

Possible Health Effects of Power Line Electric Fields

**A Summary of Findings of the Human Effects
Radiation Group at the University of Bristol**

**A Report on a Presentation
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The Assignment

The assignment was to perform a web search on the topic of Electric field limits under, and at the edge of ROW for power lines. Prepare a three-minute in-class presentation using no more than five overhead transparencies.

The Topic

In searching the web, I found that there are no federal guidelines on the strength of electrical fields beneath power lines. There are seven states that have established regulations. Since safe and unsafe levels of electric fields have not been established, these regulations are designed to simply prevent electric field levels on new power lines from exceeding the maximum field strength present on existing power lines. Due to the wide scope of the topic, the fact that information remains in dispute, and the short length of the presentation, I decided to report on only one web site.

	<p>UNIVERSITY OF BRISTOL Bristol, England</p> <p>Human Radiation Effects Group</p> <p>headed by Professor Denis L. Henshaw</p> <p>http://www.phy.bris.ac.uk/research/track_analysis/home.html</p>
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The Human Radiation Effects Group

This is the web site of the Human Radiation Effects Group at the University of Bristol. Previous studies on the health effect of power line electric fields have given inconsistent and often contradictory results. Although there seems to be a suggestion that there are health risks associated with power line electric fields, the actual risks, and even whether they exist, remain undetermined.

When electric fields penetrate the human body, resultant electrical activity is quite small, even when compared to the tiny signals associated with cellular activity. Some researchers believe that power line electric fields do add a stress factor to nervous system activity. Researchers at the Human Radiation Effects Group have focused on other characteristics of the power line electric field and feel that they have discovered the answer to the riddle of how these electric fields present a health risk. Rather than study the direct effects of electric fields on the body, they are looking at how electric fields affect airborne particles.

The Human Radiation Effects Group refers to airborne particles as "aerosols". By aerosols, they mean any small particles, liquid and/or solid, suspended in the atmosphere. These particles can also attract gas molecules. So aerosols may contain chemical pollutants, bacteria, fungi, etc., that are harmful to people. The Bristol group has found two mechanisms by which power line electric fields serve to increase the health risks posed by aerosols.

1. Aerosols in the proximity of power line electric fields become polarized. The polarity of the particles reverses in concert with the alternating current, setting up an oscillatory movement. The particles become "stickier" and are more likely to adhere to skin or to lung tissue.
2. Aerosols are drawn up the field gradient. This causes increased concentration in the vicinity of power lines—up to 80% increase measured at the center of ROW at 1 meter above ground level. This effect is more pronounced on the larger particles.

Conclusions

The Human Radiation Effects Group conducted their experiments on a 400 kV, 50 Hz, power line in England. The maximum electric field strength at one meter above ground level was about 4 kV/m. The research group states that their findings are preliminary.

These aerosols are omnipresent in the atmosphere at levels our immune systems routinely deal with them. However, when present in increased concentrations and with increased adherence properties, they present a health risk. The risk is further compounded by the fact that electric power lines are often located along busy highways, which provide a source of airborne pollutants which can be drawn into the electric field and concentrated beneath the power lines. If the findings of the Human Radiation Effect Group are substantiated, the implication is that safe electric field levels would be a function not only of the strength of the field, but also of the ambient pollution levels in the area.