

**International Agency on Research on Cancer (IARC)**  
***Monograph on Non-Ionizing Radiation, Part 1:***  
***Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields***  
**Volume 80 2002**

**LIST OF ABBREVIATIONS**

**AC:** alternating current  
**ALL:** acute lymphoblastic leukaemia  
**AMEX:** average magnetic exposure (a personal exposure meter)  
**AML:** acute myeloid leukaemia  
**ANLL:** acute non-lymphocytic leukaemia  
**bw:** body weight  
**CI:** confidence interval  
**CLL:** chronic lymphocytic leukaemia  
**CML:** chronic myeloid leukaemia  
**DC:** direct current  
**DMBA:** 7,12-dimethylbenz[*a*]anthracene  
**EEG:** electroencephalogram  
**ELF:** extremely low frequency (the frequency range from 3–3000 Hz)  
**EMDEX:** electric and magnetic field digital exposure system (a personal exposure meter)  
**ENU:** *N*-ethyl-*N*-nitrosourea  
**Fe<sub>3</sub>O<sub>4</sub>:** magnetite  $\gamma$   
**GT:**  $\gamma$ -glutamyltranspeptidase  
**GST-P:** glutathione-*S*-transferase, placental form  
**HRV:** heart rate variability  
**ICD:** International Classification of Diseases  
**IEC:** International Electrotechnical Commission  
**IEEE:** Institute of Electrical and Electronics Engineers, USA  
**JEM:** job–exposure matrix  
**MDS:** myelodysplastic syndrome  
**MNU:** *N*-methyl-*N*-nitrosourea  
**MRI:** magnetic resonance imaging  
**NDEA:** *N*-nitrosodiethylamine  
**NRPB:** National Radiological Protection Board  
**ODC:** ornithine decarboxylase

**OHCC:** ordinary high current configuration  
**OLCC:** ordinary low current configuration

**OR:** odds ratio

**PEM:** personal exposure meter

**PEMF:** pulsed electromagnetic fields

**PIR:** proportionate incidence ratio

**PMR:** proportionate mortality ratio

**PRR:** proportionate registration ratio

**rms:** root-mean-square (see Glossary)

**SIR:** standardized incidence ratio

**SMR:** standardized mortality ratio

**TPA:** 12-*O*-tetradecanoylphorbol 13-acetate

**TWA:** time-weighted average (see Glossary)

**UG:** underground (buried cables)

**VDT:** video (visual) display terminal

**VDU:** video display unit

**VHCC:** very high current configuration

**VLCC:** very low current configuration

**VLFF:** very low frequency

## GLOSSARY OF TERMS

**Atmospherics:** the electromagnetic processes associated with lightning discharges (also called ‘sferics’)

**Busbars:** electrical connections between the transformer and other parts of an electricity substation.

**Characteristics:** detailed physical properties of electric or magnetic fields, such as the magnitude, frequency spectrum, polarization, etc.

**Counterion polarization:** the physical phenomenon responsible for the dispersion at low frequencies.

**Dosimeter:** an instrument that can be worn on the body of a person for measuring exposure over time.

**Electric field:** a vector field **E** measured in volts per metre.

**Electromagnetic fields:** the combination of electric and magnetic fields in the environment. This term is often confused with ‘electromagnetic radiation’ and can therefore be misleading when used with extremely low frequencies for which the radiation is barely detectable. For this reason the term ‘electric and magnetic fields’ is used throughout this Monograph.

**Electrostatic fields:** static fields produced by fixed potential differences.

**Exposure:** the amount of a chemical or physical agent in the environment that a person comes into contact with over a period of time.

**Exposure assessment:** the evaluation of a person's exposure by measurements, modelling, information about sources or other means.

**Exposure metric:** a single number that summarizes exposure to an electric and/or magnetic field. The metric is usually determined by a combination of the instrument's signal processing and the data analysis performed after the measurement.

**Frequency response:** the output of an instrument as a function of frequency relative to the magnitude of the input signal. The specification of the frequency response of an instrument includes the type of filter and its bandwidth.

**Gap junction:** an aqueous pore or channel through which neighbouring cell membranes are connected.

**Geomagnetic field:** magnetic field originating from the earth (including the atmosphere). Predominantly a static magnetic field, but includes some oscillating components and transients.

**Harmonic (frequency):** frequencies that are integral multiples of the power frequency or some other reference frequency.

**High-voltage power lines:** usually taken to mean power lines operating at 100 kV or 132 kV (also referred to as transmission lines).

**Intermittent fields:** fields with a root-mean-square vector magnitude that changes rapidly. In contrast to transients, intermittent fields may reach high levels for longer times and are generally in the ELF frequency range.

**Magnetic field:** In studies at extremely low frequency, this term is generally used for the magnetic flux density (B field).

**Magnetic field strength:** a vector field  $\mathbf{H}$  with units of ampere per metre.

**Magnetic flux density:** a vector field  $\mathbf{B}$  with units of tesla.

**Magnetostatic fields:** static fields established by permanent magnets and by steady currents.

**Phosphenes:** weak visual sensations that occur in response to magnetic fields (threshold, 20 Hz, 8 mT) or by direct electrostimulation. The effect is believed to result from the interaction of the induced current with electrically excitable cells in the retina.

**Power frequency:** the frequency at which AC electricity is generated. For electric utilities, the power frequency is 60 Hz in North America, Brazil and parts of Japan, and 50 Hz in much of the rest of the world.

**Right-of-way:** corridor of defined width within which the power line runs.

**Root-mean-square (rms):** the most versatile mathematical function for averaging the magnitude of time-varying electric and magnetic fields.

**Spot measurement:** an instantaneous measurement at a designated location.

**Static field:** a field vector that does not vary with time. In most environments, electric and magnetic fields change with time, but their frequency spectrum has a component at 0 Hz. This 'quasi-static' component of the field can be measured by averaging the oscillating signal over the sample time.

**Time-weighted average (TWA):** a weighted average of exposure measurements taken over a period of time with the weighting factor equal to the time interval between measurements. When the measurements are made with a monitor with a fixed sampling rate, the TWA is equal to the arithmetic mean of the measurements.

**Transients:** brief bursts of high-frequency fields, usually resulting from mechanical switching of AC electricity.

**Transmission lines:** *see* high-voltage power lines.

**Transposed phasing:** arrangement in which the wires or bundles of wire — phases — in the circuit on one side of the tower have the opposite order to those on the other side. This arrangement results in fields that decrease more rapidly with distance from the lines than other configurations.

**Voxels:** cubic cells with sides of 1–10 mm used to represent animal and human tissues in dosimetry models.

**Waveform:** a single component of the field measured as a function of time by an instrument with a response time much faster than the field's frequency of oscillation. The term also refers to the shape of the wave as displayed on a graph or oscilloscope trace.

**Wire coding:** a non-intrusive method for classifying homes on the basis of their distance from visible electrical installations and the characteristics of these installations