

Electric and Magnetic Fields



The following information about electromagnetic fields (EMF) and their effects on health comes from scientists and researchers who have studied this phenomenon since the early 1970s.



What are electromagnetic fields?

EMFs are invisible forces created by any electric charge. Electric fields are the result of the strength, or concentration, (voltage) of the electric charge. Magnetic fields are the result of the motion (current) of the charge. Together, these fields are referred to as electromagnetic fields.

EMFs are everywhere in modern society. Everyone is exposed to them in varying degrees. Electric currents deep in the earth's core produce the earth's strong magnetic field. And all power lines and electrical devices — appliances, cell phones, household wiring — produce EMFs.

The magnitude of EMFs decreases rapidly as you move farther from the source.

EMFs associated with electricity are considered extremely low frequency (ELF) fields because, at 60 Hertz (Hz), they are at the extreme low end of the electromagnetic spectrum.

How are EMFs measured?

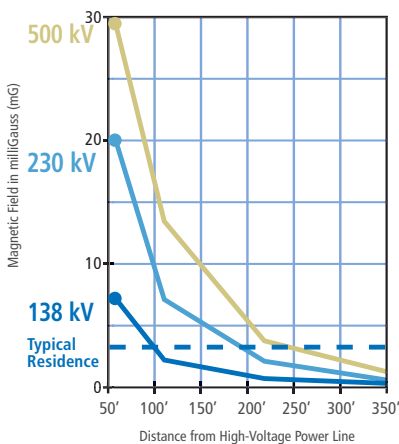
EMFs can be measured with instruments or calculated with computer programs. Electric fields are typically measured in volts per meter (V/m) or kilovolts per meter (kV/m). Magnetic fields are typically measured in milligauss (mG).

An EMF meter can measure the strength of electric and magnetic fields in a specific area for comparison purposes.

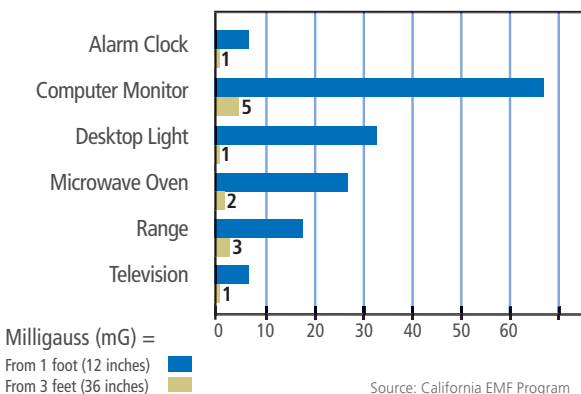
Magnetic fields and Distance

Depending on the type of line and its current, magnetic fields from power lines at a distance of 100 feet become less than those produced by the typical residence.

Magnetic fields and distance from high-voltage power lines in comparison to typical fields in residences that are not near high-voltage lines. Data is from the US National Research Council.



Examples of typical magnetic field strengths at specific distances (12" and 36") from appliance surfaces:



Source: California EMF Program



What are the known health effects of EMFs?

Researchers have studied ELF-EMFs since the early 1970s in response to questions about the possible health effects of EMFs near power lines. This research has not shown that long-term low-level exposure to ELF-EMFs has detrimental effects on health.

Major research on EMFs and potential health effects has been performed in the following four areas:

Epidemiology

Epidemiology is the science that looks for patterns in human diseases, such as cancer and leukemia. Epidemiological evidence of a link between ELF-EMF exposure and health effects ranges from weak or inconclusive to non-existent.

Animal Studies

These studies examined EMFs' biological effects on animals, such as rodents, to determine if exposure was linked to cancer. Studies were performed at a variety of exposure levels over several generations. Data did not show any connection between exposure to ELF-EMFs and increased likelihood of cancer.

Biological Studies

Generally, cancer is caused because cells or DNA have been damaged. Biological studies have not found any consistent evidence that ELF-EMF exposure damages either cells or DNA.

Clinical Studies

Clinical studies test the results of exposure in human volunteers to ELF-EMFs at levels higher than generally encountered in residential or work environments. Human responses have been detected at extremely high field strengths, but these responses are not generally associated with health hazards.

- The American Cancer Society reviewed a January 2000 study that did not find any association between EMFs and childhood cancer: "This was a nice, large, population-based study. It found no evidence of an association of EMF and acute lymphoclastic leukemia, all leukemias, central nervous system tumors, and all other malignant disease."
- A 1996 report by the National Research Council stated that "after examining more than 500 studies spanning 17 years of research, the committee said there is no conclusive evidence that EMFs play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems."
- A recent comprehensive study, by the Institute of Cancer Epidemiology — Danish Cancer Center in Denmark and published in the December 2006 Journal of the National Cancer Institute, evaluated cell phone records of more than 420,000 people between 1982 and 1995 to determine if EMFs from cell phones were associated with any increase in cancerous tumors or a heightened risk of leukemia. The study did not find any evidence of any link to cancer.
- The World Health Organization recommends caution when judging EMF-related reports by the media and other groups.

Are there any established electromagnetic field exposure limits in Idaho?

NO. Some states have them, but none have been established for Idaho. A great deal of animal testing and cell biology research has been conducted worldwide, but even exposure to very strong ELF-EMFs has never been identified as a cause of cancer or any other disease. Scientists, therefore, cannot identify any level of ELF-EMFs that are harmful. Since no level of exposure has been shown to be hazardous, the federal government has not adopted any environmental EMF-standards.

Some government and private organizations have issued advisory limits or guidelines. These limits or guideline ELF-EMF levels, however, are well above the low levels of EMF typically found in homes, schools and offices, or even the EMF exposures being studied in relation to childhood leukemia.

For example, the International Commission on Non-Ionizing Radiation Protection recommends limiting public exposure to magnetic fields of 2,000 mG or less. Most homes have average levels of 20 to 30 mG or less.



Frequently Asked Questions

Do EMF levels increase when the voltage of a line increases, like rebuilding a 69-kV line to 138 kV?

The magnetic field of a power line depends on the current in the line and the distance from it. When the voltage of a line is increased, it requires greater clearance and, thus, greater distance from the ground. And when voltage is doubled, as in this example, the current drops by half.

In fact, increasing a line's voltage from 69 kV to 138 kV can reduce magnetic field exposure by as much as two-thirds, due to increased distance from the ground and decreased current.

Do underground power lines limit EMFs?

Underground lines' maximum magnetic fields are generally stronger than from overhead lines, though intensities vary based on construction methods and other factors.

Should I have an EMF strength reading done?

If you have questions or concerns about EMFs that are not addressed here, please feel free to contact Idaho Power. We can measure EMFs in and around your home or business and discuss the results with you.

Should I limit my exposure to electrical appliances?

Research doesn't indicate any need to change the amount of time or the way people use electrical appliances.

Additional Resources on EMFs

National Institute of Environmental Health Sciences

U.S. Department of Health and Human Services

www.niehs.nih.gov/health/topics/agents/emf

World Health Organization Electromagnetic Fields

www.who.int/peh-emf/en

International Commission on Non-Ionizing Radiation Protection

www.icnirp.de/PubMost.htm

See Low-frequency reports

www.icnirp.org/en/frequencies/low-frequency/index.html

Government of Canada

Health Canada

www.canada.ca/en/health-canada/services/home-garden-safety/electric-magnetic-fields-power-lines-electrical-appliances.html

www.radiationsafety.ca/resources/factsheets/information-on-emf

National Cancer Institute

National Institutes of Health

www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet



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