

## Can AC electric and magnetic fields cause audible noise or radio/television interference?

Possibly, effects on amplitude-modulated (AM) radio stations may be noticeable, particularly when crossing underneath a transmission line. Effects may also be noticeable when viewing television stations that still broadcast with analog signals outside major population areas, particularly when one is both very close to a transmission line and far from the broadcasting station. Frequency-modulated (FM) radio stations, cable television, and television stations that broadcast with digital signals are rarely affected. Adherence to Canada's and Manitoba's electrical codes and standards will minimize possible effects.

For more information, please visit the following websites:

### Canada

#### Health Canada

<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/environ/magnet-eng.php>

#### BC Centre for Disease Control

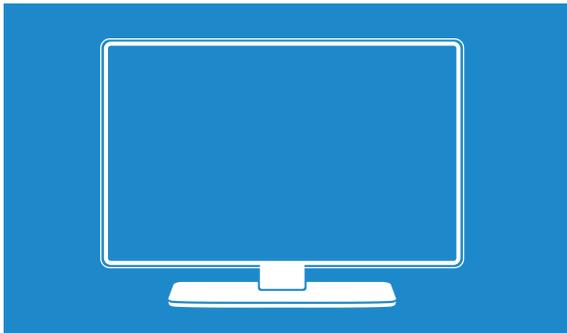
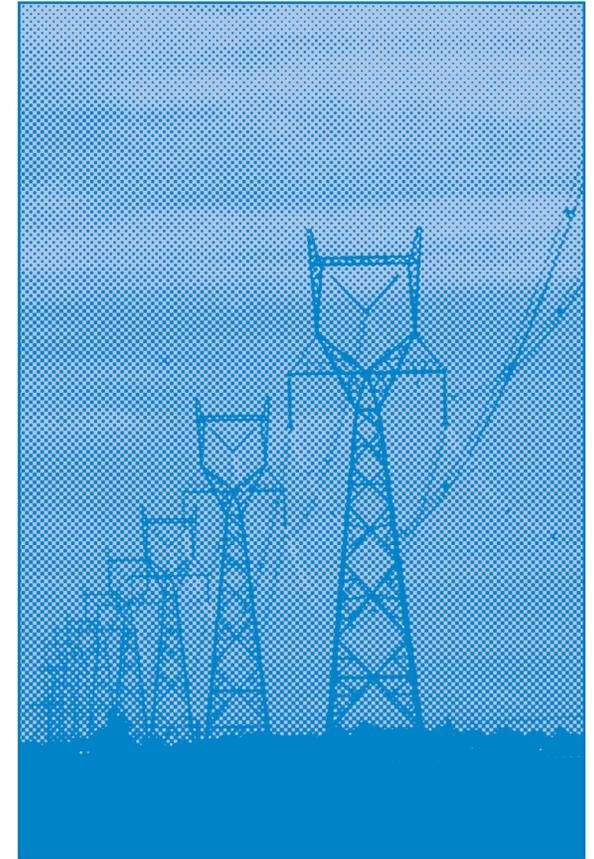
<http://www.bccdc.ca/NR/rdonlyres/E1B06155-6B2A-419E-95C0-3CA6A0F-A17BF/0/R1N01.pdf>

### International

#### World Health Organization

<http://who.int/peh-emf/about/en/>

# Alternating Current Electric and Magnetic Fields



This brochure was created by epidemiologists and biological scientists in the Health Sciences Practice of Exponent, a leading firm in scientific and engineering disciplines. ©October 2013.

**Exponent**  
Engineering and Scientific Consulting

 **Manitoba  
Hydro**

Manitoba Hydro is a crown corporation that generates and distributes electricity to customers in Manitoba. This electric system and any device connected to it produces alternating current (AC) electric and magnetic fields (EMF) that oscillate at a frequency of 60 Hertz (Hz).

This brochure describes EMF, the health research that has been conducted, and the conclusions offered by various scientific agencies on AC EMF and effects on human health.

## What are AC electric and magnetic fields?

Manitoba Hydro's electric system carries power from generating stations to customer's homes by way of transmission lines, substations and distribution lines. Each component of this system — from the transmission lines that carry the electricity to the appliances that use the electricity — produces EMF in the extremely low frequency range that includes 60 Hz.<sup>[1]</sup> In scientific terms, a field describes the properties of space surrounding an object due to the characteristics of the object. A temperature field, for example, surrounds a warm object, just as both electric fields and magnetic fields surround electrical objects.

## What do health and scientific agencies say about EMF?

In the past 35 years, several thousand research studies have investigated the potential health effects of EMF in human populations, laboratory animals and cells. Numerous scientific and health agencies have evaluated this body of research, including the World Health Organization, the International Agency for Research on Cancer and Public Health England.<sup>[2]</sup> In Canada, the topic has been evaluated by the Federal Provincial Territorial Radiation Protection Committee (FPTRPC). The FPTRPC is an intergovernmental Canadian committee assembled to harmonize the standards and practices for extremely low frequency EMF

within federal, provincial and territorial jurisdictions. Health Canada refers to the FPTRPC as the authority on issues related to EMF. The FPTRPC established an extremely low frequency working group to carry out periodic reviews, to recommend appropriate actions and to provide position statements that reflect the common opinion of intergovernmental agencies.

The conclusion of these scientific agencies has been generally consistent. Overall, they concluded that the research does not show that either electric fields or magnetic fields are a known or likely cause of any disease, including cancer. They also concluded that while some statistical data suggests a relationship between childhood leukemia and rare exposure to high average magnetic field levels, the uncertainty associated with these findings and the lack of support from experimental studies does not support a true causal relationship. Please see the end of this brochure for additional sources that provide more details about these agencies' conclusions

## What are the specific conclusions of agencies in Manitoba and Canada?

The FPTRPC concluded "...there is insufficient scientific evidence showing exposure to EMFs from power lines can cause adverse health effects such as cancer." (See [www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/emf-cem-eng.php](http://www.hc-sc.gc.ca/ewh-semt/radiation/fpt-radprotect/emf-cem-eng.php) for more.) Also, the Manitoba Clean Environment Commission recently concluded that while "...some Manitobans are concerned about theories that EMFs from transmission lines can be harmful, ultimately decisions need to be made on the basis of international scientific consensus, and the scientific consensus is that there is no evidence for these concerns about EMFs."

## Are there any standards or guidelines to limit exposure to AC EMF in Canada?

Canada does not have any national, territorial, or provincial standards or guidelines related to extremely low frequency EMF.

## What does Health Canada recommend?

Health Canada states, "You do not need to take action regarding typical daily exposures to electric and magnetic fields at extremely low frequencies. There is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living and working environments."

## Do AC electric and magnetic fields affect animals and plants?

Numerous research programs have been created to study the effects of extremely low frequency EMF on wild and domesticated animals; the largest of these research programs was conducted at McGill University in Quebec. Overall, this research has not found any relationship between EMF and the health, behaviour, or productivity of animals, including cows, pigs and sheep. Furthermore, studies of crops and other plants have reported no adverse effects on growth or viability.

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<sup>[1]</sup> Extremely low frequency EMF is different than radio frequency fields, such as those produced by mobile phones and radio and TV stations.

<sup>[2]</sup> Public Health England is the successor agency to the National Radiological Protection Board and the Health Protection Agency.