

# Biological effects of overhead electric transmission lines: a technical or a social issue?

by Scott A. Smith

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*Scott A. Smith is an Environmental Analyst with the Siting and Environmental Section of the City Public Service Board of San Antonio in San Antonio, Texas.*

This controversial issue first became a reality at the City Public Service Board at a time when easements were being obtained for the construction of the 345,000 volt transmission line running from the South Texas Nuclear Project to San Antonio. In fact, the very first project I was asked to conduct at CPS was an inquiry into the environmental effects of overhead transmission lines. I was just out of graduate school, I was accustomed to spending long hours in libraries, analyzing tremendous amounts of written material. In retrospect, it's a good thing that I was asked to become involved in this project when I first came to CPS. Today I don't think I could devote the amount of energy necessary to dissect and inject such a voluminous and contradictory topic.

As an environmental analyst at CPS, I am paid to make subjective recommendations based upon the available literature. I have three file cabinets in my office stuffed with studies concerning the scientific aspects of the biological effects topic. It is a highly complex, multidisciplinary field of study. Chemistry, engineering, biology, physics, meteorol-

ogy, and geology are just some of the disciplines sharing the spotlight. Considering the staggering amount of time and effort that has been consumed in trying to quantify the alleged effects of OH transmission lines, it is truly remarkable that the answer to the question of effects remains as elusive and enigmatic as ever. The vast majority of the research conducted in this field unquestionably vindicates transmission lines from being the nasty characters as alleged. Also, should a study ever be initiated to quantify the benefits of the high voltage transmission of electricity as opposed to the environmental costs, I am confident that the results would weight overwhelmingly in favor of the continued utility of the lines.

So why all the fuss? Why do we see such a disparity within the scientific community when pondering the effects question? Part of the fault for this can be pointed at the scientific method itself. The scientific method of reason and logic works well in most cases of research, but encounters uncertainty when faced with having to prove the negative, that is, that there is no effect. Obviously, having to prove that something, anything, can or will not happen, is likely to be a difficult proposition at best. However, some research has indicated that biological effects do indeed

occur as the result of transmission lines. The supposition that biological effects do occur is hardly a surprise. The problem arises from the interpretation of these effects, that is, do they pose a hazard? Complicating the matter further is the fact that the effects seen in the laboratory are manifested in experimental animals, not humans, and the fact that the effects discovered are ever so subtle. It is for these reasons that research being conducted by such organizations as S.W. Research and Dr. Rogers has attracted the scrutiny of scientists everywhere. However, with all due respect to these efforts, I do not believe that we shall ever see a single definitive study resolve this issue. It shall remain controversial and open to personal interpretation for a long time to come.

The beginnings of this issue may have rooted originally in the laboratory in a purely academic fashion. But, the real catalyst that ensures its longevity is purely emotional in nature. Let me be more precise. The question of environmental effects from O.H. transmission lines really flexes its muscle in a court of law, and originates as a shout of protest from the landowner whose property is earmarked for a power line. The environmental effects question at this point becomes a tool, a point of leverage for the landowner and his legal advisors.



I recently came across a very interesting article that related an incident in Minnesota involving the routing of a 400,000 volt direct current transmission line through two-thirds of that state and two-thirds of North Dakota. The article described in gory details the struggle between two electric cooperatives exercising their right of eminent domain and the property owners to be affected by the line. The best screen writers in Hollywood could not have concocted a more representative case study than what occurred in Minnesota between August of 1973 and today.

The idea was to build a power plant in North Dakota, then transmit the electricity via the 400 KV dc line back to the distribution area of the two cooperatives involved, that area being the suburbs of Minneapolis-St. Paul. Upon discovery of the proposed line and its route, the landowners, primarily farmers, took their concerns to their respective county governments. The reason for this is because many Minnesota counties have zoning powers over cooperatives. Simply stated, the farmers wanted the counties to zone the lines off of their properties. In all, eight county governments became involved.

The cooperatives chose at that point to request the State to have the Minnesota Environmental Quality Board (MEQB) route the power line. The request was accepted in April of 1975. The effect of this landmark action was to remove local power from the decision making process, frustrate and anger the landowners involved and severely hamper their input into the siting of the line. One year later, the line had been routed by the MEQB over the objections of the farmers. These objections included:

1. The use of eminent domain by the cooperatives to take over private land.
2. The financial compensation due them for the land.
3. The loss of prime farmland for the project.
4. Preemption of county authority by the state.
5. The fear that power from the project would benefit metropolitan areas and not farms.
6. The lack of notice to landowners from the cooperatives, the state and the county.

7. The biological effects from these lines on their crops, farm machinery, animals, and families.


I called Sheldon Mains, the author of the article describing the events leading up to and following the routing of the Minnesota line. Mains was a key figure in the routing of the line and works for the Minnesota Environmental Quality Board. I asked Mains what the most important concern of the farmers was at this point. He concluded that, without a doubt, the farmers were primarily opposed to the "confiscation" of their property by the authorities, period. To Mains, the biological effect concerns developed coincidentally to property rights.

In addition to routing the line, the MEQB ordered the cooperatives to construct the line a minimum of 50 feet rather than 35 feet over agricultural land and to monitor ozone levels. They also asked the Minnesota Department of Health to conduct an inquiry into the health and safety effects of ac and dc lines.

A few months later, four counties in Minnesota filed a five million dollar damage suit against various Minnesota agencies, state officials, and the cooperatives. The suits were consolidated by the Minnesota Supreme Court, who appointed a special panel of three District Court judges to hear the case. On July 14, 1977, the panel ruled unanimously in favor of the State and the cooperatives. Particularly frustrating to the farmers was the decision by the panel that the preemption of county authority by the State was legal.


Meanwhile, surveyors were encountering opposition from farmers in the field. So much so that they requested protection by the National Guard.

As I read more about violent opposition to the construction of the line, I began to wonder about the inhabitants of this area of Minnesota. Looking into the census statistics for that area, I found it to be largely agrarian in nature (as expected). But the history on the four county areas in question was much more interesting. It seems that this is the birthplace of the Populist movement



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back in the 1930's. During the Depression, the banks in these counties were controlled by banks in Minneapolis-St. Paul. When the city holding companies fell, as a result of the Depression, they also took with them the county banks where the farmers kept their savings. Recovery from the Depression brought the Populist Movement and a Populist governor for the first time in history to the State of Minnesota. Furthermore, the area was originally settled largely by German homesteaders. These settlers developed strong ties to the land. Their land and their independence was to them like a religion. Generations later, it still is.

Originally, electricity came to this area to be consumed locally. Having a power line run across a farmers field was well worth the price to pay for the luxury that electricity offered. But in this case, they do not benefit from this electricity. Through their eyes, the urban areas will reap the benefits at the farmers expense. So when in 1978 construction workers on the line required protection from the State Highway Patrol, power line towers were toppled, insulators were damaged by gunfire, and mass demonstrations caused work to come to a halt at several locations, it was becoming clear that the people were not as concerned about the subtleties of biological effects, but rather the audacity of the electric company's confiscation of their property.

In October of 1977 the Minnesota Department of Health published the results of their special study into the safety and health effects of the transmission lines as requested by the MEQB. I will quote to you the following conclusions from the report: "With regard to HV lines, insufficient research and experience exists to propose any meaningful performance standards . . . that have an objective of protecting public health. As a general observation, there does not seem to be as much concern among the scientific community over dc fields . . . The subject is controversial, and considerable further research is unquestionably warranted." The report went on to say that "As yet, there is no evidence whatsoever suggesting any effect on health or a sense of well-being from the intermittent exposure experienced in the transmission line environment. Nor

has a theoretical basis for the presumption of effects been postulated." They then made a final statement destined to become a truism, and that was that "This is a particularly important point, for it forces research into the biological effects of power frequency fields to be exploratory or observational, rather than rigorous experimental studies designed to accept or reject specific hypotheses." In my opinion, what the study did accomplish was to *not* show that something cannot happen in nature. This fact would continue to fuel the flames of hope of the protesters for the next three years. All legal efforts had failed to stop the takeover of their land for the project. All that was left was to shackle the project to the environmental/biological effects issue. Shortly thereafter, another scientific advisory board was established to resolve the conflict. Their report concluded in 1982 that "there is no scientific basis to believe that the electric and magnetic field or air ions produced by the . . .  $\pm 400$  KV power line pose a hazard to human or animal health." Another study, conducted by the University of Minnesota Veterinary College to determine if the line would effect the production of milk by cows near the line, found no correlation between proximity to the line and milk production. Furthermore, the presence of a field voltage from the line was determined to be non-detrimental to the reproductive ability of the dairy herd.

As of today, there have been no new lawsuits filed in conjunction with the transmission line. The line has been operating for four years without major incident. The latest action occurred in March of 1983, when a bill was introduced into the Minnesota House of Representatives requiring that a standard be set by 1984 for small air-ion concentrations generated by transmission lines. The case came to a halt. The impact of any potentially negative effects study from this point became fruitless.

In retrospect, the chairman of the scientific advisory board set up to study the biological effects concluded, "The more remote that scientific knowledge is from the senses of the average man or woman, the more people are distrustful of what scientists tell them. People distrust what they cannot understand, and

they can neither understand science nor the phenomenon surrounding dc power lines." This statement is true, but I think that much more accurate and illustrative of the underlying irony characterizing the issue, was a statement made by none other than a representative of GASP (General Assembly to Stop the Powerline). He concluded that, "The science upon which this committee is likely to focus its attention . . . is but one of many facets of this controversy. It is only one part of a difficult problem, *and that problem is fundamentally a social one, not a scientific one.*" I wholly agree with that statement.

In every condemnation case where the biological effects of transmission lines becomes an issue, the social aspects of condemnation are overriding. The case originates as a social issue and terminates as a social issue. Although research indicates that transmission lines are biologically non-hazardous, the question of effects will still occasionally emerge only to cloud the real conflict, which is the condemnation of private property for the public good. As right-of-way professionals, you help to initiate the condemnation process which throws the social issue into gear. What you do, how you behave professionally and personally at the beginning stage of an eminent domain exercise will largely determine the success of negotiations between the company and the landowner. Through good communication and a sincere concern for compromise in this early stage, I think a settlement can be reached without introducing the biological effects question.

I don't mean to imply that a fear of the possible effects of electricity is not legitimate. The fact that electricity is as invisible as it is powerful does not help to allay these fears. I recall an individual living near the South Texas Nuclear Project right-of-way who called our offices and wanted to know how the radioactivity from the nuclear reactor would effect his cows. He sincerely thought that we transmitted radioactivity through the power line. There are probably others out here who think this also. Through education and understanding, perhaps the public will become less ignorant and emotional about the so-called invisible threat posed by power lines. That is a challenge that I face.

The ordinary landowner is just as ignorant of the sophisticated methods used by the right-of-way agent when representing his company. You as a right-of-way professional have a responsibility to the landowner to maintain a high level of trust and understanding. Moreover, you are as vitally involved, as knowledgeable, and as influential as any single actor in the biological effects play. This is because in the long run, it is first a social issue and second a scientific one.

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## Easements: buyer refuses to carry out purchase agreement because of power lines crossing property

You're selling land which has high voltage power lines running across it. You get a purchaser under contract. You're looking forward to closing when the purchaser informs you that he is backing out of the deal because of the power lines. Can he do that? This question was recently presented to the North Carolina courts.

**Power lines in the way.** Paul and Alma Waters owned 1,712 acres in Pamlico County which the North Carolina Phosphate Corp. sought to acquire. The mining company planned to assemble the tract with other property in the area in order to have sufficient land for its operations. Along the western boundary of the Waters tract a high-voltage power line ran for 8,550 feet on five steel towers. The power line was erected pursuant to a 100-foot-wide easement in favor of the Carolina Power and Light Co. recorded in the usual manner. The Waterses and the mining company executed a purchase contract which included the following provision: "It is specifically understood and agreed that this property shall be conveyed subject to no encumbrances not satisfactory to BUYER." The mining

company subsequently reneged on the contract, giving the excuse that the power lines would have interfered with assemblage of mining lands. The Waterses sued for specific performance of the contract. When the Waterses came up on the losing end, they took their case before the North Carolina Supreme Court.

**Visible physical burden.** The court considered the rule of conveyances of land with visible physical burdens which provides that a seller's promise to give title free and clear of encumbrances is not breached through the presence on the premises of visible physical burdens known to the buyer. The rule serves the same function as recorded notice of the existence of the burden. Because it has such a function, the court held that the rule has no application where, in fact, there is recorded notice of the burden in question. Thus, the court rejected the Waterses' argument that the obviousness of the power line took it outside the meaning of "encumbrance" as that term was used in the purchase contract.

**Material interference.** The court treated the power line simply as an easement. Said the court, an easement materially affecting or interfering with the full use or enjoyment of the land constitutes an encumbrance. The court then ruled that the power line easement, by standing astride the lands which the buyer wanted for mining purposes, would so affect and interfere with property use that it had to be deemed an encumbrance. The court was swayed in this direction by the fact that the power lines ran through without distributing electricity locally and, therefore, conferred no benefit to the property which they crossed. Thus, the mining company could refuse to buy the land. (*Waters v. North Carolina Phosphate Corp.*, 312 S.E.2d 428 (N.C. 1984).)

**Observation:** Just because a power line must be obvious to the buyer does not necessarily mean that the buyer cannot later use the power line as an excuse if he wants out of a purchase contract. The buyer should be made to agree in writing that conveyance will be subject to the burden.

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