



Electric Transmission Lines Individual Rights vs Utility Rights of Public Domain



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A few years ago most electricity was generated at local Rural Electrification Administration (REA Cooperative) generation plants. As demand for electrical energy has increased, most utilities have adopted the practice of purchasing electricity from generators located hundreds of miles away, e.g. Alabama, Mississippi, Texas, etc. The electricity is shipped to other utilities via high voltage, high current transmission lines. The companies that own the transmission lines may not be the producers nor the utility serving local customers. They are simply independent transmission operators (middle-men) who make a profit by moving electricity across personal private property in their overhead lines and selling it to utilities at some other location. The electricity moving through the transmission lines is not ordinarily used by utility customers over which it travels. It is simply being transported across your private domain as the raw material from which profits are made somewhere else. In that regard, the transmission line does not serve eminent interests of public domain; there are other means of getting electricity to public citizens and businesses. It serves the profit interests of a utility located elsewhere.

In the early days of rural electrification, Right of Way (ROW) for local "distribution lines" were granted by farmers and land owners to serve the interests of neighbors and themselves. As utilities grew larger and reached greater distances, ROWs for transmission lines were also granted for the noble purpose of serving the public through a "public utility." Transmission lines were generally smaller, limited to two or four lines, and carried less volts and current.

Now citizens are asking for answers to reasonable questions and are opposed to unnecessary, excessive, and intrusive development of transmission lines trespassing on private property. Questions about use of underground transmission cables; insulation of the transmission lines; local power generation instead of transporting hundreds of miles; appropriate environmental appraisals; and protection from secondary health effects on families, children in schools, neighborhoods and businesses; and effects on property values are all on the table and often end up in court.

Utilities using a grounded-Y system have saved millions of dollars by using the ground as part of their electric circuits instead of returning the unused neutral current through hard

wires. (Donald W. Zipse, PE, *Electrical Shock Hazard Due to Stray Current*, 2002).

Some Things are Different Now

Today utilities are using that same ROW that was obtained 30 to 50 years ago to install higher voltage/current transmission lines in locations where the farmer or landowner never intended such a transmission line to be built.

For example, Consumers Power Co. (Consumers Energy) had a 133-foot ROW that passed between a dairy barn and within a corn-crib/ machine-shed that was obtained 30 years ago. The power line was originally a 3-wire circuit.

In 2004, Consumers decided to increase the transmission line to 9-wires (three 3-wire, 0.71 inch diameter circuits) in the same location. Each of the wires carries 46 kV (46,000 Volts) pushing several thousand amperes of current to a new sub-station across the highway from the farm.



Mr. Chick Reading 71.6 Volts under 46 kV Transmission Line

The farmer/landowner objected to this large increase in electricity passing over the most common workspace for preparing and repairing farm machinery, storage of grain, entrance to the dairy barn, and cattle lots located next to the transmission line and the dairy barn. He offered free ROW to Consumers if they would change the location of the

¹*Shocking News* (dba) is a registered publisher of science-based information dedicated to public awareness of electric and magnetic fields (EMF) in the living environment and their effects on the health and welfare of humans and animals. Editor is Don Hillman, Ph.D., Professor Emeritus, Department of Animal Science, with help from wife Mary, MS, Michigan State University, East Lansing, MI. Don is a member of the American Society of Agricultural Engineers and The American Dairy Science Association. Telephone: (517) 351-9561.

transmission to traverse next to the road-fence ¼ mile south of the farmstead, a path that would be directly across from the new sub-station and would not induce the extra health-risk in the working/living area of the farm.

Consumers refused the offer saying they had the right of eminent domain, and they proceeded with construction of the transmission line between the barn and the storage building. Consumers claimed the transmission lines posed no danger to the farmer or to livestock on the farm. They claimed there was no basis for health concerns.

A similar situation is developing in the north-east section of Grand Rapids (Ada, MI) where Consumers has decided to build a transmission line through 10.7 miles of suburban, high valued property after allegedly having told local landowners no transmission lines would be built on the ROW (See mlive.com, 1/10/05, Ed White, Grand Rapids Press).

Voltage , Electric and Magnetic Fields Under the Transmission Lines at the Leslie Farm

Voltage on a temporary fence registered 68.9 to 71.6 Volts (root mean square, rms), January 10, 2005, and 60.3 Volts on July 18, 2004. Voltage was measured with a Fluke® 79III oscilloscope at a height about 5.5 feet above the ground, between a wire fence and the ground. The fence was a 15 foot x 1 foot wire mesh (1/8" hardware cloth) strung between insulated plastic stakes parallel to and directly below the power lines.

Electric fields were 8 kV/m (kilovolts per meter) measured about 6 feet above the ground, with an Alpha Lab® TriField Meter, January 10, 2005. EMF readings about 5 feet above the ground November 8, 2004, at 2:30 PM, were 2.5 kV/m e-fields and 4 milliGauss (mG) magnetic fields . Effects of electric and magnetic fields on health of humans and cattle are reported below.

Voltage differential from the metal roof of the building to ground was 5.0 V, and on the galvanized-steel door of the building next to the power line, 4.6 V ac (8/18/04). The farmer reported that he received a strong electric shock when he touched the door to open or close it.

Prior to installation of the 9-wire line, voltage from (corncrib) roof to ground was 0.112 to 0.16 V(peak to peak). The metal door-to-ground measured 1.28 Vrms (7/05/04). The dairy-barn roof on the south side of the transmission line ROW measured 0.448 Vrms at 8:15 PM, 7/05/04 prior to energizing of the 9-wire installation.

A study of the **Electrostatic and Electromagnetic Effects of Overhead Transmission Lines**, was conducted by the Rural Electrification Administration (REA), Division of the United States Department of Agriculture, May 1976. It contains numerous illustration and examples of the induction of amperage and voltage from transmission lines to fences, trucks, and other metallic conductive objects at various distances from power lines, ranging from 345 to 765 kiloVolts (kV). At page 9, the document states, "When a conductive object is connected to ground through a person's body resistance, a shock current flows through the connection if an induced voltage exists between the point of contact and ground. The seriousness of this shock is determined by the magnitude of current flowing through the body. Currents of 1 milliamper (mA) or more, but

less than 6 mA, are often termed secondary shock currents. Currents with magnitudes of 6 mA or more are considered primary shock currents. A possible consequence of primary shock current is ventricular fibrillation of the heart which results in an immediate arrest of blood circulation. Table II-1 summarizes typical effects of electric currents on an average size man (150 pounds), reference 10." [Reference 10 is IEEE Midwest Power Symposium, University of Cincinnati "Investigation of the Electrostatic Voltages Induced by EHV and UHV Transmission Lines," by J. C. Procario and S. A. Sebo, October 1974].

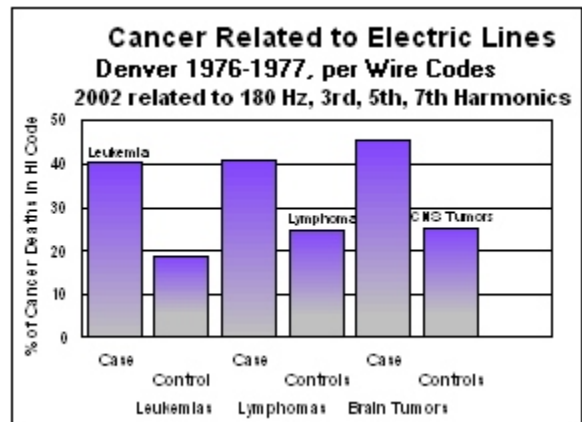
Some will ask, "Who wants to be challenged to the highest likely "let go" current without preventing it if possible.

A protective electrically-insulated suit is now available for electrical workers to reduce induced body current and contact current when working near high power radio, TV, or transmission sites. See: KW-Gard™, Euclid Garment Manufacturing Company, Kent, OH. The suits effectiveness was confirmed by Richard A. Tell and Associates, consulting engineers, Las Vegas, NV. Families may want to inquire about protective playsuits for children?

Harmful Effects of Exposure to Electricity Radiated from Transmission Lines

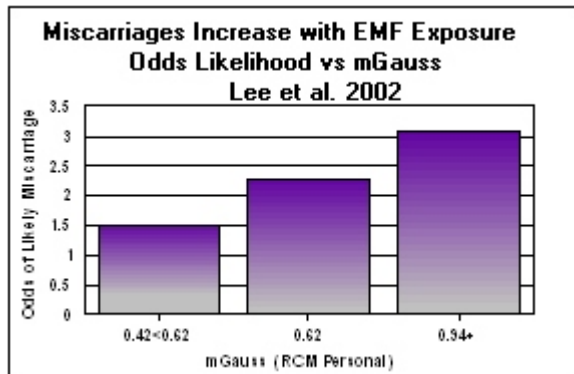
Increased Risk of Childhood Leukemia, Brain Tumors and other forms of Cancer–

In Denver, Colorado (2002), a study conducted by electrical engineers and epidemiologist reported that the risk of children dying from cancer was four times higher if they lived near high voltage/high current electrical lines than controls who did not live near high current lines. The incidence of cancer was directly related to the intensity of electromagnetic fields (EMF) in the living area of the homes of victims who died from cancer. Electric current was followed from the utility service drop--hot, and neutral wires grounded to the water lines and EMF was related to current on the water lines to which the electric system was grounded [W. T.Kaune, et al. Study of High- and Low-Current Configuration Homes From the 1988 Denver Childhood Cancer Study. *Bioelectromagnetics* 23:177-186 (2002)].



Cancer Risks. Vs Electricity in USA

An Evaluation of the possible risks from electric and magnetic fields (EMF) from power lines, internal wiring, electrical occupations & appliances was conducted in 2002 by the California Department of Health and Human Services for the Public Service Commission. They concluded that more than 50% chance of a small increased risk of childhood leukemia, adult brain cancer, and amyotrophic lateral sclerosis (ALS—Lou Gehrig's Disease), and more than 50% chance of 5-10% added miscarriages, 10-50% increased risk of male breast cancer, childhood brain cancer, suicide, Alzheimer's disease, or sudden cardiac death. (See the following website)
<http://www.dhs.ca.gov/ehib/emf/RiskEvaluation/riskeval.html>.



Non-Hodgkin's Lymphoma was associated with intensity of electric fields and exposure time of Ontario, Canada, Hydro (utility) workers. Subjects in the upper tertile of percentage of time spent above electric field intensities of 10 and 40 Volts per meter had odds ratios of 3.05 and 3.57 indicating they were 3 to 3.57 times more likely to get Non-Hodgkin's lymphoma (cancer) than utility employees who were less exposed to electric fields. Electrical exposures of utility workers in various occupations had been monitored while they worked. (Villeneuve, Paul J., et al. 2000. Non-Hodgkin's Lymphoma among electric utility workers in Ontario: the evaluation of alternative indices of exposure to 60 Hz electric and magnetic fields.. *Occupational and Environmental Medicine*. 2000, 57:349-357).

It should be noted that Electric Fields on the Chick farm under the transmission line were 8 kV/m, approximately 8,000 times higher than exposure of the Canadian electrical workers.

Summary of Nine Studies

Children residing in homes with exposure levels $< 0.4 \mu\text{T}$ had no increased risk, while children with exposures $\geq 0.4 \mu\text{T}$ had a relative risk estimate two times greater than children exposed to $< 0.4 \mu\text{T}$ ($0.4 \text{ microTesla} = 4 \text{ milliGauss}$). From: A Pooled Analysis of Magnetic Fields and Childhood Leukaemia, *British Journal of Cancer* (2000).

Further from the UK:

Childhood leukemia risk doubles within 100 meters of high-voltage power lines. This result from the Oxford Childhood Cancer Research Group study, headed by Gerald Draper analyzed and compared 33 years of data (from 1965-1995) on 35,000 children diagnosed with cancer, with their distance to the nearest electricity transmission line. The biggest ever funded UK study into power lines and child cancer has found that children under the age of 15 living within 100 meters of high-voltage power lines have close to twice the risk of developing leukemia. (See: www.revolt.co.uk and <http://www.leukaemiaconference.org> Westminster, Sept. 6-10, 2004).

Blood sugar levels of diabetics increased as measures of electricity (millivolts and microsurgues) increased in the living environment of patients diagnosed with diabetes.

Secondly, reducing electrical pollution (high frequency electrical noise) by use of microsurge filters plugged into wall outlets resulted in blood glucose decreasing within minutes. Insulin use decreased from 36 to 9 units (Humlin 70/30) per day when the filters were installed in the home of an elderly patient with diabetes. [M. Havas and D. Stetzer, *International Conference on Childhood Leukaemia*, London, Sept. 6-10, 2004].

Similarly, persons living near electrical transmission lines had significantly more cases of Type II diabetes than persons living farther from the transmission lines in Australia [Beale, Ivan L., Neil E. Pearce, Roger J. Booth, and Sandra A. Heriot. 2001. Association of Health Problems with 50 Hz Magnetic Fields in Human Adults Living Near Power Transmission Lines. *J. Australian College of Nutritional & Environmental Medicine* 20(2):9-12,15,30]. Results indicated that the average and the mean time-integrated magnetic field exposure (mGauss-hour) ranged from 6.4 at the lowest to 307.6 mG-h at the highest exposures in the two or three rooms in which occupants spent one or more hour per day on average. Chronic illnesses and asthma were also linearly related to the flux density of magnetic field exposure, mG-h. The report contained results from 112 subjects in each exposure category, 560 total. Effects of electricity on the immune system may play a role.

These diabetes findings correspond with reports that insulin secretion from pancreatic cells of laboratory animals was reduced by exposure to EMF in three of four reports [Sakurai, T., et al., 2004. An extremely Low Magnetic Field Attenuates Insulin Secretion From the Insulinoma Cell Line, RIN-m. *Bioelectromagnetics* 25:160-166 (2004)].

Effects of Electric and Magnetic Fields on Dairy Cows—

Studies conducted at McGill University, Montreal, Quebec, Canada, have revealed that several changes in blood and cerebrospinal fluid (CSF), milk and milk-fat production occurred when dairy cows were exposed to 10 kV/m vertical electric fields, and 30 μT (micro Tesla) horizontal magnetic fields for 28 day periods. Intensities are equivalent to standing under a 735 kV electrical transmission line. Tesla and Gauss

are measures of the flux density of magnetic fields, ($1.0 \mu\text{T} = 10$ milliGauss) named after their inventors.

Burchard et al. reported in Bioelectromagnetics (2003):

Sixteen nonpregnant lactating Holstein cows with 150 ± 40 days of lactation were confined to wooden metabolic crates in a E & MF chamber during the experiment with a 12:12 h light:dark cycle.

Results were as follows:

1. Milk production decreased 5% from exposed cows compared to controls.
2. Fat-corrected milk decreased 14% compared to controls.
3. Milk fat decreased 16% compared to controls
4. Dry matter intake increased 5% compared to controls.

No significant change in milk or fat production was found during an earlier 28-day trial report in the Journal of Dairy Science 79(9):1549-1554 (1996).

Physiological effects from Burchard et al. include:

1. Melatonin, a hormone produced in the Pineal gland in the brain, decreased in cows exposed to EMF.
2. Melatonin has strong oncostatic immunological, and antioxidant properties in the blood. It normally follows the pattern of light:dark nocturnal exposure.
3. Progesterone increased in lactating pregnant cows.
4. Length of estrus cycle increased 3 days.
5. Insulin-like growth factor (IGF-1) increased in blood.
6. Growth hormone was modified during part of the nocturnal cycle.
7. Macro and trace element changes in blood: Calcium, magnesium, iron, and copper were affected by EMF exposure.
8. Cerebrospinal fluid (CSF) changes in concentrations of Ca, P, Mg, Mn and Na occurred.
9. Quinolinic acid increased in CSF, tryptophan tended to increase in CSF.
10. CSF changes were consistent with weakening of blood-brain barrier, according to the authors.

While none of these physiological disturbances were considered clinical, needing treatment, exposure of the cows to EMF was limited to 28 days. Under farm conditions they are likely to be exposed continuously from birth to death.

Secondly, the low milk-fat production of cows exposed to EMF as reported in the latest McGill University experiment concurs with a report by Cornell workers in which cows exposed to electricity during milking had lower fat test. "Milk fat was lower when currents were applied to first lactation cows and significantly lower for multiple-lactation cows." (Aneshansley, Gorewit, and Price, J. Dairy Sci 75:2739, 1992).

The low milk fat production of cows exposed to electricity may be due to a diabetic condition. If electrical exposure depresses insulin release from the pancreas, absorption of glucose from blood into mammary cells may be limited. Glucose is essential for synthesis of milk fat in mammary cells. Further research is needed to assess this relationship.

Effects on Immune System of Cows Exposed to Overhead Transmission Lines:

Investigators in Italy, analyzed the blood cells and antigens of dairy cows housed 7 meters under a 380 kV transmission line. Cattle on farm A were exposed to 1.98 to 3.28 μT , whereas the values measured on the control farm B can be considered zero, except in brief periods (3 min 4 x per day) the measures were from 0.2 to 0.7 μT when the automatic feeder was running.

Results indicate that certain sub-populations of lymphocytes particularly CD4+/CD8 ratios indicate a depressing effect on blood cells and immunity that may be specific for ELF-EMF electrical exposure. (Calogero et al., Effects of EMF on Circadian Rhythms and Distribution of Some Leucocyte Differentiation Antigens in Cows, University of Padua, Italy, International Veterinary Conference, Quebec 2004).

Marino et al., at LSU Medical Center, concluded that power frequency fields produce changes in the immune system that were both real and inconsistent, thus linear relationships should not always be expected while statistical method for chaos were most helpful. Serotonin, the most important neurotransmitter in the body; and neuroreceptors in the brain were modified by EMF in experiments at several universities.

