

For Our Children and Ourselves

SUGGESTED SCHOOL BOARD EMF GUIDELINES

Prepared by
“Safe EMF Environment Committee for Our Schools”

SEEC is a group of concerned students, parents, teachers, school board employees and members of our community dedicated to ensure that everyone can work and learn in a normal EMF environment.

For Our Children and Ourselves

Suggested School Board EMF Guidelines

Electromagnetic Fields (EMFs), the radiation emitted from the flow of electric current, has been found to be biologically active. Causes changes at the cellular level.

Laboratory rats exposed to elevated EMFs have higher rates of tumors and more aggressive tumors than unexposed rats.

Melatonin; EMFs have been found to affect melatonin (a basic human hormone) in animal studies.

Occupational studies have strongly linked EMFs to leukemia and also to breast and brain cancer.

Childhood leukemia rates have been associated with higher exposure to EMFs. Most studies find elevated risk at four times normal rates.

THE TIME TO ACT IS NOW

While the debate surrounding EMFs and their effect on human health continues, the evidence to suggest that there is no risk is neither strong nor conclusive. Schools have always been a safe and nurturing environment for our children and prudent avoidance to EMFs will ensure this situation is maintained. Precautionary action has a long history in public health interventions.

We in society have abhorred public health “decision making” based upon 95% certainty because that certainty can only be achieved by measuring disease, illness and death.

The precautionary principal of prudent avoidance to elevated EMFs is achievable in almost all cases. The vast majority of our schools, areas and equipment will be below the 2 mG standard. In the vast majority of the small numbers of areas found above 2 mG, procedures such as distance, organization, reduced or limited use and physical changes to the facilities can be used to bring these areas to within the 2 mG standard.

If measures generally reducing exposure can be taken at reasonable expense with reasonable consequences in all other respects, an effort should be made to reduce fields deviating from what is considered “NORMAL” in our environment.

What are EMFs

EMF fields are invisible lines of force. Whenever current is flowing there are electric and magnetic fields. Electric and magnetic fields are present around power transmission lines, surrounding visual display terminals (VDTs), computers, televisions, and the wiring in our homes, workplaces and schools. Thunderclouds can create enormous electric and magnetic fields, and the earth also has its own magnetic field.

Electric fields lines of force are created when two different charges come close to one another causing current to flow. The strength of an electric field is measured in volts per meter (V/m).

Magnetic fields are created whenever there is a flow of electric current. Think of them as circles, or loops that surround an electric wire. The loops get bigger and stronger with higher currents.

Why is the EMF Environment Important?

Test Tube and Animal Studies:

Low levels of EMF have been shown in the test-tubes, and in animal studies to have biological effects. Some of these effects are consistent with the present hypotheses concerning cancer in adults and children. EMFs have reduced white blood cells (lymphocytes) ability to kill cancer cells and have been shown to disrupt enzyme activity inside the lymphocyte.

1 - White blood cells' calcium metabolism has also been disrupted in studies on rats.

2 - Battelle Pacific labs found that EMFs suppressed pineal melatonin levels in rats.

3 - In 1994, rats with breast cancer had lower melatonin and incidence of breast cancer increased with the surgical removal of the pineal gland. Melatonin has been shown to reduce the growth of a human breast cancer cell used in research, the MCF-7 cell line.

4 - A study of rat tumors in Germany found that moderately high levels of 60-Hz magnetic fields (50 mG) suppressed melatonin and The unit that magnetic fields are measured in milligauss (mG), or in micro-tesla (uT). 1 mG = 0.1 uT In North America the most common term is the milligauss.

Most scientific literature use the tesla. The range of interest for scientist is in the milligauss, or micro-tesla units.

5 - increased mammary carcinogenicity.

The US Congress, Office of Technology Assessments pointed out that humans will have more current induction than smaller species, like the rat. Rats need eight times the level of exposure to get the same effect as humans. Melatonin is suspected in playing a role in breast and other hormone sensitive cancers. In the laboratory and in studies of animals, EMFs have been found to be biologically active at field intensities found in our modern environment.

Human Epidemiology and EMFs:

There have been up to two hundred separate studies of human population and health effects that may be caused by exposure to elevated EMFs. The studies are from small populations up to large populations. In general, most studies can be divided into three broad categories: children's health and their residential exposure; adults' health and their residential exposures; and workers' exposure to EMF.

An analysis of occupational exposure and health outcomes published in 1996 by Gilles Theriault, McGill University, stated that there is strong evidence that EMFs play a role in adult leukemia, and a weaker association with brain tumors. The most recently published paper that specifically looked at women's occupational exposure found an elevated risk (43% excess over the women in background exposures). The pre-menopausal woman in the highest exposure category were found to have a two fold elevated risk (100% excess "This analysis shows that magnetically induced body currents are much larger for large species than for small ones. In comparing the magnetic fields used in lab animal experiments to the fields that humans commonly encounter, one may want to adjust laboratory exposure intensities to account for these differences in magnetic induction."

U.S. Congress, OTA, 1989

6 - over background exposed women).

Thomas Erren, in an analysis of male and female breast cancer studies, called a meta analysis, calculated significant excess for both men and woman. In case-control studies of women he calculated a 47% excess risk .

7 - The recent report in the New England Journal of Medicine by Linet and colleagues is a very disturbing one. It has been widely reported as showing no link between exposure to electromagnetic fields (EMF) and one type of leukemia in children. On the basis of this single study, some scientists and some news media organizations, including the major networks, have repeated the questionable claim that the link between EMF exposure and cancer risk is no longer an issue, and further research is unnecessary. More

disturbing still is the fact that the data presented in the Linet study does not support the assertion that no link exists. Even a cursory review of the main data set shows a 53% increase in leukemia incidence at magnetic field exposure levels above 2 mG; a 72% increase above 3 mG, which is statistically significant, and a more than 600% increase at exposures of between 4 and 5 mG. Above 5 mG, no link is shown, but there are too few cases in this range to yield any significant result.

8 - In fact, the Linet study reinforces the Ahlborn, Feychting study that found children exposed to average fields of 3 mG or more in their homes had close to four times the expected rate of leukemia.

9 - A Taiwan case-control study published by Li found evidence that adult leukemia is related to exposure above 2 mG (40% increased risk) and distance from high voltage power lines (100% increased risk).

10 - There is considerable evidence in the scientific literature that links exposure to EMF to childhood leukemia, adult leukemia and adult cancers of the blood, breast and brain.

Why Modern Guidelines?

The present exposure standards generally used are the Threshold Limit Values and Biological Exposure Indices (American Conference of Governmental Industrial Hygienist, [ACGIH], 1997), and the International Radiation Protection Association (IRPA). These standards are set at a level to protect from burns and heart attacks.

These standards/guidelines have been under review to take into account the cancer and other bio-activity due to EMF of lower power. In 1990 the Swedish National Board for Measurement and Testing (MPR, now MIK) has issued guidelines for VDTs. The U.S. National Council of Radiation Protection and Measurements (NCRP) in a 1995 draft generally endorsed a 2 mG exposure limit.

Present Day Standards

ACGIH 10,000 mG at 60-Hz

IRPA 5,000 mG at 60-Hz

Swedish EMF Guidelines

EMF

(5 Hz-2 kHz)

MAGNETIC FIELDS

2.5 mG

ELECTRIC FIELDS 25 V/M

•

measured at 50 cm from VDT, and 25 cm below and above the VDT.

What is the Precautionary Principle?

The precautionary principle enables the development of sound policies in light of some uncertainty.

“If measures generally reducing exposure can be taken at reasonable expense and with reasonable consequences in all other respects, an effort should be made to reduce fields radically deviating from what could be deemed normal in the environment concerned. Where new electrical installations and buildings are concerned, efforts should be made already at the planning stage to design and position them in such a way that exposures is limited.”

The Swedish: The Precautionary Principles for National Authorities. 1995

•

“While it may continue to be impossible to prove either the presence or absence of risk, perhaps it can be feasible to assign likely risk boundaries upon which practical guidelines for community consensus can be reached.”

Clark W. Heath, Jr., MD

CA Cancer J Clin 1996: 65: 29-44

It is important that we continue to put effort into the protection of our children and school board employees. It is our children and board employees who are the canaries in the coal mines. Everyone can work, learn and play in a safe EMF environment.

Page 11

STANDARDS

School Boards need to design guidelines along the principles of “Prudent Avoidance”.

The three processes of Prudent Avoidance are:

Monitor

Intervention

Surveillance

The process needs to be integrated into all existing schools and into the planning of any changes to existing facilities and new facilities.

MONITORING

The Board will establish an “EMF Committee” with the mandate to develop protocols for testing:

Equipment

Areas, such as classrooms and play grounds

_ The Committee will also develop a purchasing process so that all equipment brought into schools, especially VDTs and computers, meet OR exceed Swedish MIK guidelines.

Prudent Avoidance for our children, means no extended exposure over 2 mG or 0.2 uT.

The goal of Prudent Avoidance is to allow for school board workers to have the freedom to work in electric and electromagnetic fields as close to “normal” (background or below 2 mG) as possible.

Establish a time frame for all schools and school properties to have all initial testing completed. Monitoring will take place for all changes within facilities which may affect electric and magnetic fields This is to include all new facilities.

INTERVENTION

Equipment and areas that are identified as above 2 mG will be assessed case by case based upon achievability and feasibility.

The Boards policy needs to be that a child should not be exposed above 2 mG for any extended periods of time (fifteen minutes).

Feasibility

Prudent Avoidance in almost all cases is feasible. Creative and innovative ways to solve a small number of cases will be found through the use of input from students, parents, teachers, school board officials and health professionals.

Achievability

Magnetic and electric exposure can be reduced through a number of measures including: Distance; fields drop off rapidly with distance from source. Reduced use of equipment and separation of equipment.

Computer labs, libraries and classrooms can be organized so that equipment has the proper separation to ensure a low EMF environment. (See Pathac; appendix A) Transmission lines and cable conduit can be rerouted so that the area where employees and children work has a “normal” EMF environment.

Shielding

maybe an effective method of reducing the EMF environment. Most interventions will be low cost utilizing the principles of distance and time.

SURVEILLANCE

The School Board EMF Committee shall develop a surveillance program that ensures proper planning for new facilities, proper monitoring and testing of new equipment and any changes to existing facilities and random sampling of facilities and areas in such a manner that any changes to the EMF environment would be identified. It is our children and Board employees who are the canaries in the coal mines. Every one can work, learn and play in a safe EMF environment.

References

1. Dr W.R. Adey before U.S. congress on July 25, 1990.
2. Liburdy, R., Lawrence Berkeley Lab, UCLA, 1990
3. U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-53, May 1989.
4. Hill, et al. Effects of Pineal Hormone Melatonin on the Proliferation and Morphological Characteristics of Human Breast Cancers Cells in Culture. *Cancer Res* 1988; 48: 6121-6126.
5. Mevissen M, et al., Effects of Magnetic Fields on Mammary Tumor Development Induced by DMBA, in Rats. *Bioelectromagnetics* 1993; 14: 131-143.
6. Coogan, et al. Occupational Exposure to 60-hertz Magnetic Fields and Risk of Breast Cancer in Women. *Epidemiology*, September 1996, V 7, #5, 459-464.
7. Erren, Thomas. *Epidemiological Studies of EMF and Breast Cancer Risk: A Biologically Based Overview; The Melatonin Hypotheses*, Battelle Press, 1996.
8. Linet, M. et al. Residential Exposure to Magnetic Fields and Acute Lymphoblastic Leukemia in Children. *New England Journal of Med.* July 3, 1997.
9. *Microwaves News*, September/October 1992.
10. Li, et al., Residential Exposure to 60-Hertz Magnetic Fields and Adult Cancers in Taiwan. *Epidemiology*, January 1997, V 8, #1.