



Before the
Pennsylvania Public Utility Commission

**REESE - HERSHEY
138/69 kV LINE**

**Attachments in Support of the
Letter of Notification**

Application Docket No. _____

Submitted by: PPL Electric Utilities Corp.

SUMMARY

This Letter of Notification is being submitted by PPL Electric Utilities Corporation (PPL Electric) pursuant to the Pennsylvania Public Utility Commission's (PUC or the Commission) regulations at 52 Pa. Code §§57.71 through 57.77 for approval to construct two short sections of new overhead 138/69 kV transmission line to connect the Reese Candy 138/69 kV Tap to the Hershey 69-13 kV Substation in Derry Township, Dauphin County. The two new sections of overhead 138/69 kV transmission line will be approximately 360 feet and 70 feet in length. The remaining portion of the new 138/69 kV line, which is approximately 2.2 miles, will be constructed underground. Therefore, the remaining portion is not subject to Commission approval. The underground section of this line will be constructed within existing public right-of-way and new private right-of-way. The new transmission line will be designed and constructed for single-circuit 138 kV operation, although it will initially operate at 69 kV until load growth in the area makes an increase appropriate.

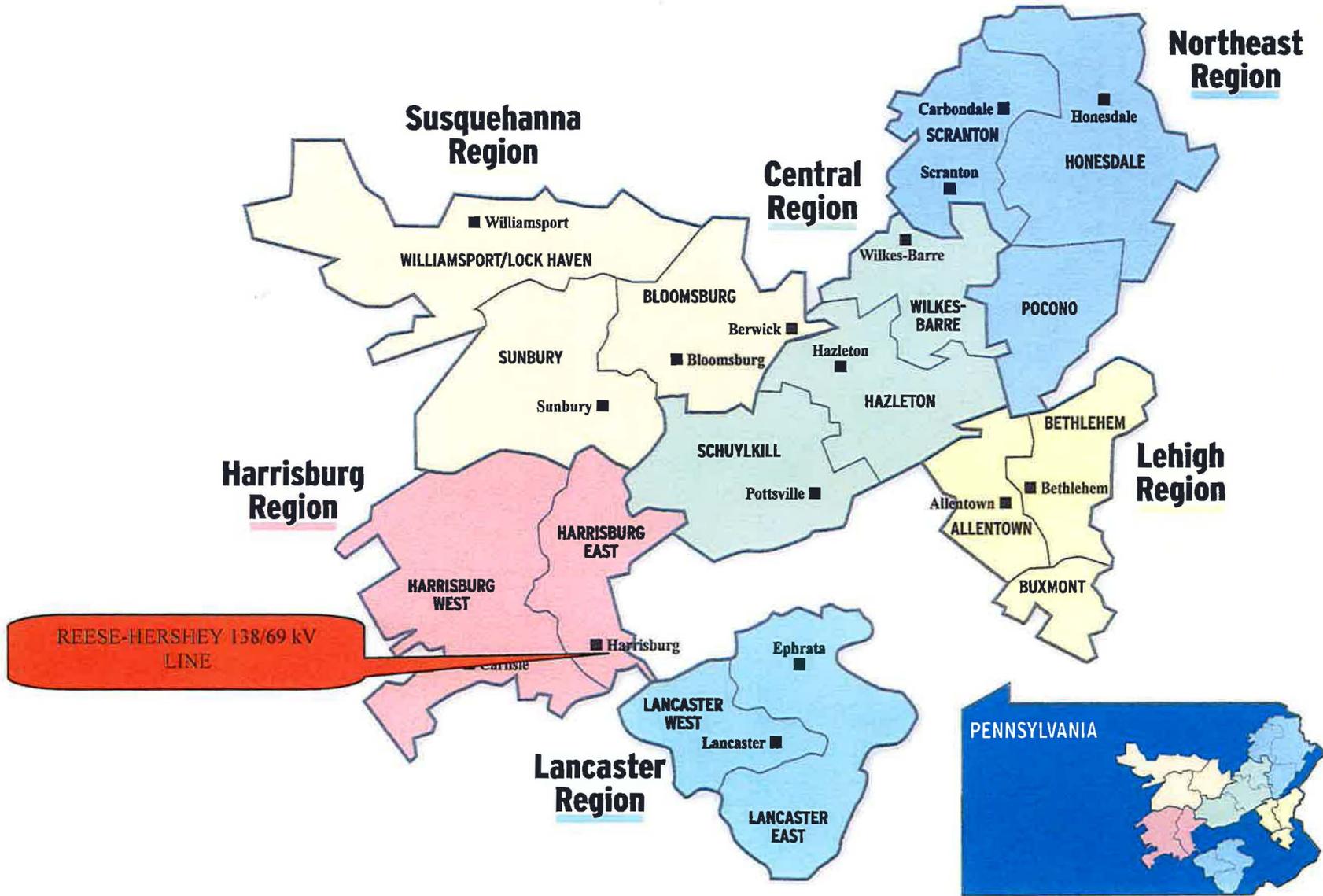
This project is required to improve the reliability and operating flexibility of PPL Electric's system in the Hershey area. PPL Electric will install a 138/69 kV transmission line from its existing Reese Candy 138/69 kV Tap to provide a third 69 kV supply to the existing Hershey 69-13 kV Substation. Although, a majority of the proposed line will be constructed underground, there will be two overhead sections, one at each end of the proposed line. These overhead sections allow for the new line to tie into the existing Reese Candy 138/69 kV Tap, located on the western side of the project, and the existing Hershey 69-13 kV Substation to the east. Commission approval is required for the two overhead sections.

The total estimated cost of the proposed project is \$13 million which includes both the overhead and underground portions. The overhead transmission portion will cost approximately \$700,000 and the underground portion will cost approximately \$12.3 million. Construction is scheduled to begin in March, 2012 to support the project's in-service date of May, 2013.

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

Attachment 1	Necessity Statement
Attachment 2	Engineering Description
Attachment 3	Environmental Assessment
Attachment 4	PPL Electric Design Criteria and Safety Practices
Attachment 5	PPL Electric Magnetic Field Management Program
Attachment 6	List of Owners of Property within the Right-of-Way
Attachment 7	List of Involved Governmental Agencies, Municipalities, and Other Public Entities

PPL ELECTRIC UTILITIES SERVICE TERRITORY



Attachment

1

ATTACHMENT "1"
REESE-HERSHEY 138/69 kV LINE
NECESSITY STATEMENT

TABLE OF CONTENTS

<u>Section</u>	<u>Topic</u>	<u>Page</u>
A.	INTRODUCTION.....	1
B.	SYSTEM PLANNING PROCESS AND GUIDELINES.....	1
C.	EXISTING TRANSMISSION SYSTEM	4
D.	DEFINITION OF THE PROBLEM.....	4
E.	CONVERSION TO 138 KV.....	5
F.	PROPOSED TRANSMISSION SYSTEM.....	6
G.	ALTERNATIVES CONSIDERED.....	7

LIST OF FIGURES/TABLES

FIGURE 1	FUNCTIONAL ONE-LINE DIAGRAM OF EXISTING FACILITIES.....	9
FIGURE 2	FUNCTIONAL ONE-LINE DIAGRAM OF PROPOSED FACILITIES.....	10

MAP

MAP 1	PPL ELECTRIC SYSTEM MAP.....	ATTACHMENT 1 MAP POCKET
-------	------------------------------	-------------------------------

ATTACHMENT "1"
REESE-HERSHEY 138/69 kV LINE
NECESSITY STATEMENT

A. INTRODUCTION

PPL Electric Utilities Corporation (PPL Electric) proposes to construct a new 138/69 kV transmission line from the PPL Electric owned Reese Candy 138/69 kV Tap to the Hershey 69-13 kV substation. A majority of the line will be constructed underground except for two short portions, one at each end of the project, which will be constructed overhead. One of the overhead spans will be constructed on the Reese Candy Tap side, and the other will be on the Hershey Substation side. The overhead section near the Reese Candy Tap will be approximately 360 feet in length, and the overhead section into the Hershey Substation will be approximately 70 feet in length. The line will be designed and constructed for single circuit 138 kV operation, although initially it will operate at 69 kV until load growth in the area makes an increase in voltage appropriate.

This project is required to resolve violations of PPL Electric's Reliability Principles and Practices (RP&P) guidelines, improve the reliability of service, and improve operating flexibility of PPL Electric's system in the Hershey area. In addition, the project will also help meet the increasing demand for electrical power in the area.

The estimated cost to design and construct this project is approximately \$13 million. The overhead transmission portion will cost approximately \$700,000 and the underground portion will cost approximately \$12.3 million. In order to meet a scheduled in-service date of May 2013, construction on this project is scheduled to start by March 2012.

B. SYSTEM PLANNING PROCESS AND GUIDELINES

System Planning is the process which assures that PPL Electric's regional system can supply electricity to all customer load in a manner that is reliable and economic. This process assures that PPL Electric's regional system is planned and constructed so that:

- It can sustain probable contingencies and disturbances with minimal customer service interruptions;
- It can adequately serve each customer's needs with regard to capacity, voltage and reliability for all load levels throughout the daily load cycle; and
- It is in conformance with the applicable PPL Electric Reliability Principles and Practices.

The reliable and economical operation of PPL Electric's 138/69 kV transmission system requires planning guidelines for system expansion. The planning guidelines establish that:

- The system expansion should be coordinated to achieve the most economical balance of construction and operating expenditures;
- It should maintain a proper balance between the degree of risk, amount and type of load interrupted, and the cost of providing the needed expansion; and
- System reliability should be maintained to prevent large scale, long term, or frequent service interruptions to avoid the adverse effects and hazards to the public.

In accordance with these guidelines and PPL Electric's Reliability Criteria, PPL Electric's regional transmission system is planned so that:

1. Normal operation of the system will not load any electric facility beyond its normal continuous rating;
2. The loss of any single transmission line, generating unit connected to the sub-transmission system, power transformer, substation bus, circuit breaker, or double circuit line due to the outage of a single tower or pole, does not result in any electric facility on the system being operated beyond its applicable emergency rating;
3. No customer load should remain interrupted for routine maintenance of sub-transmission facilities;
4. The loss of any single facility should not result in a voltage drop of more than 5% on the 138/69 kV transmission system;

5. Stability of the electric system should be maintained from a permanent three-phase transmission line fault cleared by normal primary relay action. Stability of the electric system should also be maintained for a permanent single line to ground fault with failure of the protective devices to operate or failure of a circuit breaker;
6. No large-scale, long term or frequent interruption may cause excessive load loss because of the adverse effects on, and hazard to, the public; and
7. Excessive load is not interrupted for the loss of a single circuit 69 kV line or double circuit 69 kV line.

These principles are incorporated in PPL Electric's RP&P document.

The planning process begins with the development of a computer model of the future system. A specific study year is chosen. The future system model is then developed using the existing system plus any planned modifications to the transmission system scheduled to be in service prior to the study year. Load levels used in the system model are based on the latest forecast prepared annually by PPL Electric, which is based on recent summer peak load forecasts that take into account ambient temperatures and humidity indices.

Once the system model is complete, comprehensive power flow simulations are performed to determine the ability of the system to comply with the PPL Electric transmission planning reliability criteria. This is accomplished by simulating an outage of each regional and bulk electric facility. All conditions where the system is not in conformance with the reliability criteria are identified, and system reinforcements are added to bring the system into conformance. Also identified are estimated costs and lead-times to implement the required reinforcements. Computer simulations of the system with the identified reinforcement alternatives are completed to identify the best overall reinforcement that will meet the needs of the region in a reliable and economic manner.

C. EXISTING TRANSMISSION SYSTEM

Figure 1 shows the functional configuration of the existing 69 kV transmission lines into the Hershey 69-13 kV Substation. Two existing 69 kV transmission lines terminate into the Hershey Substation; both are served from PPL Electric's Hummelstown 230-69 kV Substation. One of the transmission lines goes directly into the Hershey Substation. The other goes via PPL Electric's South Hershey 69-13 kV Substation. These two 69 kV transmission lines provide electric power supplies to two PPL Electric-owned distribution substations and one Hershey Medical customer-owned substation. These two lines are double circuited for 1.47 miles into the Hershey Substation. This portion of the line is an area of immediate concern, because an outage on this portion of the line could interrupt the entire Hershey Substation load of 52 MW.

D. DEFINITION OF THE PROBLEM

This project is required to uphold the reliability requirements of PPL Electric's 69 kV transmission system to adhere to PPL Electric's RP&P.

The RP&P standards require that, for an outage of a double circuit 69 kV transmission line, the following load interruption standards be upheld:

- 120 MW of load can be interrupted for up to 2 hours, after 2 hours only 45 MW of load can remain interrupted. All other load must be restored by field switching to adjacent transmission lines or substations.
- After 10 hours, or until repairs are completed, all load must be restored.

By the summer of 2012, if there were a double circuit line failure¹ of the Hummelstown — Hershey and Hershey — South Hershey 69 kV lines due to a transmission line failure or a maintenance outage, approximately 52 MW of load would remain interrupted at the Hershey Substation after all of the field switching moves are completed to transfer load to the adjacent substations. PPL Electric's Transmission Planning RP&P permits up to 45 MW for a double

¹ A line failure includes failure of cross arms, insulators, structures, or wires down, etc.

circuit 69 kV line outage. A double circuit line outage of the Hummelstown — Hershey and the Hershey — South Hershey 69 kV Line would cause excessive load drop beyond that which is permitted by the RP&P.

By the end of May 2012 this problem will transfer from the Hershey Substation side of the system to the Reese Substation side, because approximately 20 MW of load from Hershey Substation would be transferred permanently to the customer-owned Reese Substation as a result of the relocation by The Hershey Company of some manufacturing equipment from their existing facility, which is served by the Hershey Substation, to a new facility which will be served by the Reese Substation. A double circuit outage of the 69 kV transmission line from the Hummelstown Substation, which supplies the PPL Electric-owned Duke Substation and the customer-owned Reese Substation, would interrupt approximately 57 MW of load. After restoration of 5 MW of load via transfers on the 12 kV system, load in excess of 45 MW would remain interrupted. This amount would exceed the permissible limit for a double circuit 69 kV line outage under the RP&P.

This project will allow PPL Electric to meet its RP&P guidelines in order to provide the transmission facilities required for quick restoration of electric service to customers, and will resolve the load loss concerns associated with a double circuit outage.

The proposed project involves the construction of a high capacity 138/69 kV transmission line between the customer owned Reese Substation and the PPL Electric owned Hershey Substation in order to alleviate the excessive load drop condition. The project will also provide capacity for future load growth and load transfer capability in case an outage occurs at the PPL Electric owned Hershey or Duke Substations, or at the customer owned Reese Substation. In addition, the proposed system will provide improved operating flexibility.

E. CONVERSION TO 138 KV SYSTEM

Conversion to 138 kV will be required when load growth in the Hershey area exceeds the capability of the 69 kV system. The decision to construct this project using 138 kV design

standards will facilitate future conversion to 138 kV and minimize interruption of service to customers during the future conversion.

F. PROPOSED TRANSMISSION SYSTEM

The functional configuration of the proposed system is shown in Figure 2. PPL Electric plans to construct a new 138/69 kV transmission line connecting the Reese Candy 138/69 kV Tap and terminating it into the Hershey 69-13 kV Substation. The majority of the line will be underground, except for two short portions at either end which will be overhead; one on the Reese Candy Tap side and the other on the Hershey Substation side. The transmission line will be designed and constructed for single circuit 138 kV operation, although it will initially operate at 69 kV until load growth makes it appropriate for the line to be operated at 138 kV.

The overhead portion of the line located on the Reese Candy Tap side will be constructed to accommodate a future double tap configuration. Initially, only one tap line will be installed and will connect the Reese Candy #1 Tap Line to the Hershey Substation. In the future, a second tap line will be installed and will connect the Reese Candy #2 Tap Line to a switching pole, in what is known as a double tap single feed configuration. This configuration will provide increased operating flexibility during routine maintenance and contingency situations.

Construction of this project will provide a high capacity 138/69 kV transmission line between Reese and the Hershey substations, which will eliminate excessive load drop beyond the limits permitted by the RP&P because it will create an additional supply source for the Hershey Substation and for the Duke and Reese Substations which will enable them to continue to provide service in the event of an outage of the existing supply lines. Also it will create additional capacity for future load growth. Additionally, the project will provide improved operating flexibility and load transfer capability as compared to the existing system.

The estimated cost to design and construct this project is \$13 million which includes both the overhead and underground costs. This project has a scheduled construction start date of March 2012 to meet the scheduled in-service date of May 2013.

G. ALTERNATIVES CONSIDERED

Two alternatives were considered for the proposed project to reinforce the Hershey Substation. Each alternative was evaluated based on its ability to ensure that customer load in the region could be supplied in accordance with PPL Electric's reliability criteria in a long-range economic and environmentally acceptable manner for a 69 kV double circuit outage. The two alternatives considered were:

- 1) Construct a new 138/69 kV transmission line, approximately 2 miles long, mostly underground with two short overhead sections at either end of the project.
- 2) Construct a new 138/69 kV transmission line, which would be overhead and underground, and approximately 4 miles long.

Alternative 1

Alternative 1 would construct a new 138/69 kV transmission line, which would be approximately 2 miles long and mostly underground. The line would have two short overhead sections at either end of the line. The overhead portions will be built in new right-of-way obtained from private property owners. The total estimated cost to design and construct Alternative 1 is \$13 million.

This reinforcement alternative resolves the excessive load drop concerns and contributes to the long-term development of the 138/69 kV regional electric supply system in this area.

Alternative 1 is more economical, because the line will only be 2 miles long and utilizes very minimum rights-of-way. No extensive outages of the existing facilities would be required for the construction of the new transmission line, thus maintaining the reliable supply to customers in this area during construction.

Alternative 2

Alternative 2 would require construction of a transmission line that would be approximately 4 miles long. Approximately two miles of this line would be overhead in a new right-of-way, and approximately two miles would be underground, similar to Alternative 1. The new transmission line would connect the Hummelstown Substation to the Hershey Substation with a normally

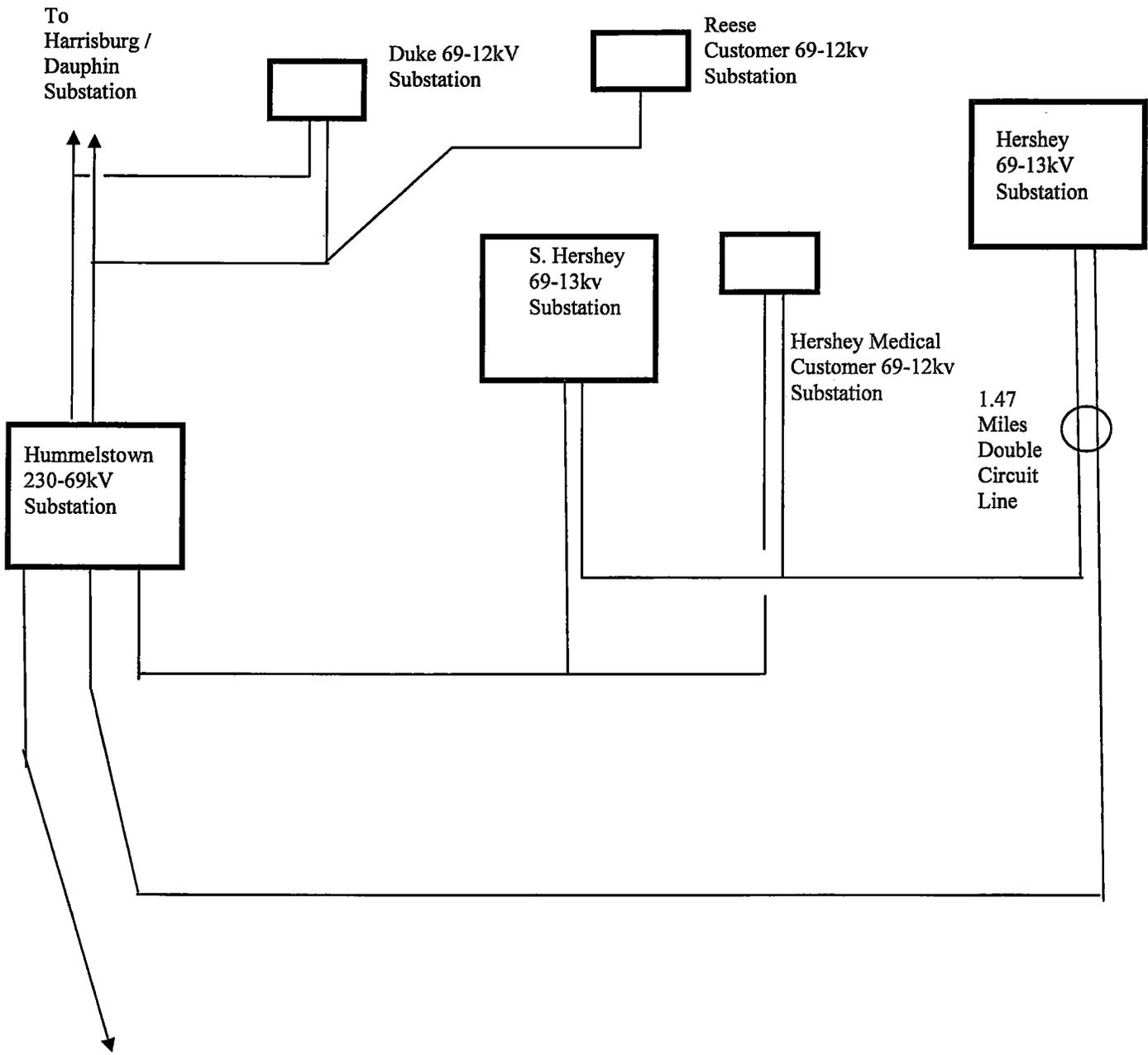
open tie to the Reese Candy Tap to restore Duke and Reese substation load in case of a double circuit outage on the lines from the Hummelstown Substation. This alternative is estimated to cost approximately \$17.2 million.

Alternative 2 adds 2 miles of additional overhead transmission line to Alternative 1, which makes this option more expensive and more difficult to construct, due to the additional right-of-way requirements. This option would also require a new 69 kV line terminal at the Hummelstown Substation, a normally open 69 kV tie line connection to the Reese Candy Tap for capability to restore load to Duke and Reese substations, and the negotiation of approximately 2 miles of additional right-of-way. The need for the additional rights-of-way creates an additional level of uncertainty in proceeding with Alternative 2.

Due to the above limitations, Alternative 2 was rejected in favor of Alternative 1.

Conclusion

Based upon the analysis summarized above, PPL Electric determined that Alternative 1 was the better alternative for addressing the problem identified in Section D, above.



W. Hempfield
69kV line

FIGURE 1
FUNCTIONAL ONE-LINE
DIAGRAM OF EXISTING
FACILITIES

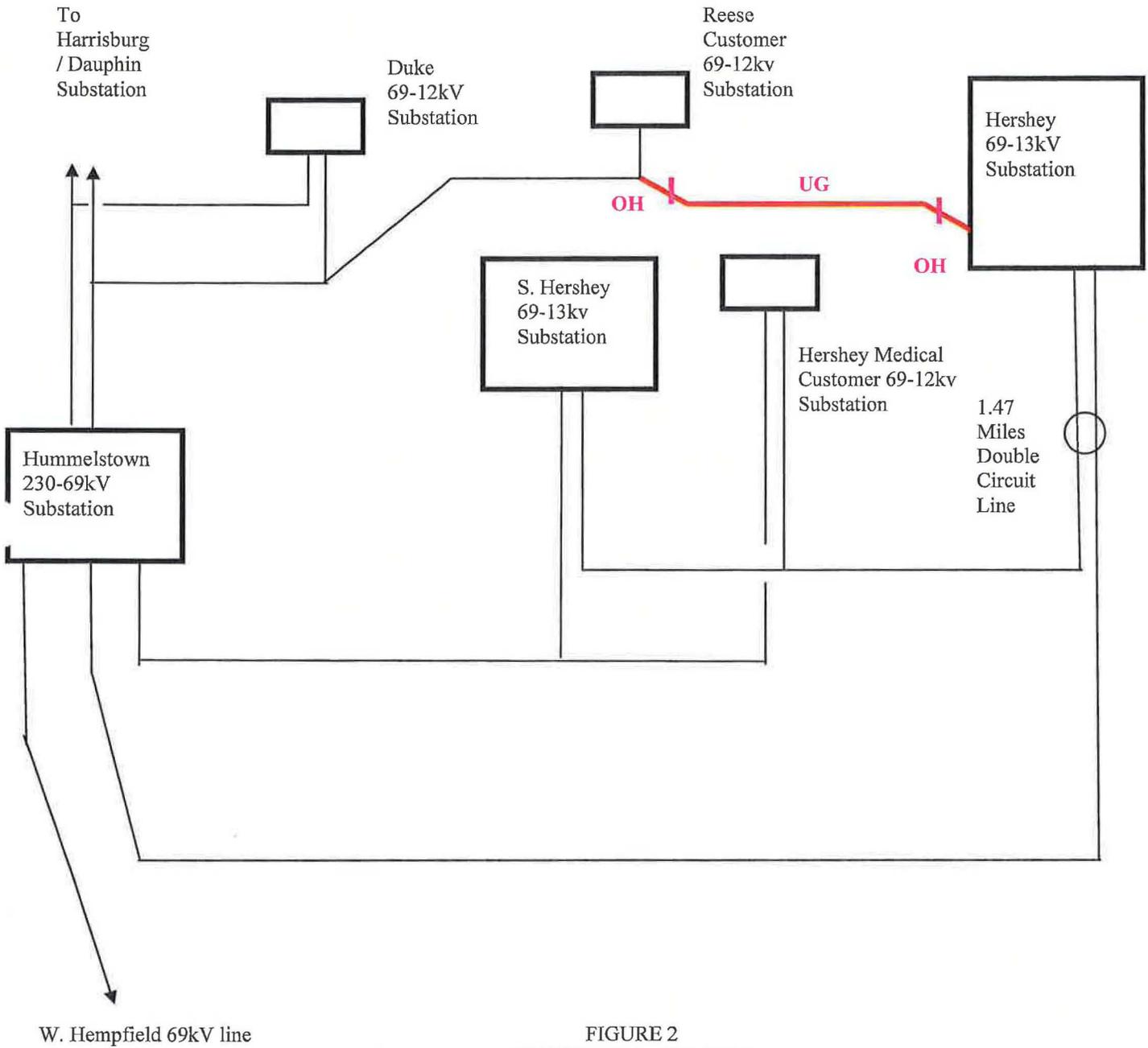


FIGURE 2
FUNCTIONAL ONE-LINE
DIAGRAM OF PROPOSED
FACILITIES

SUBSTATION LISTING

- | | | | |
|------------------------|-------------------------|-------------------------------|----------------------|
| 1. WEST WILLIAMSPORT | 136. SELINGSGROVE | 271. HALIFAX | 404. APPENZEL |
| 2. FAIRFIELD | 137. SUMNER | 272. MILLERSBURG | 405. BLUE MOUNTAIN |
| 3. MONTGOMERY | 138. AUBURN | 273. MUNCY | 406. DAPPERS 69/12KV |
| 4. VARDEN | 139. ROHRSBURG | 274. HAUTO | 407. MEISERDALE |
| 5. HONESDALE | 140. DEERY | 275. BERWICK | 408. LEDGEDALE |
| 6. JERSEY SHORE | 141. EAST GREENVILLE | 276. SHEVANDONAH | |
| 7. LOGANTON | 142. WEST DAMASCUS | 277. PINE GROVE | |
| 8. VALMONT | 143. NEW COLUMBIA | 278. STROUDSBURG | |
| 9. RIVER | 144. FARMERSVILLE | 279. FREEMANSBURG | |
| 10. LIMESTONE | 145. GREENVILLE | 280. ALLENTOWN | |
| 11. NORTH STRUDSBERG | 146. NORTH STRUDSBERG | 281. BINGEN | |
| 12. REED | 147. TANNERSVILLE | 282. RHEIMS | |
| 13. WRIGHT | 148. ELIZABETHVILLE | 283. CLEVELAND | |
| 14. ST. JOHNS | 149. WYOMISSING | 284. LITTLE GAP | |
| 15. FREELAND | 150. EXETER | 285. ORVILLE | |
| 16. * | 151. CRACKERSPORT | 286. TUSCARORA | |
| 17. GILBERT | 152. SCHNECKSVILLE | 287. BARTONSVILLE | |
| 18. * | 153. HEMLOCK | 288. ALTON PARK | |
| 19. CHERRY HILL | 154. MT. ALLEN | 289. SALEM | |
| 20. SUSQUEHANNA 230KV | 155. PRINCE | 290. NORTH BRIDGEPORT | |
| 21. TAMAHEND | 156. WAKEFIELD | 291. HAMPDEN | |
| 22. WHITE HILL | 157. COOPERSBURG | 292. CANELBACK | |
| 23. PALMERTON | 158. WERTZVILLE | 293. SILVER SPRING | |
| 24. HAMILTON | 159. WEST CARLISLE | 294. BRECKNOCK | |
| 25. HUNTER | 160. BENVENUE | 295. BENTON | |
| 26. FAIRVIEW | 161. HEGINS | 296. MICHAELS | |
| 27. * | 162. LEOLA | 297. HUGHSTOWN | |
| 28. * | 163. YATESVILLE | 298. NEWVILLE | |
| 29. MONTOUR PUMP | 164. CENTRAL ALLENTOWN | 299. POINTE NORTH | |
| 30. MT. CARMEL | 165. OBERLIN | 300. MARIETTA | |
| 31. KELLY | 166. STRASBURG | 301. CENTER CITY | |
| 32. SPORTING HILL | 167. ATGLEN | 302. NEW KINGSTOWN | |
| 33. MAHANOCY CITY | 168. BROOKSIDE | 303. NEARSTOWN | |
| 34. GREENWOOD | 169. WILLIAMSTOWN | 304. DUPONT | |
| 35. MOWERY | 170. EAST PETERSBURG | 305. HUMBOLT | |
| 36. ALTMOUNT | 171. WERNERSVILLE | 306. CEDAR AVE. | |
| 37. HAMLIN | 172. NORTH BETHLEHEM | 307. INDIAN ORCHARD | |
| 38. ASHFIELD | 173. WEST ALLENTOWN | 308. NOTTINGHAM | |
| 39. SOUTH SLATINGTON | 174. SOUTH COOLBAUGH | 309. NORTH COOLBAUGH | |
| 40. SOUTH MIDDLEBURG | 175. MECKESVILLE | 310. LETORT | |
| 41. WALKER | 176. DONERVILLE | 311. EAST MOUNTAIN | |
| 42. FRAILEY | 177. MILLERSVILLE | 312. JERMYN | |
| 43. MORGANTOWN | 178. SHILLINGBURG | 313. BLOOMSBURG | |
| 44. EGYPT | 179. DUKE | 314. HIFFLINTOWN | |
| 45. CRESSONA | 180. WALLISTERVILLE | 315. RIDGE ROAD | |
| 46. SOUTH WHITEHALL | 181. NEWFOUNDLAND | 316. SUSQUEHANNA | |
| 47. EAST TOMHICKEN | 182. MARLIN | T-10 SW. YARD | |
| 48. BEAR GAP | 183. WEST BERWICK | 317. KIMBLES | |
| 49. SALISBURY | 184. KEYSER AVENUE | 318. CHRISTMANS | |
| 50. SOUTH MILTON | 185. NICKLEYS | 319. OTTER CREEK | |
| 51. HEIDELBERG | 186. EAST ALLENTOWN | 320. STEEL CITY | |
| 52. LYKENS | 187. PINE RIDGE | 321. MCGOVERNVILLE | |
| 53. UPPER HANOVER | 188. DALMATIA | 322. ROBESONIA | |
| 54. RICHLAND | 189. PENNSBORO | 323. SOUTH FOGESVILLE | |
| 55. MACADA | 190. NORTH COLUMBIA | 324. ELROY | |
| 56. HUGHSVILLE | 191. HUGHSVILLE | 325. BUSHKILL | |
| 57. THOMPSONTOWN | 192. SOUTH ALLENTOWN | 326. WALLENPAUPACK | |
| 58. PAXTON | 193. WEISSPORT | 327. ELK MOUNTAIN | |
| 59. COCALICO | 194. HONEYBROOK | 328. JACK FROST | |
| 60. EAST ELIZABETHTOWN | 195. MOSCOW | 329. HARWOOD 230/69KV | |
| 61. WARWICK | 196. * | 330. HARWOOD CTG | |
| 62. EARL | 197. ROSSMOYNE | 331. HARWOOD 69/12KV | |
| 63. HEMPFIELD | 198. NORTHAMPTON | 332. NAZARETH | |
| 64. EAST LANCASTER | 199. WOOLRICH | 333. ALBURTIS | |
| 65. KINZER | 200. FAXON | 334. FRACKVILLE | |
| 66. MT. NERO | 201. ELIZABETHTOWN | 335. * | |
| 67. MT. POCONO | 202. ENOLA | 336. ELMSPORT | |
| 68. PENNS | 203. TERRE HILL | 337. ALLENWOOD | |
| 69. GOULDSBORO | 204. BUCK | 338. * | |
| 70. DILLERVILLE | 205. MT. BETHEL | 339. GRATZ | |
| 71. GILBERT MANOR | 206. RICHFIELD | 340. HOCKERSVILLE | |
| 72. KENMAR | 207. SCANTON | 341. BLOOMING GROVE | |
| 73. COWEN CITY | 208. TWIN LAKES | 342. MONROE | |
| 74. * | 209. HARLEIGH | 343. LACKAWANNA #B | |
| 75. ELLIOT HEIGHTS | 210. TAPTON | 344. STANTON | |
| 76. ROHRERSTOWN | 211. BEAR CREEK | 345. JACKSON | |
| 77. MACURGIE | 212. DRWIGSBURG | 346. EAST PALMERTON | |
| 78. EAST HAZLETON | 213. EAST TEXAS | 347. SIEGRID | |
| 79. WAGNERS | 214. CANDENSIS | 348. HOSENSACK 230/69KV | |
| 80. EAST CARBONDALE | 215. LINDEN | 349. HOSENSACK 500KV | |
| 81. EYON | 216. MT. JOY | 350. CONESTOGA | |
| 82. MINOOKA | 217. WEST BLOOMSBURG | 351. MANOR | |
| 83. OLD FORGE | 218. MINSI TRAIL | 352. CLINTON | |
| 84. FOUNTAIN SPRINGS | 219. LAKE MCGMI | 353. EXCHANGE | |
| 85. SULLIVAN TRAIL | 220. LANARK | 354. MILTON | |
| 86. * | 221. * | 355. DAUPHIN | |
| 87. SWATARA | 222. MONTGOURSVILLE | 356. QUARRY SUB. | |
| 88. NEPBURN | 223. PORT CARBON | 357. STEBLTON | |
| 89. * | 224. BLYTHEBURN | 358. JUNIATA 500/230KV | |
| 90. * | 225. MILFORD | 359. JUNIATA 230/69KV | |
| 91. * | 226. TREICHLERS | 360. CUMBERLAND | |
| 92. FRANCONIA | 227. ROSEVILLE | 361. DONEGAL | |
| 93. BRIMMALS | 228. RUTHERFORD | 362. JENKINS 230/69KV | |
| 94. MORGAN | 229. HARTLAND | 363. JENKINS CTG | |
| 95. THROOP | 230. PARRISH | 364. WILKES-BARRE | |
| 96. * | 231. WEST NEW HOLLAND | 365. BUXMONT | |
| 97. * | 232. POINT | 366. SOUTH AKRON 230/138/69KV | |
| 98. CHAPMAN | 233. LINCOLN | 367. SOUTH AKRON 69/12KV | |
| 99. SUBURBAN | 234. MIDDLETON | 368. SOUTH MANHEIM 69/12KV | |
| 100. * | 235. STATE HILL | 369. SOUTH MANHEIM 230/69KV | |
| 101. * | 236. MILLVILLE | 370. ENGLESDALE | |
| 102. * | 237. TINKER | 371. COLUMBIA | |
| 103. PROVIDENCE | 238. LAKEVILLE | 372. DANVILLE | |
| 104. * | 239. NORTH MANHEIM | 373. SUNBURY | |
| 105. AVOCA | 240. HATFIELD | 374. HUMMELS WHARF | |
| 106. * | 241. HERSHEY | 375. LYCOMING | |
| 107. CASS | 242. SOUTH HERSHEY | 376. LOCK HAVEN CTG | |
| 108. CATASAUQUA | 243. SOUTH WILLIAMSPORT | 377. LOCK HAVEN 69/12KV | |
| 109. * | 244. FOGESVILLE | 378. HUMMELSTOWN | |
| 110. SUSQUEHANNA 500KV | 245. WINDSOR | 379. WEST SHORE | |
| 111. SEIDERSVILLE | 246. WEST WILLOW | 380. MONTAGE | |
| 112. ROSEMONT | 247. WESTGATE | 381. SOUTH FARMERSVILLE | |
| 113. QUARRYVILLE | 248. EDELA | 382. WESCOSVILLE | |
| 114. LAWNTON | 249. SUMMERDALE | 383. FISHBACH | |
| 115. LITZ | 250. DOWNERVILLE | 384. BERKS | |
| 116. RENOVO | 251. BOHEMIA | 385. MONTOUR | |
| 117. WALNUT | 252. WHITE HAVEN | 386. SUBURBAN YARD | |
| 118. WATSON | 253. LAURELTON | 387. * | |
| 119. TREKERTOWN | 254. LINGLESTOWN | 388. * | |
| 120. LAVINO | 255. POCONO FARMS | 389. MACK | |
| 121. SPRING | 256. HICKORY RUN | 390. WILLIAMSPORT | |
| 122. COLONIAL PARK | 257. BLOOMING GLEN | 391. HARRISBURG | |
| 123. WEST LANCASTER | 258. SHERMANSDALE | 392. ELSDRED | |
| 124. MADISONVILLE | 259. * | 393. * | |
| 125. NEIFSVILLE | 260. LARRY'S CREEK | 394. MILLWOOD | |
| 126. BEAVERTOWN | 261. SPANGLER MILLS | 395. TELFORD | |
| 127. BELMONT | 262. EAST DANVILLE | 396. TWIN VALLEY | |
| 128. LAKE HARMONY | 263. DELANO | 397. DEVONSHIRE | |
| 129. GEORGETOWN | 264. CARBON | 398. JESSUP | |
| 130. SCOTT | 265. SELERSVILLE | 399. BELTZVILLE | |
| 131. NORTH HARRISBURG | 266. MECHANISBURG | 399. SCHENOCK | |
| 132. MOUNT ROCK | 267. CARLISLE | 400. HAWLEY | |
| 133. GREENLAND | 268. CEDAR | 401. EFFORT MOUNTAIN | |
| 134. LANDISVILLE | 269. ARROWHEAD | 402. COPPERSTONE | |
| 135. GREEN PARK | 270. NEWPORT | 403. RED FRONT | |

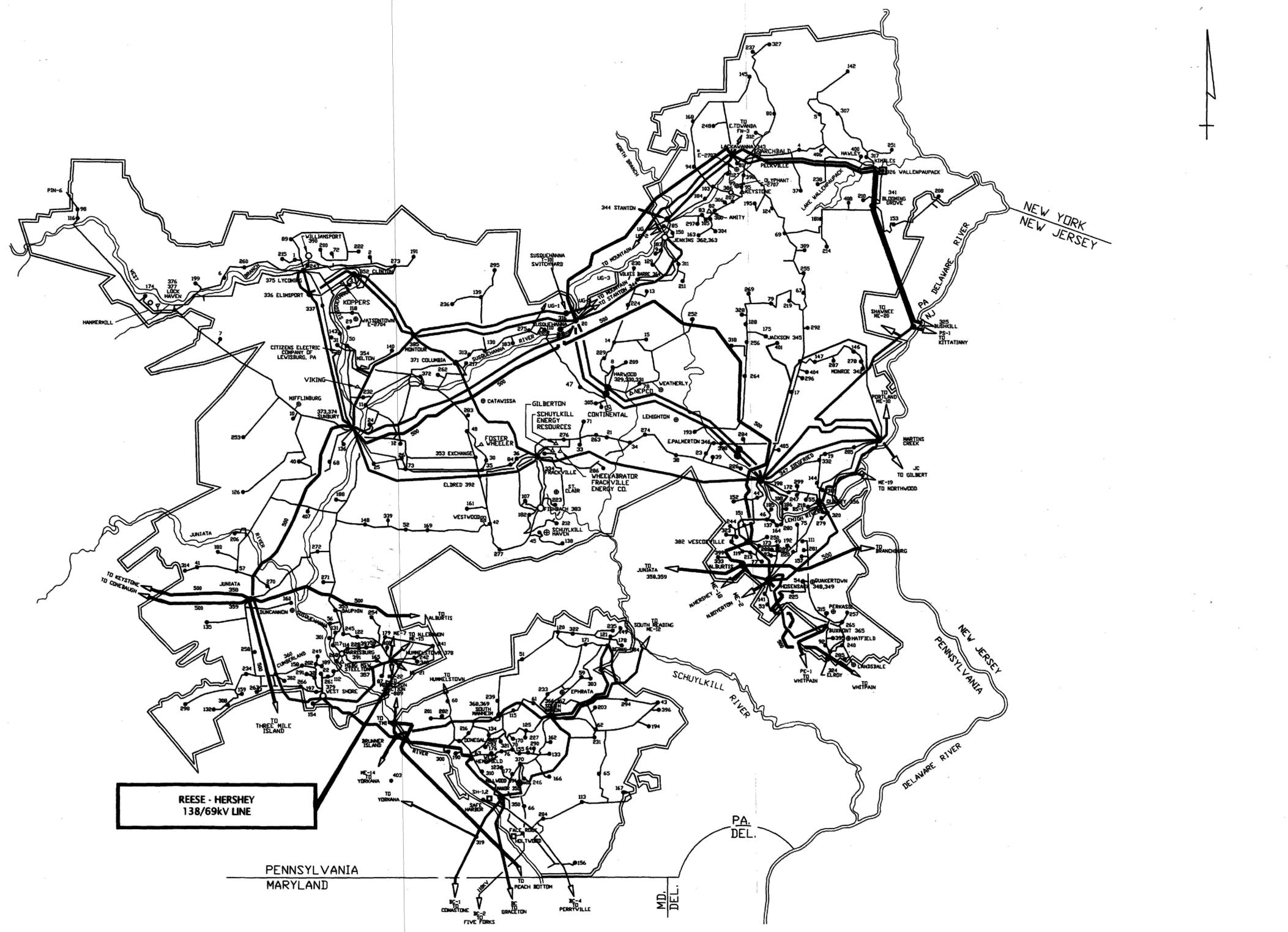
* - SUBSTATIONS THAT HAVE BEEN RETIRED.

** - SITE OF THE EXISTING 230KV SUBSTATION AND PROPOSED 500KV SYBSTATION.

INTERCONNECTIONS

- PS PUBLIC SERVICE ELECTRIC AND GAS CO. OF N.J.
- ME METROPOLITAN EDISON CO. (FIRST ENERGY)
- PE PHILADELPHIA ELECTRIC CO. (PECO ENERGY)
- BC BALTIMORE GAS AND ELECTRIC CO.
- SH SAFE HARBOR WATER POWER CORPORATION
- UP THE UNITED GAS IMPROVEMENT CO. - LUZERNE ELECTRIC DIVISION
- PN PENNSYLVANIA ELECTRIC CO. (FIRST ENERGY)
- JC JERSEY CENTRAL POWER AND LIGHT CO. (FIRST ENERGY)

- COMBUSTION TURBINE
 - HYDRO ELECTRIC
 - COMBINATION
 - FIRM SALES
 - SUBSTATION / SWITCHING STATION
 - STEAM ELECTRIC
 - NON-UTILITY GENERATION
 - INDEPENDENT POWER PRODUCERS
- 500KV OPERATION
 230KV OPERATION
 138KV OPERATION
 69KV OPERATION



REESE - HERSHEY
138/69KV LINE

PENNSYLVANIA
MARYLAND

PA. DEL.

MD. DEL.

ACCT - 805201		ELECTRICAL SYSTEM MAP	
SCALE - NONE		REESE - HERSHEY	
BY - CDW		138/69 KV LINE	
REVIEWED	APPROVED	DATE	PPL ELECTRIC UTILITIES
	G. HAKUN III	7/17/85	
PPL DRAWING NO.		SHEET NO.	REV.
D191830			1 91

NO.	DATE	ACCT.	DESCRIPTION	BY	REVIEWED	APPROVED
08	5/6/11	10012079	ADDED LEDGEDALE 138/69 KV TAP LINE PROJECT LOCATION.	MG	RWM	KBK
01	6/9/11	1169002	ADDED REESE - HERSHEY 138/69 KV LINE.	RRC	RWM	JW
90	6/9/11	10014284	ADDED WHITPAIN-BUXMONT 230 LINE REPLACEMENT.	RRC	RWM	JW
09	5/20/11	10014555	ADDED TAPTON #2 138/69KV TAP	GRC	RWM	DJG

Attachment

2

ATTACHMENT "2"
REESE-HERSHEY 138/69 kV LINE
ENGINEERING DESCRIPTION

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	DESCRIPTION OF PROPOSED LINE	1
B.	MAGNETIC FIELD MANAGEMENT.....	4
C.	RIGHT-OF-WAY STATUS.....	4

LIST OF TABLES

TABLE 1	DESIGN MINIMUM CONDUCTOR CLEARANCES.....	3
TABLE 2	CONDUCTOR THERMAL RATINGS	3

LIST OF FIGURES

FIGURE 1	TYPICAL 138/69 kV LOAD SECTIONALIZING AIR BREAK SWITCH.....	5
FIGURE 2	TYPICAL 138/69 kV UNDERGROUND TERMINAL POLE....	6

MAP

MAPS	AERIAL PLOT PLAN – DRAWING.....	ATTACHMENT 2 MAP POCKET
------	---------------------------------	----------------------------

**ATTACHMENT “2”
REESE-HERSHEY 138/69 kV LINE
ENGINEERING DESCRIPTION**

A. DESCRIPTION OF PROPOSED LINE

PPL Electric proposes to construct a new 138/69 kV transmission line from the existing Reese Candy 138/69 kV Tap to the existing Hershey 69-13 kV Substation. The majority of the new line will be constructed underground with the exception of two short sections, one at each end of the line. The new line will be designed and constructed for single circuit 138 kV operation, although initially it will operate at 69 kV. The project is located in Derry Township, Dauphin County. An aerial exhibit showing the location of the proposed facilities is provided at the end of Attachment 2.

The proposed transmission line is divided into three line segments: the Reese Candy overhead line segment, the underground line segment, and the Hershey overhead line segment.

The section of new overhead line near the area of the existing Reese Substation, which is on the western side of the line, will connect to the existing Reese Candy 138/69 kV Tap. This line segment will require the installation of approximately 360 feet of new wire and two new structures. This section will be designed to accommodate an additional pole and conductors to allow for a future double tap configuration. One new structure will be a single-shaft steel transmission pole switch structure (Figure 1), and the other will be an overhead to underground transition structure (Figure 2). The new steel transmission pole will be approximately 70 feet in height and direct embedded. The new transition structure will be approximately 80 feet in height and will be installed on a concrete foundation. The line will consist of three power conductors and one overhead ground wire. The power conductors will be 556.5 kcmil¹, 24/7 stranding, ACSR² power conductors. A 3/8 inch steel overhead ground wire will provide lightning protection for the proposed line.

¹ Kcmil stands for “thousand circular mils.” A circular mil is the cross-sectional area of a wire one mil in diameter, where 1 kcmil = 0.5067 mm².

² ACSR stands for aluminum conductor steel reinforced.

The future pole will be a switch structure (Figure 1) which will be similar to and installed adjacent to the switch structure mentioned above. Three additional power conductors will be installed, along the western section, when the future switch structure is installed. The additional facilities will be installed when justified by system requirements.

The section of new overhead line connecting to the existing Hershey Substation, which is the eastern section of the line, consists of approximately 70 feet of new wire and one new overhead to underground transition structure (Figure 2). The new structure will be approximately 71 feet in height and will be installed on a concrete foundation. The line will consist of three power conductors and one overhead ground wire. The power conductors will be 556.5 kcmil, 24/7 stranding, ACSR power conductors. A 3/8 inch steel overhead ground wire will provide lightning protection for the proposed line.

The proposed line will be designed to, and will generally exceed, National Electrical Safety Code (NESC) minimum standards. The design specifications and safety rules practiced by PPL Electric are included in Attachment 4 of this Letter of Notification. The minimum conductor-to-ground clearance for the overhead segments of the Reese – Hershey 138/69 kV will be 33.2 feet, which occurs at a maximum conductor temperature of 125° C. The designed minimum conductor clearances and conductor thermal ratings for the Reese – Hershey 138/69 kV transmission line are as follows:

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

TABLE 1
DESIGN MINIMUM CONDUCTOR CLEARANCES
FOR 556.5 KCMIL 24/7 STRANDING ACSR

Condition	Transmission Single-Circuit Design Clearance-to-Ground ¹
Normal load average weather (16° C ambient Temperature)	34.5 feet
Predicted extreme thermal load (125° C conductor Temperature)	33.2 feet
Predicted extreme weather conditions (1-inch, 0 lbs. Wind, -18° C)	34.6 feet

¹ Clearances based on an initial maximum tension of 3,000 pounds at 1" ice, 0 degrees F, 4 pounds wind (6-31-058A) and a ruling span of 250 feet.

TABLE 2
CONDUCTOR THERMAL RATING
556.5 KCMIL 24/7 STRANDING ACSR
(257°F) 125°C MAXIMUM CONDUCTOR TEMPERATURE

Condition	Ambient Temperature <u>°C</u>	Wind Speed <u>Knots</u>	Ampacity <u>Amps</u>
Summer Normal	35	0	815
Winter Normal	10	0	926
Summer Emergency	35	1 1/2	1,041
Winter Emergency	10	1 1/2	1,163

B. MAGNETIC FIELD MANAGEMENT

PPL Electric's Magnetic Field Management Program, summarized in Attachment 5, is applied to new and reconstructed transmission line projects. The Company does not believe that the current scientific evidence demonstrates that magnetic fields cause any adverse health effects or pose a health or safety danger to the public. Nevertheless, PPL Electric has determined, as a matter of policy, to design its new and rebuilt transmission lines to reduce magnetic fields when that can be done at low or no cost and consistent with functional requirements. PPL Electric's Magnetic Field Management Program has been developed to implement that policy decision. To reduce magnetic field exposures, the program generally prescribes the use of a line design that provides for five feet higher ground clearance than NESC standards and reverse phasing of new double-circuit lines where it is feasible to do so at low or no cost.

Consistent with the program, PPL Electric will construct the new overhead line sections for five feet higher ground clearance than NESC standards, in order to reduce magnetic field exposures. Since the design is only a single circuit, reverse phasing is not possible. Reverse phasing requires a double circuit line. When the double tap configuration is installed in the future, reverse phasing will be reviewed and implemented if economically feasible.

C. RIGHT-OF-WAY STATUS

In order to construct the proposed line, PPL Electric requires new right-of-way across three separate parcels, all of which are owned by a single property owner. PPL Electric is in the process of negotiating with the property owner to acquire the new land rights. PPL Electric has come to an agreement in principle with the property owner but has yet to execute a signed agreement. Attachment 6 identifies the owner of properties which are crossed by the proposed new rights-of-way.

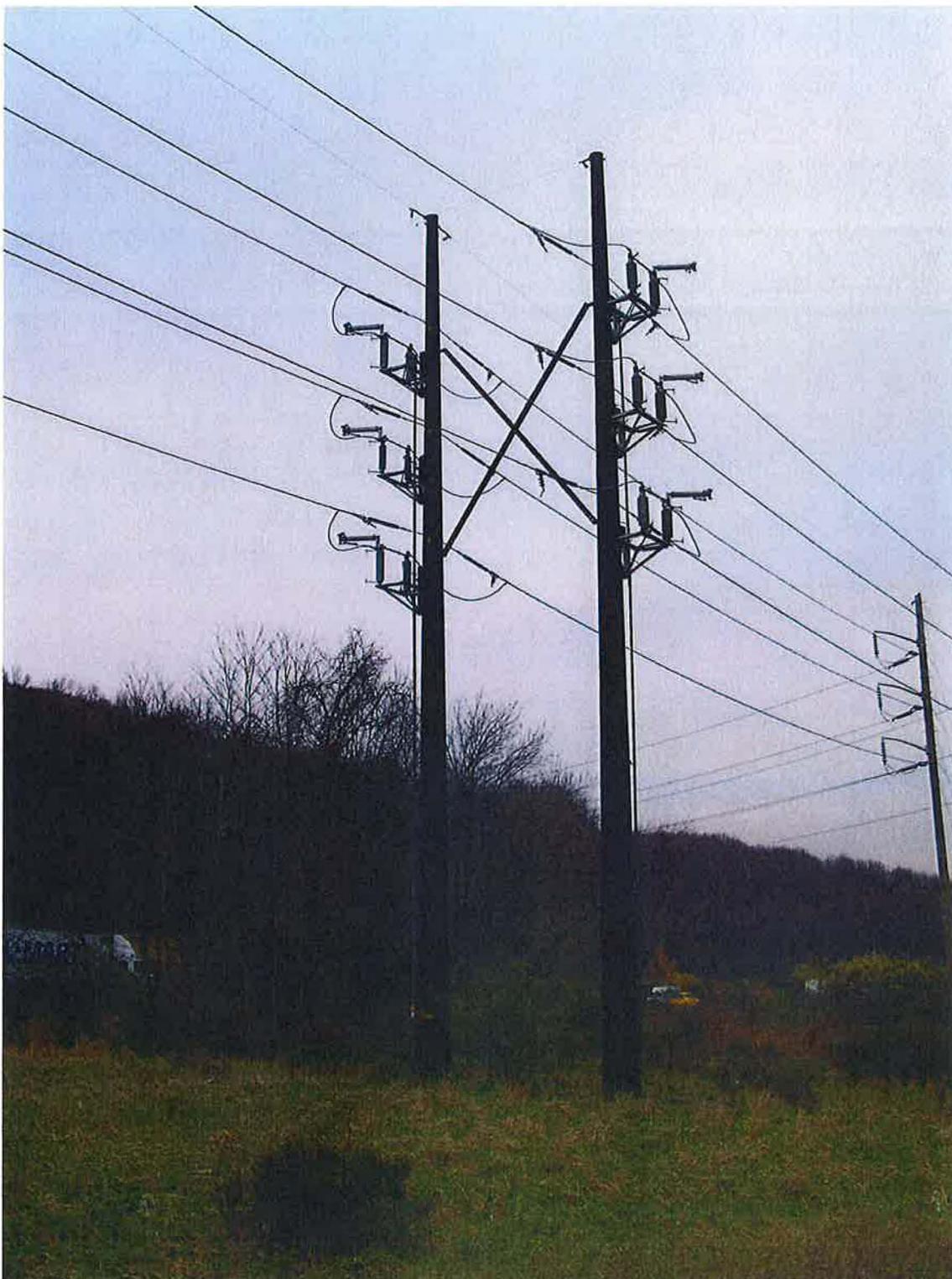


FIGURE 1 – 138/69 kV LOAD SECTIONALIZING AIR BREAK SWITCH (LSAB), SHOWN AS FUTURE CONFIGURATION

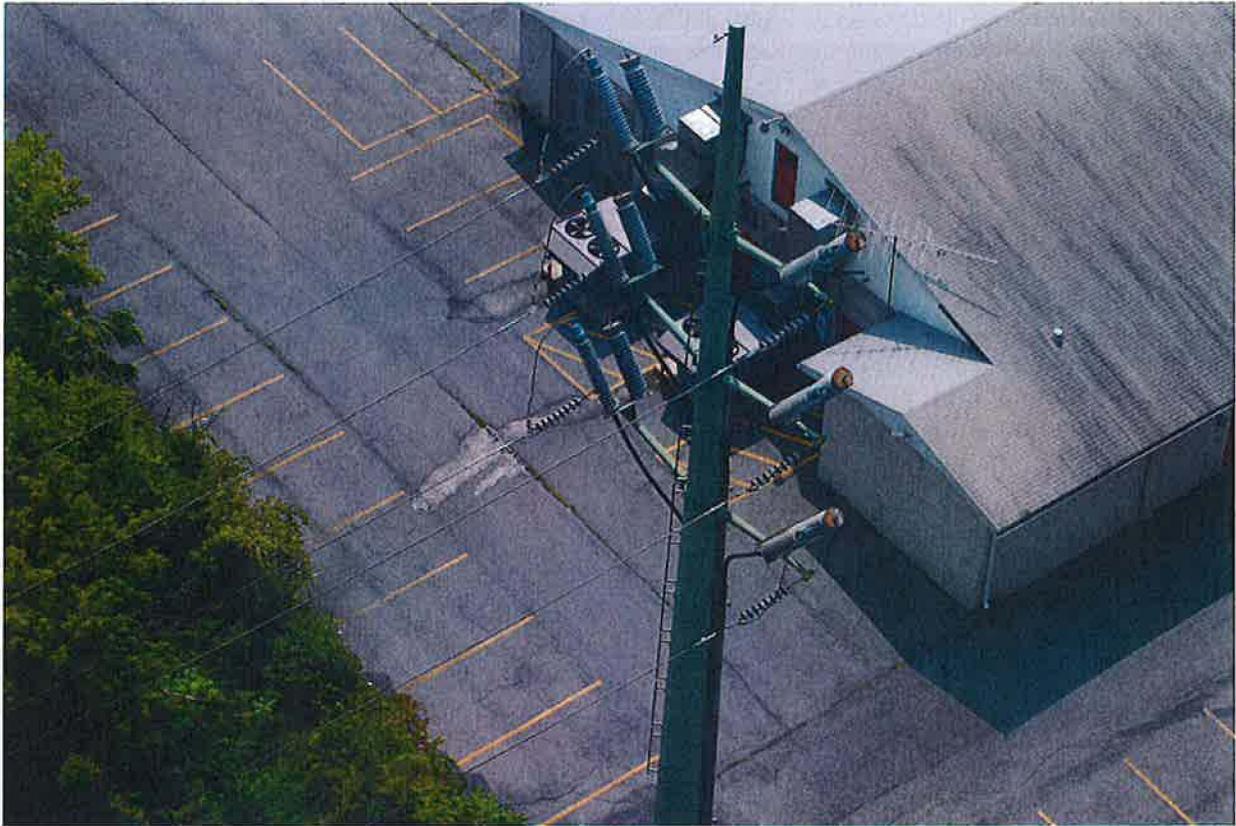


FIGURE 2 - TYPICAL 138/69 kV UNDERGROUND TERMINAL POLE

Property Number	Property Owner
1	THE HERSHEY COMPANY
2	THE HERSHEY COMPANY
3	THE HERSHEY COMPANY

LEGEND

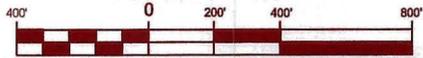
EXISTING TRANSMISSION LINE	
PROPOSED OVERHEAD TRANSMISSION LINE	
PROPOSED UNDERGROUND TRANSMISSION LINE	
FUTURE OVERHEAD TRANSMISSION LINE	
EXISTING PROPERTY LINE	
PROPOSED RIGHT-OF-WAY	
PROPOSED POLE	
FUTURE POLE	

ATTACHMENT 1

AERIAL EXHIBIT SHEET 1 OF 3

**REESE-HERSHEY
138/69KV LINE**
DERRY TOWNSHIP
DAUPHIN COUNTY, PA.

SCALE: 1" = 400'



PREPARED BY:
PPL ELECTRIC UTILITIES CORP.
PPL ELECTRIC UTILITIES



RESE SUBSTATION
OVERHEAD SECTION TO BE CONSTRUCTED AT THIS TIME
FUTURE OVERHEAD SECTION
UNDERGROUND SECTION

OVERHEAD SECTION
HERSHEY SUBSTATION
UNDERGROUND SECTION



Property Number	Property Owner
1	THE HERSHEY COMPANY
2	THE HERSHEY COMPANY
3	THE HERSHEY COMPANY

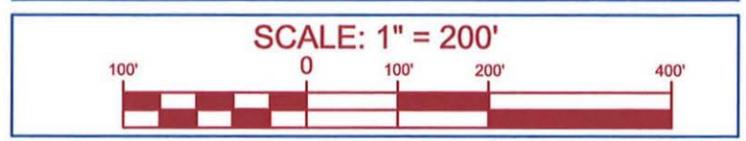
LEGEND

EXISTING TRANSMISSION LINE	
PROPOSED OVERHEAD TRANSMISSION LINE	
PROPOSED UNDERGROUND TRANSMISSION LINE	
FUTURE OVERHEAD TRANSMISSION LINE	
EXISTING PROPERTY LINE	
PROPOSED RIGHT-OF-WAY	
PROPOSED POLE	
FUTURE POLE	

ATTACHMENT 1

AERIAL EXHIBIT SHEET 2 OF 3

**REESE-HERSHEY
138/69KV LINE**
DERRY TOWNSHIP
DAUPHIN COUNTY, PA.



PREPARED BY:
PPL ELECTRIC UTILITIES CORP.
PPL ELECTRIC UTILITIES



Property Number	Property Owner
1	THE HERSHEY COMPANY
2	THE HERSHEY COMPANY
3	THE HERSHEY COMPANY

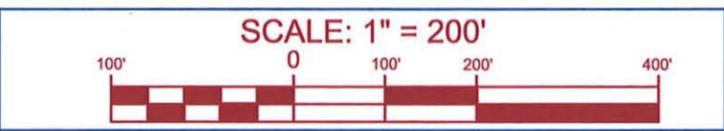
LEGEND

EXISTING TRANSMISSION LINE	
PROPOSED OVERHEAD TRANSMISSION LINE	
PROPOSED UNDERGROUND TRANSMISSION LINE	
FUTURE OVERHEAD TRANSMISSION LINE	
EXISTING PROPERTY LINE	
PROPOSED RIGHT-OF-WAY	
PROPOSED POLE	
FUTURE POLE	

ATTACHMENT 1

AERIAL EXHIBIT SHEET 3 OF 3

**REESE-HERSHEY
138/69KV LINE**
DERRY TOWNSHIP
DAUPHIN COUNTY, PA.



PREPARED BY:
PPL ELECTRIC UTILITIES CORP.
PPL ELECTRIC UTILITIES

Attachment

3

ATTACHMENT "3"
REESE-HERSHEY 138/69 kV LINE
ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

<u>SECTION</u>	<u>TOPIC</u>	<u>PAGE</u>
A.	INTRODUCTION.....	1
B.	LAND USE.....	1
C.	CULTURAL RESOURCES.....	2
D.	NATURAL FEATURES.....	2
E.	THREATENED AND ENDANGERED SPECIES.....	3

**ATTACHMENT “3”
REESE-HERSHEY 138/69 kV LINE
ENVIRONMENTAL ASSESSMENT**

A. INTRODUCTION

PPL Electric is seeking Commission approval to construct two short sections of new overhead 138/69 kV transmission line which in conjunction with an underground section will connect the existing Reese Candy 138/69 kV Tap to the existing Hershey 69-13 kV Substation. The new line will be designed and constructed for single circuit 138 kV operation, although it will operate initially at 69 kV until load growth in the area makes it appropriate to convert to 138 kV.

This project is required to resolve violations of PPL Electric’s Reliability Principles and Practices (“RP&P”) guidelines, improve the reliability of service, and improve operating flexibility of PPL Electric’s system in the Hershey area. In addition, the project will also help meet the increasing demand for power in the area.

The proposed project was reviewed with Derry Township and Dauphin County. The Township and the County have no objection. A list of involved governmental agencies, municipalities and other public entities is included as Attachment 7.

B. LAND USE

The proposed line is located in Derry Township, Dauphin County. The new overhead line segment located near the existing Reese Candy Tap, which will be the western-most overhead section, is bordered to the east by the Reese Candy Company facility, to the north by rail-road tracks, to the west by an agricultural field and to the south by PA Route 422. The new overhead line segment located near the existing Hershey Substation, which will be the eastern-most overhead section, is located on property owned by The Hershey Company, and spans parking lots on the east side of the Hershey industrial facility.

The new overhead line sections will be located on property where new right-of-way agreements are required. PPL Electric maintains existing facilities in the vicinity of the new overhead line sections. PPL Electric is in the process of obtaining the new rights-of-way required to complete this project.

No nearby communication towers, pipelines or other utilities will be affected by the proposed construction. The closest point of the Reigle Field Airport¹ is approximately 3.50 miles east of the project area. PPL Electric will file the appropriate documentation with both the Federal Aviation Administration and the PennDOT Bureau of Aviation to ensure that the proposed construction will not be a hazard to the airport's flight operations. Based on the pre-existing electrical facilities in the vicinity, PPL Electric does not anticipate any impact.

C. CULTURAL RESOURCES

The project was reviewed by the Pennsylvania Historical and Museum Commission (PHMC). The PHMC determined that prehistoric and historic archaeological resources are located near the project. In addition, the PHMC determined that there are properties near the project which are listed or eligible for the National Register of Historic Places. Correspondence from the PHMC, dated July 18, 2011, indicates that the proposed activities associated with this construction should have no effect on the identified resources.² No further investigations are required. If, however, PPL Electric becomes aware of any previously unidentified resources that would be affected by the construction, the Bureau for Historic Preservation will be contacted immediately.

D. NATURAL FEATURES

The project, as proposed, will not affect any unique geological, scenic or natural area. The overhead line segments will be located in industrial areas. Tree clearing is not required for either segment. The line will not cross any wetlands or other aquatic resources.

¹ FAA ID: 58N

² File No. ER2011-1883-043-A.

PPL Electric will obtain all permits necessary from the Pennsylvania Department of Environmental Protection and the United States Army Corps of Engineers, and will comply with any and all conditions placed on those permits. In addition, PPL Electric will acquire any required soil erosion and sedimentation control permits and will comply with any conditions placed on those permits.

E. THREATENED AND ENDANGERED SPECIES

PPL Electric has coordinated with the relevant state and federal agencies to obtain information regarding endangered and threatened species that could occur in the study area. A review of the Pennsylvania Natural Diversity Inventory (“PNDI”) records³ indicates that there is a potential impact under the jurisdiction of the United States Fish and Wildlife Service (“USFWS”). The USFWS reports that the project area is within the known range of the bog turtle (*Clemmys muhlengerii*). PPL Electric retained Rick Mellon, of Mellon Biological Services, to address any USFWS concerns. Bog turtles are known inhabitants of certain types of wetlands. However, Mellon Biological Services determined that there are no wetlands within the project area. Correspondence from the USFWS, dated May 11, 2011, concluded that, based on the information supplied by Mr. Mellon, the proposed project will not affect the bog turtle. All conflicts with species of concern have been resolved with the appropriate agencies.

³ PNDI Search ID 20101229276318

Attachment

4

ATTACHMENT "4"
REESE-HERSHEY 138/69 kV LINE
PPL ELECTRIC 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 Electric) 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 Electric 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 Electric 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 Electric 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 Electric 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 Electric lines are designed to operate safely and reliably during inclement weather even more severe than assumed by the NESC. In addition, PPL Electric transmission lines are designed with more clearance to the ground than required by the NESC. The tables below compare PPL Electric and NESC ground clearances for lines of various voltages.

138 kV

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Electric Design</u>
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

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Electric Design</u>
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

<u>Surface Underneath Conductors</u>	<u>Vertical Clearance to Ground</u>	
	<u>NESC Standard</u>	<u>PPL Electric Design</u>
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 Electric 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:

<u>Voltage-kV</u>	<u>Minimum Clearance</u>
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.

Attachment

5



**MAGNETIC
FIELD
MANAGEMENT
PPL Electric Utilities
Corporation**

DECEMBER 2004

TABLE OF CONTENTS

INTRODUCTION	1
DEVELOPMENT OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM.....	6
VARIABLES THAT AFFECT MAGNETIC FIELDS	6
Effect of Phase Current on Magnetic Fields	6
Effect of Conductor Configuration on Magnetic Fields	7
Effect of Distance from the Magnetic Field Source	7
SUMMARY OF PPL EU's MAGNETIC FIELD MANAGEMENT PROGRAM.....	8
MAGNETIC FIELD MANAGEMENT PROGRAM GUIDELINES	9
Overhead Lines	9
New or Rebuilt Transmission Lines	9
Reconductoring or Adding Additional Circuits to Existing Transmission Lines	14
Distribution Lines	14
Underground Transmission Lines	15
CHARTS	16

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

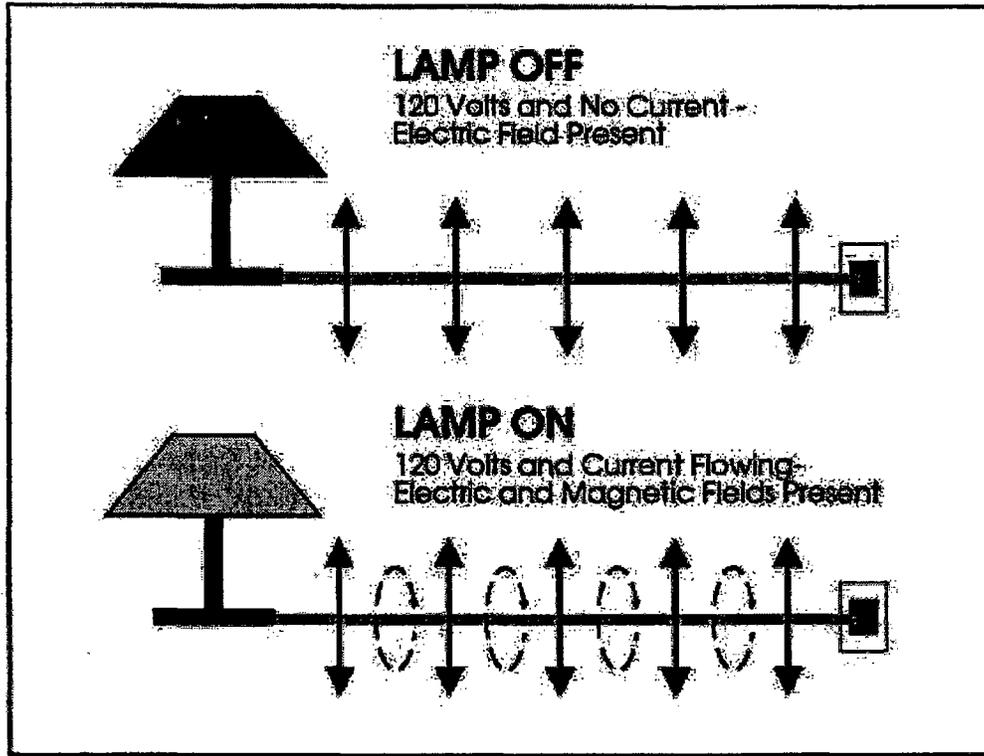


Figure 2

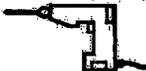
Magnetic field strengths decrease with distance Magnetic fields are measured in milligauss		Source: "EMF in Your Environment", U.S. Environmental Protection Agency 1992		
		At 6 inches	At 1 foot	At 2 feet
Clothes dryer		2 to 10	* to 3	*
Microwave oven		100 to 300	1 to 200	1 to 30
Toaster		5 to 20	* to 7	*
Power drill		100 to 200	20 to 40	3 to 6
Can opener		500 to 1500	40 to 300	3 to 30
Mixer		30 to 600	5 to 100	* to 10
Hair dryer		1 to 700	* to 70	* to 10
Color television		Data not available	* to 20	* to 8

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.

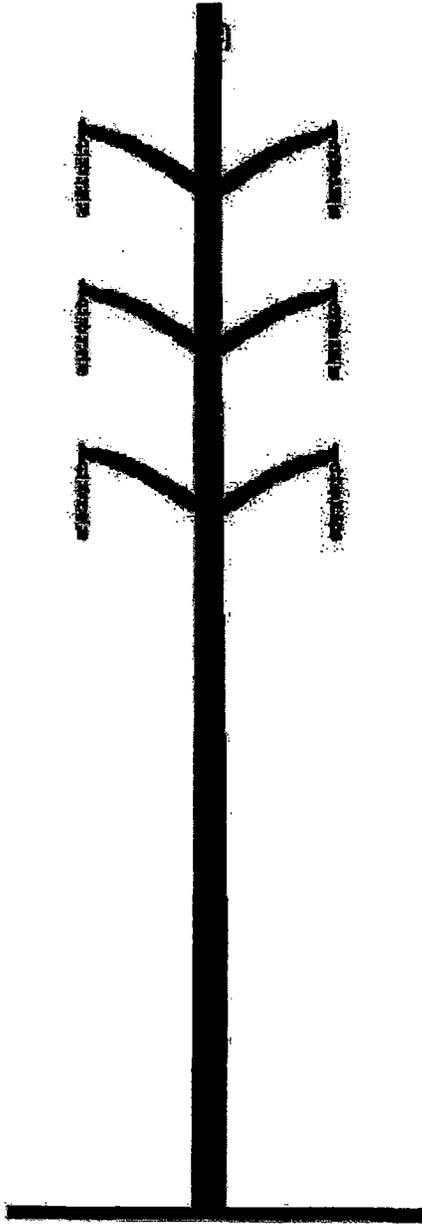
- Main lines are the most heavily loaded sections of a distribution line and therefore have the highest magnetic fields associated with them.
- Increasing the ground clearance by five feet reduces the magnetic field under the line from 14 mG to 11 mG using the standard eight-foot crossarm design. These 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.

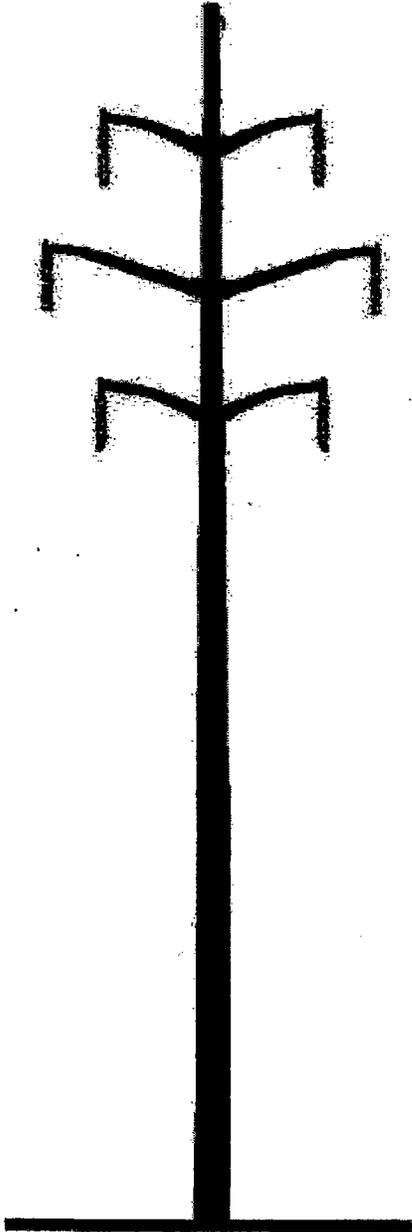
- The phase arrangement that produces the lowest field will be determined.
- The depth of burial of the line will be determined considering the cost of excavation and the location of other buried utilities in the area.
- The use of steel pipe ferromagnetic shielding that reduces magnetic fields will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



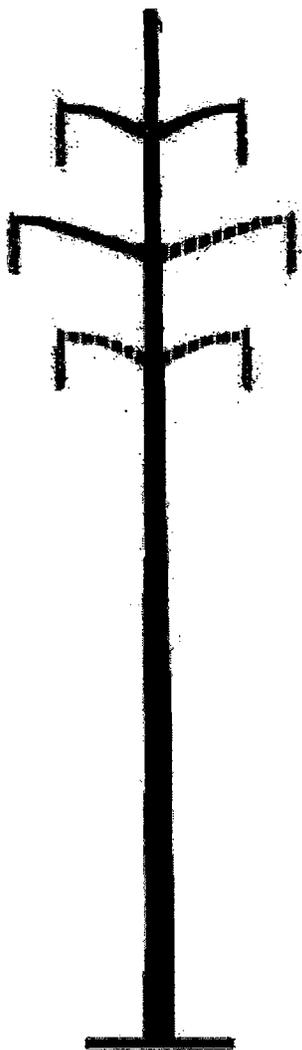
- Lower cost alternative
- Reduces magnetic fields due to higher structures
- Typical conductor data:
 - 1 3/8" HS steel overhead ground wire - 17.3 feet sag
 - 6-556.5 KCMIL 24/7 ACSR power conductors - (PARAKEET) 23.0 feet sag
 - Average span - 600 feet

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

TYPE CONSTRUCTION	MAGNETIC FIELD IN MILLIGAUSS 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.

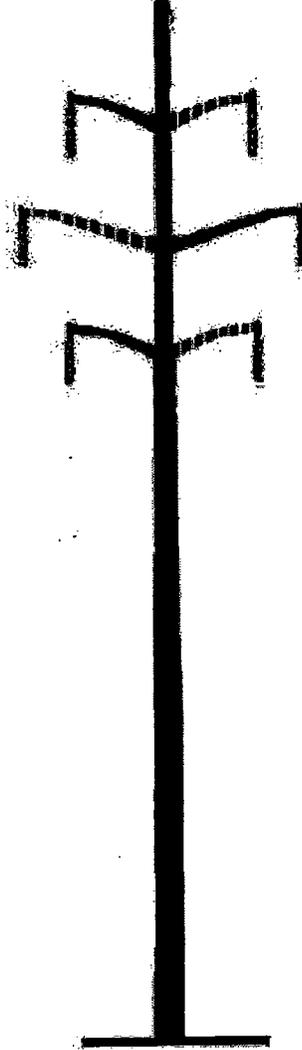
Typical Single-Circuit Structure Designs



Top/Middle



Vertical



Top/Middle/Bottom

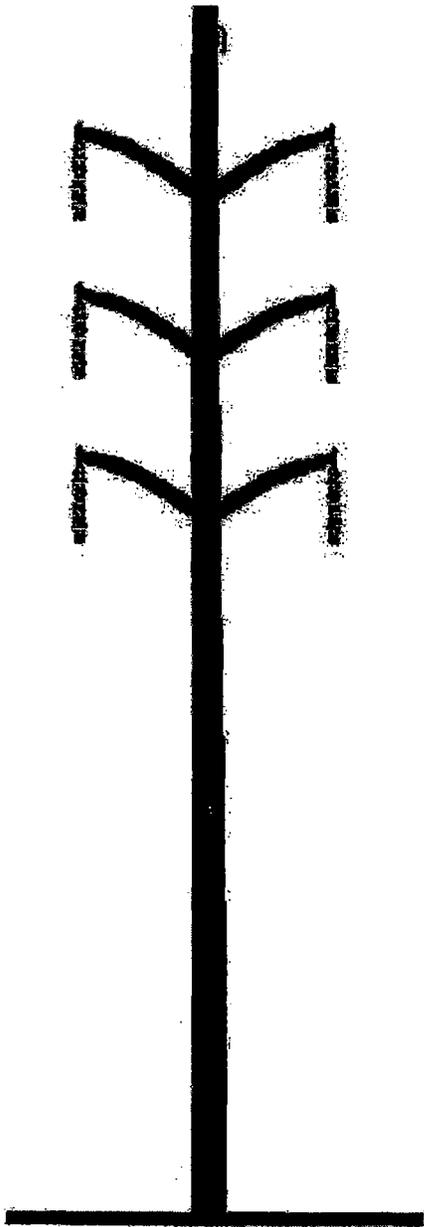
——— initial single circuit
- - - - - future second circuit

**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

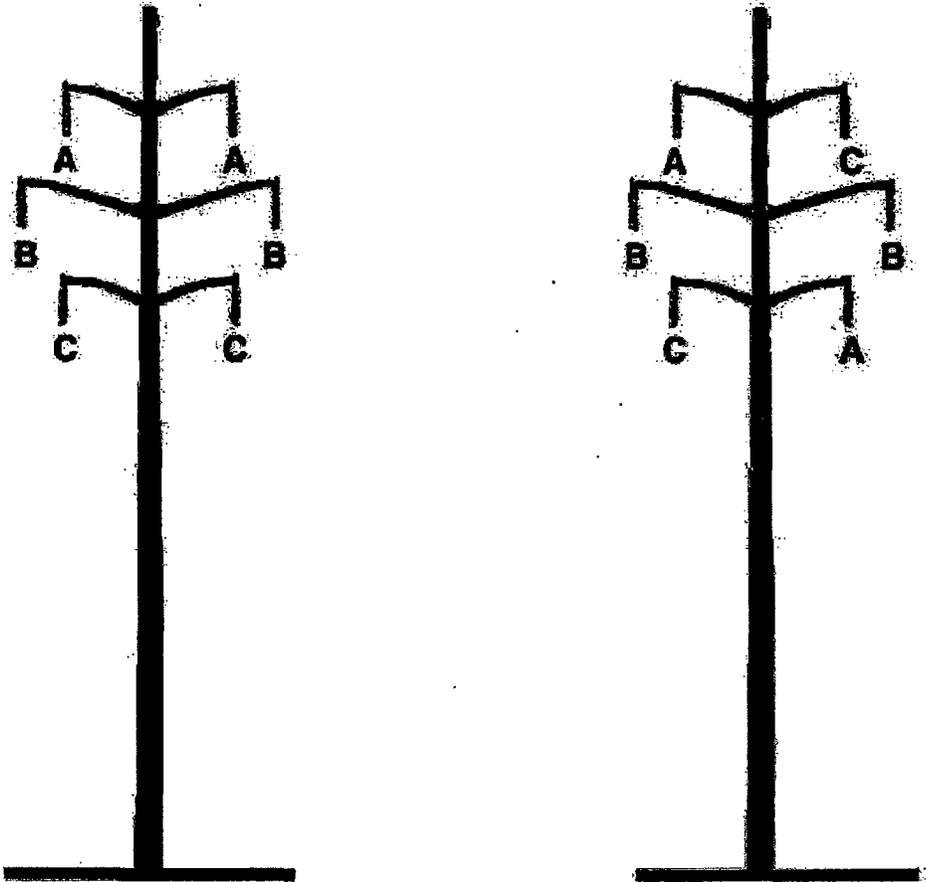
The edge of right of way is 50 feet from the line centerline.
The 400 ampere phase current is balanced between phases.
Calculations are based on a minimum ground clearance of 25 feet.

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 |

**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.

**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.

**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.

**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.

**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.

**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.

Attachment

6

ATTACHMENT 6
REESE-HERSHEY 138/69 kV LINE
LIST OF OWNERS OF PROPERTY WITHIN THE RIGHT OF WAY

The Hershey Company
100 Crystal A Drive
PO Box 810
Hershey, PA 17033-0810

Attachment

7

ATTACHMENT 7
REESE-HERSHEY 138/69 kV LINE
LIST OF INVOLVED GOVERNMENTAL AGENCIES, MUNICIPALITIES
AND OTHER PUBLIC ENTITIES

1. 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. McLearn, Chief

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

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

4. Dauphin County Planning Commission
Dauphin County Veterans Memorial Building
112 Market Street, 2nd Floor
Harrisburg, PA 17101
Attn: Thomas Clark, Chairperson

5. Dauphin County Board of Commissioners
P.O. Box 1295
Harrisburg, PA 17108
Attn: Jeffrey T. Haste, Chairperson

6. Derry Township Planning Commission
600 Clearwater Road
Hershey, PA 17033
Attn: Ned Wehler, Chairperson

7. Derry Township Board of Supervisors
600 Clearwater Road
Hershey, PA 17033
Attn: E. Christopher Abruzzo, Chairperson