 minutes resulting in 308,830 CMI.

In total, the WEST BERWICK 53-03 circuit had 34 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (17); equipment failure (8); animal contacts (5); contact or dig in (1); nothing found (1); other (1); vehicles (1).

Remedial Actions

- In 2021, additional animal guarding will be installed.
- In 2021, additional fusing will be installed.
- In 2025, full circuit trimming will be performed.

16 Circuit 26604 -- BROOKSIDE 66-04

Performance Analysis

The BROOKSIDE 66-04 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On July 7, 2021, during a period of heavy rain, a tree contacted an overhead conductor causing a sectionalizing device to be interrupted. This outage affected 985 customers for up to 147 minutes resulting in 144,795 CMI.

On May 1, 2021, during a period of strong wind, a tree contacted an overhead conductor causing an interruption. This outage affected 278 customers for up to 445 minutes resulting in 123,482 CMI.

In total, the BROOKSIDE 66-04 circuit had 78 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (55); equipment failure (9); animal contacts (8); nothing found (3); vehicles (2); other (1).

Remedial Actions

- In 2020, full circuit trimming was performed.
- In 2021, additional animal guarding will be installed.
- In 2021, hazard tree removal was performed.
- In 2021, additional fusing will be installed.
- In 2021, an additional Smart Grid device will be evaluated.
- In 2022, numerous porcelain cutouts will be replaced.
- In 2022, eleven single-phase reclosers will be installed.

17 Circuit 26401 -- INDIAN ORCHARD 64-01

Performance Analysis

The INDIAN ORCHARD 64-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the INDIAN ORCHARD 64-01 circuit had 95 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (57); equipment failure (18); animal contacts (14); nothing found (4); other (1); vehicles (1).

Remedial Actions

- In 2021, additional animal guarding will be installed.
- In 2021, numerous porcelain cutouts will be replaced.
- In 2021, additional single-phase reclosers will be evaluated for this circuit.
- In 2021, the protection settings on this circuit will be evaluated.
- In 2021, reconductoring will be evaluated at several locations.
- In 2021, additional fusing will be evaluated.
- In 2022 and 2023, several additional single-phase reclosers will be installed.

18 Circuit 52402 -- GREEN PARK 24-02

Performance Analysis

The GREEN PARK 24-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On July 11, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 197 customers for up to 555 minutes resulting in 103,819 CMI.

In total, the GREEN PARK 24-02 circuit had 82 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (47); equipment failure (16); animal contacts (12); nothing found (4); vehicles (3).

Remedial Actions

- In 2020, five sections of conductor were relocated.
- In 2020, a second transmission source to the distribution substation was constructed.
- In 2020, six single-phase sectionalizing devices were installed.
- In 2020, a Proactive Circuit Analysis was performed, several future remediations were performed as a result.
- In 2020, additional animal guarding was installed.
- In 2020, additional fusing was installed.
- In 2021, two sections of single-phase will be relocated overhead.
- In 2021, 215 hazard trees were removed.
- In 2021, expanded trimming right-of-way was obtained for sections of this circuit.
- In 2021, a section of single-phase will be relocated to underground.
- In 2021, additional animal guarding will be installed.
- In 2021, one section of single-phase will be reconductored.
- In 2021, an additional single-phase recloser will be installed.
- In 2021, a new battery storage installation will be evaluated.
- In 2022, full circuit trimming will be performed.
- In 2022, an additional section of single-phase will be reconductored.
- In 2022, a section of single-phase will be relocated.
- In 2022, two sections of single-phase will be re-sourced to reduce exposure.

19 Circuit 18502 -- CANADENSIS 85-02

Performance Analysis

The CANADENSIS 85-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the CANADENSIS 85-02 circuit had 90 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (63); animal contacts (9); equipment failure (9); other (3); vehicles (3); nothing found (2); contact or dig in (1).

Remedial Actions

- In 2021, full circuit trimming was performed.
- In 2021, additional animal guarding was installed.
- In 2021, several Smart Grid devices received communications upgrades.
- In 2021, hazard tree removal was performed.
- In 2021, additional single-phase reclosers were installed.
- In 2021, a section of three-phase will be reconductored.
- In 2021, an additional Smart Grid device will be installed.
- In 2021, tree cable will be installed in a section of heavily wooded conductor.
- In 2021, additional fusing will be installed.
- In 2021, an additional single-phase tie will be evaluated.

20 Circuit 47002 -- HUGHESVILLE 70-02

Performance Analysis

The HUGHESVILLE 70-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the HUGHESVILLE 70-02 circuit had 93 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (63); equipment failure (15); animal contacts (7); nothing found (5); vehicles (2); contact or dig in (1).

Remedial Actions

- In 2021, an additional sectionalizing device was installed.
- In 2021, a section of difficult-to-access conductor was relocated.
- In 2021, additional animal guarding was installed.
- In 2021, additional fusing was installed.
- In 2021, an additional single-phase recloser was installed.

21 Circuit 53901 -- HALIFAX 39-01

Performance Analysis

The HALIFAX 39-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On July 19, 2021, during a period of strong wind, a tree contacted a pole or pole arm causing an interruption. This outage affected 693 customers for up to 658 minutes resulting in 179,554 CMI.

In total, the HALIFAX 39-01 circuit had 45 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (32); equipment failure (11); animal contacts (2).

Remedial Actions

- In 2020, an additional fuse was installed.
- In 2020, three single-phase reclosers were installed.
- In 2020, additional animal guarding was installed at seven locations.
- In 2021, additional fusing will be evaluated.
- In 2021, reconductoring at a river crossing will be evaluated.
- In 2021, full circuit trimming will be performed.
- In 2022, a single-phase recloser will be installed.

22 Circuit 21901 -- HUMBOLDT 19-01

Performance Analysis

The HUMBOLDT 19-01 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 14, 2021, during a period of strong wind, a tree contacted a pole or pole arm causing a recloser to trip to lockout. This outage affected 370 customers for up to 1,054 minutes resulting in 154,562 CMI.

On September 15, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 328 customers for up to 1,422 minutes resulting in 258,567 CMI.

In total, the HUMBOLDT 19-01 circuit had 81 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (64); equipment failure (8); animal contacts (3); nothing found (3); vehicles (2); other (1).

Remedial Actions

- In 2021, full circuit trimming will be perform, as well as removal of over 1,000 hazard trees.
- In 2021, a section of single-phase line will be evaluated for build-out to three-phase to reduce the customer count on a large single-phase tap.
- In 2021, a single-phase tie opportunity to the GIRARD MANOR 24-01 will be evaluated.
- In 2022, single-phase fusing opportunities will be reviewed in conjunction with new reclosers.
- In 2023, eleven additional reclosers will be installed.

23 Circuit 56802 -- BENVENUE 68-02

Performance Analysis

The BENVENUE 68-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the BENVENUE 68-02 circuit had 68 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (49); equipment failure (12); animal contacts (4); nothing found (2); other (1).

Remedial Actions

- In 2020, seven sectionalizing devices were installed.
- In 2020, a section of single-phase line was resourced.
- In 2020, six additional single-phase reclosers were installed.
- In 2021, additional fusing will be installed.
- In 2021, a single-phase recloser will be installed.
- In 2022, a section of single-phase will be relocated and reconfigured.
- In 2022, two single-phase reclosers will be installed.
- In 2022, full circuit trimming will be performed.
- In 2023, a section of three-phase will be reconductored.
- In 2023, a section of single-phase will be relocated to underground.

24 Circuit 25801 -- SULLIVAN TRAIL 58-01

Performance Analysis

The SULLIVAN TRAIL 58-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On July 13, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 790 customers for up to 256 minutes resulting in 144,185 CMI.

In total, the SULLIVAN TRAIL 58-01 circuit had 58 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (36); equipment failure (11); animal contacts (6); other (3); nothing found (2).

Remedial Actions

- In 2020, an off-cycle drone inspection was performed with several minor remediations performed as a result.
- In 2021, three additional single-phase reclosers were installed on this circuit with another scheduled.
- In 2021, a section of three-phase was reconductored.
- In 2021, a section of three-phase conductor was extended.
- In 2021, full circuit trimming will be performed.
- In 2022, a Proactive Circuit Analysis will be performed.
- In 2022, additional fusing and single-phase sectionalizing will be evaluated.
- In 2022, additional hazard tree removal will be evaluated.

25 Circuit 53601 -- DALMATIA 36-01

Performance Analysis

The DALMATIA 36-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the DALMATIA 36-01 circuit had 38 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (16); equipment failure (12); nothing found (6); animal contacts (2); vehicles (2).

Remedial Actions

- In 2020, four additional fuses were installed.
- In 2020, one trip saver was installed.
- In 2020, full circuit trimming was completed.
- In 2021, a section of single-phase line was relocated.
- In 2021, a three-phase tie will be evaluated.
- In 2021, an additional single-phase recloser will be evaluated.

26 Circuit 22003 -- BOHEMIA 20-03

Performance Analysis

The BOHEMIA 20-03 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On October 8, 2020, a tree contacted a pole or pole arm causing a circuit breaker to trip to lockout. This outage affected 567 customers for up to 440 minutes resulting in 249,485 CMI.

On February 9, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 556 customers for up to 673 minutes resulting in 374,082 CMI.

In total, the BOHEMIA 20-03 circuit had 37 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (19); animal contacts (9); equipment failure (6); nothing found (3).

Remedial Actions

- In 2021, additional fusing was installed at three locations with two more planned.
- In 2021, an additional Smart Grid device was installed.
- In 2021, additional animal guarding was installed.
- In 2021, a Smart Grid device was upgraded.
- In 2021, six additional single-phase reclosers were installed.
- In 2022, a new tie line will be constructed.
- In 2022, a section of difficult-to-access conductor will be relocated.

- In 2023, full circuit trimming will be performed.

27 Circuit 17802 -- GILBERT 78-02

Performance Analysis

The GILBERT 78-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On August 27, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 176 customers for up to 677 minutes resulting in 106,344 CMI.

In total, the GILBERT 78-02 circuit had 63 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (36); animal contacts (13); equipment failure (8); nothing found (3); vehicles (3).

Remedial Actions

- In 2021, hot spot trimming was completed.
- In 2021, four single-phase reclosers were installed.
- In 2021, additional animal guarding will be installed.
- In 2021, five transformers will be replaced.
- In 2022, two sections of difficult-to-access single-phase will be relocated.
- In 2022, a single-phase recloser will be installed.
- In 2022, full circuit trimming will be performed.

28 Circuit 46302 -- ROHRSBURG 63-02

Performance Analysis

The ROHRSBURG 63-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the ROHRSBURG 63-02 circuit had 68 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (49); equipment failure (11); animal contacts (5); nothing found (2); other (1).

Remedial Actions

- In 2021, a sectionalizing device was relocated.
- In 2021, addition fusing was installed.
- In 2021, a section of three-phase conductor will be relocated.
- In 2021, additional fusing will be installed.
- In 2021, a section of difficult-to-access conductor will be evaluated for relocation.
- In 2023, an additional single-phase recloser will be installed.

29 Circuit 47001 -- HUGHESVILLE 70-01

Performance Analysis

The HUGHESVILLE 70-01 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On August 13, 2021, during a period of strong wind, an equipment failure occurred on an overhead conductor causing a recloser to trip to lockout. This outage affected 833 customers for up to 602 minutes resulting in 130,480 CMI.

On July 7, 2021, during a period of strong wind, a tree contacted a pole or pole arm causing a recloser to trip to lockout. This outage affected 590 customers for up to 459 minutes resulting in 130,642 CMI.

In total, the HUGHESVILLE 70-01 circuit had 92 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (57); equipment failure (15); animal contacts (11); nothing found (8); vehicles (1).

Remedial Actions

- In 2021, addition fusing was installed.
- In 2021, several transformer cutouts were replaced.
- In 2021, a single-phase recloser was relocated.

30 Circuit 51502 -- SWATARA 15-02

Performance Analysis

The SWATARA 15-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On June 30, 2021, during a period of extreme temperatures, an equipment failure occurred on an overhead conductor causing a recloser to trip to lockout. This outage affected 1,511 customers for up to 535 minutes resulting in 461,418 CMI.

In total, the SWATARA 15-02 circuit had 11 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (6); equipment failure (3); contact or dig in (1); nothing found (1).

Remedial Actions

- In 2021, a three-phase sectionalizing device will be evaluated.
- In 2021, additional animal guarding was installed.
- In 2021, full circuit trimming will be performed.
- In 2021, a new tie line and three-phase sectionalizing device will be installed.

31 Circuit 45902 -- AUBURN 59-02

Performance Analysis

The AUBURN 59-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the AUBURN 59-02 circuit had 58 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (39); equipment failure (9); animal contacts (6); nothing found (2); other (1); vehicles (1).

Remedial Actions

- In 2020, additional fusing was installed at several locations.
- In 2020, a dissimilar metal connection was remediated.
- In 2020, multiple cross arms were replaced.
- In 2020, multiple porcelain cutouts were replaced.
- In 2021, hazard tree removal was performed.
- In 2021, additional fusing will be installed.
- In 2022, nine single-phase reclosers will be installed.
- In 2022, a section of difficult-to-access conductor will be relocated.
- In 2023, the AUBURN substation will be configured to be remotely transferrable.
- In 2023, a section of this circuit will be transferred to a new line.
- In 2023, full circuit trimming will be performed.

32 Circuit 43401 -- BENTON 34-01

Performance Analysis

The BENTON 34-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the BENTON 34-01 circuit had 62 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (47); equipment failure (7); nothing found (3); other (3); animal contacts (2).

Remedial Actions

- In 2020, full circuit trimming was performed.
- In 2021, hazard tree removal will be performed.
- In 2021, additional fusing will be installed.
- In 2021, a section of difficult-to-access single-phase circuit will be relocated.
- In 2021, a section of difficult-to-access conductor will be evaluated for relocation or undergrounding.
- In 2022, two single-phase reclosers will be installed.
- In 2022, additional fusing will be installed.

33 Circuit 52401 -- GREEN PARK 24-01

Performance Analysis

The GREEN PARK 24-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the GREEN PARK 24-01 circuit had 56 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (42); equipment failure (7); animal contacts (4); nothing found (1); other (1); vehicles (1).

Remedial Actions

- In 2020, multiple hazard trees were removed.
- In 2020, three single-phase reclosers were installed.
- In 2020, a transmission upgrade was completed.
- In 2021, nine additional fuses will be installed.
- In 2021, protective device coordination will be reviewed.
- In 2021, reconductoring will be evaluated for a section of single-phase.
- In 2022, full circuit trimming will be performed.
- In 2022, two sections of single-phase will be relocated.
- In 2022, a section of single-phase will be reconductored.
- In 2022, additional sectionalizing devices will be installed.
- In 2022, an additional Smart Grid device will be installed.

34 Circuit 44802 -- EAST DANVILLE 48-02

Performance Analysis

The EAST DANVILLE 48-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On September 15, 2021, a vehicle contact caused a circuit breaker to trip to lockout. This outage affected 1,200 customers for up to 1,040 minutes resulting in 526,629 CMI.

In total, the EAST DANVILLE 48-02 circuit had 42 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (20); equipment failure (10); animal contacts (4); nothing found (4); vehicles (3); other (1).

Remedial Actions

- In 2021, a section of difficult-to-access conductor will be relocated.
- In 2022, two single-phase reclosers will be installed.
- In 2023, full circuit trimming will be performed.

35 Circuit 14403 -- SO SLATINGTON 44-03

Performance Analysis

The SO SLATINGTON 44-03 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the SO SLATINGTON 44-03 circuit had 82 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (43); equipment failure (25); nothing found (9); animal contacts (2); contact or dig in (1); other (1); vehicles (1).

Remedial Actions

- In 2020, additional fusing was installed.
- In 2020, an additional single-phase recloser was installed.
- In 2021, additional fusing was installed at fourteen locations with more to be performed.
- In 2021, four additional single-phase reclosers were installed with one more planned.
- In 2021, one section of difficult-to-access single-phase conductor was relocated with another to be performed this year.
- In 2022, full circuit trimming will be performed.
- In 2022, six additional single-phase reclosers will be installed.
- In 2022, a section of single-phase conductor will be relocated.

36 Circuit 12301 -- LANARK 23-01

Performance Analysis

The LANARK 23-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the LANARK 23-01 circuit had 45 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (25); equipment failure (10); animal contacts (5); nothing found (2); vehicles (2); other (1).

Remedial Actions

- In 2020, hot spot trimming was performed.
- In 2021, additional animal guarding was installed.
- In 2021, two single-phase reclosers were installed.
- In 2022, full circuit trimming will be performed.
- In 2022, two single-phase reclosers will be installed.

37 Circuit 55408 -- SOUTH HERSHEY-H 54-08

Performance Analysis

The SOUTH HERSHEY-H 54-08 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On March 14, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 1,098 customers for up to 660 minutes resulting in 116,239 CMI.

In total, the SOUTH HERSHEY-H 54-08 circuit had 14 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (10); equipment failure (3); animal contacts (1).

Remedial Actions

- In 2021, two additional fuses were installed.
- In 2021, a single-phase section of line will be evaluated for relocation.
- In 2021, a three-phase sectionalizing device will be evaluated.
- In 2023, full circuit trimming will be performed.

38 Circuit 22406 -- MORGAN 24-06

Performance Analysis

The MORGAN 24-06 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the MORGAN 24-06 circuit had 46 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (33); equipment failure (8); nothing found (4); animal contacts (1).

Remedial Actions

- In 2021, full circuit trimming was performed.
- In 2021, numerous porcelain cutouts will be replaced.
- In 2021, a single-phase recloser will be installed.
- In 2021, additional animal guarding will be installed.
- In 2021, additional fusing will be evaluated.
- In 2021, a section of difficult-to-access conductor will be evaluated for relocation.
- In 2022, resourcing will be evaluated for a section of underground conductor.
- In 2023, five additional single-phase reclosers will be installed.

39 Circuit 16005 -- DORNEYVILLE 60-05

Performance Analysis

The DORNEYVILLE 60-05 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On May 26, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 1,128 customers for up to 1,604 minutes resulting in 334,522 CMI.

On May 26, 2021, during a period of strong wind, a tree contacted an overhead transformer causing a recloser to trip to lockout. This outage affected 146 customers for up to 1,410 minutes resulting in 205,732 CMI.

In total, the DORNEYVILLE 60-05 circuit had 25 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (15); equipment failure (6); animal contacts (2); nothing found (2).

Remedial Actions

- In 2020, full circuit trimming was performed.
- In 2021, additional fusing will be installed.
- In 2023, three additional single-phase reclosers will be installed.

40 Circuit 40502 -- CRESSONA 05-02

Performance Analysis

The CRESSONA 05-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the CRESSONA 05-02 circuit had 52 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (28); animal contacts (11); equipment failure (9); nothing found (3); vehicles (1).

Remedial Actions

- In 2020, a three-phase sectionalizing device was replaced.
- In 2020, full circuit trimming was performed.
- In 2020, additional fusing was installed.
- In 2021, two single-phase reclosers were installed.
- In 2021, three poles were replaced.
- In 2022, four additional single-phase reclosers will be installed.
- In 2023, a section of this line will be transferred to a new line.

41 Circuit 42401 -- GIRARD MANOR 24-01

Performance Analysis

The GIRARD MANOR 24-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the GIRARD MANOR 24-01 circuit had 50 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (37); equipment failure (5); nothing found (3); vehicles (3); animal contacts (2).

Remedial Actions

- In 2021, two additional fuses were installed.
- In 2021, four single-phase reclosers were installed.
- In 2021, full circuit trimming will be performed.
- In 2021, the circuit breaker settings will be reviewed for coordination with downstream sectionalizer.
- In 2021, a single-phase tie opportunity will be evaluated.
- In 2021, additional single-phase fusing opportunities will be evaluated.

42 Circuit 58101 -- NEW KINGSTOWN 81-01

Performance Analysis

The NEW KINGSTOWN 81-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the NEW KINGSTOWN 81-01 circuit had 14 outages between October 2020 and September 2021, with the causes breaking down as follows: equipment failure (4); tree related (3); vehicles (3); other (2); contact or dig in (1); nothing found (1).

Remedial Actions

- In 2021, a new tie line will be evaluated.
- In 2021, a Proactive Circuit Analysis will be completed.
- In 2022, additional fusing will be installed.
- In 2023, full circuit trimming will be performed.

43 Circuit 27101 -- GREENFIELD 71-01

Performance Analysis

The GREENFIELD 71-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On December 18, 2020, during a period of extreme temperatures, an equipment failure occurred on an overhead splice causing a circuit breaker to trip to lockout. This outage affected 1,826 customers for up to 231 minutes resulting in 200,316 CMI.

In total, the GREENFIELD 71-01 circuit had 51 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (25); equipment failure (15); nothing found (5); animal contacts (4); other (1); vehicles (1).

Remedial Actions

- In 2021, full circuit trimming will be performed.
- In 2021, numerous porcelain cutouts will be replaced.
- In 2022, eight single-phase reclosers will be installed.
- In 2022, additional fusing will be evaluated.
- In 2022, additional animal guarding will be installed.

44 Circuit 45002 -- LIMESTONE 50-02

Performance Analysis

The LIMESTONE 50-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On August 14, 2021, during a period of lightning, a tree contacted a pole or pole arm causing a recloser to trip to lockout. This outage affected 1,013 customers for up to 184 minutes resulting in 185,865 CMI.

In total, the LIMESTONE 50-02 circuit had 54 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (36); equipment failure (11); animal contacts (5); vehicles (2).

Remedial Actions

- In 2021, part of this circuit will be transferred to an adjacent circuit.
- In 2022, a section of difficult-to-access single-phase will be relocated.
- In 2022, additional fusing will be installed.
- In 2022, several poles will be replaced.

45 Circuit 46504 -- LOCK HAVEN 65-04

Performance Analysis

The LOCK HAVEN 65-04 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On January 28, 2021, a vehicle contacted a pole causing an interruption. This outage affected 264 customers for up to 431 minutes resulting in 110,665 CMI.

In total, the LOCK HAVEN 65-04 circuit had 40 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (30); animal contacts (4); equipment failure (3); other (2); vehicles (1).

Remedial Actions

- In 2021, additional animal guarding was installed.
- In 2021, a single-phase tie and additional Smart Grid devices will be evaluated.
- In 2021, a single-phase recloser will be evaluated.

46 Circuit 46004 -- BERWICK 60-04

Performance Analysis

The BERWICK 60-04 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On June 28, 2021, a vehicle contact caused a recloser to trip to lockout. This outage affected 1,174 customers for up to 839 minutes resulting in 837,918 CMI.

In total, the BERWICK 60-04 circuit had 30 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (21); equipment failure (7); other (1); vehicles (1).

Remedial Actions

- In 2021, additional three-phase ties will be evaluated.
- In 2021, a section of single-phase in a heavily wooded area will be evaluated for remediation.
- In 2022, three single-phase reclosers will be installed.
- In 2024, full circuit trimming will be performed.

47 Circuit 43701 -- WILLIAMSPORT 37-01

Performance Analysis

The WILLIAMSPORT 37-01 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On June 30, 2021, during a period of extreme temperatures, an equipment failure occurred on an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 986 customers for up to 245 minutes resulting in 158,752 CMI.

On July 16, 2021, an equipment failure occurred on an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 564 customers for up to 568 minutes resulting in 271,075 CMI.

In total, the WILLIAMSPORT 37-01 circuit had 17 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (7); equipment failure (5); animal contacts (4); nothing found (1).

Remedial Actions

- In 2020, additional animal guarding was installed.
- In 2021, additional animal guarding will be installed.
- In 2021, an additional sectionalizing device will be installed.
- In 2021, the protection settings for this circuit will be reviewed.

48 Circuit 47502 -- NEW COLUMBIA 75-02

Performance Analysis

The NEW COLUMBIA 75-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the NEW COLUMBIA 75-02 circuit had 27 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (18); equipment failure (4); animal contacts (3); nothing found (1); vehicles (1).

Remedial Actions

- In 2020, multiple porcelain cutouts were replaced.
- In 2021, two substation transformers were replaced.
- In 2022, a three-phase Smart Grid device will be installed.
- In 2022, two single-phase reclosers will be installed and a section of the circuit will be reconfigured.
- In 2022, additional fusing will be installed.
- In 2022, two reclosers will be relocated to protect more customers.

49 Circuit 56803 -- BENVENUE 68-03

Performance Analysis

The BENVENUE 68-03 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On January 1, 2021, an unidentified issue occurred with an overhead conductor causing a circuit breaker to trip to lockout. This outage affected 765 customers for up to 135 minutes resulting in 103,680 CMI.

In total, the BENVENUE 68-03 circuit had 56 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (40); equipment failure (7); nothing found (5); animal contacts (3); vehicles (1).

Remedial Actions

- In 2020, additional fusing was installed at five locations.
- In 2020, additional animal guarding was installed at five locations.
- In 2021, full circuit trimming will be performed.
- In 2021, three additional single-phase sectionalizing devices were installed.
- In 2022, five additional single-phase sectionalizing devices will be installed.
- In 2023, a three-phase Smart Grid device will be installed.

50 Circuit 43201 -- MILLVILLE 32-01

Performance Analysis

The MILLVILLE 32-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the MILLVILLE 32-01 circuit had 61 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (43); equipment failure (7); nothing found (7); animal contacts (3); other (1).

Remedial Actions

- In 2021, an additional tie will be constructed.
- In 2021, two sections of difficult-to-access conductor will be relocated.
- In 2022, additional single-phase reclosers will be installed.

51 Circuit 40901 -- JERSEY SHORE 09-01

Performance Analysis

The JERSEY SHORE 09-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On July 13, 2021, during a period of heavy rain, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 558 customers for up to 341 minutes resulting in 107,156 CMI.

In total, the JERSEY SHORE 09-01 circuit had 44 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (30); equipment failure (8); nothing found (3); animal contacts (2); other (1).

Remedial Actions

- In 2021, hazard tree removal was performed.
- In 2021, a transformer cutout was replaced.
- In 2021, a sectionalizing device was replaced.
- In 2021, additional animal guarding was installed.
- In 2021, additional fusing will be installed.

52 Circuit 46802 -- HEPBURN 68-02

Performance Analysis

The HEPBURN 68-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the HEPBURN 68-02 circuit had 71 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (48); equipment failure (13); animal contacts (5); nothing found (3); other (1); vehicles (1).

Remedial Actions

- In 2021, two additional reclosers were installed.
- In 2021, splitting an existing tap will be evaluated.
- In 2021, additional fusing will be installed.
- In 2021, additional animal guarding will be installed.
- In 2023, a section of difficult-to-access conductor will be relocated.

53 Circuit 28602 -- BLYTHEBURN 86-02

Performance Analysis

The BLYTHEBURN 86-02 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On July 27, 2021, during a period of strong wind, a tree contacted an overhead conductor causing an interruption. This outage affected 294 customers for up to 737 minutes resulting in 117,617 CMI.

In total, the BLYTHEBURN 86-02 circuit had 49 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (32); equipment failure (8); animal contacts (5); vehicles (2); nothing found (1); other (1).

Remedial Actions

- In 2020, a section of three-phase was reconductored.
- In 2021, a section of three-phase was reconductored.
- In 2021, six single-phase reclosers were installed.
- In 2021, three additional single-phase reclosers will be installed.
- In 2022, a three-phase tie line will be constructed.
- In 2022, a Proactive Circuit Analysis will be performed.
- In 2023, the Substation will be upgraded.
- In 2024, full circuit trimming will be performed.

54 Circuit 17803 -- GILBERT 78-03

Performance Analysis

The GILBERT 78-03 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On December 9, 2020, during a period of ice/sleet/snow, a tree contacted an overhead conductor causing an interruption. This outage affected 611 customers for up to 296 minutes resulting in 105,260 CMI.

In total, the GILBERT 78-03 circuit had 41 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (26); equipment failure (8); animal contacts (6); vehicles (1).

Remedial Actions

- In 2021, additional animal guarding was performed.
- In 2021, several sections of conductor were relocated and reconductored.
- In 2021, numerous porcelain cutouts were replaced.

- In 2021, a drone inspection was performed with several minor remediations implemented.
- In 2022, full circuit trimming will be performed.
- In 2023, numerous single-phase reclosers will be installed.

55 Circuit 18001 -- ZIONSVILLE 80-01

Performance Analysis

The ZIONSVILLE 80-01 circuit experienced two outages of over 100,000 CMI between October 2020 and September 2021.

On September 2, 2021, during a period of strong wind, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 374 customers for up to 1,670 minutes resulting in 388,773 CMI.

On July 8, 2021, during a period of lightning, a tree contacted an overhead conductor causing a recloser to trip to lockout. This outage affected 681 customers for up to 490 minutes resulting in 209,052 CMI.

In total, the ZIONSVILLE 80-01 circuit had 28 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (24); animal contacts (2); vehicles (2).

Remedial Actions

- In 2021, an additional single-phase reclosers was installed with two more planned.
- In 2021, additional fusing will be installed.
- In 2021, additional single-phase reclosers will be evaluated.

56 Circuit 11506 -- FREEMANSBURG 15-06

Performance Analysis

The FREEMANSBURG 15-06 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the FREEMANSBURG 15-06 circuit had 50 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (27); equipment failure (11); animal contacts (7); nothing found (4); vehicles (1).

Remedial Actions

- In 2020, a section of three-phase conductor was extended.
- In 2020, a Smart Grid device was replaced.
- In 2020, a switch at the substation was replaced.

- In 2021, seven additional single-phase reclosers were installed with two more to be installed.
- In 2021, additional fusing was installed with more to be performed.
- In 2021, replacement of five reclosers will be evaluated.
- In 2022, a section of this circuit will be reconfigured.
- In 2022, full circuit trimming will be performed.
- In 2023, additional single-phase reclosers will be installed.
- In 2023, additional fusing will be installed.
- In 2024, the circuit will be split to reduce loading and improve reliability.

57 Circuit 41602 -- CLEVELAND 16-02

Performance Analysis

The CLEVELAND 16-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the CLEVELAND 16-02 circuit had 51 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (40); nothing found (4); equipment failure (3); animal contacts (2); contact or dig in (1); vehicles (1).

Remedial Actions

- In 2020, a Proactive Circuit Analysis was completed, with several minor remediations performed as a result.
- In 2022, tree trimming will be completed on this circuit.
- In 2021, a section of overhead conductor that experiences frequent tree damage will be relocated to underground.
- In 2022, a three-phase tie line between two branches of the circuit will be evaluated.
- In 2021, single-phase fusing opportunities will be evaluated.

58 Circuit 42902 -- MIDDLEBURG 29-02

Performance Analysis

The MIDDLEBURG 29-02 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the MIDDLEBURG 29-02 circuit had 42 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (24); equipment failure (11); animal contacts (4); contact or dig in (1); nothing found (1); vehicles (1).

Remedial Actions

- In 2022, multiple poles will be replaced.
- In 2022, an additional manual sectionalizing point will be installed.

- In 2022, seven single-phase reclosers will be installed.

59 Circuit 54601 -- SUMMERDALE 46-01

Performance Analysis

The SUMMERDALE 46-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On June 23, 2021, a fault occurred on an underground conductor causing a circuit breaker to trip to lockout. This outage affected 1,997 customers for up to 139 minutes resulting in 111,528 CMI.

In total, the SUMMERDALE 46-01 circuit had 22 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (12); equipment failure (6); animal contacts (1); nothing found (1); other (1); vehicles (1).

Remedial Actions

- In 2020, three fuses were installed.
- In 2020, the feeder protective settings were optimized and applied.
- In 2021, full circuit trimming was performed.
- In 2021, one additional fuse was installed.

60 Circuit 54701 -- NEW BLOOMFIELD 47-01

Performance Analysis

The NEW BLOOMFIELD 47-01 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the NEW BLOOMFIELD 47-01 circuit had 31 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (19); equipment failure (5); animal contacts (4); vehicles (2); other (1).

Remedial Actions

- In 2020, two fuses were installed.
- In 2020, four single-phase reclosers were installed.
- In 2020, 4 single-phase fuses were installed.
- In 2020, full circuit trimming was performed.
- In 2020, a drone patrol and Proactive Circuit Analysis were performed with several minor remediations implemented.
- In 2021, an additional fuse will be installed.
- In 2022, a new Smart Grid device will be installed.
- In 2022, five single-phase reclosers will be installed.
- In 2023, two sections of single-phase will be relocated underground.

61 Circuit 22601 -- KIMBLES 26-01

Performance Analysis

The KIMBLES 26-01 circuit experienced one outage of over 100,000 CMI between October 2020 and September 2021.

On September 2, 2021, during a period of strong wind, a tree contacted a pole or pole arm causing a recloser to trip to lockout. This outage affected 545 customers for up to 1,062 minutes resulting in 142,341 CMI.

In total, the KIMBLES 26-01 circuit had 32 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (16); equipment failure (6); animal contacts (5); nothing found (4); other (1).

Remedial Actions

- In 2021, full circuit trimming was performed.
- In 2021, a section of difficult-to-access conductor was relocated.
- In 2021, additional animal guarding was installed at 20 locations.
- In 2021, a Smart Grid device received a communication upgrade.
- In 2022, six single-phase reclosers were installed.
- In 2022, a Smart Grid device will be upgraded.
- In 2022, additional animal guarding will be installed.

62 Circuit 64304 -- LINCOLN 43-04

Performance Analysis

The LINCOLN 43-04 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the LINCOLN 43-04 circuit had 29 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (14); equipment failure (7); animal contacts (3); nothing found (2); vehicles (2); other (1).

Remedial Actions

- In 2020, a section of difficult to access conductor was relocated.
- In 2021, three single-phase reclosers were installed.
- In 2021, an additional fuse was installed.
- In 2021, 178 hazard trees were removed from this circuit.
- In 2021, full circuit trimming was performed.
- In 2021, a proactive circuit analysis was performed with several minor remediations implemented.

- In 2021, additional fusing will be installed.
- In 2021, a section of single-phase will be resourced.
- In 2022, a section of single-phase line will be resourced.
- In 2022, five additional single-phase reclosers will be installed.

63 Circuit 13503 -- MC MICHAELS 35-03

Performance Analysis

The MC MICHAELS 35-03 circuit experienced no outages of over 100,000 CMI between October 2020 and September 2021.

In total, the MC MICHAELS 35-03 circuit had 29 outages between October 2020 and September 2021, with the causes breaking down as follows: tree related (18); equipment failure (5); vehicles (3); animal contacts (1); nothing found (1); other (1).

Remedial Actions

- In 2021, 25 poles were replaced.
- In 2021, a section of underground conductor was replaced.
- In 2021, several Smart Grid devices received communications upgrades.
- In 2022, additional animal guarding will be installed.
- In 2022, a three-phase recloser will be upgraded to single-phase operability.
- In 2022, full circuit trimming will be performed.

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.

Cause Description	Trouble Cases	Percent of Trouble Cases	Customer Interruptions	Percent of Customer Interruptions	Customer Minutes	Percent of Customer Minutes
Animals	2,538	10.8%	53,759	4.1%	3,017,441	1.2%
Contact / Dig-In	154	0.7%	10,584	0.8%	676,983	0.3%
Directed by Non-PPL Authority	66	0.3%	11,267	0.9%	698,140	0.3%
Equipment Failures	5,417	23.1%	295,602	22.5%	35,979,577	14.1%
Improper Design	1	0.0%	759	0.1%	15,901	0.0%
Improper Installation	1	0.0%	14	0.0%	1,776	0.0%
Improper Operation	3	0.0%	1,407	0.1%	10,024	0.0%
Nothing Found	1,052	4.5%	66,526	5.1%	7,452,569	2.9%
Other Controllable	83	0.4%	19,599	1.5%	413,140	0.2%
Other Non-Control	281	1.2%	26,454	2.0%	2,494,529	1.0%
Other Public	30	0.1%	3,167	0.2%	256,185	0.1%
Tree Related	13,058	55.6%	711,817	54.2%	190,461,226	74.8%
Unknown	2	0.0%	1,239	0.1%	210,492	0.1%
Vehicles	808	3.4%	111,173	8.5%	13,061,051	5.1%
Total	23,494	100.0%	1,313,367	100.0%	254,749,035	100.0%

Analysis of causes contributing to the majority of service interruptions:

Weather Conditions: PPL Electric records weather conditions, such as wind or lightning, as contributing factors to service interruptions, but does not code them as direct interruption causes. Therefore, some fluctuations in cause categories, especially tree- and equipment-related causes, are attributable to weather variations. For the current reporting period, weather was considered a significant contributing cause in 61% of cases, 62% of customer interruptions, and 81% of CMI.

Tree Related: Vegetation is one of the largest single contributors to the number of cases of trouble, customer interruptions and customer minutes. For the current reporting period, approximately 86% of the cases of trouble, 86% of the customer interruptions and 94% of the customer minutes attributed to tree related outages were weather-related.

Animals: Animals accounted for approximately 11% 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 72% of the number of cases of trouble were 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, PPL Electric initiated distribution and substation animal guarding programs in 2009 to focus systematically on protecting existing facilities most at risk of incurring animal-caused interruptions. A complete effectiveness review of this strategy is being evaluated.

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. 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 41% of the cases of trouble, 43% of the customer interruptions and 52% of the customer minutes attributed to equipment failure were weather-related and, as such, are not considered to be strong indicators of equipment condition or performance.

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	3rd Quarter		Year-to-date	
		Budget	Actual	Budget	Actual
Transmission					
Transmission C-tag poles (# of poles)	91	11	11	78	78
Transmission arm replacements (# of arms)	29	22	22	28	28
Transmission air break switch inspections (# of switches)	0	0	0	0	0
Transmission surge arrester installations (# of sets)	N/A	16	16	445	445
Transmission structure inspections (# of activities)	12,564	400	400	8,391	8,391
Transmission tree side trim-Bulk Power (linear feet)	N/A				
Transmission herbicide-Bulk Power (# of acres)	N/A				
Transmission reclearing (# of miles) BES Only	539	202	208	468	490
Transmission reclearing (# of miles) 69 kV	998	293	364	686	697
Transmission reclearing (# of miles) 138 kV	80	24	42	55	58
Transmission danger tree removals-Bulk Power (# of trees)	N/A				
Substation					
Substation batteries (# of activities)	285	12	17	256	281
Circuit breakers (# of activities)	396	89	67	382	379
Substation inspections (# of activities)	1,761	359	354	1,383	1,397
Transformer maintenance (# of activities)	494	10	16	483	484

Inspection & Maintenance Goals/Objectives	Annual Budget	3rd Quarter		Year-to-date	
		Budget	Actual	Budget	Actual
Distribution					
Distribution C-tag poles replaced (# of poles)	3,083	545	365	1,330	904
C-truss distribution poles (# of poles)	N/A	0	0	696	696
Capacitor (MVAR added)	0	0	0	0	0
OCR Replacements (# of)	1	0	2	1	3
Distribution pole inspections (# of poles)	74,500	26,875	15,681	33,568	16,855
Distribution line inspections (miles)	2,200	1,870	1,870	2,068	2,068
Group re-lamping (# of lamps)	16,140	4,035	2,943	12,105	8,201
Test sections of underground distribution cable	N/A	122	122	197	197
Distribution tree trimming (# of miles)	5,848	1,487	1,013	4,442	3,896
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)	616	154	34	462	330
LTN vault inspections (# of)	301	75	22	226	196
LTN network protector overhauls (# of)	55	14	6	41	39
LTN reverse power trip testing (# of)	27	7	4	20	15

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.

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

Activity		3rd Quarter		Year-to-date	
	2021 Budget (000s)	Budget ($000)	Actual ($000)	Budget ($000)	Actual ($000)
Provide Electric Service	6,239	1,779	1,781	4,679	5,838
Vegetation Management	36,696	10,507	8,213	28,791	25,783
Customer Response	61,140	17,317	18,545	47,077	54,084
Reliability Maintenance	25,438	6,936	7,358	19,955	22,566
System Upgrade	3,625	861	875	2,778	1,317
Customer Service/Accounts	119,095	36,418	30,147	90,249	68,022
Others	39,453	9,771	9,941	28,980	37,603
Total O&M Expenses	**291,687**	**83,588**	**76,860**	**222,509**	**215,211**

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.

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

Activity		3rd Quarter		Year-to-date	
	2021 Budget (000s)	Budget ($000)	Actual ($000)	Budget ($000)	Actual ($000)
New Service/Revenue	95,137	25,707	24,264	73,060	73,600
System Upgrade	188,825	42,148	40,504	132,083	144,884
Reliability & Maintenance	422,424	108,549	112,907	306,684	343,388
Customer Response	28,711	8,325	19,126	23,350	39,343
Other	22,271	7,407	3,598	18,349	6,824
Total	**757,367**	**192,136**	**200,399**	**553,527**	**608,038**

9) Quarterly and year-to-date information on distribution substation inspections and reliability metrics.

Quarterly and year-to-date information on distribution substation inspections and reliability metrics.

During the 3rd quarter of 2021, 58 corrective work orders were created with the following breakdown by priority.

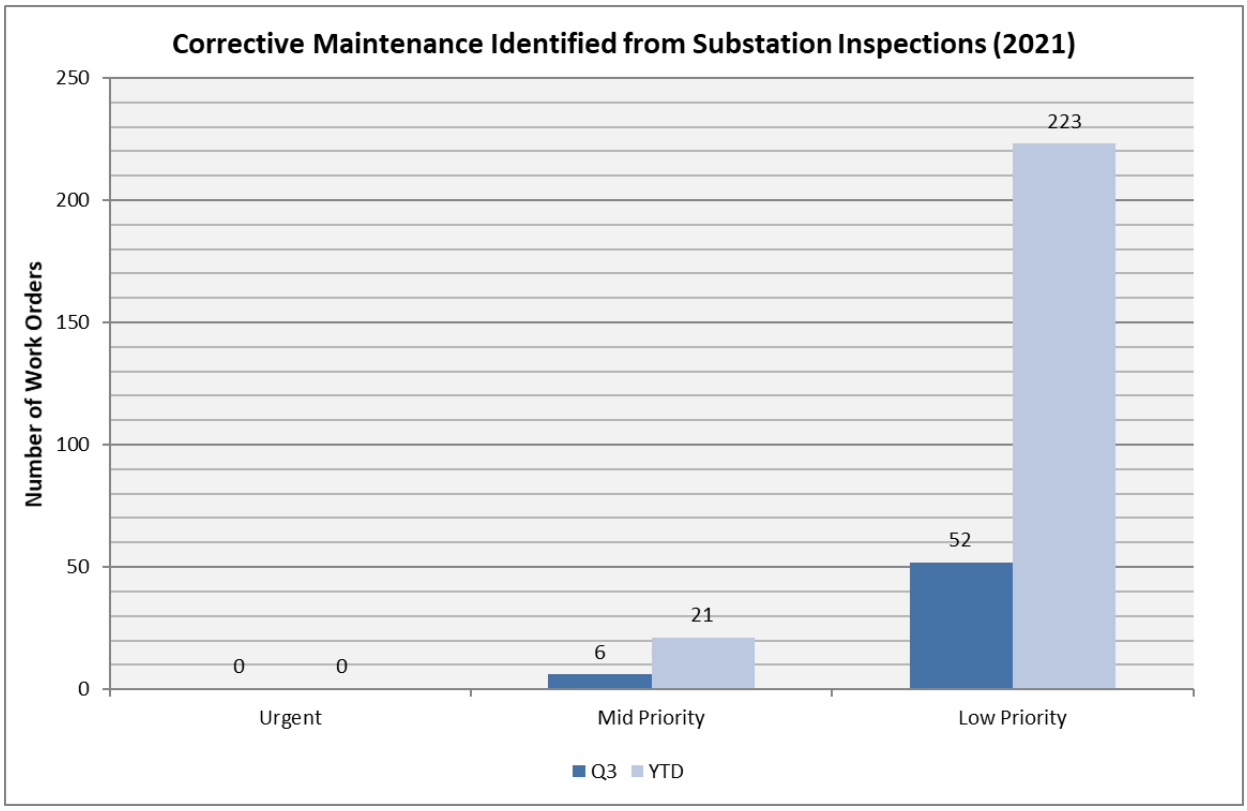

Figure 1: Corrective Maintenance Work Orders by Priority Level for 3rd Quarter and Year-to-Date 2021

(b) The Amount Spent on Substation Inspections

During the 3rd quarter of 2021, PPL Electric Utilities spent approximately $119,000 on substation inspections.

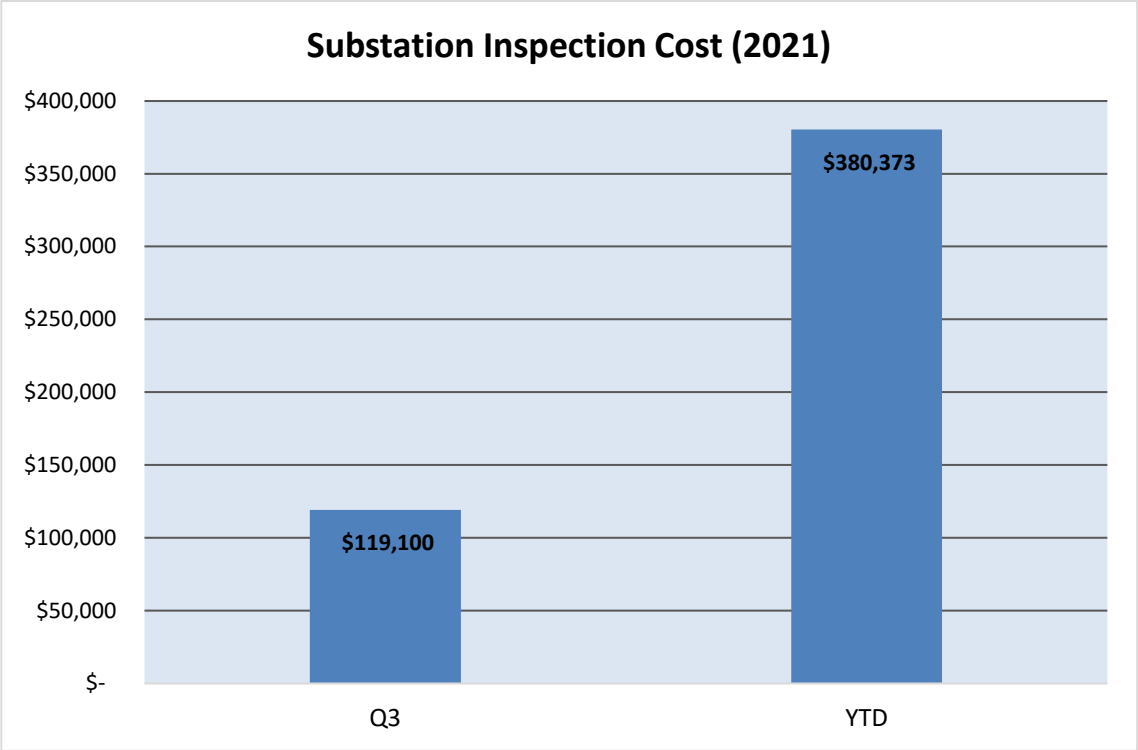

Figure 2: Substation Inspection Costs for 3rd Quarter and Year-to-Date 2021.

(c) The Amount Spent on Vegetation Management

Please refer to Section 7 for vegetation management expenses for the 3rd quarter and year-to-date 2021.

(d) The Projected CMI Avoidance Due to Substation Inspections

Figure 3 below shows the CMI avoidance that PPL Electric Utilities has estimated for the 3rd quarter and year-to-date. During the 3rd quarter of 2021, PPL Electric Utilities avoided a projected 122,000 CMI.

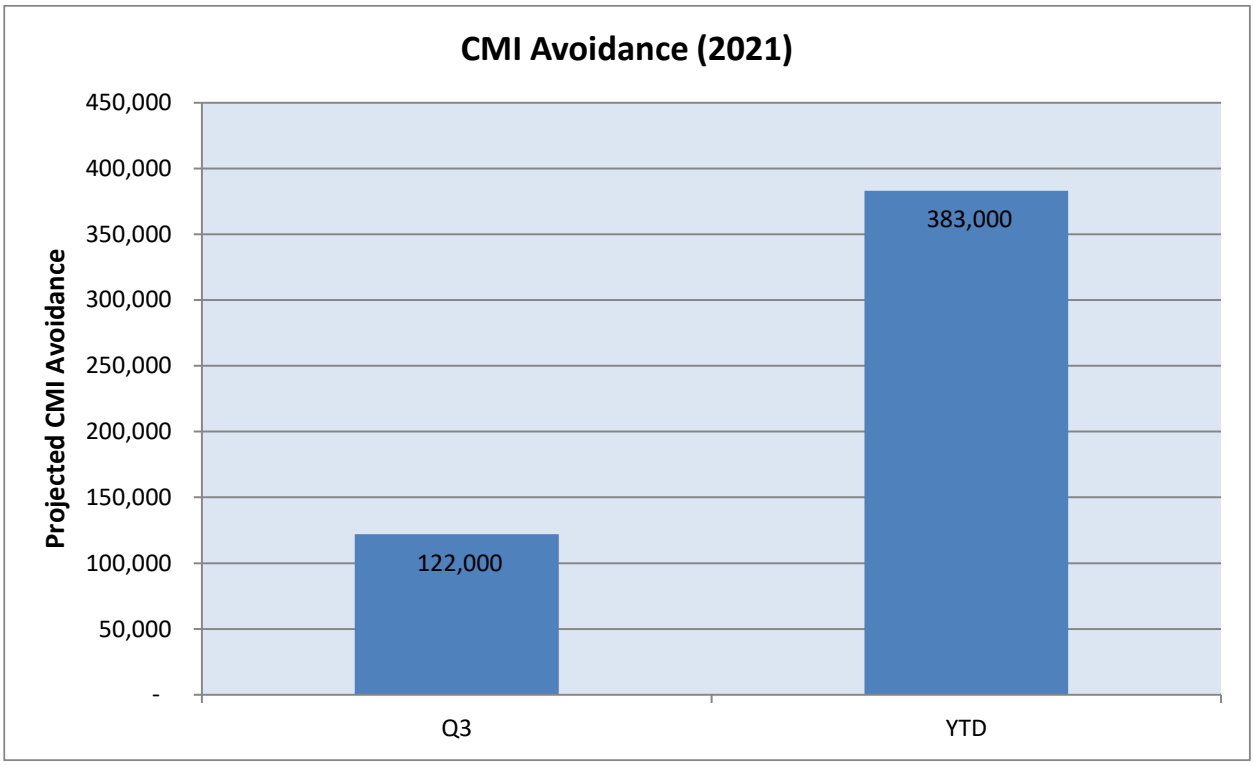

Figure 3: Projected CMI Avoidance Due to Substation Inspections for 3rd Quarter and Year-to-Date 2021

(e) Customer Minutes and Number of Customers Affected Due to Substation Sustained Outages

In the past three years, distribution substations have contributed a small amount toward the reliability metrics. During the 3rd quarter of 2021, the Company interrupted approximately 9,500 customers for a total of 127,000 CMI. The figures below show these results for the number of customers interrupted and CMI experienced, respectively.

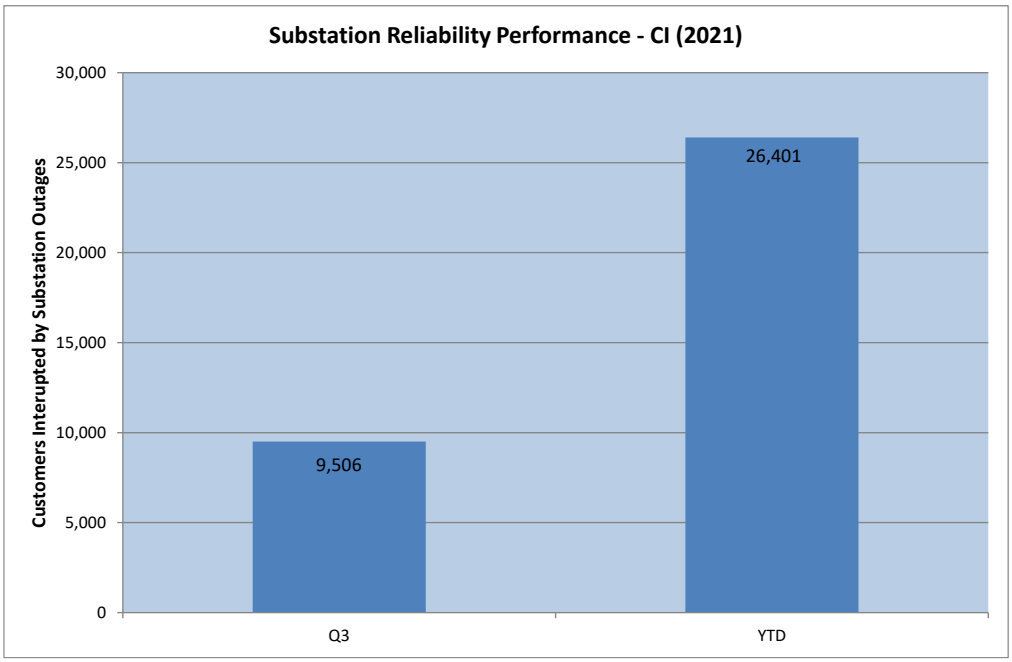

Figure 4: Substation Customers Interrupted for 3rd Quarter and Year-to-Date 2021

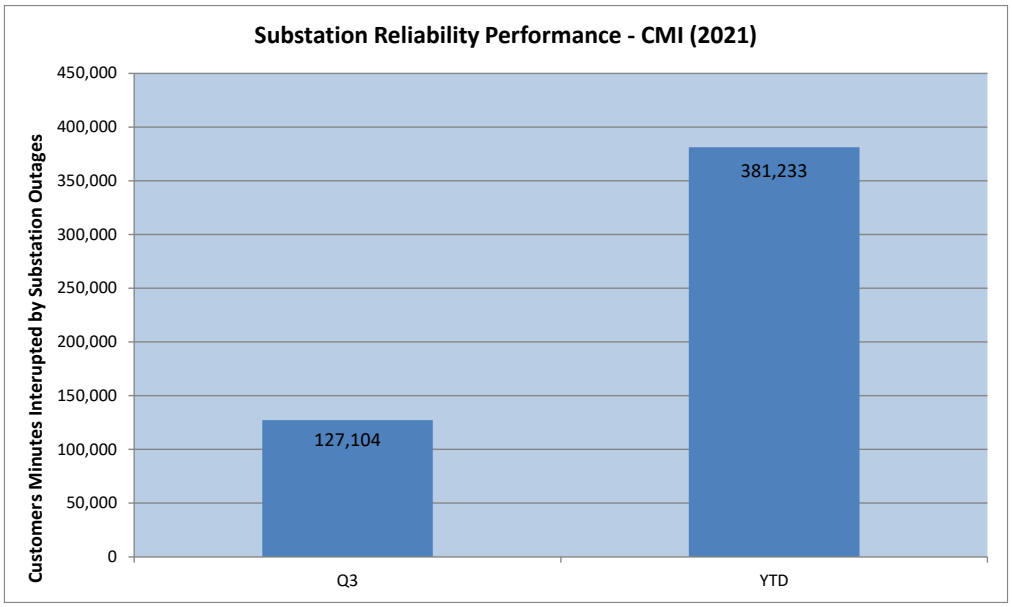

Figure 5: Substation Customer Minutes of Interruption for 3rd Quarter and Year-to-Date 2021

(f) Substation SAIFI Contribution

Overall, substation outages contributed approximately 1.8% of the total SAIFI experienced by PPL Electric customers in the 3rd quarter of 2021. Historically, PPL Electric Utilities has ranked in the first quartile for substation SAIFI performance on the Southeastern Electric Exchange (SEE) Survey and is on-track to maintain its ranking among other electric utilities.

(g) Number of Substations with Remote Monitoring and Communication Technologies

PPL Electric Utilities has the capability of remotely monitoring its distribution substations through SCADA installations and other telemetered equipment. This equipment allows PPL Electric to closely track the performance of its substation assets and respond to any trouble that is experienced on the distribution system. The table below shows the number of distribution substations that have this functionality.

	3rd Quarter	Year-to-Date
Substations with Remote Monitoring	354	354
Total Number of Substations	356	356

PPL Electric has launched a project to install smart relaying onto all 12kV circuit breakers at its distribution substations. These relays will allow the Company to quickly perform automated switching for lesser system impact during an outage event, and better-estimate fault locations for quicker system restoration. By 2022, the Company expects all 12kV circuit breakers to have these functionalities to enhance reliability performance.

10) 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 B.

Transmission and Distribution	
Lineman Leader	60
Journeyman Lineman	149
Journeyman Lineman-Trainee	42
Helper	38
Groundhand	0
Troubleman	51
T&D Total	**340**
Electrical	
Elect Leaders-UG	2
Elect Leaders-Net	8
Elect Leaders-Sub	20
Journeyman Elect-UG	9
Journeyman Elect-Net	28
Journeyman Elect-Sub	47
Electrical Total	**114**
Overall Total	**454**

Appendix A

PPL Electric Utilities Corporation

Worst Performing Circuit Definition

PPL Electric uses an equal weighting of circuit SAIDI and system SAIFI contribution over the previous four quarters to define the worst performing circuits on its system. IEEE Major Event days are excluded. This ranking system was put in place as of the first quarter of 2020, for the following reasons:

- Increased targeting of problem areas versus circuits that may be reasonable performers but are simply long circuits that have been in storms.
- It prioritizes the circuits contributing the most toward system SAIFI.
- It is less biased towards long, rural circuits and more reflective of the customer experience.

Appendix B

PPL Electric Utilities Corporation

Job Descriptions

Transmission and Distribution

Groundhand	• Performs manual labor and assists employees in higher job classifications.
Helper	• 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.
Journeyman Lineman	• Works alone 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.
Journeyman Lineman-Trainee	• Works alone 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.
Lineman Leader	• 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. • Engage in and perform work along with providing the necessary leadership, all-around knowledge, program, judgment, and experience to produce a quality job. • Performs all the direct duties of the Journeyman Lineman when not acting as a Lineman Leader.
Troubleman	• Investigates and resolves trouble calls, voltage abnormalities on transmission and distribution systems associated with, but not limited to, PPL Electric facilities.

Appendix B

Electrical

Electrician Leader - Substation - Network - Underground	• 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. • Engage in and perform work along with providing the necessary leadership, all-around knowledge, program, judgment, and experience to produce a quality job. • Performs all direct duties of the Journeyman Electrician when not acting as a leader.
Helper - Substation - Network - Underground	• 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.
Laborer - Substation - Network - Underground	• Performs manual labor and assists employees in higher job classifications.
Journeyman Electrician - Substation - Network - Underground	• 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. • Uses microprocessor based equipment for troubleshooting and revising relay logic and its control systems related to the field services electrical discipline.

Appendix B

Journeyman Electrician - Trainee - Substation - Network - Underground	• 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. • Uses microprocessor based equipment for troubleshooting and revising relay logic and its control systems related to the field services electrical discipline.