



September 1, 2011

Project 2009-149

Mr. Joseph Marhefka
PPL Electric Utilities
2 North Ninth Street
Allentown, PA 18101-1179
MS: GENN4

*Special Inspection Report for
Zone #1, Hauto-Siegfried #1 and #4 &
Siegfried-E. Palmerton #1 and #2 69kV Transmission Lines*

Dear Mr. Marhefka;

This report contains our findings and overview of the Zone #1 Hauto-Siegfried Siegfried-E. Palmerton 69kV transmission lines which were recently inspected from the ground as part of the PPL Asset Optimization Strategy (AOS) Program.

Introduction and Overview

This 9 mile long transmission line corridor consists of two double circuit tower lines. The first tower line consists of the Hauto-Siegfried #1 and Siegfried-E. Palmerton #2 circuits. The second tower line consists of the Hauto-Siegfried #4 and Siegfried-E. Palmerton #1 circuits. The tower lines consist of approximately 160 structures; primarily steel lattice towers. The sample size chosen for inspection was 10% of structures. Selection was based on structures known to have problems and at random.

The Hauto-Siegfried #1 and #4 lines have been in service since 1914 and 1923 respectively. The Siegfried-E. Palmerton #1 and #2 circuits have been in service since the 1950's. Hauto-Siegfried #1 was the first line to be constructed and it was built on the centerline of the existing right of way. When Hauto-Siegfried #4 was constructed, it appears that it was primarily built on the edge of the existing right of way. The Siegfried-E. Palmerton lines occupy both second circuit positions on the original two tower lines. Zone #1 of the AOS Program consists of the Hauto-Siegfried lines from the junction with the Siegfried-E. Palmerton Lines to Siegfried Substation. The Hauto-Siegfried Circuits are strung with the original 4/0 copper conductor and the Siegfried-E. Palmerton circuits are strung with the original 250 mcm copper conductor. The conductors in this zone are well beyond their expected life. It is also assumed that the insulators and hardware were also changed out at the same time in 1950. The majority of steel foundations inspected are in poor condition and 50% of concrete foundations inspected are in severe condition.

It is the opinion of DiGioia, Gray & Associates that the Zone #1 Hauto-Siegfried and Siegfried-E. Palmerton lines are at the end of their useful life. Given the age the structures, foundation corrosion conditions, age of conductor and lastly the right of way constraints, it would be prudent for PPL to rebuild these lines with a more reliable, redundant and robust double circuit steel pole line built on the centerline of the existing right of way.

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Inspections

Seventeen (17) steel lattice tower structures received detailed structural inspections from the ground. Data from ground inspections is located at the end of this report.

The ground inspections included evaluation of the following items:

- Encroachments: Includes structures on the Right of Way, danger trees, vegetation on the Right of Way, fencing, debris, fire hazards and anything that can affect the operation and maintenance of the line
 - Two of the inspected wood pole structures have good vehicle access from Siegfried Substation and Avery Road. These are good conditions.
 - Seven of the inspected structures have good 4wd access, usually located in a farmer's field. One structure is located adjacent to East Grant Street and is subject to vehicle collisions. These are fair conditions.
 - The remaining seven structures inspected have difficult access due to a variety of reason. All have difficult 4wd access. Four have difficult access due to stream crossings or their location in a junk yard adjacent to the turnpike. Three have gated access but with no PPL lock on the gate. These are poor conditions.
 - 2/17 structures Rating 2 – good condition.
 - 8/17 structures Rating 3 – fair condition.
 - 7/17 structures Rating 4 – poor condition.



Photo 1 – Typical lattice tower

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- Geotechnical: Includes slope stability, landslides, subsidence, erosion, questionable foundation capacity, grade changes around structure and leaning structures
 - Three of the structures are located in quarries. Excavation has occurred around the towers, but the structures do not appear to be undermined or in danger. These are fair conditions.
 - Two of the structures are located in wet areas. One has two legs located in a roadside drainage swale and the other structure is located in a marsh. These are fair conditions.
 - Structure Inspection No. 58 has very severe geotechnical conditions. The structure is located in a hillside cut in a slide prone area. Tower legs 1 and 4 are being washed out and undermined. These are severe conditions.
 - There were no detrimental geotechnical issues found at the remaining fourteen inspection sites.
 - 14/17 structures Rating 2 – good condition.
 - 2/17 structures Rating 3 – fair condition.
 - 1/17 structures Rating 5 – severe condition.



Photo 2 – Severe foundation condition (Structure Inspection No. 58)

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- Shield Wire Hardware: To evaluate the electrical and mechanical connection of the shield wire to the structure and to the adjacent shield wire span
 - The shield wire hardware is difficult to evaluate from the ground. There is a variety of different types of hardware being used. Most hardware that is steel has significant corrosion. U bolts on clamps are also significantly corroded.
 - Four structures have suspension saddle clamps and the shield wire is not bonded to the tower. The hardware has moderate surface corrosion. These are fair conditions.
 - The remaining thirteen structures have strain clamps. The shield wire is not jumpered or bonded to the structure at five of these locations. All hardware has significant surface corrosion. Structure Inspection No. 63 provides no shielding into Siegfried Substation. These are poor conditions.
 - Based solely on age, all hardware such as strain clamps and saddle clamps should be replaced. This may be problematic though due to the use of ductile iron clamps and copper or copperweld conductor. The clamps are likely difficult to remove and the wire is likely damaged.
 - 4/17 structures Rating 3 – fair condition.
 - 13/17 structures Rating 4 – poor condition.



Photo 3 – Typical Shield Wire Saddle Clamp Connection (not bonded to tower and hardware corroded)

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Photo 4 – Typical Shield Wire Strain Clamp Connection (not jumpered or bonded to tower and hardware corroded)

- Insulators & Hardware: To look for flashed or broken insulators, contamination of insulator strings, corrosion of insulator caps and related hardware
 - One inspected structure has good insulator and hardware conditions. All insulators have been replaced and hardware has very little surface corrosion.
 - The majority of structures (sixteen) inspected have fair insulator and hardware conditions. Some surface corrosion can be seen on the insulator caps and the hardware. U bolts on clamps are difficult to evaluate, but corrosion can be seen on them.
 - Based solely on age, hardware such as strain clamps and saddle clamps should be replaced. This may be problematic though due to the use of ductile iron clamps and copper or copperweld conductor. The clamps are likely difficult to remove and the wire is likely damaged.
 - 1/17 structures Rating 2 – good condition.
 - 16/17 structures Rating 3 – fair condition.

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Photo 5 – Typical suspension insulator string

- Steel Corrosion: Evaluate the corrosion of original galvanizing (if exposed) and the corrosion of the bare steel. Related to Paint evaluation. Does not include ground line corrosion.
 - For three inspected structures, there is moderate surface corrosion where paint has begun to flake off near base of tower and on crossarms. These are fair conditions.
 - For the remaining fourteen steel structures, no steel corrosion was present. This was largely due to good paint coatings. These are good conditions.
 - 14/17 structures Rating 2 – good condition.
 - 3/17 structures Rating 3 – fair condition.

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Photo 6 – Fair steel corrosion conditions

- Paint: Evaluation of paint or other above ground coatings
 - On three inspected structures, tower paint is in poor condition. Paint is rapidly peeling off on entire tower and crossarms. Red paint and galvanizing is visible near base of tower and at top of towers, especially on crossarms and hangars. These are fair conditions.
 - On thirteen inspected structures, the paint is just starting to peel off near the base of the structures. Some red paint is visible on these towers due to issues with paint coverage, but over the paint is in fair condition.
 - One structure has paint in very good condition. It is apparent that this tower has been repainted in the past decade.
 - 1/17 structures Rating 2 – good condition.
 - 13/17 structures Rating 3 – fair condition.
 - 3/17 structures Rating 4 – poor condition.

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Photo 7 – Poor paint conditions

- Bent or Missing Steel: Includes identifying missing or loose bolts, bent or missing steel members and the determination of the cause (i.e. equipment collision, settlement, loading, etc.). Excludes problems associated with ground line corrosion.
 - Structure Inspection No. 53 has Leg No. 2 bent due to a vehicle collision. The foundation on Leg No. 2 was built up to protect the leg but the leg capacity is greatly reduced due to the bent leg. This is a severe condition, as leg strength is greatly reduced.
 - One inspected structure has a bent diagonal member. This is generally a fair condition and appears to be a result of equipment collision.
 - Two inspected structures have bent redundant members. This is generally a fair condition and appears to be a result of equipment collision and framing tolerances.
 - The remaining thirteen towers have no bent or missing steel or missing bolts.
 - 13/17 structures Rating 2 – good condition.
 - 3/17 structures Rating 3 – fair condition.
 - 1/17 structures Rating 5 – severe condition.

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Photo 8 – Bent leg due to vehicle impact (Structure Inspection No. 53)

- Concrete Foundations: To evaluate the concrete condition, steel corrosion at the steel-concrete interface, anchor bolt conditions, concrete projection above ground line
 - Not applicable for malone and grillage type foundations.
 - Structure Inspection No. 53 and 62a have fair foundation conditions. All concrete foundations have concrete projection above the groundline. No corrosion was found at the steel-concrete interface.
 - Structure Inspection No. 55 and 58 have poor foundation conditions. For structure Inspection No. 58, all concrete foundations have concrete projection above groundline, but there is significant steel corrosion at the steel-concrete interface. Concrete foundation are also splitting and spalling. Structure Inspection No. 55 has all concrete foundations buried. There was surface corrosion at the steel-concrete interface, but no measurable section loss.
 - Structure Inspection No. 58 and 61 have severe foundation conditions. Some or all foundations on each structure have no concrete projection above groundline. Severe section loss (40%) was found on Leg No. 4 of Inspection No. 58. Significant surface corrosion and pitting was found below groundline on other legs of Inspection No. 58. Structure Inspection No. 58 and 61 also have significant surface corrosion at the steel-concrete interface located below and above the groundline.
 - Structure inspection No. 62 has a concrete pedestal foundation. The foundation is crumbling with reinforcing bars visible all over structure foundation. Efflorescence is also visible all over foundation. This is a severe condition.

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- Structure Inspection No. 63 has very severe foundation conditions. Only one leg has concrete projection. The buried legs have severe section loss at the steel-concrete interface. The section loss has been painted over with coal tar epoxy. This is a very severe condition.
- The concrete steel interface is best located above grade to avoid corrosion problems.
- For all concrete foundations, the protective coal tar epoxy coating is cracking and delaminating above the concrete line and is no longer protecting the steel.
- 2/8 structures Rating 3 – fair condition.
- 2/8 structures Rating 4 – poor condition.
- 4/8 structures Rating 5 – severe condition.



Photo 9 – Severe section loss (Structure Inspection No. 63)

- Steel Foundations: Evaluation of steel corrosion where steel is directly embedded in the ground (grillage, malone and basket types)
 - Under PPL Electric's maintenance program, coal tar epoxy was applied to all structures both above and below groundline. This coating, in general, is no longer functioning. It is delaminating or completely missing below ground line and is cracking and delaminating above groundline.
 - The original red paint and galvanizing is visible on most structures when the steel was exposed below groundline.

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- Structure Inspection No. 59 has fair steel foundation conditions. The coal tar epoxy groundline coatings are generally in good condition, but evidence of past corrosion was evident.
- Eight of the inspected structures are all experiencing failure of the protective coal tar epoxy coating at and below the groundline. Minor surface corrosion was common. No section loss was discovered on these eight structures. These are all poor conditions due to the failure of the groundline coating.
- 1/9 structures Rating 3 – fair condition.
- 8/9 structures Rating 4 – poor condition.



Photo 10 – Typical groundline coating failure (red paint visible)

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- Grounding: To evaluate the presence and condition of grounding from the attachment to structural steel to the embedded ground rod or counterpoise.
 - Continuous counterpoise was used for grounding.
 - Generally, most towers have at least two legs grounded. Some ground leads were corroded through or significantly corroded, reducing their functionality. These are all poor conditions due to the lack of and/or poor condition of grounding leads and due to the use of continuous counterpoise.
 - 17/17 structures Rating 4 – poor condition.
- Vegetation by Structure: Any vegetation which negatively impacts the maintenance and operation of a structure. Includes dense vegetation that inhibits access, vines growing on tower and up legs, vegetation that impacts painting and wetland locations.
 - Structure Inspection No. 53 and 55 have vines and poison ivy growing up tower legs. Vegetation does not impair the functionality of the structure. These are fair conditions.
 - Structure Inspection No. 62 and 62a have small trees growing within and around the structures. Vines are growing up all tower legs on 62a and all over pedestal foundation on 62. These are poor conditions.
 - Structure Inspection No. 60 has vines covering nearly 1/3 of the tower, all faces. The vines have been cut at groundline, but the vegetation was left on the structures, significantly increasing the wind area of the tower. This is a poor condition.
 - There were no detrimental vegetation issues found at any of the remaining inspection sites.
 - 12/17 structures Rating 2 – good condition.
 - 2/17 structures Rating 3 – fair condition.
 - 3/17 structures Rating 4 – poor condition.

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Photo 11 – Vegetation growing on tower (Structure Inspection No. 60)

- Signage: To evaluate the presence and condition of all Structure Danger Signs and Structure Identification Signs.
 - Three towers have faded, illegible number signs and have faded danger signs. These are poor conditions.
 - Eleven towers have good, legible number signs but have faded danger signs or are missing one or more danger signs. These are fair conditions.
 - The remaining three tower inspections have good number signs and good danger signs. These are good conditions.
 - 3/17 structures Rating 2 – good condition.
 - 11/17 structures Rating 3 – fair condition.
 - 3/17 structures Rating 4 – poor condition.

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These inspection results and the conclusions drawn from them may or may not be representative of the entire line. A 20% sample size would be desirable for each type of construction, wood or steel, on a specific transmission line.

Condition Assessment

The Zone #1 Hauto-Siegfried tower lines were put in service in 1914 and 1923. The Siegfried-E. Palmerton circuits were installed in 1950. Based on observations in Zone #2 and Zone #3, it is assumed that most insulators were changed out near 1950. Zone #1 Siegfried-E. Palmerton insulators and hardware appear to have aged the same as insulators from the original Hauto-Siegfried lines. It is assumed that all insulators and hardware are approximately 60 years old and are approaching the period in which deterioration from corrosion becomes more rapid. The conductor is 4/0 copper for the original installation and 250 mcm copper for the Siegfried-E. Palmerton installation. The 4/0 copper conductor is approximately 97 years old and the copperweld shield wire is approximately 67 years old. The Siegfried-E. Palmerton 250 mcm copper conductor is approximately 61 years old.

Unlike other lines built in this era and in this region, the lightning protection afforded by the overhead ground wires, or shield wires, appears to be adequate. Very few splices and repair sleeves were found on the lines over the course of the inspection of over 18 miles of tower lines. Normally, when numerous repair sleeves and full tension splices exist on a line for reasons other than stringing, the most likely cause is poor lightning protection resulting in lightning strikes to the conductors, phase to phase faults or phase to ground faults.

It is assumed that all insulators that have not been replaced are approximately 60 years old. Insulators this old have several drawbacks. Due to their age, they can be heavily contaminated with pollutants. This contamination greatly reduces the insulation levels intended to be provided by the insulators. There is a mixture of porcelain and polymer insulators on this line. Many of the insulator strings on the Hauto-Siegfried-E. Palmerton lines have either had entire insulator strings replaced with newer porcelain bells or with polymer insulators. Insulators were most likely replaced due to flashovers, contamination, mechanical damage or failure. This is indicative of poor insulation levels causing phase to ground faults. There is evidence of galvanizing left on the insulator caps, although corrosion is actively occurring on all hardware. Corrosion of both the caps and the pin and clevis end fittings will all contribute to a reduction in strength. See Figure 1 below for a plot of service life of hardware and galvanized steel versus rated strength. Galvanizing, when not painted can have a life expectancy of anywhere from 30 to 80 years, depending on the environment. The hardware on the Hauto-Siegfried-E. Palmerton lines is over 60 years old and even in a favorable environment is approaching the age marking the period in which rapid decline in strength begins. The useful life of all original insulators and hardware is approaching its end.

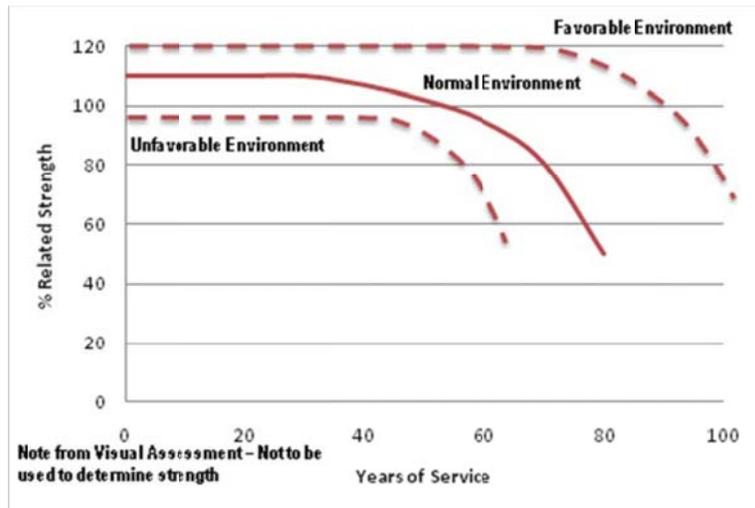


Figure 1 – Relation between Service Life and Rated Strength (Galvanized Steel) (from EPRI *Overhead Transmission Inspection and Assessment Guidelines – 2009*)

Lightning protection research was a work in progress when the Hauto-Siegfried structures were designed and built. In general, the shielding provided is adequate. Only at structures with strain shield wire connections does it appear to be inadequate. Historically, the maximum shielding afforded by an overhead shield wire is a 30 degree cone at tangent structures. The cone necessary to protect the conductors at strain structures on the Hauto-Siegfried-E. Palmerton lines is 41 degrees at a minimum. This is unrealistic. A more refined analysis was performed for the structures shown in Figures 2 and 3 using IEEE and EPRI guidelines. The refined shielding analysis yields the same conclusions of the 30 degree rule of thumb. In general, all structures except ones with strain shield wire connections were adequately shielded. Fortunately, most structures are connected using a suspension clamp, thus most structures are adequately shielded. Additionally, since the shield wires are connected to the structures using a suspension saddle clamp, there is not an adequate electrical connection to the structure. The lightning current is expected to follow a path along the shield wire, down the tower and through the tower footing resistance to the ground. With a saddle suspension clamp, this expected path cannot be relied upon. The shield wires should be physically bonded to select towers to provide the required electrical connection, without forming a closed loop for induced current to circulate, resulting in a resistance heating line loss. See Figure 2 and 3 below for schematics of the shielding angle for two structure types on the Hauto-Siegfried-E. Palmerton lines.

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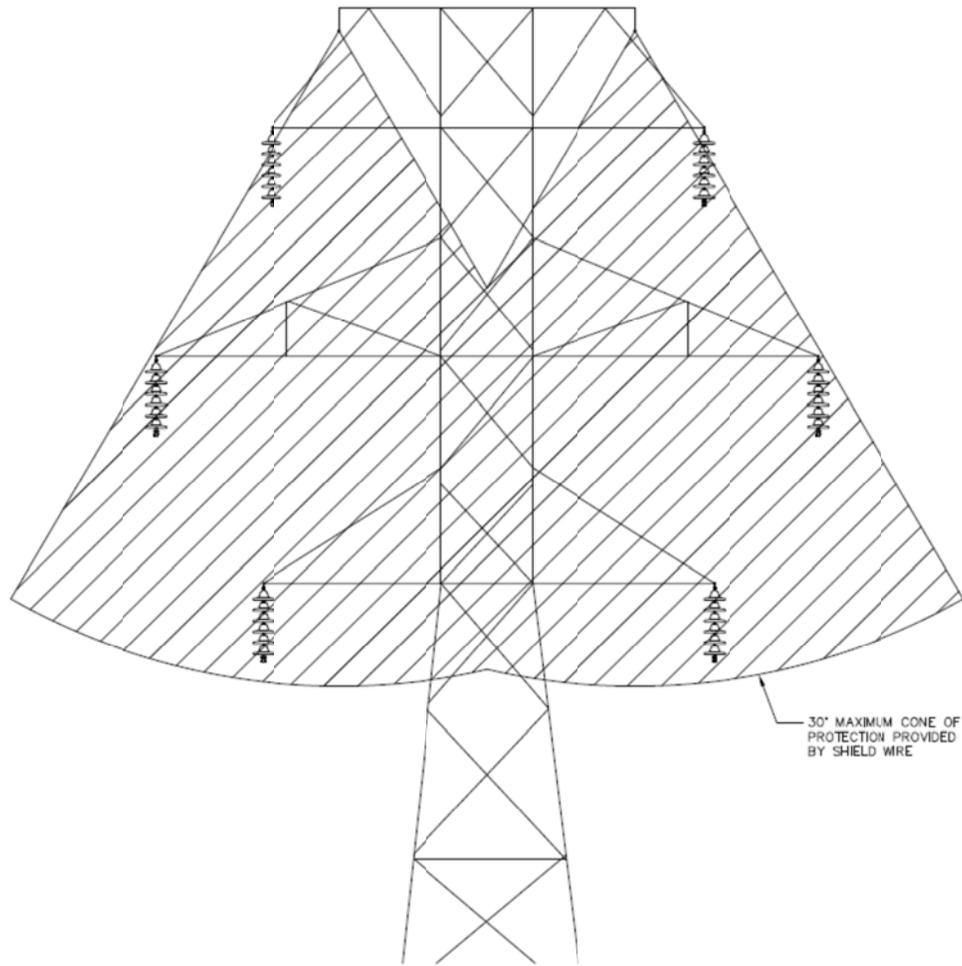


Figure 2 – Adequate shielding angle schematic for tangent Lattice Tower

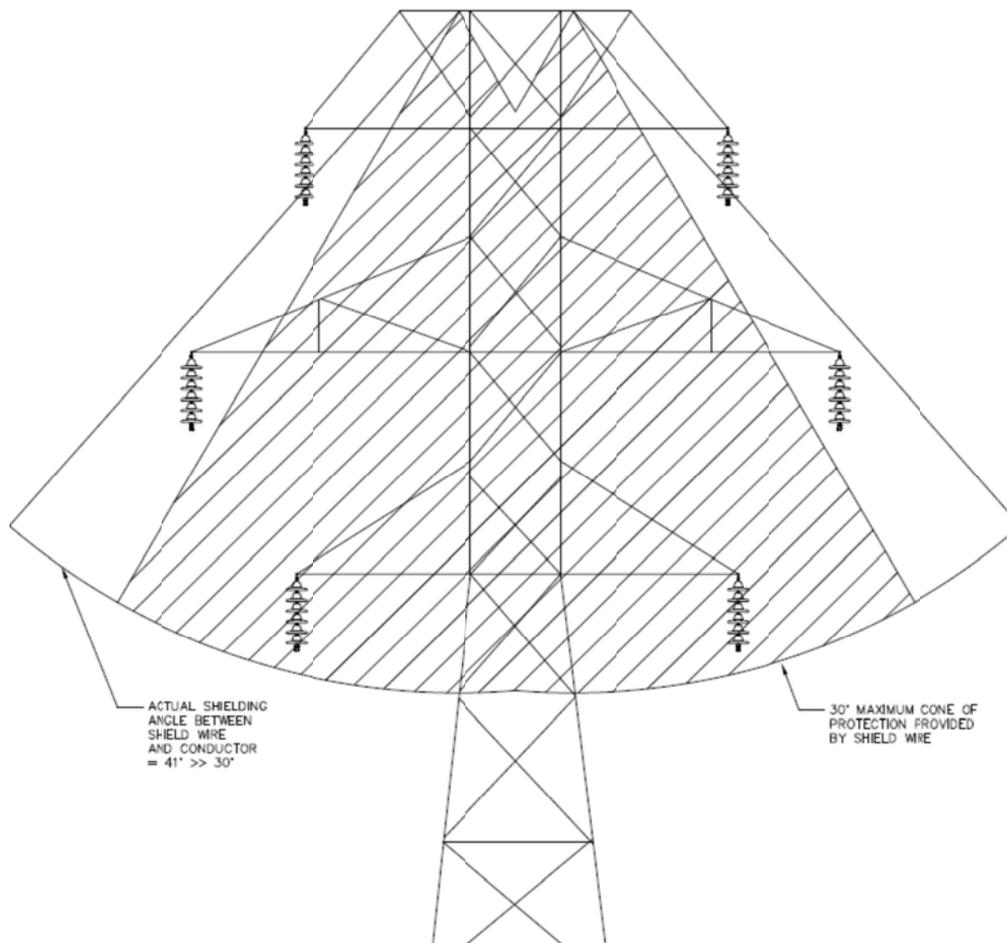


Figure 3 – Inadequate shielding angle schematic for structures with strain shield wire connection

The structures were built using a continuous counterpoise instead of driven grounding rods. While counterpoise certainly decreases the ground resistance of a structure, it is not as effective in dissipating lightning strikes as a ground rod system or a radial counterpoise system. During a lightning induced surge, the counterpoise acts as an electrode and the entire length of counterpoise cannot be relied upon to ground out the surge. More numerous, smaller electrodes (driven grounding rods) are in many ways more effective than a single counterpoise running from structure to structure. In several instances along the Zone #1 Hauto-Siegfried-E. Palmerton Lines, the counterpoise was exposed and destroyed near the structures or along the Right of Way. This is usually the result of farming, earth moving or erosion occurring in the area. The grounding for the line is no longer in a functioning state. The tower lines have a good shielding system, but are lacking in the ability to efficiently ground out shielded lightning strikes. It is important to have good grounding performance on transmission lines.

The paint coatings on towers are generally in poor condition. The current coatings are desiccated. The original paint can be seen on most towers. Galvanizing can also be observed where all remnants of tower paint are gone. Moderate surface corrosion on tower steel is evident and with failing coatings and exposed galvanizing, corrosion will begin to increase at a more rapid rate. Reference Figure 1.

Near the ground line and below ground line, the coal tar epoxy coating is at the end of its life and is no longer protecting the steel. In many instances, the original red tower paint and galvanizing can be seen where the coal tar epoxy has flaked off. Over 80% of structures are experiencing surface corrosion below ground line. Generally, the losses were not enough to compromise the structure, but action needs to be taken immediately to prevent further losses and emergency conditions to develop, similar to Structure Inspection No. 63. Based on the inspection results from the Hauto-Siegfried Inspections and other PPL inspections, steel corrosion and section loss doesn't always occur at the ground line. Grillage foundations appear to be the predominant foundation type for the steel lattice towers on the Hauto-Siegfried-E. Palmerton lines. The whole of the embedded steel in a grillage foundation tends to corrode over time, but occasionally accelerated corrosion can occur just below the groundline up to a few feet. Careful attention also needs to be paid to buried concrete foundations. The interaction between the steel, concrete and the soil leads to significantly accelerated corrosion of the steel.

Recommendations

The decision to rehabilitate or replace the line should be based on total life cycle costs and dependability. The life cycle cost is the present value of all rehabilitation, construction, maintenance, operation and other costs which take into account dependability considerations. Dependability is the term that addresses the availability of the line for service and the reliability of the line. If one option is less dependable than others (such as greater likelihood of failures) then a cost equivalency shall be included in the assessment. Think of it as the annual cost of insurance to keep the line both functioning and safe. The cost/dependability analysis must also define an expected life. A new line, properly designed and built to current NESC standards will likely provide a useful service life of 80 years. For a rehabilitated line, the expected life would not reach 80 years. Due to the construction standards and safety factors used in the 1920s, a more reasonable estimate of 30 years can be expected.

The inspections have identified a number of deficiencies associated primarily with age, but also due to a lesser knowledge, in the 1920s, of durability and lightning protection. Even after a full rehabilitation the line would not be as reliable and robust as a full replacement. For instance, even if all foundations are excavated, inspected and all known deficiencies repaired, the degree of uncertainty concerning the effectiveness of the repair is still significant. Corrosion is certainly still occurring below ground and below the limits of excavation. It is impossible to ascertain the degree of corrosion below excavation limits without completely removing the structure foundations.

A good life cycle analysis, which includes dependability, is an arduous task and is beyond the scope of this report. Some generalities can be applied to the decision process in lieu of a life cycle cost analysis. As a general rule, replacing a line where the cost to rehabilitate is greater than 50% is prudent. We recommend, given the age of the line and the importance of reliability, that a 30%-40% ratio is more reasonable and should be the basis used to determine whether to rehabilitate or replace the existing line.

At a minimum, to rehabilitate the existing line the following would be required:

- Perform a full engineering assessment of each structure, including computer modeling to ensure proper safety factors and clearances
- Replace existing conductor
- Replaces existing shield wire
- Replace all hardware and insulators
- Install new grounding system at each structure location

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- Repaint all steel structures
- Have all wood poles tested for strength and repair/replace as necessary
- Repair or replace all bent, missing or corroded structural members
- Repair all corroded steel below ground
- Install cathodic protection at each structure.
- Evaluate lightning strike and other fault history for the existing line to determine the cause for the extensive conductor damage. Improve lightning resistance by bonding shield wires to the structures. This work associated with improving tower ground resistance.
- Strengthen, reinforce or replace structures based on results of the engineering assessment mentioned above
- Repair any other issues found during engineering assessment or construction

Performing all of the work mentioned above on a transmission asset that is 97 years old would not be justifiable economically. There are significant deficiencies on these lines and a pre-existing R/W condition exists as well. It is the opinion of DiGioia, Gray & Associates that PPL should rebuild this corridor with a more reliable, redundant and robust double circuit steel pole line built on the centerline of the existing right of way. A decision to replace the existing line provides the company the opportunity to upgrade the line to current standards, as well as to install additional circuits and improved conductors to allow for future load growth.

We are pleased to have the opportunity to assist PPL Electric in the assessment of the Zone #1 Hauto-Siegfried-E. Palmerton 69kV transmission lines. We hope our inspection and the information contained in this letter report will be useful in determining how to proceed with this line. Feel free to contact us to answer any questions you may have and to discuss PPL's need for future assistance on the project.

Respectfully submitted,

DiGioia, Gray & Associates, LLC

Andrew V. Zorn, PE
Project Engineer

Paul G. Cass, PE
Project Manager

AVZ:PGC

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Structure Inspection No.	48		<div style="text-align: left; margin-bottom: 5px;">Ahead to _____</div> <div style="text-align: right; margin-top: 5px;">Back to _____</div>
PPL Grid Number	58002S52553		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 25, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access from Deer Road	access difficult, stream crossing
Geotechnical	3	Tower located in marsh, legs are submerged	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2 dug -mild surface corrosion -submerged in water -coal tar epoxy flaking off -red paint visible
	4	Leg No. 4 dug -mild surface corrosion -submerged in water -coal tar epoxy flaking off -red paint visible	Leg No. 1
Grounding	4	Leg No. 1 & 2 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	danger signs good
Notes	horizontals at bottom of tower are experiencing significant corrosion and section loss.		

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Structure Inspection No.	49		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58083S52499		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 25, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	3	4wd access from Deer Road in farmer's field	
Geotechnical	2	no issues	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower hardware has moderate surface corrosion	
Insulators & Hardware	3	suspension saddle clamp insulator caps and hardware have moderate corrosion	
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower red paint is visible on some of tower due to paint coverage	
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3 Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	
	4	Leg No. 4 Leg No. 1 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	
Grounding	4	Leg No. 4 is grounded non-functioning due to use of continuous counterpoise	
Vegetation by Str	2	no issues	
Signage	3	number signs good danger signs faded	
Notes	tower legs reinforced		

ATTACHMENT TUS A-1A

Structure Inspection No.	50		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58200S52438		
GPS Waypoint	6		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 25, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	3	4wd access from Deer Road	through farmer's field
Geotechnical	2	no issues	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	3	Bent redundants on face B & C	
Steel Foundations	3	Leg No. 3 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
	4	Leg No. 4	Leg No. 1
Grounding	4	Leg No. 3 & 4 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes	two splices on conductor in ahead span		

ATTACHMENT TUS A-1A

Structure Inspection No.	51		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58217S52437		
GPS Waypoint	7		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 25, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	3	4wd access from Deer Road through farmer's field	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower hardware has surface corrosion	
Insulators & Hardware	3	suspension saddle clamp insulator caps and hardware have moderate corrosion	
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower red paint is visible on some of tower due to paint coverage	
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3 Leg No. 2	
	4	Leg No. 4 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible Leg No. 1 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	
Grounding	4	Leg No. 1 & 2 are grounded non-functioning due to use of continuous counterpoise	
Vegetation by Str	2	no issues	
Signage	3	number signs good danger signs faded	
Notes	horizontals at bottom of tower are experiencing significant corrosion and section loss. Six conductor splices found in back span, stringing site.		

ATTACHMENT TUS A-1A

Structure Inspection No.	52		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58330552378		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	3	access from East Grant Street in farmer's field	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, jumpered but not bonded to tower hardware has surface corrosion	
Insulators & Hardware	3	suspension saddle clamp insulator caps and hardware have moderate corrosion	
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower red paint is visible on some of tower due to paint coverage	
Bent Missing Steel	3	Bent redundant on Face A	
Steel Foundations	4	Leg No. 3 Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	
	4	Leg No. 4 Leg No. 1 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	
Grounding	4	Leg No. 1 & 2 are grounded non-functioning due to use of continuous counterpoise	
Vegetation by Str	2	no issues	
Signage	2	number signs good danger signs good	
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	53		
PPL Grid Number	58442S52310		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	3	access from East Grant Street	located adjacent to main road and subject to collisions
Geotechnical	3	two foundations located in roadside drainage swale	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp	hardware and insul caps corroded
Steel Corrosion	3	moderate surface corrosion of bottom half of tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	5	Leg No. 2 was bent due to vehicle collision	Foundation on Leg 2 was built up to protect leg
Concrete Foundations	3	Leg No. 3 has concrete projection	Leg No. 2 has concrete projection
		Leg No. 4 has concrete projection	Leg No. 1 dug -has concrete projection -no section loss -coal tar epoxy flaking off -red paint visible -corner of foundation broken off
Grounding	4	Leg No. 3 & 4 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	3	vines and poison ivy growing on leg 4 up tower	
Signage	3	number signs good	danger signs faded
Notes	compression legs on tower reinforced		

ATTACHMENT TUS A-1A

Structure Inspection No.	54		<div style="text-align: left;">Ahead to _____</div> <div style="text-align: right;">Back to _____</div>
PPL Grid Number	58574S52293		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	3	access from East Grant Street	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp	hardware and insul caps corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	3	Bent Diagonal on face C	
Steel Foundations	4	Leg No. 3	Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
	4	Leg No. 4	Leg No. 1 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 3 & 4 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	55		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58629S52283		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access through junkyard or from I476 Turnpike	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp	hardware and insul caps corroded
Steel Corrosion	2	good condition	
Paint	2	good condition	
Bent Missing Steel	2	none	
Concrete Foundations	4	Leg No. 3	Leg No. 2 dug -surface corrosion at steel/concrete interface -steel/concrete interface located below groundline -no measurable section loss -coal tar epoxy flaking off
	4	Leg No. 4	Leg No. 1 dug -surface corrosion at steel/concrete interface -steel/concrete interface located below groundline -no measurable section loss -coal tar epoxy flaking off
Grounding	4	Leg No. 1 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	3	vines growing on Leg No. 3 & 4	
Signage	3	number signs good	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	56		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58667S52246		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access through junkyard or from I476 Turnpike	
Geotechnical	2	no issues	saturated ground
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp, all insulators have been replaced	hardware is corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
	4	Leg No. 4	Leg No. 1 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 3 & 4 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	57		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58704S52150		
GPS Waypoint	6		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	vehicle access from pedestrian trail	area restricted to pedestrians only, gated access, no PPL lock
Geotechnical	2	no issues	saturated ground
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp, all insulators have been replaced	hardware is corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Concrete Foundations	4	Leg No. 3 has concrete projection -surface corrosion on steel at concrete interface -concrete foundations are deteriorating, spalling and splitting (corrosion?)	Leg No. 2 has concrete projection -surface corrosion on steel at concrete interface -concrete foundations are deteriorating, spalling and splitting (corrosion?)
	4	Leg No. 4 has concrete projection -surface corrosion on steel at concrete interface -concrete foundations are deteriorating, spalling and splitting (corrosion?)	Leg No. 1 has concrete projection -surface corrosion on steel at concrete interface -concrete foundations are deteriorating, spalling and splitting (corrosion?)
Grounding	4	Leg No. 3 & 4 are grounded, lead is corroded through on Leg No. 3	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	58		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58749S52100		
GPS Waypoint	7		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access from Main Street	
Geotechnical	5	located in slide prone area, hillside eroding away	Leg No. 1 & 4 foundations are being washed out
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp, all insulators have been replaced	hardware is corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Concrete Foundations	5	Leg No. 3 dug -surface corrosion and pitting below groundline -coal tar epoxy flaking off -red paint visible	Leg No. 2
	5	Leg No. 4 has concrete projection (see geotech comment) -section loss (0.5" to 0.3" 40%) on steel at concrete interface -concrete foundations are deteriorating, spalling and splitting (corrosion?)	Leg No. 1 has concrete projection (see geotech comment)
Grounding	4	Leg No. 1 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	59		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	58884551960		
GPS Waypoint	8		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 26, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	3	4wd access Williamstown Road	
Geotechnical	2	no issues	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp	insulator caps and hardware have moderate corrosion, one bell broken, bottom phase
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Steel Foundations	3	Leg No. 3 dug -no corrosion -no section loss -coal tar epoxy good	Leg No. 2
		Leg No. 4 dug -no corrosion -no section loss -coal tar epoxy good	Leg No. 1 corroded part of horizontal was cut out and new piece spliced in
Grounding	4	Leg No. 1 & 2 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	danger signs good
Notes	horizontals at bottom of tower are experiencing significant corrosion and section loss.		

ATTACHMENT TUS A-1A

Structure Inspection No.	60		<p>Ahead to -----</p> <p>Back to -----</p>
PPL Grid Number	59376S51761		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 29, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	2	access from Avery Road	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	strain clamp, all insulators have been replaced	hardware is corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
	4	Leg No. 4	Leg No. 1
Grounding	4	not evident	non-functioning due to use of continuous counterpoise
Vegetation by Str	4	Vines growing on all faces, adding wind area to tower	
Signage	3	number signs good	danger signs faded
Notes	all signs covered with vines, vines were cut, but remained on tower		

ATTACHMENT TUS A-1A

Structure Inspection No.	61		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	61685S51023		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 29, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	3	access from Egypt Road in farmer's field	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower hardware has surface corrosion	
Insulators & Hardware	3	compression dead end, most insulators have been replaced hardware is corroded	
Steel Corrosion	3	minor surface corrosion where paint and galvanizing are gone	
Paint	4	poor condition, paint rapidly peeling off galvanizing and red paint is visible in many areas	
Bent Missing Steel	2	none	
Concrete Foundations	5	Leg No. 3 has concrete projection -surface corrosion on steel at concrete interface -red paint visible -coal tar epoxy flaking off	
	5	Leg No. 4 dug steel-concrete interface located below groundline significant pitting on embedded steel, significant section loss, but unable to measure	
Concrete Foundations	5	Leg No. 2 has concrete projection -surface corrosion on steel at concrete interface -red paint visible -coal tar epoxy flaking off	
	5	Leg No. 1 has concrete projection -surface corrosion on steel at concrete interface -red paint visible -coal tar epoxy flaking off	
Grounding	4	Leg No. 3 & 4 are grounded non-functioning due to use of continuous counterpoise	
Vegetation by Str	2	no issues	
Signage	3	number signs good danger signs faded	
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	62		<div style="text-align: left; margin-bottom: 5px;">Ahead to _____</div> <div style="text-align: right; margin-top: 5px;">Back to _____</div>
PPL Grid Number	61791S51037		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
	Line #457, Siegfried-E Palmerton #2		
Inspection Date	March 29, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete Pedestal		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access from Sportsman's Club Gated access without PPL lock	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower hardware has surface corrosion	
Insulators & Hardware	3	strain clamp hardware is corroded	
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower red paint is visible on some of tower due to paint coverage	
Bent Missing Steel	2	none	
Concrete Foundations	5	Leg No. 3 has concrete projection, unable to inspect Leg No. 2 has concrete projection, unable to inspect	
	5	Leg No. 4 has concrete projection, unable to inspect Leg No. 1 has concrete projection, unable to inspect	
Grounding	4	Leg No. 1 & 2 are grounded non-functioning due to use of continuous counterpoise	
Vegetation by Str	4	small trees growing around and within structure vines growing all over pedestal foundation	
Signage	4	number signs barely legible danger signs faded	
Notes	concrete pedestal foundations crumbling, reinforcing bar visible, efflorescence evident over entire foundation		

ATTACHMENT TUS A-1A

Structure Inspection No.	62a		<p>Ahead to -----</p> <p>Back to -----</p>
PPL Grid Number	61700S51022		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 29, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd access from Sportsman's Club	Gated access without PPL lock
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	compression dead end	hardware is corroded
Steel Corrosion	2	good condition	
Paint	3	paint is just starting to peel near base of tower	red paint is visible on some of tower due to paint coverage
Bent Missing Steel	2	none	
Concrete Foundations	3	Leg No. 3 has concrete projection. Coal tar epoxy coating is in good condition. No corrosion at steel-concrete interface	Leg No. 2 has concrete projection. Coal tar epoxy coating is in good condition. No corrosion at steel-concrete interface
	3	Leg No. 4 has concrete projection, concrete spalling off on corners. Coal tar epoxy coating is in good condition. No corrosion at steel-concrete interface	Leg No. 1 has concrete projection, concrete spalling off on corners. Coal tar epoxy coating is in good condition. No corrosion at steel-concrete interface
Grounding	4	Leg No. 1 & 2 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	4	small trees growing around and within structure	vines growing up legs
Signage	4	number signs barely legible	danger signs faded
Notes			

ATTACHMENT TUS A-1A

Structure Inspection No.	63		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	61828551021		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
	Line #454, Siegfried-E Palmerton #1		
Inspection Date	March 29, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete unknown		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	2	access from Siegfried Substation	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion, no shielding into substation
Insulators & Hardware	2	strain clamp and compression dead end	all insulators and hardware have been replaced
Steel Corrosion	3	mild surface corrosion from top to bottom	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	2	none	
Concrete Foundations	5	Leg No. 3 steel-concrete interface buried below groundline. Assume severe conditions similar to Leg No. 2 & 4.	Leg No. 2 dug severe section loss (=50%) recoated with coal tar epoxy over top of corrosion. Very severe condition
	5	Leg No. 4 dug severe section loss (=50%) recoated with coal tar epoxy over top of corrosion. Very severe condition	Leg No. 1 has concrete projection
Grounding	4	not evident	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	4	number signs barely readable	danger signs faded
Notes			