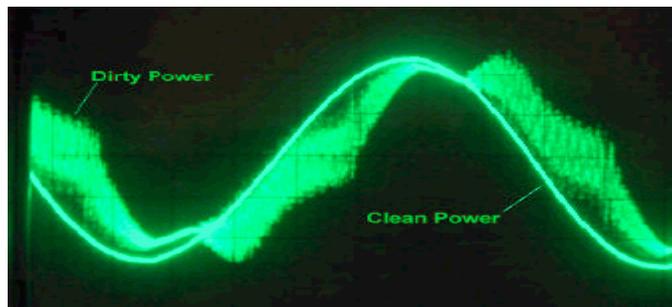


# Electrical Pollution and Our Schools:

## An Action Plan for Principals, Teachers and Parents



The green area in the oscilloscope display shown above represents 'dirty' power that contaminates normal (60 Hertz) electricity (courtesy Dave Stetzer).

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**Completed by:** Sue Fusco  
S.T.O.P. (Stop Transmission lines Over People)  
[www.stop-emf.ca](http://www.stop-emf.ca)  
[info@stop-emf.ca](mailto:info@stop-emf.ca)

and Cammie Jaquays, MBA  
Pure Power Solutions  
[www.getpurepower.ca](http://www.getpurepower.ca)  
[info@getpurepower.ca](mailto:info@getpurepower.ca)

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## **Why does your school need to clean its electricity?**

This is a quick reference summary. More detail is presented in this paper, page 16.

### **Cost Savings to Schools and School Boards:**

- ◆ Teacher absences for health-related reasons were dramatically reduced after the filters were installed in a school in Wisconsin. Fewer teacher sick days leads to less teacher substitution.
- ◆ Sick building syndrome may be due to dirty electricity rather than mold. Check electrical quality before starting a costly mold clean-up program that may not be necessary.
- ◆ Fewer computer repairs.
- ◆ Increased efficiency of operations – less time spent in disciplinary action, improved use of class time.
- ◆ A happier, calmer school.

### **Benefits of a clean electrical environment to teachers and students:**

- ◆ Overall teacher wellbeing improved while the filters were in place in a Toronto school study. Teachers were less frustrated, less tired, less irritable. They were better able to focus and had better health, improved mood, and greater sense of accomplishment.
- ◆ The study results show:
  - ✓ 45% of the teachers reported feeling less tired and less frustrated;
  - ✓ 35% felt healthier; 30% were less irritable;
  - ✓ 25% had improved mood, more energy and a greater sense of satisfaction with their work while the filters were installed.
  - ✓ Staff with allergies took less medication, students with migraines experienced less pain.
  - ✓ 39% to 56% of teachers may have some degree of electrosensitivity
- ◆ Sixty percent of the classes showed significant improvements in student behaviour.
- ◆ As much as 5 to 10 minutes were saved each period in unproductive activity while the Graham-Stetzer filters were installed.
- ◆ Improved power quality is associated with behaviour that is more conducive to learning in the classroom.

## Introduction

The area of electrical pollution and power quality is inherently complex and multifaceted. For many, it is a challenge to understand what information is fundamental and what is incidental.

A human or animal is perhaps the most appropriate 'meter' to measure how harmful the levels of electrical pollution are. A balance of empirical evidence and theory shows that electric current enters the body more readily at higher frequencies, while current through the body (body current) is increasingly harmful at these higher frequencies.

Defining and measuring harmful electrical pollution is analogous to defining and measuring harmful drinking water. **It is not the water that is harmful; it's what comes with the water. Similarly it is not (in general) the 60 Hz electric power; it is what comes with the 60 Hz power that is the problem.** Quite simply, pollution is the problem.

### Understanding the Roots of 'Dirty Electricity'

Until recently, people who suffer from electrical hypersensitivity (see page 7 of this paper for the definition of electrical hypersensitivity) could find little medical evidence to support their assumptions, that somehow electricity was a source of their problems, nor any means to relieve their discomfort. Electrical pollution is at the root of a very real problem for many people – people who have a biological reaction to the poor power quality that is generated by common electronic devices, household appliances and power lines.

From such ailments as chronic fatigue, depression and body aches, to memory loss, insomnia and a host of other health concerns, many of the symptoms related with these problems can be directly attributed to an exposure to what is known as 'dirty electricity'. In simple terms, this is a type of power characterized by higher frequencies that can have a negative impact on our bodies.

Why our concerns over electrical pollution have not been validated as readily as other forms of pollution – such as air, water or noise pollution – is understandable. Up until now we haven't been able to gauge the amounts of harmful dirty electricity that exists in our homes or in the workplace. Yet our dependence on electronic devices such as computers, cell phones, fax machines and many types of appliances and entertainment systems continues to rise.

# What is Electrical Pollution?

This is a new and revolutionary way of looking at electricity and electromagnetic energy. There are four areas of concern, with regards to a creating healthy electrical environment:

## 1. Radio Frequency (RF) Radiation

- a. *Caused by:* Cell phones, antennas, microwave ovens, broadcasting and communication transmitters and radar systems generate powerful RF magnetic fields.<sup>1</sup>
- b. *Human Effects:* Some of the known effects of exposure to RF radiation include cognitive impairment<sup>2</sup>, memory deficit<sup>3</sup>, EEG modifications<sup>4</sup>, DNA damage<sup>5</sup>, chromosome aberrations<sup>6</sup>, micronucleus formation<sup>7, 8</sup>, fetal malformation<sup>9, 10</sup>, increased permeability of the blood-brain barrier<sup>11, 12</sup>, altered cellular calcium efflux<sup>13</sup> and altered cell proliferation<sup>14</sup>. RF radiation, a new form of exposure of the human embryo, fetus, and infant, and an acknowledged environmental toxin under many exposure conditions, may be associated with the increased incidence of autism.<sup>15</sup>
- c. *Frequency range:* 300 MHz - 300 GHz

## 2. Dirty Electricity (Electromagnetic Frequencies)

- a. *Caused by:* Electrical devices such as computers, televisions, energy efficient lighting, variable speed motors. Dirty electricity generated from our homes and offices, travels back to the power station, and then is redistributed via the power company's hot wires back into the electrical grid.
- b. *Human Effects:* Electrical hypersensitivity, which includes such effects as chronic fatigue, depression, headaches, body aches and pains, ringing in the ears, dizziness, impaired sleep memory loss and confusion.
- c. *Frequency range:* 4 kHz - 100 kilo Hertz (kHz). Reilly<sup>16</sup> and others show that it is frequencies above 1.7 kHz that dissipate internally to the body.

## 3. Electric and Magnetic Fields (EMFs)

- a. *Caused by:* Power and transmission lines, substations, transformers, breaker panels, power supply cables, appliances, computers (VDT's), transponders, radar installations, power generating dams, from underground distribution lines or from grounded metal pipes, radio towers, cell towers, fluorescent lighting, security and scanning equipment. These fields are a natural byproduct of each other in the generation of electricity, but are invisible.
- b. *Human effects:* Childhood leukemia, breast cancer, miscarriages. EMFs have been found to reduce melatonin levels in animal and people.
- c. *Frequency range:* below 60 Hz.

#### 4. Ground Current

- a. *Caused by:* Inadequate return neutral wire on the electrical wires
- b. *Human effects:* Electrical hypersensitivity.
- c. *Animal effects:* Dairy cattle have shown decreased milk production, began to get foot sores and udder problems and had miscarriages. This has resulted in law-suites and out of court settlements.
- d. *Frequency range:* at Power Frequency - 50 & 60 Hz and associated high frequency harmonics, and transients.

*"I have no doubt in my mind that at the present time that the greatest polluting element in the earth's environment is the proliferation of electromagnetic fields. I consider that to be far greater on a global scale than warming..."*

Robert O Becker, M.D., Author of *Cross Currents* and *The Body Electric*.

*"...Unless, however, further research indicates that the finding is due to chance or some currently unrecognized artefact, the possibility remains that intense and prolonged exposures to magnetic fields can increase the risk of **leukaemia in children...**"*

[National Radiological Protection Board, 3/6/01](#)

[http://earthrenewal.org/enviro.htm#Dangers%20of%20EMF's%20\(Electromagnetic%20Frequencies\)](http://earthrenewal.org/enviro.htm#Dangers%20of%20EMF's%20(Electromagnetic%20Frequencies))

## What is Electrical Hypersensitivity?

People are increasingly becoming sensitive to the various forms of electrical pollution<sup>17</sup>.

This definition is taken from [www.feb.se](http://www.feb.se), FEB - The Swedish Association for the ElectroSensitive:

“Electrical Oversensitivity or Electrical Hypersensitivity is a fairly new phenomenon, the first cases and discussions came to public knowledge in the early seventies.

The *first* signs of electrical hypersensitivity are often experienced as a minor irritation when working with VDTs (Computer monitors, surveillance monitors, common TV - Television sets). A frequent symptom is that of warmth or a burning sensation in the face, not unlike a strong sunburn. Some people develop a reddish skin blemish or rash at the same time. These can also be accompanied by a tingling sensations in the skin, both facially and/or over other parts of the body. In addition eye problems can occur. You might get the feeling that the mucus membranes have dried.

These initial symptoms must be regarded as a **serious first warning!** Switch of the VDT when not in use, cut down time before the VDT, move the VDT far away from the user, buy a new low emission, grounded, monitor with a Cu-net embedded into the front glass (shielding glass).

### Warning signs:

These are symptoms that people experience with eg. VDT work. For some individuals the problem becomes gradually worse, the symptoms are sustained for longer periods.

- ◆ An unnatural warmth or burning sensation in the face.
- ◆ A tingling, stinging or pricking sensation in the face or other areas of the body.
- ◆ Dryness of the upper respiratory tract or eye irritation.
- ◆ Problems with concentration, dizziness and loss of memory.
- ◆ Swollen mucus membranes resulting in non-viral/bacterial swelling of nose, throat, ear and sinuses.
- ◆ Feeling of impending influenza that never quite breaks out.
- ◆ Headache and nausea.
- ◆ Teeth and jaw pains.
- ◆ Ache in muscles and joints.
- ◆ Cardiac palpitations.

Naturally the differences between individuals are great, some may only have one or a few symptoms, some have many, some have light symptoms, some may have severe difficulties.”

Several studies found that magnetic fields are associated with health problems including cancers of the brain and central nervous system as well as an increased risk of miscarriage. Up to 50% of the population is more or less sensitive to electromagnetic pollution, according to expert Magda Havas, Professor in Environmental and Resource Studies at Trent University, Ontario. She discovered that the installation of Graham-Stetzer filters improve power quality generated by electrical appliances and attenuate the symptoms of various diseases from chronic fatigue to depression.

In October, in Prague, she presented the result of five case studies at a workshop on the electrical hypersensitivity organized by WHO. The installation of 20 Grahams/Stetzer filters (cleaning the home of the radio frequency (RF) energy on the building's wires) improves sleep, reduces blood sugar in diabetics and reduces pain and other symptoms for people with multiple sclerosis. These filters reduce radio frequencies (1.7 kiloHertz and higher) irradiating from electrical wires caused mainly by modern electronic (nonlinear) loads.

The [www.electricalpollution.com](http://www.electricalpollution.com) site defines Radio Frequency Sickness the following way:

“Sleeplessness or disturbed sleep, fever, rash, nausea, inability to concentrate, thinking in a fog, short-term memory problems, sore joints particularly hip joints, irritable bowel syndrome, miscarriage, and birth defects. Symptoms, particularly the fever, clear up outside of the exposure area as long as there is not continued exposure to high frequencies from another source.”

According to studies in the UK about 35% of the population is electrically hypersensitive.

One way for people to determine if they are electrically hypersensitive (EHS) is to turn the power off to their home at night (except the fridge or freezer) and see how it affects your sleep. If you sleep much better you may very well be EHS.

## Interesting Facts

### 1. Radio Frequency Radiation

- ◆ This frequency stems from wireless devices such as cell phones and antennas. We are moving to wireless computer technology as well without knowing what the long term consequences are likely to be. Some studies show increased incidence of brain tumors with prolonged (greater than 10 years) exposure to cell phones. An increasing number of people who live near cell towers are experiencing symptoms of electrical hypersensitivity.
- ◆ The official advice of the Public Health Department of the Salzburg Region is not to use WLAN and DECT in Schools or Kindergardens. Dr Gerd Oberfeld MD, Salzburg Region Public Health Department states:

“WLAN antennas are emitting microwave radiation in the frequency range 2400-2485 MHz - it is the same as used by microwave ovens. The pulses change their amplitude 10 times per second in stand by (10 Hz) with a very sharp rise. The exposure depends on the distance to the antenna which could be very small in the case of antennas build in the notebook. Despite the widespread use of WLAN there are no studies available on short or long-term effects from WLAN exposures. Based on first empirical evidence from sensitive people the signal seems to be very "biologically active". The symptoms seen so far are the same seen in base station studies: headaches, concentration difficulty, restlessness, memory problems etc.”<sup>18</sup>

- ◆ The students and professors at Lakehead University in Thunder Bay, Ont., won't have wireless Internet access for their computers any time soon. The institution, citing both health concerns and security reasons, has decided against installing the popular technology. Lakehead is believed to be the only major educational institution in Canada to have taken such a strong step against the technology.<sup>19</sup>
- ◆ Don Maisch<sup>20</sup>, an Australian-based researcher on both radiofrequency and power line exposure standards, who is also directly involved in the standard setting process in Australia, states in his paper: Children and Mobile Phones ... Is There a Health Risk? the following piece of information:
  - On March 3rd, 2003, the US Environmental Protection Agency (EPA) proposed new guidelines for evaluating cancer risks to children, on the grounds that children may be 10 times more vulnerable than adults to cancer risks from exposure to a wide range of chemicals. This is the first time the EPA has officially taken into account the differences between adults and children when assessing cancer risks from chemical exposure. The EPA views the question of chemical exposure as so significant, that it has written a separate guidance paper on the risks of cancer to children, concerned that exposure to mutagenic chemicals may be significantly more dangerous to the young.<sup>21</sup>
- ◆ Don Maisch, in the same article, also summarizes the following statements of concern from the scientific community:

1. In 1999, as a result of public concerns about possible health hazards from mobile phone technology, the UK Government formed the Independent Expert Group on Mobile Phones (IEGMP) to examine possible effects of mobile phones and transmitter base stations. This group was headed by Sir William Stewart, the famous British biochemist and president of the British Association for the Advancement of Science. What made the Stewart Inquiry unique, was that it was made up almost entirely of biomedical specialists — and so it was able to focus many years of acquired specialist knowledge on the problem. Their report, “Mobile Phones and Health”, was released in April 2000. In regards to the use of mobile phones by children the IEGMP stated: **“If there are currently unrecognized adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system, the greater absorption of energy in the tissues of the head and a longer lifetime of exposure.** In line with our precautionary approach, we believe that the widespread use of mobile phones by children for non-essential calls should be discouraged. We also recommend that the mobile phone industry should refrain from promoting the use of mobile phones by children.”<sup>22</sup>
2. Concerns about children using mobile phones was specifically mentioned in a recent report (July, 2002) by the Science and Public Policy Institute, based in Arlington, Virginia, USA. The institute was founded by Dr George Carlo, who formerly ran the U.S. wireless industry’s \$28 million research program into the possible health risks of cell phone use. The report “Proposals for Supplementary Funding” states on page 4: **“Special concern for children followed from the research. Studies showed that radiation penetrated deeper into the heads of teenagers and children resulting in more exposure to potentially harmful radio waves than adults; the type of genetic damage that was found – micronuclei in human blood – is more likely to occur in growing tissue undergoing mitosis, such as growing brain tissue in children;** the wireless industry had targeted children as a growth market and were succeeding in increasing cell phone usage among children and teenagers.” **The report also recommends the “development of informational materials for children and their parents, regarding the science and solutions that can be used in schools.”**<sup>23</sup>
3. On December 8th 2000 a statement was issued by the German Academy of Paediatrics advising parents to restrict their children’s use of mobile phones. They advised that all mobile phone users keep conversations as brief as possible but that **additional precautions are appropriate for children in view of “special health risks” associated with their growing bodies.**<sup>24</sup>
4. In a statement from Sianette Kwee, Professor, Department of Medical Biochemistry, University of Aarhus, Denmark. (Member of the Editorial Board of Bioelectrochemistry. Danish expert representative in the European Union’s COST 281 project ‘Potential health effects from Emerging Wireless Communication Systems’, Basic Research Group.). “Our studies showed that there was a significant change in cell growth in these cells (human amnion cells) after being exposed to EMF fields from both power lines (ELF) and from mobile phones (MW). These biological effects were greatest in young and vigorously growing cells, but much less in old cells. These results tell us,

that e.g. **microwave fields from mobile phones can be expected to affect children to a much greater degree than adults.**<sup>25</sup>

- ◆ When questioned about the health and safety concerns of the WLAN computer in the classroom environment, Dr. W. Gregory Lotz, Ph..D., Chief, Physical Agents Effects Branch Division of Biomedical and Behavioral Science (MS C-27) for NIOSH (National Institute for Occupational Safety and Health) and NIOSH's representative to RFIAGW (Radiofrequency Interagency Work Group) stated his personal opinion: **"While we still don't have all the answers on this issue, it would be advisable to use the Precautionary Principle."** (Emphasis added.) "The Precautionary Principle is an important guiding principle in handling inevitable scientific uncertainty, especially in situations of potentially irreversible or catastrophic impacts" (UNESCO, 1999). Consistent with the Precautionary Principle, Dr. Lotz also indicated that a hard-wired portable classroom connected to a rooftop antenna would be a safer option than wireless-laptops, work stations, and base stations in a classroom environment.<sup>26</sup>
- ◆ When questioned about the health and safety concerns of the wireless computer in the classroom scenario, Senior Scientist Norbert Hankin, of the EPA Office of Radiation and Indoor Air and Chairman of RFIAGW said: **"In my personal opinion, I wouldn't do it."** (Emphasis added.) He further stated that there are animal studies showing health issues with short-term exposures to non-ionizing RF/MW (radio frequency/microwave) radiation. Mr. Hankin expressed concern about children who would be close to transmitting antenna(s) (wireless-laptops, work stations, and base stations) and exposed to prolonged low intensity transmissions. He likened it to being in a room of cell phones running all day long. Mr. Hankin suggested that the hard-wired portable classroom scenario, connected to a rooftop antenna, was a safer way to go.<sup>27</sup>
- ◆ "Dr Grahame Blackwell has noted that of the six major epidemiological studies done globally on cell phone towers and human health, all six studies have demonstrated negative effects on human health. These effects include depressive tendency, fatigue, sleeping disorder, difficulty in concentration, cardiovascular problems and hyperactivity. No other studies showing neutral or beneficial effects exist, despite what the public relations departments of our telecommunications firms might suggest."<sup>28</sup>
  1. ". it is advisable that mobile phone base stations not be sited closer than 300 meters to populations"<sup>29</sup>
  2. The Netherlands Organization for Applied Scientific Research (TNO) found significant effects on wellbeing, according to a number of internationally-recognized criteria (including headaches, muscle fatigue/pain, dizziness etc) from 3G mast emissions well below accepted 'safety' levels (less than 1/25,000th of ICNIRP guidelines). Those who had previously been noted as 'electrosensitive' under a scheme in that country were shown to have more pronounced ill-effects, though others were also shown to experience significant effects.<sup>30</sup>
  3. The Microwave Syndrome - Further Aspects Of A Spanish Study, presented at an International Conference in Kos (Greece), 2004: This study found significant ill-health

effects in those living in the vicinity of two GSM mobile phone base stations. They observed that: "The strongest five associations found are depressive tendency, fatigue, sleeping disorder, difficulty in concentration and cardiovascular problems."<sup>31</sup>

As their conclusion the research team wrote:

"Based on the data of this study the advice would be to strive for levels not higher than 0.02 V/m for the sum total, which is equal to a power density of 0.0001  $\mu\text{W}/\text{cm}^2$  or 1  $\mu\text{W}/\text{m}^2$ , which is the indoor exposure value for GSM base stations proposed on empirical evidence by the Public Health Office of the Government of Salzburg in 2002."

4. The "Increased Incidence Of Cancer Near A Cell-Phone Transmitter Station" study, published in the International Journal of Cancer Prevention, based on medical records of people living within 350 metres of a long-established phone mast, showed a fourfold increased incidence of cancer generally compared with the general population of Israel, and a tenfold increase specifically among women, compared with the surrounding locality further from the mast.<sup>32</sup>
5. The results of the Naila Study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance of up to 400 metres from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away, and that the patients fell ill on average 8 years earlier.

In the years 1999-2004, i.e. after five years' operation of the transmitting installation, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the installation compared to the inhabitants of Naila outside the area.

The basis of the data used for the survey were PC files of the case histories of patients between the years 1994 and 2004. While adhering to data protection, the personal data of almost 1.000 patients were evaluated for this study, which was completed without any external financial support. It is intended to continue the project in the form of a register.<sup>33</sup>

6. The radiation of a cell phone base station at a distance of 80 metres causes significant changes of the electrical currents in the brains of testees (measured by electroencephalogram, EEG). All the testees said they felt unwell during the radiation, some of them seriously.

That is the result of an investigation by a team of Austrian scientists. They measured alpha 1 (8 to 10 Hz), alpha 2 (10 to 12 Hz) and beta waves (13 to 20 Hz). A small density of GSM 900 and GSM 1800 radiation already caused several significant changes in these three frequency ranges. This means the body is stressed - temporarily this may have some positive effect, in the long run however stress certainly reduces the quality of life, capacity for work and state of health.

The results of the research will be published in international scientific

magazines and confirmed by replication. The research was financed by Land Salzburg in Austria. The testees were nine women and three men between 20 and 78, who considered themselves 'electrosensitive'. They were invited to sit in a chair, eyes covered and ears plugged. Of course they were not aware of the sequence of the tests.

The side of the room directed at the cell phone base station was shielded against radiation, except for a small part which could be (un)shielded easily. In the first phase, the radiation density near the head was 26 mikroWatt/m<sup>2</sup>, in the second phase 3327 mikroWatt/m<sup>2</sup> and in the third phase 26 mikroWatt/m<sup>2</sup> again. Several other environmental parameters were measured to be sure they could not influence the results, such as radiation by television and FM-radio, noise, CO<sub>2</sub>, temperature, relative humidity, low frequency magnetic fields and soherics (electrical discharges in the atmosphere, possibly causing radiation).

During the second phase the parameters of all the brainwaves, measured by EEG, changed significantly. Afterwards the testees were asked to describe their experiences. All of them felt unwell during the second phase. They reported symptoms like buzzing in the head, palpitations of the heart, unwellness, lightheadedness, anxiety, breathlessness, respiratory problems, nervousness, agitation, headache, tinnitus, heat sensation and depression.

According to the scientists, this is the first worldwide proof of significant changes of the electrical currents in the brain by a cell phone base station at a distance of 80 metres. It has been scientifically established before that the radiation of cell phone base stations leads to unwellness and health complaints.

- Dr Blackwell concludes: "These are the only studies known of that specifically consider the effects of masts on people. All six of these studies show clear and significant ill-health effects. There are no known studies relating to health effects of masts that do not show such ill-health effects. In this respect, any statement by industry or official sources that claims (or suggests) that:
  - (a) There is no evidence of ill-health effects from masts; or
  - (b) The overwhelming evidence is that masts do not cause ill-health effects; is completely and blatantly untrue.

## 2. Dirty Electricity

- ◆ Dirty Electricity is becoming a problem as we use more computers, plasma TV's, halogen lighting, energy efficient appliances (including variable speed motors) and dimmer switches.
- ◆ Power quality has been recognized as a serious issue for many years when it comes to electronic equipment and most manufacturing plants place large filters (capacitors) to clean up the electrical supply.

- ◆ What is new information is that this Dirty Electricity is also affecting people. Dr Magda Havas, Trent University, has been conducting studies since 2003 and documented improvements among diabetics and people with MS, chronic fatigue, tinnitus, when their electrical environment was cleaned up. Her findings show that some people are very sensitive to this type of energy and this is now called electrical hypersensitivity. There is still a lot to learn about this illness but so far the results are promising as most of the dirty electricity in homes can be removed.
- ◆ The two aspects of Dr Havas' current research that are novel is that:
  - Dirty electricity (power surges that affect sensitive electronic equipment such as computers) are biologically active at levels currently found in the home
  - There exists a technology that reduces them and results in better health of the occupants: the Graham-Stetzer filters.
- ◆ The dirty electricity on a building's wires can be measured using the Graham-Stetzer Microsurge meter to see if it is elevated. If the dirty electricity is high (above 30), Graham-Stetzer filters can be installed.
- ◆ The Graham-Stetzer filters reduce dirty electricity on wiring inside the home but there are other sources of electromagnetic pollution (ground current, radio frequency radiation, electromagnetic fields) to which a person may be exposed to and these other frequencies may have an affect on a person's symptoms
- ◆ There could indeed be a causal relationship between the dirty electricity and diabetes. This form of pollution is increasing as is the percentage of diabetics in our population. Some diabetics are sensitive to dirty electricity and their blood sugar levels change within 30 minutes of moving from a dirty to a clean to a dirty environment. Not all diabetics respond the same way but many diabetics have elevated blood sugar levels caused by dirty electricity in their environment. Millions of dollars could be saved in our health care system and the suffering associated with diabetes could be reduced with a simple technological solution.
- ◆ The filters will remove high frequencies on your wiring but they will not reduce the magnetic field generated at the power station.
- ◆ The Graham-Stetzer filters reduce the RF (radio frequency) noise from computers and other electronic devices including dimmer switches that produce this dirty electricity.  
**People are responding to the removal of dirty electricity – This is a frequency range that is bioactive.**

In their paper 'Dirty Electricity and Electrical Hypersensitivity: Five Case Studies', presented at the World Health Organization Workshop on Electrical Sensitivity, 25-26 October, 2004 in Prauge, Dr Magda Havas and Dave Stetzer found that:

The individuals from the case studies presented in the paper experienced major to moderate improvements in their health and wellbeing after Graham-Stetzer filters improved power quality in their home or work environment. The results suggest that **poor power quality may be contributing to electrical hypersensitivity** and that as much as **50% of the population may be**

**hypersensitive; children may be more sensitive than adults and dirty electricity in schools may be interfering with education and possibly contributing to disruptive behavior associated with attention deficit disorder (ADD);** dirty electricity may elevate plasma glucose levels among diabetics, and exacerbate symptoms for those with multiple sclerosis and tinnitus. Graham-Stetzer filters and meters enable individuals to monitor and improve power quality in buildings and they provide scientists with a tool for studying the effects of dirty electricity. For the first time we can progress from simply documenting electrical hypersensitivity to alleviating some of the symptoms. These results are dramatic and warrant further investigation. If they are representative of what is happening worldwide, then dirty electricity is adversely affecting the lives of millions of people.<sup>34</sup>

### 3. Electromagnetic Fields (EMF)

- ◆ EM fields are invisible lines of force. Whenever current is flowing, there are electric and magnetic fields. They are present around power transmission lines, surrounding visual display terminals (VDTs), computers, TVs, and the wiring in our homes, workplaces and schools. Thunderclouds generate enormous electric and magnetic fields: The earth also has its own electromagnetic field.
- ◆ An electric field will exist even when there is no current flowing. Electric fields are measured in units of volts per meter or V/m. Magnetic fields are created when electric current flows: the greater the current, the stronger the magnetic field. Magnetic fields are measured in milli Gauss (mG) or micro Tesla ( $\mu$ T). 10 mG equals 1  $\mu$ T.
- ◆ 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). The strength of a magnetic field is measured with a Gauss meter, and is measured in milliGauss units.
- ◆ Children exposed to average fields of 3 mG or more in their environment had close to four times the expected rate of leukemia.<sup>35</sup> Commonly referred values are 4 mG = 2-fold increase in childhood cancer.
- ◆ A major new study found that children whose birth address was within 200 meters of an overhead power line had a 70% increased risk of leukemia.<sup>36</sup>
- ◆ Do you know that Canada currently lags behind a number of Countries including Italy, Germany, Spain, Sweden, Japan and now the Netherlands on the issue of protecting its residents re: policies aimed at avoidance of EMFs?
- ◆ The Canadian standard for public exposure is 800+ mG. Many studies have shown an association between childhood leukemia and magnetic field exposure above 4 mG. Teachers are also at risk with an increased growth of estrogen-responsive breast cancer cells above 12 mG and miscarriages above 16 mG. Also, occupational exposure above 10 mG has been associated with brain and blood cancer.

- ◆ Teachers are also at risk with an increased growth of estrogen-responsive breast cancer cells above 12 mG and miscarriages above 16 mG. Also, occupational exposure above 10 mG has been associated with brain and blood cancer. The Canadian standard needs to be re-examined.
- ◆ There is new evidence (2004) that extremely low frequency magnetic fields (Our electric power functions at 60 Hz, which is considered extremely low frequency (ELF).). affects insulin secretion (Sakurai et al. 2004, Bioelectromagnetics 25:160-166) and that electromagnetic energy produces stress proteins in laboratory animals based on the work of Blank and Goodman<sup>37</sup>.
- ◆ Electromagnetic energy can produce stress in living organisms. Diabetics are very sensitive to stress and they often react with an increase in blood sugar.
- ◆ EMFs in some homes, schools, and workplaces may be excessive where utility primary neutrals are grounded to earth and bonded to secondary (user) neutral conductors and to water pipes which permeate the walls and living environment of premises. Exposure to electronic equipment emitting excessive EMF contributes further to radio frequency radiation (RFR) sensitivity and illness.<sup>38</sup>
- ◆ The time of day that you are exposed may be very important. Some research shows that exposure during sleep may be more harmful than exposure during waking hours as it affects the melatonin balance which is a hormone that, among other things, fights cancers cells and promotes immune system function.
- ◆ EMFs cause changes at a cellular level. Iron, necessary for healthy blood and stored in the brain, is highly effected by EMF. The permeability of the cell membrane of our nerves, blood vessels, skin, and other organs are effected. The intricate DNA of the chromosomes has been shown to be effected by EMFs as well<sup>39</sup>.
- ◆ Childhood leukemia, brain tumors, and non-Hodgkin's lymphoma are among the diseases that epidemiological studies have associated with excess exposure to EMF in the environment where cancer victims lived (and for adults worked).
- ◆ On June 24, 1998, The *National Institute of Environmental Health Sciences* (NIEHS) classified EMF as a possible carcinogen. An international panel of experts agreed that electric and magnetic field exposures gave great weight to human carcinogenicity. Therefore, if someone consistently experiences these exposures, that person could be at risk for developing health problems which can range from headaches, fatigue, and dizziness to skin rashes, miscarriage, leukemia, and cancer. Unfortunately, health effects are being associated to exposures well below accepted standards.
- ◆ "The weight of evidence supports an association of power lines and risk of, at least childhood leukemia, and an association of putative occupational EMF exposure and increased link in leukemia and brain tumours. ... In addition, other possible cancer associations have begun to be examined that are plausible based on laboratory research on melatonin. These include breast cancer in women and prostate cancer in men."<sup>40</sup>

- ◆ S.T.O.P. (Stop Transmission lines Over People, [www.stop-emf.ca](http://www.stop-emf.ca)) group in York Region was started by a group of citizens opposed to a Hydro One proposal to upgrade an existing hydro corridor to a 230 kV transmission line in close proximity to homes, schools and businesses in Markham, Aurora, Richmond Hill and Newmarket. They have been successful and have support from the Towns of Markham, and Aurora, and the York Catholic District School Board who collectively acted as members of the Markham-Aurora Hydro One Task Force and on the working group with the newly formed Ontario Power Authority (OPA). The Ontario Energy Board has just approved the OPA recommendation to direct Hydro One Networks and the Local Distribution Companies to build an additional Transformer Station at Holland Junction in King Township. Additional Transformation is the first step to the integrated solution recommended by the OPA. The Ontario Energy Board will still need to rule on Conservation measures and a Local Generation facility in Northern York Region. In evaluating other alternatives Hydro One's preferred option to upgrade the power line is no longer required in the forecast for at least 10-15 years!
- ◆ S.T.O.P.'s mandate is: "To advocate the halt of and construction of hazardous hydro towers and lines in close proximity to residents, schools and businesses in order to safeguard the physical and economic health of the community, using all legal and political means." S.T.O.P.'s experience validates the importance of concerned citizens exercising their right to participate in public consultations for proposed energy projects in their communities.

#### 4. Ground Current.

- ◆ This issue originally surfaced on dairy farms with the following effects of ground current on cattle: 1) Intermittent periods of reduced production; 2) reasons unexplained; 3) increased incidences of mastitis; 4) elevated somatic cell count [in milk samples]; 5) lengthened milking times; 6) incomplete milk letdown; 7) extreme nervousness in milking parlor [stepping, or raising of feet, switching of tail, kicking off milkers]; 8) reluctance to enter the milking parlor; 9) rapid exit from the parlor; 10) reluctance to use water bowls or metallic feeders; and 11) altered consummatory behavior [such as lapping water or splashing rather than normal drinking behavior]. Authors observed effects of stray voltage on four general areas: milking performance and behavior, herd health, nutritional intake, and yield of product.<sup>41</sup>
- ◆ This is becoming serious in certain parts of Ontario and was first noticed among dairy producers. Their cows produced less milk, began to get foot sores and udder problems and had miscarriages.<sup>42</sup>
- ◆ Canadian cows exposed to 10 kV/m and 30  $\mu$ T, 60 Hz EMF produced 5% less milk, 16% less milk-fat, and consumed 5% more feed (dry matter) than control cows not exposed.<sup>43</sup>
- ◆ Humans are now experiencing sensitivity to ground current in the form of Electrical Hypersensitivity.

# Steps to clean your school's electrical environment

There are many steps involved in cleaning your school's electrical environment.

Our government must be lobbied and informed as to the need for policy change. SWEEP (Safe Wireless, Electric and Electromagnetic Policy) is a newly formed group addressing this issue. You may contact Dr David Fancy, Brock University, St. Catharines, Ontario, tel 905-688-5550 ext 3584. His email is [dfancy@brocku.ca](mailto:dfancy@brocku.ca).

The simplest issue to address is the issue of dirty electricity (electromagnetic frequencies), as the installation of Graham-Stetzer electrical filters is quite straightforward. Once the results of cleaner electricity is experienced by teachers and students then hopefully school boards will more apt to address the issue of ground current, cell tower radiation and electromagnetic fields.

EMF Solutions ([www.EMFSolutions.ca](http://www.EMFSolutions.ca)) is an Ontario based company providing on-site Environmental Site Assessment, Remediation and Consulting Services to homes, schools, offices and institutions. The company specializes in the detection and mitigation of electrical contamination caused by Ground Current, Electrical Pollution, Electromagnetic Fields and Radio-Frequency Radiation. Dirty Electricity Solutions will evaluate your school's electrical environment and provide a full professional report of the findings and recommendations. Contact: Kevin Byrne, Phone 905-987-9994.

## 1. Radio Frequency Radiation

- ◆ There is a growing trend for cell phone companies to place cell towers on schools, and in close proximity to schools. Parents need to group together to halt the installation of cell and satellite antennas on our schools and in our communities.
- ◆ Visit the <http://www.protectschools.org/> web site. Wireless technology is not needed in our schools, and studies are showing it is not safe.
- ◆ To have your school measured for the amount of cell tower frequencies emitting in your area, or for information as to where to purchase measuring equipment please contact:
  - EMF Solutions Canada : 904 987-9994 or 1-877-987-5185 or visit [www.EMFSolutions.ca](http://www.EMFSolutions.ca)

## 2. Electric and Magnetic Fields (EMFs) and Ground Current

- ◆ Contact Sue Fusco at S.T.O.P. ([www.stop-emf.ca](http://www.stop-emf.ca)) for information about power lines near your schools (email [info@stop-emf.ca](mailto:info@stop-emf.ca))

- ◆ Contact Lorna Wilson (519-751-2560 and see Appendix VII) about the recommendations a school in Brampton put together entitled: Taken from “For Our Children and Ourselves: Suggested School Board EMF Guidelines”. These guidelines were prepared by Safe EMF Environment Committee for our Schools (SEEC), 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.
- ◆ Purchase a Gauss meter to measure the amount of EMFs in your school. These are available from Essentia ([www.essentia.ca](http://www.essentia.ca), phone 888-639-7730) and from EftonScience ([www.escience.ca](http://www.escience.ca), phone 888-777-5255) for about \$150 Cdn.
- ◆ Visit [http://www.fms-corp.com/mitigation\\_overview.php4](http://www.fms-corp.com/mitigation_overview.php4) to learn the process of EMF mitigation solutions (also see Appendix 1)

### 3. Dirty Electricity

- ◆ The amount of Dirty Electricity on a building’s wires can be measured using the Graham-Stetzer Microsurge Meter available from Pure Power Solutions ([www.getpurepower.ca](http://www.getpurepower.ca), phone 705-654-3790 or 888-242-1522).
- ◆ Have the filters installed in your school to reduce student and teacher reactions to dirty electricity.

## Why does your school need to install Graham-Stetzer filters?

Graham-Stetzer filters are capacitors that remove microsurgers on electrical wires within the range of 4 to 100 kHz [4,5]. These microsurgers include transients and harmonics of the 60 Hz frequency and consist of variable spikes in the voltage that rides on top of the electrical distribution grid’s 60 Hz sine wave.

Filters were installed in Willow Wood School, a private school (grades 1 to 12) in Toronto, because one of the students is electrically sensitive. Teachers were asked in a single blind study to complete a questionnaire daily between January and March 2003 for a 6-week period (3 weeks with and 3 weeks without filters). Eighteen teachers out of 49 completed the questionnaire enough times to enable statistical analysis.<sup>44</sup>

The Graham-Stetzer filters improved power quality at Willow Wood School by filtering out high frequency transients on indoor wiring. The amplitude of frequencies below 20 kHz were reduced by

approximately 50% from an average of 23 mV (range 13-101 mV rms) to 13 mV (range 8-24 mV rms).

The conclusions include the following:

- ◆ Symptoms improved for 55% of the teachers.
- ◆ Overall teacher wellbeing improved while the filters were in place. Teachers were less frustrated, less tired, less irritable. They were better able to focus and had better health, improved mood, and greater sense of accomplishment.
- ◆ Student response appeared to be age-specific with younger students responding more favorably than older students
- ◆ Students or teachers who suffer from electrical sensitivity in a school with computers, energy efficiently lighting, photocopy machines and other electronic equipment are unlikely to do well in their work.
- ◆ The study results show:
  - ✓ 45% of the teachers reported feeling less tired and less frustrated;
  - ✓ 35% felt healthier;
  - ✓ 30% were less irritable;
  - ✓ 25% had improved mood, more energy and a greater sense of satisfaction with their work while the filters were installed.
  - ✓ 39% to 56% of teachers may have some degree of electrosensitivity
- ◆ This was not a placebo effect since the teachers were unaware of the nature of the research that was being conducted.
- ◆ These data are particularly interesting since the filters were installed during February, a month which people associate with symptoms of seasonal affective disorder (SAD).
- ◆ Teachers also documented student behaviour (but not student health) in this questionnaire.
- ◆ In the lower school (grades 1 to 6) students spend most of their time in the same classroom. Sixty percent of the classes showed significant improvements in student behaviour.
- ◆ In middle school (represented by grade 7, Table 4), only one class showed statistically significant improvements. In two of the three classes, as much as 5 to 10 minutes were saved each period in unproductive activity while the filters were installed.
- ◆ In high school (grades 9 to 12, Table 5) as in middle school, students change classrooms each period and hence their exposure to microsurgers are likely to be much more varied.

- ◆ Younger students may be more sensitive than older students to poor power quality. Similar results were observed for childhood leukemia with residential exposure to magnetic fields. Younger children were at greater risk for developing leukemia than older children.<sup>45</sup>
- ◆ Improved power quality is associated with behaviour that is more conducive to learning in the classroom. It also raises questions about students who may have learning disabilities or those with ADD or ADHD. To what degree are these symptoms associated with or exacerbated by poor power quality in the classroom?

[0]

The Melrose-Mindoro School District in western Wisconsin was previously categorized as a "sick" building but attempts to remove mold, which was assumed to be the problem, did nothing to alleviate symptoms among the staff.

After installation of the Graham-Stetzer filters:

- ◆ Both teachers and students had more energy.
- ◆ The school nurse documented these changes ([www.electricalpollution.com](http://www.electricalpollution.com)). With Graham-Stetzer filters installed, of the 37 students with inhalers only 3 used them for exercise-induced asthma before physical education classes.
- ◆ Staff with allergies took less medication
- ◆ Students with migraines experienced less pain.
- ◆ Teacher absences for health-related reasons were dramatically reduced after the filters were installed.
- ◆ One teacher who was diagnosed with MS had her symptoms disappear with a few days and have not returned 3 years later.
- ◆ The increase in modern electronics inside the school and "dirty" power from similar sources outside the school were to blame.

**These data suggest that poor power quality may be interfering with the education of students, particularly younger students, and the performance of teachers.** If the improvements in wellbeing, behaviour and performance that coincided with improved power quality at Willow Wood is a sign of electrical sensitivity then the proportion of electrically sensitive people in the population may be 20-60% than the 2% reported in Sweden<sup>46</sup>. This situation is likely to get worse as we continue to promote the use of computers in the classroom and as we move towards wireless computer and communication technologies that generate radio frequency radiation.

The Graham-Stetzer filters provide one method by which individuals can improve power quality in their home, work, or school environment. They also provide a tool that enables scientists to study the biological effects of poor power quality.<sup>47</sup>

Dr Havas has recently completed studies in two more schools in Minnesota with very promising results, 41% of the teachers improved while Graham-Stetzer filters were installed. This was a single blind study using "dummy" filters as well as the real ones, to eliminate a placebo effect.

## Web Site References:

### EMFs and Other Schools:

<http://www.lessemf.com/emf-news.html> Scroll down to what you can do about EMF- look at computers in schools

<http://www.energyfields.org/publicpolicy.html> California child EMF child risk reduction Act

[http://www.ehib.org/cma/project.jsp?project\\_key=TCHR01](http://www.ehib.org/cma/project.jsp?project_key=TCHR01) Breast cancer amongst teachers exposed to EMF

<http://www.emfacts.com/> EMFacts Consultancy, founded in 1994 by Don Maisch, has produced a wide range of reports and papers dealing with various health issues related to human exposure to Electromagnetic Radiation.

[http://ieq.nibs.org/ieq\\_project.pdf](http://ieq.nibs.org/ieq_project.pdf) Recommendations of future action (pg 68 of 97)

<http://www.who.int/peh-emf/meetings/archive/en/rapporteurreport.pdf> Pg 6: Dr. Paolo Vecchia and children

<http://members.aol.com/gotemf/emf/kids.htm> Kids and real EMF effects

### Electromagnetic Frequencies:

[www.stetzerelectric.com](http://www.stetzerelectric.com) A new application of existing science and technology designed to improve power quality in home and office environments.

[www.getpurepower.ca](http://www.getpurepower.ca) Pure Power Solutions is the Canadian Distributor for Graham-Stetzer filters. The research section of these sites has downloadable versions of Dr Havas' research publications, along with information and articles explaining dirty electricity and what can be done about it.

[www.electricalpollution.com](http://www.electricalpollution.com) Electrical Pollution Solutions. People exposed to excessive "dirty" power may develop radio wave sickness. Clean power enters the home at 60 Hz. Electrical pollution is 60 Hz electricity polluted with high frequency signals or "dirty" power flowing on the wires and through the earth.

### Electrical Hypersensitivity (EHS) Information:

[www.electrosensitivity.org.uk](http://www.electrosensitivity.org.uk) ES-UK is the association for the electrically hypersensitive (EHS) that supports those made ill by electromagnetic fields/RF/microwaves and campaign for recognition of this illness.

[www.feb.se](http://www.feb.se) FEB - The Swedish Association for the ElectroSensitive

[www.aeha-quebec.ca](http://www.aeha-quebec.ca) Allergy and Environmental Health Association of Quebec (AEHAQ)

[www.who.int/peh-emf/en](http://www.who.int/peh-emf/en) World Health Organization

[www.nfam.org](http://www.nfam.org) National Foundation for Alternative Medicine

[www.niehs.nih.gov/emfrapid](http://www.niehs.nih.gov/emfrapid) National Institute of Environmental Health Sciences

## EMF Information

[www.microwavenews.com](http://www.microwavenews.com) For more than 25 years, **Microwave News** has been reporting on the potential health and environmental impacts of electromagnetic fields and radiation.

[www.powerwatch.org.uk](http://www.powerwatch.org.uk) The [Powerwatch Handbook](#) is a practical guide to reducing your exposure to electromagnetic fields from all aspects of your environment.

[www.emrpolicy.org](http://www.emrpolicy.org) : The EMR Policy Institute - Advancing Sound Public Policy on the Use of Electromagnetic Radiation

[www.icems.eu](http://www.icems.eu) The **International Commission for Electromagnetic Safety (ICEMS)** is a non-profit organization that promotes research to protect public health from electromagnetic fields and develops the scientific basis and strategies for assessment, prevention, management and communication of risk, based on the precautionary principle

[www.hir.nu/Publications.htm](http://www.hir.nu/Publications.htm) Örjan Hallberg, Hallberg Independent Research

[www.emfacts.com](http://www.emfacts.com) *EMFacts* Consultancy, founded in 1994 by Don Maisch, has produced a wide range of reports and papers dealing with various health issues related to human exposure to Electromagnetic Radiation

[www.EMFSolutions.ca](http://www.EMFSolutions.ca) : EMF Solutions is an Ontario based company providing on-site Environmental Site Assessment, Remediation and Consulting Services to homes, schools, offices and institutions. The company specializes in the detection and mitigation of electrical contamination caused by Ground Current, Electrical Pollution, Electromagnetic Fields and Radio-Frequency Radiation.

<http://blakelevitt.com> : B. Blake Levitt is an award-winning journalist who has researched the biological effects of non-ionizing radiation since the late 1970's

[http://home.comcast.net/~es\\_info](http://home.comcast.net/~es_info) :Electrical Sensitivity & Electrical Pollution Information

[www.emraustralia.com.au](http://www.emraustralia.com.au) Electromagnetic Radiation – EMR Resources, Articles & Advice for Living and Working Safely with EMR

[www.enviratest.com](http://www.enviratest.com) EMF Safety Protection Products for Electromagnetic Fields

[www.lifeenergies.com](http://www.lifeenergies.com) : Become informed about the causes and health effects of electrical pollution and electro-smog.

[www.lessemf.com](http://www.lessemf.com): LessEMF.com - The Place to Buy Gauss Meters, RF Meters, & Shielding

[http://www.fms-corp.com/fmsprojects\\_project3.php4?sec=3](http://www.fms-corp.com/fmsprojects_project3.php4?sec=3) FMS – Field Management Services

### **Ground Current (Stray Voltage) Web Sites:**

[http://ecmweb.com/mag/electric\\_clearing\\_confusion\\_unwanted/index.html](http://ecmweb.com/mag/electric_clearing_confusion_unwanted/index.html) *EC&M* magazine is the technical authority for 140,000+ electrical professionals. This is a great article outlining and explaining ground current.

<http://www.cbc.ca/cp/health/061019/x101964.html> CBC - Ont. bill targets stray voltage from power lines as threat to human health

[http://www.ontla.on.ca/hansard/house\\_debates/38\\_parl/Session2/L110.htm#P188\\_57980](http://www.ontla.on.ca/hansard/house_debates/38_parl/Session2/L110.htm#P188_57980) The Ground Current Pollution Act passed second reading in the Ontario Legislature Oct 19, 2006. This is the link for the Hansard notes, the official minutes to the Legislative session that this Bill received unanimous support.

### **Cell Tower Web Sites:**

[www.protectschoools.org/](http://www.protectschoools.org/) Cell Towers and Health Risks to School Children. Parents have become very concerned about Fairfax County Public Schools' contracts with Milestone Communications and cellular telephone companies to build wireless transmission facilities on school grounds.

[www.mastsanity.org](http://www.mastsanity.org) Mast Sanity is the primary national organisation opposing the insensitive siting of mobile phone and Tetra masts in the UK.

[www.emfinterface.com](http://www.emfinterface.com) EMF Interface - Bioelectromagnetics - Harmful & Beneficial Health Effects

[www.c-a-r-e.org](http://www.c-a-r-e.org) Canyon Area Residents for the Environment - Dedicated to Preserving and Enhancing our Community and Environment

[www.buergerwelle.de](http://www.buergerwelle.de) : One of the biggest information sources concerning mobile phones, mobile radio-communications and electro-smog

[www.emr.co.nz](http://www.emr.co.nz) : Welcome to the EMR, Electromagnetic Radiation Web site, where we share research and information about the effects of EMR, on health from mobile phones, cellphones, base stations or cellsites.

<http://www.powerwatch.org.uk/docs/camphill.asp> Power Watch.org

[www.mast-victims.org](http://www.mast-victims.org) : Raising awareness of the harmful effects of cell phone masts

[www.scram.uk.com](http://www.scram.uk.com) : SCRAM – Seriously Concerned Residents Against Masts. Set up in 2003 by Eileen O’Connor and Lynn Insley who attributed their illnesses to a mobile phone mast

<http://www.radiationresearch.org/> Radiation Research.org:

[www.tetrawatch.net](http://www.tetrawatch.net) : TETRAWATCH: a research based campaign against TETRA Airwave

[www.safewireless.org](http://www.safewireless.org) : Safe Wireless Initiative

[www.mastaction.co.uk](http://www.mastaction.co.uk) : Mast Action UK - National Campaign for the Sensible Siting of Masts

[www.w-a-r-t.pwp.blueyonder.co.uk](http://www.w-a-r-t.pwp.blueyonder.co.uk) UK - Wednesbury Action for the Removal of Telephone masts

[www.nomasts.org.uk](http://www.nomasts.org.uk) : Goldsworth Residents Against the Masts

[www.stopumts.nl/english.php](http://www.stopumts.nl/english.php) A critical view on the health aspects of mobile communication devices

[www.iddd.de](http://www.iddd.de) : Articles in Polish, German and English

<http://www.microwavenews.com> Microwave News:

[www.latitudes.org/articles/electrical\\_sensitivity\\_articles.html](http://www.latitudes.org/articles/electrical_sensitivity_articles.html) Association for Comprehensive NeuroTherapy (ACN):

[http://news.com.com/2100-7351\\_3-5089202.html?tag=nefd\\_top](http://news.com.com/2100-7351_3-5089202.html?tag=nefd_top) Parents sue elementary school for wireless technology

Radio (TV) Canada’s news program “Decouverte” [Discovery] broadcast a two-part news show on EMFs Nov.20, 2005. You can watch both shows on Radio Canada’s Web site (in French):

[http://radio-canada.ca/actualite/v2/decouverte/niveau2\\_5587.shtml#](http://radio-canada.ca/actualite/v2/decouverte/niveau2_5587.shtml#)

## **Power Line Web Sites**

[www.powerlinefacts.com](http://www.powerlinefacts.com) : Power Line Health Facts. Information for the concerned

[www.stop-emf.ca](http://www.stop-emf.ca) Stop Transmission Lines Over People

[www.electrical-fields.bris.ac.uk](http://www.electrical-fields.bris.ac.uk) : The Human Radiation Effects Group

[www.shieldus.com](http://www.shieldus.com) The purpose of Shieldus.com is to offer a unified voice and unite all of the individuals, groups and towns that are in opposition to the VELCO Northwest Reliability Project.

# Appendix I

## What Can You Do About EMF? Mitigation Solutions

Source: [http://www.fms-corp.com/mitigation\\_overview.php4](http://www.fms-corp.com/mitigation_overview.php4)

Successfully mitigating an existing EMF problem typically involves several phases:

- ◆ As first step, it is necessary to conduct an EMF survey of the area or areas of concern. An EMF site survey involves the measurement or "mapping" of EM field levels in the affected area to determine their exact magnitude and characteristics and location of the offending source.
- ◆ In the next phase, measurement and other data collected during the EMF site survey, is analyzed and used to develop a range of possible mitigation measures.
- ◆ A third step is the actual implementation of an optimum mitigation solution.
- ◆ A post-mitigation EMF survey confirms by measurement, that elevated EMF levels in the area of concern have been adequately reduced by the mitigation.
- ◆ DC magnetic fields, AC magnetic fields and RF radio frequency fields, usually each require distinctly separate and differing mitigation techniques. However, all EMF problems, irrespective of frequency, typically employ one or more of the following mitigation strategies:
  - ◆ Create or [increase distance](#) between the EMF source and the affected area or device
  - ◆ [Decrease or minimize EMF emission field strength](#) from the offending source
  - ◆ [Shield](#) either the EMF source or affected area and/or device

Prudent avoidance of EMF is the best policy. It means to measure fields, determine the sources, and act to reduce exposure. Keep exposure to under 2 mG. In February 2003, the World Health Organization decided to apply the precautionary principle to extremely low frequency and high frequency radiation.

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## Appendix II

### Childhood leukaemia risk doubles within 100 metres of high voltage power lines

<http://www.medicalnewstoday.com/medicalnews.php?newsid=13440>

Article Date: 15 Sep 2004

The biggest ever publicly funded UK study (1) into power lines and child cancer has found that children under the age of 15 living within 100 metres of high-voltage power lines have close to twice the risk of developing leukaemia. Children aged 0-5 are the most vulnerable so their risk is likely to be even higher.

This result from the Oxford Childhood Cancer Research Group Study, headed by Gerald Draper analysed and compared 33 years of data (from 1962 to 1995) on 35,000 children diagnosed with cancer, with their distance to the nearest electricity transmission line. These latest findings from the Draper study of a direct effect on childhood leukaemia from U.K. power lines follow from the acknowledged International studies that the risk of childhood leukaemia is doubled for magnetic field exposures above 0.4 microtesla, well below that seen under high voltage power lines.

## Appendix III

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Source: <http://www.energyfields.org/publicpolicy.html>

### Statement of the precautionary principle

"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof." -- Wingspread, 1998

Now that we know there is a health threat, especially to our children, it is time to call for public policy change in siting of power lines near homes and schools to require full disclosure in the monitoring and reporting of EMF emissions from current sites and, by mitigating hazardous sites, to eliminate or reduce EMF fields to be within the safe limits. Many scientists now believe that, based on the scientific evidence showing biological effects as low as 3-4 milligauss, any chronic exposure over 2 milligauss should be avoided.

In 1993, The Children's Electromagnetic Field Risk Reduction Act (California) established a national policy to prohibit the construction and operation of new schools, and child care facilities, on property where the EMF exceeds an average two milligauss per day. The bill responds to a growing body of scientific studies showing a possible dose-response relationship between human exposure to electromagnetic fields from electric transmission lines and development of cancer, particularly childhood cancer. Most recently, the Karolinska Institute in Stockholm found that children exposed to 1 milligauss over long periods have twice the normal risk of developing leukemia, those exposed to 2 milligauss had three times the normal risk, and those exposed to 3 milligauss had 4 times the normal risk.

## Appendix IV

**Statement from Dr. Gerard Hyland** of the University of Warwick, Coventry, England, and the International Institute of Biophysics, Neuss-Holzheim, Germany.

Excerpt (dealing specifically with children and mobile phone use) from his Report for the STOA Committee of the EU.

"The Increased Vulnerability of Pre-adolescent Children:

Pre-adolescent children can be expected to be (potentially) more at risk than are adults - as recognised in the Report of the UK Independent Expert Group on Mobile Phones (the Stewart Report) - for the following reasons:

\*Absorption of microwaves of the frequency used in mobile telephony is greater (particularly at 900MHz) in an object about the size of a child's head - the so-called head resonance – than in an adult's, whilst, in consequence of the thinner skull of a child, the penetration of the radiation into the brain is greater than in an adult.

\*The still developing nervous system and associated brain-wave activity in a child (and particularly one that is epileptic) are more vulnerable to aggression by the pulses of microwaves used in GSM than is the case with a mature adult. This is because the multi-frame repetition frequency of 8.34Hz and the 2Hz pulsing that characterises the signal from a phone equipped with the energy-saving discontinuous transmission (DTX) mode lie in the range of the alpha and delta brain wave activities, respectively. The fact that these two particular electrical activities are constantly changing in a child until the age of about 12 years, when the delta-waves disappear and the alpha rhythm is finally stabilised, means that a child's brain must be anticipated to be *doubly* vulnerable to interference from the GSM pulsing.

\*The increased mitotic activity in the cells of developing children makes them more susceptible to genetic damage.

\*A child's immune system, whose efficiency is, in any case, degraded by radiation of the kind used in mobile telephony, is generally less robust than is that of an adult, so that the child less able to cope with any adverse health effect provoked by (chronic) exposure to such radiation." <sup>48</sup>

## Appendix V

### Electrical pollution takes its toll on school

*by Ken Luchterhand of The Chronicle, Melrose, Wisconsin*

Angela Olstad almost quit being a fourth grade teacher and principal. Although she loved her job at the Mindoro school, she couldn't handle being sick so often.

The whole right side of her body went numb. She had terrible headaches, vision problems and felt completely exhausted at the end of a work day. She had never been able to teach for an entire week without calling in sick. This had gone on more than two years.

She was about to quit when a cause had been found for her illness - electrical pollution. Electrical filters soon were placed throughout the school and now she says she feels better than ever.

She's not the only person making these claims. Several other teachers have been convinced of the electrical pollution theory and swear to its authenticity.

"I feel better," said teacher Sharon Kaczowski. "All my sinus problems are gone. I was always fighting a sinus infection



Angela Olstad, teacher and principal at Melrose-Mindoro Elementary, Mindoro, shows an electrical filter in her left hand and an RF meter in her right hand. Ideally, the RF meter should show below 50 for a healthy environment. Chronicle photo by Ken Luchterhand

before."

Teacher Aide Dawn Rand agrees, and said she used to experience chest pains and sinus problems. Before, when she walked up the stairs, she could hardly breathe. Since the filters have been installed, she hasn't had any chest pains and her sinuses have cleared.

"I'm definitely a believer," Rand said. "I have them installed in my home now."

Olstad has worked for the Melrose-Mindoro School District for 15 years. She worked at the Melrose building as a kindergarten teacher for 10 years, then switched to the Mindoro building five years ago, when she began teaching fourth grade.

That's when the health problems began surfacing.

At the end of October during her first year, her whole right side went numb, a problem that continued for four months. Her ability to think became difficult and she always felt exhausted. She began to see double at the end of the second year.

Meanwhile, Administrator Ron Perry was trying to find out what was causing her illness. State inspectors came to the school and, after some analysis, they determined it was being caused by mold.

During the summer, the school was completely cleaned, including the heating ducts, tunnels and ceiling tiles. It cost the district about \$100,000, she said.

Olstad's health improved during the summer because she spent time away from her classroom.

However, when she returned to her third year at Mindoro, the symptoms returned. The numbness on one side of her body returned.

"I need to be out of this room," she told herself. "There must be something that was skipped." She told Perry about the return of her health problems and her classroom was completely stripped and cleaned. Everything was bleached.

"My students were in a traveling classroom for a month while they tore my classroom apart," Olstad said.

She had been to a general practitioner physician, an allergist and an eye doctor. A neurologist at Mayo Clinic diagnosed her as having benign multiple sclerosis. "I had never been so sick in my life," she said. "It even hurt to put my head on the pillow at night." The sickness was so great, she was ready to quit teaching.

Then, early one morning Perry and Melrose-Mindoro District Board of Education President Bob Hardie came to the school to hold a meeting. They told the group of teachers they think they know what the problem might be.

The only thing that had changed over the years, they explained, was the amount of electricity used by the school. More computers and other electrical devices increased the demand for electricity.

The culprit: electrical pollution emanating from the electrical wiring, they concluded.

"I didn't want to believe it," Olstad said. "I was the biggest skeptic there."

Dave Stetzer of Stetzer Electric, Blair, was contracted to isolate the problem and make any adjustments to alleviate the problem. Stetzer found the amount of radio frequency electromagnetic fields were too high, so he installed electrical filters in every outlet.

Besides the Mindoro school, the Melrose-Mindoro High School and the Melrose school also were fitted with filters. Weeks after the filter installation, Olstad and other teachers began to report they felt much better. Even students were in better health, she said.

Before the problem was diagnosed, 37 children were on inhalers. Now, only five children are using inhalers.

"I haven't had a headache since. I have never felt this good," Olstad said. "Some people come here feeling bad and when they leave at the end of the day, they are feeling good."

The temperature in the computer lab dropped 20 degrees since the filters have been installed, yet the thermostat hasn't been changed.

Many of the teachers have installed electrical filters in their homes. Each filter costs \$25 and it usually takes 20 for an average house, Olstad said.

Stetzer recently spoke before the Wisconsin School Board convention about the hazards of electrical pollution. Blair-

Taylor, CFC, Brighton and Marshfield schools now have filters installed at each school building.

Rep. Barbara Gronemus (D) - Whitehall has introduced legislation (bill AB529) that would require something done about electrical pollution.

"It's time they do something," Olstad said. "What is it doing to our children?"

No one from Xcel Energy, the supplier of electricity to the school, would speak on the subject. Also, no doctor could be located who would speak on the validity of electrical pollution's affects on health.

"It has changed so many lives," Olstad said. "I'm so thankful that the filters have been installed. The cost is so minimal considering the benefits."



## Melrose-Mindoro Area Schools

Ron Perry, Superintendent  
Del Deberg, High School Principal  
Tracy Dalton, K-8 Principal

N181 State Rd. 108 • Melrose, WI

High School – (608) 488-2201 or (608) 857-3417

Fax – (608) 488-2805

Melrose Elementary – (608) 488-2311

Mindoro Elementary – (608) 857-3410

### **Appendix VI – Melrose-Mindoro School Health Summary** **CHANGES NOTED SINCE FILTERS INSTALLED**

In the years previous to the filters being installed, several children required inhalation treatments for their asthma in the spring and in the fall. Many of them required nebulizer treatments once or twice a day while at school. I have not had to administer one nebulizer treatment this past year and of the 37 students with inhalers, only three of them use the inhaler for their exercise-induced asthma before Phy Ed.

Teachers are stating they are less fatigued and tired.

The sense of smell has come back for me. I lost it for three years and the doctors said it was my allergies.

The students seem to have more energy and appear and seem less tired.

Several staff who doctored regularly for allergies have not had to take medication or see their doctor because they are having less problems.

Students whom have been diagnosed with migraine headaches have had their headaches reduced no headaches at all.

I feel that our faculty and students have had improved health overall since the filters have been installed.

Char Sbraggia R.N.  
District Nurse

## Appendix VII

### SEEC STANDARDS

Taken from "For Our Children and Ourselves: Suggested School Board EMF Guidelines"  
Prepared by Safe EMF Environment Committee for our Schools (SEEC).

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.

Contact: Lorna Wilson  
23 Lynden Hill Cresc.  
Brantford, ON N3P 1R1  
519-751-2560 phone or 519-751-65-457 fax  
Email: [lorna.wilson@sympatico.ca](mailto:lorna.wilson@sympatico.ca)

The School Boards need to design guidelines along the principles of "Prudent Avoidance".

The three processes of Prudent Avoidance are:

1. Monitor
2. Intervention
3. Surveillance

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

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.

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

#### 1. 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.

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.

## 2. 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 classroom 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.

## 3. Surveillance

The School Board EMF Committee shall develop a surveillance program that ensures proper plumbing 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.*

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