



Revised: May 4, 2006

Wire and Cable Installations

NO VERBAL AUTHORIZATION IS VALID TO WORK ON CSXT PROPERTY. EXECUTED AGREEMENTS AND ROADMASTER NOTIFICATION ARE REQUIRED PRIOR TO ANY ENTRY ON CSXT PROPERTY FOR WORK BEING PERFORMED.

Authorization for wire and cable installations begins by providing the following:

- One original and one copy of the completed, signed, and dated application form (Application Forms, Instructions, and Specifications are provided)
- Two prints of project drawing(s).
- \$750.00 non-refundable check, made payable to CSX Transportation, Inc.

SECRETARY'S BUREAU
PA PUC

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Forward to:

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AUG 31 2006

Property Services
Contract Administration
CSX Transportation, Inc.
500 Water Street, J180
Jacksonville, FL 32202

Direct questions to:

(904)366-5662
Fax: (904)359-3665

**DOCUMENT
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When the completed application form and drawing are received, the proposed agreement will be sent to you in approximately 30 days (provided the application is approved). Incomplete applications or drawings will be returned to you and will not be handled until the correct information is received.

Before submitting an application, please keep in mind CSX will be requesting that signed documents, fees, and proof of insurance be returned within 25 days after receipt of our agreement proposal; therefore, please do not submit an application to CSX if you are not prepared to meet this deadline policy.

REMEMBER! No work is to be performed on railroad property without proper authorization. For preliminary surveying and site design requests, please obtain a right-of-entry application by calling the number above or downloading a copy from the following website:

http://www.csx.com/share/general/csxp/docs/eng_right_of_entry-REF10220-REF21827.pdf

Contact CSX Police Communication Center for emergency, safety and security situations as well as any situation that could negatively affect safe train operations 800-232-0144.

JNC 1 *cont'd* PA 7/12/06
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IV. Paralleling Occupancies

Where practicable, occupancies shall be located to cross tracks at approximately right angles only and not parallel tracks within CSXT right-of-way. Paralleling occupancies shall only be constructed within CSXT's right-of-way where there is no other practicable alternative.

If a request is made for paralleling properties and/or track of CSXT, the following must accompany the Application and standard *required* project drawings:

- An overall plan view of the proposed route, profile view and cross-sections, showing all tracks and CSXT right-of-way lines. The distance from the proposed occupancy to the adjacent track and to the right-of-way lines must be shown.
- A written project outline that includes the general scope of the project, as well as justification for the longitudinal request (an explanation why there are no other practicable alternative routes).

Wirelines laid longitudinally on CSXT's right-of-way shall be located as far as possible from any tracks or other important structures and as close to the railroad property line as possible as it is understood that CSXT occupies its right-of-way for the primary purpose of operating a railroad. All occupancies shall therefore be designed and constructed so that railroad operations and facilities are not interfered with, interrupted or endangered. In addition, the proposed facility shall be located to minimize encumbrance to the right-of-way so that the railroad will have unrestricted use of its property for current and future operations.

V. Crossing under Railroad Bridges

Wirelines shall be located, where practicable, to cross tracks at approximately *right angles* to the track (but preferably not less than 45 degrees) and shall not be placed within a culvert, under railway bridges nor closer than 45 feet to any portion of any railway bridge, building or other important structure, except in special cases and then by special design as approved by Railroad.

VI. Overhead Bridge Structures for Wires and Cables

New overhead structures shall not be constructed over CSXT's right-of-way unless underground installation is not possible and/or the Project Owner can show that no practicable alternative is available.

When forwarding requests of this nature, utilize the Application for Wireline Installations to the fullest extent possible. Along with standard project drawings, complete structural plans and design computations for the structure and foundations, sealed by a Licensed Professional Engineer, are also required.

The vertical clearance requirement (distance from top of rail to closest component of the structure) is a minimum of 23 feet with a horizontal clearance of 18 feet from centerline of track.



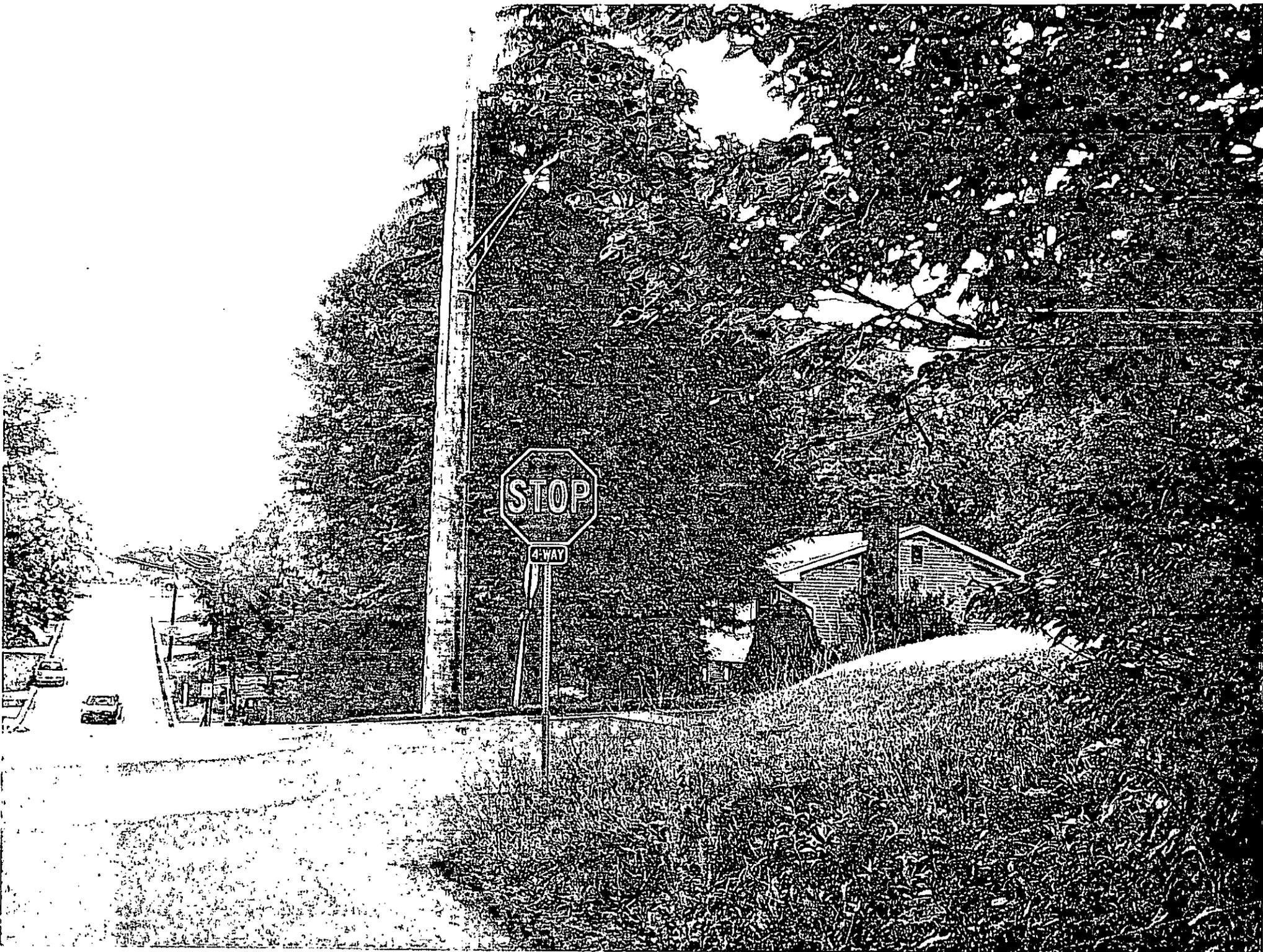
DESIGN & CONSTRUCTION STANDARD SPECIFICATIONS

Wirelines Occupancies

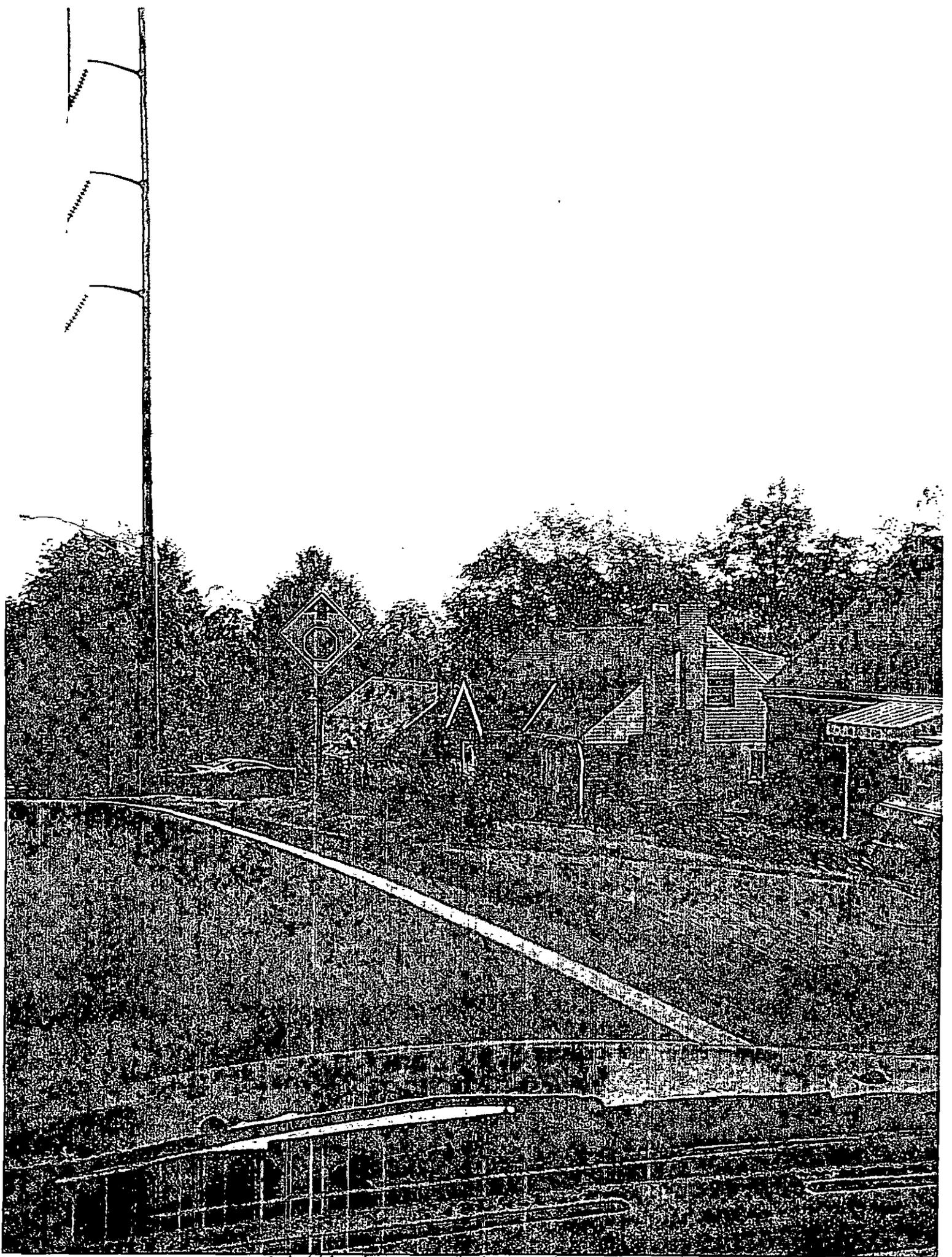
OFFICE OF:
CHIEF ENGINEER – DESIGN AND CONSTRUCTION
JACKSONVILLE, FLORIDA
September 15, 2003

Above Ground and Aerial Wirelines

- A) The poles or towers supporting the crossing span should be located outside CSXT's right of way. If locating the poles or towers outside the right of way is not possible, the side clearance of poles and towers from the nearest track rail shall be not less than 25'-0".
- B) Crossing poles and towers shall be located as far as practicable from inflammable structures. The space around the poles and towers shall be kept free from underbrush, grass, and other inflammable material.
- C) Wires and cables running longitudinally along CSXT's right-of-way shall be constructed as close to property lines as possible, except in cases where doing so will interfere with Railroad operations, surface drainage, or soil stability.
- D) The minimum distance above top-of-rail for lines carrying voltage is shown in Plate V. Guy wires and suspension cable systems may be located no closer than 25'-0" above top-of-rail.
- E) For the protection of the wire crossing and railroad pile driver operation, it is preferable that the wire crossing should be located 1,000 feet or more from any railroad bridge, trestle, or large culvert. Where necessary to locate the crossing less than 1,000 feet from such bridge, trestle, or large culvert, the vertical clearance of the wire shall be not less than 50 feet above top of rail.
- F) The poles or structures supporting the crossing span shall be plainly marked with the name, initials, or trademark and the pole numbers, if used, of the Crossing Company. When required by CSXT, the Crossing Company shall place on all crossing structures located on the property of CSXT, warning signs of approved design.
- G) Double cross-arms are required on poles adjacent to track. Any tower or steel pole foundation design must be accompanied by engineering computations and date stamped by a licensed professional engineer. Any tower or steel pole to be installed on CSXT property must meet or exceed the industry standards regarding design and usage.
- H) All work done will be without interfering with CSXT's signal system and cables.
- I) Inductive Interference
 - i) An inductive interference coordination study is required for all proposed electrical power longitudinal occupations. This study may also be required for any crossing other than 90° with the track(s).
 - ii) All agreements covering crossings and longitudinal occupations will include provisions that the owner provides appropriate remedies, at his own expense, to correct any inductive interference with CSXT facilities.



Area 2.6. 24 1/2 miles. A110150R0091. 11.11.2010. DC-7



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PC-8

Cost Comparison between Routes E and C

9 months	Option E	Option C
Initial Construction Cost		
Line Cost	\$3.0 mil	\$2.5 mil
RR Lease or R/W Easement Cost	\$0.0 mil	\$0.9 mil
Inductive Interference mitigation		\$0.2 mil
Extra Costs for Relocated Line	<u>\$0.0 mil</u>	<u>\$2.0 mil</u>
	\$3.0 mil	\$5.6 mil
Annual Maintenance Cost	*	*
Time for Construction		
Line Construction	9 months	5 months
Extra Construction Items		3 months

* Difficult to estimate annual future costs but is relatively low compared with initial cost. Route C's cost would probably be 2x Route E's cost due to the increased acreage of clearing.

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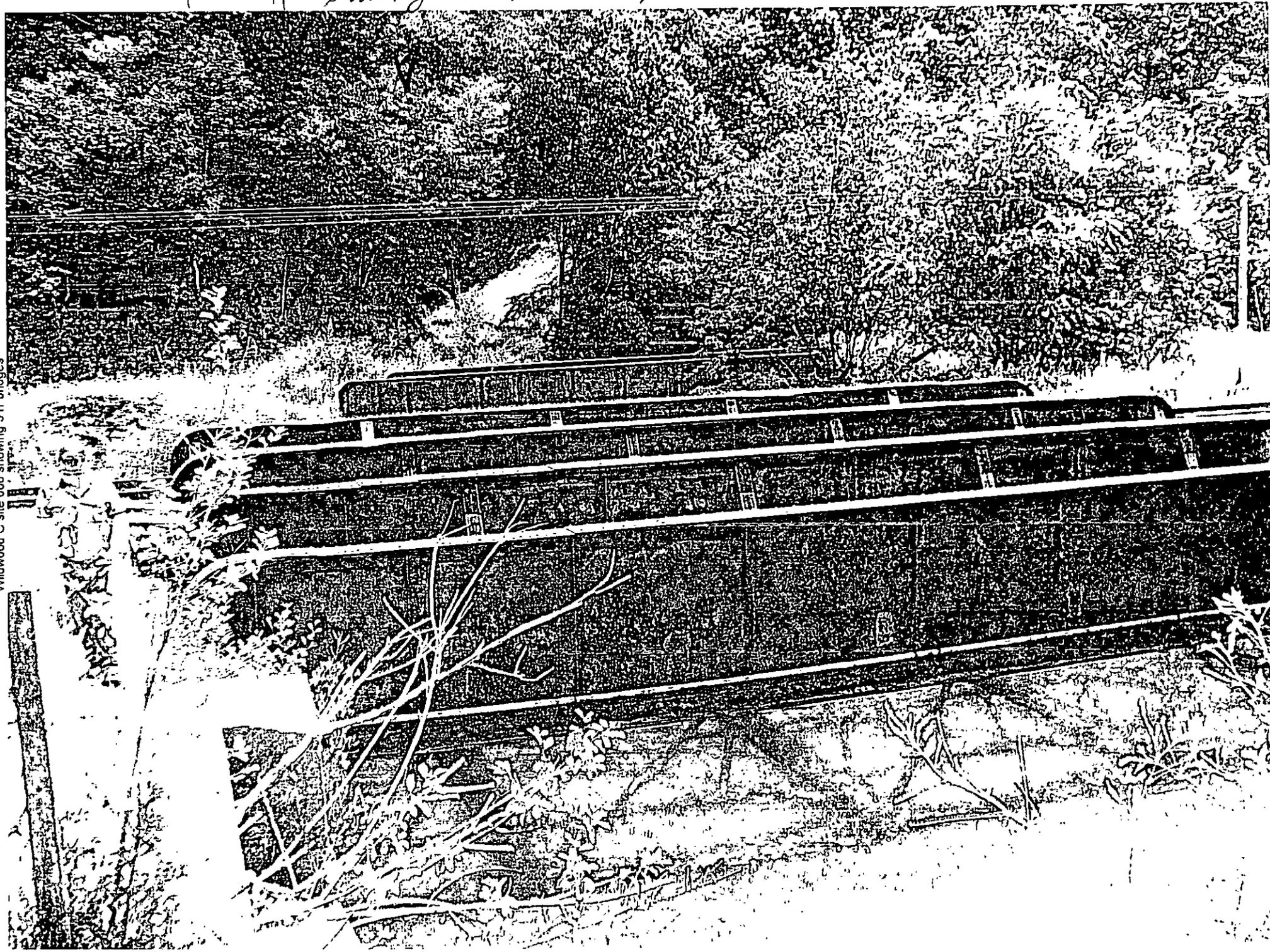
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PC 10
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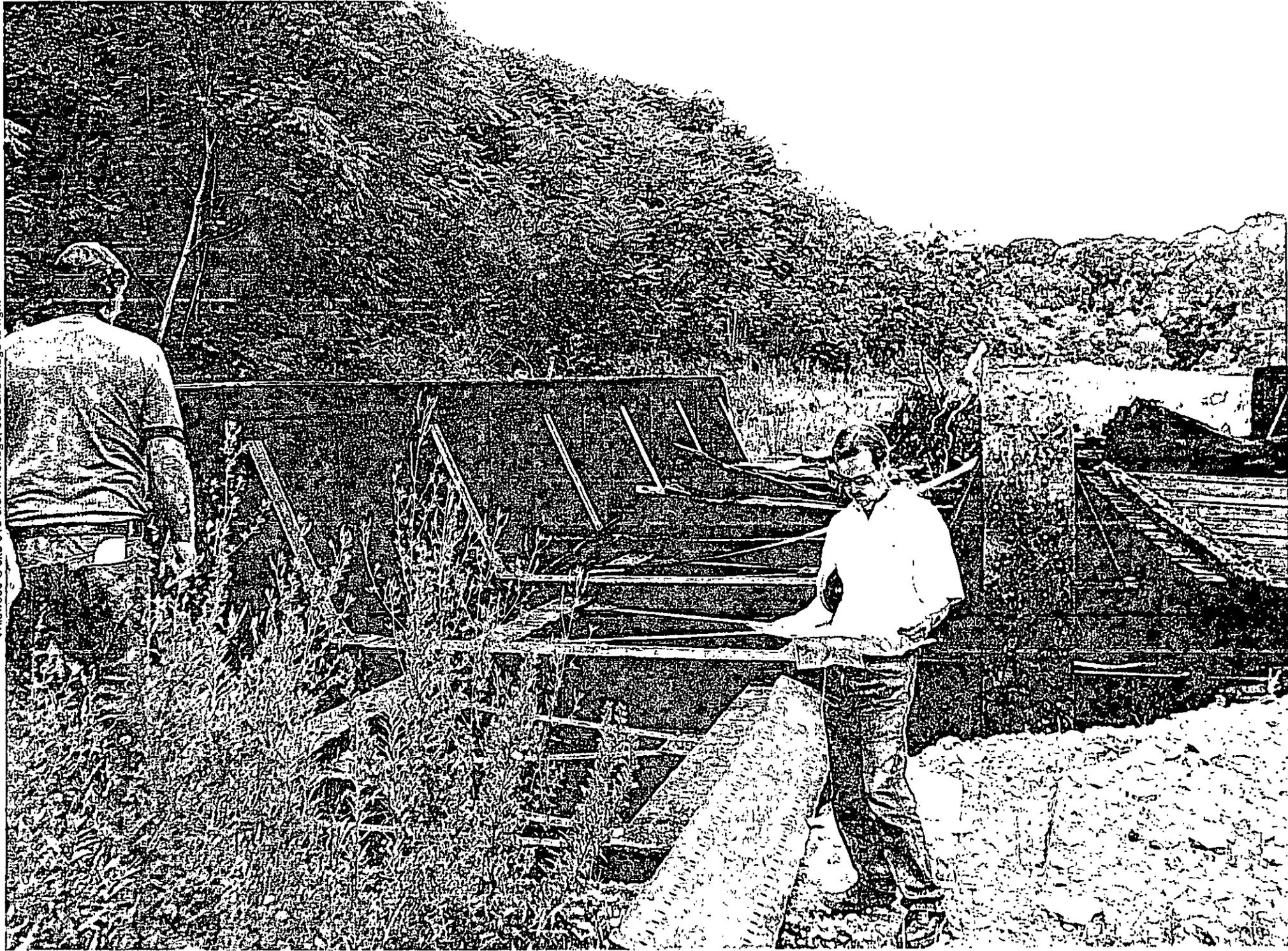
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Wildwood C site 006 showing 3 tr bridges





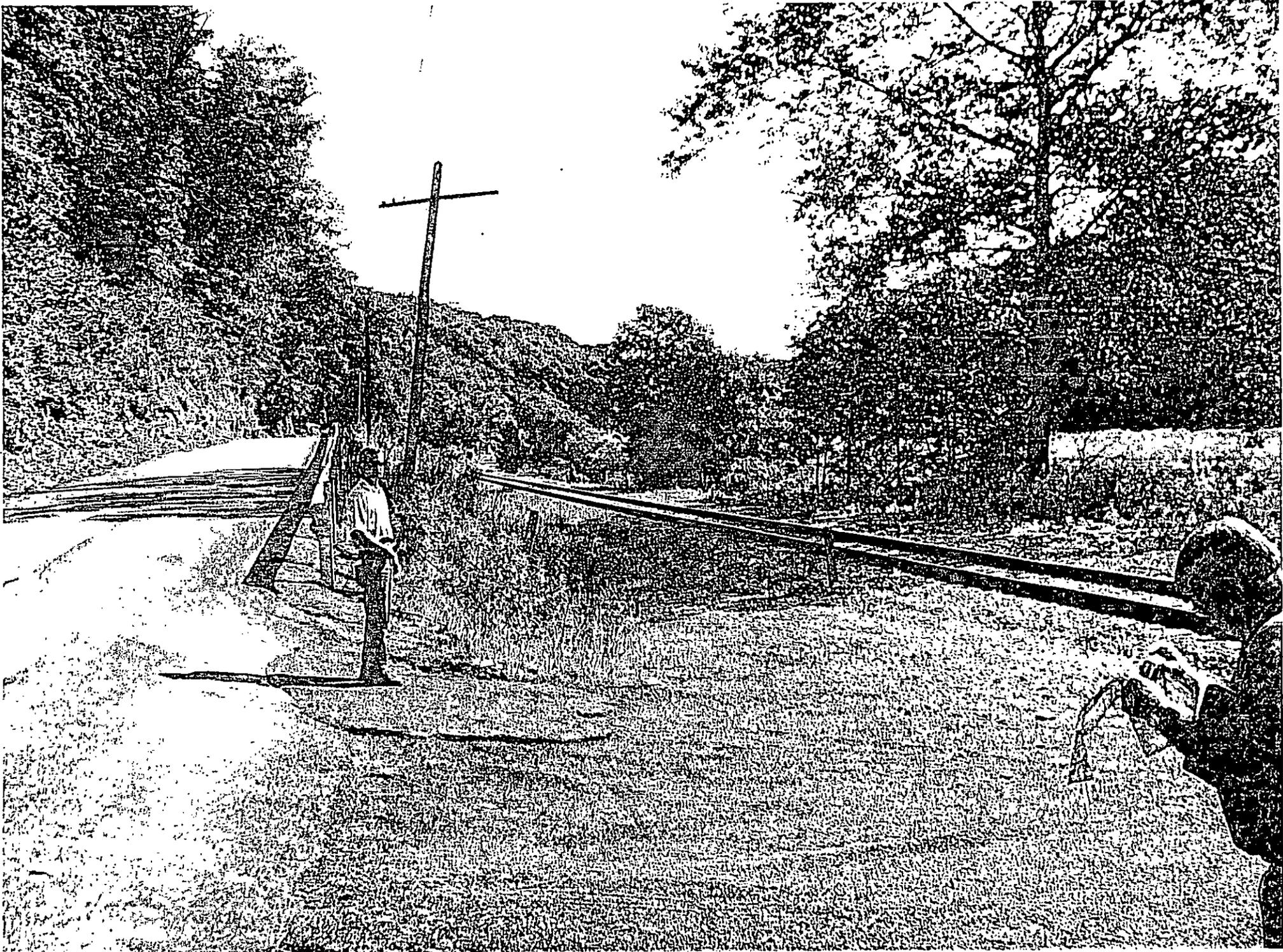
Wildwood C site 018 3rd RR bridge, see 2nd bridge to right



Wildwood C site 052 12H x 15L reinforced box culvert_headwall



Wildwood C site 074 at Sample Rd. 30' from tracks



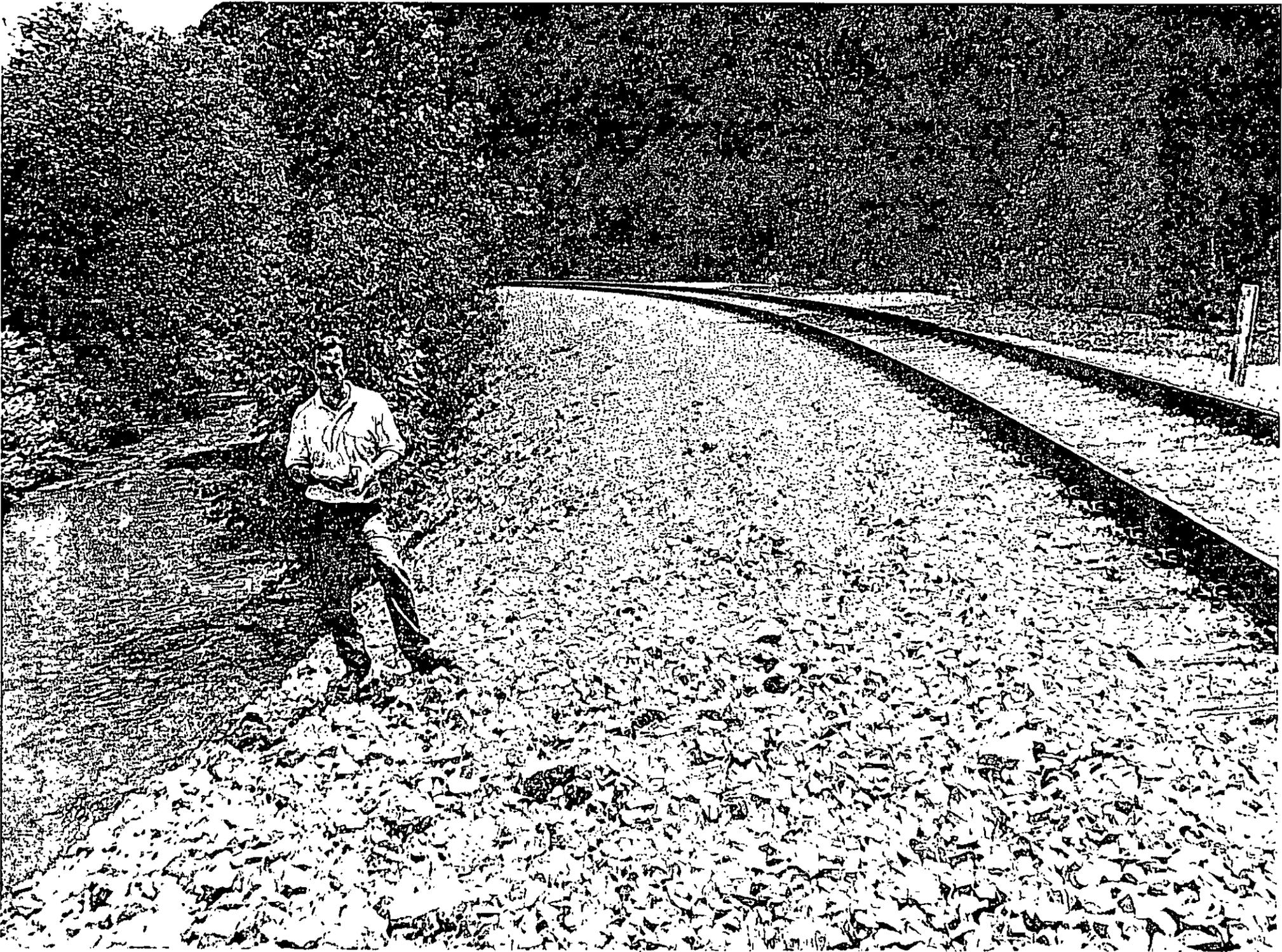
Wildwood C site 089 29' R is top of creek bank



Wildwood C site 106 Mt Royal Blvd need to cross over existing lines - go off RR



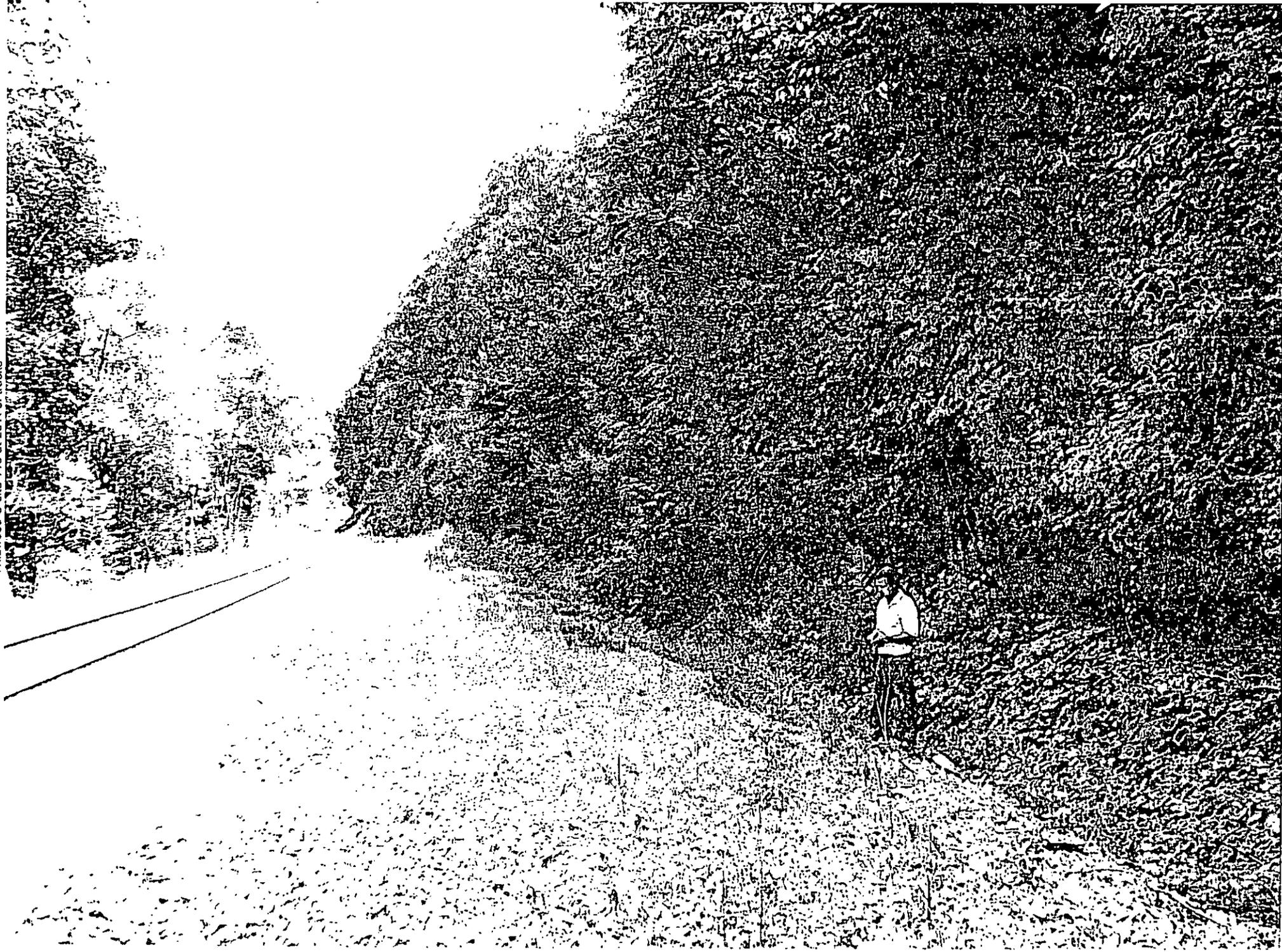
Wildwood C site 113 12' to edge of Embankment



Wildwood C site 114 typical from site 112 to 118 30°R is midway up cliff 15' L is almost in creek



Wildwood C site 116 at 20'R of tracks



PROPRIETARY INFORMATION

Docket Number A-110150 F-0031

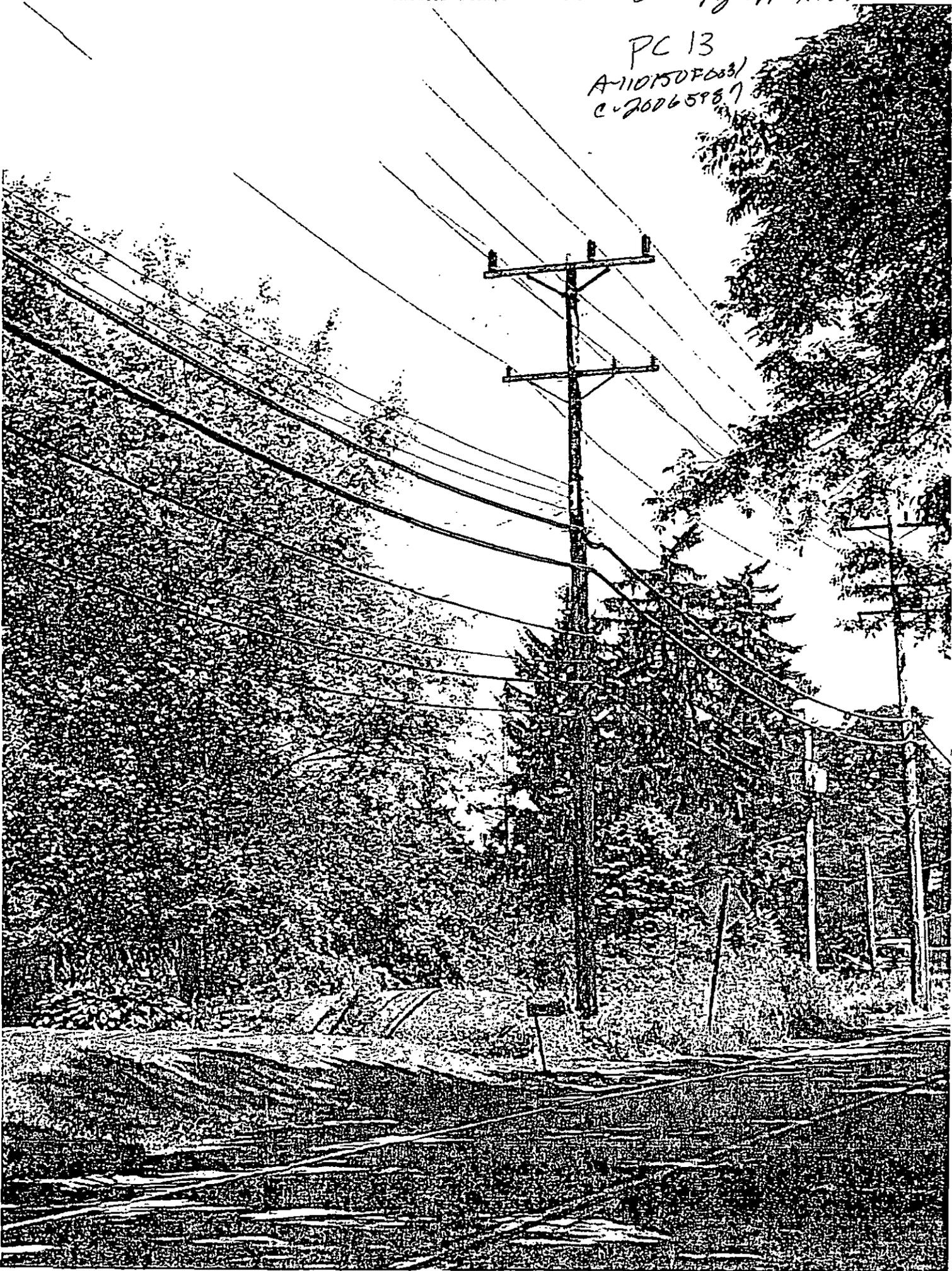
Name of Document Wildwood 138kV Line
Route C Preliminary Layout Maps

Date Document Received 7-12-2006

DOCUMENT CONTAINS

PROPRIETARY INFORMATION

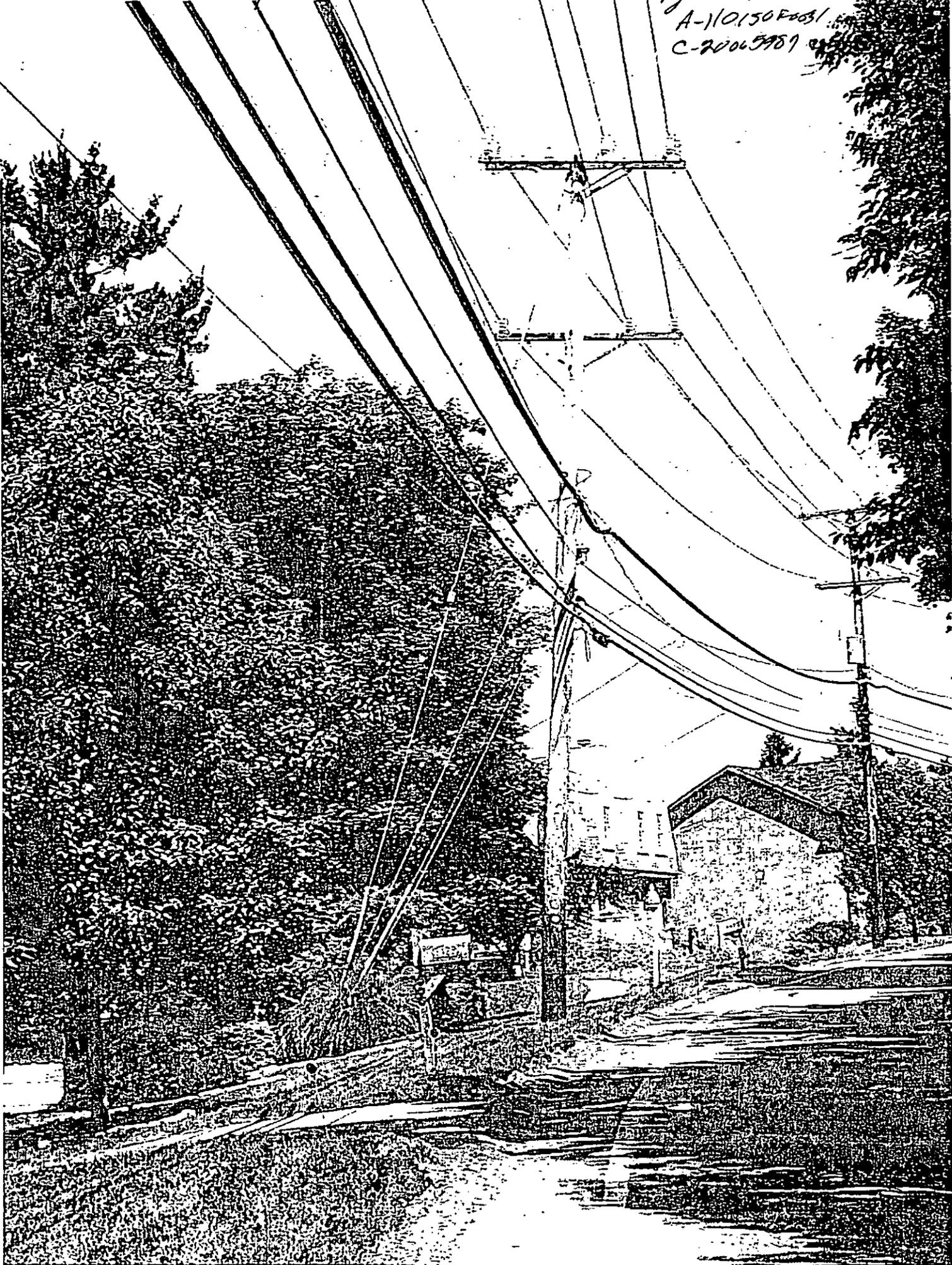
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pg 10

Wildwood - thompson run rd 058

Case # 7112106
A-110150F0031
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DOCKETED
AUG 31 2006

STATE OF CONNECTICUT
SITING COUNCIL

**DOCUMENT
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Re: The Connecticut Light and Power Company and)
The United Illuminating Company Application for a)
Certificate of Environmental Compatibility and)
Public Need for the Construction of a New 345-kV)
Electric Transmission Line and Associated Facilities)
Between Scovill Rock Switching Station in)
Middletown and Norwalk Substation in Norwalk,)
Connecticut Including the Reconstruction of)
Portions of Existing 115-kV and 345-kV Electric)
Transmission Lines, the Construction of the Beseck)
Switching Station in Wallingford, East Devon)
Substation in Milford, and Singer Substation in)
Bridgeport, Modifications at Scovill Rock)
Switching Station and Norwalk Substation and the)
Reconfiguration of Certain Interconnections)

Docket 272

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SECRETARY'S BUREAU

May 3, 2004

SUPPLEMENTAL TESTIMONY OF DR. WILLIAM H. BAILEY
CONCERNING PASSIVE REGULATORY RESPONSES
WITH RESPECT TO 60 HZ ELECTRIC AND MAGNETIC FIELDS

Q. Dr. Bailey, in the March 25th hearing Councilman Tait asked about the difference between passive and aggressive regulatory action. Please elaborate on the information you provided at that time.

A. As was discussed at the hearing, the distinction between passive and active regulatory action has been made by the Director of the National Institute of Environmental Science (NIEHS) in the report of his agency to Congress (NIEHS, 1999). (Tr. 3/25/04, at 62, 63). The Director indicated that there is only marginal, scientific support that exposure to extremely low frequency electric and

magnetic fields ("ELF-EMF"), which include the 60-Hz fields associated with electric power transmission, are a health hazard and that it is unclear what aspect of the exposure, if any, may be the active component of the field statistically associated with cancer risk. In this context, NIEHS provided suggestions to agencies for the scope of regulatory actions. Specifically,

The NIEHS suggests that the level and strength of evidence supporting ELF-EMF exposure as a human health hazard are insufficient to warrant aggressive regulatory actions; thus, we do not recommend actions such as stringent standards on electric appliances and a national program to bury all transmission and distribution lines. Instead, the evidence suggests passive measures such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. NIEHS suggests that the power industry continue its current practice of siting power lines to reduce exposures and continue to explore ways to reduce the creation of magnetic fields around transmission and distribution lines without creating new hazards. We also encourage technologies that lower exposures from neighborhood distribution lines provided that they do not increase other risks, such as those from accidental electrocution or fire. [emphasis added] (NIEHS, 1999, pp. 37-38).

Here, NIEHS identifies aggressive regulatory actions and passive [non-regulatory] actions by example, not by definition. The examples of aggressive regulatory actions include stringent standards and costly, universal mitigation. Clearly, such actions would need to be mandated by regulatory agencies. Instead of such actions, NIEHS recommended "passive measures" including education of public and the regulated community, the design and siting of transmission lines, and technologies for distribution lines, as voluntary activities to reduce exposures of the public to EMF. Further down in this section of the report NIEHS also identifies the mitigation of improper grounding and improper wiring in residences and alternative designs to appliances as methods to reduce magnetic fields "at

minimal cost". These recommendations are consistent with their concluding opinion that "inexpensive and safe reductions to exposure should be encouraged." (p. 38).

Q. Did the NIEHS describe any other passive measures?

A. No, but I believe that other measures that could be shown to reduce exposures at low or no cost without increasing environmental impacts or safety risks would be consistent with the NIEHS recommendations.

Q. Are there related discussions of passive measures that might be of interest to the Council?

A. Yes, Dr. M. Granger Morgan of Carnegie Mellon University has published extensively on appropriate public policies to consider in the face of questions as to whether human exposure to EMF involves risks to health or the environment. He is best known as the originator of the concept of "prudent avoidance" (Morgan, 1988) that was mentioned at the hearing, and popularized in a widely circulated informational brochure (Morgan, 1989). Even though NIEHS did not credit Dr. Morgan as the inspiration for its policy recommendations, they are clearly informed by his work.

Q. What did Dr. Morgan mean by prudent avoidance in relation to EMF?

A. By prudent avoidance, Morgan meant "limiting exposures which can be avoided with small investments of money and effort." He believed that:

...because our understanding of the science of the problem is still very incomplete, there is a real chance that some or all of the expense and associated trouble that would result from "aggressive action" taken now, would ultimately turn out to have been ineffective. There are two ways this could happen. First, it could turn out that there are no health risks from fields or that there are risks but they are very small. Second, it could turn out that while there are risks, we've done the wrong things to control them and gotten little or no improvement for our money....

In our discussion of the strategy of "prudent avoidance" we argued that today it is hard to justify spending more than a few thousand dollars per person exposed in order to reduce exposures. We said this because we believe that if fields pose health risks, only a very small fraction of all the people exposed can be expected to develop adverse health consequences (probably not more than one in many thousands). That means that spending a few thousand dollars per exposure avoided amounts to spending millions of dollars *or more* per possible health effect avoided (Morgan, 1989, pp. 28-29).

Q. What are some of Dr. Morgan's examples of exercising prudent avoidance?

A. He describes how individuals could respond to concerns about unverified potential risks of EMF in fiscally prudent ways by using regular instead of electric blankets, moving small electric motors, such as are found in electric clocks, further away, and including the location of transmission and distribution lines as one of many things considered in making a decision for purchasing a residence. Such decisions are easy because we are making the decision for ourselves, the costs for the above decisions are negligible, and we can make tradeoffs against alternative choices for expenditures. See Attachment I to this testimony for another excerpt of Morgan's discussion of his prudent avoidance approach (OTA, 1989).

Q. Can Dr. Morgan's concept of prudent avoidance be easily applied to the making of public policy?

A. No. As Morgan points out, "In our private lives we exercise prudence all the time when we face an uncertain risk. In public decision making we have more trouble being 'prudent' about uncertainty"(Morgan, 1989, p. 26). Some of the difficulties in applying this concept are that: the actions of public agencies affect groups of persons with very different attitudes toward, and judgments about, potential risk; actions by public bodies may mistakenly be interpreted as proof that a risk exists, even if not demonstrated; the costs and benefits often accrue to different groups within the population; and the costs for avoiding exposures to power line fields are much greater than costs for controlling an individual's exposures.

Q. According to Dr. Morgan, what expenditures to limit exposure would not be fiscally prudent?

A. Dr. Morgan argues the upper bound for spending to reduce exposure to an unknown risk should be less than that for known risks. He states, "Clearly it makes no sense to invest more per person-exposure avoided than we invest per death avoided for various known risks in our society....We conclude that it might be possible to justify investment rates of up to some thousands of dollars of person-exposure avoided, but not possible to justify rates of investment in field avoidance activities that are significantly higher than this" [Emphasis in original text] (OTA, 1989, p. 79).

Q. Did Dr. Morgan believe that the setting of limits on field strengths from transmission or distribution lines, the undergrounding of transmission lines, or doing nothing were compatible with a prudent avoidance approach given the current state of the science?

A. No, he believed that setting field limits could not be justified upon scientific grounds, widespread undergrounding was too costly, and doing nothing was not an appropriate response to public concern (OTA, 1989).

Q. Have public agencies tried to apply this concept without incurring the drawbacks mentioned above?

A. There are several examples. Consider the approach of the World Health Organization (WHO). WHO has recommended that concern about EMF be addressed by separating strategies for private persons from public strategies. The WHO public strategies further distinguish between the actions that are necessary to address *health issues* and those that necessary to address *public concerns* (Repacholi, 2001). Addressing public health issues involves the vigorous unbiased evaluation of EMF research as has been carried out by various scientific, national, and international health organizations and this tradition is continuing under sponsorship of WHO.

Activities that the WHO has recommended to address public concern about EMF include:

- Research programs to address data gaps and narrow uncertainties to better health risk assessments;
- Encourage manufacturers to keep exposures to the minimum needed for the technology
- Improve risk communication
- Encourage public involvement in decision making
- Siting facilities to minimize public exposure and concerns

Q. Are there examples in the United States?

A. Yes. The recommendations of NIEHS discussed above and the Connecticut EMF Best Management Practices both embrace the strategy of encouraging responses and expenditures that are proportionate to the degree of scientific evidence that there might be a risk, and responsive to public concern.

It is important here to point out here that the approach taken by the state of Connecticut in 1993 to request that utilities follow best management practices, as described in the "Supplemental Testimony of Robert E. Carberry. Concerning State Policies With Respect To 60-Hz Electric And Magnetic Fields," predated the recommendations of NIEHS by six years.

Q. Is the 'Precautionary Principle' also an example of a passive non-regulatory response?

- A. Only in a non-technical sense. The precautionary principle is embedded in both European and U.S. regulatory considerations and actions as a legal principle and therefore when applied by government agencies would seem to go beyond a “passive response.”

The European Commission has identified the precautionary principle as a key tenet of environmental policy. The Rio Declaration on the Environment at The United Nations Conference on Environment and Development, the precautionary principle is defined:

Principle 15

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (UNEP, 1992)

The European Commission (EC, 2000) has provided guidance to decision makers on the application of the precautionary principle. The Commission recommends:

- *Proportionality*. “Measures . . . must not be disproportionate to the desired level of protection and must not aim at zero risk.”
- *Nondiscrimination*. “[C]omparable situations should not be treated differently and . . . different situations should not be treated in the same way, unless there are objective grounds for doing so.”
- *Consistency*. “[M]easures . . . should be comparable in nature and scope with measures already taken in equivalent areas in which all the scientific data are available.”
- *Examination of the benefits and costs of action or lack of action*. “This examination should include an economic cost/benefit analysis when this is appropriate and feasible. However, other analysis methods . . . may also be relevant.”
- *Examination of scientific developments*. “The measures must be of a provisional nature pending the availability of more reliable scientific

data” . . . “scientific research shall be continued with a view to obtaining more complete data.”

The European Commission’s recommendations make very clear that “The precautionary principle should be considered within a structured approach to the analysis of risk which comprises three elements: risk assessment, risk management, risk communication.”

With regard to EMF, the European Commission has summarized the scientific evidence as:

Regarding the long term effects there is much more debate. Possible effects that are considered include carcinogenic effects (e.g. leukemia and other cancers) and biological effects. The results of the research in this field have been contradictory, and the balance of scientific evidence did not demonstrate at the time any risk associated with EMF exposure at the low levels to which the public is confronted in its everyday life. Before implementation of the 1999 Recommendation, all the available evidence [from] the world’s largest health authorities have concluded that the weight of the scientific evidence indicated that electromagnetic fields did not cause cancer [Emphasis added] (EC, 2002, p. 5).

The Commission therefore concluded that the precautionary principle should not be invoked because:

...there are no clear scientific indications that the possible effects on human health may be potentially dangerous.

Therefore the Commission decided to base its proposal on established health effects only, for which there are thresholds of exposure before the effects occur. However, since there are safety factors of about 50 between the threshold values for acute effects and the basic restrictions this recommendation would cover implicitly possible long-term effects in the whole frequency range. As a result, ICNIRP guidelines provide safe protection thresholds with respect to adverse health effects which may be caused by EMF exposure (EC, 2002, p. 10).

- Q. At the March 25th hearing, Mr. Tait expressed an interest in what state health departments outside Connecticut had listed on their websites concerning EMF. (Tr. 3/25/04 at 310). Have you done anything to provide that information?
- A. Yes. We searched for websites maintained by Departments of Health in all the 50 states and determined if they posted information about EMF. We found seven such websites (including that of the Connecticut Department of Health). In addition, we found that the health department websites of four states contained no such information, but EMF information was posted at a website of another state agency. We printed out all of this material, and I understand that the Companies have filed a request that the Council take administrative notice of it. **Attachment 2** to my testimony lists the health department websites that we visited, and indicates whether or not there was EMF information posted on it. **Attachment 2** also identifies the materials from all eleven states that were included in the Companies Request to Take Administrative Notice.
- Q. Do any of these state agency websites suggest need to update Connecticut's EMF Best Management Practices?
- A. No. No state has recommended a more aggressive approach than Connecticut's EMF Best Management Practices. Moreover, the information posted by the Connecticut Department of Health appears to have been updated more recently than most of these other states.

Q. Have any states concluded that an even less aggressive strategy is appropriate based upon multidisciplinary reviews of the literature?

A. Yes. After considering the review of the literature in 1997 performed by a multidisciplinary panel of scientists for the National Academy of Sciences, the Public Service Commission of Wisconsin, formerly at the forefront of addressing EMF issues, *rescinded* its 1992 mandates to utilities at the conclusions of Advance Plan Proceedings to:

- Use low-EMF design structures where practicable when proposing to construct new electric transmission lines or rebuild old ones;
- Investigate and report on methods of reducing EMF on their distribution systems; and
- Incorporate the possibility of adverse health effects from EMF into the integrated resource planning process.

A copy of the ruling in which the Wisconsin PSC announced this position is submitted as **Attachment 3** to this testimony. The Wisconsin example highlights the fact that most public policies regarding EMF (including those based on prudent avoidance) were developed in the late 1980s and early 1990s when the uncertainty about EMF was much greater than it is today. At that time epidemiology research had just begun gaining momentum, the U.S. national EMF research program (RAPID) had not started, no long-term chronic exposure studies in animals had been initiated, and there were hints of potential mechanisms to

explain the contribution of EMF to carcinogenic processes, which subsequent research failed to confirm.

Q. Why did the Wisconsin Public Service Commission rescind these mandates?

A. After hearing expert testimony, the Commission concluded that the evidence did not invalidate a previous conclusion of "no evidence that electric fields pose a significant health risk to the general public."

Regarding magnetic fields, the Commission stated:

A scientific consensus is growing that, despite many years of focused research, exposure to power frequency EMF has not been shown to adversely affect human health. This consensus is supported by an extensive review of EMF research published by the National Academy of Sciences in 1997. In light of this consensus, it is reasonable to eliminate a number of EMF regulatory requirements established in previous Advance Plans. However, because some concern remains, especially in the mind of the public, and because research on this subject is continuing, it would be unreasonable to ignore EMF altogether. (Attachment 3, at. 6-7, Emphasis added)

Q. At the March 25th hearing, Mr. Tait asked whether any EMF exposure standards or guidelines have been set by any state or by any regulatory agency in the world. (Tr. 3/25/04, at 282). Have you prepared any information in response to that request?

A. Yes. **Attachment 4** is a list of the standards and guidelines for electric and magnetic fields associated with electric power transmission lines that have been adopted in other states. There are seven of them. **Attachment 5** is a list of exposure guidelines and recommendations adopted by other countries and international agencies.

Q. What are the bases for the standards and guidelines adopted by these states regarding transmission lines?

A. For electric fields the goal of these guidelines and standards is to prevent contact shocks, particularly from large ungrounded vehicles parked under the conductors and to minimize field perception. The two states that enacted standards for magnetic fields thoroughly examined health and safety issues regarding fields from transmission lines but did not that the pose a public health risk. The basis for limiting magnetic fields from transmission lines was to maintain the 'status quo' so that fields from new transmission lines would be no higher those produced by existing transmission lines.

Q. Have state health or transmission siting agencies recommended limits on electric or magnetic fields based upon new scientific information that has become available since the completion of the RAPID program and evaluation of the research by NIEHS?

A. No. As shown in **Attachment 4**, the most recent standards that we could for magnetic fields were published in 1990; and for electric fields it was 1996.

Q. Would populations near the existing or proposed transmission lines on the proposed or alternative routes be identified as subject to adverse health effects as

implied by exposures exceeding health-based limits on electric or magnetic fields recommended by national or international organizations?

A. No. Attachment 5 summarizes the most frequently cited limits for fields at 60 Hz. For instance, a magnetic field exposure limit for the general public of 830 mG has been recommended by the International Committee on Nonionizing Radiation Protection (ICNIRP) and has been adopted by the National Radiological Protection Board in the United Kingdom and other countries. The projected EMF levels even underneath/above the overhead/underground conductors are below these exposure limits. And each of these standards incorporates large safety factors.

Q. You recently submitted supplemental testimony describing site-specific EMF reduction measures that Exponent and the Companies have designed for potential use at the Jewish Community Center and the B'nai Jacob/Ezra Academy complex in Woodbridge. In your opinion, would the adoption of these measures be consistent with the concept of prudent avoidance and the Siting Council's Best Management Practices?

A. It is a borderline case. The estimated the cost of designing and implementing these alternate designs could be expected to exceed a no-cost or low cost criterion. However, in comparison to the overall project cost and the cost per mile of undergrounding, it could be considered modest. Given the expressed public concern about the use of these sites by large numbers of young children, the

Council could consider these measures to be consistent with Best Management Practices.

However, the Council also is faced with equity issues.

- The cost of splitting the phases of the new line for its entire length would not be a modest one, even if there were enough room on the right of way to do that without expanding the right of way or making room by moving an existing line off the right of way. Moreover, for much of the length of the proposed line, there is not enough room on the existing right of way, so the total cost of split phasing would be prohibitively high.
- Is it equitable to provide for the reduction of EMF at two specific locations, where children might be at school or voluntary activities part of the day, while denying reductions in involuntary EMF exposure at perhaps hundreds of residences along a much longer portion of the overhead route, where it could be argued that children spend even more time?
- Does taking what may appear to many to be 'drastic' action to reduce EMF at a specific site imply that a risk exists, and thereby attach a stigma to properties along the route, where similar EMF reductions are not proposed or where the opportunity to take similar action does not even exist because of right-of-way limitations.

Q. Do you have any further discussion of regulatory responses at this time?

A. No. This concludes my testimony.

Attachment 1

Attachment 1

Dr. Morgan's Prudent Avoidance Policy

Our fifth and final option is a strategy of "prudent avoidance" of field exposures. By avoidance we mean taking steps to keep people out of fields, both by re-routing facilities and by redesigning electrical systems and appliances. By prudence we mean undertaking only those avoidance activities which carry modest costs. When, as individuals, we think a risk may exist but we are not sure, we exercise prudence. For example, broccoli and cauliflower may contain anti-carcinogens. Dietary fiber may help to reduce the risk of certain cancers. Conversely char-grilled meats may carry increased risks of cancer. The evidence on these things is suggestive but inconclusive. As a matter of prudence many people have tried to increase the frequency with which they eat cauliflower vegetables, increase their fiber intake, and reduce the amount of char-grilled meat they eat. But reasonable people do not rent a helicopter to fly high fiber bread in to them when they spend a week at a mountain ski resort which serves only regular bread. Families who eat meat, would not buy lobster for their kids every night for a week at that same ski resort if it is the only meat on the menu that is not charbroiled. Nor do reasonable people rent their own refrigerated truck to supply them with broccoli and cauliflower when they travel in places where these foods are not available. Such steps go beyond prudence. At the least they would be foolishly expensive, at the worst, signs of serious paranoia.

What would constitute prudence in the context of keeping people out of 60 Hz fields? Here are a few possibilities:

- Attempt to route new transmission lines so that they avoid people;
- Widen transmission line rights-of-way;
- Develop designs for distribution systems, including new grounding procedures, which minimize the associated fields;
- Develop new approaches to house wiring that minimize associated fields;
- Redesign appliances to minimize or eliminate fields.

If we decide to do these things we have to ask how do we avoid going overboard...how do we avoid the equivalent of renting the helicopter? The answer lies in asking how much we should be prepared to invest in avoiding exposing people to fields. It is fairly easy to set an upper bound on the amount we should be willing to spend. Clearly it makes no sense to invest more per person-exposure avoided than we invest per *death* avoided for various *known* risks in our society. In other writings we have used the rates at which our society invests in avoiding *known* risks of death and injury to develop an upper bound on the rates at which it would be prudent to invest in field avoidance (Morgan 87b, Morgan 87c). We conclude that it might be possible to justify investment rates of up to thousands of dollars of person-exposure avoided, but not possible to justify rates of investment in field avoidance activities that are significantly higher than this. Thus, for example, while it might make sense to work to avoid exposing people in siting new lines, in most cases, with our current knowledge, it would not make sense to tear out and rebuild old lines. Similarly it might make sense to redesign new appliances to reduce fields exposure if this can be done for small increments in their cost. It might even make sense to selectively replace a few old appliances, such as electric blankets, with "field-free" versions. But it probably would not make sense to throw out all old appliances before they wear out and replace them all immediately with new "field-free" ones (OTA, 1989, pg 78-79).

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C-20065987
A-1101505003;
C-20065987**Overall Evaluations of Carcinogenicity to Humans****Group 2B: Possibly carcinogenic to humans**As evaluated in *IARC Monographs Volumes 1-88*

This list contains all agents evaluated as being in Group 2B. Where appropriate, chemical abstract numbers are given [in square brackets]. For details of the evaluation, the relevant Monograph should be consulted (volume number given in round brackets, followed by year of publication of latest evaluation). Use a free-text search to find a particular compound.

Group 2B: Possibly carcinogenic to humans (241)**Agents and groups of agents**A- α -C (2-Amino-9H-pyrido[2,3-b]indole) [26148-68-5] (Vol. 40, Suppl. 7; 1987)

Acetaldehyde [75-07-0] (Vol. 36, Suppl. 7, Vol. 71; 1999)

Acetamide [60-35-5] (Vol. 7, Suppl. 7, Vol. 71; 1999)

Acrylonitrile [107-13-1] (Vol. 71; 1999)

AF-2 [2-(2-Furyl)-3-(5-nitro-2-furyl)acrylamide] [3688-53-7] (Vol.31, Suppl. 7; 1987)

Aflatoxin M1 [6795-23-9] (Vol. 56; 1993)

para-Aminoazobenzene [60-09-3] (Vol. 8, Suppl. 7; 1987)*ortho*-Aminoazotoluene [97-56-3] (Vol. 8, Suppl. 7; 1987)

2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole [712-68-5] (Vol.7, Suppl. 7; 1987)

Amsacrine [51264-14-3] (Vol. 76; 2000)

ortho-Anisidine [90-04-0] (Vol. 73; 1999)

Antimony trioxide [1309-64-4] (Vol. 47; 1989)

Aramite® [140-57-8] (Vol. 5, Suppl. 7; 1987)

Auramine [492-80-8] (technical-grade) (Vol. 1, Suppl. 7; 1987)

Azaserine [115-02-6] (Vol. 10, Suppl. 7; 1987)

Aziridine [151-56-4] (Vol. 9, Suppl. 7, Vol. 71; 1999)

(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)

Benzo[*b*]fluoranthene [205-99-2] (Vol. 32, Suppl. 7; 1987)Benzo[*j*]fluoranthene [205-82-3] (Vol. 32, Suppl. 7; 1987)Benzo[*k*]fluoranthene [207-08-9] (Vol. 32, Suppl. 7; 1987)DOCUMENT
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- Benzofuran [271-89-6] (Vol. 63; 1995)
- Benzyl violet 4B [1694-09-3] (Vol. 16, Suppl. 7; 1987)
- 2,2-Bis(bromomethyl)propane-1,3-diol [3296-90-0] (Vol. 77; 2000)
- Bleomycins [11056-06-7] (Vol. 26, Suppl. 7; 1987)
(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)
- Bracken fern (Vol. 40, Suppl. 7; 1987)
- Bromodichloromethane [75-27-4] (Vol. 52, Vol. 71; 1999)
- Butylated hydroxyanisole (BHA) [25013-16-5] (Vol. 40, Suppl. 7; 1987)
- β -Butyrolactone [3068-88-0] (Vol. 11, Suppl. 7, Vol. 71; 1999)
- Caffeic acid [331-39-5] (Vol. 56; 1993)
- Carbon black [1333-86-4] (Vol. 65; 1996)
- Carbon tetrachloride [56-23-5] (Vol. 20, Suppl. 7, Vol. 71; 1999)
- Catechol [120-80-9] (Vol. 15, Suppl. 7, Vol. 71; 1999)
- Chlordane [57-74-9] (Vol. 79; 2001)
- Chlordecone (Kepone) [143-50-0] (Vol. 20, Suppl. 7; 1987)
- Chlorendic acid [115-28-6] (Vol. 48; 1990)
- para*-Chloroaniline [106-47-8] (Vol. 57; 1993)
- 3-Chloro-4-(dichloromethyl)-5-hydroxy-2(5*H*)-furanone [77439-76-0] (Vol. 84; in preparation)
- Chloroform [67-66-3] (Vol. 73; 1999)
- 1-Chloro-2-methylpropene [513-37-1] (Vol. 63; 1995)
- Chlorophenoxy herbicides (Vol. 41, Suppl. 7; 1987)
- 4-Chloro-*ortho*-phenylenediamine [95-83-0] (Vol. 27, Suppl.7; 1987)
- Chloroprene [126-99-8] (Vol. 71; 1999)
- Chlorothalonil [1897-45-6] (Vol. 73; 1999)
- CI Acid Red 114 [6459-94-5] (Vol. 57; 1993)
- CI Basic Red 9 [569-61-9] (Vol. 57; 1993)
- CI Direct Blue 15 [2429-74-5] (Vol. 57; 1993)
- Citrus Red No. 2 [6358-53-8] (Vol. 8, Suppl. 7; 1987)

Cobalt [7440-48-4] and cobalt compounds (Vol. 52; 1991)
(NB: Evaluated as a group)

Cobalt sulfate [10026-24-1] and other soluble cobalt(II) salts (Vol. 86; in preparation)

para-Cresidine [120-71-8] (Vol. 27, Suppl. 7; 1987)

Cycasin [14901-08-7] (Vol. 10, Suppl. 7; 1987)

Dacarbazine [4342-03-4] (Vol. 26, Suppl. 7; 1987)

Dantron (Chrysazin; 1,8-Dihydroxyanthraquinone) [117-10-2] (Vol.50; 1990)

Daunomycin [20830-81-3] (Vol. 10, Suppl. 7; 1987)

~~DDT~~ [*p,p'*-DDT, 50-29-3] (Vol. 53; 1991)

N,N'-Diacetylbenzidine [613-35-4] (Vol. 16, Suppl.7; 1987)

2,4-Diaminoanisole [615-05-4] (Vol. 79; 2001)

4,4'-Diaminodiphenyl ether [101-80-4] (Vol. 29, Suppl. 7; 1987)

2,4-Diaminotoluene [95-80-7] (Vol. 16, Suppl. 7; 1987)

Dibenz[*a,h*]acridine [226-36-8] (Vol. 32, Suppl. 7; 1987)

Dibenz[*a,j*]acridine [224-42-0] (Vol. 32, Suppl. 7; 1987)

7*H*-Dibenzo[*c,g*]carbazole [194-59-2] (Vol. 32, Suppl.7; 1987)

Dibenzo[*a,e*]pyrene [192-65-4] (Vol. 32, Suppl. 7; 1987)

Dibenzo[*a,h*]pyrene [189-64-0] (Vol. 32, Suppl. 7; 1987)

Dibenzo[*a,i*]pyrene [189-55-9] (Vol. 32, Suppl. 7; 1987)

Dibenzo[*a,l*]pyrene [191-30-0] (Vol. 32, Suppl. 7; 1987)

1,2-Dibromo-3-chloropropane [96-12-8] (Vol. 20, Suppl. 7, Vol. 71; 1999)

2,3-Dibromopropan-1-ol [96-13-9] (Vol. 77; 2000)

Dichloroacetic acid [79-43-6] (Vol. 84; in preparation)

para-Dichlorobenzene [106-46-7] (Vol. 73; 1999)

3,3'-Dichlorobenzidine [91-94-1] (Vol. 29, Suppl. 7; 1987)

3,3'-Dichloro-4,4'-diaminodiphenyl ether [28434-86-8] (Vol. 16,Suppl. 7; 1987)

1,2-Dichloroethane [107-06-2] (Vol. 20, Suppl. 7, Vol. 71; 1999)

Dichloromethane (methylene chloride) [75-09-2] (Vol. 71; 1999)

- 1,3-Dichloropropene [542-75-6] (technical-grade) (Vol. 41, Suppl.7, Vol. 71; 1999)
- Dichlorvos [62-73-7] (Vol. 53; 1991)
- 1,2-Diethylhydrazine [1615-80-1] (Vol. 4, Suppl. 7, Vol. 71; 1999)
- Diglycidyl resorcinol ether [101-90-6] (Vol. 36, Suppl. 7, Vol. 71; 1999)
- Dihydrosafrole [94-58-6] (Vol. 10, Suppl. 7; 1987)
- Diisopropyl sulfate [2973-10-6] (Vol. 54, Vol. 71; 1999)
- 3,3'-Dimethoxybenzidine (*ortho*-Dianisidine) [119-90-4](Vol. 4, Suppl. 7; 1987)
- para*-Dimethylaminoazobenzene [60-11-7] (Vol. 8, Suppl.7; 1987)
- trans*-2-[(Dimethylamino)methylimino]-5-[2-(5-nitro-2-furyl)-vinyl]-1,3,4-oxadiazole [25962-77-0] (Vol. 7, Suppl. 7; 1987)
- 2,6-Dimethylaniline (2,6-Xylidine) [87-62-7] (Vol. 57; 1993)
- 3,3'-Dimethylbenzidine (*ortho*-Tolidine) [119-93-7] (Vol.1, Suppl. 7; 1987)
- 1,1-Dimethylhydrazine [57-14-7] (Vol. 4, Suppl. 7, Vol. 71; 1999)
- 3,7-Dinitrofluoranthene [105735-71-5] (Vol. 65; 1996)
- 3,9-Dinitrofluoranthene [22506-53-2] (Vol. 65; 1996)
- 1,6-Dinitropyrene [42397-64-8] (Vol. 46; 1989)
- 1,8-Dinitropyrene [42397-65-9] (Vol. 46; 1989)
- 2,4-Dinitrotoluene [121-14-2] (Vol. 65; 1996)
- 2,6-Dinitrotoluene [606-20-2] (Vol. 65; 1996)
- 1,4-Dioxane [123-91-1] (Vol. 11, Suppl. 7, Vol. 71; 1999)
- Disperse Blue 1 [2475-45-8] (Vol. 48; 1990)
- 1,2-Epoxybutane [106-88-7] (Vol. 47, Vol. 71; 1999)
(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)
- Ethyl acrylate [140-88-5] (Vol. 39, Suppl. 7, Vol. 71; 1999)
- Ethylbenzene [100-41-4] (Vol. 77; 2000)
- Ethyl methanesulfonate [62-50-0] (Vol. 7, Suppl. 7; 1987)
- Foreign bodies, implanted in tissues (Vol. 74; 1999)
- Polymeric, prepared as thin smooth films (with the exception of poly(glycolic acid))
Metallic, prepared as thin smooth films
Metallic cobalt, metallic nickel and an alloy powder containing 66-67% nickel, 13-16%

chromium and 7% iron

2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole [3570-75-0](Vol. 7, Suppl. 7; 1987)

Fumonisin B₁ [116355-83-0] (Vol. 82; 2002)

Furan [110-00-9] (Vol. 63; 1995)

Glu-P-1 (2-Amino-6-methyldipyrido[1,2-*a*:3',2'-*d*]imidazole) [67730-11-4] (Vol. 40, Suppl. 7; 1987)

Glu-P-2 (2-Aminodipyrido[1,2-*a*:3',2'-*d*]imidazole)[67730-10-3] (Vol. 40, Suppl. 7; 1987)

Glycidaldehyde [765-34-4] (Vol. 11, Suppl. 7, Vol. 71; 1999)

Griseofulvin [126-07-8] (Vol. 79; 2001)

HC Blue No. 1 [2784-94-3] (Vol. 57; 1993)

Heptachlor [76-44-8] (Vol. 79; 2001)

Hexachlorobenzene [118-74-1] (Vol. 79; 2001)

Hexachloroethane [67-72-1] (Vol. 73; 1999)

Hexachlorocyclohexanes (Vol. 20, Suppl. 7; 1987)

Hexamethylphosphoramide [680-31-9] (Vol. 15, Suppl. 7, Vol. 71; 1999)

Human immunodeficiency virus type-2 (infection with) (Vol. 67; 1996)

Human papillomaviruses: some types other than 16, 18, 31 and 33 (Vol. 64; 1995)

Hydrazine [302-01-2] (Vol. 4, Suppl. 7, Vol. 71; 1999)

1-Hydroxyanthraquinone [129-43-1] (Vol. 82; 2002)

Indeno[1,2,3-*cd*]pyrene [193-39-5] (Vol. 32, Suppl. 7; 1987)

Iron-dextran complex [9004-66-4] (Vol. 2, Suppl. 7; 1987)

Isoprene [78-79-5] (Vol. 60, Vol. 71; 1999)

Lasiocarpine [303-34-4] (Vol. 10, Suppl. 7; 1987)

Lead [7439-92-1] (Vol. 23, Suppl. 7; 1987)

Magenta [632-99-5] (containing CI Basic Red 9) (Vol. 57; 1993)

Magnetic fields (extremely low-frequency) (Vol. 80; 2002)

MeA- α -C (2-Amino-3-methyl-9H-pyrido[2,3-*b*]indole) [68006-83-7] (Vol. 40, Suppl. 7; 1987)

Medroxyprogesterone acetate [71-58-9] (Vol. 21, Suppl. 7; 1987)

MeIQ (2-Amino-3,4-dimethylimidazo[4,5-*f*]quinoline) [77094-11-2] (Vol. 56; 1993)

- MeIQx (2-Amino-3,8-dimethylimidazo[4,5-*f*]quinoxaline) [77500-04-0] (Vol. 56; 1993)
- Merphalan [531-76-0] (Vol. 9, Suppl. 7; 1987)
- 2-Methylaziridine (Propyleneimine) [75-55-8] (Vol. 9, Suppl. 7, Vol. 71; 1999)
- Methylazoxymethanol acetate [592-62-1] (Vol. 10, Suppl. 7; 1987)
- 5-Methylchrysene [3697-24-3] (Vol. 32, Suppl. 7; 1987)
- 4,4'-Methylene bis(2-methylaniline) [838-88-0] (Vol. 4, Suppl.7; 1987)
- 4,4'-Methylenedianiline [101-77-9] (Vol. 39, Suppl. 7; 1987)
- Methylmercury compounds (Vol. 58; 1993)
(NB: Evaluated as a group)
- 2-Methyl-1-nitroanthraquinone [129-15-7] (uncertain purity) (Vol.27, Suppl. 7; 1987)
- N*-Methyl-*N*-nitrosourethane [615-53-2] (Vol. 4, Suppl.7; 1987)
- Methylthiouracil [56-04-2] (Vol. 79; 2001)
- Metronidazole [443-48-1] (Vol. 13, Suppl. 7; 1987)
- Mirex [2385-85-5] (Vol. 20, Suppl. 7; 1987)
- Mitomycin C [50-07-7] (Vol. 10, Suppl. 7; 1987)
- Mitoxantrone [65271-80-9] (Vol. 76; 2000)
- Monocrotaline [315-22-0] (Vol. 10, Suppl. 7; 1987)
- 5-(Morpholinomethyl)-3-[(5-nitrofurfurylidene)amino]-2-oxazolidinone [3795-88-8] (Vol. 7, Suppl. 7; 1987)
- Nafenopin [3771-19-5] (Vol. 24, Suppl. 7; 1987)
- Naphthalene [91-20-3] (Vol. 82; 2002)
- Nickel, metallic [7440-02-0] and alloys (Vol. 49; 1990)
- Niridazole [61-57-4] (Vol. 13, Suppl. 7; 1987)
- Nitrilotriacetic acid [139-13-9] and its salts (Vol. 73; 1999)
(NB: Evaluated as a group)
- 5-Nitroacenaphthene [602-87-9] (Vol. 16, Suppl. 7; 1987)
- 2-Nitroanisole [91-23-6] (Vol. 65; 1996)
- Nitrobenzene [98-95-3] (Vol. 65; 1996)
- 6-Nitrochrysene [7496-02-8] (Vol. 46; 1989)

Nitrofen [1836-75-5] (technical-grade) (Vol. 30, Suppl. 7; 1987)

2-Nitrofluorene [607-57-8] (Vol. 46; 1989)

1-[(5-Nitrofurfurylidene)amino]-2-imidazolidinone [555-84-0] (Vol.7, Suppl. 7; 1987)

N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide [531-82-8] (Vol. 7, Suppl. 7; 1987)

Nitrogen mustard *N*-oxide [126-85-2] (Vol. 9, Suppl. 7;1987)

Nitromethane [75-52-5] (Vol. 77; 2000)

2-Nitropropane [79-46-9] (Vol. 29, Suppl. 7, Vol. 71; 1999)

1-Nitropyrene [5522-43-0] (Vol. 46; 1989)

4-Nitropyrene [57835-92-4] (Vol. 46; 1989)

N-Nitrosodi-*n*-butylamine [924-16-3] (Vol. 17, Suppl.7; 1987)

N-Nitrosodiethanolamine [1116-54-7] (Vol. 17, Suppl. 7, Vol. 77;2000)

N-Nitrosodi-*n*-propylamine [621-64-7] (Vol. 17, Suppl.7; 1987)

3-(*N*-Nitrosomethylamino)propionitrile [60153-49-3] (Vol. 85; in preparation)

4-(*N*-Nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)[64091-91-4] (Vol. 37, Suppl. 7; 1987)

N-Nitrosomethylethylamine [10595-95-6] (Vol. 17, Suppl.7; 1987)

N-Nitrosomethylvinylamine [4549-40-0] (Vol. 17, Suppl.7; 1987)

N-Nitrosomorpholine [59-89-2] (Vol. 17, Suppl. 7; 1987)

N'-Nitrosonornicotine (NNN) [16543-55-8] (Vol. 37, Suppl. 7;1987)

N-Nitrosopiperidine [100-75-4] (Vol. 17, Suppl. 7; 1987)

N-Nitrosopyrrolidine [930-55-2] (Vol. 17, Suppl. 7; 1987)

N-Nitrososarcosine [13256-22-9] (Vol. 17, Suppl. 7; 1987)

Ochratoxin A [303-47-9] (Vol. 56; 1993)

Oestrogen-progestogen therapy, postmenopausal (Vol. 72; 1999)

Oil Orange SS [2646-17-5] (Vol. 8, Suppl. 7; 1987)

Oxazepam [604-75-1] (Vol. 66; 1996)

Palygorskite (attapulgit) [12174-11-7] (long fibres, > 5 micrometers) (Vol. 68; 1997)

Panfuran S [794-93-4] (containing dihydroxymethylfuratrizine)
(Vol. 24, Suppl. 7; 1987)

Phenazopyridine hydrochloride [136-40-3] (Vol. 24, Suppl. 7; 1987)

Phenobarbital [50-06-6] (Vol. 79; 2001)

Phenolphthalein [77-09-8] (Vol. 76; 2000)

Phenoxybenzamine hydrochloride [63-92-3] (Vol. 24, Suppl. 7; 1987)

Phenyl glycidyl ether [122-60-1] (Vol. 47, Vol. 71; 1999)

Phenytoin [57-41-0] (Vol. 66; 1996)

PhIP (2-Amino-1-methyl-6-phenylimidazo[4,5-*b*]pyridine) [105650-23-5] (Vol. 56; 1993)

Polychlorophenols and their sodium salts (mixed exposures) (Vol. 41, Suppl. 7, Vol. 53, Vol. 71; 1999)

Ponceau MX [3761-53-3] (Vol. 8, Suppl. 7; 1987)

Ponceau 3R [3564-09-8] (Vol. 8, Suppl. 7; 1987)

Potassium bromate [7758-01-2] (Vol. 73; 1999)

~~Progestins~~ (Suppl. 7; 1987)

Progestogen-only contraceptives (Vol. 72; 1999)

1,3-Propane sultone [1120-71-4] (Vol. 4, Suppl. 7, Vol. 71; 1999)

β -Propiolactone [57-57-8] (Vol. 4, Suppl. 7, Vol. 71; 1999)

Propylene oxide [75-56-9] (Vol. 60; 1994)

Propylthiouracil [51-52-5] (Vol. 79; 2001)

Refractory ceramic fibres (Vol. 43, Vol. 81; 2002)

Riddelliine [23246-96-0] (Vol. 10, Suppl. 7, Vol. 82; 2002)

Safrole [94-59-7] (Vol. 10, Suppl. 7; 1987)

Schistosoma japonicum (infection with) (Vol. 61; 1994)

Sodium *ortho*-phenylphenate [132-27-4] (Vol. 73; 1999)

Special-purpose fibres such as E-glass and '475' glass fibres (Vol. 81; 2002)

Sterigmatocystin [10048-13-2] (Vol. 10, Suppl. 7; 1987)

Streptozotocin [18883-66-4] (Vol. 17, Suppl. 7; 1987)

~~Styrene~~ [100-42-5] (Vol. 60, 82; 2002)

(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)

Sulfallate [95-06-7] (Vol. 30, Suppl. 7; 1987)

Tetrafluoroethylene [116-14-3] (Vol. 19, Suppl. 7, Vol. 71; 1999)

Tetranitromethane [509-14-8] (Vol. 65; 1996)

Thioacetamide [62-55-5] (Vol. 7, Suppl. 7; 1987)

4,4'-Thiodianiline [139-65-1] (Vol. 27, Suppl. 7; 1987)

Thiouracil [141-90-2] (Vol. 79; 2001)

Toluene diisocyanates, [26471-62-5] (Vol. 39, Suppl. 7, Vol. 71; 1999)

Trichlormethine (Trimustine hydrochloride) [817-09-4] (Vol. 50; 1990)

Trp-P-1 (3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole)[62450-06-0] (Vol. 31, Suppl. 7; 1987)

Trp-P-2 (3-Amino-1-methyl-5H-pyrido[4,3-b]indole)[62450-07-1] (Vol. 31, Suppl. 7; 1987)

Trypan blue [72-57-1] (Vol. 8, Suppl. 7; 1987)

Uracil mustard [66-75-1] (Vol. 9, Suppl. 7; 1987)

Urethane [51-79-6] (Vol. 7, Suppl. 7; 1987)

Vanadium pentoxide [1314-62-1] (Vol. 86; in preparation)

Vinyl acetate [108-05-4] (Vol. 63; 1995)

4-Vinylcyclohexene [100-40-3] (Vol. 60; 1994)

4-Vinylcyclohexene diepoxide [106-87-6] (Vol. 60; 1994)

Zalcitabine [7481-89-2] (Vol. 76; 2000)

Zidovudine (AZT) [30516-87-1] (Vol. 76; 2000)

Mixtures

Bitumens [8052-42-4], extracts of steam-refined and air-refined (Vol. 35, Suppl. 7; 1987)

Carrageenan [9000-07-1], degraded (Vol. 31, Suppl. 7; 1987)

Chlorinated paraffins of average carbon chain length C12 and average degree of chlorination approximately 60% (Vol. 48; 1990)

Coffee (urinary bladder) (Vol. 51; 1991)

(NB: There is some evidence of an inverse relationship between coffee drinking and cancer of the large bowel; coffee drinking could not be classified as to its carcinogenicity to other organs)

Diesel fuel, marine (Vol. 45; 1989)

(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)

Engine exhaust, gasoline (Vol. 46; 1989)

Fuel oils, residual (heavy) (Vol. 45; 1989)

Gasoline (Vol. 45; 1989)

(NB: Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms)

Pickled vegetables (traditional in Asia) (Vol. 56; 1993)

Polybrominated biphenyls [Firemaster BP-6, 59536-65-1] (Vol. 41, Suppl. 7; 1987)

Toxaphene (Polychlorinated camphenes) [8001-35-2] (Vol. 79; 2001)

Toxins derived from *Fusarium moniliforme* (Vol. 56; 1993)

Welding fumes (Vol. 49; 1990)

Exposure circumstances

Carpentry and joinery (Vol. 25, Suppl. 7; 1987)

Cobalt metal without tungsten carbide (Vol. 86; in preparation)

Dry cleaning (occupational exposures in) (Vol. 63; 1995)

Printing processes (occupational exposures in) (Vol. 65; 1996)

Textile manufacturing industry (work in) (Vol. 48; 1990)

PROPRIETARY INFORMATION

Docket Number A-11615 OF 0031

Name of Document Exhibit TS-1 and
TS-2

Date Document Received 7-12-2006

DOCUMENT CONTAINS

PROPRIETARY INFORMATION

RECEIVED of the Allegheny County Light Company the sum of Twenty five (\$25.00) Dollars, in consideration of which we do hereby give and grant unto the said Allegheny County Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right privilege and authority to erect, use, maintain, renew and finally remove Five (5) poles, together with the crossarms, cables, wires (anchors), guys, brace poles and other fixtures and apparatus thereto belonging, along the Western side of the Thompson Run Road in front of our land, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of David Ferguson and John Doeghty, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS our hand and seal, this 20th day of September, A. D. 1923

WITNESS: Ann M. Doeghty (SEAL)
Susannah Doeghty (SEAL)
Mary E. Doeghty (seal)

P. O. Address Glenham Pa. RD 2
P. O. Address Andrewella Doeghty

State of Pennsylvania, }
County of Allegheny, } ss.

Before me, a Notary Public, in and for said State and County, personally came _____ and acknowledged the foregoing grant to be _____ act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____, A. D. 19____

2154
2

D. L. Co. R. of W.
FILE NO.
2154-2 Notary Public

DOCUMENT
FOLDER

THOMPSON RUN ROAD

DOCKETED
AUG 31 2006

EXHIBIT TS-3

Cum Lg LA 7/12/06
A-110150F0051
C-20065987

PERMIT FOR THE ERECTION OF POLE LINE UPON PRIVATE PROPERTY

FORM 0417280

RECEIVED of the Duquesne Light Company the sum of One Hundred fifty (\$150.00) Dollars, in consideration of which us do hereby give and grant unto the said Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Two (2) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, upon, over and across our land, fronting on the Thompson Run Road, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of _____ and _____

with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution or transmission line, and with the further right to permit others to use said poles and apparatus.

The amount paid on this agreement includes 2-anchors and one Guy Pole

WITNESS our hands and seal at this 20th day of February

A. D. 1931

WITNESS:

B. A. Llewellyn Annie M. Voegtly
B. A. Llewellyn Mary E. Voegtly
B. A. Llewellyn Andrewella Voegtly

Commonwealth of Pennsylvania, }
County of Allegheny } ss:

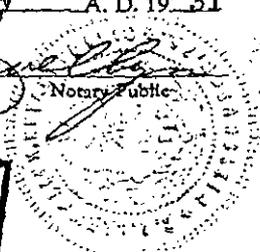
Before me, a Notary Public, in and for said Commonwealth and County of Allegheny, personally came Annie M. Voegtly (unmarried), Mary E. Voegtly (unmarried) and Andrewella Voegtly (unmarried) the foregoing grant to be their act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 20th day of February A. D. 1931

B. A. LLEWELLYN, Notary Public
MY COMMISSION EXPIRES
APRIL 2, 1931

207
9

D. E. Co. R. of W.
FILE NO.
2154-9



RECEIVED of the Allegheny Bauxite Light Company the sum of

Fifteen (\$15.00) Dollars, in consideration of which do hereby give and grant unto the said Allegheny Bauxite Light Company, its successors and assigns; for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove seven (7) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the Western side of the Thompson Run Road in front of our land, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of Andrew Voegtly Hein and M. & Donald Hein, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS our hand and seal this 19th day of September, A. D. 1923

WITNESS:

O. Peck

Wm J Voegtly (SEAL)

P. O. Address R. 3. Evans City

J. M. Voegtly (SEAL)

P. O. Address C. H. Voegtly
1231 Evergreen Ave (Seal)
Milwaukee Wis

State of Pennsylvania, }
County of Allegheny, } as.

Before me, a Notary Public, in and for said State and County, personally came

and acknowledged the foregoing grant to be act and deed,

and desired the same to be recorded as such.

Witness my hand and Notarial Seal this day of A. D. 19

D. L. Co. R. of W.
FILE NO.
2154-3

Notary Public

February 2, 1932.

Mr. C. F. Voegtly,
1251 Evergreen Avenue,
Millvale, Pa.

Dear Sir:-

Upon investigation we find that the Duquesne Light Company is now maintaining an electric transmission line along the westerly side of the Thompson Run Road in front of the property now or formerly of William J. and J. M. Voegtly, Ross Township. Five poles are erected on the public highway and one anchor is located on the Voegtly property. The original permit covering this line, secured in 1923, provides for a maximum of seven poles and one anchor, also the right to trim or remove any trees which at any time might interfere or threaten to interfere with the construction, maintenance or operation of the transmission line.

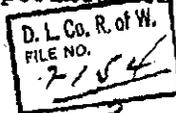
When this line was rebuilt last year a few small trees on the Voegtly property near the roadway were cut down, mostly locust, some of which might have been suitable for fence posts or mine props. I believe your estimate of the entire number was in the neighborhood of 30. Such of them as could have been used would have had a low marketable value. As far as I have been able to ascertain, such trees as were suitable for posts were trimmed of their branches and left lying on the property and were either used by the property owners or removed by others.

While we do not believe the Duquesne Light Company is legally liable for the cutting of these trees, we are willing to pay for such as may have had a marketable value, which would undoubtedly be under \$1.00 per tree.

Yours respectfully,

A. B. DAMPMAN
Superintendent Rights of Way.

ABD.M



July 15, 1931.

Mr. C. P. Voegtly,
1231 Evergreen Avenue,
Millvale, Pa.

Dear Sir:-

I understand from Mr. F. E. Tencate, Superintendent of Operations, Northern Division, that you wished to be advised under what right or authority our construction crews recently trimmed trees along the Thompson Run Road on the Voegtly property, Ross Township, Allegheny County, Pa.

I am enclosing a copy of a right of way grant, dated September 20, 1923, signed by the Voegtly Heirs, under which this line was originally constructed. You will note that this grant includes the right to trim or remove any trees which may interfere or threaten to interfere with the construction, maintenance or operation of the line.

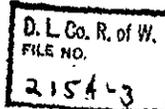
The original grant is on file in this office and you may inspect the same at your convenience.

Yours respectfully,

A. B. DAMPMAN
Supt. Rights of Way.

AED:M

CC-Mr. F. E. Tencate.



RECEIVED of Duquesne Light Company the sum of
Fifteen (\$ 15.00) Dollars, in consideration of which I do hereby
 give and grant unto the said Duquesne Light Company, its successors
 and assigns, the right, privilege and authority to erect, use, maintain, renew and finally remove
Three (3) anchor 0, together with the guy wires and other apparatus
 thereto belonging, upon, over and across My land, fronting on the Thompson Run
 Road, situated in Pros Township, Allegheny County, Pennsylvania,
 between the lands of _____ and _____

WITNESS my hand and seal this 27th day of
February, A. D. 1911

WITNESS:
B. A. Shavellyn Edith R. MacDonald 

809202

254
10

D. L. Co. R. of W.
 FILE NO.
2154-10



RECEIVED of the DUQUESNE LIGHT COMPANY the sum of *Forty*

(\$ *40.00*) Dollars, being payment in full to date for all damages, claims and demands whatsoever

which *I* may have for or by reason of the erection, construction, operation, use, maintenance, repair and renewal of said DUQUESNE LIGHT COMPANY'S transmission system for the conveyance and distribution of electric current, or by reason of the trimming or removal of any trees or shrubbery in connection therewith,

upon, over and across land situate in *Ross* Township, *Allegheny* County,

Pennsylvania; and *I* do hereby release and discharge the said DUQUESNE LIGHT COMPANY, its successors and assigns, of and from all such claims and demands.

WITNESS *my* hand and seal this *29th* day of *June*, A. D. 19*37*.

WITNESS:

B. A. Llewellyn

Edith MacDonal (SEAL)

D. L. Co. R. of W.
FILE NO.
2154-10

(SEAL)

RECEIVED of The Allegheny County Light Company the sum of Seventy-five (\$75.00) Dollars, in consideration of which we do hereby give and grant unto the said The Allegheny County Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove twelve (12) poles, together with the crossarms, cables, wires, three (3) anchors, guys and other fixtures and apparatus there-to belonging, along the North side of the Thompson Run Road in front of our land, situate in Ross Township, Allegheny County, Pa., between the lands of J. S. Huey and John Voegtly Heirs, with the right to trim or remove any trees which at any time may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line. Said poles and anchors shall be located as shown in red on the blueprint attached hereto and made a part hereof.

The said The Allegheny County Light Company, its successors or assigns, shall pay for all damages done to trees and fences due to the construction, maintenance and operation of said distribution or transmission line.

WITNESS our hands and seals this 29 day of April A. D. 1924.

WITNESS:

P. W. Leahy

Jennie M. McDonald (SEAL)
~~Jennie M. McDonald~~
~~Charles H. McDonald~~ (SEAL)
Mary L. McDonald (SEAL)
Edith McDonald (SEAL)
Lucinda McDonald (SEAL)

D. L. Co. R. of W.
 FILE NO.
 2154-4

*attached a blueprint and
 by proper officers*

*Letter to Dept. of
 4/25/24
 -1-*

~~D. L. Co. R. of W.~~
Real Estate Department.

May 20, 1924.

Right of Way Permit.

Mr. C. S. Mitchell:

We enclose for your files certified copy of grant, dated April 29th, 1924, whereby Jennie M. McDonald et al., grant unto The Allegheny County Light Company, for the consideration of \$75.00, the right to erect 12 poles along the Thompson Run Road in front of their property situate in Ross Township, Allegheny County, Pa.

A. W. Stevenson
A. W. Stevenson.

WJS.
Encl.

D. L. Co. R. of W.
FILE NO.
2152

4

RECEIVED of the Duquesne Light Company the sum of One thousand two hundred (\$1,200.00) Dollars, in consideration of which we do hereby give and grant unto the said Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove five (5) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, upon, over and across our land, fronting on the Thompson Run Road, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of Andrew Voegtly Heirs and Howard Neely, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric transmission line.

Said transmission line shall be located as indicated by the red line on the blueprint attached hereto and made a part hereof.

WITNESS our hands and seals this 30th day of March, A.D. 1927.

WITNESS:

A. B. Anguys
Signature

Jennie M MacDonald (SEAL)

Mary L. MacDonald (SEAL)

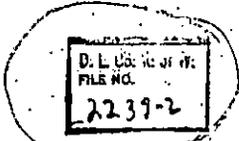
Edith R MacDonald (SEAL)

Suanna M MacDonald (SEAL)

Jennie M MacDonald (SEAL)
Executrix of the Last Will
and Testament of Hannah
McDonald, deceased.

Jennie M MacDonald (SEAL)
Trustee for Ada Blanche
McDonald.

THOMPSON RUN
ROAD



COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

Before me, a Notary Public in and for said Commonwealth and County, personally appeared Jennie M. McDonald, single, Mary L. McDonald, single, Edith R. McDonald, single, and Susannah W. B. McDonald, single, and acknowledged the foregoing Grant to be their act and deed and desired the same to be recorded as such.

WITNESS my hand and Notarial seal this 30th day of March, A.D. 1927.

Allan B. Angrey
Notary Public.

My Commission Expires Feb'y 14th, 1929.

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

Before me, a Notary Public in and for said Commonwealth and County, personally appeared Jennie M. McDonald, and acknowledged the foregoing Grant to be her act and deed as Executrix of the Last Will and Testament of Hannah McDonald, deceased, and desired the same to be recorded as such.

WITNESS my hand and Notarial seal this 30th day of March, A.D. 1927.

Allan B. Angrey
Notary Public.

My Commission Expires Feb'y 14th, 1929.

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

Before me, a Notary Public in and for said Commonwealth and County, personally appeared Jennie M. McDonald and acknowledged the foregoing Grant to be her act and deed as Trustee for Ada Blanche McDonald, and desired the same to be recorded as such.

WITNESS my hand and Notarial seal this 30th day of March, A.D. 1927.

Allan B. Angrey
Notary Public.

My Commission Expires Feb'y 14th, 1929.

D. L. Co. R. of W.
FILE NO.
2235-2

PERMIT FOR THE ERECTION OF ANCHORS ON PRIVATE PROPERTY

FORM: D41-230

RECEIVED of the Duquesne Light Company the sum of Thirty five
(\$35.00) Dollars, in consideration of which we do hereby give and grant unto the said Duquesne
Light Company, its successors and assigns, the right, privilege and authority to erect, use, maintain,
renew and finally remove one (1) anchor, together with the guy wires and
other apparatus thereto belonging, upon, over and across our land, fronting on the Thompson

Rum Road, situated in Ross Township, Allegheny

County, Pennsylvania between the lands of _____ and
Anchor to be placed near culvert. this also includes the
right to cut one kind of Hickory Nut tree and then permit
anchors to be moved to some other location or provided and cable crossing
road at intersection

WITNESS our hand, s and seal s this
April 21st day of _____, A. D. 1930

D. L. Co. R. of W.
FILE NO.
2154-11

WITNESS:
B. A. Llewellyn

Ernest Thompson
Miss Rose Thompson



RECEIVED of the Allegheny County Light Company the sum of (\$ 3.00) Dollars, in consideration of which I do hereby give and grant unto

the said Allegheny County Light company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Three (3.) pole together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the North side of the Thompson Run Road in front of my land, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of Thomas A. Beer and Mr. Douglas Hines, with the right to trim ~~or remove any~~ only under supervision of owner trees of shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS my hand and seal this 14th day of September, A. D. 1923

WITNESS:

D. Peckes

James S. Hines



P. O. Address 301 Hay St. Wilkesbarre



P. O. Address

State of Pennsylvania, }
County of Allegheny, } sa.

Before me, a Notary Public, in and for said State and County, personally came

and acknowledged the foregoing grant to be act and deed,

and desired the same to be recorded as such.

Witness my hand and Notarial Seal this day of A. D. 19

2154
5

D. L. Co. R. of W.
FILE NO.
2154-5

Notary Public

RECEIVED of the Allegheny County Light Company the sum of (\$50.00) Dollars, in consideration of which we do hereby give and grant unto

the said Allegheny County Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Twenty one (21) pole, together with the crossarms, cables, wires (anchors) guys, brace poles and other fixtures and apparatus thereto belonging, along the West side of the Thompson Run Road in front of our land, situate in Ross Township, Allegheny County, Pennsylvania, between the lands of Thomas Donaldson and J. S. Hily ^{or under supervision of owner}, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS our hand and seal this 14th day of September, A. D. 1923

WITNESS:

O. Peck

Mary J. Deer (SEAL)

P. O. Address Thos. A. Deer

Edua K. Smith (SEAL)

P. O. Address Allison Park

R.D. 1. Pa.

State of Pennsylvania, } ss.
County of Allegheny, }

Before me, a Notary Public, in and for said State and County, personally came _____

_____ and acknowledged the foregoing grant to be _____ act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____ A. D. 19 _____

D. L. Co. R. of W.
FILE NO.
2154

Notary Public

(over)

Under this grant we are to furnish the
Property owners with one or two poles
for service to his Residence:

© P. P. P.

D. L. Co. R. of W.
FILE NO.
2154

6

RECEIVED of Duguesne Light Company the sum of Twenty five (\$25.00) Dollars, in consideration of which, do hereby give and grant unto the said Duguesne Light Company, its successors and assigns, the right, privilege and authority to erect, use, maintain, renew and finally remove

One (1) anchor, together with the guy wires and other apparatus thereto belonging, upon over and across my land, fronting on the Thompson Run Road, situated in Ross Township, Allegheny County, Pennsylvania, between the lands of _____ and _____

It is understood that there is to be a good place of an anchor.
WITNESS my hand and seal this 12th day of

May A. D. 1921

WITNESS J. B. McCulligh

Mary J. Deer

D. L. Co. R. of W.
FILE NO.
2154-12



RECEIVED of the Allegheny County Light Company the sum of One Dollar (\$ 1.00) Dollars, in consideration of which I do hereby give and grant unto the said Allegheny County Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove 11 poles pole....., together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the North side of the Thompson Road in front of my land, situate in W. Cassless Township, Allegheny County, Pennsylvania, between the lands of Thomas Deer and Eward Orbetzinger with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS my hand and seal this 13th day of September, A. D. 1923

WITNESS:

Thos. Donaldson 

O. Pecker

P. O. Address Pitts Pa 

P. O. Address _____

State of Pennsylvania, } ss.
County of Allegheny, }

Before me, a Notary Public, in and for said State and County, personally came _____ and acknowledged the foregoing grant to be _____ act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____ A. D. 19____

No contribution paid
WSTO

D. L. Co. R. of W.
FILE NO.
2154

Notary Public

RECEIVED of the Allegheny County Light Company the sum of thirty five (\$35.00) Dollars, on consideration of which we do hereby give and grant unto

the said Allegheny County Light company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove 15 poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the West side of the Thompson Road in front of our land, situate in Mt. Candless Township Allegheny County, Pennsylvania, between the lands of Thomas Donelson and William Frank Keil, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS our hand and seal this 17th day of October, A. D. 1903

WITNESS:

O. Parker

Ed. Grotzinger (SEAL)

P. O. Address Beaver Falls Pa. P. M. 2

Anna M. Grotzinger (SEAL)

P. O. Address 1

State of Pennsylvania, } ss.
County of Allegheny, }

Before me, a Notary Public, in and for said State and County, personally came _____

_____ and acknowledged the foregoing grant to be _____ act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____ A. D. 19 _____

D. L. Co. R. of W.
FILE NO.
2154

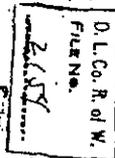
Notary Public

(over)

The Allegheny County Light Co.
agrees to remove and dispose of all shrubbery
and brush and trees that shall be removed in
the construction of the line, under the
supervision of the tenant or owner of the
property,

It also agrees to compensate the present
tenant upon said property, for any damages
that may be done in the construction of said
line

J. Peckin
Right of way agent



DUGESNE LIGHT COMPANY
Rights of Way Division

July 1, 1930.

Extension to Allegheny County
Memorial Park - Thompson Run Road.
E.O.#9120.

Mr. G. A. Gardner:

Verbal permission has been secured from H. L. Mason, Supt. Allegheny County Memorial Park, for the construction indicated on your sketch No.H-35289, Thompson Run Boulevard.

#2154-13

M

J. M. Froelich
J. M. Froelich

D. L. Co. R. of W.
FILE NO.
2154-13

RECEIVED of the Dryness Light Company the sum of One (\$1.00) Dollars, in consideration of which we do hereby give and grant unto the said Dryness Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove three (2) poles together with the crossarms, cables, wires, ^{one} anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the worthly side of the Duncan Road Road in front of our land, situate in M. Candless Township, Allegheny County, Pennsylvania, between the lands of August Reil and Coyne, with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or operation of such electric distribution or transmission line.

WITNESS our hand and seal this 28 day of Nov, A. D. 1927

WITNESS:

W. J. Steen

Jacob Hill (SEAL)

Magdalena Hill (SEAL)

(SEAL)

(SEAL)

State of Pennsylvania, }
County of Allegheny, } ss.

Before me, a Notary Public, in and for said State and County, personally came

and acknowledged the foregoing grant to be

act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____ A. D. 192_____

D. L. Co. R. of W.
FILE NO.
2154
14

Notary Public

RECEIVED of the Duquesne Light Company the sum of
One Hundred (\$100.00) Dollars, in consideration of which we do hereby
 give and grant unto the said Duquesne Light Company,
 its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and
 authority to erect, use, maintain, renew and finally remove Nine (9) poles, together with the
 crossarms, cables, wires, ~~and other fixtures~~ and other fixtures and apparatus thereto belonging, along the
Western side of the Township Road in front of our land, situate in McCandless
 Township, Allegheny County, Pennsylvania, between the lands of
 and _____, with the right to trim or remove any trees or shrubbery which,
 at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal or opera-
 tion of such electric distribution or transmission line.

*all poles to be set along road out of fields
 until road is improved, anchor to placed along
 & ample road. Trees to be trimmed and not cut down
 also will cover our private road*

WITNESS my hand and seal this 17 day of February, A. D. 1931

WITNESS:

B. A. Llewellyn

Wm H Ringeisen (SEAL)

Sophia Ringeisen (SEAL)

Ringeisen (SEAL)

(SEAL)

D. L. Co. R. of W.
 FILE NO.
2154-16

State of Pennsylvania, } ss.
 County of Allegheny, }

Before me, a Notary Public, in and for said State and County, personally came Wm. H. Ringeisen
and Sophia Ringeisen. and acknowledged the foregoing grant to b
their act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 17th day of February, A. D. 1931

B. A. Llewellyn

Notary Public



B. A. LLEWELLYN, Notary Public
 MY COMMISSION EXPIRES
 APRIL 2, 1931

2154
16

PERMIT FOR THE ERECTION OF POLE LINE UPON PRIVATE PROPERTY

FORM 0417280

RECEIVED of the Duquesne Light Company the sum of One Hundred and Fifty Dollars, in consideration of which I do hereby give and grant unto the said

Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Four

(4) pole s, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, upon, over and across my land, fronting on the

Sample Road, situate in McConnells Township, Allegheny County, Pennsylvania, between the lands of Ringhiser and Anna Guyton

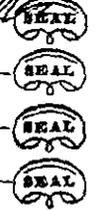
with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution or transmission line, and with the further right to permit others to use said poles and apparatus.

WITNESS my hand and seal this 17 day of February A. D. 1931

WITNESS:

B. A. Llewellyn

anna m. Guyton
Guyton



Commonwealth of Pennsylvania, }
County of Allegheny } ss:

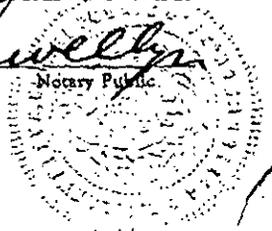
Before me, a Notary Public, in and for said Commonwealth and County of Allegheny, personally came Anna M. Guyton and acknowledged the foregoing grant to be her act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 17th day of February A. D. 1931

D. L. Co. R. of W.
FILE NO.
2154

17

B. A. Llewellyn
Notary Public
B. A. LLEWELLYN, Notary Public
MY COMMISSION EXPIRES
APRIL 2, 1931



PERMIT FOR THE ERECTION OF POLE LINE UPON PRIVATE PROPERTY

FORM: DA1720

RECEIVED of the Duquesne Light Company the sum of Three Hundred and no/100 Dollars, in consideration of which we do hereby give and grant unto the said Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove three (3) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, upon, over and across Our land, fronting on the Peebles Road, situate in McCandless Township, Allegheny County, Pennsylvania, between the lands of Anna Guyton and William Ringeisen and Caroline Kress with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution or transmission line, and with the further right to permit others to use said poles and apparatus.

WITNESS our hands and seals this 17th day of February

A. D. 1931

WITNESS:

W. J. Steen

Earl M. Fretwell
Mrs. E. M. Fretwell



Commonwealth of Pennsylvania, }
County of Allegheny } ss:

Before me, a Notary Public, in and for said Commonwealth and County of Allegheny, personally came Earl M. Fretwell and Mrs. E. M. Fretwell, his wife, and acknowledged the foregoing grant to be their act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 17th day of February A. D. 19 31

D. L. Co. R. of W.
FILE NO.
2154

18

W. J. Steen
Notary Public
W. J. STEEN, Notary Public.
MY COMMISSION EXPIRES
FEBRUARY 21, 1931

PERMIT FOR THE ERECTION OF POLE LINE UPON PRIVATE PROPERTY

FORM NO. 17230

RECEIVED of the Duquesne Light Company the sum of Two Hundred fifty
(\$ 250⁰⁰) Dollars, in consideration of which J do hereby give and grant unto the said

Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all
purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Four
Four (4) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and

other fixtures and apparatus thereto belonging, upon, over and across my land, fronting on the
Peoples Road, situate in McLanahan Township,
Allegheny County, Pennsylvania, between the lands of _____
and _____

with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to
interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution
or transmission line, and with the further right to permit others to use said poles and apparatus.

This amount includes all trees along road frontage

WITNESS my hand and seal this 18th day of February

A. D. 1931

WITNESS:

B. A. Lewellyn Caroline Kress



Commonwealth of Pennsylvania, }
County of Allegheny } 65:

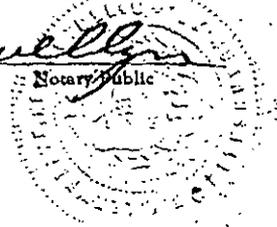
Before me, a Notary Public, in and for said Commonwealth and County of Allegheny, personally
came Caroline Kress and acknowledged
the foregoing grant to be her act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 18th day of February A. D. 1931

D. L. Co. R. of W.
FILE NO.
2154

19

B. A. Lewellyn
Notary Public
B. A. LEWELLYN, Notary Public
MY COMMISSION EXPIRES
APRIL 2, 1932



PERMIT FOR THE ERECTION OF ANCHORS ON PRIVATE PROPERTY

FORM: D41-230

RECEIVED of the Duquesne Light Company the sum of Five
(\$5.00) Dollars, in consideration of which I do hereby give and grant unto the said Duquesne
Light Company, its successors and assigns, the right, privilege and authority to erect, use, maintain,
renew and finally remove Two Pole & anchors anchor, together with the guy wires and
other apparatus thereto belonging, upon, over and across my land, fronting on the
Purple Road, situated in McCandless Township, Allegheny
County, Pennsylvania, between the lands of _____ and

WITNESS my hand and seal this 25th day of

February, A. D. 1931

WITNESS:

B. A. Shively 2.15.31 A. E. Kress
20

D. L. Co. R. of W.
FILE NO.
2154-20



A. E. KRESS

PERMIT FOR THE ERECTION OF POLE LINE ALONG PUBLIC HIGHWAY

RECEIVED of the Duquesne Light Company the sum of Fifteen (\$ 15.00) Dollars, in consideration of which we do hereby give and grant unto the said Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority, to erect, use, maintain, renew and finally remove Three (3) pole s, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, along the Easterly side of the Poplar Road in front of our land, situate in McCandless Township, Allegheny County, Pennsylvania, between the lands of _____ and _____ with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution or transmission line, and with the further right to permit others to use said poles and apparatus.

WITNESS our hands and seal this 3rd day of March, A. D. 1931.

WITNESS:

B. A. Shively _____ (SEAL)
E. E. Kress _____ (SEAL)
Boate L. Kress _____ (SEAL)

_____ (SEAL)
_____ (SEAL)

E. E. KRESS

Commonwealth of Pennsylvania, }
County of _____ } ss

Before me, a Notary Public, in

_____ d County of Allegheny, personally came

_____ and acknowledged the foregoing grant to be

_____ act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this _____ day of _____ A. D. 19_____

D. L. Co. R. or W.
FILE NO.
2156

Notary Public

PERMIT FOR THE ERECTION OF POLE LINE UPON PRIVATE PROPERTY

FORM 0417220

RECEIVED of the Duquesne Light Company the sum of Two Hundred fifty (\$250.00) Dollars, in consideration of which we do hereby give and grant unto the said Duquesne Light Company, its successors and assigns, for transmitting electric current for any and all purposes, the right, privilege and authority to erect, use, maintain, renew and finally remove Five (5) poles, together with the crossarms, cables, wires, anchors, guys, brace poles and other fixtures and apparatus thereto belonging, upon, over and across our land, fronting on the Township Road, situate in McCandless Township, Allegheny County, Pennsylvania, between the lands of _____ and _____

with the right to trim or remove any trees or shrubbery which, at any time, may interfere or threaten to interfere with the construction, maintenance, repair, renewal, use or operation of an electric distribution or transmission line, and with the further right to permit others to use said poles and apparatus.

Poles to be placed as shown on blue print hereto attached. This grant also includes 5 Poles along Township Road.

WITNESS our hand and seals this 26th day of March

A. D. 1931

WITNESS:

J. W. Cashdollar
J. W. Cashdollar

Geo. Wittmer
Josephine C. Wittmer





Commonwealth of Pennsylvania, }
County of Allegheny } ss:

Before me, a Notary Public, in and for said Commonwealth and County of Allegheny, personally came George Wittmer Jr. & Josephine C. Wittmer and acknowledged the foregoing grant to be their act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial Seal this 26th day of March A. D. 1931

D. L. Co. R. of W.
FILE NO.
2154

22

J. W. Cashdollar
Notary Public

J. W. CASHDOLLAR, Notary Public
MY COMMISSION EXPIRES
MARCH. 7. 1935,

AGREEMENT

MADE and ENTERED into this 18 day of January, 1983, by and between the COUNTY OF ALLEGHENY, a political subdivision of the Commonwealth of Pennsylvania hereinafter called "Licensor,"

18715

A N D

DUQUESNE LIGHT COMPANY, a corporation, having its principal place of business at 435 Sixth Avenue, Pittsburgh, Pennsylvania; Allegheny County, hereinafter called "Licensee,"

W I T N E S S E T H:

WHEREAS, Licensor owns, operates and maintains North Park, a public park located in the Town of McCandless, Hampton and Pine Townships; Allegheny County, Pennsylvania; and

WHEREAS, Licensee is desirous of acquiring a License from Licensor for the purpose of installing fourteen (14) poles and fifteen (15) anchors, and necessary appurtenances; and

WHEREAS, Licensor deems it in the public interest to grant to Licensee such License.

NOW, THEREFORE, the parties covenant and agree as follows:

1. For and in consideration of the sum of One Dollar (\$1.00), receipt of which is hereby acknowledged, and intending to be legally bound hereby, Licensor hereby grants to Licensee, its successors and assigns, a License to erect, use, maintain, renew and finally remove fourteen (14) poles and fifteen (15) anchors, appurtenances (hereinafter referred to as "facilities"), upon, over and across land of Licensor situated in Hampton Township, Allegheny County, Pennsylvania, and described fully on Licensee's Drawing No. 13484-T4, attached hereto and made a part hereof.

2. Licensee shall install and maintain the aforesaid facilities in compliance with all rules and regulations governing such installation and maintenance.

3. The aforesaid license granted to the Licensee by this Agreement may be revoked by Licensor at any time upon giving sixty (60) days notice in writing of the termination of this Agreement, and in such event, Licensee shall remove its facilities from the site at its own expense and to the satisfaction of the Licensor within thirty (30) days after receipt of such notice.

D. L. Co. R. of W.
FILE NO.
2154

24

4. The Licensee shall have the right of ingress, egress and regress to and from the land hereinabove described for the purpose of erecting, using, maintaining, renewing and finally removing said facilities.

5. The Licensee shall indemnify, hold and save harmless the Licensor, its servants, agents and employees from and against any and all liability for any and all personal injuries (including death) or property damage that may be suffered by any person whatsoever, occasioned by or resulting from Licensee's negligence in the construction, use, maintenance, repair or removal of said facilities.

6. The Licensee shall pay for all damages to growing crops, trees and fences by the construction, use, maintenance, repair or removal of said facilities, except for those damages necessarily incurred by the construction herein contemplated and arising out of necessary maintenance of the facilities herein contemplated.

7. This agreement is not intended to vest in Licensee any easements or interests whatsoever in said land. Accordingly, Licensee shall not record this Agreement at any time in the office of the Recorder of Deeds in and for the County of Allegheny, Commonwealth of Pennsylvania.

8. In the exercise of the rights herein granted, Licensee shall not create or cause any obstruction to or impairment of any roads, highway, sidewalks or other public ways on or near the property involved in this License.

9. The Licensee shall file a copy of this Agreement with the Pennsylvania Public Utility Commission as required by Title 66, Section 507 of the Public Utility Code, and this Agreement shall become effective in accordance therewith.

IN WITNESS WHEREOF, the due execution of this Agreement by the parties hereto as of the day and year first above written.

O.K.
NOV 1 1982
VICE PRESIDENT

Wok w/4/12
Not 10/26/82
Jue 10/26/82
RJM
9-20-82
gwh
10/1/82
ARW
10-20-82
10-20-82

ATTEST:
Thomas Wilbur
Secretary

DUQUESNE LIGHT COMPANY
By: Stanley H. Schaffer
President

ATTEST:
[Signature]
Secretary

COUNTY OF ALLEGHENY
By: [Signature]
[Signature]
Board of County Commissioners

O.K.
10/26/82
VICE PRESIDENT

APPROVED:
[Signature]
Director, Parks and Recreation

APPROVED AS TO FORM:
[Signature]
County Solicitor
[Signature]
Assistant County Solicitor

FILE NO. 2154

RIGHT OF WAY AGREEMENT

THIS INDENTURE made this 31st day of December in the year of our Lord one thousand nine hundred and sixty-nine (1969)

BETWEEN

BUTLER CONSOLIDATED COAL COMPANY, a Pennsylvania corporation, having its principal office in the City of Butler, County of Butler, Commonwealth of Pennsylvania, hereinafter called "Grantor", party of the first part,

A N D

DUQUESNE LIGHT COMPANY, a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, having its principal office in the City of Pittsburgh, Allegheny County, Pennsylvania, hereinafter called "Dukesne", party of the second part;

W I T N E S S E T H,

THAT the said Grantor, for and in consideration of the sum of Seventeen Thousand Eight Hundred Dollars (\$17,800.00), to it now paid by Dukesne, the receipt whereof is hereby acknowledged, does hereby grant, bargain, sell and convey unto Dukesne, its successors and assigns, forever, perpetual easement and right of ways, upon, over, under and across its land situate in Hampton Township, Allegheny County, Pennsylvania, being part of that certain land which the Guaranty Trust Company of Butler by its deed dated June 1, 1928 and of record in the Recorder's Office of Allegheny County, in Deed Book Vol. 2370, page 1, conveyed to the Butler Consolidated Coal Company; said land being Tract No. 81, Parcel 1 and 2 and Tract 99, Parcel 6 in said deed;

TOWNSHIP OF HAMPTON
DEED TRANSFER No. 481
TAX STAMP
DATE 2/13 1970
RECEIVED Eighty Ninety /100
AGENT [Signature]

CANCELLED FEB 13 1970

HAMPTON TOWNSHIP SCHOOL DISTRICT
DEED TRANSFER No. 481
TAX STAMP
DATE 2/13 1970
RECEIVED Eighty Ninety /100
AGENT [Signature]

CANCELLED FEB 13 1970



for transmission and/or distribution systems, for the conveyance, distribution, and use of electric current, consisting of such cables, wires, conductors, cross-arms and other fixtures and apparatus appurtenant thereto, supported on H-frames, poles, anchors and guys which Duquesne may at any time, or from time to time, deem necessary or proper for use in connection with said transmission and/or distribution systems, together with and including the right, privilege and authority on the part of Duquesne to erect, construct, install, use, operate, maintain, repair, renew and finally remove the same and with the further right to cut, trim or remove and control the growth of, by any means selected by Duquesne, any trees, shrubbery, roots or other obstructions on said tract of land, which Duquesne, at any time, may deem necessary to prevent interference or threatened interference with the erection, construction, installation, use, operation, maintenance, repair, renewal and removal of said transmission and/or distribution systems, and with the further additional right to enter upon said tract of land of Grantor, above described, at any time for the aforementioned purposes.

The easements and right of ways herein granted unto Duquesne are described as follows:

FIRST: An easement and right of way fifty (50) feet in width, extending from the line of land of North Park of Allegheny County to land to be conveyed to Duquesne on which is located Wildwood Substation; this easement and right of way shall be located substantially as outlined in red on Exhibit A, a photostatic reproduction of Duquesne Light Company drawing F-2475 attached hereto and made a part hereof; the centerline of this easement and right of way 50 feet in width shall be a line connecting the center points of the supporting structures of the transmission and/or distribution systems erected thereon.

SECOND: An easement and right of way fifty (50) feet in width in two parts: (1) extending from the land on which Wildwood Substation is located to the line of land of the Baltimore and Ohio Railroad, and (2) extending from the line of land of the Baltimore and Ohio Railroad to the line of Wildwood Park Plan of Lots on Gibsonia Road; this easement and right of way shall be located substantially as outlined in red as Exhibit B, a photostatic reproduction of Duquesne Light Company drawing F-2059 attached hereto and made a part hereof; the centerline of this

D. L. Co. R. of W.
FILE NO.
2154-25

easement and right of way 50 feet in width shall be a line connecting the center points of the supporting structures erected thereon.

THIRD: An easement and right of way thirty (30) feet in width in two parts: (1) extending from the centerline of the Baltimore and Ohio Railroad to the land on which Wildwood Substation is located, and (2) extending from the easement and right of way granted as FIRST herein to the centerline of Wildwood Road; the easement and right of way shall be located substantially as outlined in red on Exhibit C, a print of Duquesne Light Company drawing LL-6484 attached hereto and made a part hereof; the centerline of this easement and right of way 30 feet in width shall be a line connecting the center points of the supporting structures erected thereon.

The land upon, over, under and across which said easements and right of ways are granted may always be used by Grantor for such uses and purposes as will not interfere with the erection, construction, installation, use, operation, maintenance, repair, renewal, and/or removal of said transmission and/or distribution systems, and are not inconsistent therewith, provided, always, that no buildings or structures, except as hereinafter provided, shall be erected or constructed by Grantor within the limits of the easements and right of ways, and provided further that Grantor in the use of said tract of land shall not damage or injure any of the property of Duquesne on said easements and right of ways, nor interfere in any manner with the erection, construction, installation, use, operation, maintenance, repair, renewal, and/or removal of said transmission and/or distribution systems.

Grantor reserves the right to erect buildings within the limits of the easement and right of way identified herein as FIRST between the points shown on Exhibit A as "A", the line of Pine Creek as presently located and "B", the line of Wildwood Road, provided that the written permission of Duquesne is first obtained. The easements granted herein are subject to all prior mining and removal of coal conducted by Grantor.

NOTICE--THIS DOCUMENT MAY NOT SELL, CONVEY, TRANSFER, INCLUDE OR INSURE THE TITLE TO THE COAL AND RIGHT OF SUPPORT UNDERNEATH THE SURFACE LAND DESCRIBED OR REFERRED TO HEREIN, AND THE OWNER OR OWNERS OF SUCH COAL MAY HAVE THE COMPLETE LEGAL RIGHT TO REMOVE ALL OF SUCH COAL AND, IN THAT CONNECTION, DAMAGE MAY RESULT TO THE SURFACE OF THE LAND AND ANY HOUSE, BUILDING OR OTHER STRUCTURE ON OR IN SUCH LAND. (This notice is set forth in the manner provided in Section of the Act of July 17, 1957, P. L. 984).

D. L. Co. R. of W. FILE NO. 2154-25

RACQUET
CLUB

This Indenture, and all of the conditions and covenants contained herein, shall be binding upon and inure to the benefit of the parties hereto, and their respective successors and assigns.

WITNESS the due execution and ensembling hereof the day and year first above written.

BUTLER CONSOLIDATED COAL COMPANY

ATTEST:

Robert A. Chapman
Secretary

By: *Marten A. Reiber*
President

COMMONWEALTH OF PENNSYLVANIA)
COUNTY OF BUTLER) SS:

On this 31st day of December, 1969, before me, the undersigned officer, a Notary Public in and for said Commonwealth and County, personally appeared MARTEN A. REIBER, who acknowledged himself to be the President of Butler Consolidated Coal Company, a corporation, and that he as such President, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as President.

IN WITNESS WHEREOF I have hereunto set my hand and official seal.

Janice D. Benson
Notary Public

My Com. Exp. Jan. 29, 1971

(Faint circular notary seal)

D. L. Co. R. of W.
FILE NO.
2154-25

ORIGINAL

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

Duquesne Light Company

Statement No. 1	Direct Testimony of Homer R. Zucconi
Statement No. 2	Direct Testimony of Paul G. Cass
Statement No. 3	Direct Testimony of David W. Fugate
Statement No. 4	Direct Testimony of William H. Bailey
Statement No. 5	Direct Testimony of Robert J. Houston
Statement No. 6	Direct Testimony of Thomas P. Schmitt

2006 AUG 14 PM 2:52
PA PUC
SECRETARY'S BUREAU

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2006 AUG 14 PM 2:52
PA PUC
SECRETARY'S BUREAU

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

Duquesne Light Company
Statement No. 1

DOCUMENT
FOLDER

Direct Testimony of Homer R. Zucconi

DOCKETED
AUG 31 2006

Comp PA 7/12/06
A-110150F0031
C-20065987

DIRECT TESTIMONY OF HOMER R. ZUCCONI

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Q. Please state your name.

A. Homer R. Zucconi.

Q. By whom are you employed?

A. Duquesne Light Company.

Q. How long have you worked for Duquesne Light Company?

A. My start date is May, 18, 1970. Over 36 years of service.

Q. What is your present job title?

A. System Planner.

Q. How long have you held that position?

A. The name has changed but I have been doing the same work since May, 18, 1970.

Q. What are your job duties?

A. Responsible to plan, develop recommendations and initiate projects for additions, improvements or modifications to company facilities for providing quality service in a cost effective manner. Prepare various engineering documents including scopes, business cases, technical and equipment specifications, proposed line routes, substation sites, customer service recommendations and transformer tap ratio requests.

Q. What education and training relevant to your job duties have you completed?

A. BSEE from West Virginia University, 1970.

1 Q. Before we get into specifics about the Wildwood Project,
2 please provide an overview of Duquesne Light's electrical
3 system. Please use the document which I have labeled Exhibit
4 HZ-1 to illustrate.

5 A. Exhibit HZ-1 displays the entire high voltage system of Duquesne
6 Light down to and including the 23 kV and 11.5 kV subtransmission
7 systems. Initially, electricity goes from the bulk supply
8 transmission system to bulk supply substations. The bulk supply
9 transmission system interconnects substations basically without
10 customers. For ease of clarity colors are used to distinguish the
11 different voltage levels. Green is for 345 kV lines, red is for 138 kV
12 (solid line) and 69 kV (dashed line) lines, and blue is for the 23 kV
13 and 11.5 kV lines. The voltage used for the transmission level by
14 Duquesne Light is 345 kV, 138 kV and 69 kV. The proposed new
15 138 kV is also shown on the exhibit. It is located just to the right
16 of center. The next step down in voltage is the subtransmission
17 system. This voltage level is 23 kV and 11.5 kV and supplies large
18 customers and the older 4 kV distribution system. The older 4 kV
19 system and the older 69 kV system are being phased out. These
20 systems have become obsolete and the availability of spare parts is
21 becoming an ever increasing problem. Some parts must be
22 fabricated at a high cost. On the Duquesne Light system, service
23 to residential and commercial customers is supplied by this older 4
24 kV distribution system and the newer 13.2/23 kV distribution
25 system. The 13.2/23 kV distribution system is connected directly to
26 the bulk supply substations mentioned earlier. Both the older 4 kV

1 system and the newer 13.2/23 kV system then steps the voltage
2 down to household voltage which is 120/240 volts. This is
3 accomplished by the small transformers located on the utility poles.

4 **Q. How does the Wildwood Substation fit into this system?**

5 A. Wildwood Substation is presently a 4 kV substation. If you look at
6 Exhibit HZ-1 it is located just to the right of center. As I mentioned
7 earlier this substation is very old and the availability of parts and
8 continuing higher than average maintenance is an ever increasing
9 problem.

10 **Q. What is your involvement with the Wildwood Project.**

11 A. One of my areas of responsibility at Duquesne Light Company is to
12 provide for the safe, economical and reliable expansion of the
13 electrical system. Wildwood Substation was built in 1938, when the
14 area it served was less densely populated. Portions of the town of
15 McCandless and Hampton Township served by the older Wildwood
16 Substation have experienced a substantial increase in electrical
17 load since 1938. It has become increasingly difficult to adequately
18 supply reliable electricity from the existing 23 kV subtransmission
19 system. As electrical load continued to grow in the area, the
20 additional electrical capacity was supplied by the newer distribution
21 circuits from the nearby bulk supply substations called North
22 Substation and Pine Creek Substation. Both substations are
23 located just to the right of center on Exhibit HZ-1. The location of
24 these two substations result in very long distribution circuits to
25 supply the load in the area of Wildwood Substation. The straight
26 line distance from North Substation is 4.5 miles and the straight

1 line distance from Pine Creek Substation is 6 miles. When you add
2 the normal twisting and turning of roads the distances increase to
3 more than 10 to 12 miles. Capacity in these bulk supply
4 substations can no longer supply the present electrical load in the
5 Wildwood Substation service area and the future growth that is
6 expected. Both bulk supply substations are either overloaded or at
7 their operating limits. The older 4 kV substation, Wildwood
8 Substation, is also overloaded. Reliability is compromised because
9 of the lengthy lines that come from these two substations.
10 Therefore, a new bulk supply substation is needed.

11 **Q. You have explained the need for a new high voltage substation**
12 **at the present site of the older 4 kV Wildwood Substation, what**
13 **else is required in order that the new substation can become**
14 **used and useful?**

15 A. As I mentioned earlier in my testimony, all of Duquesne Light's bulk
16 supply substations are connected to the high voltage system. This
17 is how electricity is transported around the system. The proposed
18 Wildwood Substation also requires a connection to the high voltage
19 system. It is very similar to a common household that has just
20 purchased a 240 volt electric dryer. In order to use the dryer a
21 new 240 volt circuit must be established at the household's electric
22 circuit breaker box and a new circuit run to the dryer's location in
23 the home. The substation must be connected to the high voltage
24 system. In order to accomplish this a 138 kV line must be
25 extended to the new substation.

1 Q. You mentioned that the nearby bulk supply substations, North
2 and Pine Creek Substations, are either overloaded or at their
3 operating limits. Have you prepared summaries showing the
4 load on these bulk substations?

5 A. Yes.

6 Q. Is the document labeled Exhibit HZ-2?

7 A. Yes. Exhibit HZ-2 displays three items for Pine Creek, North, and
8 Wildwood Substations: The rating of the substation, the average
9 load for each month and the peak load for each month. The rating
10 of the substation is established much like a normal household
11 electrical circuit is rated. A typical household circuit may be rated
12 at 20 or 30 amps. If you overload the circuit, the circuit breaker or
13 fuse will trip or the overload could lead to that system's destruction
14 through a fire. Substations are rated much the same way. As the
15 Exhibit HZ-2 shows, Pine Creek Substation is at its operating limit
16 during the summer months. Future load growth will overload the
17 substation. North Substation is already overloaded, as well as the
18 Wildwood Substation. Running substations beyond their operating
19 ratings will accelerate loss of life of the equipment and cause
20 premature failure. This would be similar to a fire that could be
21 caused on a normal household circuit that I mentioned earlier.

22 Q. How would the Wildwood Project alleviate this situation?

23 A. A new bulk supply substation at the site of the older 4 kV Wildwood
24 Substation will provide capacity for future growth in the areas of
25 Hampton Township and the town of McCandless and eliminate
26 existing overloads and future overloads at North Substation and

1 Pine Creek Substation respectively. This new substation will also
2 reduce exposure on existing 13.2/23 kV distribution lines in the
3 area by reducing the length of the circuits. The older 4 kV
4 substation will be eliminated. If we go back to Exhibit HZ-1, the
5 only bulk supply sources for the area are North Substation and
6 Pine Creek Substation. The distance to Hampton Township and the
7 Town of McCandless from these two substations results in very
8 long distribution circuits. As I stated before, by establishing a new
9 substation in the area the length of the circuits will be reduced and
10 a source or new bulk supply substation will be nearer the load.

11 **Q. What is the reason for reducing the length of the circuits?**

12 A. The exposure to outages caused by storms and vehicles will be
13 reduced. We all see storm clouds in the distance. If the storm is
14 sitting over a substation in that area and lightning or high winds are
15 present, the weather disturbance that might be miles away could
16 affect an area not under the influence of the storm. A vehicular
17 incident could happen in a similar fashion.

18 **Q. Can you show us what you mean by reducing exposure by**
19 **discussing Exhibit HZ-3 North #D-23704 and Pine Creek #D-**
20 **23711?**

21 A. North #D-23704 has a total circuit length of approximately 11.6
22 miles. The first page of the circuit map displays the overall circuit
23 without any detail. It is just an overview of the area covered by the
24 circuit. That is the main or primary circuit length. It does not
25 include any lateral feeds. Subsequent pages contain more detail.
26 The detail included are transformers, wire size, street names, site

1 numbers and names of the larger customers. By establishing a
2 new circuit at Wildwood Substation the circuit length of North #D-
3 23704 is reduced to only 3.6 miles. The main circuit length of the
4 new Wildwood circuit will be 8 miles. Although this is not an even
5 split it does reduce exposure for both circuits. This reduced
6 exposure improves circuit reliability. Pine Creek #D-23711 has a
7 total circuit length of approximately 9.2 miles. That is the main
8 circuit length. It does not include any lateral feeds. Again, by
9 establishing a second new circuit at Wildwood Substation the
10 circuit length of Pine Creek #D-23711 is reduced to 5 miles. The
11 main feeder length of the second new Wildwood circuit will be 4.2
12 miles. The reduced exposure will improve circuit reliability. There
13 is a similar effect on North #D-23705 and North #D-23707. By
14 reducing the lengths of these two circuits, you will improve service
15 to Ross and Shaler Townships. There will also be a reduction in
16 load on North #D-23705 and North #D-23707 thereby providing for
17 future growth.

18 **Q. Can you summarize why the new substation is required and**
19 **what the substation will provide in terms of benefits?**

20 A. The substation will provide needed capacity nearer the area of
21 growth and it will reduce circuit length of various existing circuits in
22 the areas of Ross Township, Shaler Township, Hampton Township
23 and the Town of McCandless. It will also eliminate a very old 4 kv
24 substation that can not continue to meet the load demands of the
25 area it presently serves which is portions of Hampton Township and
26 the Town of McCandless.

1 Q. Does that conclude your testimony?

2 A. Yes.

PROPRIETARY INFORMATION

Docket Number A-110750 F0031

Name of Document Map

Date Document Received 7-12-2006

DOCUMENT CONTAINS

PROPRIETARY INFORMATION

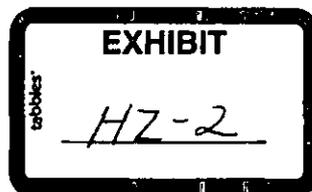
Monthly Peaks and Averages

North138 / 23KV Tfmr Summation Amps

		<u>Average</u>	<u>Peak</u>	<u>Rating</u>
2005	June	2,217	3,653	3,580
2005	July	2,303	3,850	3,580
2005	August	2,330	4,040	3,580
2005	September	1,928	3,058	3,600
2005	October	1,782	2,507	3,600
2005	November	1,821	2,706	3,600
2005	December	1,941	2,882	3,600
2006	January	1,754	2,442	3,600
2006	February	1,823	2,432	3,600
2006	March	1,751	2,356	3,600
2006	April	1,667	2,373	3,600
2006	May	1,796	3,631	3,600
2006	June	1,653	2,910	3,580

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cmr Pgh PA 11/21/06
A-110150 F0031
C-20065987

Monthly Peaks and Averages

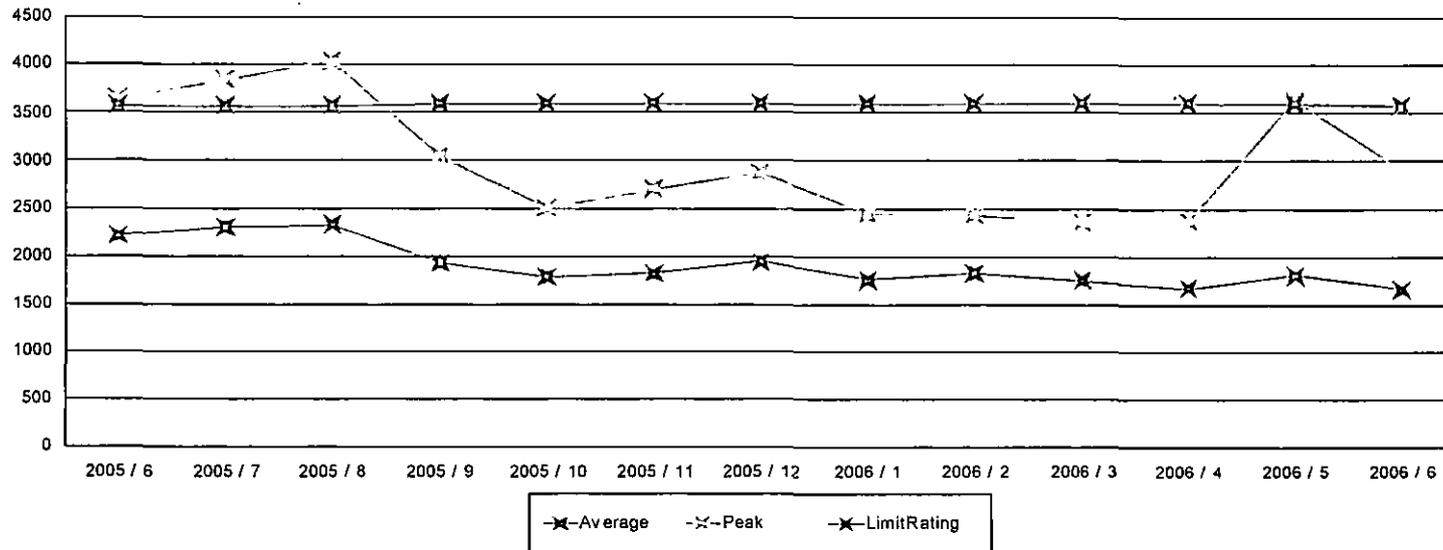
North138 / 23KV Tfmr Summation Amps

Average Peak Rating

Average of Averages: **1,905**

Point Id: 916

Maximum Peak: **4,040**



Run Date: 6/6/2006

Monthly Peaks and Averages

North69 / 23KV Transformer Summation Amps

		<u>Average</u>	<u>Peak</u>	<u>Rating</u>
2005	June	477	1,010	1,000
2005	July	418	832	1,000
2005	August	457	1,139	1,000
2005	September	353	708	1,000
2005	October	385	682	1,000
2005	November	504	1,276	1,000
2005	December	522	1,349	1,000
2006	January	472	753	1,000
2006	February	484	645	1,000
2006	March	448	622	1,000
2006	April	447	644	1,000
2006	May	615	1,802	1,000
2006	June	561	1,368	1,000

Monthly Peaks and Averages

North69 / 23KV Transformer Summation Amps

Average

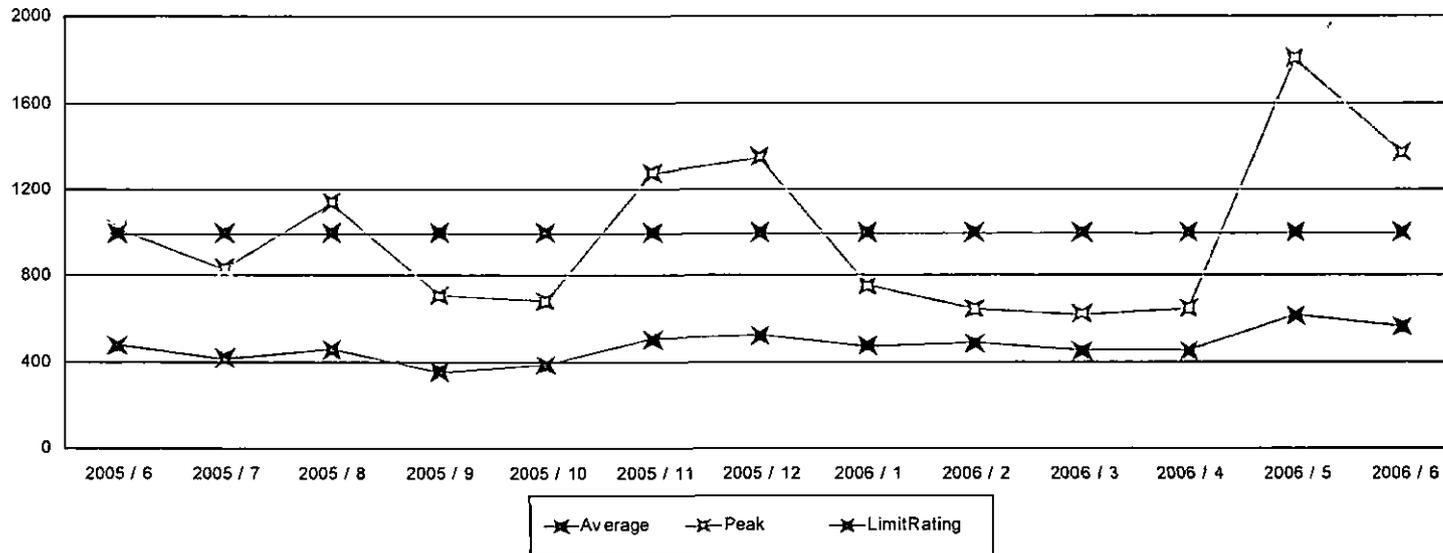
Peak

Rating

Average of Averages: **473**

Point Id: 1008271

Maximum Peak: **1,802**



Monthly Peaks and Averages

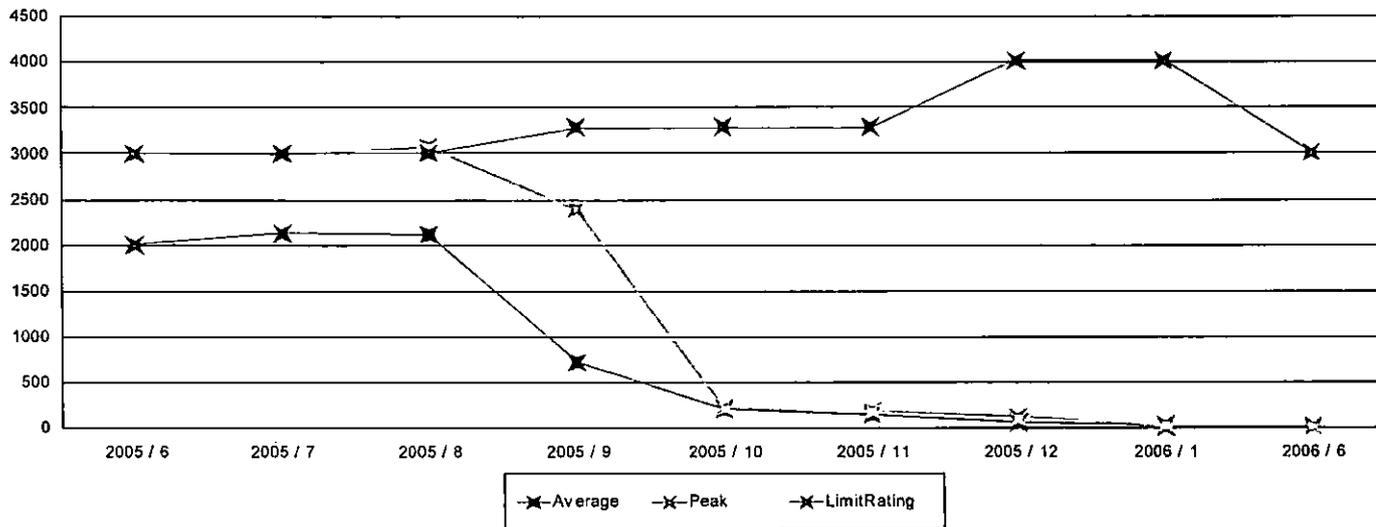
PineCreek / 23KV Transformer Summation Amps

		<u>Average</u>	<u>Peak</u>	<u>Rating</u>
2005	June	2,006	3,000	3,006
2005	July	2,132	2,999	3,006
2005	August	2,114	3,071	3,006
2005	September	725	2,393	3,290
2005	October	204	222	3,290
2005	November	139	188	3,290
2005	December	53	114	4,023
2006	January	8	27	4,023
2006	June	4	11	3,006

Average of Averages: **821**

Point Id: 201681

Maximum Peak: **3,071**



System Planning

Distribution Circuit Peak Loads

* - Indicates Graphic Meter

Location	Circuit Name	Date	Time	Peak Load Amps			Operating Ratings	High Phase	Average	% Rating	% Unbal	KVA
				A	B	C						
Wildwood Co Sub												
4505, Ckt Bkr												
4505												
		6/14/2001	14	312 *	264 *	180 *	255	312.0	252.0	99	24	1890
		7/22/2001	16	216	282 *	198	255	282.0	232.0	91	22	1740
		8/9/2001	16	222	294 *	216	255	294.0	244.0	96	20	1830
		9/9/2001	17	186	228 *	162	255	228.0	192.0	75	19	1440
		4/18/2002	20	144	180 *	120	305	180.0	148.0	49	22	1110
		5/30/2002	23	150	180 *	132	305	180.0	154.0	50	17	1155
		7/3/2002	18	246	300 *	222	255	300.0	256.0	100	17	1920
		8/2/2002	17	258	324 *	234	255	324.0	272.0	107	19	2040
		12/16/2002	22	156	204 *	138	330	204.0	166.0	50	23	1245
		6/9/2004	19	2960	16380 *	11880	255	16380.0	13740.0	5388	19	103050
		7/13/2004	19	420	588 *	396	255	588.0	468.0	184	26	3510
		8/2/2004	18	210	282 *	192	255	282.0	228.0	89	24	1710
		9/5/2004	20	192	234 *	168	255	234.0	198.0	78	18	1485
		10/10/2004	20	114	168 *	126	305	168.0	136.0	45	24	1020
		12/10/2004	16	198	252 *	156	330	252.0	202.0	61	25	1515
		1/17/2005	20	174	222 *	138	330	222.0	178.0	54	25	1335
		2/10/2005	18	168	198 *	126	330	198.0	164.0	50	21	1230
		4/15/2005	20	120	174 *	126	305	174.0	140.0	46	24	1050
		5/12/2005	15	234	300 *	210	305	300.0	248.0	81	21	1860
		7/5/2005	19	264	348 *	234	255	348.0	282.0	111	23	2115
		8/4/2005	18	276	348 *	240	255	348.0	288.0	113	21	2160

PROPRIETARY INFORMATION

Docket Number A-110150 F-0031

Name of Document Exhibit HZ-3 Maps

Date Document Received 7-12-2006

DOCUMENT CONTAINS

PROPRIETARY INFORMATION

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987
**DOCUMENT
FOLDER**

Duquesne Light Company

Statement No. 2

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Direct Testimony of Paul G. Cass

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AUG 31 2006

*Comm Pgh PA 7/12/06
A-110150 F 0031
C-20065987*

1 **Q. Are you a licensed Professional Engineer in the Commonwealth**
2 **of Pennsylvania?**

3 A. Yes, I am

4 **Q. What are your responsibilities relative to the proposed 138kV**
5 **transmission line to Wildwood Substation?**

6 A. I am responsible for the "Engineering" aspects of the transmission
7 line design. Specifically, for the structural design of each
8 supporting structure; for electrical clearances between conductors
9 or any other nearby object; for locating and sizing the structure
10 such that it meets the NESC Code, the Duquesne Light Design
11 Criteria and where applicable Duquesne Light T&D Standards; for
12 preparing the Construction Drawings and Specifications; for
13 identifying and specifying all materials for construction; for
14 adherence in design to State Regulations, such as Erosion and
15 Sedimentation Control Measures; for identifying and rectifying
16 technical difficulties associated with various line routes.

17 **Q. What do you mean by the NESC Code?**

18 A. The NESC Code stands for the National Electrical Safety Code
19 published by the IEEE (Institute of Electrical and Electronics
20 Engineers), which governs practical safeguarding of persons during
21 the installation, operation or maintenance of Electrical Supply
22 Lines. While it is not intended as a design specification, its
23 specifications on clearances, and strength of components are
24 considered design minimums.

25 **Q. What do you mean by Duquesne Light Design Criteria?**

1 A. Each utility has its own criteria for transmission line design. These
2 criteria meet or exceed the NESC criteria and encompass
3 conditions relevant to the state and service area of the utility. The
4 Duquesne Light Design Criteria addresses design loads, structure
5 strength, clearances and constructability issues. They are based
6 on the line voltage, type of construction (wood pole versus steel
7 towers), and the date of construction (different criteria for a line
8 built in 2006 versus a line built in 1996). Where steel poles are
9 used, the design will also meet ASCE (American Society of Civil
10 Engineers) Standard 48-05 "Design of Steel Transmission Pole
11 Structures".

12 **Q. What do you mean by "Duquesne Light T&D Standards"?**

13 A. The Duquesne Light T&D Standards are set of "Standard" designs
14 for wood pole type construction. For steel pole construction there
15 are "Standard Components" such as insulators, shield wire
16 hardware and grounding. Using "Standard" type insures standard,
17 readily accessible and replaceable hardware, insulators and other
18 parts be used.

19 **Q. Why is it preferable that Duquesne Light Standard type of
20 construction be used?**

21 A. Duquesne Light Standards are familiar to all Duquesne Light
22 lineworkers. Repair or replacement parts are often stocked and
23 readily available.

24 **Q. Can you supply a copy of the Duquesne Light Design Criteria?**

25 A. Not in the form that you would expect. The criteria is currently
26 embedded within the PLS-Cadd computer program for design and

1 analysis of transmission lines. The criteria and design methods are
2 “dynamic” due to changes in regulations, improvements in line
3 design calculations and changing materials.

4 **Q. What is meant by “structural design of each supporting
5 structure”?**

6 A. Each structure (pole) is analyzed based on loads from the
7 Duquesne Light Design Criteria and rated strength of the wood or
8 other component (such as insulators). The pole or structure
9 component must not be overstressed.

10 **Q. What is meant by “electrical clearances between conductors or
11 any other nearby object”?**

12 A. The “electrical clearance” is the distance between the surface of
13 the conductor and the object in question, whether it is the ground,
14 a structure or another conductor. The electrical clearance must
15 consider the direction of the clearance and variables of
16 temperature, and wind blowing on the conductor.

17 **Q. What State regulations do you consider?**

18 A. It would be difficult to list all the state regulations but, in addition
19 to the Public Utility Commission Regulations, we include
20 regulations by PennDOT associated with building in a highway
21 right-of-way, and regulations by Pa Department of Environmental
22 Resources on Erosion and Sedimentation Control, and Storm Water
23 Management among others. We utilize a “Permit Manual for the
24 Transmission, Distribution, Telecommunications and Substation
25 Construction and Maintenance Activities” to assist in identifying
26 applicable regulations for the specific job.

1 **Q. What is the general description of the proposed line?**

2 A. The proposed line is approximately 4.9 miles long. It will have
3 three phase conductors and one or two shield wires. Each phase
4 conductor will be an 853.7kcmil 24/13 Aluminum Conductor Alloy
5 Reinforced ("ACAR") conductor. Each shield wire will be a #1 AWG
6 Aluminum Equivalent, 4/3 Alumoweld-Aluminum ("AWAC") shield
7 wire.

8 Wood h-frame type construction similar to Exhibit PC-1 is proposed
9 for long span construction in North Park and Wildwood Highlands
10 Properties. These 138kV h-frames are replacing the existing 23kV
11 h-frames.

12 Wood or steel pole construction similar to Exhibit PC-2 is proposed
13 where the lines do not traverse beside a roadway. In general, the
14 poles in these areas do not have any other utilities or lines below
15 the transmission line.

16 Wood or steel pole construction similar to Exhibit PC-3 is proposed
17 where the lines traverse beside a roadway (behind Shady Oak
18 Drive, and portions of North Park and Wildwood Highlands). In
19 general, the poles in these areas do not have any other utilities or
20 lines below the transmission line.

21 **Q. Do you have examples of poles on existing transmission lines
22 that are of similar construction?**

23 A. In general, the wood poles will look similar to those installed on
24 138kV tap to Evergreen Sub, located on Old William Penn Highway
25 in Monroeville, portions of our Logans Ferry-Plum line along New
26 Texas Road, portions of our Dravosburg-Rankin line along

1 Kennywood Blvd. and Homeville Road, and portions of our
2 Dravosburg-Carson Line along Carson St and along Mifflin Rd. The
3 attached photos, Exhibits PC-4 and PC-5, show similar 138kV wood
4 pole lines. The steel poles would look similar to those installed on
5 our Findlay-Montour 138kV line. The attached photo, Exhibit PC-6,
6 shows a similar 138kV steel pole line except the poles will be
7 painted a light brown, pole spacing will be closer, the poles will be
8 shorter and in certain areas there will be more underbuild of
9 subtransmission, telephone and cables.

10 **Q. How will the location of each pole be determined?**

11 A. We do not know at this time the specific location of each pole,
12 however the process will be iterative using a transmission line
13 design program titled PLS-Cadd. We will seek a balanced looking
14 line with pole spacing approximately the same as the existing pole
15 lines. In most cases the new pole will be located adjacent to and
16 replace the existing poles. Clearances, strength, property issues,
17 obstructions, and "no-build areas" will impact the final location of
18 each pole.

19 **Q. What do you mean by "property issues"?**

20 A. This means that I'm trying to minimize the impact from a
21 transmission structure on a property. Such as, locating poles and
22 anchors on property boundaries, avoiding or conversely selecting
23 certain areas as good areas for poles or anchors. The important
24 word is "try". I don't want to improve conditions for one property
25 owner by creating a worse condition for another.

26 **Q. What is meant by "no-build" areas?**

1 A. These area areas such as driveways or other physical obstructions
2 that the structures and anchors have to avoid.

3 **Q. What will happen to the existing pole line and the existing**
4 **poles?**

5 A. Where the 138kV line overbuilds the existing 23kV, distribution and
6 secondary lines, the existing lines will be transferred to the new
7 poles. The telephone and other attachments will be transferred to
8 the new poles by their respective owners. After third party
9 attachments (telephone and cable) are moved to the new poles
10 then the old pole will be removed completely.

11 **Q. What technical concerns do you have relevant to the 138kv line**
12 **to Wildwood?**

13 A. The technical concerns I have include: the ability to construct the
14 line given that there are other electric facilities, telephone and
15 cable along the proposed route; the ability within right-of-way
16 constraints to construct a supporting structure of sufficient
17 strength; the ability to deliver and install sufficient sized poles in a
18 suburban area and along congested roads; traffic control while
19 construction is going on; what material or materials are best suited
20 for the line.

21 **Q. What is needed to construct a line where electric facilities that**
22 **already exist, yet continue service to the customers and still**
23 **maintain safety to the lineworkers working the job?**

24 A. Duquesne Light may need to take brief outages on the existing
25 lines during the construction process to isolate a section of the
26 line, or they may be able to "cover" the lines with rubber blankets

1 to provide safety to the lineworkers constructing the new line.
2 Regardless, this is an everyday concern on most lines with multiple
3 circuits and is solved by Duquesne Light Operations and the
4 Construction Department.

5 **Q. What options does Duquesne Light have concerning pole
6 delivery?**

7 A. Pole sizes will generally be 85 ft or shorter (total pole size
8 including buried portions). This requires special permits but is
9 generally transportable over most roads. Routes will need to be
10 determined. If steel poles are used, then shorter lengths would be
11 utilized during transport and the poles assembled on site.

12 **Q. Will traffic be impacted by construction?**

13 A. During construction, lane restrictions with flagmen are expected.
14 Detours may also be used. All traffic obstructions will be
15 coordinated with the respective police departments to achieve
16 minimal impact.

17 **Q. What types of material will be used for the line.**

18 A. The specific material type at specific locations has not been
19 determined, but we are considering both wood poles, Class 1,
20 Western Red Cedar 75ft. to 85ft. lengths (total length) and painted
21 galvanized steel poles, light brown in color and equivalent in size
22 to the wood poles. Both types of poles will be directly embedded in
23 soil.

24 **Q. Does that conclude your testimony?**

25 A. Yes.

26

PROPOSED 138KV LINE

PROPOSED 138KV LINE

DOCUMENT
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13'
(TYP.)

12'

12'

70'

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AUG 31 2006

R/W

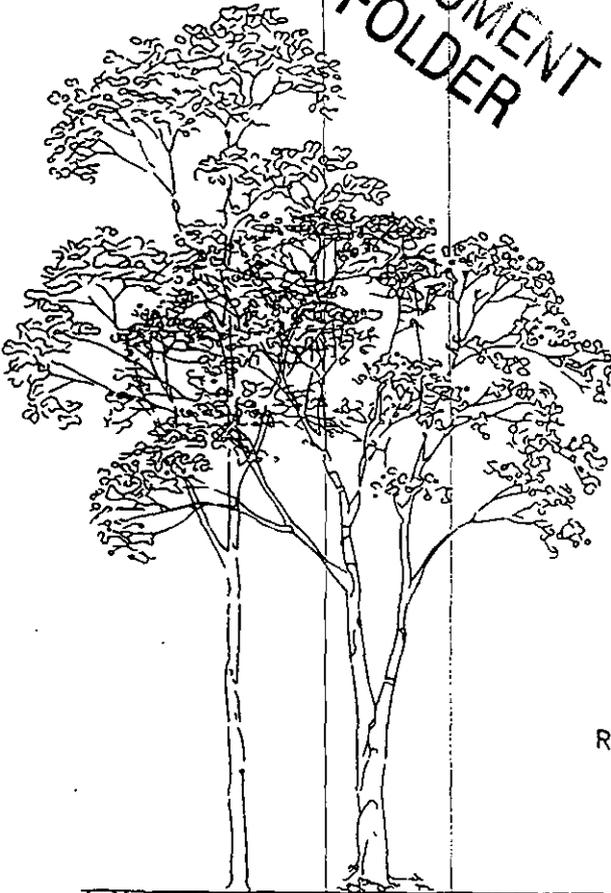
R/W

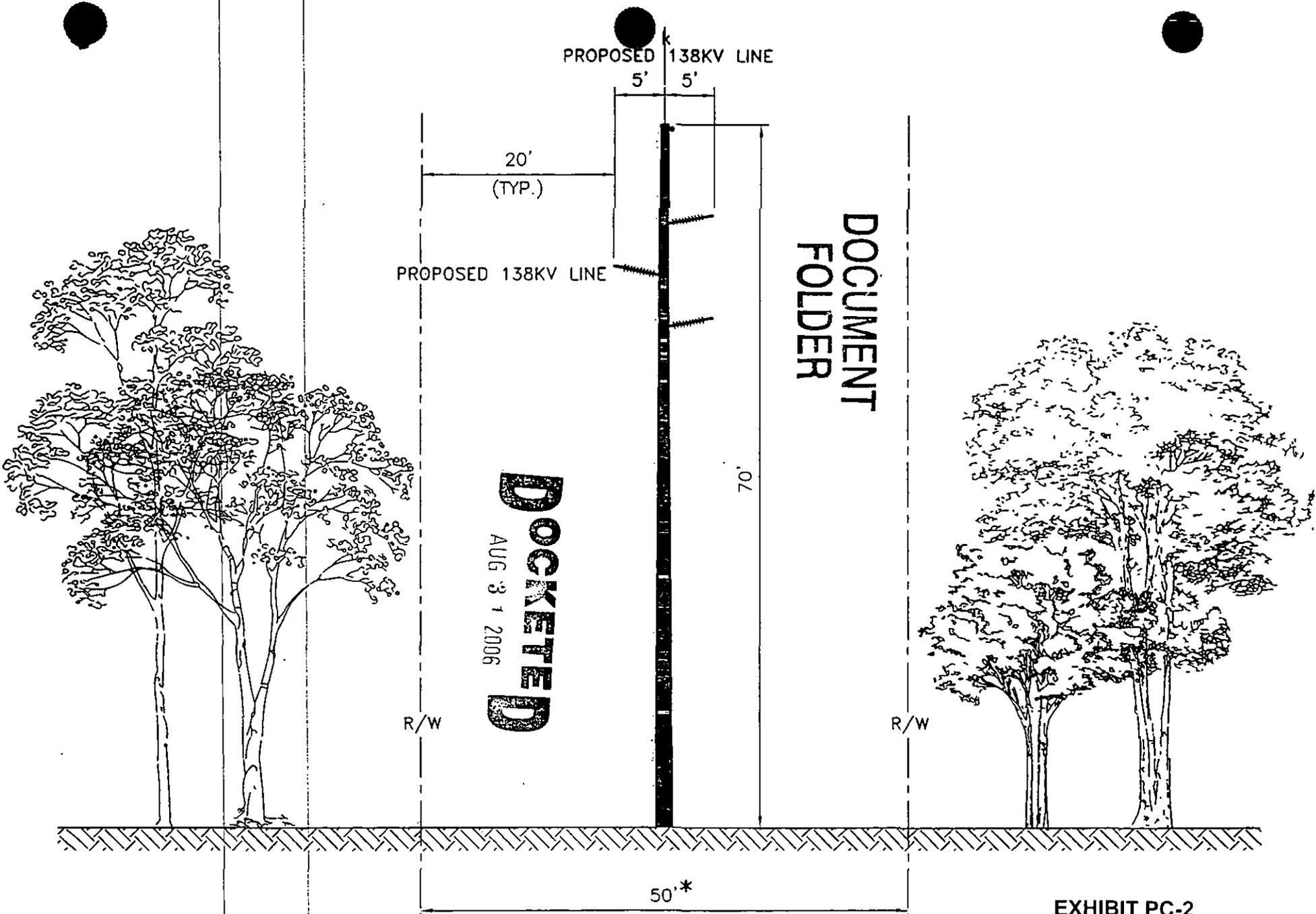
12'

50'

EXHIBIT PC-1
138KV TAP TO WILDWOOD S.S.
TYPICAL CROSS SECTION
OF LINE

*arm pgh PA 7/12/06
A-110150F0031
C-20065987*





PROPOSED 138KV LINE

PROPOSED 138KV LINE

20'
(TYP.)

5' 5'

70'

R/W

R/W

DOCKETED
AUG 31 2006

**DOCUMENT
FOLDER**

50'*

* ALSO SAME CONSTRUCTION ON
CENTERLINE RIGHT-OF-WAY AND
BY LICENSE AGREEMENT; i.e.
NO RIGHT-OF-WAY WIDTH.

**EXHIBIT PC-2
138KV TAP TO WILDWOOD S.S.
TYPICAL CROSS SECTION
OF LINE**

*crumbly RA 7/12/06
A-110105P003/
C-20045987*

PROPOSED 138KV LINE

5' 5'

5'
(TYP.)

PROPOSED 138KV LINE

RELOCATED 23KV LINE

70'

DOCUMENT
FOLDER

DOCKETED
AUG 31 2006

R/W

R/W

60' ROAD R/W

EXHIBIT PC-3

138KV TAP TO WILDWOOD S.S.
TYPICAL CROSS SECTION
OF LINE

Cam Rgh, PA 7/12/06
A-1050F0031
C-20065987

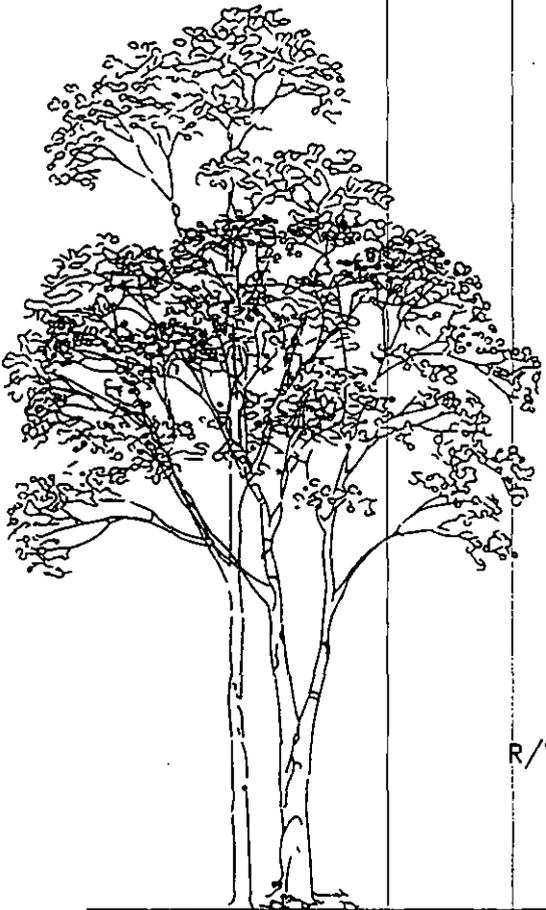




Exhibit PC-4. Typical construction of 138kV wood pole line with underbuild along Old William Penn Highway in Monroeville.

CM G/A 7/12/06
A-110150F0031
C-20065987



Exhibit PC-5. Typical construction of 138kV wood pole line in residential area along Mifflin Road.

cm bh PA 7/12/06
A- 110150 F0031
C- 20065987



Exhibit PC-6. Typical construction of 138kV steel pole line with underbuild along the bike trail in Findlay Township.

Chris B. PA
7/12/06
A-110150F0031
C-20065987

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

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Duquesne Light Company

Statement No. 3

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Direct Testimony of David W. Fugate

DOCKETED
AUG 31 2006

Chris Pugh At 8/12/06
A-110150 F 0031
A-20065987

1 **DIRECT TESTIMONY OF DAVID WILLIAM FUGATE**

2 **Q. Please state your name and business address.**

3 A. David W. Fugate, Electric Research & Management, Inc., 1211
4 Cornplanter Road, Cabot, Pennsylvania, 16023.

5 **Q. By whom are you employed and in what capacity?**

6 A. I am a Consulting Engineer for Electric Research & Management,
7 Inc. (ERM).

8 **Q. Please describe your educational and professional background,
9 and responsibilities at ERM.**

10 A. I have a Ph.D. in Electrical Engineering from Carnegie Mellon
11 University and over 16 years of professional experience in
12 modeling and measuring electric and magnetic fields (EMF). My
13 work involves EMF consulting for a range of clients including
14 utilities, hospitals, universities, architects, and government
15 organizations. A curriculum vitae providing a more complete
16 description of education and work experience is attached as Exhibit
17 DWF-1.

18 **Q. Dr. Fugate, what is the purpose of your testimony?**

19 A. In my testimony, I identify and generally describe the ERM report
20 “Electric and Magnetic Field Effects Calculations for the Wildwood
21 Transmission Line Project”, attached as Exhibit DWF-2. These
22 calculations were performed to address the electric and magnetic
23 field impact of the proposed Wildwood 138 kV transmission line.

24 **Q. Was ERM paid by Duquesne Light Company (DLC) to perform
25 work on the Wildwood Transmission line project?**

1 A. ERM was hired by GAI Consultants as a subcontractor to perform
2 the electric and magnetic field analysis for the Wildwood
3 Transmission Line project.

4 **Q. Does ERM perform work for anyone other than Duquesne Light
5 Company?**

6 A. Yes, ERM performs work for many different clients. As stated
7 previously, these clients include other utilities (for example, utility
8 clients include Consolidated Edison Company of New York and
9 Florida Power & Light), hospitals, universities, architects, medical
10 imaging manufacturers (Siemens Medical Solutions, GE
11 Healthcare), and the United States government (Food and Drug
12 Administration, Department of Transportation).

13 **Q. What was the basis for ERM's calculations in the report
14 identified as Exhibit DWF-2?**

15 A. DLC provided the pole configuration information (dimensions,
16 voltages, and currents) for the existing and proposed electric lines.
17 ERM used this line information from DLC to perform the analysis
18 and produce the report (Exhibit DWF-2).

19 **Q. Does ERM have expertise in conducting such studies?**

20 A. Yes, ERM has been performing power line field studies for more
21 than 25 years. As examples, ERM was responsible for audible
22 noise, radio interference (RI) and television interference (TVI)
23 evaluations for new 500 kV lines constructed in Florida, and for a
24 study characterizing magnetic fields from New York Power
25 Authority 345 kV lines running across the state of New York.

26 **Q. Please provide a summary description of the report.**

1 A. The report, Exhibit DWF-2, provides results from an electric and
2 magnetic field effects analysis for the proposed replacement of an
3 existing 23 kV sub-transmission line with a 138 kV transmission
4 line. The analysis included calculations of electric and magnetic
5 fields (EMF), audible noise (AN), and electromagnetic emissions
6 over frequency ranges that correspond to radio interference (RI)
7 and television interference (TVI). These calculations were
8 performed for five different line configurations that represent
9 typical construction at various locations along the proposed
10 transmission line.

11 **Q. How were the calculations performed?**

12 A. Calculations were performed using software produced by engineers
13 of the Bonneville Power Administration (BPA). The BPA software
14 provides the capability to calculate electric and magnetic fields
15 produced by any user-defined power line cross-section. The BPA
16 software uses empirical equations to provide calculated AN, RI,
17 and TVI strengths at specified distances from the defined
18 transmission line cross-section.

19 **Q. Can you provide additional description of the report contents
20 pertaining to EMF?**

21 A. The report contains two sections on electric and magnetic fields
22 (EMF). The first of these provides a comparison of calculated EMF
23 for the five existing and proposed line configurations evaluated in
24 the analysis. These calculations show that the electric field will
25 increase due to the increased operating voltage of the 138 kV line,
26 while the magnetic fields will be similar or lower in magnitude. The

1 second EMF section compares measurements from two locations
2 with calculated EMF as a check on the calculations. This
3 comparison shows that the electric field calculations are generally
4 higher than measurements because *electric fields are attenuated*
5 by nearly all objects including telephone/cable lines, trees, and
6 nearby structures.

7 **Q. Please describe the sections of the report that address corona**
8 **effects.**

9 A. The report also contains three sections providing calculation
10 results for audible noise (AN), radio interference (RI), and
11 television interference (TVI) associated with the proposed
12 transmission line, at two distances from the line. Audible noise
13 calculations indicated that at 40 feet from the pole center line, the
14 new 138 kV line will be relatively quiet during wet (rain, fog, snow,
15 ice) weather, and essentially inaudible during fair weather.
16 Regarding radio interference (RI), calculated fair weather RI noise
17 levels for 500 kHz at 40 feet from the pole centerline are well
18 below the estimated interference threshold. For foul weather at the
19 same frequency and distance, calculated RI levels are essentially
20 right at the threshold where interference might be expected to
21 occur with weak broadcast signals. Calculated television
22 interference (TVI) noise levels are all low enough that interference
23 is not expected within the evaluated frequency range from 30 MHz
24 to 1000 MHz at distances of 40 feet, or greater, from the pole
25 center line.

1 **Q. Your results indicate that there is the potential for radio**
2 **interference from the proposed line. Is this a significant**
3 **problem?**

4 A. While interference with amplitude modulated (AM) signals is
5 possible, it is not expected to be a significant problem for a number
6 of reasons. First, the calculations indicate that the radio
7 interference noise strengths during wet weather are right at the
8 threshold of where interference is possible. Second, RI noise
9 levels decrease with increasing broadcast frequency. Thus,
10 interference might only be a problem during foul weather when
11 listening to a weak broadcast signal at the low end of the AM band.
12 Third, interference issues are not expected based on years of
13 DLC's operating experience with 138 kV lines in suburban areas of
14 Pittsburgh.

15 **Q. What are the effects of the line for the emergency radio**
16 **frequencies?**

17 A. In general, emergency radio communications operate at
18 frequencies where the RI levels are relatively low, and these radio
19 systems use modulation techniques that are not susceptible to the
20 power line interference.

21 **Q. How would the line affect Ham operators in the vicinity of the**
22 **line?**

23 A. While interference at Ham radio frequencies is possible, it is not
24 expected—the line design for the 138 kV upgrade will not cause
25 significant corona effects. In general, RI is not a problem on lines
26 energized at 138 kV; it is more common at voltages of 345 kV and

1 higher due to the increased corona. Some RI due to corona effects
2 may be present during wet weather (rain, fog, snow) and this RI
3 would be largest at lower frequencies. As such, the most
4 vulnerable Ham band would be 160 meters, which is just above the
5 AM broadcast band. Gap arcing on transmission line hardware can
6 also cause RI for Ham operators. However, gap arcing is
7 extremely rare on newer transmission lines due to the most recent
8 design practices and state-of-the-art hardware. In cases where
9 gap arcing is a problem, utilities can locate and fix the hardware to
10 eliminate the interference source.

11 **Q. What are the effects of the line for medical devices like**
12 **pacemakers, heart monitors, and any other currently available**
13 **home medical devices?**

14 A. The susceptibility of medical devices such as pacemakers and
15 defibrillators to power-frequency electric and magnetic field
16 interference varies depending on the manufacturer and model of
17 each specific device—in all cases, information from the
18 manufacturer and medical experts should be used to ensure safe
19 operation in the home, at work, and in other environments. As an
20 example of typical recommended safety levels for implant devices,
21 American Conference of Governmental Industrial Hygienists
22 (ACGIH) guidelines for non-ionizing radiation recommend 60 Hz
23 limits for workers wearing cardiac pacemakers of 1000 mG for
24 magnetic fields and 1 kV/m for electric fields. The calculated EMF
25 levels for the proposed configurations are all lower than these
26 guidelines.

1 Q. Does this conclude your testimony at this time?

2 A. Yes.

3

DOCUMENT FOLDER

DAVID W. FUGATE, Ph.D., P.E.

Dr. Fugate joined Electric Research & Management, Inc. in 1993 and currently serves as both president and consulting engineer for the firm. He has a wide range of experience in the area of electric and magnetic fields associated with power systems and electric transportation systems. This includes the modeling and simulation of electric and magnetic fields, measurement studies, development of shield designs, low-field power system configurations, and other solutions for interference problems. Recent work includes magnetic field assessment and shield design for the new Con Edison World Trade Center Substation in Manhattan, a large-scale transmission line magnetic field study for the New York Power Authority, from Buffalo to East Fishkill, and electromagnetic field characterization of the electrified rail corridor from Baltimore to Washington, D.C. for the Maryland Transit Authority.

From 1990 to 1993 Dr. Fugate was a senior engineer at the Westinghouse Science & Technology Center. At Westinghouse, he was involved in the design and analysis of electromagnetic systems. Dr. Fugate developed three dimensional modeling tools for generator design for the Power Generation Technology Division. Other work included the computer simulation of a prototype super-conducting magnetic energy storage (SMES) system.

Dr. Fugate is a licensed professional engineer in Pennsylvania and New York.

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AUG 31 2006

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Member, IEEE Power Engineering Society

PUBLICATIONS

1989 "Self-Consistent Computations of the Geometries of Magnetically Confined Liquid Metal Columns", with J.F. Hoburg, ISIJ International, Vol. 29, December 1989, p. 1016.

EXHIBIT DWF-1

*cm Fugate 7/21/06
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Electric and Magnetic Field Effects Calculations for the Wildwood Transmission Line Project

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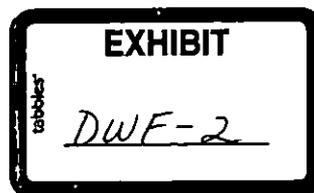
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1.0 Introduction

This report provides results from an electric and magnetic field effects analysis for the proposed replacement of an existing 23 kV sub-transmission line, Circuit 22464, with a 138 kV transmission line. This field effects analysis was performed to evaluate five different line configurations that represent typical construction at various locations along the proposed transmission line. The analysis includes calculation of electric and magnetic fields (EMF), audible noise (AN), and electromagnetic emissions over frequency ranges that correspond to radio interference (RI), and TV interference (TVI).

The calculations described in this report were performed using software produced by engineers at the Bonneville Power Administration (BPA). The BPA software provides electric and magnetic field solutions for any two-dimensional transmission line cross-section. For corona effects, the BPA software uses empirical equations to calculate audible noise, RI, and TVI at various frequencies and distances from the transmission line. The following sections describe the five line configurations and the calculated field results.

2.0 Electric and Magnetic Field Calculations

Electric and magnetic fields are calculated for the existing and proposed line configurations for each of the five cases being evaluated. Circuit configuration data and load currents (peak and average) were provided by Duquesne Light Company (DLC) transmission and planning engineers. Currents used in this study were for comparison between the existing and the proposed peak and average conditions and thus, are based on the following:

- The average current on existing 23kV lines is the calculated average of the recorded hourly currents on that line for all of 2004.
- The peak current on an existing 23kV line is defined as the maximum hourly current recorded on that line in all of 2004.
- The average current on the 138kV line is defined as the estimated yearly average of the current on the line after the circuit is cut into service. Average substation load at cut-in is estimated as 13 MVA, which corresponds to an average current of 53 amps on the 138kV line.
- The peak current on the 138kV line is defined as the estimated yearly peak of the current on the line after the circuit is cut into service. Peak substation load at cut-in is estimated as 20 MVA, which corresponds to a peak current of 86 amps on the 138kV line.

The field calculations are made at ten foot intervals for a distance of 100 feet to either side of the pole centerline, at a height of 3.3 ft (1 meter) above ground level. These calculations are based on a two-dimensional transmission line model that assumes the phase conductors run in a straight line.

To account for conductor sag, the heights of the conductors in the model correspond to the estimated lowest clearance from conductor to ground (under everyday conditions) for all cases except for Case 1 (Figure 1). In this case, the clearance was estimated from the conductor height to ground at the middle of the large span over a valley containing a recreational facility. This location was selected for analysis due to the public use of the facility. Except for this first case, field magnitudes will typically decrease moving along the line from midspan towards the support poles due to increased conductor height.

Each of the five configurations are summarized below and illustrated in a sketch. The sketch shows the general arrangement of existing and proposed circuits and tables provide the peak and average load current values. Graphs of the calculated EMF results are shown after each sketch. Magnetic fields are calculated for both peak and average load currents. Electric fields do not depend on the load currents. The data traces are labeled as existing and proposed to show the effect of the proposed line.

Case 1: From Wildwood Substation and Across North Park (Two-Pole Structure)

As shown in Figure 1, the existing configuration consists of the 23 kV sub-transmission Circuit 22464 with a double-pole wood construction and phase conductors in a horizontal arrangement. In the proposed configuration the sub-transmission line is replaced with the 138 kV transmission line on a double wood pole with phase conductors also in a horizontal arrangement.

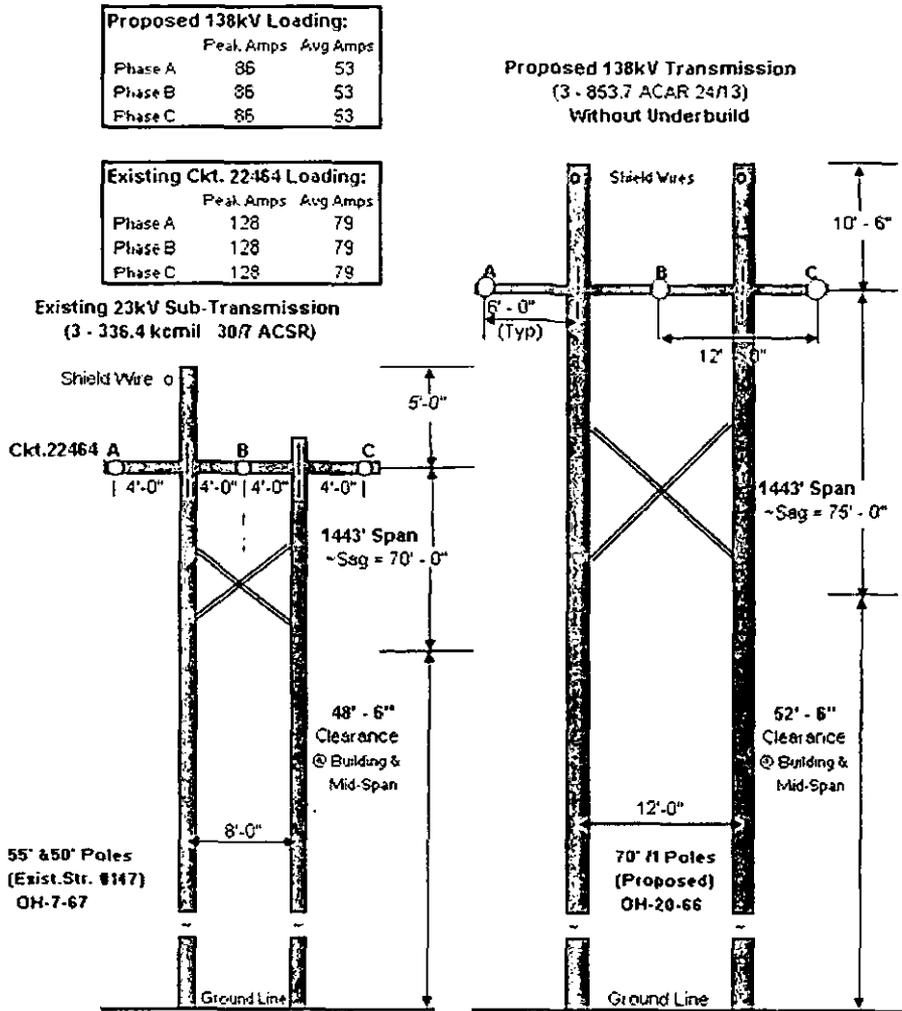


Figure 1. Sketch (not to scale) showing existing and proposed two-pole structure line configuration for Case 1, from Wildwood Substation and Across North Park)

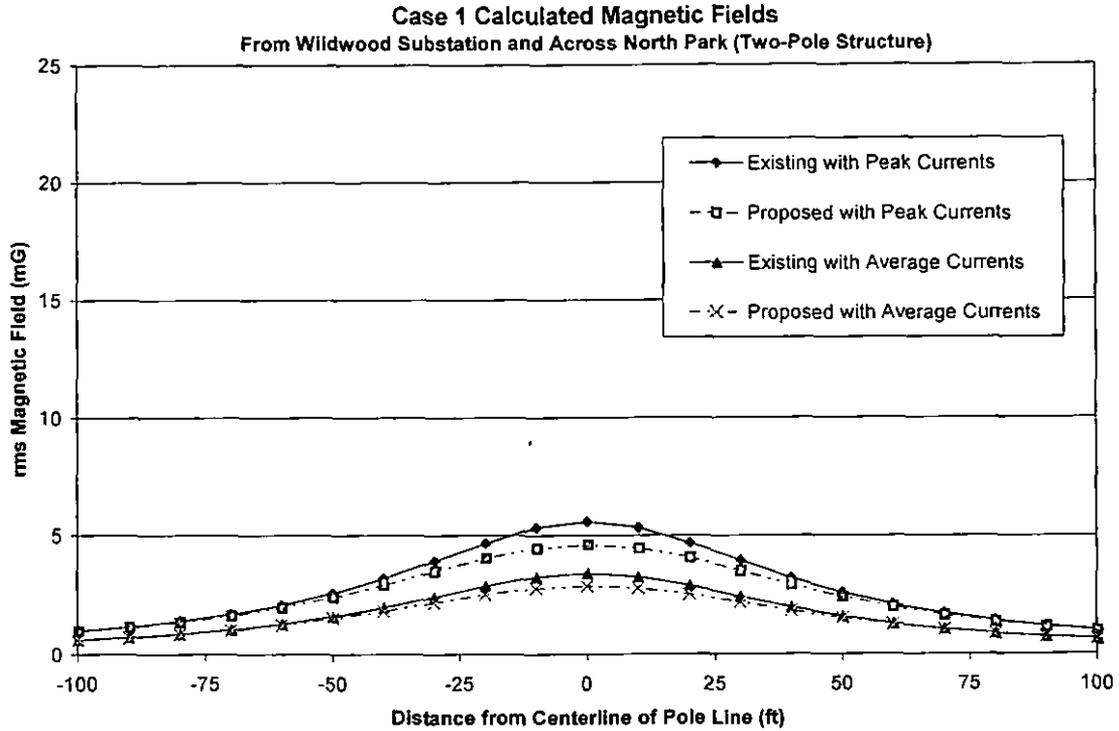


Figure 2. Calculated magnetic fields (mG) for the existing and proposed Case 1 configuration.

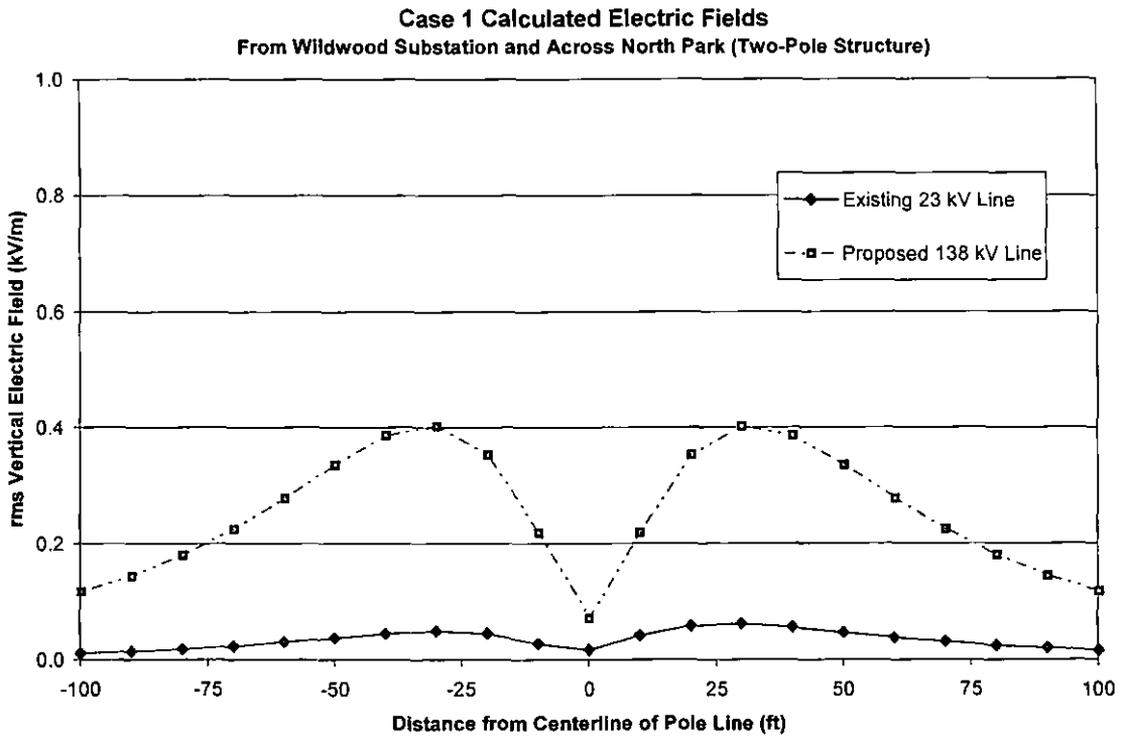


Figure 3. Calculated electric fields (kV/m) for the existing and proposed Case 1 configuration.

Case 2: Across North Park, Behind Shady Oak Circle, and Between Peebles Road and Collington Square (Single-Pole Structure)

In Case 2, the existing configuration consists of the sub-transmission Circuit 22464 on a wooden pole with cross-arm. In the proposed configuration the sub-transmission line is replaced with the 138 kV line on a wood pole. The 138 kV phase conductors are arranged vertically on alternate sides of the pole. On the existing 23 kV configuration (left side of Figure 4), the conductor labeled MGCN located on the pole below the cross-arm refers to the multi-grounded common neutral.

Proposed 138kV Loading:		
	Peak Amps	Avg Amps
Phase A	86	53
Phase B	86	53
Phase C	86	53

Existing 23kv Ckt. 22464 Loading:		
	Peak Amps	Avg Amps
Phase A	128	79
Phase B	128	79
Phase C	128	79

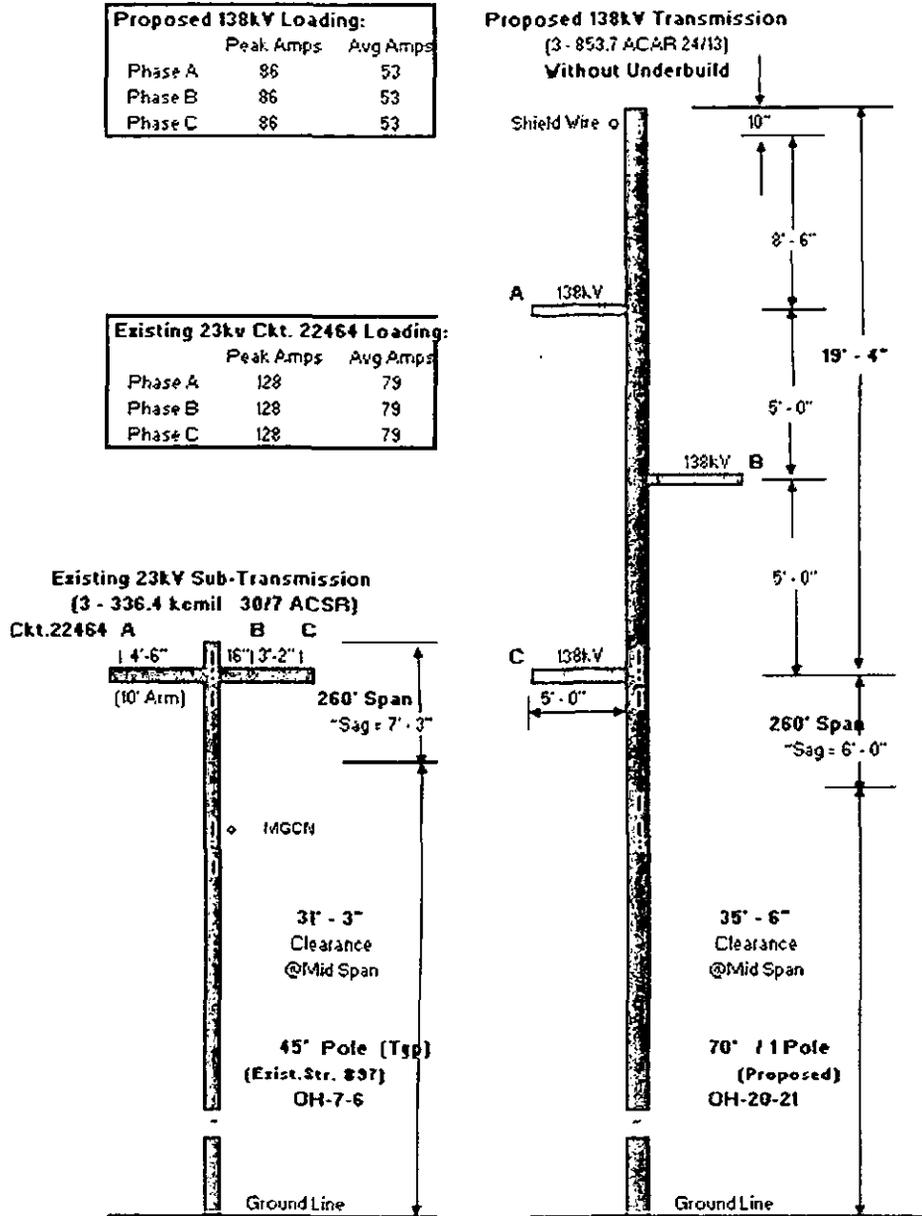


Figure 4. Sketch showing existing and proposed line configuration for Case 2.

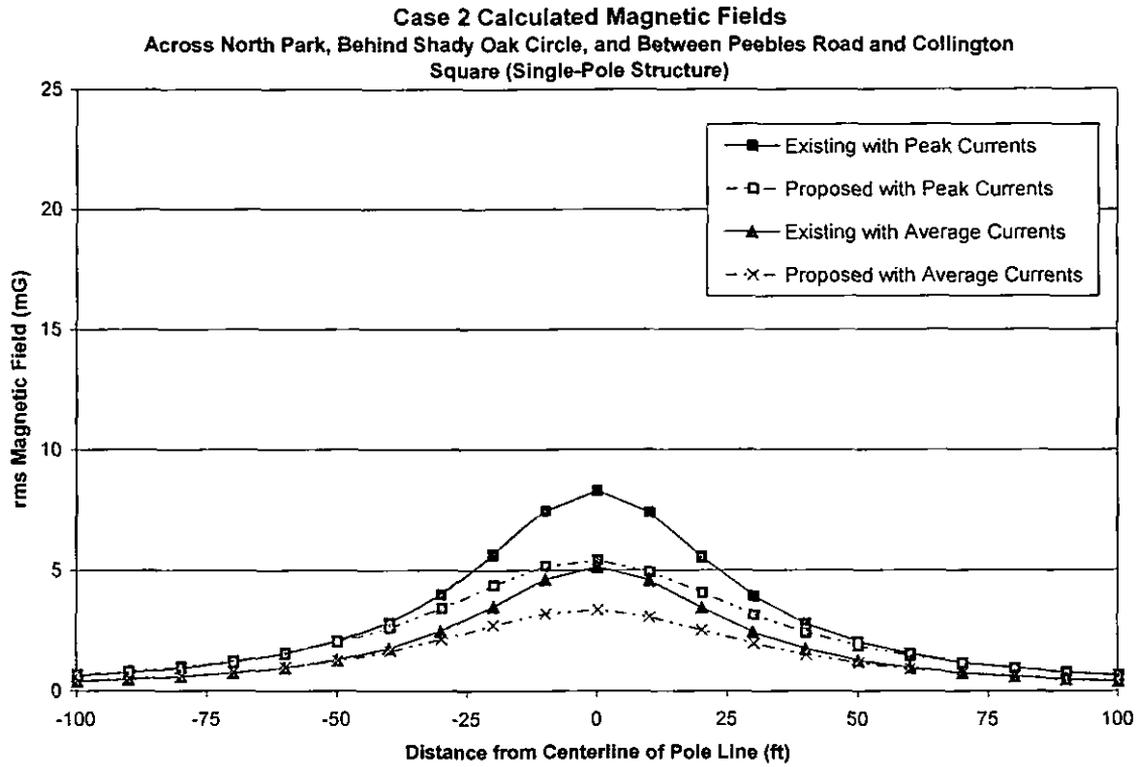


Figure 5. Calculated magnetic fields (mG) for the existing and proposed Case 2 configuration.

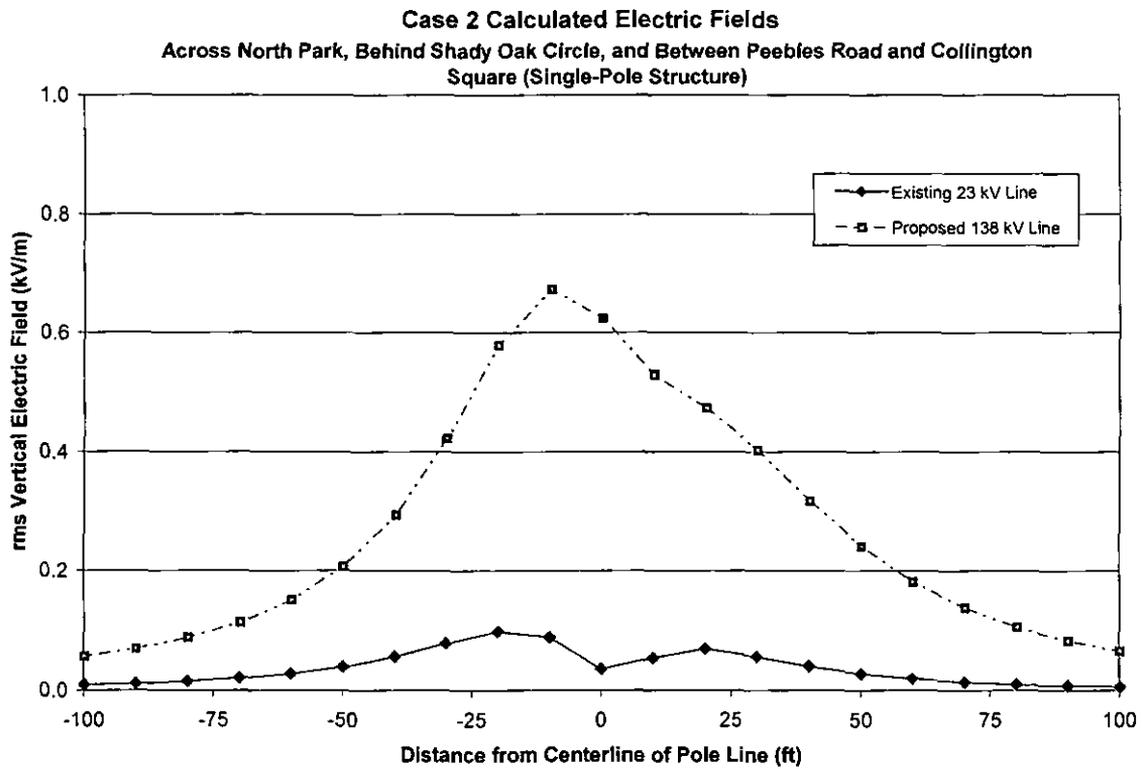


Figure 6. Calculated electric fields (kV/m) for the existing and proposed Case 2 configuration.

Case 3: Along Peebles Road

In Case 3, the existing configuration consists of the 23 kV sub-transmission Circuit 22464 on the top cross-arm and distribution circuit D23705 on a lower cross-arm. In the proposed configuration, the sub-transmission line is replaced with the 138 kV line on a wood pole. The 138 kV phase conductors are arranged vertically on alternate sides of the pole. Distribution Circuit D23705 will remain on a horizontal cross-arm below the 138 kV Circuit. MGCN on the existing 23 kV configuration refers to the multi-grounded common neutral.

Case 3: Along Peebles Road (Single-Pole Structure)

Proposed 138kV Loading:		
	Peak Amps	Avg Amps
Phase A	86	53
Phase B	86	53
Phase C	86	53

Existing 23kV Ckt. 22464 Loading:		
	Peak Amps	Avg Amps
Phase A	128	79
Phase B	128	79
Phase C	128	79

Existing 23kV Ckt. D23705 Loading:				
	Peak Amps		Avg Amps	
	Before	After	Before	After
Phase A	39	18	24	11
Phase B	39	18	24	11
Phase C	42	20	26	12

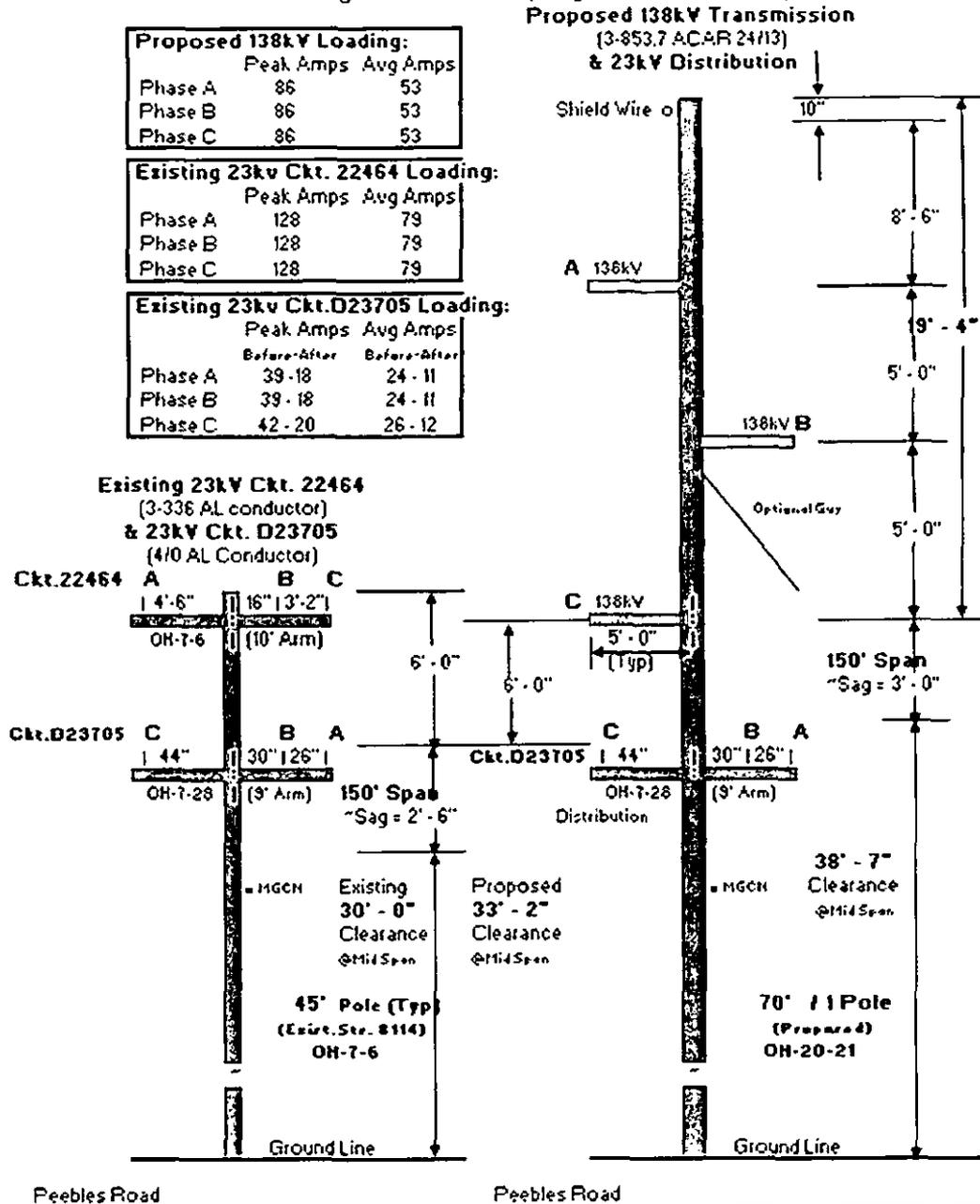


Figure 7. Sketch showing existing and proposed line configuration for Case 3.

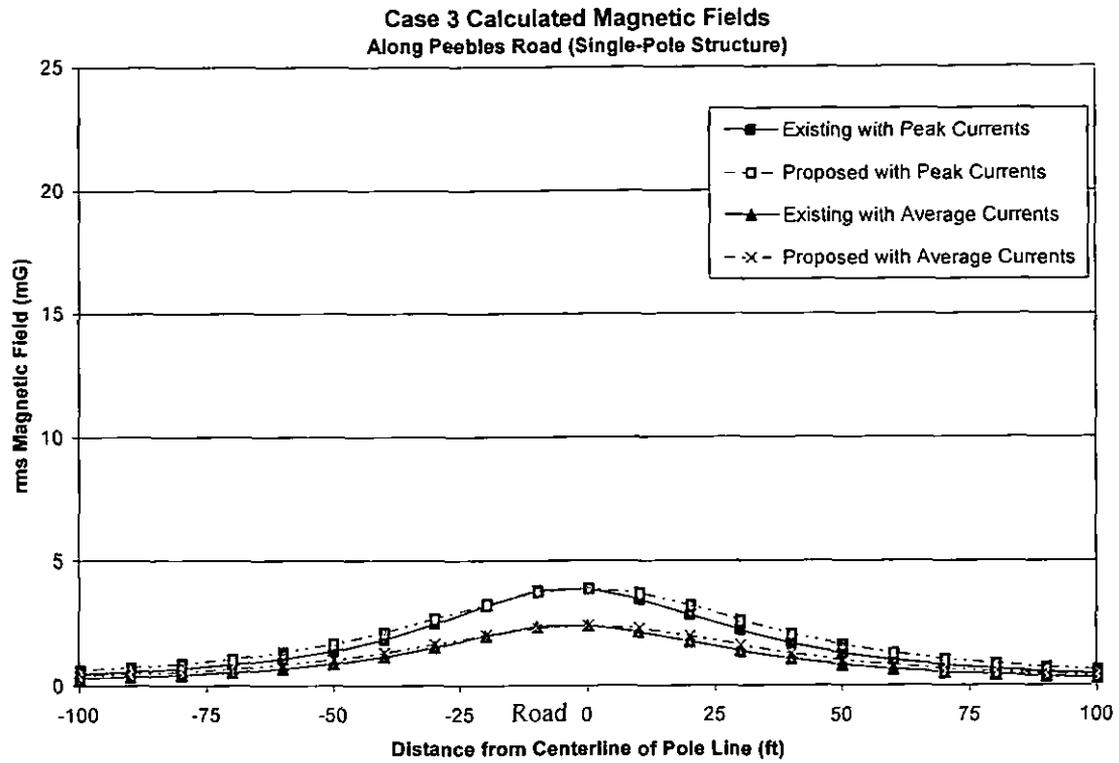


Figure 8. Calculated magnetic fields (mG) for the existing and proposed Case 3 configuration.

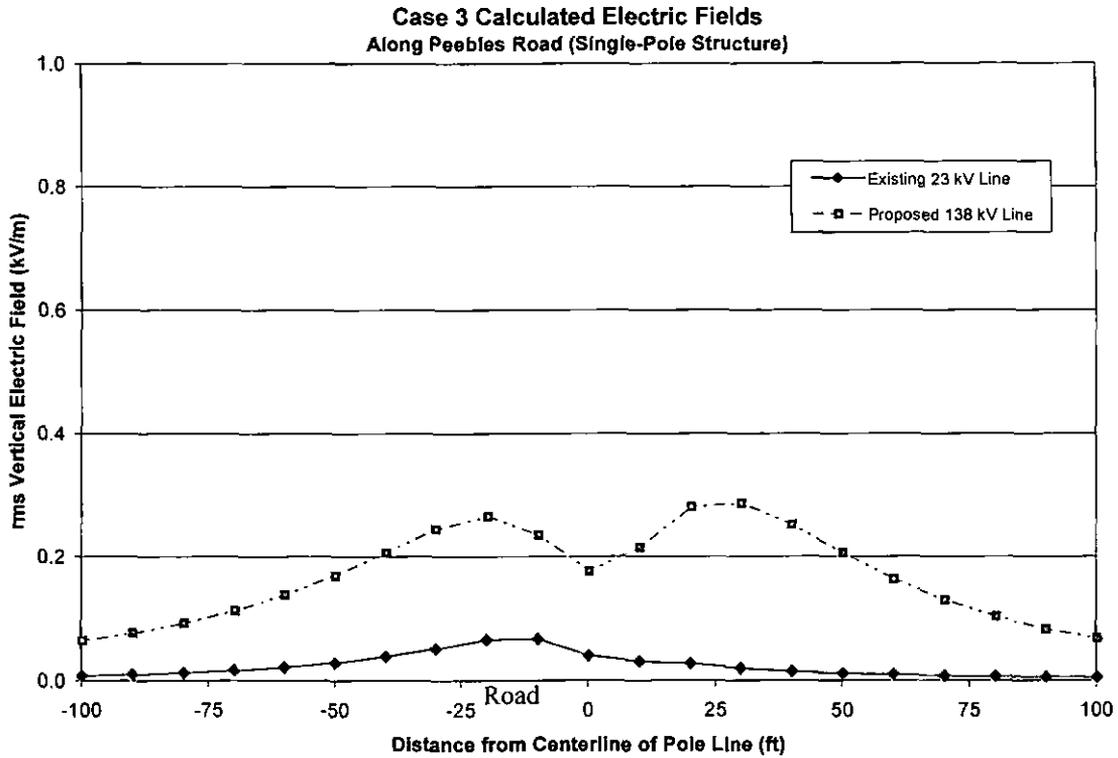


Figure 9. Calculated electric fields (kV/m) for the existing and proposed Case 3 configuration.

Case 4: Across Ringeisen Road and Collington Square (Single-Pole Structure)

Similar to Case 3, but the remaining Circuit D23701 is only a single-phase 4 kV line with a neutral on the cross-arm.

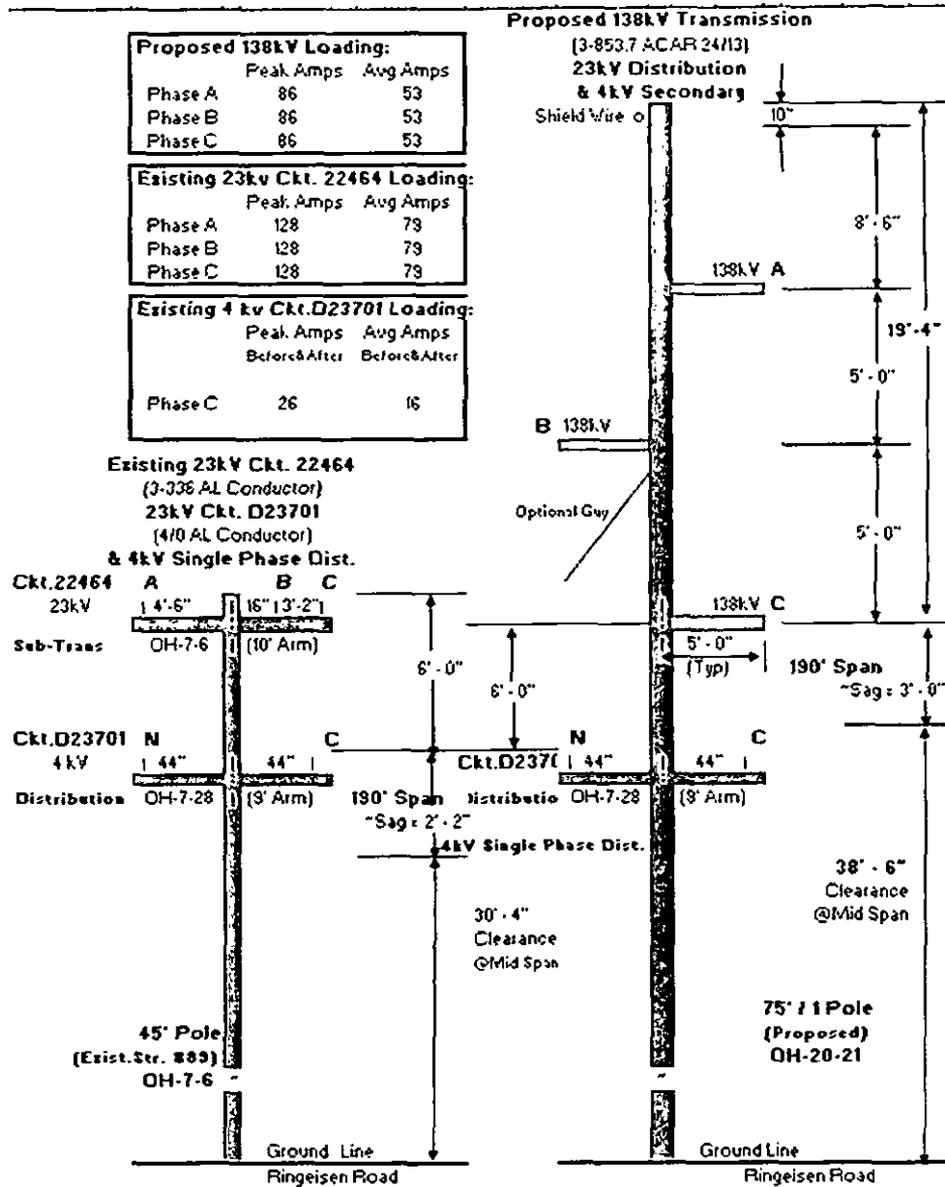


Figure 10. Sketch showing existing and proposed line configuration for Case 4.

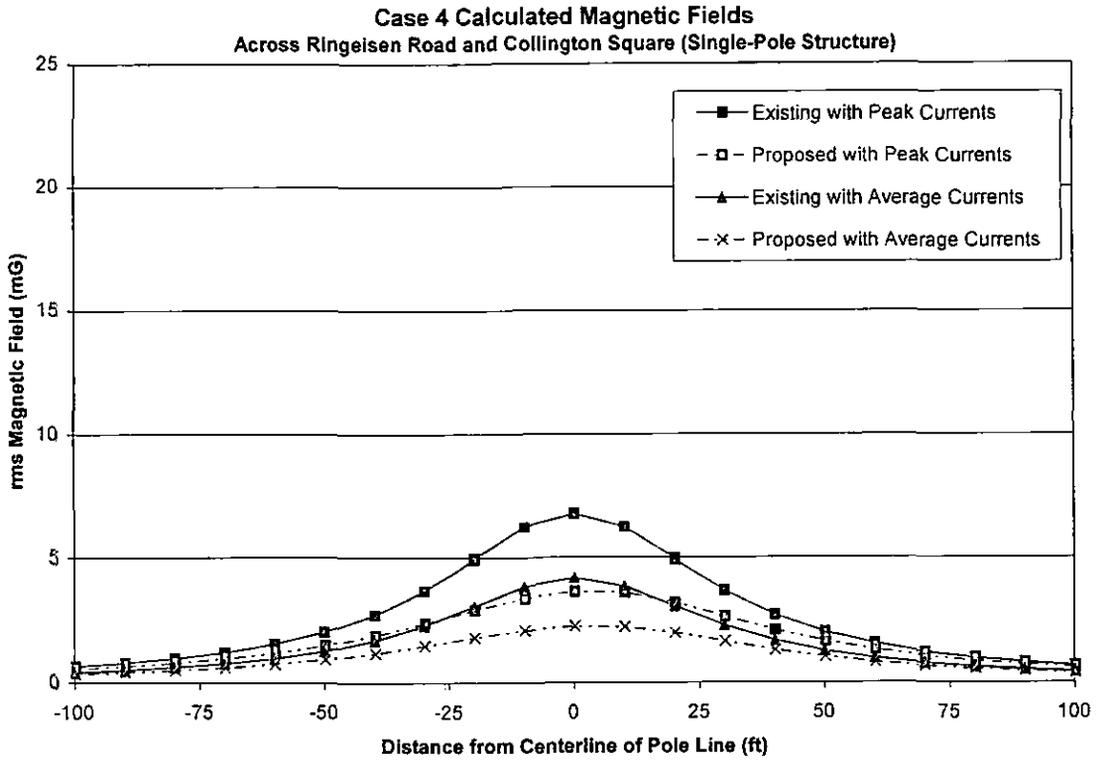


Figure 11. Calculated magnetic fields (mG) for the existing and proposed Case 4 configuration.

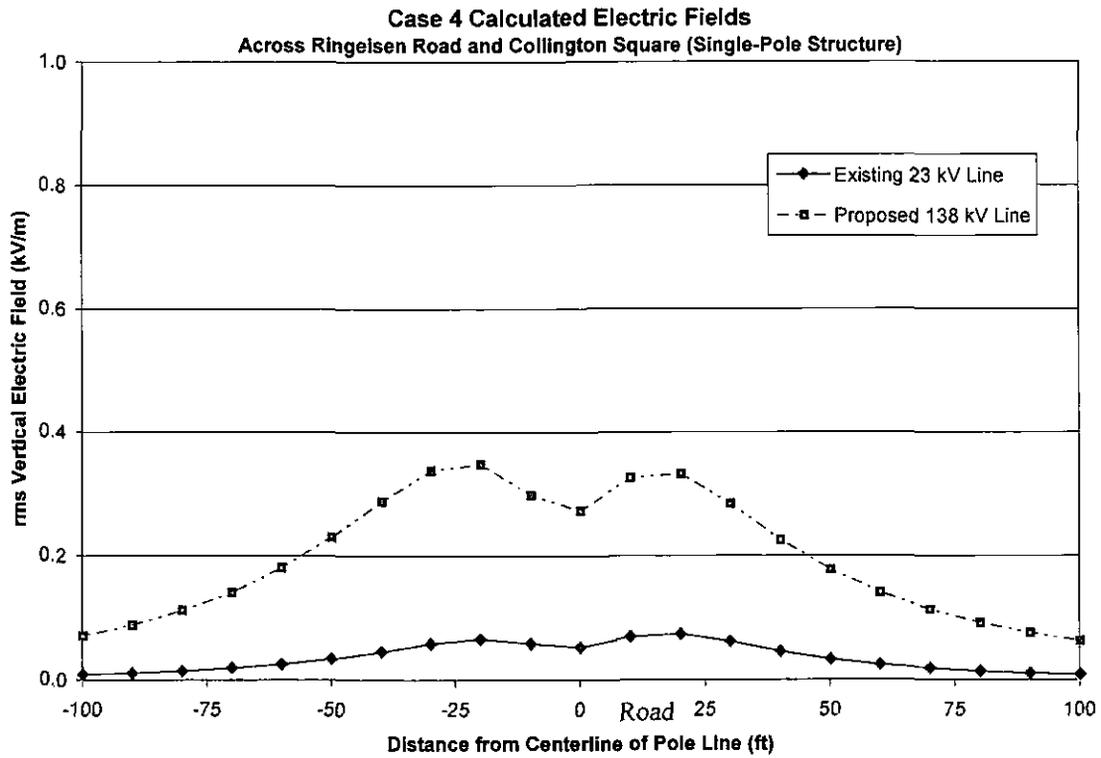
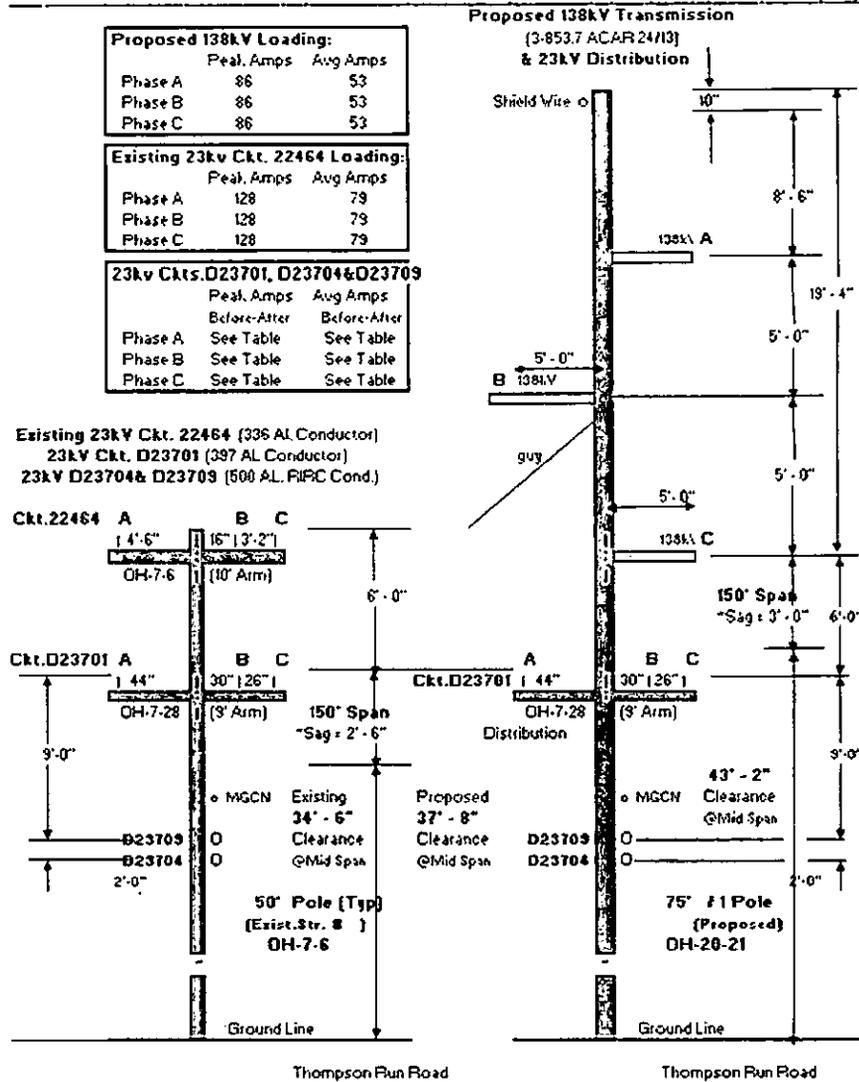


Figure 12. Calculated electric fields (kV/m) for the existing and proposed Case 4 configuration.

Case 5: Along Thompson Run Road (Single-Pole Structure)

In this case, the existing configuration consists of the 23 kV sub-transmission Circuit 22464 on the top cross-arm, distribution Circuit D23701 on a lower cross-arm, and two bundled aerial cable 23 kV distribution circuits beneath the neutral on the pole. In the proposed configuration the sub-transmission line is replaced with the 138 kV line on a wood pole. The 138 kV phase conductors are in a vertical arrangement on alternate sides of the pole. The three distribution circuits will remain.



	Ckt. D23701		Ckt. D23704		Ckt. D23709	
	Before/After	Before/After	Before/After	Before/After	Before/After	Before/After
	Peak (A)	Avg (A)	Peak (A)	Avg (A)	Peak (A)	Avg (A)
Phase A	276/276	171/171	360/250	223/155	340/340	211/211
Phase B	240/240	149/149	360/250	223/155	380/380	236/236
Phase C	300/300	186/186	354/246	219/153	310/310	192/192

Figure 13. Sketch showing existing and proposed line configuration for Case 5.

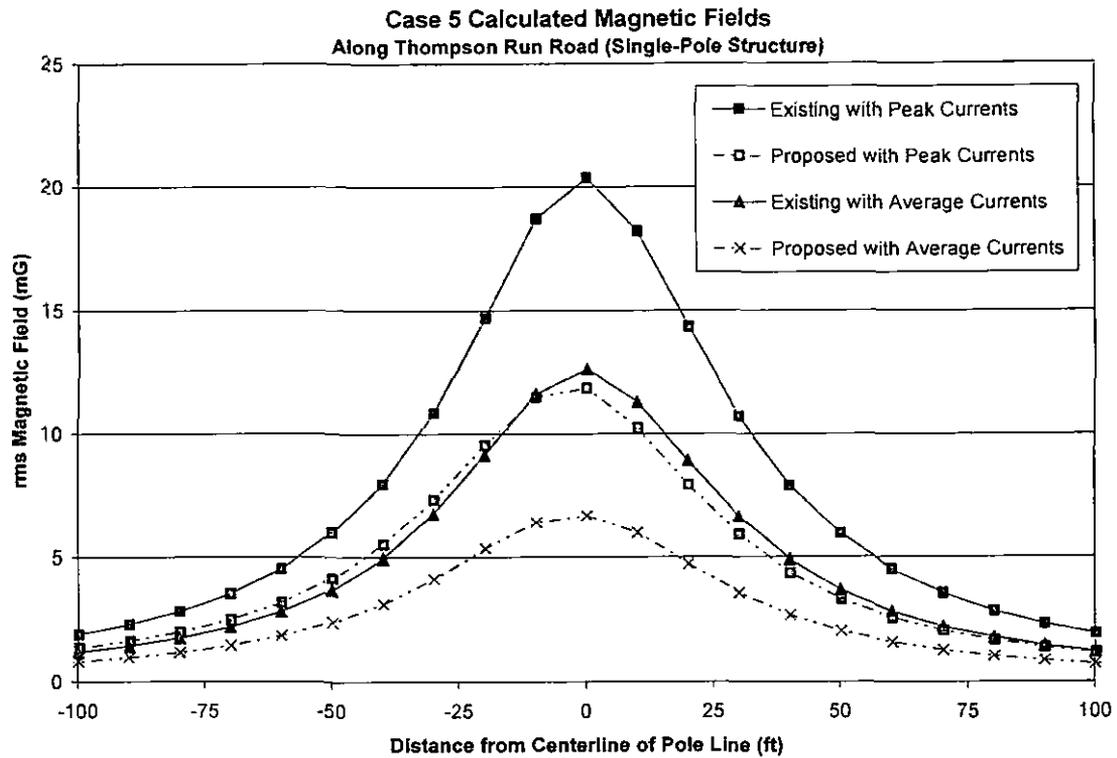


Figure 14. Calculated magnetic fields (mG) for the existing and proposed Case 5 configuration.

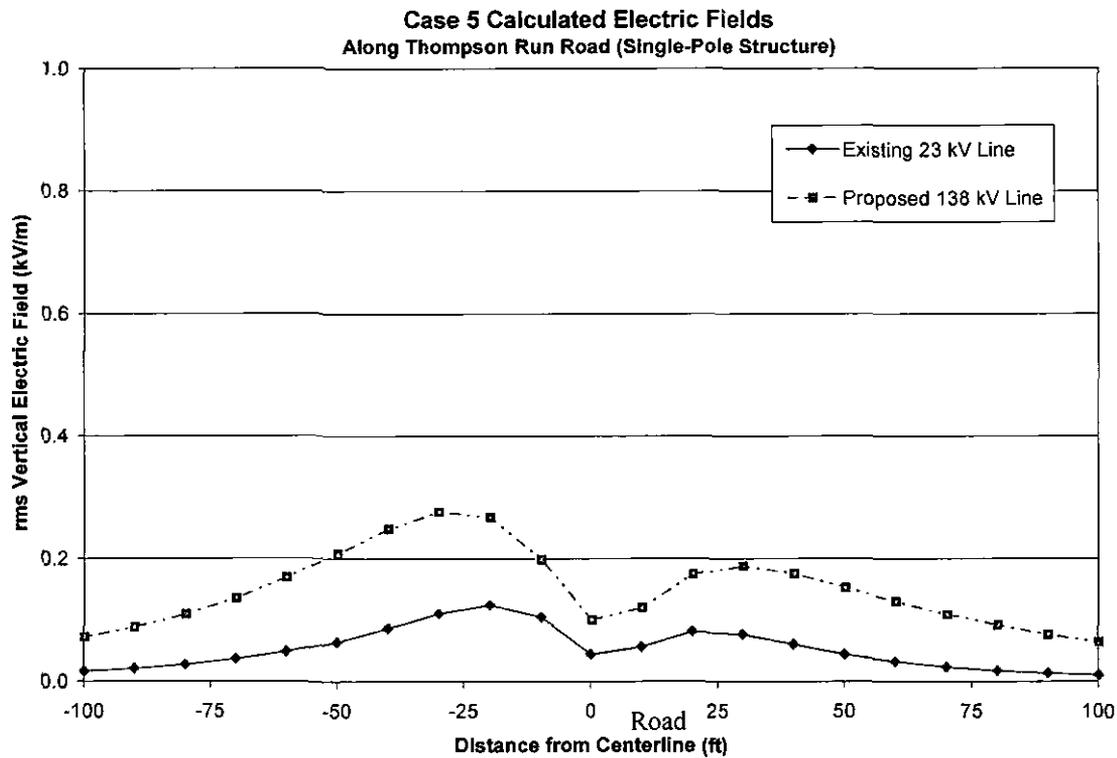


Figure 15. Calculated electric fields (kV/m) for the existing and proposed Case 5 configuration.

3.0 EMF Measurements

This section describes electric and magnetic field measurements that were recorded at two locations corresponding to two of the five cases evaluated in the previous section. These measurements document typical field levels along the existing distribution lines and provide a means for checking model results for the existing circuit configurations.

The electric and magnetic field measurements were recorded along profiles that crossed beneath the existing distribution lines at Peebles Road (Case 3), and Thompson Run Road (Case 5). The profile locations were chosen so that measurements could be recorded along a cross-street for each configuration.

These measurements were recorded on September 13, 2005 using a *MultiWave* System II meter with a Bartington three-axis fluxgate sensor (B-field) and a fiber-optic isolated single-axis electric field sensor. The electric field sensor was mounted on a fiberglass rod and oriented to measure the vertical component of the electric field (the dominant component beneath an overhead line). Both the electric and magnetic field measurements were recorded at a height of one meter above ground level and readings were triggered at five-foot intervals using a distance measurement wheel. Load readings for the distribution circuits were obtained from DLC system operators immediately after the profile measurements were recorded (for comparison with the magnetic field calculations).

The following sections provide a description of each measurement location, the existing distribution lines, and the measured field levels.

3.1 Peebles Road at Wendy View Lane

EMF measurements were recorded crossing Peebles Road at Wendy View Lane. This corresponds to the Case 3 existing configuration as shown in Figure 7. The photograph in Figure 16 shows the distribution lines along Peebles Road looking southwest at the corner of Wendy View Lane. The distribution lines consist of two three-phase 23 kV circuits (Ckt 22464 at top and D23705 below) situated in a horizontal configuration on cross-arms at two heights. A single-phase secondary circuit in a vertical configuration runs below the distribution circuits with a neutral conductor.

The profile started on the northwest side of Peebles Road and measurements were recorded for approximately 300 feet to the first driveway on the left side of Wendy View Lane. Figures 17 and 18 show the measured and calculated magnetic and electric fields along this profile.

In Figure 17, the maximum *rms* magnetic field reading beneath the distribution line was just under 3 mG. At the time of the measurements, current on the top 23 kV sub-transmission circuit was approximately 80 amps, while currents on the lower 23 kV distribution circuit were estimated at 30 amps.

In Figure 18, the maximum root mean square (*rms*) vertical electric field reading beneath the distribution line was approximately 0.012 kV/m. Compared to the calculated fields, the measured levels fall off more quickly moving toward the north side of Peebles Road. This shielding effect is due to trees and shielded telephone/cable lines on the opposite side of the road.

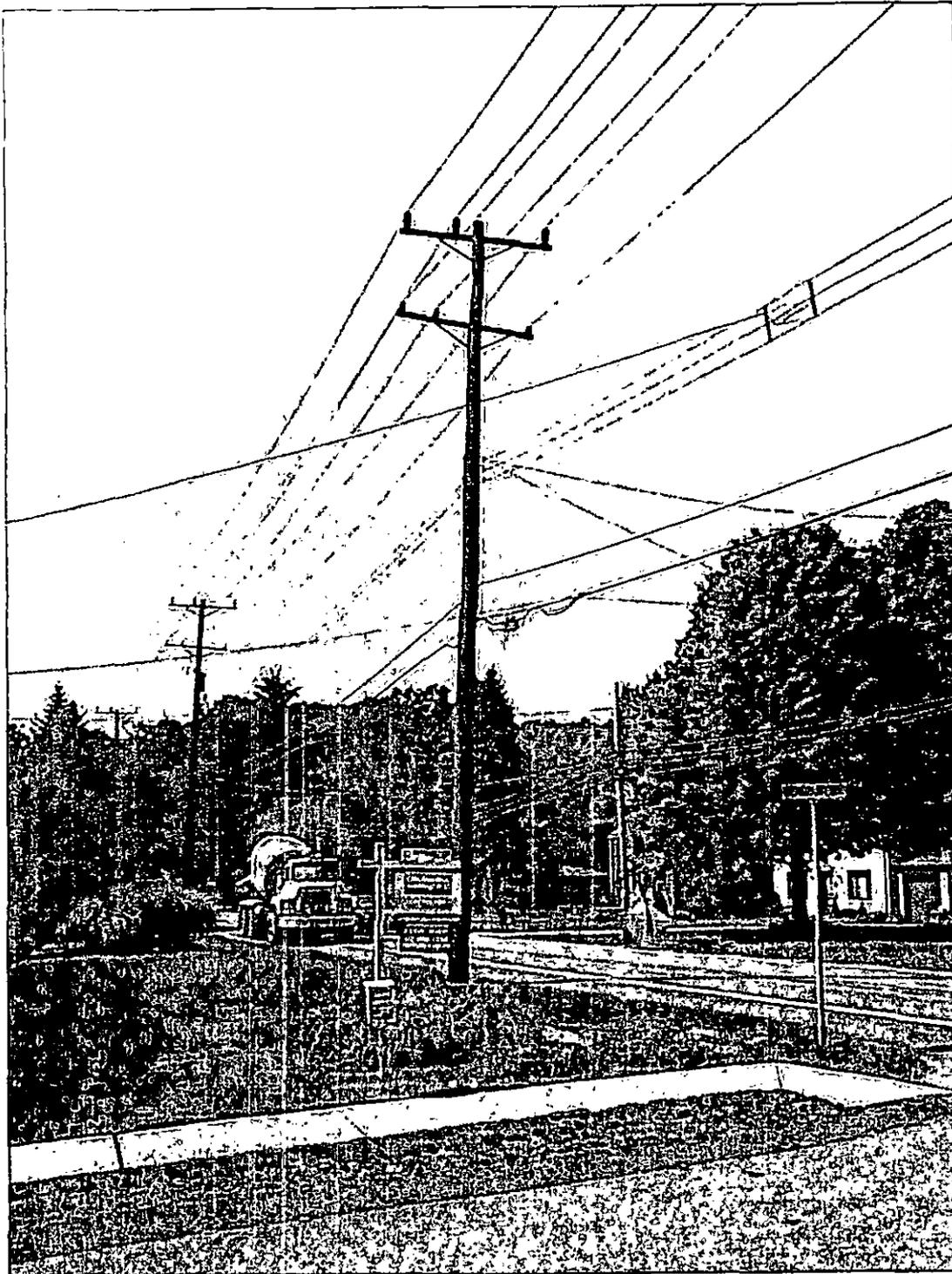


Figure 16. Photograph of distribution lines along Peebles Road at corner of Wendy View Lane.

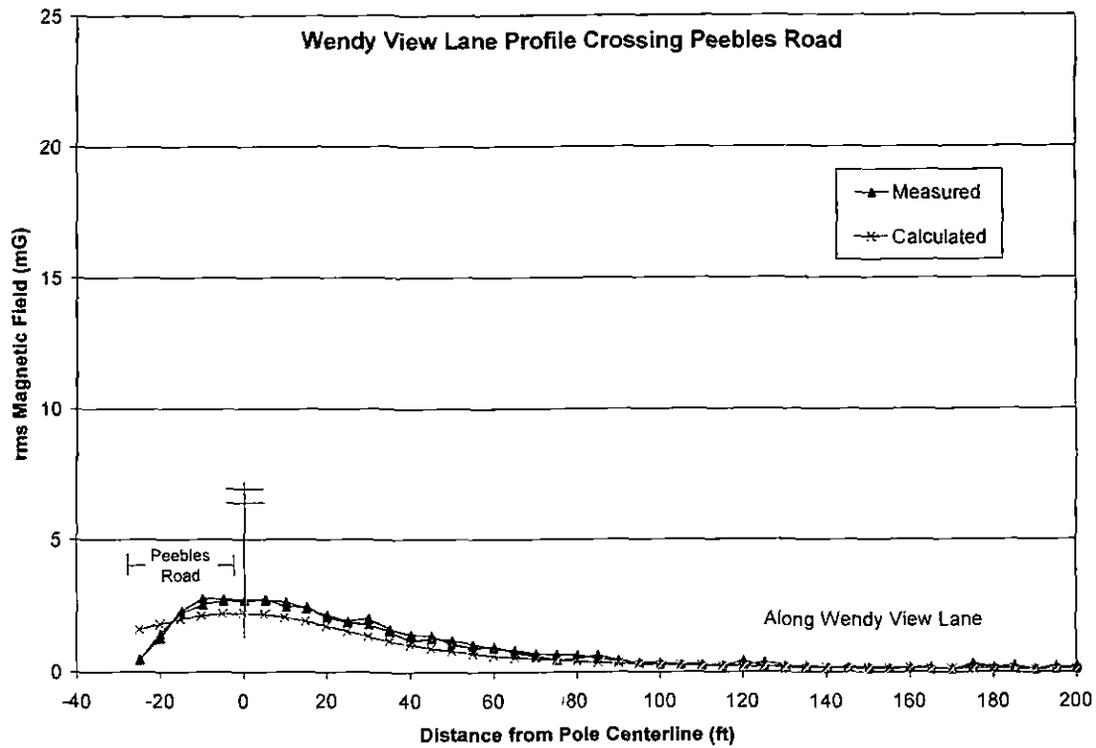


Figure 17. Measured and calculated magnetic fields (mG) along Wendy View Lane.

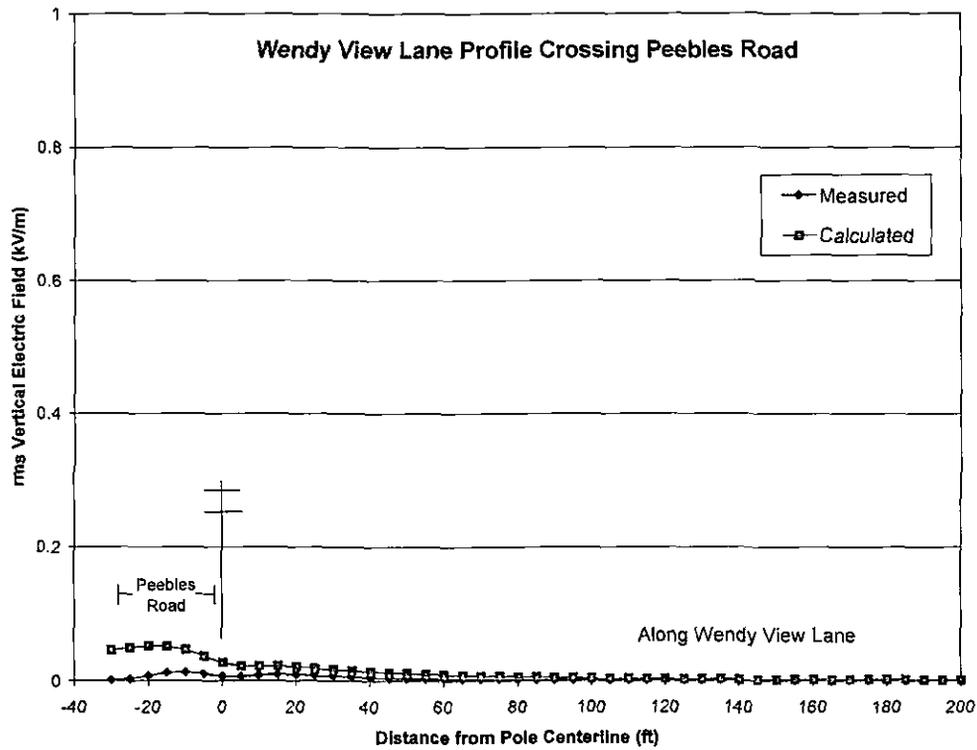


Figure 18. Measured and calculated rms vertical electric fields (kV/m) along Wendy View Lane.

3.2 Thompson Run Road at White Oak Drive

Along Thompson Run Road, measurements were recorded at White Oak Drive. The photograph in Figure 19 shows the distribution lines along Thompson Run Road at the profile location. The distribution lines consist of two three-phase 23 kV circuits situated in a horizontal configuration on cross-arms at two heights (Ckt. 22464 on top cross-arm, and D23701 on the next cross-arm down). Further down the pole, a neutral (MGCN) and two 23 kV aerial cable circuits (D23709 and D23704) also run along the road (See Fig. 13).

At this pole, a single-phase 23 kV feeder and neutral run from the pole across White Oak Drive. A street-light in the photograph also indicates the presence of a single-phase secondary circuit (120 volts).

The profile for this location starts at the southeast corner of White Oak Drive and Sycamore Drive, and runs out to and across Thompson Run Road. This profile crosses beneath the distribution lines on the west side of Thompson Run Road and ends on the east side of the road at the guardrail.

Figures 20 and 21 show the magnetic and electric fields measured along the profile along with calculated fields based on the 23 kV circuits.

In Figure 20, the *rms* magnetic field reading beneath the distribution line is approximately 12 mG. At the time of the measurements, currents on the top sub-transmission 23 kV circuit were 80 amps while currents on the lower 23 kV circuit were estimated at 180 amps (the distribution circuit is monitored only at the substation for total load—load on different sections must be estimated).

In Figure 21, the maximum *rms* electric field measured along the profile is approximately 0.04 kV/m. The two sets of shielded aerial cables appear to shield the vertical electric field directly beneath the distribution lines. An additional peak can be seen near 100 feet in Figure 21. This peak is due to the single-phase 23 kV line that crosses White Oak Drive diagonally. The calculated electric field levels in Figure 21 have a similar shape as the measured levels, but the calculated levels are higher. The measured values indicate that additional shielding of the distribution lines is provided by trees and other objects that are not in the simple distribution line model. Both the measured and calculated electric field levels are relatively low in Figure 21.

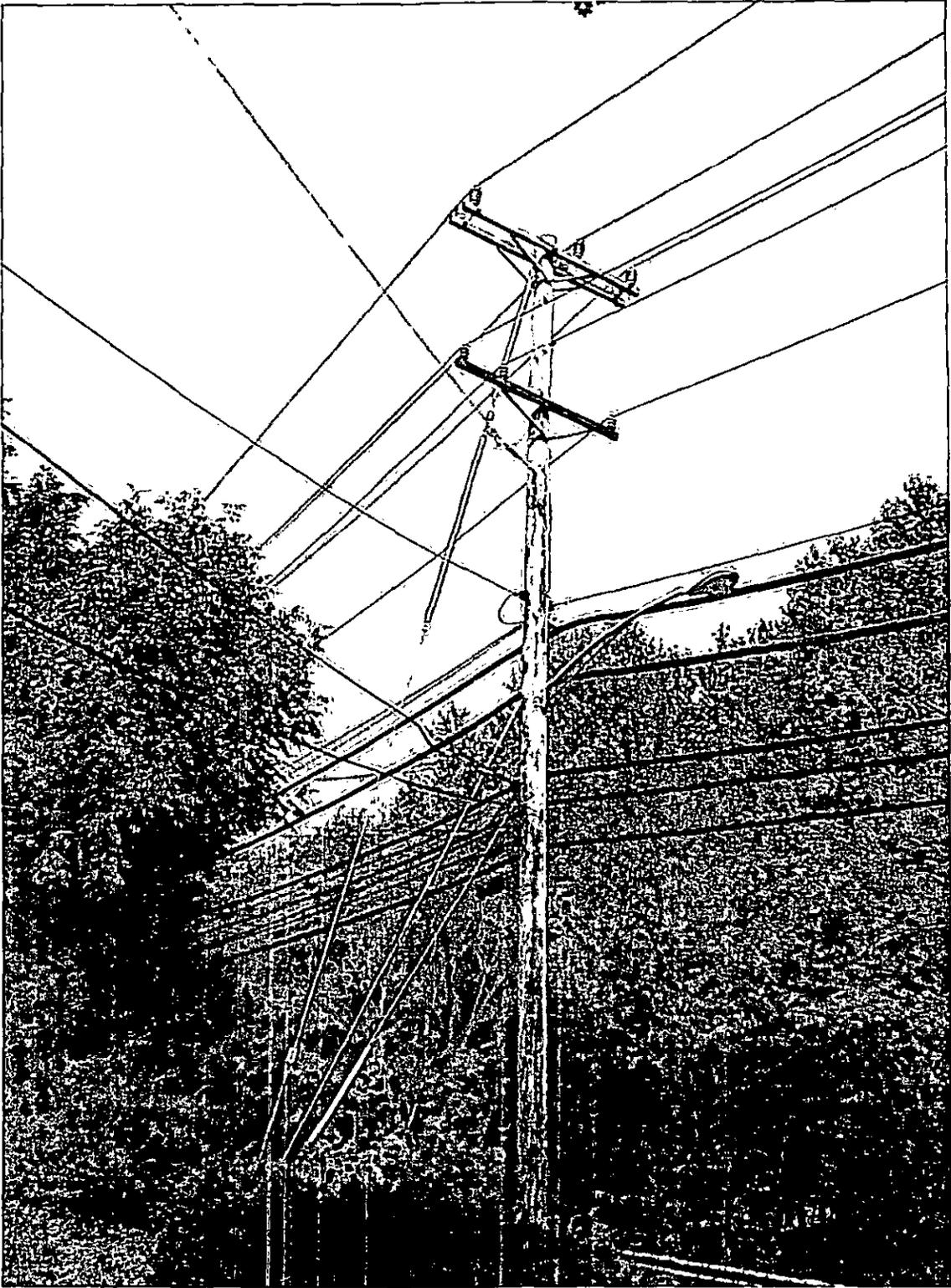


Figure 19. Photograph of distribution lines along Thompson Run Road at White Oak Drive.

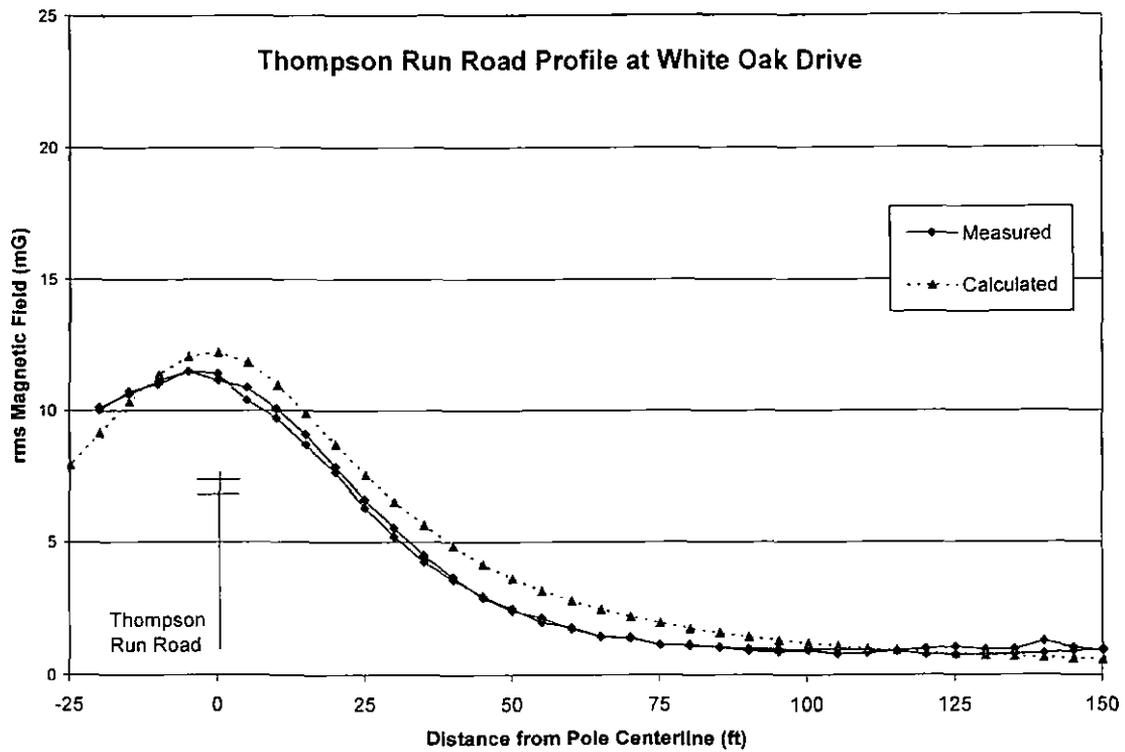


Figure 20. Measured and calculated rms magnetic field resultant (mG) along White Oak Drive.

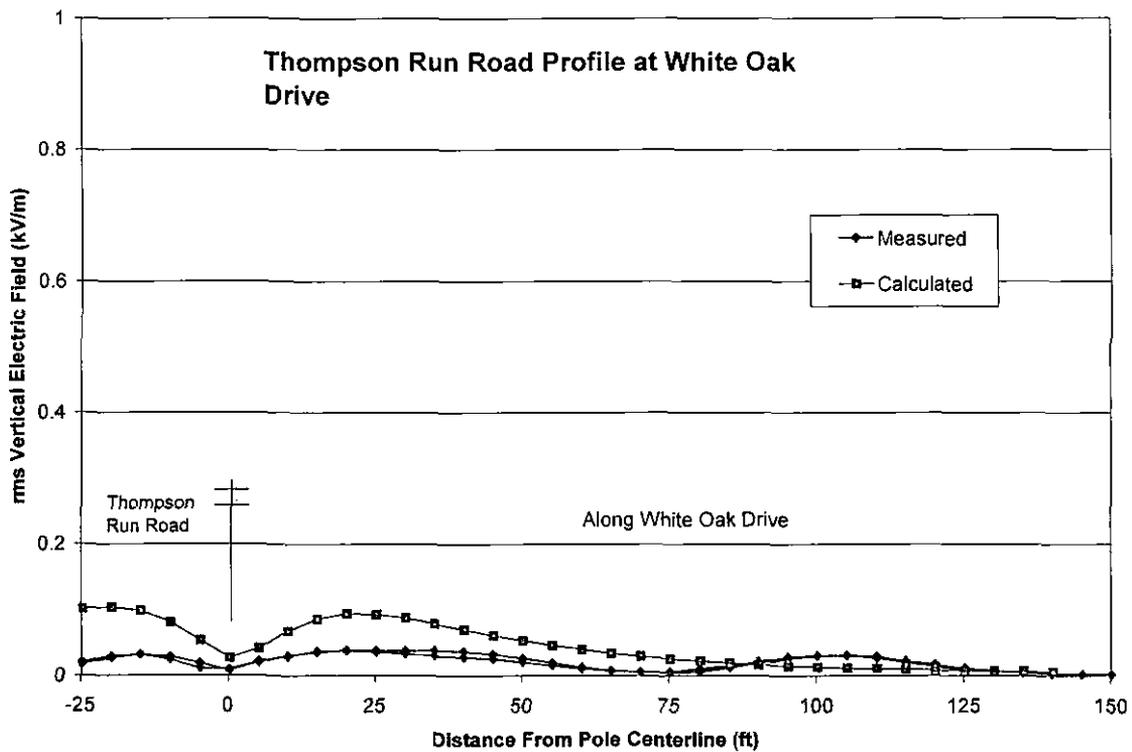


Figure 21. Measured and calculated rms vertical electric fields along White Oak Drive.

4.0 Corona Effects Calculations

4.1 Audible Noise

Corona discharges on transmission lines produce audible noise. The audible noise (AN) levels depend on the transmission line design (operating voltage, conductor dimensions and conductor configuration) and the weather. In fair weather, very little corona exists, and thus the audible noise is often imperceptible. However, higher levels of corona and thus, audible noise, are present in rainy or damp weather due to water droplets. The BPA field effects software provides L5 and L50 levels for both rainy and fair weather. The L5 value is the sound level that will be exceeded 5% of the time, and the L50 value is the sound level that will be exceeded 50% of the time (median). These calculated sound levels are listed in decibels (dB) relative to an A-weighted value (dBA) that approximates the frequency response of the human ear.

Table 1 shows the calculated fair and rainy weather audible noise levels (dBA) for the five Wildwood configurations being evaluated. These levels are calculated at a distance of 40 feet from the pole centerline.

Table 1. Calculated fair and rainy weather audible noise levels in dBA.

Case	Location	AUDIBLE NOISE (40 ft from Centerline)			
		Fair		Rain	
		L5 (dBA)	L50 (dBA)	L5 (dBA)	L50 (dBA)
1	Across North Park	-1.0	-4.5	24.0	20.5
2	Shady Oak Drive	2.0	-1.5	27.0	23.5
3	Peebles Road	3.1	-0.4	28.1	24.6
4	Ringeisen Road	2.4	-1.1	27.4	23.9
5	Thompson Run Road	2.8	-0.7	27.8	24.3

To put the calculated audible noise levels in perspective, 0-10 dBA corresponds to the threshold of hearing, 10-20 dBA corresponds to ambient sound level in a recording studio, and 20-30 dBA is similar to a bedroom at night [1]. Thus, the calculated rainy weather levels are relatively quiet, and the calculated fair weather levels are essentially inaudible at a distance of 40 feet from the pole centerline.

4.2 Radio Interference (RI) and Television Interference (TVI)

Corona on transmission lines also produces electromagnetic noise. When this noise is sufficiently strong, it causes interference with radio signals and television signals. For this report, interference levels are evaluated at a lateral distance of 40 feet from the pole centerline. To show how the levels fall off rapidly moving away from the centerline, interference levels are also evaluated at 120 feet from the pole centerline.

The BPA software calculates the L50 (median) RI and TVI levels over a range of frequencies. RI is typically evaluated over the range of frequencies that encompass the

AM broadcast radio band, and TVI is typically evaluated over a higher frequency range that encompasses the broadcast television bands (and the FM radio band). In general, the electromagnetic noise levels from a transmission line decrease with increasing signal frequency. Thus, interference effects are greatest at the lower broadcast frequencies.

Table 2 shows the calculated RI noise level in dB (relative to electric field strength of one microvolt per meter) at a frequency of 500 kHz at distances of 40 and 120 feet from the pole centerline (540 kHz is the lower end of the AM radio band). An electric field strength of one microvolt per meter ($\mu V/m$) is a standard unit for quantifying signal field strength. The low end of the band is evaluated because noise levels decrease at the higher frequencies. The RI noise levels at 120 feet from the pole centerline show the rapid fall-off with distance as well.

Table 2. Calculated L50 (median) RI levels for the proposed 138 kV configurations for fair and rainy weather at distances of 40 and 120 feet from the pole centerline

Radio Interference (at 500 kHz, Lower End of AM Band)					
Case	Location	Fair L50 (dBA)		Rain L50 (dBA)	
		40 ft	120 ft	40 ft	120 ft
1	Across North Park	26.9	14.4	43.9	31.4
2	Shady Oak Drive	28.5	14.4	45.5	31.4
3	Peebles Road	29.5	14.2	46.5	31.2
4	Ringeisen Road	30.2	14.6	47.2	31.6
5	Thompson Run Road	31.2	16.6	48.2	33.6

Typical broadcast radio signals in residential areas range from 66 to 80 dB[2] and studies have shown that any one signal needs to be at least 20 dB greater than the noise level to avoid interference. Based on this guideline, the RI noise level should be 46 dB or lower to generally avoid interference. This criterion is met for all five configurations at 120 feet from the pole centerline for both fair and rainy weather. At 40 feet from the pole centerline, this criterion is met for all five configurations during fair weather, and slightly exceeded for three cases during rainy weather. This means there is the possibility of interference with weak AM broadcast signals at the low end of the AM band during rainy weather. Typical interference is heard as an audio hum that competes with or drowns out the broadcast signal.

For TVI, the BPA software calculates the L50 (median) noise levels in decibels (dB $\mu V/m$) over a higher frequency range that includes broadcast television and the FM radio band. Table 3 shows the calculated L50 (median) TVI levels at 40 feet and 120 feet from the pole centerline for the lower and upper TVI evaluation frequencies (30 MHz and 1000 MHz).

Table 3. Calculated L50 (median) TVI levels at low and high frequencies that bracket the broadcast television range for distances of 40 feet and 120 feet from the pole centerline.

TV Interference L50 (dB μ V/m)					
Case	Location	30 MHz		1000 MHz	
		40 ft	120 ft	40 ft	120 ft
1	Across North Park	6.1	-0.7	-24.9	-31.7
2	Shady Oak Drive	11.8	3.2	-22.5	-30.9
3	Peebles Road	11.1	3.6	-21.7	-30.1
4	Ringeisen Road	12.6	4.2	-21.0	-29.4
5	Thompson Run Road	12.2	4.3	-20.4	-28.3

Typical television signals in defined broadcast coverage areas are in the 74 to 80 dB range, and studies estimate that the signal must be 30 to 40 dB greater than the noise level to avoid interference. With 40 dB of margin, the TVI noise levels must be less than 34 dB. This criterion is met for all calculated values in Table 3. Noise levels calculated at 1000 MHz show how the values decrease significantly with increasing frequency.

5.0 Results Summary

Electric and magnetic field calculations for the five configurations show that the magnetic fields are expected to decrease (except for Case 3, Peebles Road, which shows negligible magnetic field change), while electric fields are expected to increase due to the increase in operating voltage. The calculated electric field values are conservative as shown by the comparisons with measured levels beneath the existing 23 kV lines. In general, the calculated electric field levels are all higher than the measured levels due to the fact that electric fields are attenuated by nearly all objects including the telephone/cable lines, trees and vegetation, and nearby structures. The measured magnetic fields at the two profile locations agree relatively well with the calculated magnetic fields. Differences between the measured and calculated magnetic fields are expected because actual loads on the distribution line are only estimated (line currents are metered only at the substation) and secondary lines (120 volts) are not included in the models (loads on the secondary lines are also not known).

The maximum calculated L5 foul weather audible noise levels at 40 feet from the pole centerline were in the 23-28 dBA range for the five configurations. Again, to put these maximum levels in perspective, the 20-30 dBA range corresponds to a typical bedroom at night, 30-40 dBA corresponds to typical noise levels in a library, 40-50 dBA corresponds to a suburban area living room, and 50-60 dBA corresponds to a business office[1]. Although audible noise is extremely subjective, the calculated levels at 40 feet from the pole centerline during foul (rainy) weather are below levels at which complaints typically occur.

Regarding radio interference (RI), calculated fair weather noise levels for 500 kHz at 40 feet from the pole centerline are well below the estimated interference threshold of 46 dB. For foul weather at the same frequency and distance, calculated levels are essentially right at the threshold where interference might be expected to occur with weak broadcast

signals. However, noise levels decrease with increasing broadcast frequency and distance from the line and the calculations indicate that no significant RI is expected.

Calculated television interference (TVI) noise levels are all low enough that interference is not expected within the evaluated frequency range from 30 MHz to 1000 MHz at distances of 40 feet, or greater, from the pole centerline.

To summarize, the corona effects calculations for AN, RI, and TVI as shown in the previous sections indicate that no significant audible or electromagnetic impacts are expected from the proposed 138 kV transmission line. Corona effects are generally more of an issue at operating voltages of 345 kV, and greater. In addition, interference problems are not expected based on Duquesne Light's years of favorable operating experience with 138 kV lines in suburban areas of Pittsburgh.

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Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

**DOCUMENT
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Duquesne Light Company

Statement No. 4

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Direct Testimony of William H. Bailey

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1 Toxicology at the New York State Institute for Basic Research. For
2 the nine previous years, I was an Assistant Professor and
3 Postdoctoral Fellow in Neurochemistry at The Rockefeller
4 University.

5 **Q. Please outline your scientific and research experience**
6 **concerning electric and magnetic fields.**

7 A. I have studied and conducted research on electric and magnetic
8 fields (EMF) for 25 years. My research has included laboratory,
9 exposure assessment, and epidemiological studies concerning
10 alternating current (AC) electric and magnetic fields and studies on
11 direct current (DC) electric fields and air ions.

12 **Q. What are electric and magnetic fields?**

13 A. Electric and magnetic fields associated with the operation of AC
14 power lines or devices supplied with AC electricity are often
15 referred to as EMF. These fields may be imagined as invisible
16 lines of force in space near their electrical source. The voltage,
17 which is the 'pressure,' produces an electric field that moves the
18 electricity through wires. The standard unit for measuring the
19 strength of an electric field is "volts per meter," abbreviated as
20 V/m. The current produces a magnetic field, which is a measure of
21 how much electricity is flowing. The unit in which magnetic field
22 levels are measured is "milligauss," abbreviated as mG. Electric
23 and magnetic fields are characterized by the frequency at which
24 their direction and magnitude oscillate each second. The fields

1 produced by the use of electricity oscillate at a frequency of 60
2 cycles per second, or 60 Hertz (Hz).

3 **Q. What are typical sources of 60-Hz electric and magnetic fields?**

4 A. Typical sources of these fields include power lines (both
5 transmission and distribution lines), home and office appliances,
6 tools, building wiring, and currents flowing on water pipes. The
7 importance of these sources to overall exposure varies
8 considerably. For example, if a residence is very close to a
9 transmission line, or even a distribution line (which runs near most
10 everyone's residence), these sources could be the dominant, but
11 not necessarily the only, source of magnetic fields in the home.
12 Depending on the circumstances, other sources may be of equal or
13 greater importance. For example, a random survey of 1,000
14 residences in the U.S. reported that currents flowing on water pipes
15 and on other components of house grounding systems are twice as
16 likely as outside power lines to be the source of the highest
17 magnetic fields measured in homes (Zaffanella, 1993).

18 **Q. Have you served as a reviewer and scientific advisor on health-**
19 **related issues for state and federal agencies or scientific**
20 **organizations?**

21 A. Yes. I have reviewed research for the National Institutes of Health,
22 the National Science Foundation, and other government agencies.
23 Concerning transmission lines in particular, I served on a Scientific
24 Advisory Panel convened by the Minnesota Environmental Quality
25 Board to review health aspects of a high-voltage transmission line.

1 I also served as a consultant on transmission line health and safety
2 issues to the Vermont Department of Public Service, the New York
3 State Department of Environmental Conservation, and the staffs of
4 the Maryland Public Service Commission/Maryland Department of
5 Natural Resources.

6 I also have worked with the National Institute of Occupational
7 Health and Safety, the Oak Ridge National Laboratories, the U.S.
8 Department of Energy, and the Federal Railroad Administration to
9 review and evaluate health issues related to electric and magnetic
10 fields from other sources. I also assisted the U.S. EMF Research
11 and Policy Information Dissemination Program (RAPID) to evaluate
12 biological and exposure research as part of its overall risk
13 assessment process.

14 Most recently, I worked with scientific experts from 10
15 countries to evaluate possible hazards from exposures to static and
16 extremely low frequency (ELF) electric and magnetic fields for the
17 International Agency for Research in Cancer, a division of the
18 World Health Organization located in Lyon, France. I also
19 contributed to a workshop convened this past March by the
20 International Committee on Non-Ionizing Radiation Protection
21 (ICNIRP) to update guidelines for human exposures to AC electric
22 and magnetic fields.

23 **Q. Have you presented the results of your research in this and**
24 **other areas to the scientific community?**

1 A. I have published or presented more than 50 scientific papers on
2 this and related subjects.

3 **Q. Are you a member of any professional organizations?**

4 A. I am a member of The Rockefeller University Chapter of Sigma Xi,
5 a national scientific honor society; the Health Physics Society; the
6 International Committee on Electromagnetic Safety, Subcommittees
7 3 and 4 – Safety Levels with respect to Human Exposure to Fields;
8 the Bioelectromagnetics Society; the IEEE Engineering in Medicine
9 and Biology Society; the American Association for the
10 Advancement of Science; the New York Academy of Sciences; the
11 Society for Neuroscience; the Air & Waste Management
12 Association; and the Society for Risk Analysis.

13 **Q. Are your educational and professional experience summarized**
14 **elsewhere?**

15 A. Yes. Additional details of my educational and professional
16 experience are summarized in my curriculum vitae, which is
17 attached as WHB-1.

18 **Q. Have you ever appeared as a witness before regulatory**
19 **agencies?**

20 A. Yes. I have testified previously, and sometimes on behalf of public
21 utility commissions and State siting boards in various states
22 including Arizona, Arkansas, Connecticut, Illinois, Massachusetts,
23 Maryland, New Jersey, New York, Rhode Island, Pennsylvania, and
24 Vermont.

1 **Q. What is Exponent's role in this project?**

2 A. Duquesne Light Company ("Duquesne") requested that Exponent
3 evaluate the levels of EMF produced by existing and proposed
4 overhead lines along the proposed route and provide information to
5 Duquesne and its customers about the current status of health-
6 related research on EMF.

7 **Q. What is the effect of Duquesne's project on EMF levels?**

8 A. Duquesne has proposed to upgrade electrical service in the area by
9 replacing an existing 23-kV sub transmission line with a higher
10 voltage 138-kV line. The proposed 4.9-mile route was divided into
11 *five segments based on pole and distribution circuit configurations,*
12 *and the average and peak currents carried by the lines. Peak*
13 *currents occur for only for about 15 hours per year, or about 0.2%*
14 *of the time, when the demand for power is the highest. As*
15 *summarized in a report prepared by Electric Research &*
16 *Management, Inc.¹ the increase in line voltage will produce a small*
17 *increase in the electric field along the five segments of the*
18 *proposed route. However, because the new line will operate at a*
19 *higher voltage, less current will be required to transfer an*
20 *equivalent amount of power; therefore, the magnetic field will not*
21 *change appreciably on one segment of the route (along Peebles*
22 *Road) and will decrease substantially below the level produced by*
23 *the existing 23-kV line along the remaining four segments of the*
24 *route. For both electric and magnetic fields, the differences*

1 between the levels produced by the existing and proposed lines will
2 be greatest within ~25 feet of the center of the pole line and
3 become smaller at greater distances.

4 **Q. What effect will the project have on the long-term exposures of**
5 **landowners adjacent to the proposed route?**

6 A. The existing 23-kV line is sufficiently far from most adjacent
7 landowners, approximately 50 feet, so that the line contributes less
8 than 3-4 mG to the magnetic field levels at a residence under
9 average loading conditions. This exposure would **not change**
10 (along the Peebles Road segment), or be substantively **reduced**
11 along the rest of the proposed route when the existing line is
12 replaced with the new 138-kV line. The higher electric fields
13 associated with the new line would have little effect on the long-
14 term exposures of adjacent landowners to electric fields because
15 these fields are effectively blocked by trees, fences, shrubbery,
16 and buildings.

17 **Q. What about short-term exposures?**

18 A. Peoples' exposures to electric and magnetic fields on adjacent
19 sidewalks and roadways would be of limited duration and
20 intermittent. Riders in vehicles would be largely shielded from
21 exposures to the electric field.

¹ Fugate, D. Electric and Magnetic Field Effects Calculations for the Wildwood Transmission Line Project. January 6, 2006. See Exhibit DWF-2.

1 **Q. Some residents have expressed concern that the proposed line**
2 **would pose health or safety risks. What relevant standards**
3 **does Duquesne meet?**

4 **A.** The proposed lines are designed to meet the safety requirements
5 of the National Electric Safety Code (NESC, 2002).

6 Electric and magnetic fields from a variety of sources,
7 including some industrial equipment, automobile ignition wiring,
8 anti-theft devices in stores, MRI machines, slot machines, cell
9 phones, and certain medical procedures (e.g., radiation therapy,
10 electrocautery and defibrillation) have been reported to affect the
11 operation of implanted cardiac pacemakers and defibrillators. The
12 American Conference of Governmental Industrial Hygienists
13 recommends that workers with pacemakers or ICDs limit their
14 exposure to 1 kV/m and 1,000 mG to protect against possible
15 electrical interference (ACGIH, 2001). The fields from the
16 proposed line are below these values.

17 There are no federal standards for either magnetic or electric
18 fields from power lines or other sources at power frequencies. The
19 States of New York and Florida have specified that magnetic fields
20 from new transmission lines at maximum loading should not exceed
21 200 mG or 150 mG, respectively. These standards are not health-
22 based standards; rather, they were developed so that new
23 transmission lines would not cause field levels to exceed those of
24 existing lines. The fields from the Duquesne line would be well
25 below these standards.

1 A number of States have suggested limits on the levels of
2 electric fields on transmission rights-of-way or at their edges to
3 minimize the perception of nuisance shocks. Even under the
4 conductors of the proposed 138-kV line, the electric field levels are
5 so low that they will be below the lowest level recommended for a
6 project [1 kV/m] (State of Montana).

7 **Q. Would the EMF levels associated with the proposed line be**
8 **lower than limits that have been recommended to protect**
9 **health?**

10 A. Yes. The highest electric and magnetic field levels associated with
11 the proposed 138-kV line are well below limits on public exposure
12 that have been recommended by the ICNIRP (1998) and the
13 International Committee on Electromagnetic Safety (2002).

14 **Q. Does the design of the proposed 138-kV line minimize potential**
15 **EMF exposure?**

16 A. Yes. As previously discussed, operation at a higher voltage
17 reduces magnetic fields from transmission lines. Where the circuit
18 is supported on single poles, the field levels will be lower than
19 when the circuit is supported on H-frame structures. Also, the
20 location of distribution circuits on the same poles underneath the
21 transmission circuit reduces the magnetic field levels because of
22 the mutual 'cancellation' of the fields from both circuits on the
23 same structure.

1 Q. **Some Duquesne customers have pointed to recent**
2 **epidemiology studies as a basis for concern. If EMF at levels**
3 **in our communities is not harmful, why is research still**
4 **continuing?**

5 A. As in other areas of science, research on EMF is an ongoing
6 activity. Even though no adverse effects of EMF exposure at the
7 levels found in our communities have been confirmed, research is
8 continuing to explore new questions that arise, and to attempt to
9 replicate previous studies.

10 Q. **What evaluations of the research have been conducted?**

11 A. Periodically, national and international scientific agencies review
12 published research to assess gaps in the research and address
13 public health issues. These assessments provide guidance to
14 governments at national, regional, and local levels.

15 One of the most comprehensive reviews of the relevant
16 research (including epidemiology studies, animal studies, and other
17 laboratory studies) was performed by myself and other scientists in
18 a Working Group drawn from 10 countries on behalf of the
19 International Agency for Research in Cancer (IARC), a division of
20 the World Health Organization. The conclusion of our 395-page
21 report published in 2002 was that the strength of the scientific
22 evidence was inadequate to establish a statistical association
23 between EMF and risk of any disease, with the exception of
24 childhood leukemia.

1 **Q. Why is childhood leukemia an exception?**

2 A. Some epidemiology studies reported a link, or a statistical
3 association, between magnetic fields and childhood leukemia. In
4 the studies that reported an association, more of the children who
5 had cancer had lived closer to certain types of power lines, or were
6 exposed to higher, average estimated magnetic fields (e.g.,
7 Wertheimer and Leeper, 1979; Savitz et al, 1988; Feychting and
8 Ahlbom, 1993) than other children. However, because of
9 limitations of these specific studies, such as the small number of
10 children and the crude methods for estimating magnetic field
11 exposure, the meaning of these results was not clear. So larger
12 and better studies were undertaken. The investigators who
13 conducted these newer studies did not believe that their data
14 showed convincing, consistent links between magnetic fields or
15 power lines and leukemia (or any other type of cancer), even when
16 children had been exposed to higher levels of magnetic fields (e.g.,
17 Linet et al, 1997; Preston Martin et al, 1996, Gurney et al, 1996;
18 McBride et al, 1999; Kleinerman et al, 2000; UK Childhood Study
19 Investigators, 1999, 2000). Nevertheless, when the data from most
20 of these studies are pooled, a weak association for long-term
21 exposure to magnetic fields greater than 0.3–0.4 μT (3–4 mG) is
22 reported (Ahlbom et al, 2000; Greenland et al, 2000). However,
23 given the limitations of epidemiology (and pooled analyses in
24 particular) and the absence of data from laboratory studies to
25 suggest that EMF is harmful, researchers have not concluded that

1 the research, in total, suggests that magnetic fields cause
2 childhood leukemia.

3 Several recent studies of childhood leukemia have also
4 reported associations with magnetic fields (Draper et al, 2005;
5 Kabuto et al, 2006); however, because of their limitations neither
6 provides strong evidence *in favor of an association with magnetic*
7 *fields.* The statistical association reported by Draper et al. with
8 distance from transmission lines extends far beyond that where
9 magnetic fields can be measured, and the very low participation
10 rates of cases and controls in the Kabuto et al. study suggests the
11 real possibility of selection bias so that less weight should be
12 placed on this study relative to studies that also had good exposure
13 assessments and much higher participation rates. Three case-
14 control studies of childhood leukemia have been conducted with
15 high participation rates, a large sample size, and detailed magnetic
16 field measurements (Linnet et al., 1997; McBride et al., 1999;
17 UKCCS et al., 2000). No consistent association between magnetic
18 fields and childhood leukemia was reported in these studies.
19 Furthermore, no recent animal studies suggest that magnetic field
20 exposure causes leukemia, nor does recent laboratory data
21 indicate a plausible biological mechanism (see the sections “In vivo
22 studies” and “In vitro studies” below).

23 **Q. Please explain why scientists have difficulty in interpreting the**
24 **weak association suggested at higher magnetic field levels?**

1 A. To evaluate the validity of an association reported in an
2 epidemiologic study, it is first necessary to evaluate whether the
3 observed association is likely to be "real" or whether it is possible
4 that a spurious association was produced due to chance, bias, or
5 confounding. Bias refers to any systematic error in the design,
6 implementation or analysis of a study that results in a mistaken
7 estimate of an exposure's effect on the risk of disease. A
8 confounder is something that is related to both the disease (or
9 condition) under study and the exposure of interest. If care is not
10 taken to minimize bias and confounding by the design and analysis
11 of the study, these factors can distort the study's results. For
12 studies of magnetic fields and leukemia, additional studies were
13 designed to improve exposure assessment and minimize bias and
14 confounders. Still, the effects of bias and confounding have not
15 been fully eliminated from EMF studies (Greenland et al, 2000;
16 IARC, 2002; Linet et al, 2003).

17 **Q. What other types of studies did the IARC Working Group**
18 **consider?**

19 A. We considered studies of animals and cells exposed to EMF. With
20 respect to leukemia, the most important studies were those in
21 which animals had been exposed over almost their entire lifetime
22 and then examined for visible and microscopic evidence of cancer.

23 **Q. What were the findings of these laboratory studies regarding**
24 **leukemia?**

1 A. No study found an increased incidence of leukemia or lymphoma in
2 animals exposed to magnetic fields. The animals in these studies
3 were exposed to magnetic fields as high as 50,000 mG over most
4 of their lifetime.

5 **Q. What overall conclusion did you and others on the IARC**
6 **Working Group reach regarding childhood leukemia?**

7 A. The Working Group concluded that the epidemiologic studies do not
8 provide support for an association between childhood leukemia and
9 residential magnetic fields at intensities less than 4 mG. Overall,
10 magnetic fields were evaluated as "possibly carcinogenic to
11 humans" (Group 2B), based solely on the statistical association of
12 higher-level residential magnetic fields with childhood leukemia.
13 IARC reviewers also evaluated the animal data and concluded that
14 they were "inadequate" to support a risk for cancer. We state that
15 the EMF data does not merit the category "carcinogenic to humans"
16 or the category "probably carcinogenic to humans," nor did we find
17 that "the agent is probably not carcinogenic to humans." Many
18 hypotheses have been suggested to explain possible carcinogenic
19 effects of electric or magnetic fields; however, no scientific
20 explanation for carcinogenicity of these fields has been established
21 (IARC, 2002). In the rating system used by IARC, the recognition
22 of an association between exposure and cancer in epidemiology
23 studies is considered "limited evidence" of carcinogenicity. A
24 rating of "limited evidence" for epidemiology studies, even without
25 any evidence from laboratory studies that an exposure might pose

1 a cancer risk, though chance, bias and confounding cannot be
2 ruled out with reasonable confidence, requires that the exposure be
3 categorized as a "possible carcinogen" (IARC, 2002).

4 **Q. Why did the IARC Working Group not regard the association
5 between magnetic fields and childhood leukemia as reflecting a
6 causal relationship?**

7 A. Because there was neither sufficient evidence from epidemiology
8 studies that magnetic fields caused cancer in humans, nor
9 sufficient evidence that magnetic fields caused cancer in laboratory
10 studies of animals. Furthermore, there was no strong evidence for
11 a mechanism to predict cancer.

12 **Q. Did the IARC identify concerns in other research areas?**

13 A. No.

14 **Q. Are the conclusions of other recent reviews of the literature
15 consistent with that of the IARC Working Group?**

16 A. Scientists who reviewed EMF research for other national and
17 international organizations before and after the IARC review,
18 including the National Institute of Environmental Health Sciences
19 (NIEHS, 1998, 1999), the National Radiological Protection Board of
20 Great Britain (NRPB, 2001; NRPB, 2004), and the Health Council of
21 the Netherlands (HCN, 2001; 2004) reached similar conclusions.

22 **Q. Does this conclude your testimony?**

23 A. Yes.

24

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William H. Bailey, Ph.D.
Principal Scientist and Director, New York Office

**DOCUMENT
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Professional Profile

Dr. William H. Bailey is a Principal Scientist in Exponent's Health Sciences practice and Director of the New York office. Before joining Exponent, Dr. Bailey was President of Bailey Research Associates, Inc., the oldest research and consulting firm with specialized expertise in electromagnetic fields and health. Dr. Bailey specializes in applying state-of-the-art assessment methods to environmental and occupational health issues. His 30 years of training and experience include laboratory and epidemiologic research, health risk assessment, and comprehensive exposure analysis. He is particularly well known for his research on potential health effects of electromagnetic fields and has served as an advisor to numerous state, federal, and international agencies. Dr. Bailey has investigated exposures to alternating current (ac), direct current (dc), and radiofrequency electromagnetic fields, 'stray voltage' and electrical shock, as well as to a variety of chemical agents and air pollutants. Currently, he is directing research projects on effects of electrical charge on the deposition of aerosols in the respiratory tract. He is a member of a working group that advises a committee of the World Health Organization on risk assessment, perception, and communication. Dr. Bailey is a visiting scientist at the Cornell University Medical College and has lectured at Rutgers University, the University of Texas (San Antonio), and the Harvard School of Public Health. He was formerly Head of the Laboratory of Neuropharmacology and Environmental Toxicology at the New York State Institute for Basic Research, Staten Island, New York, and an Assistant Professor and NIH postdoctoral fellow in Neurochemistry at The Rockefeller University in New York.

Credentials and Professional Honors

Ph.D., Neuropsychology, City University of New York, 1975
M.B.A., University of Chicago, 1969
B.A., Dartmouth College, 1966

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Sigma Xi; The Institute of Electrical and Electronics Engineers/International Committee on Electromagnetic Safety (Subcommittee 3, Safety Levels with Respect to Human Exposure to Fields (0 to -3 kHz) and Subcommittee 4, Safety Levels with Respect to Human Exposure to Radiofrequency Fields (3 kHz to 3 GHz); Elected member of the Committee on Man and Radiation (COMAR) of the IEEE Engineering in Medicine and Biology Society (1998-present); Invited Speaker, First Institute of Neurological Sciences Symposium in Neurobiology, University of Pennsylvania (1980); Invited Speaker, National Heart and Lung Institute (1977).

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Charry JM, Bailey WH. DC Electrical environment in proximity to VDTs. Seventh Annual Meeting of the Bioelectromagnetics Society, June 1985.

Bailey WH, Collins RL, Lahita RG. Cerebral lateralization: association with serum antibodies to DNA in selected bred mouse lines. Society for Neuroscience, 1985.

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Goodman PA, Weiss JM, Hoffman LJ, Ambrose MJ, Bailey WH, Charry, JM. Reversal of behavioral depression by infusion of an A2 adrenergic agonist into the locus coeruleus. Society for Neuroscience, November 1982.

Charry JM, Bailey WH. Biochemical and behavioral effects of small air ions. Electric Power Research Institute Workshop, April 1981.

Bailey WH, Alonson DR, Weiss JM, Chin S. Predictability: a psychologic/ behavioral variable affecting stress-induced myocardial pathology in the rat. Society for Neuroscience, November 1980.

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Bailey WH, Weiss JM. Psychological factors in experimental heart pathology. Visiting Scholar Presentation, National Heart Lung and Blood Institute, March 1977.

Bailey WH, Weiss JM. Effect of ACTH 4-10 on passive avoidance of rats lacking vasopressin (Brattleboro strain). Eastern Psychological Association, April 1976.

Research Appointments

- Visiting Fellow, Department of Pharmacology, Cornell University Medical College, New York, NY (1986–present)
- Visiting Scientist, The Jackson Laboratory, Bar Harbor, ME (1984–1985)
- Head, Laboratory of Neuropharmacology and Environmental Toxicology, NYS Institute for Basic Research in Developmental Disabilities, Staten Island, NY (1983–1987)
- Assistant Professor, The Rockefeller University, New York, NY (1976–1983)
- Postdoctoral Fellow, Neurochemistry, The Rockefeller University, New York, NY (1974–1976)
- Dissertation Research, The Rockefeller University, New York, NY (1972–1974)
- CUNY Research Fellow, Dept. of Psychology, Queens College, City University of New York, Flushing, NY (1969–1971)

- Clinical Research Assistant, Department of Psychiatry, University of Chicago; Psychiatric Psychosomatic Inst., Michael Reese Hospital, and Illinois State Psychiatric Inst, Chicago, IL (1968–1969)

Teaching Appointments

- Lecturer, University of Texas Health Science Center, Center for Environmental Radiation Toxicology, San Antonio, TX (1998)
- Lecturer, Harvard School of Public Health, Office of Continuing Education, Boston, MA (1995, 1997)
- Lecturer, Rutgers University, Office of Continuing Education, New Brunswick, NJ (1991–1995)
- Adjunct Assistant Professor, Queens College, CUNY, Flushing, NY (1978)
- Lecturer, Queens College, CUNY, Flushing, NY (1969–1974)

Advisory Positions

- National Institute of Environmental Health Sciences/ National Institutes of Health, Review Committee, Neurotoxicology, Superfund Hazardous Substances Basic Research and Training Program (2004)
- National Institute of Environmental Health Sciences, Review Committee Role of Air Pollutants in Cardiovascular Disease (2004)
- Working Group on Non-Ionizing Radiation, Static and Extremely Low-Frequency Electromagnetic Fields, International Agency for Research on Cancer (2000–2002)
- Working Group, EMF Risk Perception and Communication, World Health Organization (1998–present)
- Associate Editor, Non-Ionizing Radiation, *Health Physics* (1996–present)
- Member, International Committee on Electromagnetic Safety, Subcommittee 3 - Safety Levels with Respect to Human Exposure to Fields (0 to 3 kHz) and Subcommittee 4 - Safety Levels with Respect to Human Exposure (3kHz to 3GHz) Institute of Electrical and Electronics Engineers (IEEE) (1996–present)

- Invited participant, National Institute of Environmental Health Sciences EMF Science Review Symposium: Clinical and *In Vivo* Laboratory Findings (1998)
- Working Group, EMF Risk Perception and Communication, International Commission on Non-Ionizing Radiation Protection (1997)
- U.S. Department of Energy, RAPID EMF Engineering Review (1997)
- Oak Ridge National Laboratory (1996)
- American Arbitration Association International Center for Dispute Resolution (1995–1996)
- U.S. Department of Energy (1995)
- National Institute for Occupational Safety and Health (1994–1995)
- Federal Rail Administration (1993–1996)
- U.S. Forest Service (1993)
- New York State Department of Environmental Conservation (1993)
- National Science Foundation
- National Institutes of Health, Special Study Section—Electromagnetics (1991–1993)
- Maryland Public Service Commission and Maryland Department of Natural Resources, Scientific Advisor on health issues pertaining to HVAC Transmission Lines (1988–1989)
- Scientific advisor on biological aspects of electromagnetic fields, Electric Power Research Institute, Palo Alto, CA (1985–1989)
- U.S. Public Health Service, NIMH: Psychopharmacology and Neuropsychology Review Committee (1984)
- Consultant on biochemical analysis, Colgan Institute of Nutritional Science, Carlsbad, CA (1982–1983)
- Behavioral Medicine Abstracts, Editor, animal behavior and physiology (1981–1983)
- Consultant on biological and behavioral effects of high-voltage DC transmission lines, Vermont Department of Public Service, Montpelier, VT (1981–1982)

- Scientific advisory committee on health and safety effects of a high-voltage DC transmission line, Minnesota Environmental Quality Board, St. Paul, MN (1981–1982)
- Consultant on biochemical diagnostics, Biokinetix Corp., Stamford, CT (1978–1980)

Professional Affiliations

- The Health Physics Society (Affiliate of the *International Radiation Protection Society*)
- Society for Risk Analysis
- New York Academy of Sciences
- American Association for the Advancement of Science
- Air and Waste Management Association
- Society for Neuroscience/International Brain Research Organization
- Bioelectromagnetics Society
- The Institute of Electrical and Electronics Engineers/Engineering in Medicine and Biology Society

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

Duquesne Light Company

Statement No. 5

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Direct Testimony of Robert J. Houston

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DIRECT TESTIMONY OF ROBERT J. HOUSTON

Q. Please state your name.

A. Robert J. Houston

Q. By whom are you employed and what is your business address?

A. I am employed by GAI Consultants, Inc. (GAI) at our Pittsburgh Office located at 385 East Waterfront Drive, Homestead, Pennsylvania, 15120.

Q. How long have you worked for GAI Consultants?

A. I have worked for GAI for 31 years.

Q. What is your present job title?

A. I am currently Environmental Studies and Planning Department Manager.

Q. How long have you held that position?

A. I have been in this position for 12 years.

Q. What are your duties in that position and what training or education relevant to your job duties have you completed?

A. A summary of my educational and professional background, including my responsibilities at GAI, is attached hereto as Exhibit RH-1.

Q. Was GAI paid by Duquesne Light Company to perform work in conjunction with the Wildwood Project?

A. Yes. GAI conducted a line route study and environmental assessment on a variety of alternative line routes in conjunction with the Wildwood Project.

Q. Has GAI performed other work for Duquesne Light Company?

A. Yes.

1 **Q. Does GAI perform work for anyone other than Duquesne Light**
2 **Company?**

3 A. Yes. We have performed work for hundreds of clients in the public
4 and private sectors in the United States and overseas.

5 **Q. Did Duquesne Light Company control the work on the Wildwood**
6 **Project?**

7 A. No.

8 **Q. Does GAI possess any specialized expertise in conducting such**
9 **studies?**

10 A. Yes. GAI has been conducting HV transmission line siting and
11 environmental assessment studies since 1977, in many of the eastern
12 United States.

13 **Q. Mr. Houston, what is the purpose of your testimony?**

14 A. In my testimony, I identify and generally describe Duquesne Light
15 Company Exhibit 9 to the Amended Application of Duquesne Light
16 Company for the Siting and Construction of a 138 kV Transmission
17 Line in Hampton, McCandless and Ross Townships, Allegheny County,
18 at Pennsylvania Public Utility Commission Docket No. A-110150F0031.
19 I identify the contents of the *Environmental Assessment and Line*
20 *Route Study for the Wildwood Substation 138 kV Transmission Line*
21 *Allegheny County, Pennsylvania* report and appendices dated May
22 2004 (collectively the "Report"), which explain (1) the methodology
23 utilized by GAI to site the line route alternatives, (2) the assessment
24 and recommended mitigation of the potential environmental effects of
25 the alternatives, and (3) the evaluation of the alternatives and
26 selection of a Preferred Route for the Project. The siting and
27 environmental study activities described in the report were performed
28 by GAI, under my supervision. The Report is attached hereto and
29 marked as Exhibit RH-2.

1 **Q. Would you further describe the Report marked Exhibit RH-2?**

2 A. Yes. The May 2004 report is comprised of the following:

3 Executive Summary provides an overview and summary of the report
4 including an aerial photograph and topographic maps of the Project
5 study area depicting the alternative line routes.

6 Section 1 introduces the project, provides a summary of the Project
7 need and describes the alternative routes sited for the Project.

8 Section 2 describes the existing environment through which the
9 alternatives traverse and discusses the *potential environmental*
10 impacts and the recommended measures to minimize and mitigate
11 potential effects of the Project construction and operation on land use
12 (Section 2.1), plant and wildlife habitat (Section 2.2), hydrology
13 (Section 2.3), scenic and recreational areas (Section 2.4), wilderness
14 and natural areas (Section 2.5), terrain and landscape (Section 2.6),
15 archaeologic and historic resources (Section 2.7), airports
16 (Section 2.8), unique geologic resources (Section 2.9), and soil and
17 sedimentation (Section 2.10).

18 Section 3 describes the procedures for evaluating the alternatives and
19 the selection of the Preferred Route. This section specifically
20 discusses the development of the resource categories that we identify
21 as evaluation criteria, the tabulation of potential impacts on the
22 evaluation criteria that are potentially affected, the relative scaling of
23 the identified resource impact data, the weighting of the relative
24 scores, the results of the evaluation of each alternative, and the
25 selection of the Preferred Route.

26 Section 4 provides the list of references used for data acquisition and
27 evaluation criteria development.

28 Appendix A consists of two tables identifying plant species observed
29 in the study area and animal species known to occur in the study area.

30 Appendix B contains environmental resource agencies'
31 correspondence related to the locations of endangered and threatened
32 species within the study area.

1 Appendix C contains photographs of typical locations where the
2 alternatives are located and referenced in the report.

3 Appendix D contains Figures 3-1, 3-2 and 3-3 folded in a plastic
4 Pocket. These are large format maps that are not suitable for binding
5 directly in the report.

6 **Q. After the completion of the study, did GAI subsequently prepare
7 an Addendum?**

8 A. Yes.

9 **Q. Is this Addendum marked as Exhibit RH-3?**

10 A. Yes.

11 **Q. Please explain why this Addendum was prepared.**

12 A. Subsequent to the issuance of the May 2004 report and the initial
13 filing of the Project Application, meetings were held with municipal
14 officials and the public in McCandless and Hampton Townships. At
15 those meetings, concern was expressed that not enough weight was
16 placed on residential areas during the alternatives evaluation process.
17 Thus, GAI conducted further evaluation that considered all dwelling
18 units within 100 feet of the centerlines of all the alternatives to
19 address this concern. I refer to dwelling units because GAI staff
20 counted not only single family residential structures but also
21 apartment and condominium buildings and the number of units in each
22 building.

23 The October 2005 Report Addendum provides an analysis of the
24 alternatives using one additional evaluation criterion – residential
25 dwelling units within 100 feet of the centerline of each of the
26 alternatives.

27 **Q. Please briefly describe the siting of the alternative routes, the
28 evaluation process and the selection of the Preferred Alternative
29 as detailed in the Report.**

1 A. Our first task was to establish a suitable study area that would
2 facilitate the siting of reasonable alternatives. The northern boundary
3 of the study area was set at the Wildwood Substation in Hampton
4 Township. The southern boundary was set from the North Substation
5 in the west to east along the location of Duquesne Light's 138 kV
6 Transmission Circuits Z-55, Z-56, Z-20 and Z-21 located in Hampton
7 and Ross Townships. Duquesne Light proposed to terminate the line
8 at a tap on one of these circuits to transmit power to the Wildwood
9 Substation. The western boundary of the study area was set at North
10 Park. The eastern boundary was set just beyond Route 8.

11 The second task was to collect and map resource data on the Project
12 mapping of the study area. These data were collected from published
13 sources and field investigations as detailed in the Report. The data
14 collected reflects the requirements of the Pennsylvania Public Utility
15 Commission regulations contained in Title 52, of the Pennsylvania
16 Code, Chapter 57 as well as data related to those resources that are
17 protected by state and federal statutes and regulations requiring
18 agency permits, clearance or coordination (i.e. wetlands,
19 archaeological and historic sites, threatened and endangered
20 species). The project team consisting of ecologists, planners, cultural
21 resources specialists, engineers and transmission system planners
22 then sited a group of suitable alternatives routes between the
23 Wildwood Substation and the North Substation and the circuits cited
24 above. The siting team endeavored to occupy or parallel existing
25 electrical sub-transmission and/or distribution rights of way (ROW) or
26 the ROW of roads or rail roads, while avoiding to the extent possible
27 the resources identified and mapped. Where necessary, new ROW
28 was carefully sited to avoid, to the extent practicable, land use conflict
29 and impacts to natural and cultural resources.

30 A total of 23 environmental and socioeconomic resources criteria were
31 evaluated to determine impacts projected for the seven alternative

1 routes. The 23 resource criteria were based on Pennsylvania Public
2 Utility Commission regulations as well as traditional environmental
3 impact assessment criteria reflective of the data collected and cited
4 above. To facilitate the selection of a Preferred Route, three areas
5 were evaluated: 1) the immediate construction ROW; 2) the area
6 adjacent to the proposed ROW that would be in view of sensitive
7 resources; and 3) a four-mile wide corridor based on the centerline of
8 the ROW. Only those portions of the routes that are on new ROW or
9 on existing non-electric ROW were evaluated. This procedure is
10 based on the premise that portions of the routes that are located on
11 existing electric line ROW are not considered to generate substantially
12 new impacts. The four-mile corridor was used to evaluate potential
13 impacts on archaeological and historic resources, scenic areas, unique
14 geologic areas, wilderness areas and airports, as is required by
15 current regulations.

16 Raw data were assembled by database software for the routes (see
17 Table 3-2 in the Report). Raw data are those measurements compiled
18 for the environmental resource criteria. In order to put resource
19 measurements on a relative scale (acres, number, feet) and to obtain
20 an impact score that could be compared across the different
21 alternatives, the raw data were mathematically proportioned to a scale
22 of 1 to 10 (see Table 3-3 in the Report). In this procedure the route
23 with the highest score (worst) for individual resources receives a 10;
24 that with the lowest score (best) receives a 1. Thus, the raw scores
25 are transformed to a relative scale from 1 to 10 to obtain Relative
26 Scores for each Resource Evaluation Criterion. Using the relative
27 position of the route in comparison to the values for all routes
28 provided an indication of how the route compares overall. In order to
29 determine the most suitable route, the relative scores for each
30 criterion for each route need to be totaled. Because it was felt that
31 not all of the criteria are equally important in evaluating the routes,
32 especially as perceived by the public, the criteria weights established

1 by the Siting Criteria Council (SCC) for the GPU-DQE 500 kV
2 Transmission Line Project, were used. A criterion weight identified
3 the relative importance of each criterion in the selection of the
4 preferred route. The relative scores achieved by each route for each
5 criterion were then multiplied by the criteria weights developed by the
6 SCC (Weight Column of Table 3-4 In the Report) to obtain the impact
7 scores shown in Table 3-4 of the Report. The impact scores were
8 summed to obtain an overall impact score for each alternative route.
9 These scores were then ranked and Report Table ES 1 presents the
10 ranking analysis. Higher scores indicate greater environmental
11 impact.

12 **Q. Which route was identified as the Preferred Route?**

13 A. Route E (having the lowest environmental impact score) is the most
14 suitable alternative for the proposed transmission line project and is
15 identified in the Report as the Preferred Route. Routes A, C, and E-1
16 are also environmentally acceptable and suitable as licensable
17 alternative routes.

18 **Q. You indicated earlier in your testimony that a further evaluation of
19 the alternative routes was conducted as documented in the Report
20 Addendum marked as Duquesne Light Exhibit RH-3. Please
21 describe that further evaluation and the results.**

22 A. As I mentioned earlier, concern was expressed by both public officials
23 and the interested public that not enough emphasis was placed on
24 residential areas during the alternatives evaluation process
25 documented in the Report. Thus, GAI conducted a further evaluation
26 that considered all dwelling units within 100 feet of the centerlines of
27 all the alternatives to address this concern. GAI staff, through use of
28 aerial photography and field verification, tabulated the number of
29 dwelling units within 100 feet of the centerline of each of the
30 alternative routes. As previously mentioned, I use the term dwelling
31 units to reflect the fact that all residential living units were counted,

1 including single family residential structures, as well as the number of
2 units within apartment and condominium buildings. These data were
3 then entered into the data base software as raw data within a new
4 evaluation criterion category and analyzed in conjunction with the
5 other criteria detailed in the Report. A weight of 76.9 was assigned to
6 this new evaluation criterion to directly reflect the SCC's weight
7 assigned to linear distance adjacent (miles) for the Residential Areas
8 Category. The results of this further evaluation are contained in
9 Tables A-1 through A-5 of the Report Addendum. As Table A-5 shows,
10 Route E has the lowest *environmental impact score and remains the*
11 Preferred Route. Table A-5 also shows that Routes A, C, and E-1 are
12 also environmentally acceptable and suitable as licensable alternative
13 routes.

14 The inclusion of this additional evaluation criterion yielded essentially
15 the same analytical results as the evaluation detailed in the Report.
16 The only change this further evaluation manifested was that Route A
17 moved from the 3rd lowest score to 2nd, Route E-1 moved from 2nd to
18 3rd, Route B moved from 5th to 6th and Route D/C moved from 6th to
19 5th.

20 **Q. Would you please describe the Preferred Route?**

21 A. Route E is 4.9 miles long and overbuilds or replaces existing 23 kV
22 lines for approximately 95 percent of its entire length except for 600
23 feet at the southern terminus, which is on Duquesne Light property
24 and requires no new right-of-way. The Line exits Wildwood
25 Substation, in Hampton Township, toward the west along the south
26 side of the substation access road for approximately 400 feet before
27 turning southward. The Line then follows the eastern boundary of
28 North Park for approximately 3,900 feet. The Line turns southwest for
29 approximately 1,900 feet following the existing 23 kV line through
30 North Park and across Hemlock Drive. The Line turns westward
31 following along the southern boundary of North Park for approximately

1 1,600 feet where it enters McCandless Township. The Line continues
2 for another 1,000 feet to Peebles Road. The Line follows Peebles
3 Road to the southwest for 2,400 feet, and then turns southward
4 following the existing 23 kV line along private property for 1,600 feet.
5 The Line then generally follows Ringeisen Road and Duncan Avenue
6 for 2,000 feet to the major intersection of Thomson Run Road, Duncan
7 Avenue and Ferguson Road. The Line continues southward following
8 Thomson Run Road for 5,100 feet where it enters Ross Township.
9 The route continues to follow Thomson Run Road for another 5,400
10 feet, then turns east for 600 feet on Duquesne Light property to a new
11 138 kV breaker inside the North Substation.

12 **Q. Is the Preferred Route, Route E, that you just described the route**
13 **Duquesne Light proposes to construct as described in its**
14 **Amended Application to the PAPUC?**

15 A. Yes.

16 **Q. In your opinion, was a reasonable, thorough study undertaken to**
17 **site the Preferred Route and determine the environmental impacts**
18 **of the route and was that study consistent with current methods?**

19 A. Yes. The study was both reasonable and thorough, and included the
20 analyses required of Chapter 57 of Title 52 of the Pennsylvania Code.
21 The study included a number of steps designed to compile and
22 analyze data to facilitate the selection of a reasonable Preferred
23 Route and to determine the environmental impact of the route.
24 Numerous recognized sources were also employed to obtain the data.
25 Methodologies were consistent with current practice.

26 **Q. Does this conclude your testimony at this time?**

27 A. Yes.

EDUCATIONAL AND PROFESSIONAL BACKGROUND OF ROBERT J. HOUSTON

Robert J. Houston is the Environmental Studies and Planning Department Manager of GAI Consultants, Inc. ("GAI"). GAI is an environmental, geotechnical, and civil-structural engineering firm with main offices in suburban Pittsburgh, Pennsylvania. Established in 1958, GAI and its affiliates comprise an organization of over 500 scientists, engineers, and support personnel serving industry and government. GAI provides consulting services in environmental science, environmental engineering, hazardous and solid waste management, civil engineering, geotechnical engineering, anthropology and archaeology, and related disciplines. GAI has prepared numerous siting studies, environmental impact statements, and assessments on behalf of Federal, State and local agencies, as well as for public utilities and industry. Much of this work has been for electric and gas transmission projects.

Mr. Houston earned a Bachelor of Science Degree in Zoology from Pennsylvania State University in 1969, and has completed course work and comprehensive examinations for a Ph.D. in Ecology from the University of Pittsburgh. He has been employed at GAI since 1974.

He has held positions of increasing responsibility since then. In his current capacity, Mr. Houston is responsible for (a) the management of environmental impact studies, (b) ecological, socioeconomic, archaeological, land-use planning, and cultural resources studies, (c) facilities siting studies, and (d) interpretation and application of government regulations and procedures relating to facility permitting, land reclamation, and navigability studies. Mr. Houston has directed or managed all of GAI's utility transmission (electric and gas) siting projects since 1978.

Prior to his employment with GAI, Mr. Houston was employed by the University of Pittsburgh as a teaching assistant in the Biology Department. While there, he also conducted research under a Biology Department Grant from the U.S. Atomic Energy Commission.

EXHIBIT RH-2

Exhibit RH-2 accompanies this testimony as a separate document due to its large size.

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**Report Addendum to the
Environmental Assessment and Line Route Study**

P. O. 47780 - W.O. L0317
Wildwood Substation 138kV Transmission Line
Allegheny County, Pennsylvania

GAI Project Number: C020461.20

October 2005

Prepared For: Duquesne Light Company
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EXHIBIT RH-3

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1.0 INTRODUCTION

The Duquesne Light Company (Duquesne Light) proposes to construct a 138 kV transmission line from its Wildwood Substation located in Hampton Township, Allegheny County, Pennsylvania, to a tap of its Cheswick-North 138 kV double circuit transmission line (Circuits Z-55 and Z-56) located in Hampton Township, or to its North Substation located in Ross Township.

In May 2004, GAI Consultants, Inc. (GAI) prepared an *Environmental Assessment and Line Route Study* (known as the "Report") for the project. Seven feasible alternative routes were studied, running from the Wildwood Substation in a generally southward direction. Six routes tap the northern circuit (Z-56) of the Cheswick-North line at four different locations, while the seventh route terminates at a breaker inside the North Substation as described below.

1.1 Route A

Route A extends from the Wildwood Substation along Wildwood Road and then along Pennsylvania Route 8 (Route 8) to a tap at existing Tower #670.

1.2 Route B

Route B extends from the Wildwood Substation along existing subtransmission line Circuit 22454 and distribution lines extending southward from Duncan Avenue to a tap at existing Tower #660.

1.3 Route C

Route C extends from the Wildwood Substation along the CSX Railroad right-of-way (ROW) adjacent to Pine Creek, then west at the Circuit Z-56 transmission line to a tap at existing Tower #669.

1.4 Route D

Route D extends from the Wildwood Substation along existing subtransmission and distribution lines extending southward through North Park and along Wildwood Golf Club, with new ROW from Duncan Avenue to a tap at existing Tower #656.

1.5 Route D/C

Route D/C extends from the Wildwood Substation along existing subtransmission and distribution lines extending southward through North Park and along Wildwood Golf Club, then crossing on new ROW a short distance to connect with Route C, then proceeding along the railroad ROW to a point where it exits west at the Z-56 transmission line to a tap at Tower #669.

1.6 Route E

Route E extends from the Wildwood Substation along existing subtransmission and distribution lines throughout its length, following the same alignment as Route D through North Park, turning west adjacent to the Wildwood Golf Club, then following Peebles Avenue, Ringeisen Road, and then Thompson Run Road to a breaker inside the North Substation.

1.7 Route E-1

Route E-1 extends from the Wildwood Substation along existing subtransmission and distribution lines on the same alignment as Route E, passing through North Park and adjacent to Wildwood Golf Club, then along Peebles Road and Ringeisen Road, then along Ferguson Road to a point where it turns south on new ROW to connect with Tower #656.

The locations of the routes are shown on attached Figure A-1, which is the same as Figure ES-1 in the Report. A full description of each route is provided in Section 1.0 of the Report.

The seven routes were analyzed for environmental impacts in the Report and a preferred route was selected. Section 2.0 of this report Addendum presents a summary of the Report evaluation. Following the issuance of the Report and the initial filing of the Project Application to the Pennsylvania Public Utility Commission (PUC), the public and municipal officials from McCandless and Hampton Townships expressed concern regarding the consideration of residential areas. Therefore, a further evaluation of residential communities was conducted. This evaluation is presented in Section 3.0 of this report Addendum.

2.0 SUMMARY OF THE MAY 2004 REPORT EVALUATION

2.1 Methodology

A total of 23 environmental and socioeconomic resources criteria were evaluated to determine impacts projected for the seven alternative routes. The 23 resource criteria were based on PUC regulations as well as traditional environmental impact assessment criteria reflective of the data collected. The 23 resource categories are described in Section 3.3 of the Report.

To facilitate the selection of a Preferred Route, three areas were evaluated: 1) the immediate construction ROW; 2) the area adjacent to the proposed ROW that would be in view of sensitive resources; and 3) a four-mile wide corridor based on the centerline of the ROW. Only those portions of the routes that are on new ROW or on existing non-electric ROW were evaluated. This procedure is based on the premise that portions of the routes that are located on existing electric line ROW are not considered to generate substantially new impacts. The four-mile corridor was used to evaluate potential impacts on archaeological and historic resources, scenic areas, unique geologic areas, wilderness areas and airports, as is required by current regulations.

Raw data were assembled by database software for the routes (see Table 3-2 in the Report). Raw data are those measurements compiled for the environmental resource criteria. In order to put resource measurements on a relative scale (acres, number, feet) and to obtain an impact score that could be compared across the different alternatives, the raw data were mathematically proportioned to a scale of 1 to 10 (see Table 3-3 in the Report). In this procedure the route with the highest score (worst) for individual resources receives a 10; that with the lowest score (best) receives a 1. Thus, the raw scores are transformed to a relative scale from 1 to 10 to obtain Relative Scores for each Resource Evaluation Criterion. Using the relative position of the route in comparison to the values for all routes provided an indication of how the route compares overall. In order to determine the most suitable route, the relative scores for each criterion for each route need to be totaled. Because it was felt that not all of the criteria are equally important in selecting between the routes, especially as perceived by the public, the criteria weights established by the Siting Criteria Council (SCC) for the GPU-DQE 500 kV Transmission Line Project were used. A criterion weight identified the relative importance of each criterion in the selection of the preferred route. The relative scores achieved by each route for each criterion were then multiplied by the criteria weights developed by the SCC (Weight Column of Table 3-4 In the Report) to obtain the impact scores shown in Table 3-4 of the Report. The impact scores were summed to obtain an overall impact score for each alternative route. Higher scores indicate greater environmental impact. These scores were then ranked.

2.2 Summary of Report Evaluation

The results of the Report Evaluation are presented in Table ES-1 in the Report and summarized in Table A-5. The suitability of each route is briefly described below. A complete discussion of the evaluation results for each route is provided in Section 3.5 of the Report.

2.2.1 Route A

Route A was the third most desirable route considering the environmental effects. This route has the highest impacts to urban areas (commercial/densely populated). Conversely, Route A has little impact on natural resources including vegetation, wildlife, streams, and most other natural systems.

2.2.2 Route B

Route B is the fifth most desirable route considering overall effects on environmental resources. It has relatively high impacts to adjacent residential areas. The route is located on existing ROW for 84 percent of its length and, therefore, impacts to natural resources would be less than for routes having large amounts of new ROW.

2.2.3 Route C

Route C is the fourth most desirable route considering effects on environmental resources. It is located mostly on existing railroad ROW, minimizing potential impacts. The railroad ROW and Route C avoid residential areas, one of the highest-weighted resource criteria.

2.2.4 Route D

Route D is the least desirable route (seventh) considering effects on environmental resources. For one-half of its length, this route is located on new ROW and, therefore, impacts to all resources studied would be greater than for routes following existing ROW.

2.2.5 Route D/C

Route D/C is the sixth most desirable route considering effects on environmental resources. It has the highest impact scores for Other Recreational Areas, and has substantial impacts for forested land cleared categories (third highest). Otherwise, it follows subtransmission and distribution line ROW or railroad ROW for much of its length, with approximately 0.6-mile located on non-existing ROW.

2.2.6 Route E

Route E is ranked as the most desirable route considering the effects on environmental resources. This route is located entirely on existing ROW or substation property. Therefore, impacts to environmental resources are minimal.

2.2.7 Route E-1

Route E-1 is ranked as the second most desirable route. This route is located on new ROW for the majority of its length. Thus, impacts to environmental resources have been minimized.

The Report evaluation concluded that Route E is the most suitable environmental alternative (based on least impacts) for the proposed transmission line project. Routes A, C and E-1 are also environmentally acceptable and suitable as licensable alternative routes.

3.0 OCTOBER 2005 EVALUATION

Subsequent to the issuance of the May 2004 Report and the initial filing of the Project Application to the PAPUC, meetings were held with municipal officials and the public in McCandless and Hampton Townships. At those meetings, concern was expressed that not enough weight was placed on residential areas during the alternatives evaluation process. Thus, GAI conducted a further evaluation that considered all dwelling units within 100 feet of the centerlines of all the alternatives to address this concern. This evaluation was intended to provide a sensitivity check to ensure that the process used adequately addressed the environmental issues deemed important by the potentially affected community.

3.1 Methodology

GAI staff, through use of aerial photography and field verification, tabulated the number of dwelling units within 100 feet of the centerline of each of the alternative routes. The number of dwelling units was used to reflect the fact that all residential living units were counted, including single family residential structures, as well as the number of units within apartment and condominium buildings. These data, which include the number of residential units within 100 feet of the alternative centerlines on both existing electric line ROW as well as on new ROW, were then entered into the database software as raw data (see Tables A-1 and A-2) within a new evaluation criterion category and analyzed in conjunction with the other criteria detailed in the Report. The raw scores were transformed into relative scores for the new criterion (see Table A-3). A weight of 76.9 was assigned to this new evaluation criterion to directly reflect the SCC's weight assigned to linear distance adjacent (miles) for the Residential Areas Category (see Table A-4). The impact scores were re-calculated (see Table A-4) to include this new resource criterion and the scores were ranked (see Table A-5).

3.2 Results

The results of the October 2005 Evaluation are presented in Tables A-4 and A-5 and are described below.

3.2.1 Route A

Route A was ranked as the second most desirable route from an environmental perspective. The proximity to dwelling units is relatively low. Only 35 dwelling units are located within 100 feet of the centerline. These are located primarily along Wildwood Road and Route 8. The majority of the dwelling units along Route 8 are located in apartment buildings and townhouses. This route was previously ranked as third.

3.2.2 Route B

This route was ranked as the sixth most desirable route from an environmental resource perspective. The proximity to dwelling units is relatively high; eighty-nine are located within 100 feet of the centerline. The majority of the dwelling units are located between Royal View Drive and Saddle Drive and from Duncan Avenue south to the project terminus. Route B was previously ranked as fifth.

3.2.3 Route C

Route C was ranked as the fourth most desirable route considering the potential effects on environmental resources. Since this route follows railroad ROW for the majority of its length, proximity to dwelling units is minimal. Only 11 dwelling units are located within 100 feet of the centerline, the least of all the routes. These dwelling units are located south of Duncan Avenue. This route was also ranked as fourth in the previous analysis.

3.2.4 Route D

Route D was ranked as the least desirable route (seventh) considering the potential effects on environmental resources. The proximity to dwelling units is relatively moderate; forty-one dwelling units are located within 100 feet of the centerline. The majority of these dwelling units are located along Hemlock Drive and Laurel Lane and in the vicinity of Ferguson Road. This route was also ranked seventh in the previous analysis.

3.2.5 Route D/C

Route D/C is the fifth most desirable route considering the overall potential effects on environmental resources. It has the second lowest proximity to dwelling units; only thirty-eight dwelling units are within 100 feet of the centerline. The majority of these dwelling units are located along Hemlock Drive and Laurel Lane and south of Duncan Avenue. This route was previously ranked as sixth.

3.2.6 Route E

Route E is the most desirable route considering potential effects on environmental resources. Route E has the second highest proximity to dwellings; one hundred-sixteen dwelling units are located within 100 feet of the centerline. The dwelling units are concentrated along Peebles Road, Ringeisen Road and Thompson Run Road. This route was also ranked as the most desirable in the previous analysis.

3.2.7 Route E-1

Route E-1 is the third most desirable route from an environmental resource perspective. It has the greatest proximity to dwelling units. There are 128 dwelling units within 100 feet of the centerline. The majority of these dwelling units are located along Peebles Road, Ringeisen Road and Ferguson Road. This route was previously ranked as second.

The October 2005 Evaluation concluded that Route E is the most suitable environmental alternative (based on least potential impacts) for the proposed transmission line project. The second most desirable route is Route A, the third is Route E-1, and the fourth is Route C.

4.0 CONCLUSION

The inclusion of the additional residential evaluation criterion (number of dwelling units within 100 feet of the centerline) yielded essentially the same analytical results as the evaluation detailed in the Report (see Table A-5). Route E has the lowest potential environmental impact and remains the Preferred Route. Route A moved from the third lowest score to second. Route E-1 moved from second to third and Route C remained fourth. The changes in rank for the remaining routes (Routes D/C, Route B and Route D) are presented in Table A-5.

Table A-1

SUMMARY OF RESOURCE DATA COLLECTED - ALTERNATIVE ROUTES

Resource Evaluation Criteria	A	B	C	D	D/C	E	E-1
State-Owned Lands/Recreation Areas							
State Forests¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Parks¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Game Lands¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Recreational Areas¹							
Number Adjacent/Crossed	0.0	1.0	0.0	2.0	3.0	0.0	0.0
Number within Line of Sight	0.0	0.0	1.0	0.0	1.0	0.0	1.0
Natural Areas							
National Natural Landmarks¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Natural/Wilderness Areas¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Visually-Sensitive Areas							
Unique Geological Resources¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Historic Sites¹							
Number Adjacent or in View	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	6.0	4.0	8.0	4.0	6.0	1.0	5.0
Designated Scenic Areas¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Wild and Scenic/State Scenic Rivers¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hiking and Bike Trails¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Constraints							
Airports¹							
Number Impacted	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within Two Miles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrology							
Streams							
Number of Crossings at Grade ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Archaeological Areas							
Archaeological Sites¹							
Number Disturbed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within 2,000 Feet	0.0	0.0	0.0	6.0	6.0	0.0	0.0

Report Addendum to the Environmental Assessment and Line Route Study
 Wildwood Substation 138 kV Transmission Line, Allegheny County, Pennsylvania

Table A-1 (Continued)

Resource Evaluation Criteria	A	B	C	D	D/C	E	E-1
Social or Community Impacts							
Commercial/Densely Populated Areas¹							
Linear Distance Adjacent (miles)	0.3	0.3	0.1	0.1	0.1	0.0	0.0
Residential Areas							
Linear Distance Adjacent (miles) ¹	0.1	0.3	0.3	0.9	0.2	0.0	0.2
Houses within 100 Feet of the Centerline ³	35	89	11	41	38	116	128
Highway, Railroad and Road Crossings¹							
Number of Crossings	0.0	1.0	20.0	5.0	13.0	0.0	0.0
Institutional Complexes¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number within 1,000 Feet	0.0	2.0	2.0	1.0	2.0	0.0	1.0
Forest Land Cleared							
Acres	0.4	0.8	5.7	9.1	4.1	0.9	1.7
Wetland Cleared							
Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Existing ROW							
Miles Required	0.3	0.5	0.2	1.6	0.6	0.0	0.2

Notes:

- ¹ Data is for portions of the routes which are either on new ROW or non-electric line ROW (the linear distance may be counted twice where land use is different on either side of the ROW). Portions of the routes which follow existing electric line ROW are not considered to generate a new impact and so are not included in this impact analysis.
- ² There are no stream crossings at grade for this project.
- ³ Data is for the entire route on the new ROW, non-electric line ROW, and electric line ROW.

Table A-2

RAW DATA - ALTERNATIVE ROUTES

Resource Evaluation Criteria	A	B	C	D	D/C	E	E-1
State-Owned Lands/Recreation Areas							
State Forests¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Parks¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Game Lands¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Recreational Areas¹							
Number Crossed or Within Line of Sight	0.0	1.0	1.0	2.0	3.0	0.0	1.0
Natural Areas							
National Natural Landmarks¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Natural/Wilderness Areas¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Visually-Sensitive Areas							
Unique Geological Resources¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Historic Sites¹							
Number Adjacent or in View	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Scenic Areas¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Wild and Scenic/State Scenic Rivers¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hiking and Bike Trails¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Constraints							
Airports¹							
Number Impacted	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrology							
Streams							
Number of Crossings at Grade ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Archaeological Areas							
Archaeological Sites¹							
Number Disturbed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Social or Community Impacts							
Commercial/Densely Populated Areas¹							
Linear Distance Adjacent (miles)	0.3	0.3	0.1	0.1	0.1	0.0	0.0
Residential Areas							
Linear Distance Adjacent (miles) ¹	0.1	0.3	0.3	0.9	0.2	0.0	0.2
Houses within 100 Feet of the Centerline ³	35	89	11	41	38	116	128
Highway, Railroad and Road Crossings¹							
Number of Crossings	0.0	1.0	20.0	5.0	13.0	0.0	0.0
Institutional Complexes¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forest Land Cleared							
Acres	0.4	0.8	5.7	9.1	4.1	0.9	1.7
Wetland Cleared							
Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Existing ROW							
Miles Required	0.3	0.5	0.2	1.6	0.6	0.0	0.2

Notes:

- ¹ Data is for portions of the routes which are either on new ROW or non-electric line ROW (the linear distance may be counted twice where land use is different on either side of the ROW). Portions of the routes which follow existing electric line ROW are not considered to generate a new impact and so are not included in this impact analysis.
- ² There are no stream crossings at grade for this project.
- ³ Data is for the entire route on the new ROW, non-electric line ROW, and electric line ROW.

Table A-3

FINAL RELATIVE SCORES - ALTERNATIVE ROUTES

Resource Evaluation Criteria	A	B	C	D	D/C	E	E-1
State-Owned Lands/Recreation Areas							
State Forests¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Parks¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Game Lands¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Recreational Areas¹							
Number Crossed or Within Line of Sight	1.0	4.0	4.0	7.0	10.0	1.0	4.0
Natural Areas							
National Natural Landmarks¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Natural/Wilderness Areas¹							
Linear Distance Adjacent (miles)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Visually-Sensitive Areas							
Unique Geological Resources¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Historic Sites¹							
Number Adjacent or in View	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Scenic Areas¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Wild and Scenic/State Scenic Rivers¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hiking and Bike Trails¹							
Number Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Constraints							
Airports¹							
Number Impacted	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrology							
Streams							
Number of Crossings at Grade ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Archaeological Areas							
Archaeological Sites¹							
Number Disturbed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Social or Community Impacts							
Commercial/Densely Populated Areas¹							
Linear Distance Adjacent (miles)	10.0	10.0	4.0	4.0	4.0	1.0	1.0
Residential Areas							
Linear Distance Adjacent (miles) ¹	2.0	4.0	4.0	10.0	3.0	1.0	3.0
Houses within 100 Feet of the Centerline ³	2.8	7.0	1.0	3.3	3.1	9.1	10.0
Highway, Railroad and Road Crossings¹							
Number of Crossings	1.0	1.5	10.0	3.3	6.9	1.0	1.0
Institutional Complexes¹							
Number Adjacent/Crossed	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forest Land Cleared							
Acres	1.0	1.4	6.5	10.0	4.8	1.5	2.3
Wetland Cleared							
Acres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Existing ROW							
Miles Required	2.7	3.8	2.1	10.0	4.4	1.0	2.1

Notes:

- ¹ Data is for portions of the routes which are either on new ROW or non-electric line ROW (the linear distance may be counted twice where land use is different on either side of the ROW). Portions of the routes which follow existing electric line ROW are not considered to generate a new impact and so are not included in this impact analysis.
- ² There are no stream crossings at grade for this project.
- ³ Data is for the entire route on the new ROW, non-electric line ROW, and electric line ROW.

Table A-4

ENVIRONMENTAL IMPACT SCORES - ALTERNATIVE ROUTES

Resource Evaluation Criteria	Weight	A	B	C	D	D/C	E	E-1
State-Owned Lands/Recreation Areas								
State Forests¹								
Linear Distance Adjacent (miles)	43.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Parks¹								
Linear Distance Adjacent (miles)	69.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State Game Lands¹								
Linear Distance Adjacent (miles)	33.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Recreational Areas¹								
Number Crossed or Within Line of Sight	67.3	67.3	269.2	269.2	471.1	673.0	67.3	269.2
Natural Areas								
National Natural Landmarks¹								
Number Adjacent/Crossed	78.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Natural/Wilderness Areas¹								
Linear Distance Adjacent (miles)	73.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Visually-Sensitive Areas								
Unique Geological Resources¹								
Number Adjacent/Crossed	59.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Historic Sites¹								
Number Adjacent or in View	76.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Designated Scenic Areas¹								
Number Adjacent/Crossed	71.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Wild and Scenic/State Scenic Rivers¹								
Number Crossed	72.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hiking and Bike Trails¹								
Number Crossed	42.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Constraints								
Airports¹								
Number Impacted	52.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrology								
Streams								
Number of Crossings at Grade ²	43.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Archaeological Areas								
Archaeological Sites¹								
Number Disturbed	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Social or Community Impacts								
Commercial/Densely Populated Areas¹								
Linear Distance Adjacent (miles)	88.8	888.0	888.0	355.2	355.2	355.2	88.8	88.8
Residential Areas								
Linear Distance Adjacent (miles) ¹	76.9	153.8	307.6	307.6	769.0	230.7	76.9	230.7
Houses within 100 Feet of the Centerline ¹	76.9	218.9	538.3	76.9	254.4	236.6	698.0	769.0
Highway, Railroad and Road Crossings¹								
Number of Crossings	33.1	33.1	48.0	331.0	107.6	226.7	33.1	33.1
Institutional Complexes¹								
Number Adjacent/Crossed	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forest Land Cleared								
Acres	60.0	60.0	84.8	389.0	600.0	289.7	91.0	140.7
Wetland Cleared								
Acres	66.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Existing ROW								
Miles Required	80.0	215.0	305.0	170.0	800.0	350.0	80.0	170.0
TOTALS		1636.1	2440.9	1898.9	3357.2	2361.9	1135.1	1701.5

Notes:

- 1 Data is for portions of the routes which are either on new ROW or non-electric line ROW (the linear distance may be counted twice where land use is different on either side of the ROW). Portions of the routes which follow existing electric line ROW are not considered to generate a new impact and so are not included in this impact analysis.
- 2 There are no stream crossings at grade for this project.
- 3 Data is for the entire route on the new ROW, non-electric line ROW, and electric line ROW.

Table A-5

RANKS FOR THE REPORT EVALUATION AND THE OCOTBER 2005 EVALUATION

Route	May 2004 Report Evaluation Rank	October 2005 Report Evaluation Rank
A	3	2
B	5	6
C	4	4
D	7	7
D/C	6	5
E	1	1
E-1	2	3

FIGURE ES-1

See Figure ES-1 in Exhibit RH-2

Before the
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Amended Application of Duquesne Light Company
for the Siting and Construction of a 138 kV Line
in Hampton, McCandless and Ross Townships, Allegheny County
No. A-110150 F 0031

Mark R. Janosko v. Duquesne Light Company
No. C-20065987

Duquesne Light Company

Statement No. 6

Direct Testimony of Thomas P. Schmitt

DOCKETED
AUG 31 2006

**DOCUMENT
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C-20065987

DIRECT TESTIMONY OF THOMAS P. SCHMITT

1

2

3 **Q. Please state your name.**

4 A. Thomas P. Schmitt.

5 **Q. By whom are you employed?**

6 A. Duquesne Light Company.

7 **Q. How long have you worked for Duquesne Light Company?**

8 A. Twenty-five years.

9 **Q. What is your present job title?**

10 A. My title is Principal Engineer, but my job is a Transmission
11 Engineer.

12 **Q. How long have you held that position?**

13 A. My title has recently changed but I have been a Transmission
14 Engineer since January 4, 1993.

15 **Q. What are your job duties as a Transmission Engineer?**

16 A. Responsible for engineering overhead and underground
17 transmission and subtransmission lines for system improvement,
18 relocation, maintenance and customer service.

19 **Q. What education and training relevant to your job duties have
20 you completed?**

21 A. A Bachelor Degree in Civil Engineering from Penn State University,
22 1976.

23 **Q. Are you a licensed Professional Engineer in the Commonwealth
24 of Pennsylvania?**

25 A. Yes, I am.

1 Q. **What is your connection with Duquesne Light's Wildwood**
2 **Project?**

3 A. I am the project engineer for the 138kV transmission line portion of
4 the project.

5 Q. **Would you briefly explain the proposed 138kV transmission**
6 **line?**

7 A. Duquesne Light proposes to construct a new 138kV transmission
8 line that will connect the North Substation located in Ross
9 Township with the upgraded Wildwood Substation located in
10 Hampton Township, Allegheny County, Pennsylvania. This 138 kV
11 line will be identified as the "North-Wildwood 138 kV Line". The
12 line is 4.9 miles long. A topographic map of the area, that shows
13 the location of the Line, is attached hereto and incorporated herein
14 as Duquesne Light Exhibit TS-1.

15 Q. **Please explain how the proposed routing of this transmission**
16 **line was selected.**

17 A. To facilitate the selection of the route, Duquesne Light contracted
18 with GAI Consultants to complete a comprehensive study of the
19 projected environmental and socioeconomic impacts of seven
20 alternate routes. Based on the results of this study and other
21 factors such as constructability and reliability, Duquesne Light
22 selected the route, identified as Route E in the study. Duquesne
23 Light selected this route because it is the most suitable alternative
24 for the proposed transmission line. Route E has the lowest
25 environmental impact score under both the original evaluation
26 assessment process and the more recent process that considers

1 dwelling units within 100 feet. Route E also will be located almost
2 entirely on existing private property rights-of-way. This makes
3 Route E inherently more reliable since it will not have the
4 vegetation maintenance restrictions associated with a line located
5 on a road by permit.

6 **Q. In Duquesne Light's original Application to the PUC, Route E-1**
7 **was the selected route; why has Duquesne Light amended the**
8 **Application and changed the selected route from Route E-1 to**
9 **Route E?**

10 A. Duquesne Light changed the selected route to Route E, for the
11 following reason:

12 Although route E had the lowest environmental impact score, this
13 route was not originally selected because the final mile of the route
14 approaching the North Substation is supporting four existing 23 kV
15 circuits, three of which will remain and be transferred to the new
16 138kV poles. Due to the possible reliability issues involved with a
17 mile long 138 kV and three 23 kV circuits on a single pole line,
18 Route E was originally rejected. However, route E-1 also has
19 reliability problems of its own. The final 1.3 miles of route E-1,
20 approaching the tap, would be constructed on road right-of-way by
21 permit. Lines located on road right-of-way by permit have
22 inherently more reliability problems due to the vegetation
23 maintenance restrictions, where as Route E will be located almost
24 entirely on existing private property rights-of-way. Because of this
25 we decided to take another look at the reliability of route E.
26 Duquesne Light decided that since we had no problems with the

1 existing four circuits on this portion of route E, that we could
2 therefore manage with three of the existing circuits and the 138kV
3 circuit on this portion of the line.

4 **Q. Have you obtained the Duquesne Light documents that show**
5 **what rights Duquesne Light possesses along the proposed**
6 **route of the transmission line?**

7 A. Yes. These documents are Exhibits TS-2 and TS-3.

8 **Q. Please explain what is shown in Exhibit TS-2.**

9 A. TS-2 consists of four plan drawings showing the location of the
10 existing 23 kV subtransmission line which the proposed line would
11 essentially replace. The first drawing shows the line beginning at
12 North Substation in the upper left. The line proceeds from left to
13 right across the top half of the drawing, then continues from left to
14 right on the bottom portion of the drawing. It then continues
15 similarly on the subsequent drawings until it ends at the Wildwood
16 Substation at the bottom right of the fourth drawing. The names of
17 the original property owners that we obtained rights of way from
18 are shown on these plans.

19 **Q. Please explain what rights were conveyed to Duquesne Light**
20 **Company, and how and when these rights were obtained.**

21 A. Exhibit TS-3 contains all of the existing agreements, which
22 correspond to the property owners' names shown on Exhibit TS-2.
23 Approximately 2.8 miles of the proposed route is on private
24 property by 15 separate right-of-way agreements dating from
25 September 1923 thru March 1931. These agreements allow for
26 distribution or transmission and do not specify an easement width.

1 Another 0.9 miles is on private property by a single right-of-way
2 agreement, dated December 1969. This agreement allows for
3 distribution or transmission on a 50 foot wide easement.
4 Approximately 0.6 miles is located on private property by a single
5 License Agreement, dated January 1983. This agreement allows for
6 distribution or transmission and does not specify an easement
7 width. Approximately 0.3 miles is located on private property by
8 verbal agreement, dated July 1930, with no easement width, and no
9 specified voltage. Another 0.1 miles is on State or County road
10 right-of-way by permit with no specified voltage. The remaining 0.2
11 miles will be on Duquesne Light property.

12 **Q. I'm curious about the property covered by a verbal agreement.**
13 **What does Duquesne Light plan to do if that does not convey**
14 **valid rights?**

15 A. The line is on a public road at that location, so the line could be
16 built in the road right of way.

17 **Q. How has Duquesne Light tried to communicate and explain the**
18 **construction of the proposed transmission line to the public?**

19 A. The complete Amended Application for Authorization to Site and
20 Construct a 138kV Transmission Line including the Exhibits has
21 been available for viewing at the Hampton Community Library
22 (4960 Route 8/Shopper's Plaza; Allison Park, PA 15101) and the
23 Northland Public Library (300 Cumberland Road, Pittsburgh, PA
24 15237). Also, Duquesne Light set up the Wildwood Transmission
25 Line Website, with the aid of GAI Consultants; the Amended

1 Application, except for Exhibits 1, 2 and 9, due to their large size,
2 is available for viewing on the website.

3 **Q. What is the name of the website?**

4 A. The URL for the web site is
5 <http://www.duquesnelightwildwood.info/>.

6 **Q. What other information is available on the website?**

7 A. There are five sections in the website. The "Project Overview"
8 page contains an overview of the project including the need and
9 benefits, a description of the route, and typical photographs that
10 show the existing poles as well as how these poles will appear
11 after construction of the line. There are also photos of existing
12 138kV poles and a map showing the location of the line. The
13 "What's New" page contains the latest news as well as earlier
14 activities on the project. There is a "Schedule" page that contains a
15 bar chart of the latest project schedule. There is a "FAQ" page
16 with a list of frequently asked questions and answers. And a "More
17 Information" page where the Application can be viewed and where
18 the public can ask additional questions.

19 **Q. Has there been any other communication with the public?**

20 A. Duquesne Light and GAI Consultants made a presentation before
21 the McCandless Town Supervisors on April 20, 2005. Duquesne
22 Light and GAI Consultants also participated in two public meetings,
23 to review the Wildwood transmission line project, and gather input.
24 On June 8, 2005, a presentation was made to the McCandless
25 Council and residents at the McCandless Municipal Building. A
26 question-and-answer period followed. As part of a monthly

1 Hampton Township meeting, another presentation was given on
2 June 22, 2005, before the Hampton Township Board of
3 Commissioners and residents. Duquesne Light also met with the
4 McCandless supervisors at PA Senator Jane Orie's office, on
5 September 23, 2005, to discuss their concerns with the project.
6 Issues raised by stakeholders at all the meetings were later
7 addressed on the website's "FAQ" page.

8 **Q. Will the voltage be increased on the proposed line in the**
9 **future?**

10 A. No, it will not.

11 **Q. What is the estimated cost of the proposed transmission line?**

12 A. The estimated cost of construction of the project is \$2,900,000.

13 **Q. When will construction of the line begin?**

14
15 A. Construction is anticipated to start in mid 2007 and be completed in
16 the first quarter of A 2008.

17 **Q. What is the proposed in-service date for the proposed**
18 **transmission line?**

19 A. The proposed in-service date for the Line is April 1,2008.

20 **Q. Does that conclude your testimony?**

21 A. Yes.

22

23

24

25

26