

# International Agency for Research on Cancer



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Data Center  
Missouri Public  
Service Commission

"Overall evaluation"  
"Extremely low-frequency magnetic fields are possibly carcinogenic to humans (Group 2B)"

<http://monographs.iarc.fr/ENG/Monographs/vol80/mono80-6E.pdf>

## 5.5 Evaluation

There is limited evidence in humans for the carcinogenicity of extremely low-frequency magnetic fields in relation to childhood leukaemia.

There is inadequate evidence in humans for the carcinogenicity of extremely low-frequency magnetic fields in relation to all other cancers.

There is inadequate evidence in humans for the carcinogenicity of static electric or magnetic fields and extremely low-frequency electric fields.

There is inadequate evidence in experimental animals for the carcinogenicity of extremely low-frequency magnetic fields. No data relevant to the carcinogenicity of static electric or magnetic fields and extremely low-frequency electric fields in experimental animals were available.

Overall evaluation  
Extremely low-frequency magnetic fields are possibly carcinogenic to humans (Group 2B)

Static electric and magnetic fields and extremely low-frequency electric fields are not classifiable as to their carcinogenicity to humans (Group 3)

<http://monographs.iarc.fr/ENG/Monographs/vol80/index.php>

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans  
Volume 80 (2002) Non-Ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields

View full volume (429 pages, 1.8 Mb)

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Date 9-4-14 Reporter \_\_\_\_\_

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Hamilton, MO

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# Bionitiative Report's findings are flawed regarding GBE

August 20, 2014

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*Editor's note: The following letter was sent in response to the July 23-29 guest column "Beware: GBE would create health risks," by Jeanette Carothers.*

As a project manager at Clean Line Energy and someone who has a background in the wind industry and would like to see it continue to grow, I would like to address some of the misleading statements made in the recent article published in *The Rock River Times*, "Beware: GBE would create health risks."

This article, published July 23, states that the Grain Belt Express project would "impose health hardships upon residents." As support for this claim, the author cites a document (The Bioinitiative Report) posted on the Internet by a group of individuals who have expressed concern about extremely low frequency (ELF) fields from alternating current (AC) transmission lines, distribution lines, home wiring, and appliances and radio frequency fields (RF) from mobile phones and similar sources. These ELF and RF fields are of an entirely different frequency and character than the direct current (DC) static fields from a DC transmission line. For example, unlike ELF magnetic fields, the static magnetic field from a DC line is the same as that produced by the Earth itself (which causes a compass needle to point north) and is of lower intensity.

The fact is that none of the studies in the Bioinitiative Report pertain to DC lines, and effects of DC fields are not discussed at all. Because of the differences between AC ELF and DC fields, none of the quotations from the Bioinitiative Report in the July 23 article regarding AC ELF fields are relevant to exposures to DC fields.

Despite extensive research, neither the International Agency for Research on Cancer, one of the world's leading authorities on cancer, nor the World Health Organization, have found that there is an adequate basis to conclude that DC fields at levels produced by DC lines contribute to cancer or other health effects. See <http://www.who.int/peh-emf/publications/facts/fs299/en/>.

I strongly urge folks to gain a full understanding of direct current technology from nationally and internationally trusted sources. At Clean Line Energy, safety is among our chief concerns as we strive to treat landowners with the utmost respect.

Adhar Johnson  
Manager, Clean Line Energy  
St. Louis

*From the Aug. 20-26, 2014, issue*

### Please Do Turn to Trusted Sources Regarding GBE

The recent editorial by Adhar Johnson, Clean Line Project manager has been expected, and her bias should be obvious. The information provided in the June 6 article, *Transmission Line Health Problems Brought to Light*, by Connie Duvall, was very careful to address ONLY the types of fields produced by high voltage lines.

“My reputation is on the line in the community in which I live and serve, and the information used was carefully screened for accuracy. Since the June 6th article, additional studies have been uncovered which directly name HVDC lines as the culprit in adverse health effects. The information from the studies repeatedly questions the "trusted" sources quoted by ‘Clean Line’ Energy’s advocates. This technical information will be used in November to testify before the MO Public Service Commission in Jefferson City.”  
(Above Statement by Dr. Dennis Smith)

‘Clean Line’ managers and land developers have been flooding papers in would-be affected counties with their propaganda, touting their passion for wind energy. These power lines have little if anything to do with wind energy as they are not needed to utilize it. ‘Clean Line’ execs typically implore the public to turn to trusted sources, which is exactly what we want them to do.

After all, the area of education of the Grain Belt Express (GBE) pushers is business and communications; their expertise is in the art of the deal, how to manipulate statements to their advantage, and how to turn a fast buck. Is this reason to trust them? They have determined to discredit Dr. Smith because his research threatens their venture. Along with discounting him, they must also take down the numerous scientists, electromagnetic experts, and doctors who have done countless studies pointing to the harms of this type of EMF exposure.

Adhar Johnson, ‘Clean Line’ manager attended the Randolph county commissioner public meeting where a gentleman emotionally testified of his wife’s oncologist’s admonition that such a power line would necessitate their relocation. In a meeting at Rothwell Park Adhar told me that the doctor had no business saying that, and then she handed me Clean Line’s go-to documentation of the one out-dated statement made by the World Health Organization (WHO) that there were no known health risks. Much more recently, the WHO has revised their statement and has classified the emissions from these lines a class 2B carcinogen, as has the Environmental Protection Agency. HUD has ruled the lines and towers “a hazard and a nuisance”, and FHA appraisals have to be adjusted to address the effect these lines have on marketability of properties near the lines. The highly respected, non-partisan, U.S. Government Accounting Office expressed many of the same concerns voiced by citizens regarding HVDC lines in its report to Congress in 2008.

Dr. Smith is trusted in this community as he has been in all communities in which he’s lived. I make no apologies in stating that he has had a stellar medical career, having graduated in the top 5% of his medical class and having received multiple awards and accolades for his single-minded service to his God-given mission in Public Health. He maintains excellent rapport with former hospitals where he has been employed and would be

whole-heartedly welcomed back to any of those facilities. Consider also the editorials that have been submitted by the many respected members of the community, your long-time friends and associates who oppose this line. Shall we then trust some wealthy business people whose real passion is increasing their profits, or should we trust scientists and doctors who are devotees to public health and safety? It's not a difficult choice.

Sincerely,  
Laurie Smith  
Moberly, MO  
660-263-1132

o NEWS NOW

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## • Line's health problems brought to light

- **Doctor finds independent study to show direct current lines can cause cancer in young children**

- **By Connie Duvall**  
MMI Reporter

Posted Jun. 6, 2014 @ 10:34 am

Grain Belt Express Clean Line has been working since 2010 on promoting a direct current transmission line proposed to travel across Missouri.

Many landowners are opposed to the line for various reasons. The most discussed is eminent domain (the taking of land without landowners agreement) and land values. High on the list is possible health risks.

Dr. Dennis Smith, a Randolph County landowner, and his wife, Laurie, visited the Moberly Monitor-Index last week to discuss information he researched concerning health issues a direct current line could have on humans.

Up to this point, the Moberly Monitor-Index had no information that could confirm health issues connected to high voltage direct current transmission lines.

This year, on May 20, Michael Skelly, President of Clean Line stated, "There are no known health effects of a power line like this."

As a physician, Dr. Smith has access to multiple medical research sites. He undertook a detailed search for unbiased independent studies, which provides evidence of detrimental effects direct current transmission lines do have on humans.

He was careful to limit his search to static electricity and electromagnetic radiation, both of which are documented to be produced by high voltage direct current (HVDC) lines. He adds, "Because these lines were first used in Europe, most of the research is done in Europe, and initially was difficult to access." The information Dr. Smith found is information he wants to share with all Missourians.

Dr. Smith is upfront with his stand on the Clean Line project. "I am opposed to GBE," says Dr. Smith. "I would not comment until I had a chance to research the facts."

First, he was opposed based on an abuse of eminent domain by a private for-profit company. Later, he discovered that a tower would be on his 80-acre farm, and transect it at the 1/3-to-2/3 line of the farm, directly over a site Dr. Smith and his wife discussed building a smaller home on when they turn their farm over to their daughter.

Dr. Smith's research led to a 2012 multitalented group of concerned scientists gathered to independently review over 1,800 new studies done in five years prior to their meeting. Not all were related to the effects of HVDC lines. Much of the 1,479-page document was used to review the effects of radio frequency exposure for cell phones and cell phone towers. There were enough studies and evidence-based results to cause them to make some serious conclusions. Dr. Smith invites all to visit the website:

<http://www.bioinitiative.org/report/wp-content/uploads/pdfs/BioinitiativeReport2012.pdf>. Once you are there, click on the left side (Bioinitiative Report) to open the document.

The Bioinitiative 2012 Report was prepared by 29 authors from 10 countries, with 10 holding medical degrees (MDs); 21 holding PhDs; and three holding MsC, MA or MPHs. Among the authors are three former presidents of the Bioelectromagnetics Society, and five full members of BEMS.

**Page 2 of 2** - They concluded, as scientists reviewing the literature, that standard setting processes were driven by commercial interests.

Actual health findings based on the evidence states, "Power lines and other sources of ELF are consistently associated with higher rates of childhood leukemia and resulted in the International Agency for Cancer Research (an arm of the World Health Organization) to classify ELF as a Possible Human Carcinogen (in the Group 2B carcinogen list). Leukemia is the most common type of cancer in children.

"There is little doubt that exposure to ELF causes childhood leukemia."

It also states, "Increased risk for childhood leukemia starts at levels almost 1,000 times below the safety standard."

The World Health Organization ELF Health Criteria Monograph No. 322 (2007) says that other childhood cancers "cannot be ruled out." The WHO is the same organization that Michael Skelly, President of Clean Line, frequently uses to support Clean Line's claim of no health effects.

Another study looked at what risks for cancer a child would have later in life, if that child was raised in a home within 300 meters of a high-voltage electric power line. For children who were raised for their first five years of life within 300 meters, they have a lifetime risk that is 500 percent higher for developing some kinds of cancers. A study by Lowenthal et al. investigated leukemia in adults in relation to residence near to high-voltage power lines. The study provides support for two important conclusions: adult leukemia is also associated with EMF exposure, and exposure during childhood increases risk of adult disease.

Dr. Smith's wife, Laurie, says, "There are a number of cancer survivors along the projected route. These people have a predilection to recurrence or relapse. Studies show that the risk of recurrence for children who have already had leukemia is hundreds of times greater. To proceed with this project, knowing the mounds of independent, unbiased evidence of the dangers, which have been documented by the bioinitiative group, is implicitly saying that families located along the power line must be sacrificial lambs for big, private business."

Would land values be an issue with the proposed direct current transmission line? Next week, the Monitor-Index will provide information gathered from several states on property values near high voltage lines.

Read more: <http://www.moberlymonitor.com/article/20140606/News/140609221#ixzz3BG0aBPP2>



# CLEAN LINE ENERGY PARTNERS FACT SHEET

## UNDERSTANDING ELECTRIC AND MAGNETIC FIELDS OF HVDC LINES

High voltage direct current (HVDC) transmission lines offer significant electrical, economic, and environmental advantages for the transport of electricity over long distances. HVDC is a well-established technology with decades of safe and reliable operation across the world. HVDC is particularly well-suited to transport large amounts of renewable power generated in remote areas over long distances to demand centers. Currently, there are more than 20 HVDC transmission facilities in the United States and more than 35 across the North American electric grid.

### STATIC ELECTRIC AND MAGNETIC FIELDS

The electric and magnetic fields produced by direct current (DC) lines are referred to as static fields because their sources, voltage and current, do not alternate over time. Thus, DC fields are qualitatively different in nature than the alternating current (AC) electric and magnetic fields (often called EMF) produced by AC transmission lines. While AC EMF can cause the induction of currents or voltages in nearby objects, this does not occur with DC fields. DC electric and magnetic fields are identical to those found in the natural environment.<sup>1,\*</sup>

#### Static Electric Fields

Static electric fields occur as a result of voltage. Natural sources of static electric fields include the electric fields produced by the charge on a body after shuffling across a carpet or the “static cling” found on clothing.<sup>2</sup>

#### Static Magnetic Fields

Static magnetic fields result from the flow of DC electricity. The steady flow of currents in the Earth’s core produces the static “geomagnetic” field that causes a compass to point north. Common sources of static magnetic fields much stronger than those associated with DC transmission lines include permanent magnets, battery-powered appliances (e.g., telephones, electric tooth brushes, hearing aids, laptops, etc.) and some electrified railway systems.<sup>2</sup>

Static electric and magnetic field levels close to common sources.

ELECTRIC FIELDS	
Source	Electric Field Level
Friction from walking across carpet (at body surface)	Up to 500 kV/m
Computer screen (at 30 centimeters)	10-20 kV/m
± 500 kV DC transmission line (standing beneath conductors)	20-30 kV/m
MAGNETIC FIELDS	
Source	Magnetic Field Level
MRI machines	15,000,000-40,000,000 mG
Refrigerator magnets	10,000-50,000 mG
Battery-operated appliances	3,000-10,000 mG
Electrified railways	<10,000 mG
The Earth	300-700 mG
± 500 kV DC transmission line (standing beneath conductors)	300-600 mG

mG – milligauss

kV/m – kilovolt per meter (1 kV/m = 1,000 volts/m)

### RESEARCH ON THE IMPACT OF STATIC FIELDS

Much of the research on static fields has focused on the strong magnetic fields associated with certain occupational exposures and the operation of MRI machines. The International Agency for Research on Cancer (IARC)<sup>3</sup>, the World Health Organization (WHO)<sup>2</sup>, and others<sup>1,4,5</sup> have all concluded that the current body of research does not indicate that strong static electric or magnetic fields cause long-term health effects.

Research has also been conducted to assess the impact of DC transmission lines on farm and ranching operations. Noteworthy findings from this research include:

- A ±400 kV DC line did not affect crops, vegetation, or nearby wildlife; nor were the fields perceived by persons walking on the right-of-way<sup>6</sup>
- No differences were found between cattle and crops raised under ±500 kV DC transmission lines and those raised away from the lines<sup>7</sup>
- Multiple indicators of herd health did not differ between periods before and after a nearby ±400 kV DC line was energized or with distance from the line in a study of over 500 herds of dairy cattle<sup>8</sup>



\* DC transmission lines are not connected to AC distribution systems. Therefore, they are not sources of AC voltages on farm or building equipment that can cause disturbances to livestock (i.e., stray voltage).



## CORONA PHENOMENA

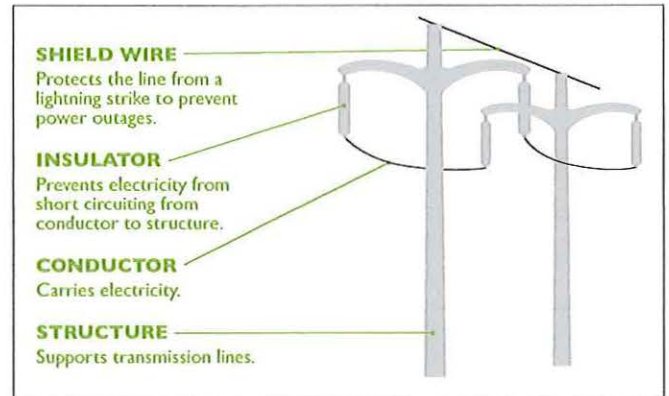
Corona refers to the partial electrical breakdown of the air surrounding points on the transmission line conductor surface by the electric field. This breakdown results in the release of small amounts of energy that may be detected near the line as audible noise and "static" on radio and analog television receivers. The US Environmental Protection Agency (EPA) and the Institute of Electrical and Electronic Engineers (IEEE) have established guidelines for the production of such noise and static, which are met in the design and construction of a HVDC transmission line.

Corona also creates air ions, which are molecules that have temporarily gained or lost electrons. Air ions also occur as a result of geologic, atmospheric, weather-related and combustion phenomena. Some air ions from DC transmission lines remain in the air for seconds before contacting an opposite charge or transferring charge to aerosol particles. Air ions and charges on aerosols collectively are called "space charge," and their presence adds to the static electric field of a DC transmission line. Space charge has been studied for over one hundred years.

**No health agencies have proposed exposure limits for space charge or confirmed any health risks from this natural phenomenon.**

## ELECTRONIC DEVICES

The static fields of DC transmission lines are too weak to affect the operation of implanted medical devices such as cardiac pacemakers. As already noted, the corona from DC transmission lines can produce AM radio and analog TV picture signal interference. This interference is typically limited to within approximately 100 feet of the transmission line. Due to right-of-way requirements, such noise interference has not been a significant issue for most landowners. Cellular telephones, GPS receivers and other electronic equipment are used near existing DC transmission lines without issue. Thus, the possibility of interference with the operation of such devices is unlikely.



A DC transmission line has two conductor bundles called "poles." Conductors are the wires that hang from the towers and are often bundled in groups of two or three. Like a car battery, the two bundles of DC conductors have opposite polarity, one positive and one negative. The voltage of a DC transmission line, therefore, is usually referred to as  $\pm$  (plus-minus) voltage. For example, a 500 kilovolt (kV) DC transmission line is referred to as a  $\pm 500$  kV DC transmission line.

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