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E-FILE

April 30, 2025

M-2023-3039027- jbs

Matthew Homsher, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, Pennsylvania 17120

**Re: PPL Electric Utilities Corporation
2024 Annual Reliability Report
Docket No. M-2016-2522506**

Dear Secretary Homsher:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") is PPL Electric's 2024 Annual Reliability Report to the Pennsylvania Public Utility Commission. This report is being filed pursuant to the Commission's regulations at 52 Pa. Code § 57.195(a).

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

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on April 30, 2025, which is the date it was filed electronically with the Commission's E-Filing System.

If you have any questions regarding the enclosed report, please call me or Beth Johnson, PPL Electric's Senior Director - Regulatory, at (610) 774-7011.

Respectfully submitted,

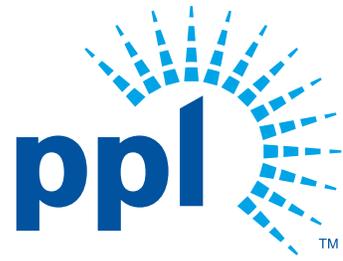
A handwritten signature in blue ink that reads "Kimberly A. Klock". The signature is written in a cursive, flowing style.

Kimberly A. Klock

Enclosures

cc via email: Darryl Lawrence, Esquire
NazAarah Sabree

John Van Zant



PPL Electric Utilities

**PPL Electric Utilities Corporation
2024 Annual Reliability Report
to the
Pennsylvania Public Utility Commission**

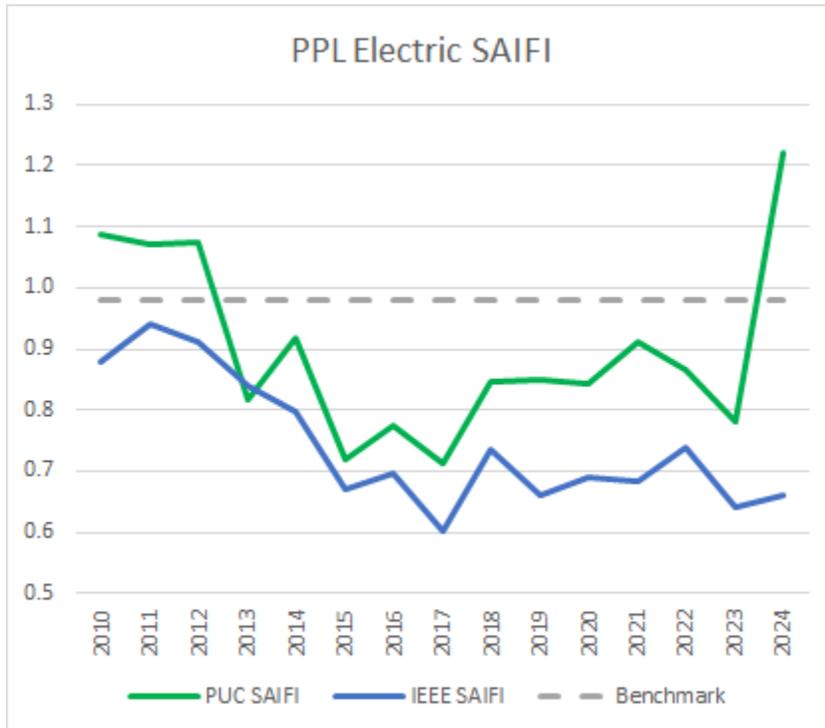
April 30, 2025

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

SAIFI Performance

In 2024, PPL Electric saw eleven storms of 600 cases or higher, including six storms of over 1,000 cases. Attributable to these storms, PPL Electric missed its PUC Benchmark for the first time in over a decade. Weather normalized IEEE SAIFI finished at 0.66, illustrating the outsized effect of storms.

Our ongoing focus around preventing customer interruptions through system automation, vegetation management and asset performance continues to directly support historically strong reliability results, with over 2 million outages saved since the inception of automation in 2017.



PPL Electric continues to drive high levels of reliability performance through:

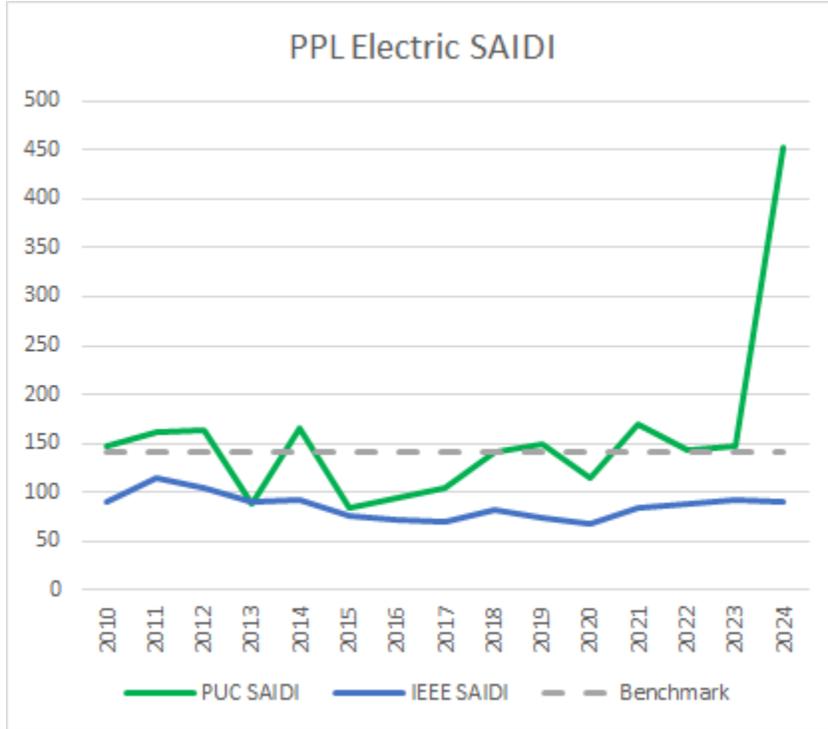
- Commitment to providing safe, reliable, affordable service to our customers.
- A focus on storm hardening.
- Strategic vegetation management.
- Implementation of proactive fault sensing.
- Continued strategic investment in distribution automation technology such as:
- Multi and single-phase Smart Grid Initiative.
- Increased leverage of our Automated Distribution Management System (ADMS).
- Full implementation of Fault Isolation and System Restoration (FISR) technology automatically restoring more than 1.9 million customers since 2015.
- Strategic data-driven reliability investments including asset replacement, and system improvements that include storm hardening standards.
- An increased focus on remediating momentary outages before they become permanent outages.
- Continued focus on outage response improvements.
- Moving to data driven condition-based maintenance programs.

The data table below shows the outsized impact of storms in 2024.

Year	PUC Storms	Total Storms	PUC Storm Cases	PUC Storm CI	PUC Storm CMI
2002	7	20	2,681	243,475	51,042,833
2003	1	13	1,346	64,594	14,260,267
2004	4	18	1,324	123,232	22,296,867
2005	4	14	1,959	161,982	34,828,302
2006	9	28	2,649	236,804	44,707,666
2007	5	28	2,883	256,372	44,971,289
2008	7	27	2,024	139,094	28,058,537
2009	4	20	1,662	140,567	26,239,980
2010	10	29	1,756	111,152	23,863,804
2011	6	33	3,157	218,839	48,451,255
2012	8	25	2,016	160,272	33,143,528
2013	3	16	1,112	127,021	26,326,830
2014	5	16	1,842	121,844	29,482,486
2015	1	19	832	104,973	17,601,887
2016	4	24	1,404	147,959	22,752,903
2017	9	25	1,780	125,766	27,530,498
2018	5	23	2,111	131,815	25,102,302
2019	10	26	1,796	127,588	25,005,406
2020	8	27	3,035	206,898	28,204,526
2021	15	42	5,219	274,015	51,974,356
2022	9	36	7,861	514,833	127,957,386
2023	14	45	8,698	526,451	146,614,799
2024	17	37	16,662	1,095,470	581,865,892

SAIDI Performance

2024 PUC SAIDI was severely impacted by storm CMI which was just short of 300% higher than the next worst year (2023). Once again, weather normalized SAIDI performed well.

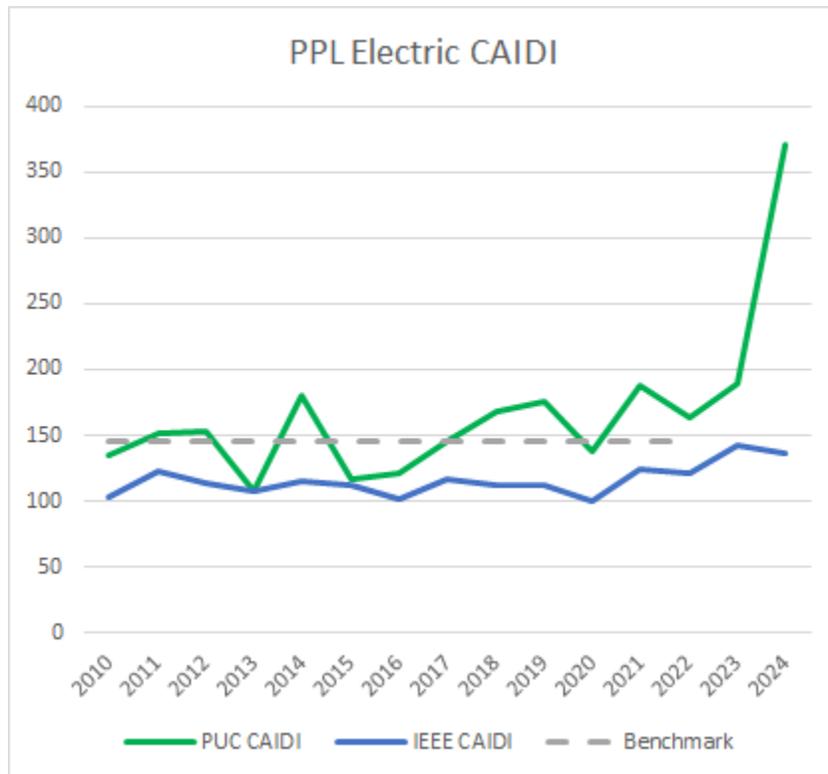


CAIDI Performance

Similarly, 2024 PUC CAIDI was heavily impacted by storms. Weather normalized IEEE CAIDI was 137.

Given 2024 storm severity, along with automated systems preventing and converting outages to momentary interruptions, higher CAIDI values are not unexpected. However, several initiatives continue to be evaluated to improve CAIDI performance. Some of these strategic areas include:

- Optimize resource planning and scheduling.
- Setting Restore vs. Repair strategy early on in storm response.
- Resource Strategy/Optimization.
- Resource scheduling and prearranging resource availability.
- Leveraging data technology to isolate impact and dispatching of resources needed to address outages.



IEEE Metrics

Because weather has a significant impact on 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 2023 performance quartiles for large utilities nationally, as issued by the IEEE Annual Reliability Survey. This survey comprises 73 utilities serving 74 million customers across the country. PPL Electric has been a top quartile IEEE SAIFI performer since 2014.

PPL Electric’s continued focus on improving system reliability is directly related to its strong IEEE SAIFI and SAIDI performance. As a company on the forefront of automation, PPL Electric’s CAIDI is predictably a second or third quartile performer.

	IEEE CAIDI	IEEE SAIFI	IEEE SAIDI
2020	100	0.69	69
2021	124	0.68	85
2022	121	0.74	89
2023	142	0.64	91
2024	137	0.66	91.0
IEEE First Quartile Ceiling	110	0.74	85
IEEE Second Quartile Ceiling	136	0.98	119

Reliability Programs

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

These programs include:

Transmission

Transmission inspection programs include aerial patrols conducted via helicopter or UAV (Unmanned Aerial Vehicle). These patrols focus on comprehensive inspections and routine “stop and go” inspections for identification of maintenance work. Inspections focus on all transmission line equipment, including poles, arms, line switches, interrupters, arresters, grounding, guying, anchors, and other key components. Proactive replacement programs are in place to target specific risk areas (e.g. cellon treated wood poles, upswept wood arms, etc.) and to apply data-driven approaches to mitigate known reliability risks (e.g. avian interference, lightning performance, etc.).

Substation

Substation maintenance programs include inspections and overhauls of equipment, such as breakers, disconnects, power cables, and security equipment. Some equipment is maintained on a time basis; other equipment is condition-monitored. These two methods

help ensure that maintenance work is performed in a cost-effective manner and keep rates low for our customers. Besides time and condition-based maintenance, thermo-graphic inspections help ensure that substation equipment does not operate at elevated temperature levels for an extended period, which helps prevent equipment failure.

Distribution

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

Vegetation

The vegetation on PPL Electric's transmission and distribution rights-of-way (ROW) is maintained utilizing a combination of several management techniques. These include tree pruning, tree removal, and incompatible brush management. Lines are surveyed on a routine basis through a combination of remote-sensing technology and field observations. The work is scheduled and budgeted based on the conditions observed and past performance. Outside of the ROW, hazard trees with the potential to contact PPL facilities are evaluated for removal when possible.

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

- 2) *A description of each major event that occurred during the year being reported on, including the time and duration of the event, the number of customers affected, the cause of the event and any modified procedures adopted in order to avoid or minimize the impact of similar events in the future.*

No major events occurred during 2024.

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

<i>Year</i>		2022	2023	2024¹	3 Yr. Avg.
SAIFI	BM 0.98	0.87	0.78	1.22	0.96
	STD 1.18	0.87	0.78	1.22	0.96
CAIDI	BM 145	164	189	371	241
	STD 174	164	189	371	241
SAIDI	BM 142	142	147	451	247
	STD 205	142	147	451	247
MAIFI²		1.4	0.3	9.7	3.8
Customers Served³		1,451,712	1,456,541	1,470,254	1,459,502
Number of Sustained Customer Interruptions (Trouble Cases)		23,882	23,088	32,294	26,421
Number of Customers Affected		1,256,631	1,136,056	1,791,362	1394683
Customer Minutes of Interruptions (CMI)		206,385,043	214,414,610	663,783,475	361,527,709
Number of Customer Momentary Interruptions		2,020,520	470,327	14,308,908	5,599,918

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

² MAIFI calculations moved to meter based data in 2024. This has been noted in quarterly reports since 2023.

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

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

The table shows a breakdown of service outage causes for 2024. Service interruption definitions are provided in Appendix E. PPL Electric has maintenance programs to address controllable service outages. Those programs are detailed in Appendices A through D.

Cause Description	Trouble Cases	Percent of Trouble Cases	Customer Interruptions	Percent of Customer Interruptions	Customer Minutes	Percent of Customer Minutes
Animals	4,888	15.1%	80,984	4.5%	6,720,270	1.0%
Contact / Dig-In	193	0.6%	7,295	0.4%	787,210	0.1%
Directed by Non-PPL Authority	50	0.2%	3,192	0.2%	662,142	0.1%
Equipment Failures	5,594	17.3%	320,826	17.9%	48,632,327	7.3%
Improper Design	6	0.0%	2,907	0.2%	119,888	0.0%
Improper Installation	6	0.0%	4,076	0.2%	371,971	0.1%
Improper Operation	7	0.0%	939	0.1%	48,779	0.0%
Nothing Found	1,498	4.6%	86,679	4.8%	16,680,980	2.5%
Other Controllable	71	0.2%	10,798	0.6%	1,358,215	0.2%
Other Non-Control	472	1.5%	40,457	2.3%	8,075,581	1.2%
Other Public	30	0.1%	12,079	0.7%	1,962,596	0.3%
Tree Related	18,707	57.9%	1,111,027	62.0%	563,453,361	84.9%
Unknown	-	0.0%	-	0.0%	-	0.0%
Vehicles	772	2.4%	110,103	6.1%	14,910,158	2.2%
Total	32,294	100.0%	1,791,362	100.0%	663,783,475	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 60% of cases, 69% of customer interruptions, and 90% 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, 88% of the customer interruptions and 96% of the customer minutes attributed to tree related outages were weather-related.

Animals: Animals accounted for approximately 15% 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 74% of the number of cases of trouble were associated with individual distribution transformers. PPL Electric has distribution and substation animal guarding programs to focus on systematically protecting existing facilities most at risk of incurring animal-caused interruptions. All PPL Electric substations are animal guarded.

Vehicles: Although vehicles cause a small percentage of the number of cases of trouble, they can account for a larger 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 35% of the cases of trouble, 37% of the customer interruptions and 58% 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 and, when closed for test, the fuse holds, and a patrol reveals nothing.

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

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

VARDEN 69/12 KV LINE 46-02

Remedial Actions

Year	Remediation	Complete
2024	Upgrade reclosers to Smart Grid devices	Y
2024	Perform full circuit trimming	Y
2024	Replace underground conductor	Y
2024	Upgrade Smart Grid devices	Y
2025	Replace single-phase reclosers	Y
2025	Replace poles	Y
2025	Install proactive fault sensors	N
2025	Install animal guarding	N
2025	Replace cross-arms	N

BLYTHEBURN 69/12 KV LINE 86-04

Remedial Actions

Year	Remediation	Complete
2024	Perform full circuit trimming	Y
2025	Transfer section of conductor to neighboring circuit	N
2025	Relocate single-phase conductor	N
2025	Construct three-phase tie line	N
2025	Relocate three-phase conductor	N
2025	Replace single-phase reclosers	N
2025	Install Smart Grid devices	N
2025	Replace Smart Grid devices	N
2025	Install fusing	N

SULLIVAN TRAIL 69/12 KV LINE 58-01

Remedial Actions

Year	Remediation	Complete
2024	Install proactive fault sensors	Y
2024	Relocate single-phase conductor	Y
2024	Perform hazard tree removal	Y
2025	Transfer section of conductor to neighboring circuit	N
2026	Underground single-phase conductor	N
2026	underground three-phase conductor	N
2026	Relocate single-phase conductor	N
2026	Construct three-phase tie line	N

HONEYBROOK 69/12 KV LINE 34-03

Remedial Actions

Year	Remediation	Complete
2024	Perform hot spot tree trimming	Y
2024	Install fusing	Y
2025	Replace cross-arms	Y
2025	Replace poles	Y
2025	Evaluate transfer of section to neighboring circuit	N
2025	Install proactive fault sensors	N
2025	Install single-phase reclosers	N
2025	Evaluate reconductoring	N
2025	Install fusing	N
2026	Reconductor single-phase sections	N

BENTON 69/12 KV LINE 34-01Remedial Actions

Year	Remediation	Complete
2024	Review and optimize coordination and protection	Y
2024	Relocate single-phase conductor	Y
2025	Relocate and reconductor line sections	N
2025	Underground three-phase conductor	N
2025	Install sectionalizing devices	N
2025	Remove conductor sections	N
2025	Perform storm hardening	N
2025	Install fusing	N

GREENWOOD 69/12 KV LINE 06-01Remedial Actions

Year	Remediation	Complete
2024	Replace single-phase conductor	Y
2025	Replace Smart Grid devices	Y
2026	Convert existing sectionalizers to Smart Grid devices	N
2026	Construct three-phase tie line	N
2026	Relocate and upgrade conductor	N
2026	Install Smart Grid devices	N
2026	Perform storm hardening	N
2026	Relocate conductor	N
2027	Perform full circuit trimming	N

S SHERMANSDALE 69/12 KV LINE 41-01

Remedial Actions

Year	Remediation	Complete
2023	Install proactive fault sensors	Y
2024	Perform full circuit trimming	Y
2024	Install fusing	Y
2025	Evaluate converting recloser to three-phase operability	N
2025	Evaluate re-sourcing single-phase section	N
2025	Convert recloser to remote operability	N
2025	Evaluate single-phase reconductoring	N
2025	Evaluate single-phase relocation	N
2025	Evaluate constructing tie line	N
2025	Evaluate three-phase reclosers	N
2025	Install single-phase reclosers	N
2025	Evaluate three-phase tie line	N
2025	Install fusing	N

MADISONVILLE 69/12 KV LINE 55-01

Remedial Actions

Year	Remediation	Complete
2024	Replace single-phase reclosers	Y
2024	Install Smart Grid devices	Y
2024	Replace poles	Y
2025	Install proactive fault sensors	Y
2025	Upgrade reclosers to Smart Grid devices	N
2025	Reconductor sections of line	N
2025	Install animal guarding	N
2026	Perform full circuit trimming	N
2026	Perform storm hardening	N

WARDEN 69/12 KV LINE 46-03

Remedial Actions

Year	Remediation	Complete
2024	Remove conductor sections	Y
2024	Replace reclosers	Y
2024	Replace poles	Y
2025	Install proactive fault sensors	N
2025	Install single-phase reclosers	N
2025	Perform full circuit trimming	N
2025	Replace porcelain cutouts	N
2025	Replace reclosers	N
2025	Replace poles	N

MILFORD 69/12 KV LINE 24-02

Remedial Actions

Year	Remediation	Complete
2024	Perform full circuit trimming	Y
2024	Replace reclosers	Y
2025	Evaluate single-phase relocation	N
2025	Install single-phase reclosers	N
2025	Replace single-phase reclosers	N
2025	Evaluate tree-shielding cable	N
2025	Install animal guarding	N
2025	Install fusing	N
2026	Reconductor single-phase sections	N
2026	Extend section of conductor	N
2026	Install Smart Grid devices	N
2026	Construct tie lines	N
2026	Upgrade poles	N

HONESDALE 69/12 KV LINE 34-01

Remedial Actions

Year	Remediation	Complete
2024	Reconductor single-phase sections	Y
2024	Perform hot spot tree trimming	Y
2024	Install fusing	Y
2025	Replace poles	Y
2025	Install proactive fault sensors	N
2025	Replace porcelain cutouts	N
2025	Install animal guarding	N
2025	Replace reclosers	N
2026	Perform full circuit trimming	N
2026	Perform storm hardening	N

KIMBLES 69/12 KV LINE 26-01

Remedial Actions

Year	Remediation	Complete
2025	Install animal guarding	Y
2025	Install single-phase reclosers	N
2025	Replace reclosers	N
2025	Replace poles	N
2027	Perform full circuit trimming	N

UNIVERSITY 69/12 KV LINE 98-04

Remedial Actions

Year	Remediation	Complete
2024	Review and optimize coordination and protection	Y
2024	Perform Proactive Circuit Analysis	Y
2024	Construct three-phase tie line	Y
2024	Install fusing	Y
2025	Reframe lines outside of substation	N
2025	Underground single-phase conductor	N
2025	Evaluate conductor relocation	N
2025	Perform full circuit trimming	N
2026	Reconductor single-phase sections	N
2026	Reconductor three-phase section	N
2026	Relocate sections of conductor	N
2026	Refeed section of conductor	N
2026	Perform storm hardening	N

HUGHESVILLE 69/12 KV LINE 70-02

Remedial Actions

Year	Remediation	Complete
2024	Relocate single-phase conductor	Y
2025	Upgrade reclosers to Smart Grid devices	N
2025	Underground single-phase conductor	N
2025	Upgrade Smart Grid devices	N
2025	Install animal guarding	N
2026	Reconductor single-phase sections	N
2026	Construct three-phase tie line	N
2026	Install Smart Grid devices	N
2026	Remove conductor sections	N
2026	Perform storm hardening	N

ZIONSVILLE 69/12 KV LINE 80-01

Remedial Actions

Year	Remediation	Complete
2024	Install proactive fault sensors	Y
2024	Perform full circuit trimming	Y
2024	Replace cross-arms	Y
2024	Replace poles	Y
2025	Install reclosers	Y
2025	Relocate single-phase conductor	N
2025	Evaluate constructing tie line	N
2025	Evaluate tree-shielding cable	N
2025	Install Smart Grid devices	N
2025	Evaluate storm hardening	N
2025	Replace poles	N

TWIN LAKES 69/12 KV LINE 81-02

Remedial Actions

Year	Remediation	Complete
2024	Install single-phase reclosers	Y
2024	Replace poles	Y
2025	Install proactive fault sensors	Y
2025	Replace lightning arrester	Y
2025	Perform Proactive Circuit Analysis	N
2025	Install Smart Grid devices	N
2025	Replace porcelain cutouts	N
2025	Install animal guarding	N
2025	Replace cross-arms	N
2025	Replace poles	N
2026	Perform full circuit trimming	N

WOOLRICH 69/12 KV LINE 56-02

Remedial Actions

Year	Remediation	Complete
2023	Install animal guarding	Y
2023	Install single-phase reclosers	Y
2023	Install proactive fault sensors	Y
2023	Perform full circuit trimming	Y
2024	Perform storm hardening	Y
2024	Upgrade recloser to Smart Grid device	Y
2025	Relocate section of conductor	N

NEWFOUNDLAND 69/12 KV LINE 83-03

Remedial Actions

Year	Remediation	Complete
2024	Install animal guarding	Y
2024	Install single-phase reclosers	Y
2024	Install proactive fault sensors	Y
2024	Perform full circuit trimming	Y

SELLERSVILLE 69/12 KV LINE 40-08

Remedial Actions

Year	Remediation	Complete
2024	Reconfigure single-phase sections	Y
2024	Install proactive fault sensors	Y
2025	Underground single-phase conductor	Y
2025	Evaluate relocation of single-phase conductor	N
2025	Reconfigure single-phase sections	N
2025	Evaluate single-phase tie lines	N
2025	Install single-phase reclosers	N
2025	Evaluate tree-shielding cable	N
2025	Evaluate Smart Grid devices	N
2025	Upgrade fuse to recloser	N
2025	Install animal guarding	N
2025	Install fusing	N
2027	Perform full circuit trimming	N

ROHRSBURG 69/12 KV LINE 63-02

Remedial Actions

Year	Remediation	Complete
2026	Underground section of three-phase conductor	N
2026	Relocate sections of conductor	N
2026	Extend sections of conductor	N
2026	Reconductor sections of line	N
2026	Install Smart Grid devices	N
2026	Perform storm hardening	N

ASHFIELD 69/12 KV LINE 04-01

Remedial Actions

Year	Remediation	Complete
2024	Install proactive fault sensors	Y
2024	Install single-phase reclosers	Y
2024	Install Smart Grid devices	Y
2024	Remove conductor sections	Y
2024	Install fusing	Y
2025	Install Smart Grid devices	N
2025	Replace Smart Grid devices	N
2026	Upgrade conductor from single-phase to three-phase	N
2026	Upgrade conductor from two-phase to three-phase	N
2026	Split and relocate section of conductor	N
2026	Relocate and reconductor line sections	N
2026	Construct three-phase tie line	N

- 6) *A comparison of established transmission and distribution inspection and maintenance goals/objectives versus actual results achieved during the year being reported on. Explanations of any variances shall be included.*

	2024 Budget	2024 Actual	Delta Pct
Transmission			
Transmission C-tag poles (# of poles)	61	61	0%
Transmission arm replacements (# of arms)	2	2	0%
Transmission air break switch inspections (# of switches)	1	1	0%
Transmission surge arrester installations (# of sets)	6	6	0%
Transmission structure inspections (# of activities)	6,859	4,653	-32%
Transmission tree side trim-Bulk Power (linear feet)	NA	18,666	NA
Transmission herbicide-Bulk Power (# of acres)	NA	1,883	NA
Transmission reclearing (# of miles) BES Only	NA	820	NA
Transmission reclearing (# of miles) 69 kV	1,375	1,375	0%
Transmission reclearing (# of miles) 138 kV		88	NA
Transmission danger tree removals-Bulk Power (# of trees)	NA	1,526	NA
Substation			
Substation batteries (# of activities)[1]	122	122	0%
Circuit breakers (# of activities)	0	6	NA
Substation inspections (# of activities)	1,250	1,489	19%
Transformer maintenance (# of activities)	374	780	109%
Distribution			
Distribution C-tag poles replaced (# of poles)	2,250	1,171	-48%
C-truss distribution poles (# of poles)[1]	1,261	1,393	10%
Capacitor (MVAR added)		1.1	NA
OCR Replacements (# of)	104	74	-29%
Distribution pole inspections (# of poles)	45,787	70,029	53%
Distribution line inspections (miles)	7,526	7,526	0%
Group re-lamping (# of lamps)	0	0	NA
Test sections of underground distribution cable	NA	69	NA
Distribution tree trimming (# of miles)	NA	4,877	NA
Distribution herbicide (# of acres)	NA	1,371	NA
Distribution >18" removals within R/W (# of trees)	N/A	N/A	NA
Distribution hazard tree removals outside R/W (# of trees)	N/A	N/A	NA
LTN manhole inspections (# of)[2]	0	0	NA
LTN vault inspections (# of)	0	1	NA
LTN network protector overhauls (# of)	0	0	NA
LTN reverse power trip testing (# of)	0	10	NA

Explanation of variances greater than 10%:

Transmission structure inspections (# of activities): The number of transmission structure inspections was less than planned due to reductions to the helicopter patrol budget.

Transformer Maintenance: As reported in the quarterly reports, an issue was identified with closing out substation maintenance activities in 2023 leading to artificially low numbers in 2023 and high numbers in 2024. This issue has been corrected. Inspection and maintenance activities in both years were generally executed according to schedule.

Substation Inspections: The same issue mentioned in transformer maintenance impacted the substation inspections as well since they are bundled under the same work orders in some instances.

Distribution C-tag poles replaced (# of poles): In 2024, completed pole replacements came in below the forecast due to the number of storms experienced and the associated resource availability. All remaining work initially scheduled for 2024 is expected to be completed in 2025.

C-truss distribution poles (# of poles): The variance is primarily due to an increase in inspections and because some poles scoped for December of 2023 were performed in early 2024.

OCR Replacements (# of): The number of three phase device installs were lower than anticipated due to three manufacturing defects that delayed the delivery of reclosers and temporarily halted installations of equipment at hand. Additionally, there were resource constraints with single phase installations due to the volume of storms in 2024; they are on track to be completed in early 2025.

Distribution pole inspections (# of poles): In order to maintain compliance with the overall inspection and maintenance cycle, a decision was made to inspect more than originally budgeted in 2024.

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

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

	2024 Budget (\$000)	2024 Actual (\$000)	Delta %
Provide Electric Service	6,371	5,998	-6%
Vegetation Management	29,115	49,078	69%
Customer Response	54,995	65,085	18%
Reliability Maintenance	19,034	20,318	7%
System Upgrade	194	7	-96%
Customer Service/Accounts	152,019	200,538	32%
Others	45,880	68,133	49%

Explanation of variances of 10% or greater:

Vegetation Management – Additional vegetation spend was approved above amounts in the initial business plan.

Customer Response - Higher than projected driven by number of storms.

System Upgrade - Lower than projected costs related to System Facilities Upgrade.

Customer Service/Accounts – Higher than projected costs due to higher uncollectable accounts and higher write offs.

Other – Higher than projected support group costs.

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

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

	2024 Budget (\$000)	2024 Actual (\$000)	Delta %
New Service/Revenue	118,093	146,249	24%
System Upgrade	388,584	368,577	-5%
Reliability & Maintenance	530,530	536,010	1%
Customer Response	63,181	136,262	116%
Other	22,823	8,410	-63%

Explanation of variances of 10% or greater:

New Service/Revenue – Overrun was consistent with higher volume of new service requests.

Customer Response - Higher than projected driven by number of storms.

Other – Driven by decrease in distributed energy resource management projects.

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

Inspection & Maintenance Goals/Objectives	2025 Budget
Transmission	
Transmission C-tag poles (# of poles)	58
Transmission arm replacements (# of sets)	1
Transmission air break switch inspections (# of switches)	2
Transmission surge arrester installations (# of sets)	11
Transmission structure inspections (# of activities)	7,327
Transmission tree side trim-Bulk Power (linear feet)	N/A
Transmission herbicide-Bulk Power (# of acres)	N/A
Transmission reclearing (# of miles) BES Only	712
Transmission reclearing (# of miles) 69 kV	1,557
Transmission reclearing (# of miles) 138 kV	204
Transmission danger tree removals-Bulk Power (# of trees)	N/A
Substation	
Substation batteries (# of activities)	0
Circuit breakers (# of activities)	0
Substation inspections (# of activities)	1,460
Transformer maintenance (# of activities)	632
Distribution	
Distribution C-tag poles replaced (# of poles)	2,500
C-truss distribution poles (# of poles)	1,500
Capacitor (MVAR added)	N/A
OCR Replacements (# of)	200-230
Distribution pole inspections (# of poles)	104,000
Distribution line inspections (miles)	4,700
Group re-lamping (# of lamps)	0
Test sections of underground distribution cable	N/A
Distribution tree trimming (# of miles)	3,100
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)	0
LTN vault inspections (# of)	0
LTN network protector overhauls (# of)	0
LTN reverse power trip testing (# of)	0

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

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

Activity	2025 Budget (\$000)
Provide Electric Service	7,012
Vegetation Management	33,351
Customer Response	60,298
Reliability Maintenance	16,964
System Upgrade	92
Customer Service/Accounts	187,078
Others	48,886
Total O&M Expenses	353,681

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

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

Activity	2025 Budget (\$000)
New Service/Revenue	138,754
System Upgrade	400,888
Reliability & Maintenance	657,008
Customer Response	76,363
Other	27,106
Total	1,300,121

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

No significant changes were requested.

***PPL Electric Utilities Corporation
Transmission Programs & Procedures***

Program	Activity
Helicopter Inspections – Routine	Aerial linemen perform annual routine transmission line patrols from a helicopter. They identify damaged or deteriorated equipment. Engineers review the findings and develop plans for repair or replacement.
Helicopter Inspections – Comprehensive	Aerial linemen perform an overhead comprehensive inspection of transmission line facilities on a risk-based time cycle. Detailed condition reports with close up digital photos are prepared for each specific component problem found along the transmission line and right of way. Engineers review the findings and schedule corrective maintenance as needed.
Helicopter Inspections – Emergency	Aerial linemen perform patrols of transmission lines that operate abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Because of the nature of this work, corrective actions are usually expedited.
Field Inspections – Emergency	Line personnel perform emergency foot patrols to inspect transmission lines that operated abnormally. This inspection focuses on identifying damage that may have been caused by lightning, inclement weather, equipment failure or vandalism. Due to the nature of this damage, corrective actions are generally expedited.
Steel Structure Inspection/Repair	Personnel inspect steel structures at the ground line for corrosion, mechanical damage and foundation degradation. Structural components are coated, and repairs are made based on the findings of the inspections as necessary.
Equipment Maintenance	During helicopter and foot patrols, equipment and facilities are identified that require repairs. Based on need and criticality, repairs are either scheduled or completed as soon as possible.
Planned Reliability Programs	Lightning arresters and avian guards are installed on targeted 69kV and 138kV facilities based on a data-driven risk analysis to improve reliability of worst performing circuits.
Line Switches – Maintenance & Inspection	Line personnel inspect, maintain, and perform operational tests on 138kV and 69kV transmission line switches to assure proper operation.

Appendix A

Program	Activity
Line Switch Upgrades	Transmission line switches are being programmatically upgraded to include motor operators to allow for remote sectionalizing that substantially improves switching times during outages.
Conductor Inspections	Line personnel collect data on overhead facilities using an NDE (nondestructive evaluation) device to identify damage and deterioration not visible through other inspection methods. Engineers review the findings and develop plans for repair or replacement.
Circuit Analysis	Engineers analyze circuit loading and performance to identify areas needing increased line capacity or improved line reliability. Circuits are also reviewed based on operational performance and ranked yearly in a WPC list, with appropriate circuits identified for targeted reliability improvements.

***PPL Electric Utilities Corporation
Substation Programs & Procedures***

Program	Activity
Load Survey	Automatic monitoring devices such as Supervisory Control and Data Acquisition (SCADA) provide continuous, real-time loading information. Engineers review equipment loading and identify facilities and transfer capabilities approaching capacity limits. A portion of the load may be supplied from a different source, the existing facilities may be upgraded, new lines and equipment may be added, or a new substation may be built to address capacity deficiencies.
Substation Inspection/Repair	Electricians inspect substations for security and equipment reliability on a time based maintenance cycle. They attempt to identify and correct potential equipment problems before a failure or interruption of service occurs.
Equipment Service	Electricians perform operational tests on power transformers, load tap changers (LTC), voltage regulators, circuit breakers, circuit switchers, vacuum switches, air break switches and transformer protective switches on a time-based maintenance cycle to assure that equipment is operating within established parameters. Equipment serviced includes batteries, battery chargers, protective relays, HV fuses and high-speed automatic grounding switches. Depending on the type of equipment, “service” can include actions other than operational testing.
Inspection & Overhaul	Electricians inspect and overhaul circuit breakers, wave traps, ground switches, stick-operated disconnects, gang-operated disconnects and motor-operated disconnects on a time based maintenance cycle to assure proper operation.
Insulation Testing	Technicians perform power factor testing on power transformers, potential transformers, lightning arresters, current transformers, select circuit breakers and power cables on a time-based maintenance cycle. Testing also includes other instrument transformers (capacitance coupled voltage transformer, coupling capacitors, potential devices, etc.). They also perform high-potential testing on 12kV oil, air and vacuum circuit breakers to assure proper operation.

Appendix B

Program	Activity
Condition Monitoring of Station Equipment	Technicians perform dissolved gas-in-oil, dielectric, oxygen, and oil acidity tests for oil in power transformers and impedance and capacity tests on station batteries to assure equipment is within normal parameters. Periodically, AC power factor tests, hi-potential tests, contact resistance tests and motion tests are performed on circuit breakers. Oil dielectric testing is conducted for oil circuit breakers.
Thermographic Inspections	Technicians perform thermography surveys of substation facilities to identify components operating at elevated temperature. Based on the findings, engineers develop plans to repair or replace the component(s) prior to failure.
Minor Improvements	Maintenance activities may identify conditions where additions or upgrades are needed to assure reliability. Engineers evaluate the need and develop action plans and schedules to complete the work.
DC Station Service Improvements	Repairmen identify deteriorated station batteries, battery chargers and battery components. Engineers schedule repair or replacement as necessary.
Capacitor Bank Protection	Engineers monitor the need for synchronous closing schemes on vacuum switches on 69kv capacitor banks. They plan and schedule installations as needed.
Area/Regional Supply	Engineers develop specific projects aimed at improving capacity shortfalls or replacing deteriorated or substandard station equipment.
SCADA Replacement	Engineers identify deteriorating substation SCADA equipment and develop plans to repair or replace it.

***PPL Electric Utilities Corporation
Distribution Programs & Procedures***

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

Appendix C

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

***PPL Electric Utilities Corporation
Vegetation Programs & Procedures***

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

***PPL Electric Utilities Corporation
Service Interruption Definitions***

Trouble Definitions: After field investigations and repairs are complete, PPL Electric linemen report the cause of each case of trouble. The definitions of the cause codes appear below. Note that while internal codes allow vegetation caused outages to be separated into trimming related and not trimming related, these categories are generally merged for internal reporting purposes, and consistent with the response to question 4.

Improper Design	Controllable	<ul style="list-style-type: none">• When an employee or agent of PPL Electric is responsible for an error of commission or omission in the engineering or design of the distribution system.
Improper Installation	Controllable	<ul style="list-style-type: none">• When an employee or agent of PPL Electric is responsible for an error of commission or omission in the construction or installation of the distribution system.
Improper Operation	Controllable	<ul style="list-style-type: none">• When an employee or agent of PPL Electric is responsible for an error of commission or omission in the operation or maintenance of the distribution system.
Trees –Trimming Related	Controllable	<ul style="list-style-type: none">• Outages resulting from conductors contacted by tree growth within the clearance zone defined by the current trimming specification (within the Right-of-Way).
Trees – Not Trimming Related	Non-Controllable	<ul style="list-style-type: none">• Outages due to trees, but not related to lack of proper tree trimming maintenance. This includes danger timber blown into PPL Electric facilities, and trees or limbs felled by the public.
Animals	Controllable	<ul style="list-style-type: none">• Any outage caused by an animal directly or indirectly coming in contact with PPL Electric facilities. This includes birds, squirrels, raccoons, snakes, cows, etc.
Vehicles	Public	<ul style="list-style-type: none">• When cars, trucks or other types of vehicles or their cargoes strike facilities causing a problem.
Contact/Dig-in	Public	<ul style="list-style-type: none">• When work in the vicinity of energized overhead facilities results in interruptions due to accidental contact by cranes, shovels, TV antennas, construction equipment (lumber, siding, ladders, scaffolding, roofing, etc.).• When contact is made by a non-employee with an underground facility causing interruption.

Appendix E

Equipment Failure	Controllable	<ul style="list-style-type: none"> • Outages resulting from equipment failures caused by corrosion or contamination from build-up of materials, such as cement dust or other pollutants. • Outages resulting from a component wearing out due to age or exposure, including fuse tearing or breaking. • Outages resulting from a component or substance comprising a piece of equipment failing to perform its intended function. • Outages resulting from a failure that appears to be the result of a manufacturer's defect or cannot be described by any other code indicating the specific type of failure.
Directed by Non-PPL Authority	Non-Controllable	<ul style="list-style-type: none"> • Interruptions under the control of a PPL Electric switchman or direction of a PPL Electric System Operator for the purpose of dropping load or isolating facilities upon request during emergency situations. • Interruptions which cannot be postponed or scheduled for a later time, and include situations like load curtailment during system emergencies, and requests of civil authorities such as fire departments, police departments, civil defense, etc. for interruption of PPL Electric facilities.
Other – Controllable (Lineman provides explanation)	Controllable	<ul style="list-style-type: none"> • Interruptions caused by phase to phase or phase to neutral contacts, resulting from sleet or ice dropping off conductors, galloping conductors, or any other phase to phase or phase to neutral contact where weather is a factor. • Interruptions resulting from excessive load that cause that facility to fail. • When restoration of service to a facility, which had been interrupted for repairs or other reasons, causes an additional interruption to another facility which had not been involved in the initial interruptions. • Controllable interruptions or Power Service Problems whose cause is not described by one of the previous controllable cause codes.
Nothing Found	Non-Controllable	<ul style="list-style-type: none"> • When no cause for the interruption can be found. • When there is no evidence of equipment failure, damage or contact after line patrol is completed. This could be the case during a period of heavy thunder and lightning, when a line fuse blows or a single phase OCR locks open. • When closed for test, the fuse holds or the OCR remains closed. A patrol of the tap reveals nothing.

Appendix E

Other Public (Lineman provides explanation)	Public	<ul style="list-style-type: none">• All outages resulting from gunfire, civil disorder, objects thrown, or any other act intentionally committed for the purpose of disrupting service or damaging company facilities.
Other – Non-Controllable (Lineman provides explanation)	Non-Controllable	<ul style="list-style-type: none">• Any outage occurring because of a fire, flood or a situation that develops as a result of a fire or flood. Do not use when facilities are de-energized at the request of civil authorities.• When an interruption is caused by objects other than trees, such as kites, balls, model airplanes, roofing material, or fences, being accidentally blown or thrown into overhead facilities.• All problems caused by contact of energized equipment with facilities of other attached companies or by trouble on customer owned equipment.• Interruptions or Power Service Problems whose cause is not described by one of the previous non-controllable cause codes, but is not affected by a PPL Electric employee's decisions.