Kimberly A. Klock
Senior Counsel

PPL
Two North Ninth Street
Allentown, PA 18101-1179
Tel. 610.774.5696 Fax 610.774.6726
KKlock@pplweb.com

FEDERAL EXPRESS

June 30, 2017

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, Pennsylvania 17105-3265

Re: PPL Electric Utilities Corporation
Biennial Inspection, Maintenance, Repair and Replacement Plan
For the Period January 1, 2018 – December 31, 2019
Docket No. M-2009-2094773

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") an original of PPL Electric's Summary Report regarding substation inspection practices. This document is being filed pursuant to the December 22, 2016 letter issued by the Bureau of Technical Utility Services in the above-referenced docket.

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on June 30, 2017, which is the date it was deposited with an overnight express delivery service as shown on the delivery receipt attached to the mailing envelope.

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

If you have any questions, please call me or Stephen J. Gelatko, PPL Electric's Manager – Distribution Asset Management at (610) 774-4785.

Very truly yours,

Kimberly A. Klock

Kimberly A. Klock

Enclosures

cc: Mr. Paul Diskin
Tanya J. McCloskey, Esquire
Mr. John R. Evans
Mr. Darren Gill
Mr. Dan Searfoorce

Introduction

Per the Commission's formal response to PPL Electric's filing of its 2018-2019 Biennial Inspection, Maintenance, Repair and Replacement Plan, this serves as PPL's formal report addressing the recommendations set forth within the Substation Inspection section.

A. Review the inclusion of actual acceptability ranges/acceptance criteria for equipment readings and observations.

PPL Electric performs visual inspections in order to document the observed physical conditions of substation equipment. The parameters documented during these inspections are based on equipment class (e.g. circuit breakers, power transformers, batteries, etc.) and type (e.g. gas circuit breakers, vacuum circuit breakers, etc.). Upon inspection completion, results are further reviewed by a qualified professional to determine any abnormal trends with respect to the current system configuration. During these inspections, electrician crews have a visual reference for acceptable operating conditions.

These trends are monitored and reviewed in PPL Electric's substation asset database, CASCADE. Deviations from these normal parameters are addressed by performing the following actions, including but not limited to: further investigations for determining the root-cause of abnormalities, performing necessary repairs to the relevant equipment, etc. The Company has developed a control report to observe these trends and variances for each set of inspections; this report will be used to reinforce correct work practices at PPL Electric for substation operations.

The visual inspection program is supplemental to various other planned maintenance programs conducted by PPL Electric for substation operations. These programs include infrared (IR) inspections and various testing procedures that are scheduled based on the reviews of manufacturers' recommendations.

All critical conditions for substation equipment are continuously monitored continuously and PPL Electric's real-time analysis database tracks event records for alarming conditions and pre-determined settings. All distribution substations at PPL Electric have these alarms for all critical components and are remotely monitored. In addition, PPL Electric has a robust plan to add additional intelligent relay packages to its substations. These relays will allow PPL Electric to automatically calculate circuit breaker health after each operation.

B. Ensure gauges are uniquely numbered and identified on inspection forms; review how out-of-specification readings, nonconforming conditions, deficiencies, and irregularities found during the inspection are to be documented and resolved.

PPL Electric has incorporated a unique naming convention for equipment gauges based on substation location and equipment number. These gauges are prominently displayed on all critical assets at PPL Electric substations so that crews can easily identify them during the inspection. This ensures that crews are confidently making observations and recording their findings for the correct equipment at all times.

C. Develop a more detailed procedure to describe responsibilities and accountabilities.

PPL Electric has developed a procedure that outlines the roles and responsibilities relating to visual inspections as a part of its standard operating procedure for this type of work. This document is reviewed on a 5-year basis, or more frequently as deemed necessary and will be communicated during annual refresher training for substation maintenance personnel.

D. Develop a process for documenting the inspection form revision process to ensure submitted changes are properly reviewed and approved prior to implementation.

PPL Electric has accounted for this revision process by including it as a part of its procedures. Each revision is reviewed and d all proposed changes to the digital inspection forms are approved by management prior to implementation. Since CASCADE logs current data for all substation assets, crews will always have access to the latest version of the digital inspection form, preventing version control issues.

E. Ensure gauges are incorporated in a calibration program.

The policies at PPL Electric do not warrant the need for a formal gauge calibration program, as gauges are not sole indicators of equipment status and performance; these readings are supplemental to asset performance with respect to the current system configuration. However, gauges will be calibrated for new installations, when abnormal conditions are identified by system operators and during equipment services for vital substation assets (e.g. circuit breakers, transformers, batteries, etc.).

F. Incorporate manufacturer's recommendations for equipment inspections and frequency.

PPL Electric reviews manufacturers' recommendations for incorporation into all of the substation planned maintenance programs. The intent of these visual inspections is to supplement the results that are obtained from other maintenance programs in order to assess the performance of substation equipment. For new installations, PPL Electric will work with equipment manufacturers to ensure that recommended maintenance frequencies are aligned with planned maintenance frequencies based on optimizing maintenance cost and incorporating field experience.

G. Re-train all responsible personnel on any inspection form process and procedure changes.

Each year, PPL Electric provides training for inspection crews as part of its substation electrician training process. During this training, crews are taught the general procedure for accessing the digital inspection form in CASCADE for performing routine inspections. In addition to this annual training, a one-time safety review will be conducted prior to releasing the new revision of the procedure.

Accompanying the process and procedural changes made with key stakeholders, PPL Electric has provided detailed guidelines to appropriately outline the changes to the proposed

inspection cycle and supplementary documentation, supporting historical data, and a detailed implementation plan. In addition, the Company frequently provides training to ensure all inspection crews can implement proposed changes and expectations when performing inspections.

H. Conduct periodic audits to ensure readings are accurately being performed and reviewed.

As part of the inspection process, qualified professionals will perform follow-up reviews to validate the results obtained from the crews; this review is performed within 2-4 weeks following the completion of each inspection. Additionally, the Company has developed a control report to monitor the quality of substation inspections.

In addition to making these process improvements to substation inspections, PPL Electric continues to improve its reliability performance through several measures.

For instance, PPL Electric closely monitors the performance of its 12kV circuit breakers on the distribution system, including how often misoperation occur compared to the total number of operations (or 'Misoperation rate'). Over the past three years, the cumulative misoperation rate for 12KV circuit breakers has decreased on PPL Electric's distribution system. Moreover, the Company is forecasted to have this rate decrease to 0.33% by end of year. These misoperations are being incorporated in the scope planning process for 12kV circuit breakers on the distribution system.

Table 1: Cumulative Misoperation Rates for Previous Three Years and YTD at PPL Electric

Year	Cumul. Misoperation Rate
2014	1.02%
2015	0.57%
2016	0.49%
2017 YTD	0.46%

Additionally, PPL Electric has launched a pilot program in 2017 for its intelligent relay package solution for implementation at all distribution substations. This solution provides a cost-effective alternative to traditional protection and control replacements, while providing system operators with a wide array of functionalities for real-time operations analysis. These functionalities include, but are not limited to: automatic sectionalizing to reduce the number of outages experienced during an event on the distribution system, enhanced fault location for faster customer restoration, suspected downed conductor detection for quicker response to emergency outages, etc.

PPL Electric has used this intelligent relay package and misoperation data to quantify the 'health' of all of its 12KV circuit breakers and relays on the distribution system. In addition to these factors, the Company also analyzes overall operation history and nameplate data for circuit breaker 'health' assessment. Relays are assessed based on compliance with the

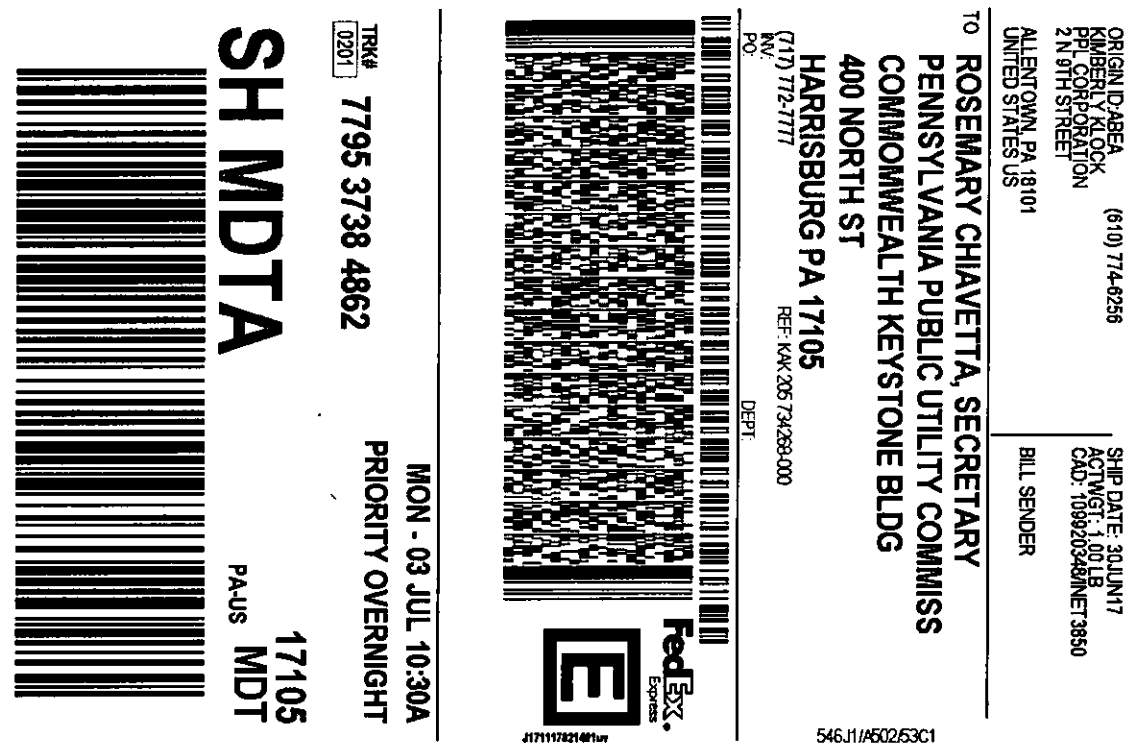
intelligent relay package solution, which calls for robust microprocessor relays and more reliable SCADA protocols.

These assessments help set the foundation for a much larger endeavor by PPL Electric. The Company is currently developing a model based on these assessments for analyzing substation 'health' across the entire service territory. This model will be used to effectively identify substations that require multiple asset replacements or repairs in order to optimize substation operations at PPL Electric.

In recent years, PPL Electric has exhibited superior substation reliability performance. Within the previous three years, IEEE CAIDI has shown a steady decrease with each year. Furthermore, substation outages have a minimal contribution to the IEEE SAIDI and IEEE SAIFI for Distribution Operations at PPL Electric. With the initiatives mentioned previously, PPL Electric strives to continually improve its performance for substation reliability.

Table 2: Substation Reliability Performance for Previous Three Years at PPL Electric

Year	IEEE CAIDI	IEEE SAIDI		IEEE SAIFI	
		Substation	% Total	Substation	% Total
2014	71	6.438	7%	0.091	11%
2015	59	2.804	4%	0.047	7%
2016	37	2.914	4%	0.078	11%



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