



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 #3 Hauto-Siegfried #1 and #4 69kV Transmission Lines*

Dear Mr. Marhefka;

This report contains our findings and overview of the Zone #3 Hauto-Siegfried 69kV transmission lines which were recently inspected from the ground as part of the PPL Asset Optimization Strategy (AOS) Program.

**Introduction and Overview**

This 15 mile long transmission line corridor consists of two double circuit tower lines, each strung only with a single circuit. The Hauto-Siegfried #1 line consists of 156 structures; primarily steel lattice towers. The Hauto-Siegfried #4 line consists of 138 structures; also primarily steel lattice towers. Coming out of Hauto substation, several wood pole structures are utilized prior to the line occupying the steel lattice tower lines. 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 Hauto-Siegfried #4 lines have been in service since 1914 and 1923 respectively. 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. In many instances, no additional right of way was acquired when this line was built. With today's safety standards and electrical requirements, this right of way arrangement is clearly unacceptable. The line was reconducted in the 1950's with 336 kcmil ACSR conductor when the Siegfried-East Palmerton lines were built. Approximately 50% of all towers inspected have severe foundation corrosion problems and the conductor is over 60 years old and well beyond its expected life.

It is the opinion of DiGioia, Gray & Associates that the Zone #3 Hauto-Siegfried lines are at the end of their useful life. Given the age of 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.

**Inspections**

Twenty three (23) steel towers and seven (7) wood pole 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:

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 2

- 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 Hauto Substation. These are good conditions.
  - Eleven of the inspected structures have good 4wd access. Some have gated access, but with a PPL lock on gate. These are fair conditions.
  - The remaining 17 structures inspected have difficult access due to a variety of reason. Four have very difficult 4wd access. Nine have the original access roads blocked with large boulders. The last four have gated access but with no PPL lock on the gate. These are poor conditions.
  - 2/30 structures Rating 2 – good condition.
  - 11/30 structures Rating 3 – fair condition.
  - 17/30 structures Rating 4 – poor condition.



Photo 1 – Typical lattice tower

- 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.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 3

- Three of the structures are located in marsh areas, adjacent to a stream or in a stream. These are fair conditions.
- Structure Inspection No. 26 has very severe geotechnical conditions. The structure is located next to an abandoned strip mine and surface drainage has eroded away the cliff directly in front of the tower. Two legs are on the verge of being completely undermined. Remediation was done in this area to properly divert water drainage, but remediation does not extend far enough to cover Inspection No. 26.
- There were no detrimental geotechnical issues found at the remaining 23 inspection sites.
- 23/30 structures Rating 2 – good condition.
- 6/30 structures Rating 3 – fair condition.
- 1/30 structures Rating 5 – severe condition.
- 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.
  - Eighteen 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.
  - Another five structures have suspension saddle clamps. Of these five, four have the shield wire bonded to the ground lead. All hardware has significant surface corrosion. These are poor conditions.
  - Six 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. 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.
  - 19/30 structures Rating 3 – fair condition.
  - 11/30 structures Rating 4 – poor condition.

**ATTACHMENT TUS A-1C**

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 4



Photo 2 – Typical Shield Wire Saddle Clamp Connection (not bonded to tower and hardware corroded)



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

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 5

- Insulators & Hardware: To look for flashed or broken insulators, contamination of insulator strings, corrosion of insulator caps and related hardware
  - Five inspected structures have good insulator and hardware conditions. Most insulators have been replaced in these instances and hardware has very little surface corrosion.
  - The majority of structures (twenty five) 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.
  - 5/30 structures Rating 2 – good condition.
  - 25/30 structures Rating 3 – fair condition.



Photo 4 – 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 four 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 nine inspected structures, there is moderate surface corrosion on the entire structure. Paint is flaked off and galvanizing is weathering. Corrosion can be seen from base of towers to top of towers including crossarms. These are poor conditions.
  - For the remaining ten steel structures, no steel corrosion was present. This was largely due to more recent paint coatings.
  - 10/23 structures Rating 2 – good condition.
  - 4/23 structures Rating 3 – fair condition.
  - 9/23 structures Rating 4 – poor condition.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 6



Photo 5 – Poor steel corrosion conditions

- Paint: Evaluation of paint or other above ground coatings
  - On thirteen 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 nine 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 overall 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.
  - 1/23 structures Rating 2 – good condition.
  - 9/23 structures Rating 3 – fair condition.
  - 13/23 structures Rating 4 – poor condition.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 7



Photo 6 – 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. 28 has bent diagonals on all faces. This appears to be the result of equipment collision, as the tower is located in a farmer's field. Since load carrying diagonals are bent on all faces, this is a severe condition.
  - Structure Inspection No. 41 has a bent redundant member on Face B and Leg No. 2 was shot with a rifle and the angle was fractured. This is a severe condition, as leg strength is greatly reduced.
  - Structure Inspection No. 25 has bent diagonal members on Faces A and C. Appears to be the result of equipment collision. This is a poor condition.
  - Nine 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 eleven towers have no bent or missing steel or missing bolts.
  - 11/23 structures Rating 2 – good condition.
  - 9/23 structures Rating 3 – fair condition.
  - 1/23 structures Rating 4 – poor condition.
  - 2/23 structures Rating 5 – severe condition.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 8



Photo 7 – Fractured Leg due to bullet impact (Structure Inspection No. 41)

- 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. 44 revealed fair concrete foundation conditions for the three foundations that have concrete projection above groundline. The steel-concrete interface on Leg No. 4 was located below groundline and had to be excavated to be inspected. The protective coal tar epoxy coating was flaking off and mild surface corrosion was detected on the leg near the interface. Red paint was visible where coal tar and tower paint was gone or deteriorating. When protective coating is gone, this is a poor foundation 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.
  - 1/1 structures Rating 4 – poor condition.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 9



Photo 8 – Buried concrete foundation

- 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.
  - On ten inspected structures, severe corrosion was discovered. Severe pitting of the steel, section loss on nuts and bolts and section loss on the embedded steel leg angle were common. Structure Inspection No. 47 is experiencing complete section loss on Leg No. 4. All of these are severe conditions that require immediate remediation.
  - Twelve 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 twelve structures. These are all poor conditions due to the failure of the groundline coating.
  - 12/22 structures Rating 4 – poor condition.
  - 10/22 structures Rating 5 – severe condition.

**ATTACHMENT TUS A-1C**

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 10



Photo 9 – Typical groundline coating failure (red paint visible)

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 11



Photo 10 – Complete Section loss (Structure Inspection No. 47)

- 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. The counterpoise is exposed near Structure Inspection No. 25, 26, 40, 41, 42 and 43 along the Right of Way.
  - Generally, all wood pole structures are grounded. It is unknown what the grounding system is for wood pole structures. Assume grounding system is same as towers, which is continuous counterpoise. This is a poor condition.
  - 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.
  - 30/30 structures Rating 4 – poor condition.

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 12



Photo 11 – Exposed and torn continuous counterpoise

- **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. 36, 37, 38, and 47 have very dense bushes and briars within and around structures. Vegetation does not impair the functionality of the structure. These are fair conditions.
  - There were no detrimental vegetation issues found at any of the remaining inspection sites.
  - 26/30 structures Rating 2 – good condition.
  - 4/30 structures Rating 3 – fair condition.
- **Signage:** To evaluate the presence and condition of all Structure Danger Signs and Structure Identification Signs.
  - Four towers have good, legible number signs, but have no danger signs. These are poor conditions.
  - Fifteen towers have good, legible number signs but have faded danger signs or are missing one or more danger signs. These are fair conditions.
  - The seven wood pole and remaining four tower structures have good, legible number signs. These are good conditions.
  - 11/30 structures Rating 2 – good condition.
  - 15/30 structures Rating 3 – fair condition.

- 4/30 structures Rating 4 – poor condition.
- Wood Poles: To evaluate how the wood pole structure, guys and anchors behave as a system. Look for leaning poles, mechanical damage (wood pecker holes, decay, insects, deep checking) and strength.
  - Structure Inspection No. 22 and 23 have many woodpecker holes compromising pole strength. When struck with hammer, inner core sounds solid. These are severe conditions.
  - Structure Inspection No. 19, 20 and 24 have a moderate amount of wood pecker holes. When struck with hammer, inner core sounds solid. Pole 1 of Structure Inspection No. 20 has a punky outer shell. These are fair conditions.
  - Structure Inspection No. 18 and 21 have no pole condition concerns.
  - 2/7 structures Rating 2 – good condition.
  - 3/7 structures Rating 3 – fair condition.
  - 2/7 structures Rating 5 – severe condition.
- Guying: To evaluate the structural condition of the guying and the effectiveness of the guying.
  - Structure Inspection No. 18 and 20 were the only guyed structures that were inspected. Guys were tight and looked good for both structures. Shield wire was bonded to the guy wires in both cases. These are good conditions.
  - 5/7 structures Rating 1 – not applicable.
  - 2/7 structures Rating 2 – good condition.

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 #3 Hauto-Siegfried tower lines were put in service in 1914 and 1923. Based on observations in Zones #1 and #2, it is assumed that all insulators and conductors were changed out near 1950. Zone #3 Hauto-Siegfried insulators and hardware appear to have aged the same as insulators from the Siegfried-E. Palmerton lines strung in 1950. 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 approximately 60 years old and the copperweld shield wire is approximately 67 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 30 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 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 lines is approximately 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.

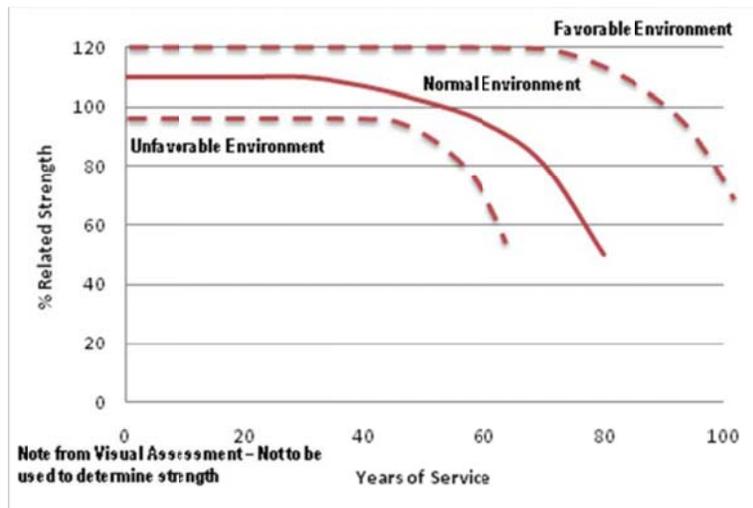


Figure 1 – Relation between Service Life and Rated Strength (Galvanized Steel) (from EPRI *Overhead Transmission Inspection and Assessment Guidelines – 2009*)

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 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 lines.

**ATTACHMENT TUS A-1C**

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

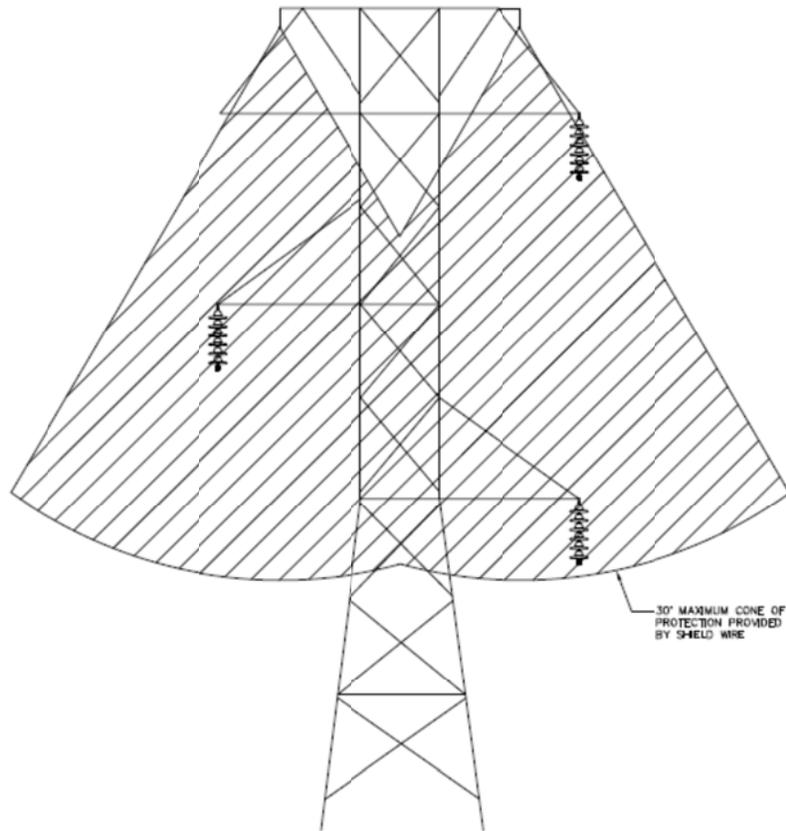


Figure 2 – Adequate shielding angle schematic for tangent Lattice Tower

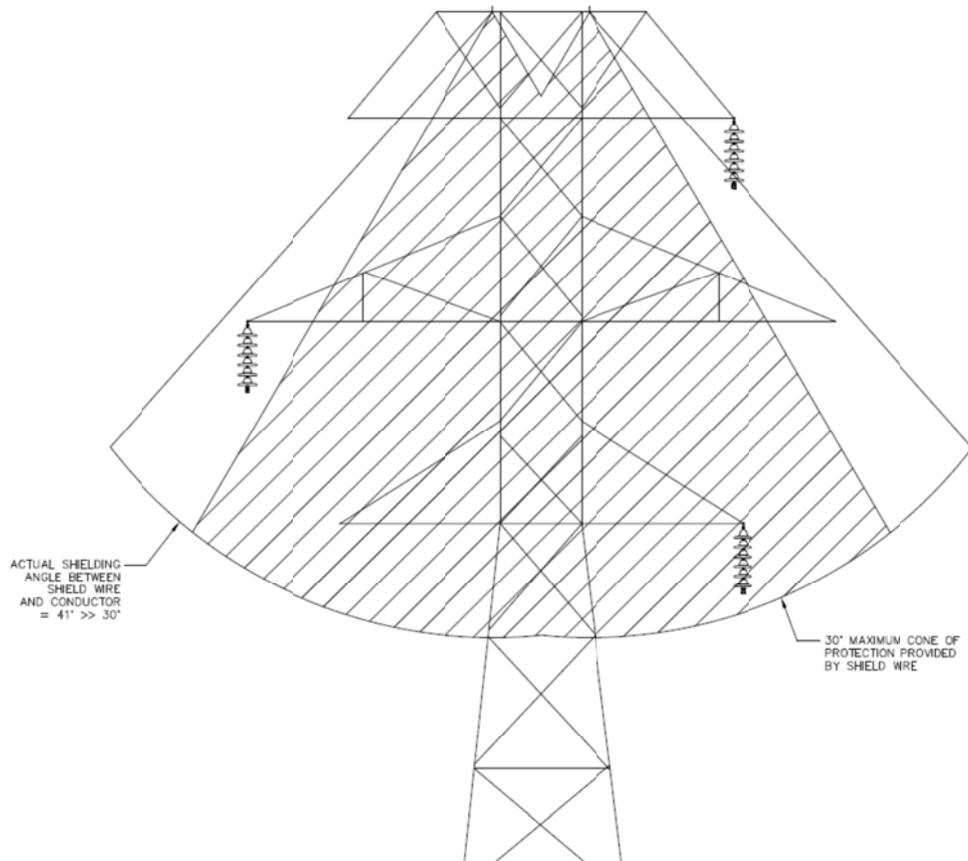


Figure 3 – Inadequate shielding angle schematic for structures with strain shield wire connection

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 many instances along the Hauto-Siegfried 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. 50% of steel structures inspected have significant surface

corrosion, pitting or section loss 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. 47. 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 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
- Repaint all steel structures
- Have all wood poles tested for strength and repair/replace as necessary

## ATTACHMENT TUS A-1C

Mr. Joseph Marhefka Zone #3, Line #449 & #452, Hauto-Siegfried 69kV Lines  
Project 2009-149  
September 1, 2011

Page 18

- 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 #3 Hauto-Siegfried 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

## ATTACHMENT TUS A-1C

Structure Inspection No.	18		Ahead to _____  Pole #1   Back to _____
PPL Grid Number	51256N25235		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole Angle		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	2	vehicle access from Hauto Substation	no issues
Geotechnical	2	no issues	
Shield Wire Hardware	4	dead end clamp, not jumpered or bonded	no sw span into substation, hardware was corroded
Insulators & Hardware	2	all insulators have been replaced	Very little corrosion if any on hardware and insulator caps
Wood Poles	2	Pole 1 Diameter 1.25' at groundline When struck with hammer, pole sounds solid. Pole is in good condition. Marking SWF S-87 SPC 1-70	
Guying	2	guys look good, guyed in line with conductor. Wires tight, attached to grounding system	
Grounding	4	pole grounded through guy wires	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	19		Ahead to _____  Pole #1   Back to _____
PPL Grid Number	51283N25207		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole Tangent		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Post, Porcelain		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	2	vehicle access from Hauto Substation	no issues
Geotechnical	2	no issues	
Shield Wire Hardware	4	suspension, saddle clamp, hardware bonded to ground lead	shield wire hardware has significant corrosion
Insulators & Hardware	2	good condition, insignificant surface corrosion	
Wood Poles	3	Pole 1 Diameter 1.4' at groundline When struck with hammer, pole sounds solid. Moderate woodpecker holes from middle to top of pole	
Guying	1	Pole 1 no guying	
Grounding	4	Pole is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	20		Ahead to _____  Pole #1                      Pole #2   Back to _____
PPL Grid Number Pole 1	52103N25514		
PPL Grid Number Pole 2	52103N25513		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood 2-Pole Corner		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	3	4wd drive access from Highway 54	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, jumpered and bonded to guy wires	hardware has surface corrosion
Insulators & Hardware	3	compression dead-end	mild surface corrosion on hardware, can see galvanizing
Wood Poles	3	Pole 1 Diameter 1.25' at groundline When struck with hammer, outer shell sounds punky. No visible woodpecker holes.	Pole 2 Diameter 1.35' at groundline When struck with hammer, pole sounds solid. Very few woodpecker holes. Marking E 1-65 SPC8 27C
Guying	2	Pole 1 guys look good, guyed in line with conductor. Wires tight, attached to grounding system	Pole 2 guys look good, guyed in line with conductor. Wires tight, attached to grounding system
Grounding	4	Pole grounded using guy wires	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	21		<p>Ahead to _____</p>  <p>Back to _____</p>
PPL Grid Number Pole 2	52335N25294		
PPL Grid Number Pole 1	52336N25294		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole H-Frame Tangent		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd drive access from Rt 209 or school	gated and blocked, no PPL lock
Geotechnical	2	no issues	
Shield Wire Hardware	3	suspension, saddle clamp, hardware bonded to ground lead	shield wire hardware has significant corrosion
Insulators & Hardware	4	suspension saddle clamp with armor rods, one insulator string has been replaced	insulator caps and hardware are significantly corroded
Wood Poles	2	Pole 1 Diameter 1.2' at groundline When struck with hammer, pole sounds solid. Pole is in good condition. Marking CFP P-54 SPC 2-85	Pole 2 Diameter 1.2' at groundline When struck with hammer, pole sounds solid. Pole is in good condition. Marking CFP P-54 SPC 2-85
Guying	1	Pole 1 no guying	Pole 2 no guying
Grounding	4	both poles are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes	one shield wire splice in span		

## ATTACHMENT TUS A-1C

Structure Inspection No.	22		<p>Ahead to _____</p>  <p>Back to _____</p>
PPL Grid Number Pole 2	52368N25209		
PPL Grid Number Pole 1	52369N25209		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole H-Frame (1 steel pole) Tangent		
Structure Material	Wood and Weathering Steel		
Foundation Type	Direct Embedment		
Insulator Type	Strain, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd drive access from Rt 209 or school	gated and blocked, no PPL lock
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, hardware jumpered bonded to ground lead	shield wire hardware has significant corrosion
Insulators & Hardware	3	compression dead-end, most hardware has been replaced	mild surface corrosion on hardware, can see galvanizing. Insulator caps have significant corrosion
Wood Poles	5	Pole 1 Diameter 1.2' at groundline When struck with hammer, pole sounds solid. Pole has many woodpecker holes from middle to top. Very serious condition. Marking SWP H54 70-2	Pole 2 Weathering steel. Pole has built up section at groundline. No groundline corrosion visible. Did not dig pole to prevent damage to protective coating. Pole is in good condition. Marking LD 4-70
Guying	1	Pole 1 no guying	Pole 2 no guying
Grounding	4	both poles are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes	2 conductor splice in ahead span and 1 conductor splice in back span		

## ATTACHMENT TUS A-1C

Structure Inspection No.	23		<p>Ahead to _____</p>  <p>Back to _____</p>
PPL Grid Number Pole 2	52309N25283		
PPL Grid Number Pole 1	52308N25283		
GPS Waypoint	6		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole H-Frame Tangent		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd drive access from Rt 209 or school	gated and blocked, no PPL lock
Geotechnical	2	no issues	
Shield Wire Hardware	4	suspension, saddle clamp, hardware bonded to ground lead	shield wire hardware has significant corrosion
Insulators & Hardware	2	suspension saddle clamp with armor rods	All insulators have been replaced
Wood Poles	5	Pole 1 Diameter 1.4' at groundline When struck with hammer, pole sounds solid. Woodpecker holes all over pole. This is a severe condition. Marking OCIN SP-8 SPC-8 2-75	Pole 2 Diameter 1.3' at groundline When struck with hammer, pole sounds hollow. Woodpecker holes all over pole. This is a severe condition. Marking KOPPERS C165 SPC 2-75
Guying	1	Pole 1 no guying	Pole 2 no guying
Grounding	4	both poles are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	24		<p>Ahead to _____</p>  <p>Back to _____</p>
PPL Grid Number Pole 1	52320N25250		
PPL Grid Number Pole 2	52321N25250		
GPS Waypoint	7		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Wood Pole H-Frame Tangent		
Structure Material	Wood		
Foundation Type	Direct Embedment		
Insulator Type	Suspension, Porcelain		
	Rating	Condition Notes	
Encroachments	4	4wd drive access from Rt 209 or school	gated and blocked, no PPL lock
Geotechnical	2	no issues	
Shield Wire Hardware	4	suspension, saddle clamp, hardware bonded to ground lead	shield wire hardware has significant corrosion
Insulators & Hardware	2	suspension saddle clamp with armor rods	All insulators have been replaced
Wood Poles	3	Pole 1 Diameter 1.2' at groundline When struck with hammer, pole sounds solid. Few woodpecker holes on pole. Pole is in good condition. Marking koppers OH 65 SPC-8 2-75	Pole 2 Diameter 1.25' at groundline When struck with hammer, pole sounds solid. Few woodpecker holes on pole. Pole is in good condition. Marking ACW L-68 SPC-8 2-75
Guying	1	Pole 1 no guying	Pole 2 no guying
Grounding	4	both poles are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	25		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	52487N24916		
GPS Waypoint	8		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Strain, Polymer		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Stony Lonesome Rd., very difficult access	
Geotechnical	2	no issues	
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	all insulators replaced with polymers, compression dead end	very little corrosion on older parts
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	4	bent diagonals on Face A and C	appears to be result of equipment collision
Steel Foundations	5	Leg No. 3	Leg No. 2
	5	Leg No. 4 dug -pitting of the steel surface below grade -coal tar epoxy flaking off -red paint visible	Leg No. 1 dug -no surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 2 & 3 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	4	number signs good	no danger signs on tower
Notes	counterpoise exposed on r/w near this structure		

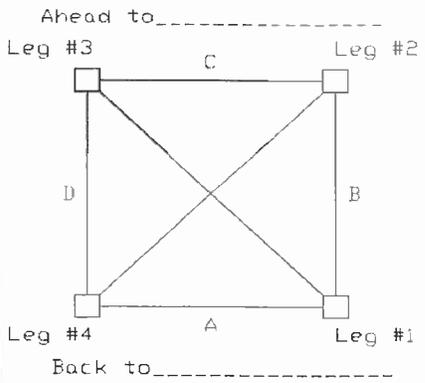
## ATTACHMENT TUS A-1C

Structure Inspection No.	26		<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	52486N24900		
GPS Waypoint	9		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	February 9, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Tangent		
Structure Material	Galvanized, Painted		
Foundation Type	Grillage		
Insulator Type	Suspension, Polymer		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Stony Lonesome Rd., very difficult access	
Geotechnical	5	tower is getting washed out, especially for Leg No. 4 Drainage problems in area, tower also located next to strip mine cliff	
Shield Wire Hardware	4	suspension, saddle clamp, not bonded to tower hardware was heavily corroded	
Insulators & Hardware	2	suspension saddle clamp with armor rods All insulators have been replaced with polymers	
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	2	none	
Steel Foundations	5	Leg No. 3 Leg No. 2	
	5	Leg No. 4 is being washed out due to erosion of cliff, significantly worse than Leg No. 1 Leg No. 1 is being washed out due to erosion of cliff	
Grounding	4	Leg No. 4 is grounded, but lead is corroded through non-functioning due to use of continuous counterpoise	
Vegetation by Str	2	no issues	
Signage	4	number signs good no danger signs on tower	
Notes	counterpoise exposed on r/w near this structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	27		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	53051N24334		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	4wd access from Mountain Top Road	gated access with PPL lock
Geotechnical	2	rocky boulders	no issues
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
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	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2
	4	Leg No. 4 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 3 & 4 are grounded, lead is corroded through on Leg No. 4	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	4	number signs good	no danger signs on tower
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss		

## ATTACHMENT TUS A-1C

Structure Inspection No.	28		<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	54026N23472		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 23, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	4wd access from Blakeslee Blvd.	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 with armor rods	insulator caps and hardware have moderate corrosion
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	all diagonals bent on all faces	appears to be result of equipment collision
Steel Foundations	5	Leg No. 3	Leg No. 2 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
		Leg No. 4	Leg No. 1 dug -surface corrosion of steel -significant section loss on nuts and bolts below groundline -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	2	all signage good	
Notes	tower legs reinforced		

## ATTACHMENT TUS A-1C

Structure Inspection No.	29		
PPL Grid Number	54264N23312		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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 Twin Hill Drive	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 with armor rods	insulator caps and hardware have moderate corrosion, galvanizing still visible
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	3	Bent redundant, Face C	
Steel Foundations	3	Leg No. 3 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 2
	5	Leg No. 4 dug -surface corrosion of steel -significant section loss on nuts and bolts below groundline -coal tar epoxy flaking off -original red paint visible	Leg No. 1
Grounding	4	Leg No. 1 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	4	number signs good	danger signs missing and not legible
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss, particularly at Leg No. 4		

## ATTACHMENT TUS A-1C

Structure Inspection No.	30		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	55519N22863		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	4wd access from Ben Salem Road	gated access with PPL lock
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 with armor rods, 2 strings replaced	insulator caps and hardware have moderate corrosion on original insul.
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	3	bent redundants on Face B & C	
Steel Foundations	5	Leg No. 3 -red paint visible	Leg No. 2 dug -severe section loss, reduced thickness from .25" to .1" -coal tar epoxy flaking off -red paint visible
	5	Leg No. 4 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1
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	horizontal at bottom of tower is experiencing significant corrosion and section loss, particularly at Leg No. 4. Counterpoise exposed on r/w near this structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	31		<div style="text-align: center;"> <p>Ahead to _____</p> <p>Leg #3 <span style="margin-left: 100px;">Leg #2</span></p> <p>Leg #4 <span style="margin-left: 100px;">Leg #1</span></p> <p>Back to _____</p> </div>
PPL Grid Number	55609N22813		
GPS Waypoint	no waypoint		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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 Ben Salem Road	gated access with PPL lock
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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	2	none	
Steel Foundations	5	Leg No. 3	Leg No. 2
	5	Leg No. 4 dug -surface corrosion of steel -significant section loss on nuts and bolts below groundline -coal tar epoxy flaking off -original red paint visible	Leg No. 1 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 1 & 4 are grounded, lead is corroded through on Leg No. 1	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	danger signs faded
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss, particularly at Leg No. 2.		

## ATTACHMENT TUS A-1C

Structure Inspection No.	32		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	55761N22709		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	4wd access from Lizard Creek 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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	3	Bent redundants on Face A & D, bent diagonal on Face D	appears to be result of equipment collision
Steel Foundations	5	Leg No. 3 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 2 dug -heavy surface corrosion/pitting on bolts -no section loss -coal tar epoxy flaking off -red paint visible
	5	Leg No. 4	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	3	number signs good	danger signs faded
Notes	tap off structure for Ashfield Substation		

## ATTACHMENT TUS A-1C

Structure Inspection No.	33		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	55944N22540		
GPS Waypoint	6		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 23, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Sand Quarry Road	access blocked with boulders
Geotechnical	3	excavation around tower, does not appear to be in danger	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2
	4	Leg No. 4 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1 dug -very minor 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 faded but legible	danger signs faded
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	34		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	55949N22553		
GPS Waypoint	7		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 23, 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 Sand Quarry Road	access blocked with boulders
Geotechnical	3	excavation around tower, does not appear to be in danger	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	none	
Paint	2	good condition	
Bent Missing Steel	3	bent redundant near Leg No. 3	
Steel Foundations		Leg No. 3	Leg No. 2
	4	Leg No. 4 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1
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 good, except several missing
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss, only dug Leg No. 4 due to hornets. No corrosion problems expected in this sandy soil		

## ATTACHMENT TUS A-1C

Structure Inspection No.	35		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	55997N22546		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 24, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Sand Quarry Road	access blocked with boulders
Geotechnical	3	excavation around tower, does not appear to be in danger	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	3	Bent redundants on Face A & D	
Steel Foundations	5	Leg No. 3	Leg No. 2 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible
	5	Leg No. 4	Leg No. 1 dug -severe surface corrosion/pitting below groundline -coal tar epoxy flaking off -red paint visible
Grounding	4	Leg No. 3 is grounded but corroded through	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs faded but legible	danger signs faded
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	36		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56080N22563		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 24, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	access from Sand Quarry 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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
Bent Missing Steel	3	bend diagonal on Face B	
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	3	bushes and briars around tower, inhibits access	
Signage	3	number signs good	danger signs good, except one missing
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	37		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56215N22561		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 24, 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 Sand Quarry Road	access blocked with boulders
Geotechnical	3	located adjacent to a stream	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3	Leg No. 2
	4	Leg No. 4 dug -very minor surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1
Grounding	4	Leg No. 4 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	3	very dense briars around in within structure, inhibits access	
Signage	3	number signs good	danger signs faded
Notes	only Leg No 4 was dug due to vegetation around structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	38		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56264N22576		
GPS Waypoint	4		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 24, 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 Sand Quarry Road	access blocked with boulders
Geotechnical	3	located adjacent to a stream	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
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	Leg No. 1 & 2 are grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	3	bushes and briars around tower, inhibits access	
Signage	2	number signs good	danger signs good
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss		

## ATTACHMENT TUS A-1C

Structure Inspection No.	39		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56505N22597		
GPS Waypoint	5		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 24, 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 Blue Mountain 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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	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
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	horizontal at bottom of tower is experiencing significant corrosion and section loss		

## ATTACHMENT TUS A-1C

Structure Inspection No.	40		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56626N22603		
GPS Waypoint	6		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 24, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Blue Mountain Road, very steep	
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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
Bent Missing Steel	2	none	
Steel Foundations	4	Leg No. 3 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	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
Grounding	4	Leg No. 2 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	2	number signs good	danger signs good
Notes	horizontal at bottom of tower is experiencing significant corrosion and section loss, counterpoise exposed in r/w near this structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	41		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56729N22599		
GPS Waypoint	no waypoint		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 24, 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 Blue Mountain Road	access entrance blocked with boulders
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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	5	Bent redundant on Face B, Leg No. 2 had local mechanical damage	Leg No. 2 appeared to be shot with rifle and steel was fractured
Steel Foundations	4	Leg No. 3 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	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
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 missing
Notes	counterpoise exposed in r/w near this structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	42		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	56916S52954		
GPS Waypoint	7		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 24, 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 Blue Mountain Road	access entrance blocked with boulders
Geotechnical	2	rocky boulder	no issues
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	4	moderate surface corrosion on whole tower	
Paint	4	poor condition, paint rapidly peeling off	galvanizing and red paint is visible in many areas
Bent Missing Steel	3	diaphragm braces in horizontal all were bent near ground level	
Steel Foundations	4	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 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs good	some danger signs missing, other faded
Notes	counterpoise exposed in r/w near this structure		

## ATTACHMENT TUS A-1C

Structure Inspection No.	43		<div style="text-align: center;"> <p>Ahead to _____</p> <p>Back to _____</p> </div>
PPL Grid Number	56946552966		
GPS Waypoint	8		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 24, 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 Blue Mountain Road	
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 with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
Bent Missing Steel	3	bent redundants on Face A	
Steel Foundations	5	Leg No. 3 dug -20% section loss on leg angle (.25" to .2") -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
	5	Leg No. 4	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	3	number signs good	danger signs missing
Notes	horizontals at bottom of tower are experiencing significant corrosion and section loss. Some horizontals have been removed. counterpoise exposed in r/w near this structure. Insulator weights for uplift.		

## ATTACHMENT TUS A-1C

Structure Inspection No.	44		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	57026S52971		
GPS Waypoint	9 (from March 24, 2010)		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #1		
Inspection Date	March 25, 2010		
Inspected By	A. Zorn and S. Konduru		
Structure Type	Steel Lattice Tower Angle		
Structure Material	Galvanized, Painted		
Foundation Type	Concrete Pier		
Insulator Type	Strain, Porcelain		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Blue Mountain Road	access entrance blocked with boulders
Geotechnical	2	rocky boulders	no issues
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	compression dead end, many insulators have been replaced,	hardware and insul caps corroded
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	
Bent Missing Steel	2	none	
Concrete Foundations		Leg No. 3 has concrete projection	Leg No. 2 has concrete projection
	4	Leg No. 4 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	Leg No. 1 has concrete projection
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 faded, but legible	danger signs faded
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	45		<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	57024S52960		
GPS Waypoint	1		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #452, Hauto-Siegfried #4		
Inspection Date	March 25, 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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	4	4wd access from Blue Mountain Road	access entrance blocked with boulders
Geotechnical	2	rocky boulders	no issues
Shield Wire Hardware	4	strain clamp, not jumpered or bonded to tower	hardware has surface corrosion
Insulators & Hardware	3	compression dead end, all insulators have been replaced,	hardware and insul caps corroded
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
Paint	3	paint is just starting to peel near base of tower	red paint is visible on much of tower due to paint coverage
Bent Missing Steel	3	diaphragm braces in horizontal all were bent near ground level	
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 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	2	no issues	
Signage	3	number signs faded, but legible	danger signs faded, one missing
Notes			

## ATTACHMENT TUS A-1C

Structure Inspection No.	46		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	57154S52918		
GPS Waypoint	2		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #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	4	4wd access from North Loop Road	access difficult, many seasonal streams
Geotechnical	2	rocky boulders	no issues
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	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 dug -mild surface corrosion -no section loss -coal tar epoxy flaking off -red paint visible	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
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.		

## ATTACHMENT TUS A-1C

Structure Inspection No.	47		<p>Ahead to _____</p> <p>Back to _____</p>
PPL Grid Number	57541S52755		
GPS Waypoint	3		
Ahead To	Siegfried		
Back To	Hauto		
Line Name	Line #449, Hauto-Siegfried #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		
	<b>Rating</b>	<b>Condition Notes</b>	
Encroachments	3	vehicle access from North Loop Road	
Geotechnical	3	stream near Leg No. 4, tower located in marsh	
Shield Wire Hardware	3	suspension, saddle clamp, not bonded to tower	hardware has moderate surface corrosion
Insulators & Hardware	3	suspension saddle clamp with armor rods	insulator caps and hardware have moderate corrosion
Steel Corrosion	2	good condition	galvanizing and red paint is visible in a few areas due to paint coverage
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	5	Leg No. 3	Leg No. 2
	5	Leg No. 4 dug -complete section loss on leg -coal tar epoxy flaking off -red paint visible	Leg No. 1
Grounding	4	Leg No. 1 is grounded	non-functioning due to use of continuous counterpoise
Vegetation by Str	3	very dense briars around in within structure, inhibits access	
Signage	3	number signs good	danger signs faded
Notes	horizontals at bottom of tower are experiencing significant corrosion and section loss.		