CAPTION SHEET — SE MANAGEMENT SYSTEM

1. REPORT DATE: 00/00/00		
2. BUREAU: FUS		
3. SECTION(S):	4. PUBLIC MEETING DATE:	
5. APPROVED BY:	00/00/00	
DIRECTOR:		
SUPERVISOR:		
6. PERSON IN CHARGE:	7. DATE FILED: 01/09/07	
8. DOCKET NO: A-110500 F0388	9. EFFECTIVE DATE: 00/00/00	

PARTY/COMPLAINANT: 20 KV LINE MODIFICATION, HAZLE TWP.

RESPONDENT/APPLICANT: PPL ELECTRIC UTILITIES CORP

COMP/APP COUNTY: LUZERNE UTILITY CODE: 110500

ALLEGATION OR SUBJECT

LETTER OF NOTIFICATION OF PPL ELECTRIC UTILITIES CORPORATION, FILED PURSUANT TO 52 PA. CODE CHAPTER 57 SUBCHAPTER G, WITH RESPECT TO THE SUSQUEHANNA-EAST PALMERTON 230 KV LINE MODIFICATION IN HAZLE TOWNSHIP, LUZENRE COUNTY.

POST & SCHELL PC
ATTORNEYS AT LAW

17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
717-731-1970 Main
717-731-1985 Fax
www.postschell.com

John H. Isom

jisom@postschell.com
717-612-6032 Direct
File #: 2507-131611

January 9, 2007

VIA HAND DELIVERY

James J. McNulty
Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
PO Box 3265
Harrisburg, PA 17105-3265

ORIGINAL

RE: Letter of Notification of PPL Electric Utilities Corporation, Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, With Respect to the Susquehanna-East Palmerton 203 kV Line Modification in Hazle Township, Luzerne County
Docket No. A- 110500F0388

Dear Secretary McNulty:

Enclosed, for filing, are the original and six (6) copies of the Letter of Notification of PPL Electric Utilities Corporation ("PPL Electric") Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, With Respect to the Susquehanna-East Palmerton 203 kV Line Modification in Hazle Township, Luzerne County, together with seven (7) copies of the accompanying exhibits and appendices which are contained in a separately-bound volume.

As indicated in the enclosed certificate of service, copies of the Letter of Notification including the exhibits and appendices are being served by certified mail, return receipt requested upon all involved governmental agencies and municipalities. As indicated in Paragraph No. 7 of the enclosed Letter of Notification, the only affected landowner is PPL Electric. If there are any questions concerning this matter, please contact me at the addresses or telephone numbers provided above.

Respectfully submitted,

John H. Isom

JHI/jl
Enclosures
cc: Certificate of Service

ORIGINAL

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Re: Letter Of Notification Of PPL Electric Utilities Corporation, Filed Pursuant To 52 Pa. Code Chapter 57 Subchapter G, With Respect To The Susquehanna-East Palmerton 230 kV Line Modification In Hazle Township, Luzerne County	:	Docket No. A- 110500 F0388

LETTER OF NOTIFICATION

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

1. This Letter of Notification is filed by PPL Electric Utilities Corporation ("PPL Electric"), pursuant to 52 Pa. Code §57.72(d)(1), to request the Pennsylvania Public Utility Commission's ("Commission") approval for the modification of the Susquehanna-East Palmerton 230 kV Line in the vicinity of the Harwood 230-69 kV Substation in Hazle Township, Luzerne County, Pennsylvania. In addition to the modification of the existing Susquehanna-East Palmerton 230 kV Line, the overall project will involve a rearrangement and upgrading of the Harwood 230-69 kV Substation into a four breaker ring bus. This rearrangement will enable the two existing power transformers to be supplied by multiple 230 kV lines. In order to accommodate the upgrade of the Harwood Substation, PPL Electric plans to split the existing Susquehanna-East Palmerton 230 kV Line and terminate the East Palmerton end into the existing bay 2-S and the Susquehanna end into a new bay 3-S . This new configuration will form the Susquehanna-Harwood #2 230 kV Line and the Harwood-East Palmerton 230 kV Line. Both the upgrade of the Harwood Substation and the modification of the Susquehanna-East Palmerton 230 kV Line are required to ensure that PPL Electric can maintain adequate voltage for customers serviced from this substation.

2. The total estimated cost for the proposed work at Harwood 230-69 kV Substation is approximately $5.8 million. Of this total, approximately $461,000 is for the modification to the Susquehanna-East Palmerton 230 kV Line. The remaining $5.339 million is for the rearrangement and upgrade of the Harwood 230-69 kV Substation. PPL Electric will bear the cost of this project.

3. This filing covers only the proposed transmission line modifications, which is the only portion of the project that requires approval by the Commission under 52 Pa. Code Chapter 57, Subchapter G.

4. The immediate concern that necessitates this project is that, due to continued load growth in the greater Hazleton area, planning studies indicate that unacceptable voltage will exist at the Harwood 230-69 kV Substation if certain unplanned line and equipment outages were to occur under peak loading conditions. Low voltage levels could affect proper operation of residential customers' appliances as well as the operation of equipment supporting commercial and industrial businesses. The loss of the Susquehanna-Harwood 230 kV Line and the associated tapped transformer would cause unacceptable voltage during periods of high electric demand. With the existing substation equipment, the remaining energized transformer cannot maintain proper 69 kV voltage under these conditions. Additionally, loading on this remaining energized transformer is approaching its capacity under the conditions described above. The addition of the proposed 230 kV line terminations on the 230 kV bus at the Harwood 230-69 kV Substation will allow proper 69 kV bus voltage to be maintained.

5. Only one functional alternative was identified that would resolve completely the problem explained above. This alternative would require PPL Electric to tap the Susquehanna-Jenkins 230 kV Line and install a new regional substation. The substation would include two

power transformers and four 69 kV line bays to terminate the Jenkins-Harwood #1 and #2 69 kV lines and the Harwood-Jenkins #1 and #2 69 kV lines. The alternative, however, would cost approximately $13 million, or more than twice as much as the cost of the project for which approval is sought in this Letter of Notification.

6. This project has a scheduled construction start date of June, 2007, to support the project's in-service date of May, 2008. The in-service date is when the project must be completed and in service to avoid unacceptable low voltage which could potentially damage customers' equipment and cause interruptions of service.

7. The entire project will be located on property owned by PPL Electric. No additional land or rights of way will have to be acquired for the project.

8. Accompanying this Letter of Notification is a separately bound volume containing Exhibits A-C and Appendices A-C, which provide additional information about the project. This Letter of Notification and the accompanying Exhibits and Appendices, which are incorporated herein by reference, contain all of the information required by 52 Pa. Code § 57.72(d)(4).

9. The name and address of the Applicant are:

PPL Electric Utilities Corporation
Two North Ninth Street
Allentown, Pennsylvania 18101

10. PPL Electric is a Pennsylvania corporation, which provides electric distribution and provider of last resort electric supply services, subject to the Commission's regulatory jurisdiction, to approximately 1.3 million customers in all or portions of twenty-nine counties in eastern and central Pennsylvania.

11. The names, addresses and telephone numbers of PPL Electric's attorneys are:

David B. MacGregor
Post & Schell, P.C.

Four Penn Center
1600 John F. Kennedy Boulevard
Philadelphia, PA 19103-2808
Voice: 215.587.1197
Fax: 215.587.1444
E-mail:dmacgregor@postschell.com

John H. Isom
Post & Schell, P.C.
12th Floor
17 North Second Street
Harrisburg, PA 17101-1601
Voice: 717.612.6032
Fax: 717.731.1985
E-mail: jisom@postschell.com

Paul E. Russell
Associate General Counsel
PPL Services Corporation
Two North Ninth Street
Allentown, Pennsylvania 18101
Voice: 610.774.4254
Fax: 610.774.6726
E-mail: perussell@pplweb.com

12. PPL Electric's attorneys are authorized to receive all notices and communications regarding this Letter of Notification.

13. PPL Electric is proceeding by means of a Letter of Notification, instead of a full Application, pursuant to the Commission's regulations at 52 Pa. Code § 57.72(d). This transmission line siting and construction proceeding qualifies for use of a Letter of Notification because it is located entirely on land owned by PPL Electric and because the modification of the Susquehanna-East Palmerton 230 kV Line will be less than two miles in length. In fact, the connection to establish the Susquehanna-Harwood #2 230 kV Line will be only 244 feet, and the connection to establish the Harwood-East Palmerton 230 kV Line will be only 345 feet in length. Further, the project will not substantially alter the existing right-of-way because the modification

of the Susquehanna-East Palmerton 230 kV Line involves the installation of only two single-shaft steel poles, and both poles will be located on land owned by PPL Electric.

14. The Necessity Statement for the project is provided as Exhibit "A" in the Exhibits and Appendices accompanying this Letter of Notification.

15. The project will be designed, constructed, operated and maintained in a manner that meets or surpasses National Electrical Safety Code ("NESC") standards and all applicable legal requirements. The proposed project will not create an unreasonable risk of danger to the public health or safety. Descriptions of NESC standards and PPL Electric's design criteria and safety practices are set forth in Appendix A in the accompanying Exhibits and Appendices.

16. The Engineering Description for the project is provided in Exhibit "B" in the Exhibits and Appendices accompanying this Letter of Notification.

17. The entire project is located on land already owned by PPL Electric. Consequently, no additional impact on land use is anticipated.

18. No nearby railroads, communication towers, pipelines or other utilities will be affected by the proposed project.

19. The nearest aviation facility is the Hazleton Municipal Airport which is located 3.6 miles from the project's location. PPL Electric will file documentation, as required, with both the Federal Aviation Administration and the Penn DOT Bureau of Aviation to ensure the proposed line sections are not a hazard to the airport's flight operations.

20. The following lists were reviewed for the presence of historical districts and structures in the project area:

National Historic Landmarks in Pennsylvania

National Register Historic districts in Pennsylvania

National Register individual Properties and historic Districts in Pennsylvania

National Register/Listed and Eligible Properties in Pennsylvania

21. The project has been reviewed by the Pennsylvania Historical and Museum Commission ("PHMC"). The PHMC has determined that, due to the absence of nearby historical sites and the small project size, no further archaeological investigation is required.

22. The project will not affect any unique geological, scenic or natural areas. No parks or recreational facilities are located in or near the project area.

23. No tree clearing is required for the project.

24. The project will not involve any wetlands or other aquatic resources. PPL Electric will employ its "Specifications for Soil Erosion and Sedimentation Control on Transmission line Rights-of-Way" as appropriate.

25. PPL Electric has coordinated with state and federal agencies to obtain information regarding endangered and threatened species in close proximity to the project. A review of the Pennsylvania Natural Diversity Inventory Records indicates that there is one potential conflict in the area of this project recorded by Pennsylvania Department of Conservation and Natural Resources. PPL Electric has requested review of the project area by the Department of Conservation and Natural Resources to be certain that no impacts will occur to any known threatened and endangered species in the area of the project. Construction will not commence until this potential issue is resolved.

26. The Environmental Assessment for the project is provided as Exhibit "C" in the Exhibits and Appendices accompanying this Letter of Notification.

27. Appendix B in the Exhibits and Appendices accompanying this Letter of Notification explains PPL Electric's standards for Magnetic Field Management.

28. Appendix C in the Exhibits and Appendices accompanying this Letter of Notification contains a list of involved governmental agencies, municipalities and other public entities. As indicated above, the only land which will be affected by the project is owned by PPL Electric.

29. The proposed project was reviewed with Hazle Township and Luzerne County. Neither of these governmental units objects to the project. A list of involved governmental agencies, municipalities and other public entities is presented in Appendix C in the accompanying Exhibits and Appendices.

30. A copy of this Letter of Notification is being served in accordance with 52 Pa. Code §57.72(d)(3).

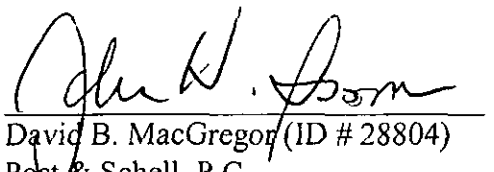
31. As soon as practicable after the filing of this Letter of Notification and the assignment by the Commission of a docket number, PPL Electric will publish notice of the filing in newspapers of general circulation in the area of the proposed project. Such notice will contain: (a) the date this Letter of Notification was filed with the Commission; (b) a brief description of the project and its location; (c) locations where the complete Letter of Notification may be reviewed by the public; and (d) an instruction that the interested parties should contact, within 15 days, James J. McNulty, Secretary, at the Commission's Harrisburg address.

32. This Letter of Notification is filed on the date set forth below. As provided in 52 Pa. Code § 57.72(d)(5), the Commission will review and, by order, approve or disapprove this Letter of Notification. If the Commission approves this Letter of Notification, the proposed project will be constructed as proposed herein without the formal application process set forth at 52 Pa. Code §§ 57.71 *et seq*. If the Commission does not approve this Letter of Notification, the

Commission's Order shall direct PPL Electric to file for approval to construct the proposed project pursuant to the Commission's formal certification regulations.

WHEREFORE, PPL Electric Utilities Corporation respectfully requests that the Commission approve the modification of the Susquehanna-East Palmerton 230 kV Line explained above.

Respectfully submitted,



David B. MacGregor (ID # 28804)
Post & Schell, P.C.
Four Penn Center
1600 John F. Kennedy Boulevard
Philadelphia, PA 19103-2808
Phone: 215.587.1197
Fax: 215.320.4879
E-mail:dmacgregor@postschell.com

John H. Isom (ID # 16569)
Post & Schell, P.C.
17 North Second Street
12th Floor
Harrisburg, PA 17101-1601
Phone: 717.612.6032
Fax: 717.731.1985
E-mail:jisom@postschell.com

Paul E. Russell (ID # 21643)
Associate General Counsel
PPL Services Corporation
Office of General Counsel
Two North Ninth Street
Allentown, PA 18106
Phone: 610.774.4254
Fax: 610.774.6726
E-mail:perussell@pplweb.com

Of Counsel:

Post & Schell, P.C.

Date: January 9, 2007

Attorneys for PPL Electric Utilities Corporation

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA :
: SS
COUNTY OF LEHIGH :

DAVID G. DeCAMPLI, being duly sworn according to law, deposes and says that he is Senior Vice President – Transmission and Distribution Engineering and Operations of PPL Electric Utilities Corporation; that he is authorized to and does make this affidavit for it; and that the facts set forth above are true and correct to the best of his knowledge, information and belief and he expects PPL Electric Utilities Corporation to be able to prove the same at any hearing hereof.

David G. DeCampli

Sworn to and subscribed
before me this 5th day
of January, 2007

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
James R. Harper, Notary Public
City Of Allentown, Lehigh County
My Commission Expires Dec. 23, 2010
Member, Pennsylvania Association of Notaries

ORIGINAL

Before the
Pennsylvania Public Utility Commission

SUSQUEHANNA-EAST PALMERTON 230kV LINE MODIFICATION

EXHIBITS AND APPENDICES IN SUPPORT OF THE

Letter of Notification

A-110500F0388

Application Docket No. _____

Submitted by: PPL Electric Utilities Corp.

SUMMARY

This filing is submitted by PPL Electric Utilities Corporation (PPL EU) pursuant to the Pennsylvania Public Utility Commission's (PUC or the Commission) regulations at 52 Pa. Code §§57.71 through 57.77 for PUC approval to modify transmission facilities around the Harwood 230-69 kV Substation located in Hazle Township, Luzerne County. This work involves the existing Susquehanna-East Palmerton 230 kV Line. This project is required to maintain adequate 69 kV bus voltage under unplanned line and equipment outages.

The estimated cost to design and construct the modified Susquehanna-East Palmerton 230 kV Line is $461,000. Construction is scheduled to begin in June, 2007 to support the project's in-service date of May, 2008.

This document, which describes the need for the project and discusses the engineering and siting analysis for the proposed construction, consists of the following exhibits and appendices:

Exhibit "A"-Necessity Statement
Exhibit "B"-Engineering Description
Exhibit "C"-Environmental Assessment

Appendix A-PPL Design Criteria and Safety Practices
Appendix B-Magnetic Field Management at PPL
Appendix C -List of Involved Governmental Agencies, Municipalities, and Other Public Entities

PPL ELECTRIC UTILITIES SERVICE TERRITORY

EXHIBIT "A"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

NECESSITY STATEMENT

TABLE OF CONTENTS

LIST OF FIGURES

MAP

EXHIBIT "A"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

NECESSITY STATEMENT

A. INTRODUCTION

PPL EU plans to modify its transmission facilities around the Harwood 230-69 kV Substation in order to eliminate low voltage concerns and potential interruption of electrical services to customers. Specifically, PPL EU is requesting the PUC's approval to modify the Susquehanna-East Palmerton 230 kV Line at the Harwood 230-69 kV Substation. The project area is located in Hazle Township, Luzerne County.

The Harwood 230-69 kV Substation would be re-arranged into a four breaker ring bus enabling the two existing power transformers to be supplied by multiple 230 kV lines. The yard re-arrangement and line modification projects are required to ensure PPL EU can maintain adequate voltage for customers served from this substation. To accommodate the upgrade of this substation, PPL EU plans to split the existing Susquehanna-East Palmerton 230 kV Line and terminate the East Palmerton end into existing bay 2-S and the Susquehanna end into a new 3-S bay. This new configuration will form the Susquehanna-Harwood #2 230 kV line and the Harwood-East Palmerton 230 kV Line.

The estimated cost to design and construct the modified line segments is approximately $461,000. This project has a scheduled construction start date of June, 2007 to meet a required in-service date of May, 2008. The required in-service date is defined as the date that the proposed facility must be placed in service to avoid unacceptable low voltage which could potentially damage equipment and result in service interruptions to customers.

A PPL EU system map showing existing transmission facilities with a design voltage of 35 kV or greater is included in the Exhibit "A" map pocket. This filing addresses only the existing

and proposed 230 kV transmission system at Harwood 230-69kV Substation located in Hazle Township, Luzerne County.

B. EXISTING SYSTEM

The Harwood 230-69 kV Substation has two transformers. One transformer is connected to the North bus and is supplied by the Susquehanna-Harwood 230 kV Line. The other is connected to the South bus and is supplied by the Siegfried-Harwood 230 kV Line. Both transformers provide voltage transformation and are an electric supply source for the 69 kV lines located in the Harwood 69 kV yard. These 69 kV lines supply the local 69-12 kV distribution substations throughout the greater Hazleton area.

The existing Susquehanna-East Palmerton 230 kV Line is currently connected to the Harwood 230-69 kV Substation through a normally-open 230 kV tie switch. The purpose of the switch was to provide an emergency 230 kV source to Harwood Substation should the two existing 230 kV circuits supplying Harwood 230-69 kV Substation be de-energized concurrently for any reason. Due to system protection concerns, the switch is interlocked such that it can only be closed and used to supply one power transformer under the above emergency situation. See Figure #1.

Planning studies indicate that inadequate bus voltage will exist when the Susquehanna-Harwood 230 kV Line and one 230-69 kV transformer are automatically de-energized during an unplanned line outage during peak loading, potentially causing interruption of electrical service to customers. This condition has been temporarily resolved by installing a load shedding scheme at Harwood 230-69 kV Substation that will reduce load by interrupting electrical service to some customers and allow voltage to recover. This temporary scheme will be disabled after the proposed line reconfiguration is completed.

C. DEFINITION OF THE PROBLEM

Because of continued load growth on the 69 kV system in the greater Hazleton area, planning studies indicate that unacceptable voltage will exist at the Harwood 230-69 kV Substation should certain unplanned line and equipment outages occur under peak loading conditions. Low voltage levels could affect proper operation of residential customers' appliances as well as the operation of equipment supporting commercial and industrial businesses. The loss of the Susquehanna-Harwood 230 kV Line and the associated tapped transformer is the condition that causes the unacceptable voltage during periods of high electric demand. With the existing substation arrangement, the remaining energized transformer cannot maintain proper 69 kV voltage. Additionally, loading on this remaining energized transformer is approaching its capacity under the condition described above. The addition of the proposed 230 kV line terminations on the 230 kV bus at Harwood 230-69 kV Substation will allow proper 69 kV bus voltage to be maintained.

D. PROPOSED SOLUTION

To resolve the issues discussed above, PPL EU, with the PUC's approval, proposes to modify the Susquehanna-East Palmerton 230 kV Line as follows:

- Break the Susquehanna-East Palmerton 230 kV Line just outside the fence of the Harwood 230-69 kV Substation and re-terminate the northern segment of this line into a new Bay 3-S at Harwood Substation. This will create the Susquehanna-Harwood #2 230 kV Line.
- Re-terminate the southern segment of the Susquehanna-East Palmerton 230 kV Line into existing Bay 2-S. This will create the Harwood-East Palmerton 230 kV Line.

The first power transformer remains connected to the North bus of Harwood 230-69 kV Substation and the second transformer to the South bus. The Siegfried-Harwood 230 kV Line remains unchanged, located in Bay 1-S; the Susquehanna-Harwood 230 kV Line will become the Susquehanna-Harwood #1 230 kV Line and remains unchanged in Bay 1-N. Figure 2 provides a one-line diagram of the proposed system.

Construction of this project as outlined above will prevent loss of electrical service and low voltage problems for PPL EU customers for the unplanned outage previously described.

Furthermore, the existing Harwood 230-69 kV Substation load shedding scheme, which is a temporary relay and control measure to resolve the low voltage problem, can be disabled.

Conversion of the Harwood 230-69 kV Substation bus arrangement and re-termination of the existing Susquehanna-East Palmerton 230 kV Line were identified as part of an overall long-term transmission plan that will alleviate reliability, low voltage, and equipment overload concerns in the Hazleton and surrounding areas.

The total estimated cost for the proposed work at Harwood 230-69 kV Substation is approximately $5.8 million, which includes $5.338 million for the substation modifications and $461,000 for the transmission work. This filing covers only the proposed transmission modifications, which is the only part of the project that requires prior PUC approval under 52 Pa. Code, Chapter 57, Subchapter G.

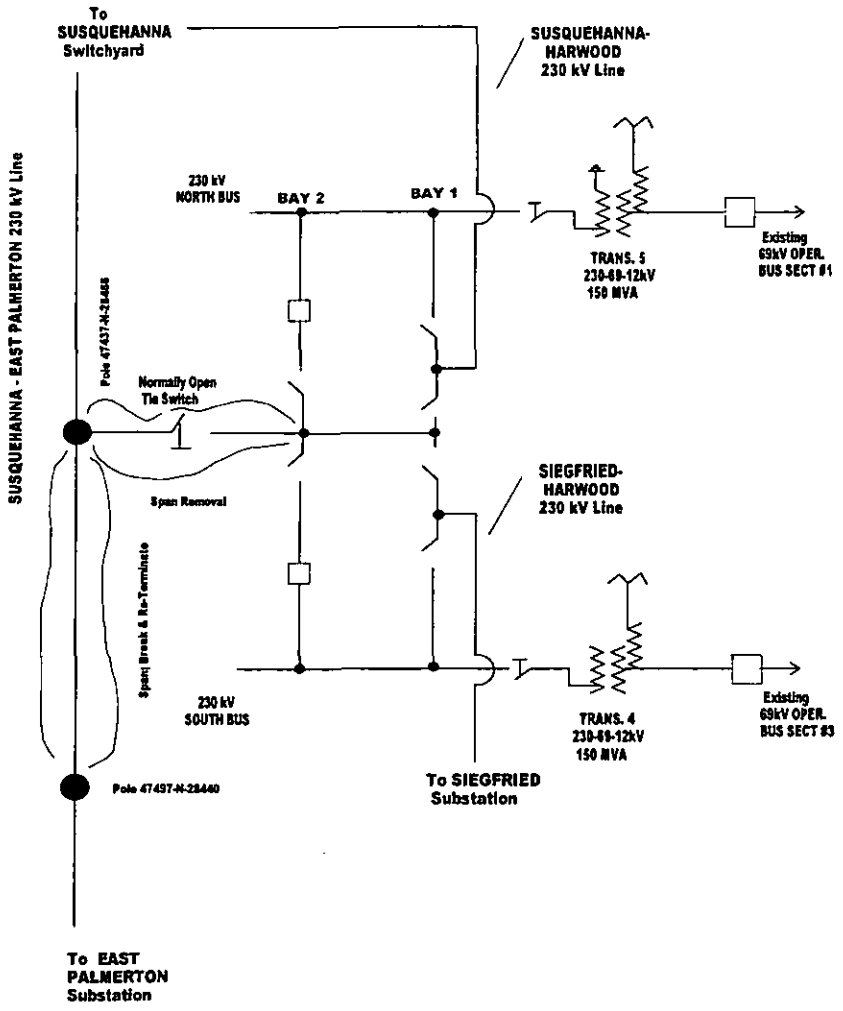
E. FUNCTIONAL ALTERNATIVES

One other functional alternative was identified that would completely resolve the problems outlined above. PPL EU planned to tap the Susquehanna-Jenkins 230 kV Line and install a new regional substation, then establish connections to the Jenkins-Harwood #1 & #2 69 kV lines just south of the Wilkes-Barre area, near Mountaintop.

The proposed substation would have included two power transformers and four 69 kV line bays to terminate the Jenkins-Harwood #1 & #2 69 kV Lines and the Harwood-Jenkins #1 & #2 69 kV Lines. The cost of this proposed substation and four 69 kV lines was approximately $13

million. This alternative was not considered further since the estimated cost is more than twice that of the preferred alternative.

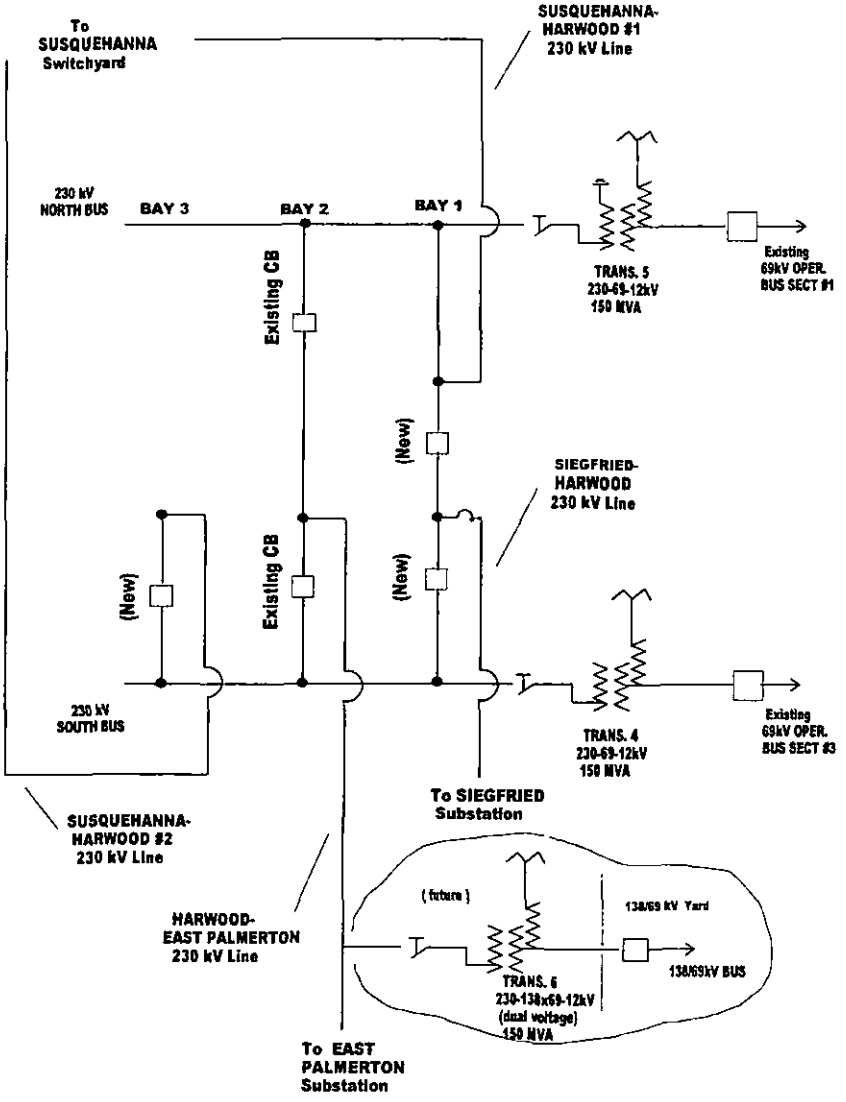
FIGURE 1



Date: 12-07-2006

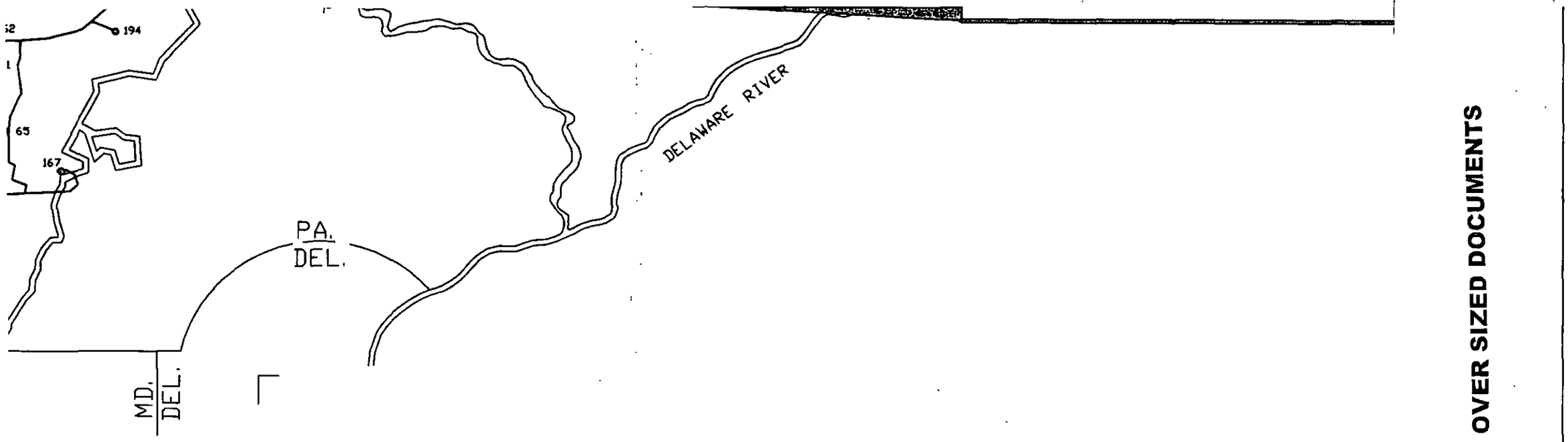
HARWOOD 230 KV YARD – EXISTING

FIGURE 2



Date: 12-07-2006

HARWOOD 230 KV YARD – PROPOSED



OVER SIZED DOCUMENTS

E

MF

500KV OPERATION	
230KV OPERATION	
138KV OPERATION	
69KV OPERATION	

PPL ELECTRIC UTILITIES

ACCT- 805201
SCALE- NONE
BY- CDW

REVIEWED

ELECTRICAL SYSTEM MAP
HARWOOD 230KV SUBSTATION
LINE RE-ARRANGEMENT

APPROVED G. HAKUN III
DATE 7/17/85

PPL ELECTRIC UTILITIES

PPL DRAWING NO. D191830
SHEET NO. 1
REV. 38

	BY	REVIEWED	APPROVED
KV LINE RECONSTRUCTION	CDW	KBK	KBK
/ TAP (LINE REPLACEMENT)	CDW		NHJ
TION LINE REARRANGEMENT PROJECT	CDW	DLH	KBK
D JACKSON - STROUDSBURG LINES	CDW	DLH	KBK

CODES | PLAN & PROFILE NO. | TRANSMISSION MAP NO. | C | SORTS

D191830_5001.DWG

PC CAD

EXHIBIT "B"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

ENGINEERING DESCRIPTION

TABLE OF CONTENTS

EXHIBIT "B"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

ENGINEERING DESCRIPTION

A. DESCRIPTION OF PROPOSED LINE

Harwood 230-69 kV Substation contains two 230-69 kV power transformers, and two 230 kV ring busses. To maintain reliable service to PPL EU customers, the Harwood 230-69 kV Substation will be converted to a four breaker ring bus operation enabling the two existing power transformers to be supplied by multiple 230 kV lines. To accomplish this, PPL EU, with the PUC's approval, proposes to split the existing Susquehanna-East Palmerton 230 kV Line and terminate each end in the Harwood 230-69 kV Substation. This new arrangement creates the Susquehanna-Harwood #2 230 kV Line and the Harwood-East Palmerton 230 kV Line. The proposed Susquehanna-Harwood #2 230 kV Line will require the construction of approximately 244 feet of new transmission line with one new single-shaft steel pole. The proposed Harwood-East Palmerton 230 kV Line will require the construction of approximately 345 feet of new transmission line with one new single-shaft steel pole. Both proposed poles will be approximately 130 feet high and will be installed on concrete foundations. The proposed line sections will consist of three power conductors and one overhead shield wire. The conductors will be 1590 KCMIL 45/7 stranding ACSR, and the shield wire will be 1/2 inch extra high strength steel. The entire project is on property owned by PPL EU. The project is located in Hazle Township, Luzerne County. A plot plan for the transmission line project is provided in the Exhibit "B" map pocket.

The proposed line will be designed to, and generally exceed, National Electrical Safety Code (NESC) standards. Design specifications and safety rules practiced by PPL EU are included in Appendix A. The minimum conductor to ground clearance will be 32 feet, which occurs at a maximum thermal conductor temperature of 125 degrees Celsius.

The designed minimum conductor clearances and conductor thermal ratings for the line are as follow:

TABLE 1

DESIGN MINIMUM CONDUCTOR CLEARANCES
FOR 1590 KCMIL 45/7 STRANDING ACSR*

Condition	Transmission Double-Circuit Design Clearance-to-Ground
Normal load; average weather (16°C ambient temperature)	33.5 feet
Predicted extreme thermal load (125°C conductor temperature)	32 feet
Predicted extreme weather conditions (11/2-inch ice, 8 lbs. wind, -18°C)	33.8 feet

*Clearances based on a maximum tension of 6000 pounds and a ruling span of 250 feet.

CONDUCTOR THERMAL RATING
1590 KCMIL 45/7 STRANDING ACSR
(257°F) 125°C MAXIMUM CONDUCTOR TEMPERATURE

Condition	Ambient Temperature °C	Wind Speed Knots	Ampacity Amps
Summer Normal	35	0	1,640
Winter Normal	10	0	1,861
Summer Emergency	35	1 1/2	1,990
Winter Emergency	10	1 1/2	2,220

B. MAGNETIC FIELD MANAGEMENT

PPL EU's Magnetic Field Management Program, summarized in Appendix B, is applied to new and reconstructed transmission line projects. To reduce magnetic field exposures, the program generally prescribes the use of a line design that provides five feet higher ground clearance and reverse phasing of new double circuit lines where it is feasible to do so at low or no cost. The implementation of additional modifications will be considered, provided those modifications can be made at low or no cost.

Both proposed lines will be constructed as single circuit transmission lines. Therefore, reduction of the magnetic field through reverse phasing is not possible. Some reduction of magnetic field is anticipated through the use of taller poles.

C. RIGHT-OF-WAY STATUS

All work will be completed on PPL EU fee owned property. No additional right-of-way is required.

EXHIBIT B

AERIAL EXHIBIT

SHEET 1 OF 1

HARWOOD 230KV SUBSTATION
LINE RE-ARRANGMENT

HAZLE TWP. **LUZERNE CO., PA.**

SCALE: 1" = 200'

PREPARED BY:
PPL ELECTRIC UTILITIES CORP.

PPL ELECTRIC UTILITIES

PPL ELECTRIC UTILITIES

ACCT- 122112	HARWOOD 230KV SUBSTATION		
SCALE- AS SHOWN			
BY- CDW			
REVIEWED: DLH	**OVER SIZED DOCUMENTS**		
	HAZLE TWP.		LUZERNE CO., PA.
	APPROVED	DATE	PPL ELECTRIC UTILITIES
PPL DRAWING NO. SM122112	SHEET NO. 1		REV. 0

APPROVED

14, 696-323-N4 C

SM122112 S001.DWG/TIF

EXHIBIT "C"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

EXHIBIT "C"

SUSQUEHANNA-EAST PALMERTON 230 kV LINE MODIFICATION

ENVIRONMENTAL ASSESSMENT

A. INTRODUCTION

PPL EU plans to reconfigure its transmission facilities around the Harwood 230-69 kV Substation in order to eliminate low voltage concerns and potential interruption of electrical services to customers. This project is required to maintain adequate 69 kV bus voltage under unplanned line and equipment outages. The project involves breaking the Susquehanna-East Palmerton 230 kV Line and terminating each end in the Harwood 230-69 kV Substation. This new configuration will form the Susquehanna- Harwood #2 230 kV line and the Harwood-East Palmerton 230 kV Line. These line modifications were identified as part of the overall long-term transmission plan that will alleviate reliability and overload concerns in the Hazelton and surrounding areas.

The proposed project was reviewed with Hazle Township and Luzerne County, and neither the Township nor the County has any objection. A list of involved governmental agencies, municipalities and other public entities is presented in Appendix C.

B. LAND USE

Both the proposed Susquehanna-Harwood #2 230 kV line and the Harwood-East Palmerton 230 kV Line construction will be located entirely on PPL EU property just outside the fence of the Harwood 230-69 kV Substation. Therefore, no additional impact on existing land use is anticipated.

No nearby railroads, communication towers, pipelines or other utilities will be affected by the proposed project. Hazelton Municipal Airport is located approximately 3.6 miles from

the project location. PPL EU, as required, will file the appropriate documentation with both the Federal Aviation Administration and the PennDOT Bureau of Aviation to ensure the proposed line section is not a hazard to the airport's flight operations.

C. CULTURAL RESOURCES

This project was reviewed with the Pennsylvania Historical and Museum Commission (PHMC). PHMC has determined that due to the absence of historical sites and the small project size no further archaeological investigations are required.

The following lists were reviewed for the presence of historical districts and structures in the area:

- National Historic Landmarks in Pennsylvania
- National Register Historic Districts in Pennsylvania
- National Register Individual Properties and Historic Districts in Pennsylvania
- National Register/Listed and Eligible Properties in Pennsylvania

D. NATURAL FEATURES

The proposed project will not affect any unique geological, scenic, or natural areas. No parks or recreational facilities are located near the project area. No tree clearing is required. The lines will not cross any wetlands or other aquatic resources. PPL EU will employ its "Specification for Soil Erosion and Sedimentation Control on Transmission Line Rights-of-Way" as appropriate.

E. THREATENED AND ENDANGERED SPECIES

PPL EU has coordinated with different state and federal agencies to obtain information regarding endangered and threatened species in the study area. A review of the Pennsylvania Natural Diversity Inventory records indicates there is one potential conflict in the area of this project recorded by Pennsylvania Department of Conservation and Natural

Resources (DCNR). PPL EU has requested review of the project area by DCNR to be sure no impacts will occur to any known threatened and endangered species in the area of this project. Construction activities will not commence until this issue is resolved.

LIST OF APPENDICES

APPENDIX A

PPL DESIGN CRITERIA AND SAFETY PRACTICES

The National Electrical Safety Code (NESC) is a set of rules to safeguard people during the installation, operation, and maintenance of electric power lines. The NESC contains the basic provisions considered necessary for the safety of employees and the public. Although it is not intended as a design specification, its provisions establish minimum design requirements. PPL Electric Utilities Corp. (PPL EU) has developed design specifications and safety rules which meet or surpass all provisions specified by the NESC.

Engineering Design Criteria and Parameters

The NESC includes loading requirements and clearances for the design, construction, and operation of power lines. The "loads" on conductors and supporting structures are the mechanical forces that develop from the weight of the conductors, the weight of ice on the conductors, plus wind pressure on the conductors and supporting structures. Loading requirements are the loads on the conductors and structures that are anticipated assuming certain ice and wind conditions. Loading requirements always contain "safety factors" to allow for unknown or unanticipated contingencies. The clearances and loading requirements contained in the NESC were developed to ensure public safety and welfare.

PPL EU transmission line design standards meet or surpass the NESC standards. For example, the relative order of grades of construction for conductors and supporting structures is B, C, and N; Grade B being the highest. According to the NESC standards, construction Grades B, C, or N may be used for transmission lines (except at crossings of railroad tracks and limited access highways where Grade B construction is specified). However, PPL EU designs all of its transmission lines for Grade B construction. The use of Grade B design and construction specifies such things as larger-minimum crossarm dimensions, larger-minimum conductor size, and increased safety factors.

Another example is the design parameters utilized to account for ice and wind loadings on the overhead ground wire (OHGW) and power conductors. The NESC standard ice and wind design magnitudes for the PPL EU territory are 0.5 inch thickness of radial ice combined with four pounds per square foot horizontal wind pressure (equivalent to 40-mile per hour wind velocity). The conductor sags and tensions used in line designs are the result of various ice and wind combinations, depending on the elevation at the line location and line design voltage. The conductor sags and tensions used in the design of all PPL EU transmission lines are at least 0.5-inch ice combined with eight pounds wind pressure (equivalent to 57 miles per hour wind velocity). This means that PPL EU lines are designed to operate safely and reliably during inclement weather even more severe than assumed by the NESC. In addition, PPL EU transmission lines are designed with more clearance to the ground than required by the NESC. The tables below compare PPL EU and NESC ground clearances for lines of various voltages.

138 kV

Surface Underneath Conductors	Vertical Clearance to Ground	
	NESC Standard	PPL EU Design
Roads, streets, alleys	21 Ft.	30 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	21 Ft.	30 Ft.
Spaces accessible to pedestrians only	17 Ft.	30 Ft.
Railroad tracks	31 Ft.	35 Ft.

230 kV

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	PPL EU Design
Roads, streets, alleys	23 Ft.	32 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	23 Ft.	32 Ft.
Spaces accessible to pedestrians only	19 Ft.	32 Ft.
Railroad tracks	31 Ft.	36 Ft.

500 kV

Surface Underneath Conductors	Vertical Clearance to Ground NESC Standard	PPL EU Design
Roads, streets, alleys	28 Ft.	53 Ft.
Other land traversed by vehicles (such as cultivated field, forest, etc.)	28 Ft.	53 Ft.
Spaces accessible to pedestrians only	24 Ft.	53 Ft.
Railroad tracks	38 Ft.	53 Ft.

A relay protection system is used to protect the public safety and welfare as well as equipment and the transmission system. Relay protection is installed for all transmission lines to automatically de-energize the line in the unlikely event that the line or supporting structure fails and the line contacts the ground.

Periodic Maintenance Program on All Transmission Lines

To ensure continued public safety and integrity of service, a periodic maintenance and inspection program is implemented for every transmission line. The program is administered through the use of helicopter patrols, with supplemental foot and structure climbing patrols. A number of helicopter patrols are performed on all lines annually. The two-man helicopter crew flies parallel, to the left, and above the line so that the observer can look for signs of line damage or deterioration and observe clearances between vegetation and conductors. The observations are included in a report that is forwarded to the appropriate department for corrective action.

Foot and structure climbing patrol programs for a transmission line begin approximately three to five years after the line is energized, unless a helicopter patrol reports a need for earlier action. The frequency of foot patrols varies from once every year to once every several years depending on line type and age.

An assigned foot patroller checks right-of-way conditions, including access roads, bridges, pole washouts, tower footers, vegetation height and clearance to conductors, pole and tower deterioration and, with the use of binoculars, insulators, and condition of hardware. Identified problems are included in a report that is forwarded to the appropriate department for corrective action.

A scheduled line outage is required to perform an overhead patrol because of "hands-on" inspection of hardware. Overhead patrols are conducted on a schedule determined by line age, operating record, and observed general condition. The necessary repairs are also done during the inspection outage.

Personnel Safety Rules

The following are a few of the PPL EU safety rules that demonstrate the Company's concern for employee safety:

- Work procedures have been developed to allow work to be performed on energized facilities in a safe manner. When lines or apparatus are removed from service to be worked on, the Energy Control Process system is applied. This system provides that a red tag must be physically placed on the control handle of the de-energized equipment. The red tag may be removed only after proper authorization to energize the equipment. Various other tags are used for limited operations

and informational purposes. Employees will not apply or remove a tag or change the status of tagged equipment unless authorized.

- Temporary safety grounds are used on de-energized facilities for employee safety during maintenance, construction, or reconstruction work. Safety grounds are wires connecting the de-energized facility to an electrical ground. If the facility should be energized, the safety grounds will divert the current directly to ground and reduce the likelihood of personal injury. The conductor size and attachment clamps of temporary safety grounds must be capable of conducting anticipated fault currents. Rubber gloves, rubber sleeves, and additional rubber protective equipment are used as required when applying or removing temporary safety grounds to or from the lines or apparatus to be grounded. An approved nonconductive working stick of sufficient length to allow workers to maintain the following required minimum clearances is used to test that the line has been de-energized and to apply temporary safety grounds:

Voltage-kV	Minimum Clearance
138	3'-7"
230	5'-3"
500	11'-3"

Before applying grounds, a test is done to confirm that the line is de-energized. The voltage test device is checked before and after use to assure reliability. When ground pins are used to establish proper ground points, they are driven to a depth of not less than four feet as near vertical as possible.

- Poles or structures are inspected and examined for structural integrity before climbing. If there is any reason to believe that a pole is unsafe, it is stabilized before work is performed. Appropriate safety gear in the form of body belts, safety straps, hard hats, gloves, etc., is worn by linemen during line work activity.

MAGNETIC FIELD MANAGEMENT

PPL Electric Utilities Corporation

APPENDIX B

DECEMBER 2004

TABLE OF CONTENTS

INTRODUCTION

At PPL Electric Utilities Corp. (PPL EU), magnetic field management means investigating and implementing methods at low or no cost to reduce magnetic fields in new or rebuilt transmission and distribution lines. This document explains PPL EU's Magnetic Field Management Program, which is part of PPL EU's larger Electric and Magnetic Fields (EMF) policy.

PPL EU's View

Some people are worried that electric and magnetic fields are harming their health. Others think the scientific research does not show a problem at all, and still others believe there's just too much scientific uncertainty to draw any conclusions.

Here's what we do know now. Various panels of scientists that have reviewed the EMF research generally have drawn two main conclusions. First, the large body of evidence does not demonstrate that EMF are harmful. Second, additional research is recommended to explore questions raised in some studies.

Given these conclusions, PPL EU is taking a reasoned approach in responding to the EMF issue. PPL EU's approach to the EMF issue consists of five elements:

- Providing EMF information to customers and employees
- Providing magnetic field measurements
- Establishing and implementing a magnetic field management program to reduce magnetic fields in new or rebuilt facilities when it can be done at no, or low, cost
- Integrating EMF in the public involvement process that PPL EU undertakes in the siting of transmission lines
- Have supported additional research

EMF Are All Around Us

Electric and magnetic fields occur in nature and in all living things. The earth, for instance, has a magnetic field, which makes the needle on a compass point north.

Electric fields and magnetic fields of a different type also surround every wire that carries electricity. In everyday life, these EMF arise from several basic sources, including power lines, electrical appliances, home and building wiring, other utility lines and cables, and currents flowing on water pipes. Though they often occur together, EMF are made up of two separate components:

Electric Fields

Electric fields are produced by the voltage—or electrical pressure—on a wire. The higher the voltage, the higher the electric field. As long as a wire is energized—has voltage present—an electric field is present (see Figure 1). In other words, an appliance, or an electric power line, doesn't actually have to be turned on to create an electric field. It just has to be plugged in. Electric fields diminish with distance and can be blocked or partially shielded by objects such as trees and houses.

Magnetic Fields

Magnetic fields are created by the current or flow of electricity through a wire. Generally speaking, the higher the current, the higher the magnetic field. Because they only occur when current is flowing, magnetic fields are present only when the power is turned on (see Figure 1). Magnetic fields also diminish with distance, but—unlike electric fields—are not blocked by common objects. In recent years, public and scientific interest has turned toward the magnetic field component of EMF because of some scientific studies regarding these fields.

Figure 1

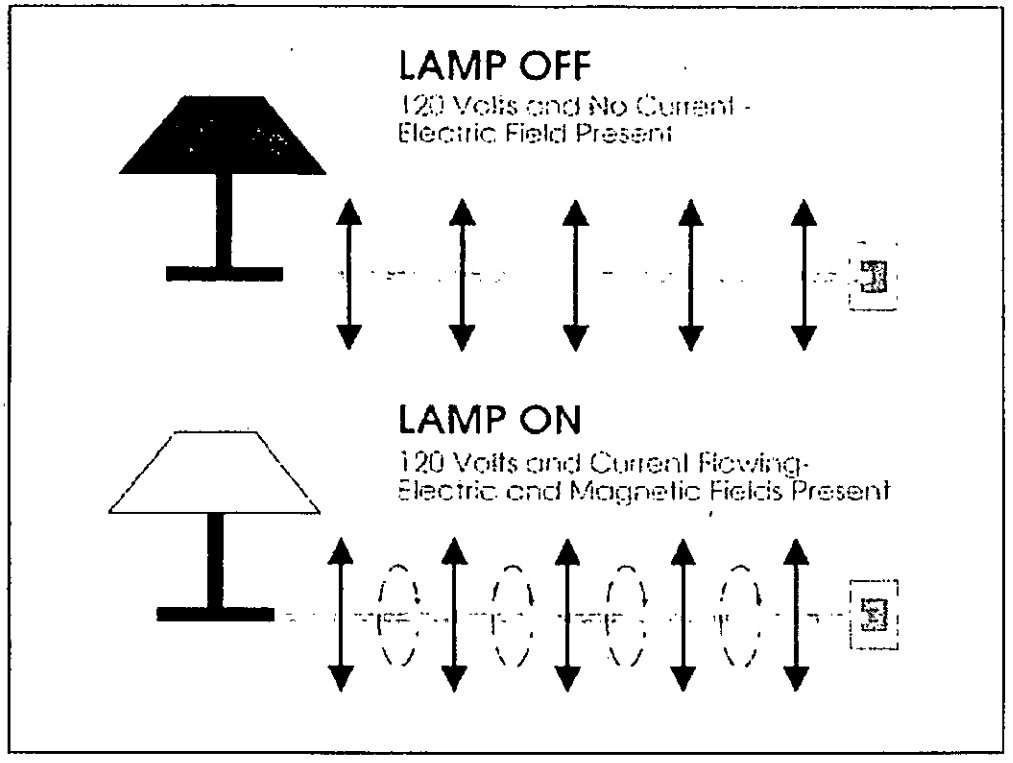

LAMP OFF
120 Volts and No Current -
Electric Field Present
LAMP ON
120 Volts and Current Flowing-
Electric and Magnetic Fields Present

Figure 2

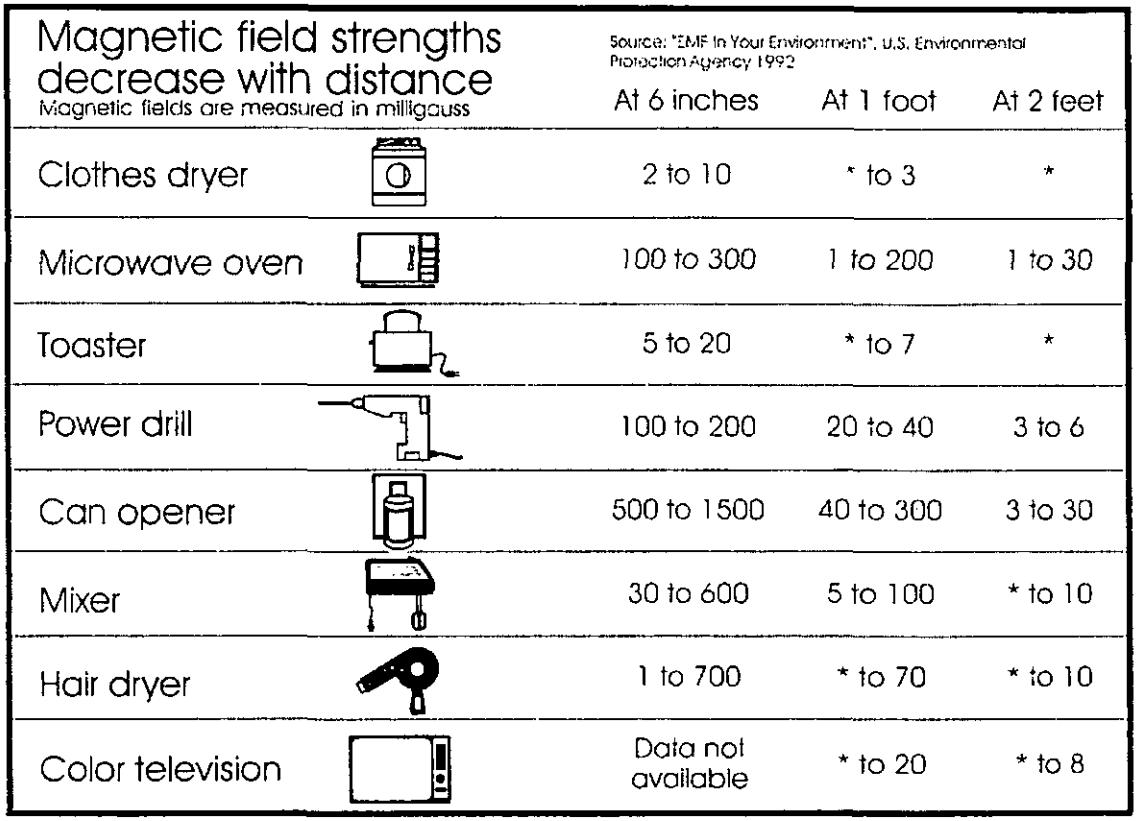


FIGURE 2 * The magnetic field measurement at this distance from the operating appliance could not be distinguished from background measurements taken before the appliance had been turned on.

Measuring Magnetic Fields

Magnetic fields usually are measured in a unit called a milligauss. Magnetic field levels found in the living areas of homes typically range from less than 1 milligauss to about 4 milligauss according to the U.S. Environmental Protection Agency. They can be higher in some cases. The levels next to appliances can exceed 1,000 milligauss (1 gauss). Figures 2 and 3 show how the strength of the field falls off as you move away from the source, just as the heat of a campfire grows weaker as you walk away from it. For overhead power lines, the strength of the magnetic fields is dependent upon a number of factors that will be explained later. Those factors produce a magnetic field that drops off rapidly as you move away from the power line.

Figure 3

Sample Magnetic Field Levels in Milligauss				
Type of Overhead Power Line	**Distance from the line**			
	Under the line	**50 ft.**	**100 ft.**	**200 ft.**
220 kV and 500 kV	5-400	5-250	1-75	0.5-20
69 kV and 138 kV	3-80	0.5-2.5	0.1-10	0.1-3
12 kV and below	0.4-20	0.1-1	-	-

The magnetic field values provided in this table represent a general range of values associated with the types of overhead power lines listed and are provided for illustration. There will be circumstances in which there will be magnetic field levels above or below the range of values provided due to variations in such factors as height of the wires, current flow and so on.

DEVELOPMENT OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

One element of our response to EMF concerns expressed by some of our customers is PPL EU's Magnetic Field Management Program. The program was initiated in March 1991 because PPL EU believes it makes good sense, as a matter of policy, to respond to the concerns expressed by some of our customers and to reduce magnetic fields in new and rebuilt facilities where it can be done with either no-cost or low-cost design changes.

This document updates the original program which has been revised several times since 1991. *These guidelines were developed by PPL EU's EMF Working Group.*

VARIABLES THAT AFFECT MAGNETIC FIELDS

Magnetic fields from transmission and distribution lines are a function of a number of design variables. The following parameters affect the magnetic field levels produced by transmission and distribution lines:

- Current
- Height of conductors above ground
- Configuration of conductors
- Distance from the line

EFFECT OF PHASE CURRENT ON MAGNETIC FIELDS

At power frequencies (i.e., 60 hertz), the magnetic field level is a function of the current or flow of electricity through a wire. Keeping all other parameters the same, the magnetic field is proportional to the current. Hence, if the current increases by 25 percent, the resulting magnetic field level will increase by 25 percent.

The overall load current on any line varies with the demand for power. It's usually highest during daytime hours and lowest at night. There also are weekly, monthly, seasonal and yearly variations.

The difference in the currents between each phase in a multiphase line also can affect the magnetic field. This difference is called phase unbalance. For a constant load, a statistical analysis of this phase unbalance can be made to determine its effect on the magnetic field. Close to the line, there is very little effect. However, the phase unbalance slows the rate at which the magnetic field decreases with distance from the line.

EFFECT OF CONDUCTOR CONFIGURATION ON MAGNETIC FIELDS

In the transmission and distribution of power, utilities like PPL EU presently use both three-phase and single-phase lines. Each phase on a three-phase power line has either a single conductor or a bundle of two or more conductors. In a three-phase system, the ground-level magnetic field is a result of the fields produced by the currents in each of the phases. Placing the three phases as close together as possible (compaction) creates some field cancellation, and the ground-level magnetic field is reduced. However, appropriate phase separation is required for the reliable operation of the line. In addition, the arrangement of the phases can create some; field cancellation and reduction of the ground-level magnetic field.

EFFECT OF DISTANCE FROM THE MAGNETIC FIELD SOURCE

Magnetic field strength diminishes with the vertical and lateral distances from the magnetic field source. Increasing the height of the conductors above ground is useful for magnetic field reduction at ground level, but may result in increased structure costs and increased aesthetic impact of the structures. Another possible method of increasing the distance to the magnetic field source is to increase the right-of-way requirements. By keeping buildings off increased rights of way, thereby requiring the public to live and work further away from lines, exposure to magnetic fields produced by the lines can be reduced. Increases in right of way are not always practical and may increase costs significantly, however.

SUMMARY OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM

Under its Magnetic Field Management Program, PPL EU has changed the way it builds and rebuilds some of its transmission and distribution lines. These design changes reduce magnetic field levels (assuming balanced circuit loadings and phase currents) by up to 69 percent in most of the company's new transmission lines. These guidelines now are being applied to new and reconstructed transmission facilities, based on this program.

The distribution component of the program focuses on 12 kV lines, the company's standard distribution voltage. It concentrates on the three-phase, primary 12 kV lines, since these are the most heavily loaded facilities and often are located in densely populated areas. The guidelines in this program are being applied to these three-phase, primary 12 kV lines.

A maximum 3-5 percent change in estimated cost was used as the limit for the guidelines since this value is consistent with low cost, is within estimating accuracy and is likely to have little impact on overall line costs.

The magnetic field calculations used in this document for the design of PPL EU's overall magnetic field management plan assume balanced load conditions among the phases and a fixed level of current, not necessarily representative of specific transmission or distribution lines. These levels were calculated using the Electric Power Research Institute's ENVIRO computer program. Under actual operating conditions, the magnetic field levels that result may vary due to such things as actual load per circuit, overall current on each phase conductor and the electrical configuration and operation of each line.

MAGNETIC FIELD MANAGEMENT PROGRAM GUIDELINES

The guidelines for magnetic field management are noted below, with discussion points for each.

OVERHEAD LINES

NEW OR REBUILT TRANSMISSION LINES

1. **Balance transmission circuit loads and phase currents as much as possible.**
   - PPL EU should continue to make every effort to balance loadings between the two circuits of a double circuit line when planning new or rebuilt facilities to maximize the effects of reverse phasing.
   - PPL EU should continue the practice of balancing single-phase loads across the three phases of the distribution system. (Unbalanced phase currents on the distribution system are reflected through to the transmission system.)
     - Unbalanced phase currents result in higher magnetic fields that do not drop off as quickly with distance as do the fields resulting from balanced phase currents.
     - For a 5 percent phase current unbalance, the magnetic field 50 feet from the centerline of a single circuit 138 kV line could be more than twice the value than if the same line had balanced phase circuits.
   - Balanced phase currents on each three-phase distribution circuit also reduce magnetic fields from the distribution circuits themselves. In addition, they reduce magnetic fields on the transmission system from which the distribution system circuits are supplied and connected through substations.
   - Apart from magnetic field considerations, balanced phase currents on each three-phase distribution circuit also reduce line losses and improve the system voltage.

2. **Continue with the present practice of using long-span construction as the PPL EU 138/69 kV standard**

- Structure designs for short-span and long-span construction are illustrated on Charts I and II, respectively.
  - Short-span design does not significantly reduce magnetic fields when compared to long-span design even though it is more compact than long-span design. Comparison of the magnetic field values from Chart III indicates essentially the same values. Therefore, short-span design should not be used solely to reduce magnetic fields.
  - PPL EU will continue to use long-span construction for 138/69 kV double-circuit lines and for single-circuit/future-double-circuit lines.
  - For single-circuit/future-double-circuit lines, PPL EU will continue to install two conductors on the top positions and one in the middle position as shown in Chart IV.
    - This arrangement minimizes magnetic fields as shown in Chart V by placing the three initial conductors higher on the structure, which increases the ground clearances, and by placing the conductors in a triangular configuration.

3. **Compact design structures are not a low-cost alternative and should be used for magnetic field reduction only in special applications.**

Chart VI illustrates the compact design structure.

- The compact design increases the initial installation costs by 79 percent when compared to the long-span design but reduces the magnetic field from 9 mG to 3 mG (about 67 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.

4. **Reverse phase new or rebuilt double-circuit transmission lines for all voltage levels.**

- Reverse phasing was adopted by PPL EU in March 1991 for double-circuit 138/69 kV transmission lines and in April 1992 for all other double circuit transmission lines. Reverse phasing is shown in Chart VII. Reverse phasing will reduce the magnetic fields when the current flow on both circuits is in the same

direction. Calculated values contained here are based on balanced and equal phase currents on both circuits.

- Reverse phasing reduces the magnetic field of a double circuit 138 kV single pole transmission line from 29 mG to 9 mG (about 69 percent) at the edge of the 100-foot-wide right of way as shown on Chart III.
- Reverse phasing reduces the magnetic field of a double circuit 230 kV single pole transmission line from 49 mG to 16 mG (about 67 percent) at the edge of the 150-foot-wide right of way as shown on Chart VIII.
- Reverse phasing reduces the magnetic field of a double-circuit 500 kV single pole transmission line from 37 mG to 21 mG (about 43 percent) at the edge of the 200-foot-wide right of way as shown on Chart IX.

• When new or rebuilt double-circuit lines require tapping existing double-circuit lines, PPL EU will review the existing lines to determine if reverse phasing can be provided at low cost.

• Computer modeling is required to develop the optimum phasing and overall conductor arrangements for lines added to, or rebuilt in, multiple-line corridors.

- Merely adding a reverse-phase double-circuit line to an existing transmission line corridor or reverse phasing a rebuilt line in the multiple-line corridor will not necessarily produce lower magnetic field levels at the edge of the corridor right of way.
- The corridor must be computer modeled with all the lines, existing phase conductor locations and currents. Then, magnetic field calculations must be made varying the phase arrangements of the new or reconstructed line to determine the appropriate phasing arrangement.
- Current flow direction on a line also must be considered. For example, a reverse-phased line should have the current flowing in the same direction on both circuits. If the current flow is in the opposite direction for one circuit, reverse phasing will not produce the lowest magnetic field and another phase arrangement that produces lower fields may need to be utilized.

5. **Increase the minimum ground clearance for all new transmission lines.**

138/69 kV Transmission Lines

- Increasing the minimum line design ground clearance from 25 feet to 30 feet may add up to about 5 percent to the installed cost of a new double-circuit single pole 138/69 kV line. For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. With long-span reverse-phase design, the, magnetic field is reduced from 9 mG to 7 mG (about 22 percent) at the edge of a 100-foot-wide right of way as shown in Chart X.
  - In the actual design of transmission lines to include higher minimum ground clearances, there may be limited segments (such as highway crossings, severe slopes and transmission line crossing locations) where National Electrical Safety Code (NESC) minimum ground clearances may need to be used. The NESC minimum ground clearances are less than the increased ground clearance discussed previously.

230 kV Transmission Lines

- Increasing the minimum line design ground clearances from 27 feet to 32 feet may add up to about 5 percent to the cost of a single-circuit single-pole line (current standard). For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 30 mG to 28 mG (about 7 percent) at the edge of a 150-foot-wide right of way.
- Increasing clearances from 27 feet to 32 feet could theoretically add up to about 2.8 percent to the cost of a double-circuit single-pole line (current standard) and reduce the magnetic field of a reverse-phase line from 16 mG to 15 mG (about 6 percent) at the edge of a 150-foot-wide right of way. Chart XI is a summary of this data.
- Studies are required for each new 230 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such

studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced phase spacing (a "Delta" configuration on a single-circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

500 kV Transmission Lines

- Increasing ground clearances from 33 feet to 53 feet may add up to about 4.5 percent to the cost of a single-circuit "H-frame" line (current standard). For a given project, such cost may be substantially less, however. In fact, PPL EU frequently uses higher-than-minimum ground clearances due to such features as road crossings, line crossings and site-specific terrain. By increasing the clearances, the magnetic field is reduced from 42 mG to 35 mG (about 17 percent) at the edge of a 200-foot-wide right of way.
- Increasing ground clearances from 33 feet to 53 feet could theoretically add up to 2.8 percent to the cost of a double-circuit "H-frame" line (current standard) and reduces the magnetic field of a reverse-phase line from 21 mG to 16 mG (about 24 percent) at the edge of a 200-foot-wide right of way. Chart XII is a summary of this data.
- Studies are required for each new 500 kV line to determine optimum structure types, ground clearances, configurations and designs to reduce field levels. Such studies could include analysis of reduction measures such as additional minimum ground clearances, increasing conductor tensions, using reduced-phase spacing (a "Delta" configuration on a single circuit line), installing the second circuit initially, and/or adding a second set of conductors that are reverse phased and operated in parallel with the first set (bundled/split phase).

RECONDUCTORING OR ADDING ADDITIONAL CIRCUITS TO EXISTING TRANSMISSION LINES

When reconductoring or adding additional circuits to existing transmission lines, PPL EU will evaluate low-cost or no-cost options for magnetic field management on a case-by-case basis.

When reconductoring existing transmission lines or adding additional circuits, low-cost alternatives may not exist; however, the following steps will be taken:

- For a single-circuit line, the use of a Delta arrangement or other modifications on the existing structure, with reduced-phase spacing, will be evaluated.
- For double-circuit lines, application of reverse phasing may reduce the magnetic field under the line and within the right of way and will be evaluated.
- For single- and double-circuit lines, evaluate using higher conductor tensions that can increase the minimum line design ground clearance.

DISTRIBUTION LINES

At the 12 kV distribution level, new main three-phase lines will continue to be constructed with five feet of additional ground clearance.

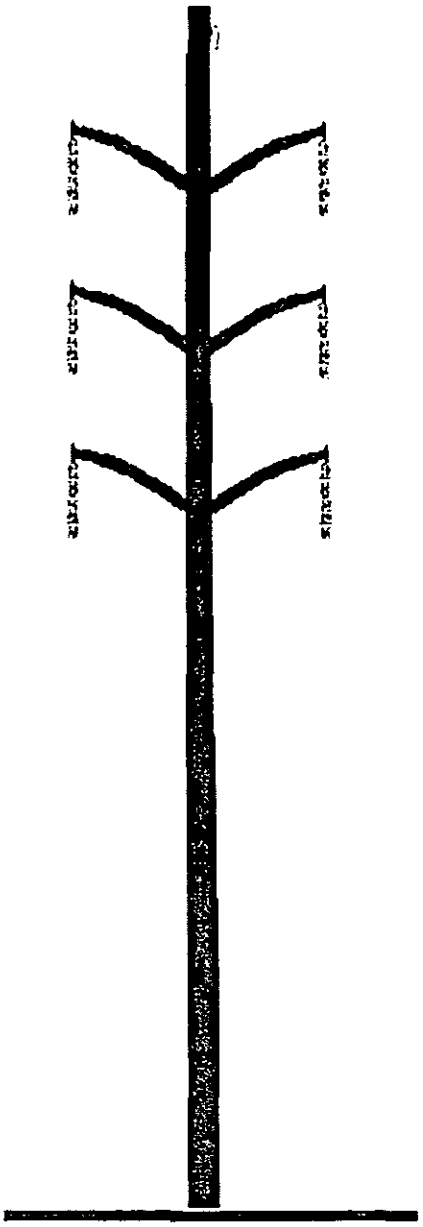
- Main lines are the most heavily loaded sections of a distribution line and therefore have the highest magnetic fields associated with them.
- Increasing the ground clearance by five feet reduces the magnetic field under the line from 14 mG to 11 mG using the standard eight-foot crossarm design. These values are based on increasing pole heights from 45 feet to 50 feet and a typical operating current of 300 amps per phase.
- Chart XIII is a summary of this data. Increasing ground clearance by five feet could theoretically add about 5 percent to the cost of a typical distribution line.

UNDERGROUND TRANSMISSION LINES

Underground transmission lines are required due to environmental or land use factors or restrictions on available clearances, PPL EU will evaluate options for magnetic field management techniques on a case-by-case basis.

- The phase arrangement that produces the lowest field will be determined.
- The depth of burial of the line will be determined considering the cost of excavation and the location of other buried utilities in the area.
- The use of steel pipe ferromagnetic shielding that reduces magnetic fields will be evaluated.

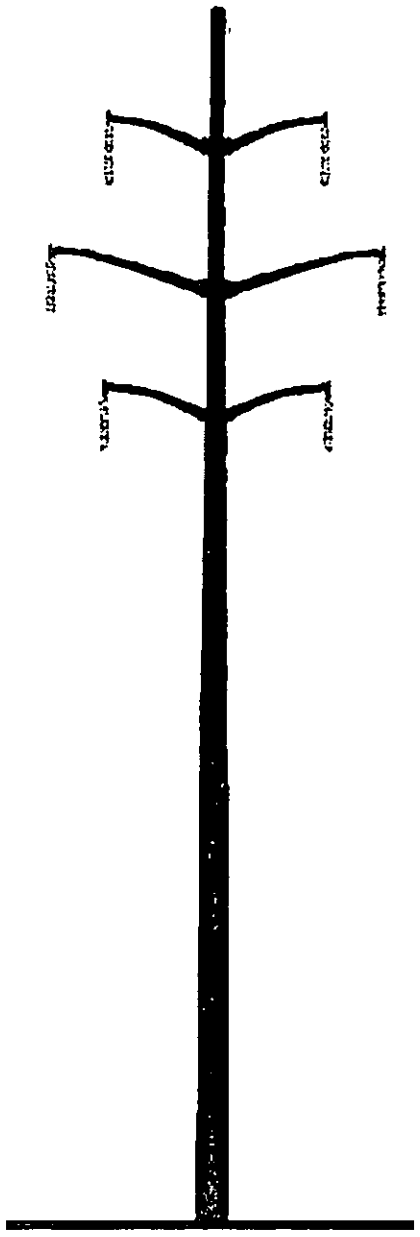
Short-Span Construction



- **More compact design**
- **Should not be used solely to reduce magnetic fields**
- **Typical conductor data:**

  1 3/8" HS steel overhead ground wire - 7.3 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 10.0 feet sag
  Average span - 400 feet

Long-Span Construction Remains PPL EU 138 kV Standard



- **Lower cost alternative**
- **Reduces magnetic fields due to higher structures**
- **Typical conductor data:**

  1 3/8" HS steel overhead ground wire - 17.3 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 23.0 feet sag
  Average span - 600 feet

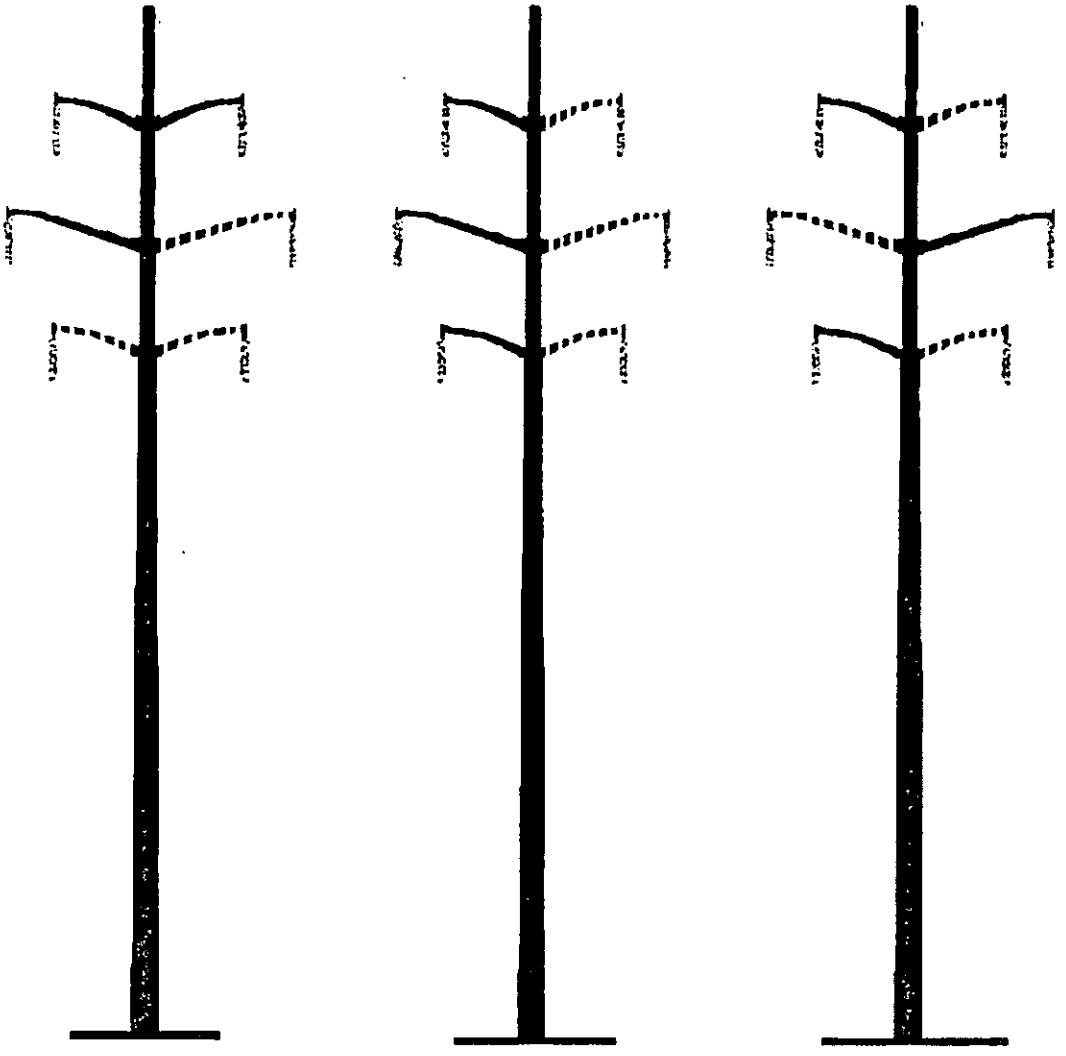
138/69 kV REVERSE-PHASE TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SHORT SPAN (CHART I)	30
SHORT SPAN (REVERSE PHASE)	8
LONG SPAN (CHART II)	29
LONG SPAN (REVERSE PHASE)	9
COMPACT (CHART VI)	14
COMPACT (REVERSE PHASE)	3

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.
LONG SPAN, SHORT SPAN and COMPACT are double-circuit lines.

CHART IV

Typical Single-Circuit Structure Designs



Top/Middle Vertical Top/Middle/Bottom

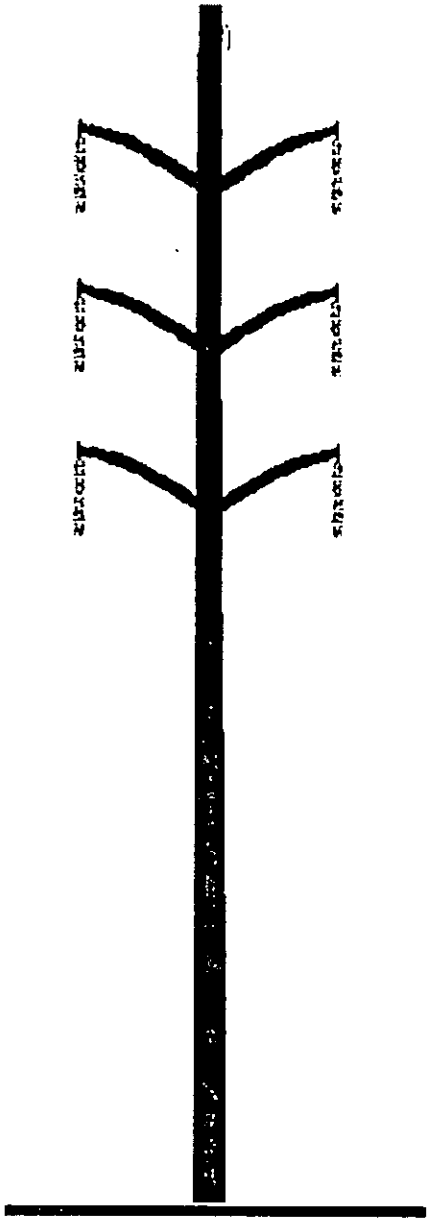
initial single circuit
future second circuit

138/69 kV SINGLE CIRCUIT TRANSMISSION LINES
CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
TOP/MIDDLE/BOTTOM	.20
VERTICAL	17
TOP/MIDDLE	12

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.

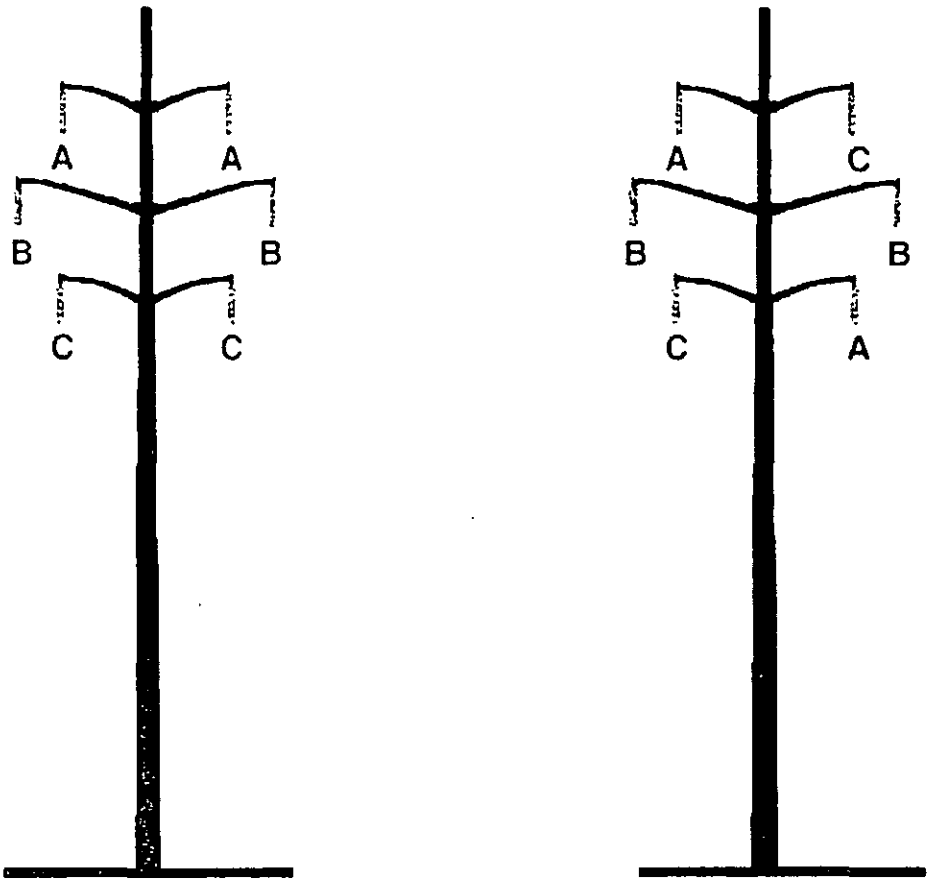
Compact Design Structure



- **Minimize magnetic fields due to compact design**
- **Not a low-cost alternative**
- **Typical conductor data:**

  1 3/8" HS steel overhead ground wire - 9.0 feet sag
  6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 9.0 feet sag
  Average span - 300 feet

Reverse Phasing of Double-Circuit Transmission Lines



From: → → → → **To:**

Reverse phasing also can be one of the following phase arrangements:

A	B		B	A		B	C		C	A		C	B
C	C	or	C	C	or	A	A	or	B	B	or	A	A
B	A		A	B		C	B		A	C		B	C

CHART VIII

230 kV REVERSE-PHASE TRANSMISSION LINES CALCULATED MAGNETIC FIELDS AT 800 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	49
DOUBLE CIRCUIT POLE (REVERSE-PHASE)	16

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 27 feet.

CHART IX

500 kV REVERSE-PHASE TRANSMISSION LINES CALCULATED MAGNETIC FIELDS AT 1100 AMPERES

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
DOUBLE CIRCUIT POLE	37
DOUBLE CIRCUIT POLE (REVERSE PHASE)	21

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 33 feet.

CHART X

INCREASED 138/69 kV MINIMUM GROUND CLEARANCE CALCULATED MAGNETIC FIELDS AT 400 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	25	12
SINGLE CIRCUIT TOP/MIDDLE	30	10
LONG SPAN	25	29
LONG SPAN	30	26
LONG SPAN (REVERSE PHASE)	25	9
LONG SPAN (REVERSE PHASE)	30	7

The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.

CHART XI

INCREASED 230 kV MINIMUM GROUND CLEARANCE
CALCULATED MAGNETIC FIELDS AT 800 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT TOP/MIDDLE	27	30
SINGLE CIRCUIT TOP/MIDDLE	32	28
DOUBLE CIRCUIT POLE	27	49
DOUBLE CIRCUIT POLE	32	46
DOUBLE CIRCUIT POLE (REVERSE PHASE)	27	16
DOUBLE CIRCUIT POLE (REVERSE PHASE)	32	15

The edge of right of way is 75 feet from the line centerline.
The 800 ampere phase current is balanced between phases.

CHART XII

INCREASED 500 kV MINIMUM GROUND CLEARANCE CALCULATED MAGNETIC FIELDS AT 1,100 AMPERES

TYPE CONSTRUCTION	MINIMUM GROUND CLEARANCE FEET	MAGNETIC FIELD IN MILLIGAUSS AT THE EDGE OF THE RIGHT OF WAY
SINGLE CIRCUIT "H" STRUCTURE	33	42
SINGLE CIRCUIT "H" STRUCTURE	53	35
DOUBLE CIRCUIT POLE	33	37
DOUBLE CIRCUIT POLE	53	31
DOUBLE CIRCUIT POLE (REVERSE PHASE)	33	21
DOUBLE CIRCUIT POLE (REVERSE PHASE)	53	16

The edge of right of way is 100 feet from the line centerline.
The 1,100 ampere phase current is balanced between phases.

CHART XIII

12 kV DISTRIBUTION LINES
CALCULATED MAGNETIC FIELDS AT 300 AMPERES

TYPE CONSTRUCTION	POLE HEIGHT FEET	MAGNETIC FIELD IN MILLIGAUSS*	
		AT CENTERLINE	AT 30 FEET FROM CENTERLINE
STANDARD CROSSARM	45	14	7
STANDARD CROSSARM	50	11	6

* Field level under the line at mid-span based on 300 amps, balanced loading, one meter above ground level.

Siting/Magnetic Field Management.doc/mlt

APPENDIX C

LIST OF INVOLVED GOVERNMENTAL AGENCIES, MUNICIPALITIES AND OTHER PUBLIC ENTITIES

Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0053
Attn: Mr. Douglas C. McLearen, Chief

Pennsylvania Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, Pennsylvania 17120
Attn: The Honorable Allen D. Biehler, P.E., Secretary

Department of Environmental Protection
P.O. Box 2063
Market Street State Office Building
Harrisburg, Pennsylvania 17105-2063
Attn: Office of Field Operations

Adrian Merolli, Director
Luzerne County Planning Commission
Penn Place
20 N. Pennsylvania Avenue
Wilkes-Barre, PA. 18711

William J. Gallagher, Chair
Hazle Township Board of Supervisors
P.O. Box 506
Harleigh, PA. 18225

Ecological Services Section
Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry
P.O. Box 8552
Harrisburg, Pennsylvania 17105-8552

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copies of the foregoing Letter of Notification (including the exhibits and appendices) have been served upon the following persons, in the manner indicated, in accordance with the requirements of § 1.54 (relating to service by a participant).

VIA CERTIFIED MAIL – RETURN RECEIPT REQUESTED

PA Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, 2nd Floor
400 North Street
Harrisburg, PA 17120-0053
ATTN: Douglas C. McLearen, Chief

PA Department of Transportation
Commonwealth Keystone Building
400 North Street, 8th Floor
Harrisburg, PA 17120
ATTN: Honorable Allen D. Biehler,
P.E., Secretary

Department of Environmental Protection
P.O. Box 2063
Market Street State Office Building
Harrisburg, PA 17105-2063
ATTN: Office of Field Operations

Adrian Merolli, Director
Luzerne County Planning Commission
Penn Place
20 N. Pennsylvania Avenue
Wilkes-Barre, PA 18711

William J. Gallagher, Chair
Hazle Township Board of Supervisors
P.O. Box 506
Harleigh, PA 18225

Ecological Services Section
PA Dept. of Conservation and Natural Resources
Bureau of Forestry
PO Box 8552
Harrisburg, PA 17105-8552

Date: January 9, 2007

John H. Isom

RECEIVED
2007 JAN -9 PM 3:24
PA PUC
SECRETARY'S BUREAU

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA PUBLIC UTILITY COMMISSION
P. O. BOX 3265, HARRISBURG PA 17105-3265

IN REPLY PLEASE
REFER TO OUR FILE
Secretary
717-772-7777

January 10, 2007

A-110500 F0388

JOHN H. ISOM
POST & SCHELL, P.C.
12TH FLOOR
17 NORTH SECOND STREET
HARRISBURG PA 17101-1601

Dear Mr. Isom:

Receipt is acknowledged of the Letter of Notification of PPL Electric Utilities Corporation, which has been captioned and docketed to the above number.

This matter will receive the attention of the Commission and you will be advised of any further necessary procedure.

Sincerely,

James J. McNulty
Secretary

DOCKETED
JAN 10 2007

JJM: jih

DOCUMENT
FOLDER

COMMONWEALTH OF PENNSYLVANIA

DATE: January 10, 2007

SUBJECT: A-110500 F0388

TO: Bureau of Fixed Utility Services

FROM: James J. McNulty, Secretary

Letter of Notification of
PPL Electric Utilities Corporation

We attach hereto a copy of the Letter of Notification of PPL Electric Utilities Corporation, which has been captioned and docketed to the above number.

May we have a report prepared by your Bureau for Public Meeting.

Attachment

cc: Law Bureau

jih