Melnykovych, Andrew (PSC)

From: Melnykovych, Andrew (PSC)
Sent: Friday, February 21, 2014 2:03 PM
To: 'song bird'
Subject: Your comments in Case 2012-00428 - smart grid administrative case

Ms. Holloway:

The documents you submitted will be entered as public comments in the record of the above-referenced case.

Andrew Melnykovych
Director of Communications
Kentucky Public Service Commission
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Frankfort, KY 40601
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From: song bird [redacted]
Sent: Monday, February 17, 2014 5:11 PM
Subject: Case 2012-00428 Re: Smart Meter Installation in Kentucky

Dear Mr. Melnykovych,

Please enter the following court testimonies into Case 2012-00428

Case 2012-00428 Re: Smart Meter Installation in Kentucky

Sincerely,

Ruby Holloway

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United States District Court

District of Oregon

Portland Division

Alexandra Helene Morrison, by and through her Guardian *ad litem* and father, David Mark Morrison**,** and **David Mark Morrison**, individually,

v.

Portland Public Schools,

Defendant.

Civil Action No.

Declaration of Lloyd Morgan

I, Lloyd Morgan, under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of a preliminary and permanent injunction enjoining Portland Public Schools' use of WI-FI:

1. I am an electronic engineer by training with 38 years of industrial experience to the Vice Presidential level (retired 2002).

2. I am a member of international science organization the Bioelectromagnetics Society (see www.bems.org), and Senior Research Fellow, Environmental Health Trust[1] (EHT) (http://www.environmentalhealthtrust.org/), Scientific Advisor, EM Radiation Research Trust (http://www.radiationresearch.org/), an investigator of a childhood leukemia cluster in Fallon, Nevada with a team from the University of California, San Francisco, USA, a columnist for Powerwatch (http://www.powerwatch.org.uk/columns/morgan/index.asp), and a brain tumor survivor.

3. Along with co-authors my latest science paper Scientific Panel on Electromagnetic Field Health Risks: Consensus Points, Recommendations, and Rationales (Reviews on Environmental Health Vol. 25, No. 4, 2010) calls for new biologically based exposure limits. It also recommends, based on scientific findings of harm, lowering the exposure limits. For example, 'Based on power density measurements, the Seletun Scientific Panel finds sufficient evidence for a whole-body scientific bench-mark for adverse health effect exists down to … 8.5 μW/cm^2 based on at least 17 scientific studies reporting low-intensity effects on humans.' The current FCC exposure limit is 1,000 μW/cm^2.

4. A previous science paper *Estimating the Risk of Brain Tumors from Cellphone Use: Published Case-Control Studies* is available on-line from Pathophysiology (http://www.sciencedirect.com/science/publication?issn=09284680&volume=16&issue=2-3) reports that the Interphone studies on the risk of brain tumor from cellphone use has a systemic-protective-skew that result in an underestimation of the risk of brain tumors.

[1] A nonprofit organization dedicated to educating individuals, professionals and communities about controllable environmental health risks and policy changes needed to reduce those risks.

5. I am a co-author on two previously published epidemiological papers: *Long-term use of cellular phones and brain tumours: increased risk associated with use for > or =10 years*.[2] This paper was awarded 'one of the top ten articles for 2007' in the journal of Occupational and Environmental Medicine, http://oem.bmj.com/misc/topten07.dtl, and, A *new electromagnetic exposure metric: high frequency voltage transients associated with increased cancer incidence in teachers in a California school*.'[3]

6. I am the lead author of the Report, *Cellphones and Brain Tumors: 15 Reasons for Concern* (http://www.radiationresearch.org/pdfs/15reasons.asp), which was widely distributed to the media and government officials August 25, 2009.

7. In November, 2009, I was a distinguished member of a Scientific Panel at the International EMF Conference in Stavanger, Norway: 'Electromagnetic fields and health: Science pointing to new biologically-based guidelines,' whose task was to arrived at new EMF exposure limits based on scientific findings of harm (see 3 above).

8. Since 1995, I have been involved in the study of exposure to electromagnetic fields and resultant health problems. Beginning in 1995, after recovering from a brain tumor, and each year since 1995, I have attended multiple science meetings including, among others, the Bioelectromagnetics Society, the Neuro-Oncology Society, the American Academy of Environmental Medicine, the 2000 Consensus Conference [to designate all brain tumor types with their appropriate codes), and the Brain Tumor Epidemiology Consortium. I have presented at the Marin County (California) Dept. of Health Services in 2003, the American Academy of Environmental Medicine in 2004, the Bioelectromagnetics Society in 2005, 2008, 2009, 2010

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[2] Hardell L, Carlberg M, Söderqvist F, Mild KH, Morgan LL. Long-term use of cellular phones and brain tumours: increased risk associated with use for > or =10 years. Occup Environ Med. 2007 Sep; 64(9):626-32.

[3] Milham S and Morgan LL. A new electromagnetic exposure metric: high frequency voltage transients associated with increased cancer incidence in teachers in a California school' Am J Ind Med. 2008 Aug; 51(8):579-86.

and will give two presentations in June, 2011, the Children with Leukemia conference in 2008, and the Radiation Research Trust (RRT), International Conference, EMF & Health, A Global Issue, in Sept. 2008, and to physicians and health advocate organizations.

9. I authored two legislative Acts concerning brain tumors, one in California (passed into law in 2000), and the other in the US Congress (passed into law in 2002). I currently have another Bill that is soon to be introduced into the US Congress, the National Childhood Brain Tumor Prevention Network Act mandating a comprehensive study into the causes of the leading cause of cancer death in children, brain tumors.

10. It is generally accepted within the relevant scientific community and has been established that many bioeffects and adverse health effects occur at far lower levels of RF exposure than those that cause measurable heating. Educating by way of the Internet via cabled systems does not increase exposure.

11. Selected studies showing health effects from microwave radiation:

a. Independently funded Swedish studies led by Dr. Lennart Hardell (cellphones & cordless phones):

i. Hardell *et al.*, 2006. Pooled analysis of two case-control studies on the use of cellular and cordless telephones and the risk of benign brain tumours diagnosed during 1997-2003.

1. >1000 hours of cellphone use, 210% increase risk of acoustic neuroma

ii. Hardell *et al*., 2006. Pooled analysis of two case–control studies on use of cellular and cordless telephones and the risk for malignant brain tumours diagnosed in 1997–2003.

1. >2000 hours of cellphone use, 270% increased risk of brain cancer.

iii. Hansson Mild *et al*., 2007. Pooled Analysis of Two Swedish Case–Control Studies on the Use of Mobile and Cordless Telephones and the Risk of Brain Tumours Diagnosed During 1997–2003.

1. For every year of cellphone, the risk of high-grade brain cancer increases by 11%.

iv. Hardell & Carlberg. 2009. Mobile phones, cordless phones and the risk for brain tumours.

1. First use of cellphone as a teenager, 580% increased of ipsilateral brain cancer;
2. First use of cellphone between 20-49 years, 150% increased risk of ipsilateral brain cancer.

b. Industry funded Interphone study:

i. Lönn *et al*., 2004. Mobile Phone Use and the Risk of Acoustic Neuroma.

1. >10 years of cellphone use, 290% increase ipsilateral increased risk of acoustic neuroma.

ii. Hepworth et al. 2006. Mobile phone use and risk of glioma in adults: case-control study.

1. 24% increased risk of ipsilateral brain cancer.

iii. The Interphone Study Group. 2010. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case–control study.

1. >10 years of cellphone use, 118% increased risk of brain cancer compared to cellphone use of 1-1.9 years.

c. Human Male Fertility Studies:

i. Hardell *et al*., 2007. Use of cellular and cordless telephones and risk of testicular cancer.

1. 80% risk, kept in left pocket=left testicle, right pocket=right testicle.

ii. Multiple human studies showing reduced sperm count and severe damage to surviving sperm.

iii. Multiple animal studies showing severely damaged sperm.

d. Cell Phones and Brain Tumors 15 Reasons for Concern 2009 (http://www.radiationresearch.org/pdfs/15reasons.asp).

e. Animals studies

i. Consistent findings of DNA damage;

ii. Consistent findings of Blood-Brain Barrier (BBB) leakage.

f. REFLEX Study of human cells exposed to cellphone microwave radiation:

i. Consistent findings of DNA mutation as low as 3% of the FCC exposure limit.

g. Salivary gland located in the cheek (parotid gland):

i. Sadetzki *et al*., 2008 (Israelí Interphone). Cellular Phone Use and Risk of Benign and Malignant Parotid Gland Tumors—A Nationwide Case-Control Study.

1. >10 years, 89% increased risk of parotid gland tumors.

ii. Duan Y, *et al*., 2010. Correlation between cellular phone use and epithelial parotid gland malignancies.

1. >2.5 hours/day of cellphone use, >3,000% increased risk

2. The magnitude of the risk of parotid gland tumors found in the Duan Y, *et al*. study on the risk of parotid gland cancer from

cellphone use were of the same magnitude as the risk of lung cancer from smoking.

h. Swisscom patent to reduce power from cordless phones. 2004

i. Need for patent: 'The risk of damage to health through electrosmog has also become better understood as a result of more recent studies and improved studies. When, for example, human blood cells are irradiated with electromagnetic fields, clear damage to hereditary material has been demonstrated and there have been indications of an increased cancer risk.'

12. Exposure standard are based on a false premise that the only biological effect from microwave radiation is heating.

13. Portland Public Schools' use of WI-FI is causing and will continue to cause Alexandra Morrison, other students, and school staff and faculty adverse health effects and should be discontinued immediately.

Dated this 31 day of May, 2011.

LLOYD MORGAN

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Local Counsel for Plaintiffs

United States District Court

District of Oregon

Portland Division

AHM, by and through
her Guardian *ad litem* and father,
David Mark Morrison**,** and
David Mark Morrison, individually,

v.

Portland Public Schools,

Defendant.

Civil Action No. 3:11-cv-00739-MO

Declaration of
Dr. Magda Havas, B.Sc., Ph.D.

I, Dr. Magda Havas, B.Sc., Ph.D., under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of an injunction enjoining Portland Public Schools' use of WI-FI:

1. I am a scientist researching the adverse health outcomes of electromagnetic radiation exposure, including from sources such as WI-FI networks and cell towers. Ironically, Portland Public Schools has decided against lucrative cell tower contracts based on health, yet uses inside schools WI-FI networks and laptops that can emit higher levels of electromagnetic radiation at user distances than do cell towers outside schools.

2. My Curriculum Vitae may be found below.

Guidelines

3. The Federal Communication Commission (FCC) and the school WI-FI provider infer, respectively by their guidelines and assertions of product testing, that school WI-FI deployment is not harmful, provided that exposures to radio frequency (RF) radiation from the WI-FI remain below FCC guidelines. This is false.

4. FCC guidelines were established in 1991 by the ASTM-IEEE Committee chaired by microwave oven co-developer John Osepchuk, who is now retired from Raytheon. These guidelines apply only to an average exposure measured for a maximum of 30-minutes, and neither assure or infer safety for greater than 30-minute exposure durations. FCC guidelines apply only to 'thermal' exposure levels, and do not protect or claim to protect against biologic effects at subthermal or microthermal exposure levels.

5. The specific carrier frequency deployed by the Portland Public Schools for WI-FI is the same as that used by the microwave oven: 2.45 GHz. This frequency, which has a wavelength of approximately 12.24 cm or 4.8 inches, not only maximizes absorption-per-exposure in living tissues approximating dimensions of the human head and brain, but also has a specific harmonic resonance with the water molecule, for the intended purpose of agitating at the molecular level. Water molecule agitation occurs in all biological tissues that contain water exposed to 2.45 GHz, including to those exposed to WI-FI radiation, not only to those placed in

an oven and exposed to the higher exposure levels an oven produces.

6. Duration is a very potent contributing factor toward adverse health effects. Chronic exposure, a maximum (24/7) or near-maximum duration of constancy over hours per day, will increase adverse effects.

7. FCC guidelines are not safety standards, but rather mere guidelines. I am informed that FCC has neither authority over nor expertise in health matters.

8. There is a voluminous and ever growing number of primary, peer-reviewed scientific publications relevant to school WI-FI deployment, publications which conclude adverse health and biological effects below 'short-term, thermal-based' guidelines (seewww.bioiniative.org). These studies are consistent in demonstrating harmful outcomes. A large and growing number of scientific, public health and medical organizations, and individuals therefrom, have publicly pronounced the need for stricter policy, including even to ban certain hazardous activities that deploy pulse-modulated microwave radiation. For these reasons it is unthinkable to introduce WI-FI microwave radiation into a school environment where young children and school employees must spend hours each day.

9. Public exposure standards and guidelines for microwave (MW) radiation, which radiation WI-FI deploys, differ by five orders of magnitude (10,000 times) around the world. The strictest standards are in Salzburg, Austria, and Liechtenstein, where the public exposure limit is 0.1 $\mu W/cm^2$ (microwatt per square centimeter). See short video (http://videos.next-up.org/SfTv/Liechtenstein/AdoptsTheStandardOf06VmBioInitative/09112008.html). In Switzerland the limit is 1.0 $\mu W/cm.^2$ However, in both Canada and the United States the guideline, not even a 'standard' or 'limit,' for WI-FI frequencies is 1,000 $\mu W/cm^2$! FCC guidelines allow considerable radiation at the more hazardous microwave frequencies.

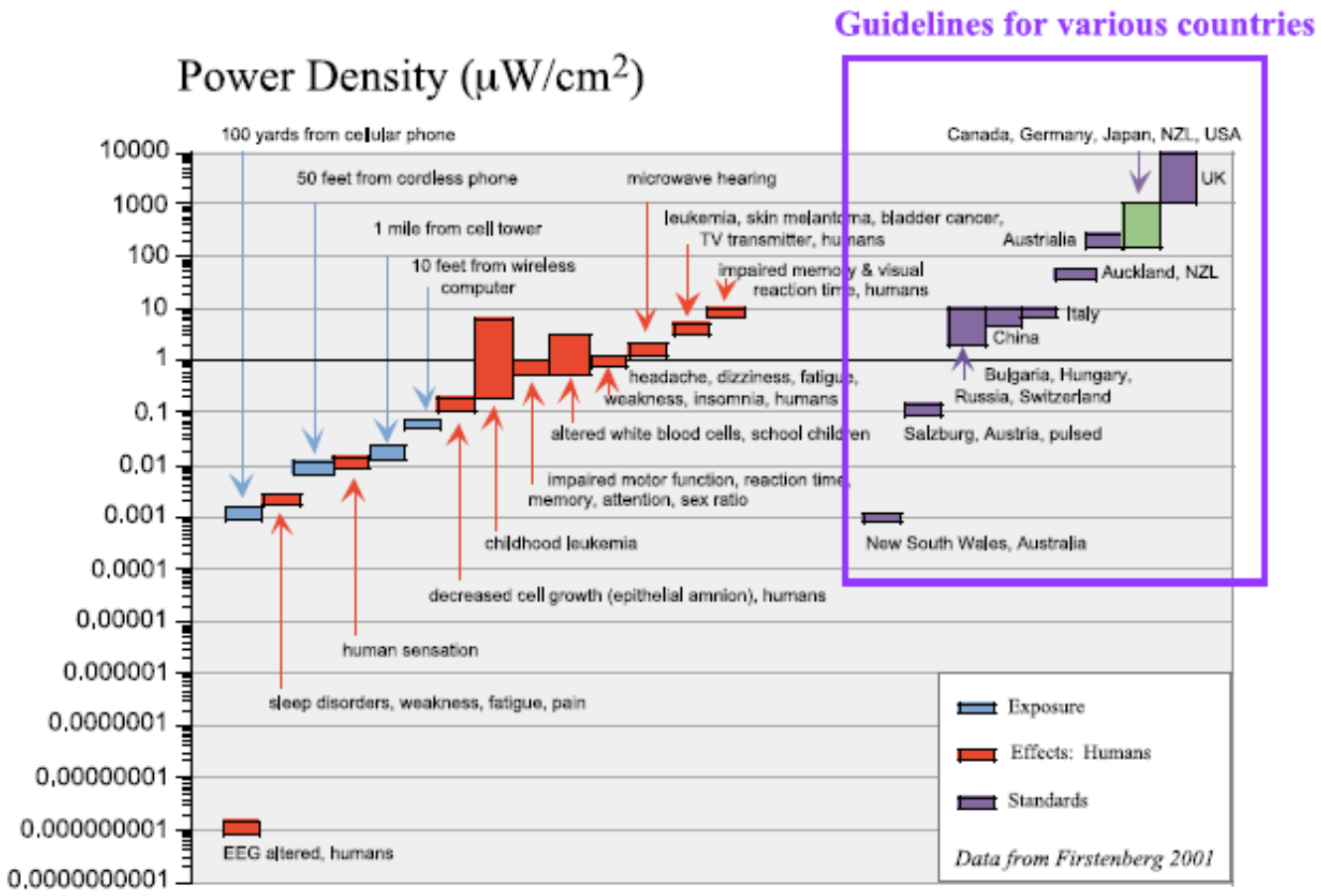

Figure 1. Guidelines, exposures and effects of radio frequency radiation at various power densities. Data from Firstenberg, A 2001 Radio Wave Packet, Cellular Phone Taskforce.

10. The Public Health Department Salzburg recommends for **all kindergartens and schools in** the region of Salzburg not to use WI-FI or DECT cordless phones, based on health grounds.

11. The FCC guideline is similar to the International Commission on Non-ionizing Radiation Protection (INCIRP) guideline, which is based on 30-minute exposure of public and 6-minute exposure of those occupationally exposed. Both are purported to protect against **heat occurrence in a 6-foot, 200-pound adult male.** The guideline for RF radiation is frequency-specific and ranges from 200 to 1,000 μW/cm^2 for the frequencies 0.3 MHz to 100 GHz, with the higher exposure (1000 μW/cm^2) for frequencies between 1.5 and 100 GHz

(i.e. WI-FI range). The latter includes Portland school WI-FI frequencies. This guideline is based on the false assumptions that below these frequency-specific power densities there exists no heating of human tissues; and that if RF (including MW) radiation does not heat tissue, there is no harm.

12. Established adverse biological outcomes of RF and MW radiation exposure (power density) levels below the FCC guidelines include, without limitation, the increased permeability of the blood brain barrier, nerve damage, alterations in calcium efflux kinetics, increased DNA breakage, induced stress proteins, decreased immune-protection markers, and–at the whole-body level–cognitive and sleep impairments, headaches, dizziness, weakness, tinnitus, cardiac irregularities, hormonal and reproductive aberrations, skin dermatitis, reproductive problems, cancer and more.

13. According to Norbert Hankin, Chief EMF Scientist, US Environmental Protection Agency:

> The U.S. Federal Communications Commission, (FCC's) exposure guidelines are considered protective of effects arising from a thermal mechanism but not from all possible mechanisms. Therefore, the generalization by many that the guidelines protect human beings from harm by any or all mechanisms is not justified. http://www.protectschool.org/epa%20letter.pdf.

14. ANSI/IEEE and ICNIRP may infer RF/MW radiation exposure can be 'safe' in the context of an exposure level too weak to produce a rise in body temperature, i.e., too weak to produce a 'thermal' effect, which is defined as 'Biological effects that result from heating of tissue by RF/MW energy.' See, *Questions and Answers about Biological Effects and Potential Hazards of Radiofrequency Electromagnet Fields*, FCC OET Bulletin 56, 4th Ed (1999) http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet56/oet56e4.pdf. The claim is misleading and false. First, all RF/MW radiation deposits heat, and there is always at least microthermal temperature increase in exposed persons. Further, it is untrue that exposure levels less than 1,000 $\mu W/cm^2$ for radiation between 1.5 and 100 GHz cannot produce a thermal

increase; since body tissues vary in their water content, producing internal hot spots, and since wavelength also significantly influences absorption.

15. Moreover, there is no question that non-thermal or microthermal adverse biologic events do occur. These adverse outcomes of RF (including MW) exposure may be amplified per other contributing factors including duration of exposure, frequency/wavelength, complexity of the radiation microenvironment, and the recipient's vulnerability and susceptibility.

Guidelines Extrapolated

16. As stated above, the current FCC guideline is based on flawed assumptions concerning a heating effect mechanism, set at 6 minutes for those occupationally exposed and 30 minutes for public exposure. A guideline based on a 30-minute (or 6-minute) exposure does not apply in the case of exposure likely to be 24/7 for decades. However, were this guideline extrapolated for long-term exposure, the exposure limit would decrease, approaching and exceeding guidelines and standards established by other countries (Table 1):

Table 1. FCC Guideline for public exposure to radio frequency radiation extrapolated for longer exposure and compared to Russia and Salzburg.

Exposure Time	**Time (hr)**	**Guideline (microW/cm^2)**	**Comments**
30 minutes	0.5	**1000**	**FCC** Guideline, public exposure
60 minutes [casual computer use]	1	**500** =1000/2	extrapolation of FCC guideline for 1 hour exposure daily
daily computer use [6 hrs/day]	6	**83** =500/6	extrapolated FCC *daily* exposure limit
weekly computer use [6 hr/day x 5 d/wk]	30	**16.7** =500/30	extrapolated FCC *weekly* exposure limit
		10	**Russian** Guideline
monthly computer use [as above for 4 weeks]	120	**4.17** =500/120	extrapolated FCC *monthly* exposure limit
annual computer use [as above for 40 weeks]	1200	**0.42** =500/1200	extrapolated FCC *annual* exposure limit
		0.1	**Salzburg** Guideline *outdoor* environments
10-year computer use [as above for 10 years]	12,000	**0.04**	extrapolated FCC *10-year* exposure limit
		0.01	**Salzburg** Guideline *indoor* environments

17. For better protection of young, healthy *adults* who use a wireless computer daily for one year, their exposure should not exceed **0.42** $\mu W/cm^2$ (a value similar to Salzburg). In fact, in 1999, the European Parliament had proposed a limit of **0.3** $\mu W/cm^2$ for all of Europe. For better protection over **13 years'** wireless computer use, young, healthy adults' exposure should not exceed **0.03** $\mu W/cm^2$. (Thirteen years is the number of years that students in the public schools, K-12, will have to be exposed to WI-FI, if it is not banned.) These extrapolated exposure limits do not take into account other exposures from RF/MW sources such as infrastructural antennas, cell and cordless phones, Wii, 'smart' boards, smart meters and grids, microwave ovens, and the many other manmade, environmental exposures. Nor do they protect vulnerable persons, for whom one would have to extrapolate further, making WI-FI unfeasible.

18. FCC will tell you their guideline is not intended for long-term extrapolation in this manner. However, since FCC, EPA and FDA all lack a long-term guideline and have no Standard whatsoever; and given that the extrapolated values fit the scientific data for long-term health effects, the potential exposure limits of 0.42 $\mu W/cm^2$, 0.03 $\mu W/cm^2$ and less for vulnerable persons respectively recommended above can help Portland officials to determine more appropriate exposure limits for schools until realistic guidelines and standards are established at the federal level for non-thermal or microthermal effects, for chronic and long-term durations of exposure, and for vulnerable subgroups and specific occupational and environmental conditions. Until such time as real standards exist, no further wireless systems or infrastructures should be imposed upon society for involuntary exposure.

19. Firstenberg (Firstenberg, A, 2001, Radio Wave Packet, President, Cellular Phone Taskforce, http://www.goodhealthinfo.net/radiation/radio_wave_packet.pdf.) also compiled a list of studies (many more recent studies exist) showing adverse biological outcomes at RF/MW radiation exposure levels below FCC guidelines (Table 2):

Power Density (μW/cm2)	Reported Biological Effects	References
0.0000000000001	Altered genetic structure in E. Coli	Belyaev 1996
0,0000000001	Threshold of human sensitivity	Kositsky 2001
0.000000001	Altered EEG in human subjects	Bise 1978
0.0000000027	Growth stimulation in *Vicius fabus*	Brauer 1950
0.00000001	Effects on immune system in mice	Bundyuk 1994
0.00000002	Stimulation of ovulation in chickens	Kondra 1970
0.000005	Effect on cell growth in yeast	Grundler 1992
0.00001	**1/100 millionth of FCC guidelines**	
0.00001	Conditioned "avoidance" reflex in rats	Kositsky 2001
0.000027	Premature aging of pine needles	Selga 1996
0.002	Sleep disorders, abnormal blood pressure, nervousness, weakness, fatigue, limb pain, joint pain, digestive problems, fewer schoolchildren promoted	Altpeter 1995, 1997
0.0027	Growth inhibition in *Vicius fabus*	Brauer 1950
0.0027 to 0.065	Smaller tree growth rings	Balodis 1996
0.01	**1/1000th of FCC guidelines**	
0.01	Human sensation	Kolbun 1987
0.06	Altered EEG, disturbed carbohydrate metabolism, enlarged adrenals, altered adrenal hormone levels, structural changes in liver, spleen, testes, and brain—in white rats and rabbits	Dumanskij 1974
0.06	Slowing of the heart, change in EEG in rabbits	Serkyuk, Reported in McRee 1980
0.1	Increase in melatonin in cows	Stark 1997
0.1 to 1.8	Decreased life span, impaired reproduction, structural and developmental abnormalities in duckweed plants	Magone 1996
0.13	Decreased cell growth (human epithelial amnion cells)	Kwee 1997
0.168	Irreversible sterility in mice	Magras 1997
0.2 to 8.0	Childhood leukemia near transmitters	Hocking 1996
0.3	Impaired motor function, reaction time, memory and attention of schoolchildren, and altered sex ratio of children (fewer boys)	Kolodynski 1996
0.6	Change in calcium ion efflux from brain tissue	Dutta 1986
0.6	Cardiac arrhythmias and sometimes cardiac arrest (frogs)	Frey 1968
4	Altered white blood cell activity in schoolchildren	Chiang 1989
1	Headache, dizziness, irritability, fatigue, weakness, insomnia, chest pain, difficulty breathing, indigestion (humans—occupational exposure)	Simonenko 1998
1	Stimulation of white cells in guinea pigs	Shandala 1978
1	**Within 16 feet (5 meters) of a Wi-Fi node in San Francisco**	**Maifeld 2007**
2	"Microwave hearing"—clicking, buzzing, chirping, hissing, or high-pitched tones	Frey 1963, 1969, 1971, 1973, 1988, Justeson 1979, Olsen 1980, Wieske 1963, Lin 1978
2.5	Breakdown of blood-brain barrier (used a digital cellular phone to provide the radiation)	Salford 1997
5	Leukemia, skin melanoma and bladder cancer near TV and FM transmitter	Dolk 1997
5	Biochemical and histological changes in liver, heart, kidney, and brain tissue	Belokrinitskiy 1982
10	**1% of FCC guideline**	
10	Damaged mitochondria, nucleus of cells in hippocampus of brain	Belokrinitskiy 1982a
10	Impaired memory and visual reaction time in people living near transmitters	Chiang 1989
10	Decreased size of litter, increased number of stillborns in mice	Il'Chevich (reported in McRee 1980)
10	Redistribution of metals in the lungs, brain, heart, liver, kidney, muscles, spleen, bones, skin, blood	Shutenko 1981
1000	**FCC Guideline, 6-minute occupational exposure and 30 minute public exposure based on heating**	

Table 2. Reported biological effects associated with radio frequency radiation. Data from Firstenberg. Shaded sections were not part of the original report.

20. Assuming, arguendo, that guidelines were protective of children, since the measurement of Portland Public School's laptops revealed in excess of **2.0 µW/cm^2**, a child could only be exposed for **41.7 hours**, or less than **42 school days** [=500/2.0/6 hours] according to Table 1. Similarly, the school's WI-FI routers measured as high as **1.65 µW/cm^2**, allowing for exposure of **50.5 school days** before exceeding guidelines [=500/1.65/6 hours]. However, there is no safe amount of radiation for children. Many peer-reviewed studies conclude harm at levels and durations below these levels, and to humans less vulnerable than schoolchildren, and under less coercive circumstances than school WI-FI. Per the many variables contributing to biologic effects, as stated earlier, there is no safe amount of radiation for children. The late physics Professor Neil Cherry PhD of Lincoln University, New Zealand, stated it best:

> Electromagnetic fields and radiation damage DNA and enhance cell death rates and therefore they are a Ubiquitous Universal Genotoxic Carcinogen that enhances the rates of Cancer, Cardiac, Reproductive and Neurological disease and mortality in human populations. ***Therefore there is no safe threshold level. The only safe*** *exposure level is zero, a position confirmed by dose-response trends in epidemiological studies.* http://www.neilcherry.com/.

21. The Environmental Protection Agency has recommended that electromagnetic radiation (which includes WI-FI radiation) be classified as a 'probably human carcinogen.' United States Environmental Protection Agency, Evaluation of the Potential Carcinogenicity of Electromagnetic Fields, External Review Draft, No. EPAl600/6-901005B, October 1990. The following is a statement from Norbert Hankin PhD, EPA Environmental Scientist, December 19, 2000:

> This * * * should not be overlooked * * * the potential for an impact by wireless communications technology on a child's educational process, i.e., by possibly affecting learning ability. [It] stems from recent studies involving short-term exposures that demonstrated subtle effects on brain functions, produced by low-intensity, pulse-modulated radiofrequency radiation * * * [E]ven a slight degree of impairment of learning ability over years of exposure * * * may negatively affect the quality of life that could be achieved by these individuals when adults.

22. If WI-FI is not turned off in the Portland schools children will be exposed over a thirteen-year period to 15,600 hours of so-called 'low-level' microwave radiation. The term 'low-level' is not accurate since the radiation received from WI-FI is billions to trillions of times higher than natural background levels at the same frequencies. Even the industry-funded INTERPHONE study showed that exposure of *adults* to cell phone radiation, for more than 1,640 hours over a ten-year period (which is 30 min per day of intermittent exposure for cell phone use v. 6 hours per day of constant exposure in a school with WI-FI) resulted in a 40 to 80 percent increased risk of brain tumors [http://www.ncbi.nlm.nih.gov/pubmed/17636416]. Cell phone MW radiation is very similar in frequency and nature to WI-FI MW radiation, though by frequency and duration not quite as harmful as that of WI-FI. Any effects that occur to adults are more likely to occur, and to occur more severely, in children from WI-FI. A constant, chronic exposure, such as WI-FI deploys, is likely to be more damaging than the intermittent duration of cell phone usage.

Studies

23. Through my studies, I have personally seen and/or become aware of thousands of military (and therefore previously classified) documents as well as hundreds of Eastern European and Russian studies showing adverse health outcomes of radio frequency and microwave exposure. The results from these early studies are confirmed by more recent studies. Some of the studies that I may offer as evidence include the following. They are classified according to effects: neurological/sleep/learning/behavior/electrohypersensitivity; stress/hormones/blood-brai n-barrier/immune system/enzymes; cardiac; reproduction; cancer/DNA damage/anti-oxidants/death and are ordered according to whether they are human studies; animal (*in vivo*) studies; or *in vitro* studies. Within each category the studies are in alphabetic order according to author. Attached as Addendum 'A,' are some of the studies on which I have based my

conclusions and opinions.

Electro-hyper-sensitivity

24. A condition identified by Russian researchers many decades ago, Microwave Sickness, is generally referred to in the West as Electro-Hyper-Sensitivity (EHS). These names are sometimes used loosely as a catch-all for a variety of adverse health outcomes of RF/MW radiation, other than cancer and genotoxicity. But they should not be confused. In EHS, either a single, acute or a long-term, low-level exposure to electromagnetism, including RF/MW radiation, induces limbic sensitization, producing abnormal brainwave spikes, such that successive exposures amplify the person's responses to electromagnetism over time. By this mechanism, a person has difficulty functioning in a society with inescapable RF/MW radiation (and ELF or extremely low frequency fields). Again, this is to be distinguished from other temporary effects of RF/MW radiation in non-sensitized persons, and by way of other mechanisms. After EHS has been induced, symptoms are retriggered by ever lower levels of RF/MW radiation (and/or ELF fields). The phenomenon thus represents *injury* into an ongoing condition, and is not merely a set of isolated symptoms.

25. Because EHS is induced by exposure, there is a growing population worldwide that is adversely affected by lower-intensity electromagnetic frequencies. The World Health Organization (WHO) defines EHS as:

> * * * [a] phenomenon where individuals experience adverse health effects while using or being in the vicinity of devices emanating electric, magnetic, or electromagnetic fields (EMFs) * * * EHS is real and sometimes a debilitating problem for the affected persons, while the level of EMF in their neighborhood is no greater than is encountered in normal living environments. Their exposures are generally several orders of magnitude under the limits in internationally accepted standards.

26. Symptoms of EHS include cognitive dysfunction (in memory, concentration, problem-solving); balance, dizziness and vertigo; facial flushing, skin rash; chest pressure, rapid heart rate; depression, anxiety, irritability, fatigue, poor sleep; body aches, headaches; ringing in the ear (tinnitus) and more. It is estimated that three percent of the adult population is severely affected and another 35 percent has moderate symptoms. Since prolonged exposure to RF/MW and ELF can result in sensitization and EHS, it is imperative that children's exposure to RF/MW radiation, such as from WI-FI, be minimized, particularly at school, given the many hours per year that attendance is required.

27. Mount Tabor Middle School, with a population of approximately 600 children, may already have 18 (3 percent of the school population) or more who are severely affected by RF/MW radiation and up to 210 children (35 percent) who have moderate symptoms. This does not include those children who are not specifically sensitized into EHS, but do have symptoms. These consider that the percentages of children with EHS would be the same as those in adult populations. Since the percentages might actually tend to be higher in children, these numbers are conservative. The Portland schools should look to identify those children, whether with EHS or not, who suffer symptoms in response to WI-FI. In so doing, administrators and teachers may, in then accommodating these students, find improved school work, cognitive and social functioning.

Children

28. Children are more sensitive to environmental contaminants, and these include RF/MW radiation. The Stewart Report (2000) recommended that children not use cell phones except for emergencies. The cell phone exposes the head to pulse-modulated (PM) MW radiation. A wireless computer (WI-FI) exposes the entire upper body to PM MW radiation; and if one has the computer on one's lap, it exposes reproductive organs as well. Certainly this is not

desirable, especially for younger children and teenagers. For this reason adults need to discourage the use of wireless technology by children. That does not mean that students cannot go on the Internet. It simply means that access to the Internet needs to be through wires rather than through the air.

29. Children generally are very susceptible to MW radiation; as they do not have developed nervous or immune systems. As well, their skulls are thin and their bones (which are producing stem cells that make their immune systems and all other parts of their bodies) are soft, allowing microwaves to penetrate easily (Cherry 1999, http://www.emfguru.org/EMF/genotoxic/Genotoxic-EMR-paper.htm, scroll down to figure 45).

30. Some parents in Collingwood (Ontario, Canada), observed their children being exposed to WI-FI and returning from school with headaches, nausea, dizziness, difficulty concentrating, weakness, pressure in the head, and a racing or fluttering heart). These symptoms occur only in classrooms with WI-FI. They do not occur in portables that do not have WI-FI, and they do not occur in homes that do not have wireless technology.

31. The heart palpitations are perhaps the most serious: several students have experienced sudden cardiac arrest. The incidence of this in the Collingwood region seems abnormally high for a small community in Canada; and such symptoms should be extremely rare in children. One student was encouraged to have exploratory heart surgery. However, her parents provided her a MW-free environment at the end of the school year and her symptoms disappeared. No surgery was required.

32. Students and teachers at a private school in Collingwood were encouraged to do research on the best Internet technology for the school. They decided wired Internet access was superior to wireless for many reasons. They now use power line adaptors instead of WI-FI and are satisfied with the results.

Direct Effect

33. I conducted a study that showed immediate and dramatic changes in both heart rate and heart rate variability associated with microwave exposure to a frequency of 2.4 GHz at levels well below (0.5 percent) federal guidelines (1000 μW/cm^2). Havas *et al*., *Provocation Study using Heart Rate Variability shows Radiation from 2.4 GHz Cordless Phone affects Autonomic Nervous System*, Eur J Oncol Library, Vol 5 at 28, http://www.magdahavas.com/wordpress/wp-content/uploads/2010/10/Havas-HRV-Ramazzini1.pdf; see also, video demonstrating the direct effects of cordless phones on heart rates, http://www.youtube.com/watch?v=_EI9fZX4iww.

34.

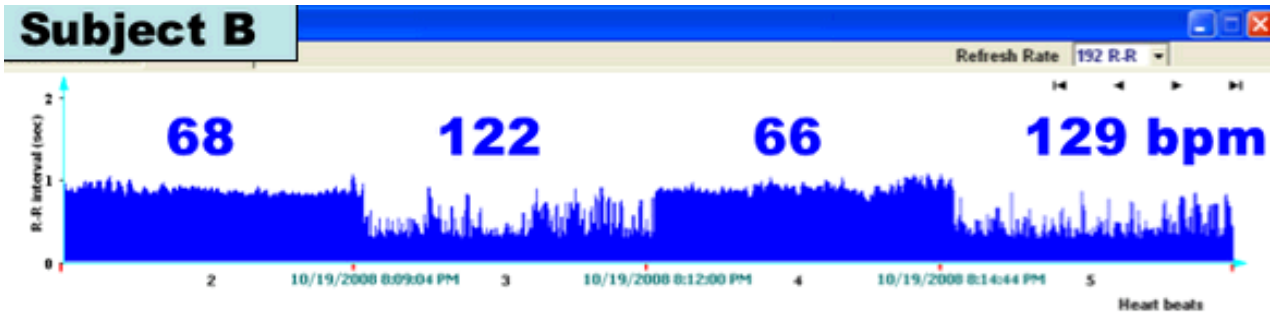

Figure 2. The sympathetic nervous system up regulated and the parasympathetic nervous system down regulated during exposure, which is the typical 'flight-or-fight' stress response. Feelings of anxiety as well as pain or pressure in the chest were associated with the rapid or irregular heart beat among some of the participants tested. http://www.magdahavas.com/2010/10/21/new-study-radiation-from-cordless-phone-base-station-affects-the-heart/.

35. The study documents that some individuals are hypersensitive to specific frequencies, and supports reports people make when they are exposed to RF/MW radiation. The reactions include heart irregularities, a rapid heart rate, up-regulation of the sympathetic nervous system, and down-regulation of the parasympathetic nervous system. These are biological effects and do not involve heating. One potential outcome is that the body goes into a fight-or-flight response when exposed to very low levels of MW radiation at the same frequency used for

WI-FI. Since children are generally more susceptible to environmental hazards than are adults, I would expect that children's hearts are generally more affected as well. *This video shows a WI-FI router directly affecting an adult heart rate: www.youtube.com/watch?v=KN7VetsCR2I !*

36. Heart irregularities, including out-of-hospital sudden cardiac arrest, are becoming increasingly common. At least some of these phenomena may be related to increasing exposure to RF/MW radiation from wireless devices and infrastructures, as documented for the first time in this study. A child must not be exposed to a technology that causes tachycardia or arrhythmia. Under certain circumstances with undiagnosed heart problems and with a demand on the heart (during exercise for example) the outcome can be deadly.

37. In addition to heart abnormalities, there is evidence of damage to sperm for males who use a laptop computer in WI-FI mode. WI-FI laptops can affect sperm motility and damage DNA. By allowing MW radiation through WI-FI in schools, adults may be adversely affecting children's ability to reproduce, as well as and the very genetics of future generations.

Removal of WI-FI

38. Most people do not want to live near either cell phone towers or WI-FI antennas because of their MW radiation. Yet when WI-FI (wireless routers) are used inside buildings, many antennas are placed inside as well as outside the building. This is much worse with respect to exposure levels, duration and coercive occupational conditions, since building occupants are closer to the sources of emission and cannot remove themselves from the radiation.

39. Libraries in France are removing WI-FI because of the refusal of MW radiation by the scientific community, library employees and patrons.

40. The Vancouver School Board passed a resolution in January 2005 that prohibits construction of cellular antennas within 1,000 feet from school property.

41. Palm Beach, Florida, Los Angeles, California, and New Zealand have all prohibited cell base stations and antennas near schools by reason of safety, based on the fact that children are more susceptible to pulse-modulated MW radiation. Clearly if antennas do not

belong near schools, they certainly do not belong *inside* schools! The only route to safety is to have wired rather than wireless Internet.

42. The Superintendent of Education, Area 3 (Mr. John Dance) hired a consultant to measure MW exposure in two schools: Mountainview Elementary School (where the children were complaining of ill health) and Collingwood Collegiate Institute (see Muc Report at http://www.magdahavas.com/wordpress/wp-content/uploads/2011/06/SCDSB-Feb-9-2011-B-F-Use-of-WI-FI.pdf). In the Mountainview School, levels above FCC guidelines were measured (1,342 $\mu W/cm^2$ or 1.342 mW/cm^2, NOTE: These are the same values expressed by different units); and this intensity of radiation was downplayed because it was close to the computer. Yet this is precisely where children sit and work for many hours per day: close to computers! Fifty percent of the locations measured in these two schools exceeded the radiation levels that affected adult hearts in our cardiac study. Testing at Collingwood Collegiate was after school hours; hence these measurements likely underestimate real-life exposure levels. The school with levels above federal guidelines is the same school where children were complaining of ill health!

Advisories

43. Advisories to limit cell phone use have been issued by various countries and organizations including the United Kingdom (2000), Germany (2007), France, Russia, India, Belgium (2008) as well as the Toronto Board of Health and the Pittsburgh Cancer Institute (July 2008). While these advisories relate to cell phone use, they apply to WI-FI exposure as well since both use pulse-modulated microwave radiation. Boston public health physicians and scientists (1997) called for a 'halt' to pulse-modulated microwave radiation-based cell phone infrastructure based on the 'biological plausibility of harm.' WI-FI infrastructure and WI-FI-connected computers expose large parts of the body to this radiation especially when uploading or downloading information. Attached as Addendum 'B,' is the Boston Petition.

44. Attached, as Addendum 'C,' is a summary of 18 appeals or resolutions released by expert scientific groups around the world since the 1997 Boston Petition, regarding the biological and health effects of both low frequency electromagnetic fields (EMF) associated with electricity and RF electromagnetic radiation (EMR) generated by wireless devices. Anyone who reads these cannot be left with the illusion (or delusion) that this form of energy is without adverse biological and health consequences at levels well below existing guidelines. Children are particularly vulnerable. It is irresponsible of governments to maintain the status quo in light of thousands of studies that have been published and statements by these experts.

Conclusion

45. It is important that children be exposed to the important education, life experiences, and social structures that public education offers, but they must not be risking their health to do so! Children must not be exposed to a constant background of pulsed microwave radiation from WI-Fi (or other sources) while at school. Most parents don't have the option of home-schooling or finding a school free of WI-FI. Most teachers are discouraged to speak out against school board decisions, and most municipalities are unaware of the growing literature about the harmful effects of this technology. This needs to change. Municipalities must keep their public schools free of WI-FI.

46. Access to the Internet is possible through wires or through the air (wireless). The wireless option (WI-FI) exposes people in that environment to microwave radiation, which is a possible human carcinogen. Wired Internet is available at low cost. At least 3 options currently exist: Ethernet cable, which is present in many schools; fibre optics that offer fast reliable service but may be inappropriate in some districts; and the power line adaptor that is perhaps the most cost-effective option. This last option is faster, more secure, more energy efficient, less expensive than WI-FI and does not exposure people to microwave radiation. Under the

Americans with Disabilities Act, an accommodation is ‘reasonable’ based on minimal cost. And this ‘accommodation’ serves not one but all building occupants, so is highly valuable. Innocent children, who are wards of their parents and of the schools, deserve every legal protection from adults who make unwise decisions. Adult decision-makers are both morally responsible for their actions and should also be held legally liable where harm occurs and since wired alternatives to WI-FI are available.

47. Portland Public Schools use of WI-FI will expose young children (and their teachers) to microwave radiation for 6 hours each school day, 5 days a week, for 40 weeks each year. This exposure will be 1200 hours each year, year after year. Never in history have children been exposed to this much microwave radiation. Indeed, if I wanted to conduct such human experiments at Trent University using these levels and durations of exposure to microwave radiation, they would be deemed unethical and I would be denied permission to proceed!

48. In my own work, I use wired Internet access at home and, whenever possible, I use wired Internet access at Trent University, although wireless is available. So we are not limiting access to the Internet if we use wired connections; with wired connections, we are simply flowing the radiation through wires rather than through the air and through the bodies that are in the area.

49. The two most important environments in a child’s life are the home (especially the bedroom) and the school. For this reason it is imperative that these environments remain as electromagnetically clean as possible, and therefore as free as possible from MW radiation.

50. It is hard to imagine that Portland parents are required to give permission with signed consent forms for student bus trips and photographs but are not consulted and asked for permission to expose their children to pulse-modulated MW radiation.

51. Based on the evidence that leading scientists have assembled in the past decade, if Portland Public Schools continues to use wireless internet (WI-FI), some students and teachers in its schools (an estimated 3% to 35% of the adult population and possibly a higher percentage of students) will become ill. Heart problems may be aggravated, other internal and external body injuries may be caused, and various pre-existing medical conditions may be worsened. Children and adults with undiagnosed, undetected heart problems may die. All students, teachers and administrators will be affected to some degree, even if their symptoms are not consciously attributed to the exposure or positively diagnosed. Portland Public Schools must be willing to make a decision that protects and does not harm the health and lives of those for whom it is responsible. It should not leave the Board open to legal action from families of children with heart and other MW radiation-related problems. There may be class-action lawsuits; the Board's decisions may jeopardize the long-term financial sustainability of the school board.

52. Submitted herewith as Addendum 'D' is a KeyNote presentation that I will use during my testimony.

53. I will receive $250 per hour for my time (plus expenses) from this date forward and that money will be used to support research in this area.

54. I reserve the right to amend to add new relevant studies as they may arise and pending analysis, additional testing, and recently received voluminous discovery.

55. The Internet is an important learning device that should not be taken away. I simply urge that its access be made available through wires rather than WI-FI. Surely when it comes to threats of serious or irreversible damage to the health of students and teachers, not to mention privacy matters where students deserve in their formative years freedom from surveillance and hackers, using wired systems is of minimal cost and not too much to ask. There is no place for wireless Internet in schools—especially since wired Internet access is safer, faster, and more secure than wireless.

Dated this 21st day of December, 201

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Curriculum Vitae

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1 BIOGRAPHICAL INFORMATION

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1.2 Degrees

B.Sc. Honors Biology, University of Toronto, 1971-1975
Ph.D. Department of Botany & Institute for Environmental Sciences, University of Toronto, 1975-1980

1.3 Awards, Scholarships, Fellowships

Academic

NSERC University Research Fellowship, 1983-1988
NSERC NATO Postdoctoral Fellowship, 1981-1983
Ann Wintercorbyn Prize, 1981, Department of Botany, University of Toronto
NRC Graduate Scholarship, 1975-1977, 1978-1979
Gulf Oil Scholarship, 1975
Bell Canada Scholarship, 1975

Nominations for . . .

Symons Award for Excellent in Teaching: 2002, 2003, 2004, 2005, 2010
Award for Educational Leadership and Innovation: 2010-11

Non-Academic

Certificate of Appreciation, Department of Veterans Affairs, USA in collaboration with Michael E. DeBakey VA Medical Center, Texas, March 31, 2008.

Certificate of Appreciation, Uxbridge Community Care, May, 1989.

2 ACADEMIC HISTORY

Employment and Positions

2002-present	Member, Centre for Health Studies [originally Institute for Health Studies], Trent University, Peterborough, Ontario.
1995-7 &1992-4	Board of Governors, Trent University, Peterborough, Ontario.
July 1993-1994	Senate, Trent University, Peterborough, Ontario.
Nov 1990-pres	Cross Appointed to Biology Department, Trent University, Peterborough, Ontario.
Aug 1989-pres	Associate Professor, Science Education and Environmental and Resource Studies, Trent University, Peterborough, Ontario.
June 1985-1989	Cross Appointed to Faculty of Forestry, University of Toronto, Toronto, Ontario, Canada.
Sept 1983-1988	NSERC University Research Follow/Assistant Professor, Institute for Environmental Studies, University of Toronto, Toronto, Canada.
Feb 1981-1983	NSERC NATO Postdoctoral Fellow, Section of Ecology and Systematics, Cornell University, Ithaca, New York, USA, in laboratory of Professor G.E. Likens.

3 PUBLICATIONS

Year	#	Reference	Type
2011	134	**Havas, M.,** D. Stetzer, E. Kelley, R. Frederick, and S. Symington. Compact Fluorescent Light Bulbs, Electromagnetic Emissions, and Health. Science of the Total Environment (accepted with minor revisions).	R

[8]	133	**Havas, M.** Open Letter to the Honourable Aglukkaq (Federal Minister of Health) and Ms Pieterson (Director-General, Environmental and Radiation Health Sciences Directorate, Health Canada needs to issue warning about wireless baby monitors. October 24, 2011, 6 pp	L
	132	**Havas, M.** Open Letter to Peterborough Mayor Bennett and City Councilors in response to "City council disagrees with cell tower site," Peterborough Examiner, October 12, 2011.	L
	131	**Havas, M.** and D. Colling. Wind Turbines Make Waves: Why some residents near wind turbines become ill? Bulletin of Science, Technology & Society, September 2011.	R
	130	**Havas, M.** School Boards Gagging Dissent over WiFi, Peterborough, Peterborough Examiner, June 6 (?), 2011.	L
	129	**Havas, M.** Report on Smart Meters Request for input regarding Smart Meters, California Council on Science and Technology (CCST), October 12, 2010, 6 pp	G
	128	**Havas, M.** September 2011 Update regarding: Veronica Ciandre, 2 Regal Road, Toronto, Ontario, September 30, 2011, 2 pp	ET
	127	**Havas, M.** August 2011 Update regarding: Veronica Ciandre, 2 Regal Road, Toronto, Ontario, August 25, 2011, 5 pp	ET
2010	126	**Havas, M**. Expert Report Re: 411 Saint-Francis Blvd, Chateauguay, Quebec, Rogers vs City of Chateauguay, December 15, 2010, 18 pp.	ET
[6]	125	**Havas, M,** J. Marrongelle, B. Pollner, E. Kelley, C. Rees, and L. Tully. 2010. Provocation study using heart rate variability shows microwave radiation from 2.4 GHz cordless phone affects autonomic nervous system. European Journal of Oncology, Vol. 2:273-300.	R
	124	**Havas, M**. Open Letter to Medical Officer of Health about WiFi in Schools. September 29, 2010.	L
	123	**Havas, M**. Re: Veronica Ciandre, 2 Regal Road, Toronto, Ontario, Landlord and Tenant Board Hearing, May10, 2010, 5 pp.	ET
	122	**Havas, M**. Urgent need to revise Safety Code 6 as it does not protect the health of Canadians. Expert Testimony to the House of Commons Standing Committee on Health regarding Radio Frequency Radiation and Health, April 20, 2010, 8 pp.	ET
	121	**Havas, M.** Comparison of Industry Canada measurements on February 18, 2010 and those take by Dr. Havas on February 13, 2010 at 2 Regal Road, Toronto, March 16, 2010, 3 pp,	T
2009	120	**Havas, M,** 2009. Open Letter to Parents, Teachers, School Boards Regarding Wi-Fi Networks in Schools, 2 pp.	L

[3]	119	**Havas, M**. 2009. Letter to the Editor, Toronto Star, February 1, 2009 response to "Jury's out on link between migraines, fluorescent tubes." by Joe Schwarcz.	L
	118	**Havas, M**. 2009. Breast Cancer and Occupational Exposure to Electromagnetic Fields. Response to Request from Heidi Evelyn, Tribunal Counsel Office, Workplace Safety and Insurance Appeals Tribunal, Jan 7&9, 2009; February 9, 2009, 42 pp.	ET
2008	117	**Havas, M**. 2008. Are Cell Phones Safe? An Ounce. Prevent Cancer Now. Fall 2008, page 1	P
[11]	116	**Havas, M**. 2008. Breast Cancer and Occupational Exposure to Electromagnetic Fields. Report to the Workplace Safety and Insurance Appeals Tribunal. Expert Testimony, November 18, 2008, 20 pp.	ET
	115	**Havas, M.** 2008. Letter to the Editor, Walrus Magazine, comment on Cellphone Games, September 11, 2008 article by Melinda Wenner.	L
	114	**Havas, M.** 2008. Letter to the Editor, BBC News, UK, RE: The bulb hoarders. http://news.bbc.co.uk/2/hi/uk_news/magazine/7480958.stm	L
	113	**Havas, M**. 2008. Radio Frequency Readings on Triangle Mt., Colwood, BC, June 25, 2008. 4 pp., Appendix to "Independence of Advisory Bodies," Environmental Petition, Auditor General of Canada, submitted by Sharon and Dennis Noble, Colwood, BC.	G/T
	112	Rees, C. and **M. Havas.** 2008. Microwave Radiation: The shadow side of the wireless revolution. Post Event Answer and Questions. Commonwealth Club, March 19, 2008.	book
	111	**Havas, M**. 2008. Request that first generation DECT Phones be Banned in Canada, Environment Petition, Auditor General of Canada, 15 pp.	G/T
	110	**Havas, M.** and T. Hutchinson. 2008. Environmental and Health Effects of Compact Fluorescent Lights. Environment Petition, Auditor General of Canada, 15 pp.	G/T
	109	**Havas, M**. 2008. Dirty Electricity Elevates Blood Sugar Among Electrically Sensitive Diabetics and May Explain Brittle Diabetes. Electromagnetic Biology and Medicine, Vol. 27(2), pp. 135-146.	R
	108	**Havas, M**. and A. Olstad. 2008. Power quality affects teacher wellbeing and student behavior in three Minnesota Schools. Science of the Total Environment, Volume 402, Issues 2-3, 1 September 2008, pp. 157-162	R
	107	**Havas, M.** 2008. Health Concerns associated with Energy Efficient Lighting and their Electromagnetic Emissions. 11 pages. *Scientific Committee on Emerging and Newly Identified*	G/T

		Health Risks (SCENIHR). Request for an opinion on "Light Sensitivity", Sanco-Sc1-Secretariat@ec.europa.eu	
2007	106	**Havas, M.** 2007. "Stray Voltage" Ground Current Problems, Prepared for Ontario Energy Board Panel on Stray Voltage, November 22, 2007.	G/T
[4]	105	**Havas, M.** 2007. Analysis of Health and Environmental Effects of Proposed San Francisco Earthlink Wi-Fi Network, Commissioned by SNAFU (San Francisco Neighborhood Antenna Free Union) and presented to Board of Supervisors, City and Country of San Francisco, 51 pp.	NR
	104	**Havas, M**. 2007. Supplemental Evidence by Magda Havas, Alberta Energy and Utilities Board Application No. 1478550 by Altalink Management Ltd. ("Altalink"); Proposed Routing for 500 kV Transmission System Reinforcement Project in the Edmonton–Calgary area. May 2007, 7 pp.	ET
	103	**Havas, M.** 2007. Expert Testimony by Magda Havas, Alberta Energy and Utilities Board Application No. 1478550 by Altalink Management Ltd. ("Altalink"); Proposed Routing for 500 kV Transmission System Reinforcement Project in the Edmonton–Calgary area. February 2007, 40 pp.	ET
2006	102	**Havas, M.** 2006. Electromagnetic Hypersensitivity: Biological effects of dirty electricity with emphasis on diabetes and multiple sclerosis. Electromagnetic Biology and Medicine, 25: 259-268, 2006	R
[8]	101	**Havas, M.** 2006. *Dirty Electricity: An Invisible Pollutant in Schools*. Feature Article for Forum Magazine, OSSTF, Fall, 2006.	P
	100	**Havas, M.** 2006. *Response to: Evaluation of the Stetzer Filters*. Open Letter to Health Canada. October 2006. 5 pp.	L
	99	**Anon.** 2006. *Ground Current Pollution Act, 2006*. Mpp2006.080.e5-CW, Private Member's Bill, First Reading October 3, 2006. *Helped draft Private Member's Bill on Ground Current Pollution*.	G
	98	**Havas, M.** and D. Stetzer. 2006. *Electromagnetic Pollution and your Health*. *Centre for Health Studies,* Trent University, Peterborough, ON September 2006.	NR
	97	**Havas, M.** and M. Bowling. 2006. *Electromagnetic Measurements at Richmond Fire Hall #7, March 8, 2006*. Final Report to Richmond Fire Fighters. 8 pages.	T
	96	**Havas, M.** 2006. Open letter to Mayor and Aldermen, Milwaukee Wisconsin. Health Concerns of WiFi.	L
	95	**Havas, M.** 2006. *Response to Linda Erdreich, Ph.D., Exponent Inc., Tsawwassen Residents Against Higher Voltage Overhead Lines (TRAHVOL),* British Columbia Transmission Corporation	ET

("BCTC") Certificate of Public Convenience and Necessity Application for the Vancouver Island Transmission Reinforcement Project.

2005	94	**Havas, M.** 2005. *Response to BCTC (British Columbia Transmission Corporation) information request to TRAHVOL,* British Columbia Transmission Corporation ("BCTC") Certificate of Public Convenience and Necessity Application for the Vancouver Island Transmission Reinforcement Project, 20 pages, November 10, 2005.	ET
[8]	93	**Havas, M.** 2005. *Response to BCUC (British Columbia Utilities Commission) information request to TRAHVOL,* British Columbia Transmission Corporation ("BCTC") Certificate of Public Convenience and Necessity Application for the Vancouver Island Transmission Reinforcement Project, 5 pages, November 7, 2005.	ET
	92	**Havas, M**. 2005. *Studies point to concerns about radiation from towers*. Salisbury Post, Salisbury, NC, October 20, 2005.	P
	91	**Havas, M**. *Tsawwassen Residents Against Higher Voltage Overhead Lines (TRAHVOL),* British Columbia Transmission Corporation ("BCTC") Certificate of Public Convenience and Necessity Application for the Vancouver Island Transmission Reinforcement Project, Expert Testimony, October 17, 2005.	ET
	90	**Havas, M.** *Health Effects Associated with Radio Frequency Radiation*. Quasi-Judicial Hearing for Z-01-05, Mt. Ulla FM Transmitter. Salisbury, North Carolina, October 13, 2005.	ET
	89	Stetzer, D. and **M. Havas**. High frequency electrical pollution in the homes of residents in South Bend, Mishawaka and Roseland Indiana, Mary 2005. 5 pages plus waveforms.	T
	88	IAFF, Position on the Health Effects from Radio Frequency/Microwave (RF/MW) Radiation in Fire Department Facilities from Base Stations for Antennas and Towers for the Conduction of Cell Phone Transmissions. International Association of Fire Fighters, Division of Occupational Health, Safety and Medicine. 29 pp, March 2005. [**M Havas** contributed to this report]	T
	87	**Havas, M.** Letter: Office of the Secretary, Federal Communication Commission, Washington DC, Proceeding WT Docket No. 04-356 and 02-353. 3 pages, January 24, 2005.	L
2004	86	**Havas, M**. 2004. *Putting Cell Phone Antennas near schools is too risky*. Washington Post, Fairfax, December 30, 2004, page VA10.	P
[9]	85	**Havas, M**. 2004. *Don't put cell towers on school property*. Northern Virginia Journal, November 16, 2004, page 12.	P
	84	**Havas, M.** and D. Stetzer. *Dirty electricity and electrical*	NR

hypersensitivity: Five case studies. World Health Organization Workshop on Electricity Hypersensitivity, Prague, Czech Republic, 25-26 October, 2004.

	83	**Havas, M.,** S. Shum, and R. Dhalla. *Passenger exposure to magnetic fields on go-trains and on buses, streetcars, and subways run by the Toronto Transit Commission, Toronto, Canada*. Biological Effects of EMFs, 3rd International Workshop, Kos, Greece, 4-8 October, 2004, pp.1065-1071.	NR
	82	**Havas, M** and J. Mackay. *Street level magnetic fields within the City of Kingston, Ontario, Canada*. Biological Effects of EMFs, 3rd International Workshop, Kos, Greece, 4-8 October, 2004, pp. 318-325.	NR
	81	**Havas, M.,** M. Illiatovitch, and C. Proctor. *Teacher and student response to the removal of dirty electricity by the Graham/Stetzer filter at Willow Wood School in Toronto, Canada*. Biological Effects of EMFs, 3rd International Workshop, Kos, Greece, 4-8 October, 2004, pp. 311-317.	NR
	80	**Havas, M.** and D. Stetzer. *Graham/Stetzer filters improve power quality in homes and schools, reduce blood sugar levels in diabetics, multiple sclerosis symptoms, and headaches*. International Scientific Conference on Childhood Leukaemia, London, 6th-10th September, 2004.	NR
	79	**Havas, M.** *Biological Effects of Low Frequency Electric and Magnetic Fields*. Derek Clements-Croome (Ed.). 2002. Electromagnetism and Health, Taylor & Francis Books, Ltd., London, England. 25 pp.	C
	78	**Havas, M.** *Cleaner power keeps schools healthy*. View from Trent, Peterborough Examiner, Peterborough, ON, February 12, 2004	P
2003	77	**Havas, M**. *Health Effects Associated with Power Lines*. Expert Testimony presented at Sumas 2 Hearing in Abbottsford B.C. July 2003.	ET
2002	76	Woodfine, D.G., **M. Havas**, and J. Acreman. 2002. *Nickel and copper tolerance of phytoplankton isolated from a recovering lake near Sudbury, Canada*. Geochemistry, Exploration, Environment, Analysis, Vol. 2 203-207	R
[6]	75	**Havas, M**. *Intensity of Electric and Magnetic Fields from Power Lines within the Business District of Sixty Ontario Communities*. Science of the Total Environment 298:183-206.	R
	74	**Havas, M**. *Cell phone headaches, cell tower blues*. View from Trent, Peterborough Examiner, August 9, 2002.	P
	73	**Havas, M.** *Wired and Wireless Energy. An overview of health concerns and a call for action*. Presented to the Environmental Committee on Sustainable Development. House of Commons,	ET

		Ottawa, ON. May 21, 2002	
	72	**Havas, M.** *Corporate support can weaken foundation*. View from Trent, Peterborough Examiner, April 12, 2002.	P
	71	**Havas, M.** *Children at risk in hospital from transformer magnetic fields*. The Act, Australia.	P
2001	70	**Havas, M.** Review of Expert Document *The Workshop Report: Review of Electric and Magnetic Fields (EMFs)*, produced by the Manitoba Clean Environment Commission, March 2001., Winnipeg, Manitoba, letter September 2001.	ET
[5]	69	**Havas, M**. *Electricity's role in cancer an eye opener*. View from Trent, Peterborough Examiner, October 12, 2001	P
	68	**Havas, M.** *Electromagnetic fields linked to childhood cancer according to two new studies*. View from Trent, Peterborough Examiner, March 9, 2001	P
	67	**Havas, M.** *Rebuttle, Peter Valberg*, Mendota Heights, Public Hearing on Transmission Lines, April 2001.	ET
	66	**Havas, M**. *Expert Testimony, Xcel Energy*, Mendota Heights, Public Hearing on Transmission Lines, April 2001.	ET
2000	65	**Havas, M.** and D. Hanna. *Magnetic Fields in Peterborough Schools: the findings and strategies to reduce exposure*. Presented to the Peterborough-Kawartha-Pine Ridge School Board, Health and Safety Committee, October 2000.	T
[4]	64	**Havas, M**. Biological effects of non-ionizing electromagnetic energy: A critical review of the reports by the US National Research Council and the US National Institute of Environmental Health Sciences as they relate to the broad realm of EMF bioeffects. Environmental Reviews 8:173-253.	R
	63	**Havas, M.** Valley of Desolation, no vacation paradise. View from Trent, Peterborough Examiner, July 28, 2000.	P
	62	Woodfine, D.G., R. Seth, D. Mackay, and **M. Havas**. Simulating the response of metal contaminated lakes to reductions in atmospheric loading using a modified QWASI model. Chemosphere 41:1377-1388.	R
1999	61	**Havas, M.** People learn in different ways. How do you learn? Answer in simple test. View from Trent, Peterborough Examiner, August 27 1999	P
1998	60	**Havas, M.** Prof takes aim at academic stereotype. View from Trent, Peterborough Examiner, November 27, 1998.	P
1996	59	**Havas, M.** University Accountability. View from Trent, Peterborough Examiner, April 1996	P
1995	58	**Havas, M.,** D.G. Woodfine, P. Lutz, K. Yung, H.J. MacIsaac, and T.C. Hutchinson. Biological Recovery of Two Previously Acidified, Metal-Contaminated Lakes near	R

Sudbury Ontario, Canada. Water, Air and Soil Pollut. 85(2): 791-796

[7]	57	**Havas, M.** and B. Rosseland. Response of Zooplankton, Benthos, and Fishes to Acidification: An Overview. [Invited Paper] Water, Air and Soil Pollut. 85(1): 51-62.	R
	56	**Havas, M**. and E. Advokaat. Can Sodium Regulation be used to Predict the Relative Acid-Sensitivity of Various Life-stages and Different Species of Aquatic Fauna? Water, Air and Soil Pollut. 85(2): 865-870.	R
	55	Woodfine, D.G. and **M. Havas**. Pathways of Chemical Recovery in Acidified, Metal-Contaminated Lakes near Sudbury, Ontario, Canada. Water, Air and Soil Pollut. 8 797-803.	R
	54	Regoczei, S. and **M. Havas**.. Group Problem Solving: If we could save the earth, how would that be done? Proc. 4th Can. Conf. on Foundations and Applications of General Science Theory. Knowledge Tools for a Sustainable Civilization. Ryerson Polytechnical University, Toronto, June 8-10, 1995, 9 pp	NR
	53	Loney, R.K., P. Northrop, and **M. Havas**. Enviro Mystery Revisited. Eighth Instructional Show & Tell for Ontario Universities and Colleges, May 29, 1995, University of Guelph, Guelph, Ontario.	NR
	52	**Havas, M.** Aluminum. In: Paehlke, R. (Ed.) Environmental Review	NR
1994	51	**Havas, M.** Recovery and Rehabiliation of Large-Scale Ecosystems: Rapporteurs Report. <u>In</u>: Rapport, D. and P. Calow. Evaluating and Monitoring the Health of Large-Scale Ecosystems, NATO Advanced Research Workshop, Chateau Montebello, Quebec, Canada, October 10-15, 1993, 10 pages.	R
[3]	50	Brakke, D., J.P. Baker, J. Bohmer, A Hartmann, **M Havas,** A. Jenkins, C. Kelly, S.J. Ormerod, T. Paces, R Putz, B.O. Rosseland, D. Schindler, and H. Segner. How does Acidification affect Biota and What are the influences of Biota on the Process of Acidification? <u>In</u>: Dahlem Workshop on Acidification of Freshwater Ecosystems, Berlin, September 27 to October 2, 1992.	R
	49	Hutchinson, T.C. and **M. Havas**. Chapter 22. Ecological Impacts of Acid Deposition on Natural Ecosystems. <u>In</u>: Calvert, J. (Ed.) The Chemistry of the Atmosphere: Its Impact on Global Change, American Chemical Society, pp. 297-315.	C
1993	48	Woodfine, D.G., D. Mackay, and **M. Havas**. Using QWASI	NR

		Model to Predict Fate of Copper and Nickel in Two Metal Contaminated Lakes near Coniston, Ontario. In: Nriagu, J.O. and R.J. Allan (eds.), International Conference, Heavy Metals in the Environment (Vol.2), Toronto, September 1993, pp 379-382.	
	47	Havas, M. OMB Hearing regarding Eutrophication of the Indian River, Township of Dummer , Warsaw, Ontario, December 6, 1993.	L
[3]	46	**Havas, M**. Environmental Education: Changing Role of the University. Seminario Internacional Sobre El Ambiente, Toluca de Lerdo, Estado de Mexico, February 22-25, 1993, 16 pp.	NR
1992	45	**Havas, M**. (Ed.) Packaging, *KEYnotes* 2(2): 16 pp [these newsletters are distributed to every school in Canada, approximately 15,000 copies].	R
[2]	44	**Havas, M**. (Ed.), Feeding the World's Population, Part 1: Distribution of Food, *KEYnotes* 2(1): 16 pp.	R
1991	43	**Havas, M**. (Ed.), Environmental Report Card, *KEYnotes* 1(2): 12 pp.	R
1990	42	**Havas, M**. Recovery of Acidified and Metal-Contaminated Lakes in Canada. In: Norton, S.A., S.E. Lindberg, and A.L. Page (Eds.), Advances in Environmental Science, Acid Precipitation Series, Volume 4, Soils, Aquatic Processes and Lake Acidification, Springer-Verlag, N.Y., pp. 187-205	C
[5]	41	**Havas, M.** 1990. Chemical Indicators. Environmental Monitoring and Assessment 15:287.	R
	40	Stokes, P., **M Havas**, and T. Brydges. 1990. Public participation and volunteer help in monitoring programs: An assessment. Environmental Monitoring and Assessment 15:225-229.	R
	39	Creed, I.F., **M. Havas**, and C.G. Trick. 1990. Effects of arsenate on the growth of nitrogen- and phosphorus-limited *Chlorella vulgaris* (Chlorophyceae) isolates. J. Phycology 26(6):	R
	38	Loney, R.K. and **M. Havas**. Enviro Mystery: An Educational Computer Game, Third Instructional Show & Tell for Ontario Universities and Colleges, May 29-29, 1990, University of Guelph, Guelph, Ontario.	NR
1989	37	**Havas, M**. The State of Our Forests. Harrowsmith, December.	P
[4]	36	**Havas, M**. Teeside and Uttersville, Uxbridge Times Journal, Uxbridge, Ontario.	P
	35	**Havas, M**. A Tale of Two Towns, Back Forty, Lindsay,	P

		Ontario.	
	34	Adriano, D.C. and **M. Havas** (Eds.), Advances in Environmental Sciences, Acid Precipitation Series, Volume 1: Case Studies. Springer-Verlag, N.Y. 330 pp.	B
1988	33	**Havas, M.** and T.C. Hutchinson. Tree Watch: Questionnaire on Tree Decline in Canada. Harrowsmith, August.	P
[4]	32	**Havas, M.**, T. Pajos, R. Loney, and V. Timmer. Effect of Aluminum, Drought and Low pH on Sugar Maple Seedlings, Ontario Ministry of the Environment, Final Report.	G
	31	**Havas, M**., R. Loney, M.G. Scott, and T.C. Hutchinson. Needle Chemistry as an Early Warning Indicator of Decline in Balsam Fir, Red Spruce, and Norway Spruce. Forest Decline Symposium, October 20-21, 1988, Rochester, N.Y.	A
	30	Loney, R. and **M. Havas**. Influence of Climate and Air Pollution on Decline of Sugar Maple in Eastern North America. Forest Decline Symposium, October 20-21, 1988, Rochester, N.Y.	A
1987	29	**Havas, M.** and T.C. Hutchinson. Aquatic Macrophytes as Bioindicators of Metal Pollution, Smoking Hills, N.W.T., Intern. Conf. Heavy Metals. September, 1987, New Orleans.	NR
[3]	28	**Havas, M**. Does hemoglobin enhance the acid-tolerance of *Daphnia*? Annls. Soc. R. Zool. Belg. 117, 151-164.	NR
	27	Creed, I.F., **M. Havas**, and C.G. Trick. 1987. Mechanisms of arsenate tolerance in the green alga, *Chlorella vulgaris*. Abstract. American Society for Limnology and Oceanography, University of Wisconsin-Madison, Madison, Wisconsin, June 14-18, 1987	A
1986	26	**Havas, M.** A hematoxylin staining technique to locate sites of aluminum binding in aquatic plants and animals. Water, Air, and Soil Pollution 30:735-741.	R
[8]	25	Hutchinson, T.C. and **M. Havas**. Recovery of previously acidified lakes near Coniston, Canada following reductions in atmospheric sulphur and metal emissions. Water, Air,and Soil Pollution 28:319-333.	R
	24	**Havas, M.** and J. F. Jaworski (Eds.), Aluminum in the Canadian Environment, National Research Council of Canada, Associate Committee on Scientific Criteria for Environmental Quality, 331 pp.	B
	23	**Havas, M**. Effects of acid deposition on aquatic ecosystems. In: Stern, A. (Ed.), Air Pollution, Volume VI, Academic Press, pp 351-389 .	C
	22	**Havas, M.** Aluminum chemistry of inland waters. In:	C

		Havas, M. and J.F.Jaworski (Eds.), Aluminum in the Canadian Environment, National Research Council of Canada, Associate Committee on Scientific Criteria for Environmental Quality, pp 51-77.	
	21	**Havas, M**. Effects of aluminum on aquatic biota. In: Havas, M.and J. F. Jaworski (Eds.), Aluminum in the Canadian Environment, National Research Council of Canada, Associate Committee on Scientific Criteria for Environmental Quality, pp 79-127.	C
	20	**Havas, M.** Groundwater quality and acid-sensitivity in south-central Ontario. Contract No. 1325, Health and Welfare Canada, 176 pp.	G
	19	**Havas, M**. and G.E. Likens. Aluminum uptake and toxicity to *Daphnia magna* in soft water at low pH. In: Geen, G.H. and K.L. Woodward (Eds.), Proceedings of the Eleventh Annual Aquatic Toxicity Workshop, November 13-15, 1984, Vancouver, B.C., pp 71.	A
1985	18	**Havas, M.** and G.E. Likens. Toxicity of aluminum and hydrogen ions to *Daphnia catawba, Holopedium gibberum, Chaoborus punctipennis,* and *Chironomus anthrocinus* from Mirror Lake, New Hampshire. Can. J. Zool. 63:1114-1119.	R
[6]	17	**Havas, M.** Aluminum bioaccumulation and toxicity to *Daphnia magna* (Straus) in soft water at low pH. Can. J. Fish.Aquat. Sci. Can. J. Fish. Aquat. Sci. 42:1741-1748.	R
	16	**Havas, M.** and G.E. Likens. Effects of aluminum on sodium regulation by *Daphnia magna* at low pH in soft water. Proc. Nat. Acad. Sci. 82:7345-7349.	R
	15	**Havas, M.** and D.W.H. Walton. Fate and transport of radionuclides in freshwater ecosystems. In: Harwell, M.A. and T.C. Hutchinson, The Environmental Consequences of Nuclear War. Volume II, J. Wiley & Sons Ltd., Chichester, pp 3-50 to 3-56.	C
	14	**Havas, M.**, T.C. Hutchinson, and G.E. Likens. 1985. Acid rain research. Environmental Science and Technology 19:4-26.	L
	13	**Havas, M.**, T.C. Hutchinson, and G.E. Likens. 1985. Comment on "Red Herrings in Acid Rain Research" Environmental Science and Technology 19:646-648.	L
1984	12	**Havas, M.,** T.C. Hutchinson, and G.E. Likens. Red herrings in acid rain research. feature article Environmental Science and Technology 18:176A-186A.	R
[3]	11	**Havas, M**., T.C. Hutchinson, and G.E. Likens. Effect of low pH on sodium regulation in two species of *Daphnia*. Can. J. Zool. 62:1965-1970.	R

	10	Contributed to: New Perspectives in Ecotoxicology, Levin, S.A. and K.D. Kimball (Eds.), Environmental Management 8:375-442.	R
1983	9	**Havas, M**. and T.C. Hutchinson. The Smoking Hills: Natural acidification of an aquatic ecosystem. Cover article Nature 301:23-27.	R
[2]	8	**Havas, M.** and T.C. Hutchinson. Effect of low pH on the chemical composition of aquatic invertebrates from tundra ponds at the Smoking Hills, N.W.T., Canada. Can. J. Zool. 61:241-249.	R
1982	7	**Havas, M**. and T.C. Hutchinson. Aquatic invertebrates from the Smoking Hills, N.W.T.: Effect of pH and metals on mortality. Can. J. Fish. Aquatic Sci. 39:890-903.	R
[4]	6	Sheath, R.G., **M. Havas**, J.A. Hellebust, and T.C. Hutchinson. Effects of long-term natural acidification on algal communities of tundra ponds at the Smoking Hills, N.W.T., Canada. Can. J. Bot. 60:58-72.	R
	5	**Havas, M.** and T.C. Hutchinson. Long-term consequences of acidification: The Smoking Hills Study. In: Johnson, R.E. (Ed.), Acid Rain/Fisheries, Proc. Intern. Symp. on Acidic Precipitation and Fishery Impacts in Northeastern North America, Cornell University, Ithaca, N.Y., August 2-5, 1981, pp 352-353.	A
	4	Munn, R.E., D. Mackay, and **M. Havas.** Impacts of coal on natural environmental systems. In: Chadwich, M.J. and N. Lindman (Eds.), Environmental Implications of Expanded Coal Utilization, Pergamon Press, Oxford, pp 230-272.	C
1981	3	**Havas, M.** Physiological response of aquatic animals to low pH. In: Singer, R. Ed.), Effects of Acidic Precipitation on Benthos, Proc. Symp. Acidic Precipitation on Benthos, 1980, North American Benthological Society, Hamilton, N.Y., pp 49-65.	C
1980	2	Hutchinson, T.C. and **M. Havas** (Eds.), Effects of Acid Precipitation on Terrestrial Ecosystems. NATO Conference Series, Series 1, Ecology Vol 4, Plenum Press, N.Y. 654 pp.	B
1978	1	Hutchinson, T.C.. W. Gizyn, **M. Havas**, and V. Zobens. Effects of long-term lignite burns on arctic ecosystems at the Smoking Hills, N.W.T. In: Hemphill, D.D. (Ed.), Trace Substances in Environmental Health XII:317-332.	R

4. CONFERENCES/WORKSHOPS/LECTURES/INVITED TALKS

Year	#	Presentation
2011	265	Havas, M. Wi-Fi in Schools–Is it Safe? Ontario English Catholic Teachers' Association, Toronto, Ontario, November 3, 2011
[23]	264	Havas, M. Zoomer Radio, Toronto, October 27, 2011.
	263	Havas, M. Symptoms of Electrohypersensitivity. MediConsult Convention 2011, Museum of Contemporary Art, San Diego, California, , October 2, 2011.
	262	Havas, M. Therapeutic pulsed magnetic fields travelogue. MediConsult Convention 2011, Museum of Contemporary Art, San Diego, California, , October 2, 2011.
	261	Havas, M. Electrosensitivity and Electrosmog Exposure, MediConsult Convention 2011, Museum of Contemporary Art, San Diego, California, , October 1, 2011.
	260	Havas, M. The History of RF Microwave Radiation, MediConsult Convention 2011, Museum of Contemporary Art, San Diego, California, , October 1, 2011.
	259	Havas, M. and R. Connolly. Therapeutic pulsed magnetic fields travelogue. MediConsult Convention 2011, Science Centre, Toronto, Ontario, September 25, 2011.
	258	Havas, M. Electrosensitivity and Electrosmog Exposure, MediConsult Convention 2011, Science Centre, Toronto, Ontario, September 24, 2011.
	257	Havas, M. The History of RF Microwave Radiation, MediConsult Convention 2011, Toronto, Ontario, September 24, 2011.
	256	Havas, M. Smart Meters, Broadband and WHO, Milagro, Tucson, Arizona, July 17, 2011.
	255	Havas, M. Workshop on EHS and various diagnostic technologies, Joshua Creek, Oakville, Ontario, July 9, 2011.
	254	Havas, M. and S. Symington. Wi-Fi in Schools, Community Centre, Bobcaygeon, Ontario, May 30, 2011.
	253	Havas, M. 2-hour Lecture on low EMF buildings, course at Fleming College, Peterborough, Ontario, May 18, 2011.
	252	Havas, M. How to minimize your exposure to potentially harmful electrosmog, Peterborough Wellness Expo, Evinrude, Peterborough, Ontario, May 7, 2011
	251	Havas, M. Women's Business Network, Speakers Group, Peterborough, Ontario, May 5, 2011.
	250	Havas, M. Switzerland, April 25 to 30, 2011

249 Havas, Windturbines, dirty electicity, and ground current, Lakeville, Connecticut, April 16, 2011.

248 Havas, D. Davis, and S. Sinatra, Panel Discussion, Total Health Show, Toronto, Ontario, April 8-10

247 Havas, Taming the Microwave Dragon, How to survive in a Wireless world, Total Health Show, Toronto, Ontario, April 8-10

246 Havas, @, Atlanta, Georgia, April 1-4, 2011.

245 Havas and Symington, Wi-Fi in Schools, Buckhorn Community Centre, March 1, 2011.

244 Havas, Health Committee Toronto, WiFi in Schools: Health Issues, Feb 14, 2011

243 Havas, Ground Current, Ripley Ontario, February 11 to 13, 2011.

2010 242 Havas, Dirty Electricity, Microwaves and Ground current Joshua Creek, Oakville, December 4, 2010.

[35] 241 Havas, Workshop, HRV and live blood, Joshua Creek, Oakville, December 4, 2010.

240 Havas, 2010, Introduction to Devra Davis, University of Toronto, Toronto, November 23, 2010

239 Havas, 2010, History of Microwave Research. San Francisco Commonwealth Club, November 18, 2010

238 Havas, 2010, Microwave Exposure in Schools. San Francisco Commonwealth Club, November 18, 2010

237 Havas, 2010. Weston A Price Conference, Pennsylvania, November 14, 2010.

236 Havas, 2010. Israel, Tel Avive, October 27, 2010

235 Havas, 2010. Israel, Tel Avive, October 26, 2010

234 Havas, 2010. Israel, Tel Avive, October 26, 2010

233 Havas, 2010. Evenrude Centre talk on WiFi in Schools, Peterborough, ON, October 20, 2010.

232 Havas, 2010. Kingston Club of the Canadian Federation of University Women, Queens University, Kingston, October 13, 2010.

231 Havas, 2010. Montreal, Best Western Europa, September 26, 2010.

230 Havas and Cline, 2010. Webinar, September 10, 2010.

229 Havas, 2010, LA Cancer Conference, September 5, 2010.

228 Havas, 2010. Talk, Los Angeles, California, September 2, 2010.

227 Havas, 2010. Barry Trower and History of EMFs, University of Toronto, Aug 24, 2010.

226 Havas, 2010. Crystal Beach, Ontario, August 9, 2010.

225 Havas, 2010. Webinar with Dr. John Cline in BC via skype. June 11, 2010.

224 Havas, 2010. WiFi in Schools. Collingwood, Ontario, June 10.

223 Havas, M. 2010. William Rae Conference, Dallas Texas, May 3-6, 2010.

222 Havas, M. and C. Rees. 2010. Full Signal. Long Island, NY, May 5, 2010

221 Havas, M. and C. Rees. 2010. Full Signal. New York City, NY, May 4, 2010

220 Havas, M. and C. Rees. 2010. Electrosensitivity, How do diagnose it. Kinghardt Academy, Madison, NY, May 1, 2010

219 Havas, M. and C. Rees. 2010. Full Signal. New York City, NY, April 29, 2010

218 Havas, M. and C. Rees. 2010. Congressional Briefing, Washington, DC, April 28, 2010

217 Havas, M. 2010. Lecture: Electrosmog and Electro-Sensitivity, Johns Hopkins, Baltimore, Maryland, April 27, 2010

216 Havas, M. 2010. HESA House of Commons Committee, Ottawa, presentation via phone, Baltimore, Maryland, April 27, 2010

215 Havas, M. 2010. Workshop on Monitoring Electrosmog at Johns Hopkins, Baltimore, Maryland, April 26, 2010

214 Havas, M. 2010. Proposed Roger's Antennas on Condominiums in Brampton, Ontario. April 7, 2010.

213 Kroh, C. and Havas, M. 2010. Is the government doing enough to protect our health? Panel Discussion. Total Health 10, Toronto Metro Convention Centre, Toronto, March 14, 2010.

212 Havas, M. 2010. Mobile Phones, Antennas, Computers, and Compact Fluorescent Lights . . . What you need to know to protect your health. Total Health 10, Toronto Metro Convention Centre, Toronto, March 14, 2010.

211 Havas, M. Electro-hyper-sensitivity (EHS): An emerging health issue. University of Ottawa, Ottawa, ON, March 3, 2010.

210 Havas, M. 2010. Electrosmog and Electrosensitivity. Health Impacts of Exposure to Wireless Radiation, Lakehead University, Thunder Bay, Ontario, February 22, 2010.

209 Havas, M. 2010. Electrosmog and Electrosensitivity: What you need to know to protect your home environment. Electrosmog: Introduction and Training. Toronto, January 23, 2010.

208 Havas, M. 2010. Ground Current in Urban Environments. Electrosmog: Introduction and Training. Toronto, January 23, 2010.

2009 207 Havas, M. 2009. Electro-hyper-sensitivity and the Nerve Express and Electro-Interstitial Scans. LD Symposium 2009, Miami, Florida, December 10-12, 2009.

[27] 206 Havas, M. Health Effects of Low Frequency Electromagnetic Fields. RETA, Edmonton Alberta, November 24, 2009.

205 Havas, M. Live Blood Analysis. MRS 2000 Meeting, Toronto, Ontario, November 21, 2009.

204 Havas, M. Evidence of Harm from Electromagnetic Radiation. Electromagnetic Radiation Impacts on Human Health. EMR Policy Institute Scientific Conference. Colorado School of Mines, Golden Colorado, November 8, 2009.

203 Havas, M. and J. Marrongelle. Heart Rate Variability (HRV): A diagnostic tool fro detecting chronic fatigue, adrenal exhaustion, and electrical hypersensitivity (EHS). Holistic Health Now Conference, American Holistic Medical Association. Cleveland Ohio, November 6, 2009.

202 Havas, M. Live Blood Analysis. A Public Lecture, Frequency Matters. Bridgenorth, Ontario, September 26, 2009.

201 Havas, M. Cigarettes and Cell Phones: What do they have in common? Stinson Beach, California, September 20, 2009.

200 Havas, M. Cell Phones and Cigarettes. What do they have in common? San Leandro High School, San Leandro California, September 18, 2009.

199 Havas, M. and D. Fancy. Conference call with Health Canada regarding Standards. August 31, 2009.

198 Havas, M. Public Meeting regarding Rogers Tower. Marmora, Ontario,August 27, 2009.

197 Havas, M. and D. Fancy. Meeting with Health Canada regarding Radio Frequency Radiation Standards, Ottawa, Ontario, August 5, 2009.

196 Havas, M. The Truth about Wired and Wireless Technology. Royal Roads University, Victoria, BC, July 22, 2009.

195 Havas, M. An Inconvenient Truth: Climate Change. Consequences of Convenience: Electrosmog. Gabriola Island, BC, July 20, 2009

194 Havas, M. Consequences of Convenience. Langley ,BC, July 17, 2009.

193 Havas, M. Transmission Lines and Health. Sto:Lo Nation. BC, July 14, 2009.

192 Havas, M. Wireless Technology-the tobacco of the 21st Century. Ontario Health Promotion Summer School, University of Toronto, Toronto, Ontario. July 9, 2009.

191 Havas, M. Public Health SOS: The Shadow Side of the Wireless Revolution. Ontario Health Promotion Summer School, University of Toronto, Toronto, Ontario. July 8, 2009.

190 Havas, M. What Health Care Professionals need to know about Electro-Smog and Electro-Sensitivity. Integrating Biophysics-based Technologies in Clinical Practice, Phoenix Arizona, May 8, 2009.

189 Havas, M. What Health Care Professionals need to know about Electromagnetic Pollution and Health. Rural Life and the Healthy Employee, IHLP, Education Symposium, Medical Laboratory Technologists, Stratford, May 6, 2009.

188 Havas, M. Our love affair with wireless technology and the consequences. U-Links Centre for Community-Based Research, Haliburton County, April 20, 2009.

187 Havas, M. Our love affair with wireless technology and the consequences. Women's Institute Bailieboro-Cavan-Milbrook-North Monaghan, Ontario, April 7, 2009.

186 Havas, M. Electrical Pollution on Farms: Poor power quality and stray voltage effects on humans and animals. National Mutual Insurance Convention, Toronto, Ontario, March 26, 2009.

185 Havas, M. Electro-smog and Electro-hyper-sensitivity: How to protect yourself, your family, and your community. University Women's Club, Toronto, Ontario, March 12, 2009.

184 Havas, M. When "green" is not enough. What do windmills and CFL bulbs have in common? Sir Sanford Fleming College, Lindsay Ontario, January 30, 2009.

183 Havas, M. Rapid Aging Syndrome & Electrosmog: Part 2. Physicians Meeting, Renfrew Ontario, January 23, 2009.

182 Havas, M. Electrial Sensitivity. University of Ottawa, Ottawa, Ontario, January, 23, 2009

181 Havas, M. Wind Turbines & Health: The effect on Individuals, Prince Edward County, Picton Ontario, January 15, 2009.

2008 180 Havas, M. Hearing on Breast Cancer and Magnetic Field Exposure, Bell Canada, Expert Testimony, Toronto, Ontario, December 16-17, 2008.

[31] 179 Havas, M. When "green" is not enough. Lecture, First Year Environmental Science Course (ERSC 100), Trent University, Peterborough, Ontario, December 2, 2008.

178 Havas, M. Poor Power Quality & Stray Voltage Effects on Human and Animal Health, Ontario Mutual Insurance, Annual Meeting, University of Guelph, Ridgetown Campus, Ridgetown, Ontario, November 27, 2008.

177 Havas, M. Why do residents near wind turbines get sick? Wind Turbines Make Waves. Township Council Public Meeting, Dawn-Euphemia Township, Florescent & District Community Centre, Florence Ontario, November 17, 2008.

176 Havas, M. EMFs Electromagnetic fields--an emerging health issue.

CAUT Health and Safety Conference, Ottawa, Ontario, November 7-9, 2008.

175 Havas, M. Electro-smog & Electro-sensitivity: what you need to know to protect yourself. RCEN, Canadian Environmental Network, Annual General Assembly, Richmond Hill, Ontario, October 23-26, 2008.

174 Havas, M. Electromagnetic Factors in Health: What do Scientists know about the effects of wireless technologies about humans, animals, and nature? Panel on Health & Environmental Concerns of the Wireless Revolution. Bioneers, Boulder Colorado, October 18, 2008.

173 Havas, M. Electrosmog & Electrosmogitis (Electro-hyper-sensitivity). HRV & EIS Workshop, Mississauga, Ontario, October 9-11, 2008.

172 Havas, M. Health Effects of Electrosmog. Round Table Discussion, Budapest, Hungary, September 26-28, 2008.

171 Havas, M. Rapid-Aging Syndrome and Electrosmog. Renfrew United Church, Renfrew, ON, 10:30 am, August 29, 2008.

170 Havas, M. Electrosmog and Electrohypersensitivity. Ottawa Area Physicians, Kanata ON, 7 pm, August 28, 2008,

169 Havas, M. Electromagnetic Fields: Best Kept Secret. Ontario English Catholic Teachers' Association. The Way Forward: Putting the Act into ACTion. Biennial Conference on Health, Safety and the Environment. Toronto, August 13-15, 2008.

168 Rees, C. and M. Havas. Meeting with Marc Sorenson regarding design of a Health Spa for those with EHS, Navada Fitness Institute, Hidden Canyon, Nevada. July 30-Aug 2, 2008.

167 Ripple, J., M.Havas, and R. Lear. Meeting with Senator Boxer's Staff--Megan Miller regarding Health Concerns of WiFi and WiMax, Marin County, July 25 2008, noon-2 pm.

166 Ripple, J., M.Havas, and R. Lear. Meeting with Assemblyman Huffman's Staff regarding the Banning of Compact Fluorescent Lights. 3501 Civic Center Drive, Suite 412, Marin County, July 25, 2008, 3-4 pm.

165 Havas, M. Public Forum, Cell/Transmission Towers, Colwood Pentecostal Church, Colwood, Vancouver Island, BC, June 25, 2008.

164 Havas, M. Cell Towers and Your Health. PACT Precautionary Approach to Cell Towers, Richmond Hill, ON, May 12, 2008.

163 Havas, M. Wind Farms and Health. Community Centre, Summerside, PEI, noon, May 3, 2008.

162 Havas, M. Transmission Lines and Health, Duffy Theatre, University of PEI, Charlottetown, PEI, 7 pm, May 2, 2008,

161 Havas, M. Transmission Lines and Health, Members of the

Legislative Assembly, Charlottetown, PEI, noon, May 2, 2008,

160 Havas, M. Transmission Lines and Health, French School, Summerside, PEI, 7 pm, May 1, 2008.

159 Havas, M. A Tale of Two Pollutants: Dirty Electricity & WiFi. Natural Building, Health Building, Building Biology Conference, Nashville, TN, April 19-20, April 19, 2008.

158 Havas, M. Electromagnetic Pollution & Health. Natural Building, Health Building, Pre-Conference Seminar, Building Biology Conference, Nashville, TN, April 19-20, April 18, 2008.

157 Havas, M. Best Kept Secret. Women's institute, Warsaw Town Hall, Warsaw, ON, April 16, 2008.

156 Havas, M. Dialogue on Electromagnetic Fields and Health. THINK^2: A Symposium on Academic Safety and Risk, Brock University, April 8-9, 2008.

155 Havas, M. Cell Towers and Schools: Tip of the Iceberg. Coalition for Healthier Schools, 90-minute Conference Call, April 4, 2008.

154 Havas, M. Electro-hyper-sensitivity (EHS): An Emerging Public Health Issue. Michael, E. DeBakey Veterans Affairs Medical Center, Houston Texas, March 31, 2008.

153 Lai, H., S. Milham, M. Havas, and L. Kelley. We are all exposed! Biological and Health Effects of Electromagnetic Fields (EMF), Radio Frequency Radiation (RFR), and Dirty Electricity (DE). City Club, San Francisco, Breakfast Meeting Panel Discussion, Sponsored by Council on Wireless Technology Impacts, March 21, 2008.

152 Havas, M., C. Sage, D. Carpenter, C. Rees. The Shadow Side of the Wireless Revolution. A Health Policy Discussion on an Emerging Global Public Health Issue. Panel Discussion, Commonwealth Club, San Francisco, California , March 19, 2008.

151 Havas, M. Electromagnetic Radiation, Peterborough, March 3, 2008.

150 Havas, M. An Inconvenient Truth, Part 2: Our Love Affair with Wireless Technology, Lecture Sponsored by The Lewis School, Princeton Public Library, New Jersey, February 12, 2008.

2007 149 Newton, J. and M. Havas, Meetings with Congressional and Senate Staff about EMR Regulations and Guidelines. Washington DC, December 3-7, 2007.

[17] 148 Havas, M. Health Concerns associated with Electromagnetic Pollution. Gave talks at 5 Churches, Jamaica, October 29-30, 2007.

147 Havas, M. Radio Frequency Radiation & Health. New Mexico Bioneers Conference, Santa Fe, New Mexico, College of Santa Fe, October 19-21, 2007.

146 Newton, J. and M. Havas. Meetings with Congressional and Senate Staff about EMR Regulations and Guidelines. Washington, DC, October 15-18, 2007.

145 Havas, M. 2007. Ground Current on Farms, Ecological Agriculture Course, Trent University, Peterborough, ON, October 4, 2007.

144 Havas, M. 2007. The link between cancer and exposure to electromagnetic energy. Cancer Conference, Ottawa, Ontario. May 25-26, 2007.

143 Havas, M. 2007. Panel Discussion on WiFi, RFR, and our Health. World Congress on Integrated Medicine, Sante Fe, New Mexico, May 4-6, 2007.

142 Havas, M. 2007. Electromagnetic Hygiene in Schools. Pegasus School, California, April 23, 2007.

141 Havas, M. 2007. Ground Current Pollution Act Bill 154: Why should we care? Chattam, Ontario, April 18, 2007.

140 Havas, M. Radio Frequency Radiation, Cell Phone Towers and your Health. Public Meeting, Charlottetown, PEI, April 17, 2007.

139 Havas, M. Electromagnetic Hygiene in the Home. Holistic Health, SSF, March 20, 2007.

138 Havas, M. Radio Frequency Health Concerns and WiFi at Trent. Committee on Technology for Teaching and Learning (COTTL), Trent University, March 8, 2007.

137 Havas, M. 2007. Shifting Paradigms: Flat earth/round earth and our concept of electromagnetic power. Ontario College of Art and Design, Toronto, March 7, 2007.

136 Havas, M. 2007. Dirty Electricity in Schools. Teacher Education Program, Trent University, March 7, 2007.

135 Havas, M. 2007. Is the electricity in your home making you sick. Health Freedom Expo, Long Beach, California, March 2-4, 2007.

134 Havas, M., B. Fraser, and R. Frederick. 2007. Ground Current Pollution Act 154, Council Chamber, Toronto City Hall, Toronto, Ontario, January 29, 2007.

133 Havas, M. Gilbert, F, Macfarlane, R., and R. Bradley. 2007. Panel discussion on WiFi. Wireless Communities Summit, Toronto, Ontario. January 23 & 24,

2006 132 Havas, M. Radio Frequency Health Concerns and WiFi at Trent. COTTL, Trent University, December 18, 2006

[19] 131 Havas, M. 2006. *Electromagnetic Pollution and Your Health*. Bermuda, October 14, 2006.

130 Havas, M. 2006. *Ground Current on Farms*. Guest Lecture: Ecological Agriculture, Trent University, Peterborough, ON, October 5, 2006.

129 Havas, M. 2006. Health Effects of Dirty Electricity. Dane County Chapter, Save Our Unique lands Coalition Against Electromagnetic Pollution, Pitchburg, Wisconsin, July 27, 2006.

128 Havas, M. 2006. Electromagnetic Pollution and Your health. Trent/Shad Valley Program, Trent University, Peterborough, ON July 6, 2006.

127 Havas, M. 2006. Electromagnetic Pollution and Electrical Hypersensitivity. American Society of Dowsers, Vermont, June 22, 2006.

126 Havas, M. 2006. Electromagnetic pollution: What can you do to have a cleaner environment and protect your health? Aurora, ON, June 14, 2006.

125 Havas, M. 2006. Health Effects of Dirty Electricity. Nassau, Bahamas, June 8, 2006.

124 Havas, M. 2006. Radio Frequency Antennas. Simcoe, Ontario, June 6, 2006.

123 Havas, M. 2006. Simcoe Cell Tower Rogers, Simcoe, ON. Public Meeting, Town Hall, April 19, 2006.

122 Havas, M. 2006. Part 2: No Place to Hide: Wireless Technology. Total Health Show, Toronto, ON, April 1, 2006.

121 Havas, M. 2006. Panel Discussion: Energy Medicine. Total Health Show, Toronto, ON, April 1, 2006.

120 Havas, M. 2006. Part 1: Electromagnetic Hygiene: Dirty Electricity in homes and schools. Total Health Show, Toronto, ON, April 1, 2006.

119 Havas, M. 2006. Biological Effects of Dirty Electricity with Emphasis on Diabetes and Multiple Sclerosis. Precautionary EMF Approach: Rationale, Legislation and Implementation, 5th ICEMS International Workshop, Benevento Italy, 22-25, 2006.

118 Havas, M. 2006. Biological Effects of Dirty Electricity. Peterborough Public Library, Peterborough, ON, February 16, 2006.

117 Havas, M. 2006. Electromagnetic Pollution: No place to hide! Markham ON, February 15, 2006.

116 Havas, M. 2006. Dirty Electricity, Electrical Hypersensitivity and your Health. Toronto, ON, February 13, 2006

115 Havas, M. 2006. Electromagnetic Pollution and Your Health. Sir Sanford Fleming College, Peterborough, ON, February 6, 2006.

114 Havas, M. 2006. Dirty Electricity, Diabetes and Multiple Sclerosis. Cenre for Health Studies Research, Trent University, Peterborough, ON, January 25, 2006

2005 113 Havas, M. 2005. Electrical Pollution & the Need for Better Health Guidelines. Meeting with Belinda Stronach, **Aurora, Ontario**, December 14, 2005.

[29] 112 Havas, M. 2005. Electromagnetic Sensitivity and Electromagnetic Pollution, Faculty of Medicine, University of Toronto, **Toronto**, **Ontario**, December 9, 2005.

111 Havas, M. 2005. *Dirty Electricity, what it is, what it does, and what we can do to protect ourselves*. Nutritionists Network Group Meeting, **Richmond Hill**, **Ontario**, November 15, 2005.

110 Havas, M. 2005. *Cell Tower Radiation and Fire Fighter Exposures*. Health and Safety for the Professional Fire Fighter, The IAFF John P. Redmond Foundation Symposium on the Occupational Health and Hazards of the Fire Service. **Honolulu Hawaii**, October 23-27, 2005.

109 Havas, M. 2005. Health and Safety Round Table Question Period, Health and Safety for the Professional Fire Fighter, The IAFF John P. Redmond Foundation Symposium on the Occupational Health and Hazards of the Fire Service. **Honolulu Hawaii**, October 23-27, 2005.

108 Havas, M. 2005. *Dirty Electricity, Diabetes, Multiple Sclerosis, Electrical Hypersensitivity and Sick Building Syndrome . . . Is there a connection?* Occupational Hygiene Association of Ontario, **Toronto,** October 20, 2005

107 Havas, M. 2005. *Electrical Pollution: No Place to Hide*. SWEEP, Safe Wireless Electromagnetic and Electrical Policy, Breast Cancer Research and Education Fund and the Niagara Healthy Environment Initiative, **St. Catharines, Ontario**, October 15, 2005.

106 Havas, M. 2005. *Radio Frequency Radiation and Adverse Biological Effects*. **Salisbury, North Carolina**, October 13, 2005.

105 Havas, M. 2005. *Earth Energy, Life Energy, and Techno Energy Interactions. How is electromagnetic Technology affecting Life on our Planet? It's a Shocker!* Toronto Dowsers, Latvian Centre, Credit Union Drive, **Toronto**, October 11, 2005.

104 Havas, M. 2005. *Electromagnetic Pollution*. Ontario Ministry of Health, **Toronto**, September 20, 2005

103 Havas, M. 2005. *Health Effects of Dirty Electricity*. **Bermuda**, September 3, 2005.

102 Havas, M. 2005. *Radio Frequency Radiation: Cell Phone and Cell Towers*. **Bermuda**, September 3, 2005.

101 Havas, M. 2005. Cell Phones, Electricity and your Home. Trent-Shad Valley Program, Trent University, **Peterborough, Ontario**, July 18, 2005.

100 Havas, M. 2005. *Effects of Electrical Pollution and Radio Frequency Radiation*. STOP (Stop Transmission lines Over People), Parent Information Session, St. Justin Martyr Parish Hall, **Markham, Ontario**, June 20, 2005.

99 Havas, M. 2005. *Health Effects of Dirty Electricity*, Public Lecture, St. Johns Church, **Peterborough, Ontario**, June 16, 2005.

98 Havas, M. and A. Olstad. 2005. *Dirty Electricity Study at Fillmore-Central Elementary, Middle & High School*. **Minnesota**, June 2, 2005.

97 Havas, M. 2005. My research with Dirty Electricity. Dr. Tel-Ore, **Minneapolis Minnesota**, May 31, 2005.

96 Havas, M. 2005. *Electrical Pollution: A Serious Environmental Problem*. Breast Cancer Research and Education Fund and the Niagara Healthy Environment Initiative, **Port Dalhousie, Ontario**, April 30, 2005.

95 Havas, M. 2005. *Electrical Pollution in the Home*, Sir Sanford Fleming College, **Haliburton**, **Ontario**, April 29, 2005.

94 Havas, M. 2005. Dirty Electricity. United Church, **Peterborough, Ontario**, April 26, 2005.

93 Havas, M. 2005. *Electrical Pollution in the Home*. Healthy Buildings Conference, **Cambridge, Ontario**, April 6-7, 2005.

92 Havas, M. 2005. *Electrical Pollution: Part 1. Electromagnetic Fields*. Medical Officer of Health, **Newmarket, Ontario**, April 1, 2005

91 Havas, M. 2005. *Dirty Electricity and Graham/Stetzer Filters*. Naturopathic Doctors, **Peterborough, Ontario**. March 10, 2005.

90 Havas, M. 2005. *Electrical Pollution*. Deputy Minister of Rural Affairs, **Toronto, Ontario,** February 24, 2005.

89 Havas, M. 2005. *Electrical Pollution*. Task Force, **Markham, Ontario**, February 23, 2005.

88 Havas, M. 2005. *Environmental Contaminants and Health: Dirty Electricity and Electrical Hypersensitivity*. Sir Sanford Fleming College, **Peterborough, Ontario**, February 14, 2005.

87 Havas, M. 2005. *Health Effects of Dirty Electricity*. Bio Ag. Conference, **Wellesley, Ontario**, January 27, 2005.

86 Havas, M. 2005. *Health Effects of Dirty Electricity*. Barbados Radiation Conference, Sherbourne 2005. Conference Centre, **Barbados**, January 18, 2005.

85 Havas, M. 2005. *Radio Frequency Radiation: Cell Phone Antennas*, Barbados Radiation Conference, Sherbourne Conference Centre, **Barbados**, January 18, 2005.

2004 84 Havas, M. 2004. *Health Concerns Associated with Part 1. Radio Frequency Radiation, Part 2. Magnetic Fields (ELF), Part 3. Dirty*

Electricity. Public Seminar, **Tobago**, November 20, 2004.

[10] 83 Havas, M. and D. Stetzer. 2004. *Health Concerns Associated with Dirty Electricity and Power Frequency Fields*. Public Seminar, Port-of-Spain, **Trinidad**, November 17, 2004

82 Havas, M. 2004. *Health Concerns Associated with Radio Frequency Radiation*. Public Seminar, Port-of-Spain, **Trinidad**, November 17, 2004

81 Havas, M. 2004. *Dirty Electricity and Electrical Hypersensitivity (EHS): Five Case Studies*, Bio-Ag Conference, **Wellesley, Ontario**, November 10, 2004.

80 Havas, M. 2004. Dirty Electricity and Multiple Sclerosis, MS Society **Pickering, Ontario**, November 2, 2004.

79 Havas, M. 2004. Dirty Electricity and Multiple Sclerosis, MS Society **Oshawa, Ontario**, November 2, 2004.

78 Havas, M and J. Mackay. *Street level magnetic fields within the City of Kingston, Ontario, Canada*. Biological Effects of EMFs, 3rd International Workshop, Kos, **Greece**, 4-8 October, 2004.

77 Havas, M., M. Illiatovitch, and C. Proctor. *Teacher and student response to the removal of dirty electricity by the Graham/Stetzer filter at Willow Wood School in Toronto, Canada*. Biological Effects of EMFs, 3rd International Workshop, Kos, **Greece**, 4-8 October, 2004.

76 Havas, M. and D. Stetzer. 2004. *Graham/Stetzer Filters Improve Power Quality in Homes and Schools, Reduce Blood Sugar Levels in Diabetics, Multiple Sclerosis Symptoms, and Headaches. Children with Leukemia* International Conference in **Westminster, London**, September 6-10, 2004.

75 Havas, M. 2004. *Wireless Communication Antennas on Fire Halls: Dumb and Dangerous! International Association of Fire Fighters Conference,* **Boston**, August 2004.

2003 74 Havas, M. *Health Effects Associated with Power Lines*. Expert Testimony. National Energy Board Hearing regarding Sumas Energy, **Abbottsford, BC**, July 2003

2002 73 Havas, M. National Research Policy Conference, Ottawa, ON., October 22-25, 2002

[15] 72 Havas, M. *Cell Phone Towers and their Biological Effects*. Behind the Scenes, Trent University, **Peterborough, Onbtario,** October 19, 2002

71 Havas, M. *Electromagnetic Fields in Schools: What can be done to reduce exposure*. Health and Safety Conference, **Toronto**, **Ontario**, August 15, 2002.

70 Havas, M. *How to reduce your exposure to wired and wireless electromagnetic energy*. Invited Speaker, Presented at People and the

Planet Conference, Sierra Club of Canada, Queen's University, **Kingston, Ontario**, June 3-9, 2002

69 Havas, M. Health Concerns Associated with Wireless Telecommunication.. Invited Speaker, Public Lecture, Caledonia, PEI, May 29, 2002.

68 Havas, M. *Mapping Magnetic Fields in the School Environment*. **Guelph Ontario**, May 24, 2002

67 *Electromagnetic fields (EMF) and Electromagnetic Radiation (EMR): An overview of Health Concerns and a Call for Action*. Presented to the Standing Committee on Environment and Sustainability, **Parliament Hill, Ottawa, Ontario,** May 21, 2002

66 Havas, M. *Biological Effects of Low Frequency Electromagnetic Fields,* **London, England,** May 16-17, 2002

65 Lund-Lucas, E., R. Silvestri, M. Havas, D.J. Cunningham, and L. Thomas. 2002. Everything students should know about Thinking and Learning. Destination Success 2002: Building Accessible Learning Communities, Sponsored by Learning Opportunities Task Force, Ministry of Training, Colleges & Universities, Government of Ontario & Georgian College; **Barrie, Ontario**, May 6 & 7, 2002.

64 Havas, M. *Electromagnetic Fields in a School Environment, the Need for Mapping*. Presented to School Health and Safety Officers, **Mississauga, Ontario**, May 3, 2002.

63 Havas, M. *Sources of electromagnetic fields in the home*. Presented to Environmental Homes, **Grand Valley, Ontario**, April 27, 2002.

62 Havas, M. *Corporatization of the University*, Smith Conference Room, Trent University, **Peterborough, Ontario**, April 6th.

61 Havas, M. *Electromagnetic fields in the home and childhood cancers: An overview from Wertheimer to Wartenberg*. Presented at the International Centre for Electromagnetic Biocompatibility (ICEB) Conference, **Montreal, Canada,** March 6-8, 2002

60 Havas, M. Rapporteur, Simply Water? Workshop, Trent University, **Peterborough, Ontario,** February 18-20, 2002

59 Havas, M. Expert Testimony on the health effects of power line electromagnetic fields. Mendota Heights, Public Meeting, Planning Commission, **Minnesota**, January 2002.

2001 58 Havas, M. *Electromagnetic fields and breast cancer*. Eyes Wide Open, Conference on Breast Cancer, **Peterborough, Ontario**. October 2001.

2000 57 Havas, M. Toronto Round Table on Cell Phone Towers, RFR, Public Meeting with Panel Discussion, City of Toronto Department of Health, **Toronto, Ontario,** February 7, 2000

[2] 56 Havas, M. Expert Testimony of the Biological Effects of Power Line electromagnetic fields, **Mendota Heights, Minnesota**, Public

Meeting, January, 2000.

1999 55 Havas, M. Power lines on London Street Peterborough and the Literature on Health Effects. Presented to the PUC, **Peterborough, Ontario**, June 22, 1999.
[1]

1995 54 POSTER: Acid Reign '95 Conference, **Gothenburg, Sweden**, June 1995. 1) Can Sodium Regulation be used to Predict Relative Acid Sensitivity of Aquatic Fauna?; 2) Biological Recovery in Two Previously Acidified, Metal-Contaminated Lakes, near Sudbury, Ontario, Canada; 3) Chemical Response of Two Previously Acidified, Metal-Contaminated Lakes, near Sudbury, Ontario, Canada.

[3] 53 PLENARY SPEAKER: Acid Reign '95 Conference, **Gothenburg, Sweden**, June 1995.

52 LECTURE: at the KEY Workshop on Biodiversity in Ontario, August 1995. Solving Environmental Problems: A framework.

1994 51 INVITED SPEAKER: conference in **Kathmandu, Nepal**, March 1994. Environmental Education in Developing Countries.

[4] 50 LECTURE: at the KEY Workshop on Chemicals in the Environment, **Regina**, July 1994. Environmental Science and Decision Making

49 LECTURE: at the KEY Workshop on Biodiversity, **Ontario**, August 1994.
Solving Environmental Problems: A framework.

48 PARTICIPANT: First International Symposium on Ecosystem Health and Medicine: Integrating Science, Policy and Management. **Ottawa, Ontario**, June 19-23, 1994.

1993 47 PARTICIPANT: Evaluating and Monitoring the Health of Large-Scale Ecosystems, NATO Advanced Research Workshop, **Montebello, Quebec**, October 10-15, 1993.

[4] 46 POSTER: International Conference on Heavy Metals in the Environment, in **Toronto**, September 1993.

45 LECTURES: at the KEY Workshop on Chemicals in the Environment, Regina June 1993, **Sarnia** August 1993; 1) DDD: A Case Study; 2) Environmental Decision Making; 3) Solving Environmental Problems: A framework.

44 INVITED SPEAKER: conference in **Toluca, Mexico**, February, 1993.

1992 43 LECTURES: at the KEY Workshop on Chemicals in the Environment, **Regina** July 1992, **Sarnia** August 1992.

[2] 42 LECTURES: at the KEY Workshop on Chemicals in the Environment, **Regina** July 1992, **Sarnia** August 1992; 1) DDD: A Case Study; 2) Environmental Decision Making; 3) Solving Environmental Problems: A framework.

1991 41 LECTURES: at the KEY Workshop on Chemicals in the Environment, August 16-25, 1991. 1) View of Environmental Issues

		from a Scientist's Perspective; 2) DDD: A Case Study
1990	40	SEMINAR: "Science Reporting and Journalism", Campbellford District High School, Your Science Future, **Cambellford, Ontario**, November 14, 1990.
[4]	39	LECTURES/DISCUSSIONS: at the KEY (formerly SEEDS) Workshop on Chemicals in the Environment, August 18-25, **Mississauga, Ontario**, 1) Environmental Problems: An Overview; 2) Acid Rain: An Historical Perspective; 3) DDD: A Case Study; 4) Agricultural Practices: synthetic vs organic chemicals
	38	CONFERENCE PRESENTATION: Enviro Mystery: An Educational Computer Game, Third International Show & Tell for Ontario Universities and Colleges, May 28-29, 1990, oral presentation and computer demonstration, with Robert Loney; **Guelph Ontario**.
	37	SEMINAR: Scientific Research in the Canadian Arctic, Science Day, Trent University, **Peterborough, Ontario**, April 10, 1990.
1989	36	LECTURE: Science in the Canadian Artic. Environmental and Resource Studies, Trent University, **Peterborough, Ontario**, July 1989.
[3]	35	LECTURES: at the SEEDS Workshop on Chemicals in the Environment, August 5-12, **Kingston, Ontario,** 1) Acid Rain: An Overview; 2) DDD: A Case Study
	34	TELEVISION INTERVIEW (TVO): Panel Discussion on Sustainable Development, **Toronto**, **Ontario**. May 1989.
1988	33	POSTER PRESENTATION: Needle Chemistry as an Early Warning Indicator of Decline in Balsam Fir, Red Spruce, and Norway Spruce. Forest Decline Symposium, October 20-21, 1988, **Rochester, N.Y.** (with R. Loney, M. Scott, and T.C. Hutchinson)
[4]	32	POSTER PRESENTATION: Influence of Climate and Air Pollution on Decline of Sugar Maple in Eastern North America. Forest Decline Symposium, October 20-21, 1988, **Rochester, N.Y.** (with R. Loney)
	31	THREE LECTURES: at the SEEDS Workshop on Chemicals in the Environment, August 12-21, 1988, **Sarnia, Ontario**. 1) Chlorinated Hydrocarbons-Friend or Foe? A Case Study; 2) Principles of Chemistry as they Pertain to the Environment; 3) Principles of Ecology as they Pertain to Chemicals in the Environment
	30	INVITED LECTURE: Later Life Learning: "Scientific Developments and Inventions at the University of Toronto, Topic was "Acid Rain in the Canadian Artic", March 10, 1988, Innis College, U of T, **Toronto, Ontario**.
1987	29	ORAL PRESENTATION: Can Aquatic Mosses and Macrophytes be used as Bioindicators of Metal Pollution? Intern. Conf. Heavy Metals. September, 1987, **New Orleans**.

[5]	28	LECTURE: Use of DDD in Clear Lake-a Case Study. SEEDS Workshop on Chemicals in the Environment, August, 1988, **Sarnia, Ontario**
	27	LECTURE: Science Careers for Women. Open Doors for Tomorrow, Peel's Career Conference for young women, Glenforest Secondary School, **Peel County, Ontario** May 9.
	26	ORAL PRESENTATION: Does hemoglobin enhance the acid tolerance of aquatic invertebrates? International Symposium on Ecophysiology of Acid Stress in Aquatic Organisms, Jan 13-16, 1987, **Antwerp, Belgium**.
	25	ORAL PRESENTATION: Effects of calcium and pH on aluminum toxicity and bioaccumulation by *Daphnia magna*. International Symposium on Ecophysiology of Acid Stress in Aquatic Organisms, Jan 13-16, 1987, **Antwerp, Belgium**.
1986	24	ORAL PRESENTATION: Chemical recovery of 2 lakes near Coniston, Ontario. SLANT/TRESLA meeting,April 11-13, 1986, **Peterborough, Ontario**.
[3]	23	SEMINAR: Aluminum toxicity in aquatic invertebrates, Department of Biology, Trent University, **Peterborough, Ontario**, February 28, 1986.
	22	ORAL PRESENTATION: Aluminum toxicity and salt regulation in aquaticinvertebrates, Society of Canadian Limnologists (SCL), Conference held n **Ottawa, Ontario**, January 7 & 8, 1986.
1985	21	POSTER PRESENTATION: "Aluminum localization in aquatic plants and animals", **Muskoka** Acid Rain Conference, Sept 15-20, 1985.
[5]	20	POSTER PRESENTATION: "Recovery of acidic metal-contaminated lakes near Coniston Ontario", with T.C. Hutchinson, **Muskoka** Acid Rain Conference, Sept 15-20, 1985.
	19	SEMINAR: "Aluminum toxicity, uptake and localization in aquatic invertebrates", Department of Biology, McMaster University, **Hamilton, Ontario,** August 29, 1985
	18	PARTICIPANT: Impact of Nuclear Winter on Natural Ecosystems, Workshop, SCOPE, **Toronto**, March 1985.
	17	ORAL PRESENTATION: "Does hemoglobin enhance acid tolerance of aquatic invertebrates?", SLANT/TRESLA Conference, **Quebec**, April 12-15, 1985.
1984	16	ORAL PRESENTATION: "Aluminum uptake and toxicity to Daphnia magna at low pH in soft water." 11th Annual Aquatic Toxicity Workshop, **Vancouver, B.C**., November 13-15.
[3]	15	INVITED SPEAKER: Physiological effects of acidity and associated water chemistry (aluminum) on freshwater invertebrates Department of Biology, Dalhousie University, **Halifax**, **Nova Scotia,** October 18.
	14	INVITED SPEAKER: Acid rain and the future of Ontario Lakes Dallington Public School, **Toronto**, Ontario, April.

1983	13	INVITED SPEAKER: Natural and Manmade Acid Rain Audubon Society, Darien, **Connecticut**, U.S.A., February 3.
[2]	12	INVITED SPEAKER: Aluminum toxicity to aquatic invertebrates Norwegian Institute for Water Research, **Oslo, Norway**, May.
1982	11	INVITED SPEAKER: Causes of Acid Rain and Acid Deposition Conference on Acid Rain, Pennsylvania Environmental Council, 14th Annual Meeting, Lock Haven State College, , **Pennsylvania**, October 21.
[4]	10	INVITED SPEAKER: Effects of acid rain on aquatic animals Acid Rain Effects Workshop, JASON MITRE Corporation, Cornell University, **Ithaca, N.Y**., Sept 30 to Oct. 1.
	9	LECTURES: Neutron Activation Analysis as an Analytical Tool. Section of Ecology and Systematics, Cornell University, **Ithaca, N.Y.**
	8	LECTURE: Response of aquatic invertebrates to acidification Aquatic Entomology Course, Cornell University, **Ithaca, N.Y**.
1981	7	PARTICIPANT: Ecotoxicology Workshop, Ecosystem Research Center, Cornell University, **Ithaca, N.Y**., November 2-5.
[5]	6	POSTER PRESENTATION: Acid/Rain Fisheries Symposium, Northeastern Division of the American Fisheries Society, Cornell University**, Ithaca, N.Y**., August 2-5.
	5	SEMINAR: The Smoking Hills and Sudbury: Two case studies Department of Biology, State University of New York College, **Cortland, N.Y**., April
	4	SEMINAR: Does hemoglobin reduce acid-stress of Daphnia magna? Entomology Seminar, Cornell University, **Ithaca, N.Y**., March.
	3	SEMINAR: Extreme acidification at the Smoking Hills: Chemical and Biological Consequences Section of Ecology and Systematics, Cornell University, **Ithaca, N.Y**., February.
1980	2	PARTICIPANT: Effects of sulphur and nitrogen oxides on plants International Workshop on Environmental Implications and Strategies for Expanded Coal Utilization, UNEP/Beijer Institute, **Moscow**, **USSR**, October 20-24.
[2]	1	SEMINAR: Toxicity of metals at low pH to aquatic invertebrates. Department of Botany, University of Toronto, **Toronto**.

5 WEBSITE ARTICLES

I have two websites www.magdahavas.com and www.magdahavas.org. The dot com website is an educational website designed to inform the public about electrosmog and electrosensitivity. The dot org website is a more formal website that provides a list of my publications. Both websites went live on October 14, 2009.

Below is a list of articles (blogs) on the website in reverse chronological order.

DATE	#	TITLE
Dec 2011	140	Dr Oz on PEMF therapy and pain relief, in prep.
Oct 2011	139	Want to learn more? Course on Electrosmog & Electrosensitivity
[4]	138	Health Canada needs to issue warning about Wireless Baby Monitors
	137	Peterborough City Council disagrees with cell tower site
	136	Advice for Health Canada regarding Wi-Fi, cell phone antennas, and other forms of radio frequency emitting devices
Sept 2011	135	Ontario School replaces Wi-Fi with Wired Internet
Aug 2011	134	Open Letter to Steve Jobs
[3]	133	Cell Phones and Head Blemishes in Adolescents: Is it Melanoma?
	132	How to properly read a scientific paper–Adolescent brain tumours and mobile phones.
July 2011	131	Mercury in broken CFL bulbs can exceed safe exposure levels for humans!
[3]	130	Conflict of Interest: The Wireless Industry and ICNIRP
	129	Health Canada confused about WHO Classification
June 2011	128	International Experts' Perspective on the Health Effects of Electromagnetic Fields (EMF) and Electromagnetic Radiation (EMR)
[5]	127	KPRD School Board silences opposition to WiFi in Schools
	126	Workers Health and Safety Centre, Radiation from Cell Phones
	125	School boards gagging dissent over WiFi, Peterborough
	124	WHO's new classification of RFR: What does this mean for Canada?

May 2011	123	May 2011: A month in review–IARC, WHO radio frequency possible human carcinogen; PACE dangers of electromagnetic fields
[2]	122	CN Tower Edgewalk: Thrill seekers may get more than they paid for. Pick of the Week 26
Apr 2011	121	Pick of the Week 25: Review of International Microwave Exposure Guidelines form 1957 to 1968
Mar 2011	120	Multiple Sclerosis and Dirty Electricity
[3]	119	Pick of the Week 24: Microwave Radiation affects the Heart
	118	Cell phones affect brain–what about cell towers?
Feb 2011	117	Cell Phone Study Warning
[9]	116	Musing #2: Truth Speaking vs Fear Mongering
	115	Musing #1: WiFi in Schools–a Ticking Time Bomb
	114	Pick of the Week 23: Research on Biological effects of Radio Frequency Radiation in Eurasian Communist Countries, 1976
	113	Pick of the Week 22: A Very Important Symposium!
	112	Pick of the Week 21: Physical Basis of Electromagnetic Interactions with Biological Systems
	111	Pick of the Week 20: Early Research on the Biological effects of Microwave Radiation: 1940-1960
	110	Pick of the Week 19: Index of Publications on Biological Effects of Electromagnetic Radiation (0-100 GHz)
	109	Oregon introduces cellphone radiation legislation
Jan 2011	108	Swiss Government's advice about Mobile Phone Use
[4]	107	Multiple Sclerosis and Electrohypersensitivity
	106	Havas Report on Smart Meters for CCST
	105	Population Control and Microwave Radiation
Dec 2010	104	Taming the Microwave Dragon
[7]	103	WiFi in Alberta Schools: A debate
	102	Science 101: Weight-of-Evidence and Weight-of Warning
	101	Canada House of Commons Microwave Radiation now Available
	100	Smart Meter Installation Challenged
	99	Are Wireless Smart Meters Safe?
	98	Pick of the Week #18: Effect of Microwaves on the Central Nervous System 1965–German translation

	97	Wireless Smart Meter Kills Plant
Nov 2010	96	School Board threatens to fine Parents and expel Students because of WiFi concerns
[9]	95	If WiFi harms trees, what about children?
	94	Wireless internet via LED "Smart" Lighting
	93	Pick of the Week #17: Power Frequency Electromagnetic Fields
	92	Brain Tumour risk and Mobile Phone use
	91	DECT Baby Monitors may be Dangerous
	90	Non-thermal Effects and Mechanisms between EMFs and Living Matter
	89	Important Review on Biological Effects of Antennas by Levitt and Lai 2010
	88	Pick of the Week #16: Russian Translation Microwave Radiation influence on Man and Animals (1970)
Oct 2010	87	New Study: Radiation from Cordless Phone Base Station affects the Heart
[6]	86	Free Fiber for Swiss Schools–WiFi Warnings
	85	Pick of the Week #15: Russian Translations on Biological Effects of Magnetic Fields and Radio Frequency Radiation.
	84	Pick of the Week #14: Proposal for Legislation: Non-ionizing Radiation (1979)
	83	Is induction Cooking Safe?
	82	Pick of the Week #13: Microwave Studies with Human Subjects, 1966.
Sept 2010	81	Open Letter to Medical Officer of Health about WiFi in Schools
[12]	80	Disconnect–The Corruption of Science
	79	Pick of the Week #12: Why Pulsed Microwave Frequencies are more Harmful.
	78	Is What Space Super WiFi Dangerous?
	77	OAHPP Comments on WiFi and Health
	76	Pick of the Week #11: Potentially Harmful Radio Frequencies used in the Packaging and Food Industry
	75	Lady Gaga–Lupus and Electrosensitivity?
	74	Pick of the Week #10: Navy Tested Microwaves on Military Volunteers

	73	Cell Phones and WiFi are Safe = Not
	72	Pick of the Week #9: 0.95 and 2.45 GHz most Lethal Microwave Frequencies
	71	WHO admits "conflicts of interest"
	70	Pick of the Week #8: Repacholi Revises Safety Code 6
Aug 2010	69	Barrie Trower speaks about Microwave Radiation
[7]	68	Real estate devalues when cell towers are erected.
	67	Pick of the Week #7: Hazards of Microwave Radiations–Review from 1960
	66	Digital portable phones affects the Heart!
	65	Pick of the Week $6: Clinical and Hygienic aspects of exposure to Electromagnetic Fields
	64	WiFi in Schools and the Health Effects of Microwaves
	63	Pick of the Week #5: Why the double standard?
July 2010	62	Study finds Vatican Radio causes cancer
[7]	61	WiFi "Laptops" affect male fertility
	60	Pick of the Week #4: Cancer Mortality near Air Force Bases
	59	Adding light to heat of WiFi debate
	58	Pick of the Week #3: 1967 EMR Review, copy 5/15
	57	Pick of the Week #2: Origins of 1966 U.S. Safety Standards for Microwave Radiation
	56	Pick of the Week #1: More than 2000 Documents prior to 1972 on Bioeffects of Radio Frequency Radiation.
June 2010	55	New iPhone 4 reception problem is good news.
May 2010	54	Lessons from the Interphone Study
[2]	53	Interphone Study: It's not just brain tumors!
April 2010	52	Moores Cancer Centre Doctor discusses cell phone tumour link
[5]	51	How to BRAG Rate your School
	50	CBC Podcast on the dangers of wireless technology
	49	BRAG School Report–Media Advisory
	48	Welcome to Planet Irth
March 2010	47	Live Blood Cells and Electrosmog
[4]	46	Diabetes and Electrosensitivity
	45	Wireless Concerns at Lakehead University

	44	Dr. Havas lectures at Total Health Show in Toronto
Feb 2010	43	From Zory's Archive
[4]	42	What do dancing cows and zapped dogs have in common?
	41	Cell phone antennas on apartment buildings?
	40	Google offers alternative to WiMax
Jan 2010	39	EM Hypersensitivity Awareness Month, Harbour Grace, NFL
[5]	38	Mobile-Boro Man
	37	Cell Phone Antennas and Cost of Electricity
	36	Open Letter–WiFi in Libraries
	35	Open Letter–WiFi in Schools (#2)
Dec 2009	34	University says "NO" to WiFi and Cellular Antennas
[6]	33	What is Dirty Electricity?
	32	Prevention exposes Dirty Electricity
	31	Dirty Electricity and GS Units
	30	Electrification causes "disease of civilization"
	29	New EMF website by Dr. Mercola
Nov 2009	28	Don't stand in front of the microwave
[8]	27	Power Line Protest
	26	Thousands turn up for the Power-Line Protest
	25	Residents Fight Proposed Power Expansion
	24	Edmonton Power Line Protest
	23	Prevention Magazine on CFL Bulbs
	22	Heart murmur and Portable Digital Phones
	21	Cell Phones & Cigarettes: What do they have in common?
Oct 2009	20	Open Letter: WiFi in Schools (#1)
[20]	19	WiFi Proposal for San Francisco
	18	Expert Testimony Broadcast Antenna
	17	Dirty Electricity in Schools
	16	Expert Testimony High Voltage Transmission Line
	15	Cell Tower Blues
	14	Mechanisms of Action, Dr. Andrew Goldsworthy
	13	Cell Transmission Towers

12	CWTI: Libby Kelley and Magda Havas
11	Conference: Holistic Health NOW, AHMA, Ohio, Nov 2009
10	Epilepsy 360 degrees
9	Electromagnetic Sensitivity Awareness Month
8	The Dark Side of CFL Bulbs
7	Dr. Martin Blank Lecture on EMF and Cancer
6	Rethink Breast Cancer
5	EHS Quiz
4	Cell Phones
3	Wind Power and Dirty Electricity
2	Conference: EMF Impacts on Human Health, Colorado, Nov 2009
1	Global TV–dirty electricity

6. YOUTUBE VIDEOS

Date uploaded	#	Title	Duration	Views
Mar 23, 2011	13	Multiple Sclerosis and Dirty Electricity (with Don Garbutt)	5:42	2.765
Jan 10, 2011	12	Conspiracy Theory: Population Control & Microwave Radiation	7:59	3,820
Jan 5, 2011	11	Taming the Microwave Dragon	7:12	41,039
Dec 23, 2010	10	Planet Irth	8:42	1,518
Oct 19, 2010	9	Microwave Radiation Dangers in your Home	6:20	205,570
Apr 27, 2010	8	WiFi in Schools and Health Effects of Microwave Radiation (with Bob Connolly & Rodney Palmer)	5:33	17,340
Mar 23, 2010	7	DECT Phone affects the Heart (with Jeff Marrongelle)	6:49	21,628
Mar 21, 2010	6	Diabetes and Electrosensitivity	7:12	43,160
Mar 21, 2010	5	Live Blood Analysis & Electrosmog	2:32	31,197
Feb 17, 2010	4	Cell Phone Antennas on Apartment Rooftops and their Health Effects (with	1:50	4,957

		Bob Connolly)		
Feb 17, 2010	3	Dancing Cows become Sick due to Ground Current on Diary Farms (with Bob Connolly)	0:32	2,527
Dec 5, 2009	2	What are GS Units? (with Ralph Frederick)	8:22	11,168
Nov, 2009	1	Cell Phones & Cigarettes: What do they have in Common?	7:39	59,881

7 VIDEO LINKS to Talks and Interviews (*incomplete list*)

Videos of some of my **talks** and **interviews** are available on the internet. Below is an incomplete list with number of views as of November 25,2011.

Date	#	Type	Title & URL	T	Views
Jul 27, 2011	17	Interview BC	Green Party Opposes BC Hydro's New Smart Meters, http://www.youtube.com/watch?v=WM9-q62Hglw	2:52	1282
Jul 19, 2011	16	Interview Toronto	Magda Havas Wylde on Health; http://www.youtube.com/watch?v=9LbQcxqf-8s	31:17	827
Jun 6, 2011	15	Interview BC	Face to Face with Dr. Magda Havas: The Dangers. http://vimeo.com/24733700	30:11	
May 31, 2011	14	Press Conference	Wireless Radiation Safety Council Press Conference, April 19, 2011, part 3, http://www.youtube.com/watch?v=6xeRWC-K1_Q	6:13	53
Apr 17, 2011	13	Talk Toronto	Unsafe Levels in Schools, http://www.youtube.com/watch?v=MQXJlMqHhvo	1:25	
			Microwaves and the Heart, http://www.youtube.com/watch?v=sv1E9IXUd6M	3:43	
Jan 14, 2011	12	Interview	Dr. Magda Havas, Wi-Fi Dangers; 16 by 9, Global, http://www.youtube.com/watch?v=Mxrjhu1R2BE	14:32	517
Nov 18, 2010	11	Talk San Francisco	Commonwealth Club, 11-18-10 Panel I-Magda Havas, PhD, http://vimeo.com/17270263	14:14	
			Panel I-Q&A http://vimeo.com/17268032	15:27	
			Panel III- http://vimeo.com/17263893	14:14	
Nov 17, 2010	10	Interview	The Concerned with Wi-Fi in Alberta Schools http://albertaprimetime.com/Stories.aspx?FlashVars=Video/PTR_111710.flv&pd=1698	14:21	
Sept 6, 2010	9	Talk, Burbank California	Wireless Dangers: Havas/Kelley 1 of 7; 1 http://www.youtube.com/watch?v=PzSDF1Q3_jk 2 http://www.youtube.com/watch?v=bbemtlMSVfk 3 http://www.youtube.com/watch?v=cjL-gpauVEg 4 http://www.youtube.com/watch?v=hpsef6fmdSg 5 http://www.youtube.com/watch?v=wbTpcnKeLcY	1-15:00 2-14:47 3-13:28 4-14:22	

			5 http://www.youtube.com/watch?v=whTpcpKeJ_Y 6 http://www.youtube.com/watch?v=Bwv1HF-5KAk 7 http://www.youtube.com/watch?v=B064tGAmmUM	5-13:04 6-13:27 7-10:55	
Aug 31, 2010	8	Interview	Wi-Fi in Schools-Chex TV-Peterborough, Ontario, http://www.youtube.com/watch?v=uEEnDwOjc7E	2:28	
Dec 30, 2009	7	Talk Colorado	EMR Magda Havas #1, Evidence of Health Harm from Electromagnetic Radiation, http://www.youtube.com/watch?v=r0yRIrN_fbY	9:23	
Dec 28, 2009	6	Talk	EMR Magda Havas #2.mov; http://www.youtube.com/watch?v=pPGINNXmOCY	9:16	
Dec 9, 2009	5	Talk	EMR Magda Havas #3.mov; http://www.youtube.com/watch?v=LcZWBF6w9Sw	8:21	
Dec 19, 2009	4	Talk	Dr. Magda Havas: The Truth about Wired and Wireless Technologies; http://vimeo.com/8283238 http://www.youtube.com/watch?v=dYjAAqUfHtE	1:29:02	
Jan 18, 2009	3	Interview	Dirty Electricity-Part 1-Rays of Rash; Global TV, 16:9, The Bigger Picture. http://www.youtube.com/watch?v=6CVLa_tRslY	8:04	57,029
Jan 18, 2009	2	Interview	Dirty Electricity-Part 2-Dirty Energy, Global TV, 16:9, The Bigger Picture, http://www.youtube.com/watch?v=A55081TOlbQ	7:17	52,951
Jul 17, 2008	1	Talk	Dr. Magda Havas: Cell/Transmission towers & your Health, http://www.youtube.com/watch?v=OmK6r0ntroE&feature=gv	59:16	

8 INTERVIEWS: TV, RADIO, NEWSPAPER *(incomplete list)*

Below is an incomplete list of interviews since 2001.

Year	Interview
2009	• Interviewed by Nigel Spence for a documentary on Wind Turbines for the BBC to be aired December 2009; Nov 2, 2009
[18]	• CBC Radio Interview, Victoria BC, Oct 6, 2009 • CFRB Radio Interview on Compact Fluorescent Light Bulbs. Sept 2, 2009 • Radio Interview with Matthew Hoffman, Aug 27, 2009 • Interview with John Maciel, July 29, 2009 • Conscious Living Radio Station, BC, July 8, 2009 • Amy Dove interview, BC, July 7, 2009 • Phone Interview regarding High Voltage Transmission Lines in Alberta. Jun 14, 2009

- CBC TV Montreal, Interview with Geeta regarding CFL bulbs. June 5, 2009
- Terri Goveia, Insurance Magazine interview on Dirty Electricity and Stray Voltage. April 28, 2009
- David Baeta, VOLT TV interview on wireless technology. March 5, 2009
- Eva Herr Radio Interview on Dirty Electricity, February 22, 2009
- Podcast Interview, Alberta, Feb 16, 2009
- Bob Lederer radio interview, Feb 14, 2009
- Patrick Timpone Radio Interview, Texas, Feb 12, 2009
- Global TV airing of interview on Dirty Electricity, 16 by 9, Feb 8, 2009
- Global TV airing of interview on RFR, 16 by 9, Jan 18, 2009
- Global TV airing of Interview on CFL Bulbs, 16 by 9, Jan 4, 2009

2006 • CHEX TV, Dirty electricity, December 4, 2006.

[18] • CBC "As it Happens", Ground Current Bill, November 16, 200

- Global TV, Ground Current, November 16, 2006.
- French documentary, dirty electricity, September 20, 2006.
- Ode Magazine with Kim Ridley, Dirty electricity and Diabetes. phone interview August 21, 2006.
- Reuters News Paper, phone interview, July 10, 2006
- French Radio, phone interview, July 4 2006.
- Chatelaine Magazine, Interview, with Maureen, May 4, 2006.
- Magazine Interview, Greek Magazine with Christina, April 18, 2006
- Book Interview with Jeffry Fawcett, phone interview, California, June 28, 2006.
- World Tonight, CHQR, Radio Interview, 20 minutes. April 3, 2006.
- Radio Interview 95.7 FM, Halifax, 1 hour interview with Bill Carr. April 3, 2006.
- Radio News 940, Radio Interview, Montreal, April 5, 2006.
- CBC Radio with Roman in Montreal, phone interview, March 30, 2006.
- Canada AM, CTV, Toronto, ON, March 29, 2006.
- Globe and Mail, Martin Middlestat, Does Power Corrupt. interview February 14 for article March 28, 2006.
- Global News, Cell Antennas and Electrical Hypersensitivity, Neil McCartney, Toronto, Ontario, January 29th, 2006.
- Wisconsin Public Radio, WiFi in the City of Milwaukee and possible health implications. January 26, 2006

2005 • Newspaper interview, The Barbados Advocate, Radiation Risks, Renee Taylor, January 19, 2005

[15] • Insight with Pam Macdonald, Transmission Lines, Rogers Cable,

Newmarket, April 6 2005

- CBC NFL Radio interview, Transformers and cancer. April 15, 2005.
- Vancouver Sun, Newspaper interview, Karen Gram, Dirty Electricity, March 8, 2005,
- Vancouver Sun, Newspaper interview, Karen Gram, Health Effects of EMFs, May 1, 2005,
- The Power Hour Radio interview, Electromagnetic Pollution, May 4, 2005.
- Insight with Pam Macdonald, Ground Current, Rogers Cable, Newmarket, April 11 2005
- Insight with Pam Macdonald, Dirty Electricity, Rogers Cable, Newmarket, June 15 2005.

- CKVR TV News, Transmission Lines, Markham, Ontario, June 20. 2005.
- Toronto Star Interview with Tyler Hamilton, Cell Phones, July 12, 2005.
- Alive Magazine interview, August 1, 2005.
- Insight with Pam Macdonald, Rogers Cable, Newmarket, October 2005.
- Toronto Star, Interview with Tyler Hamilton, Distress Signals, November 11, 2005.
- Wisconsin Public Radio, Ben Merens, Interview on Electronic Pollution with Dave Stetzer
- Fitchburg Star, Newspaper Interview with Kurt Gutknecht, Is "dirty electricity" making you sick? December 29, 2005, Vol. 30, No. 21.

2004 [5]

- Patrick Timpone Show, Radio interview with Patrick Timpone, Electrical Pollution, Austin, Texas, August 7, 2004.
- Newspaper interview, Dirty Electricity, Bangor Wisconsin, September 1, 2004,
- Radio interview, phone-in show, 3 hours, Electromagnetic Pollution you're your Health, Trinidad, November 17, 2004.
- Newspaper Interview, Trinidad, November 18, 2004.
- Jackson County Chronicle, Ken Luchterhand, Newspaper Interview, Testing the Current: Researchers look into the affects of electrical pollution on human health. Wisconsin, November 23, 2004.

2001 [1]

- Toronto Star Interview with Cameron Smith, Electromagnetic Fields in 60 Communities, September 1, 2001.

9 COURSES AT TRENT UNIVERSITY

UNDERGRADUATE COURSES AT TRENT UNIVERSITY, 1989 TO PRESENT

First Year Courses:

INTRODUCTION TO ENVIRONMENTAL ISSUES, science course for 1st year undergraduate students, 1989-2004 and 2005-present; team taught. (Course coordinator 1991-1994.)

THINKING AND LEARNING first year course, 2001-2003, course coordinator, co-taught with instructors from Psychology, Education, English, Anthropology, Native Studies, Special Needs, and Academic Skills.

Second Year Courses:

SCIENCE AND POLICY, course for 2nd year students, co-taught with Professor Stephen Bocking, 1999-2000.

DISCOVERING SCIENCE, science course for 2nd year arts students, 1992-93.

Third Year Courses:

BIOLOGICAL EFFECTS OF ELECTROMAGNETIC FIELDS science course for 3rd and 4th year students, 1995 to present.

POLLUTION ECOLOGY, environmental science course for third and 4th year students, 1994-present, co-taught with Professor Tom Hutchinson. Offered alternate years (even-numbered years)

ENVIRONMENTAL SCIENCE, for 3rd and 4th year undergraduate science students, Science Education, 1989-2008. Offered alternate years (odd-numbered years).

ENVIRONMENTAL COMMUNICATION, *(replaced Communicating Science 2003/4)* for 3rd and 4th year undergraduate science students, Science Education, 2009-present. Offered annually.

AQUATIC TOXICOLOGY, for 3rd and 4th year undergraduate students, Environmental and Resource Studies, Trent University, 1990-1991, co-taught with Professor Doug Evans.

WATER POLLUTION, for 4th year undergraduate students, co-taught with Professor Jim Buttle, 1989/90.

Forth Year Courses:

GROUP PROBLEM SOLVING, arts course for senior undergraduates, co-taught with Professor Stephen Regoczei, 1995 to 2003. Offered alternate years.

HONOURS THESIS, thesis management and communication skills for 4th year undergraduate students, 1989-present. Coordinator 2000-2004; 2011-2012

READING COURSE, various topics dealing with the environment or with education, 1989-present

Graduate Courses:

WATERSHED ECOSYSTEM GRADUATE PROGRAM, science communication for graduate students, Trent University, 1990-2003.

TECHNICAL SCIENCE WRITING, for senior graduate students, WEGP, half credit course running full year, 2003-2006.

Guest Lectures in following Trent Courses:

FIRST YEAR ENVIRONMENTAL SCIENCE, when I am not normally lecturing in this course

BIOREGIONALISM, Wadland and Whillans

HONOURS THESIS (ES401/402): four 2-hour guest lectures annually

ENVIRONMENTAL IMPACT ASSESSMENT AND ECOLOGICAL PRINCIPLES (ER308)

PHILOSOPHICAL APPROACHES TO SCIENCE (WF 500a)

ECOLOGICAL AGRICULTURE, Tom Hutchinson

WASTE MANAGEMENT, Barbara Wallace

Non-Trent Summer Course for High School Students

SHAD VALLEY SUMMER PROGRAM for exception high school students, Co-Director; Trent-Bark Lake-Shad Valley, June 1997; Co-Director again in 2005.

10 COMMITTEES

INTERNATIONAL

2011-pres	INVITED GUEST EDITOR: Special Issue *Bulletin of Science, Technology and Society*, Electrosmog, Electrosensitivity, Electrodiagnostics and Electrotherapies.
2010-pres	SCIENCE ADVISOR: Electromagnetic Radiation Research Foundation of South Africa (EMRRFSA); www.emrrfsa.org/
2006-pres.	ADVISOR: Nationaal Platform Stralingscrisico's in the Netherlands
	ADVISOR: HESE, UK
	ADVISOR: EM Radiation Trust, UK
	ADVISOR: Council on Wireless Technology Impacts
	MEMBER: International Commission on Electromagnetic Safety (ICEMS)
2004-pres.	ADVISOR: EMR Policy Institute, Marshfield Vermont.
2003-4	ADVISOR: International Association of Fire Fighters
1996-7	ADVISOR: Great Lakes Science Advisory Board Workgroup on Emerging Issues. International Joint Commission, Canada/US.
1993-96	ADVISOR: Environmental Science Program for Tribhuvan University,

	Nepal.
1988	SCIENCE ADVISOR: Public Focus; BARK (Backyard Acid Rain Kit) Program which is to be used in school across Canada and the United States.
1988	SCIENCE ADVISOR: Lakes 2000, on their Great Lakes Public Awareness Program.
1981	MEMBER: Forest Sub-Committee, US/Canada Scientific Committee on Acid Rain, Huntington Forest, N.Y., September 1-3, 1981.
1980	ADVISOR: Acid Rain Coalition, Joint US/Canadian Committee on Acid Rain, Michigan 1980.
1978	CO-ORGANIZER (with T.C. Hutchinson): NATO Advanced Institute Workshop on Effects of Acidic Deposition on the Terrestrial Ecosystem, Toronto, May 21-25, 1978.

NATIONAL

2010-pres.	CO-FOUNDER: Electro Sensitive Society, www.electrosensitivitysociety.com ADVISOR: Citizens for Safe Technology Society, www.citizensforsafetechnology.org
2009	RETA, Responsible Electricity Transmission for Albertans, Edmonton Alberta, November 2009
2006-pres.	CO-FOUNDER and ADVISOR: WEEP Initiative, Canada. www.weepinitiative.org
2005	Adviser, SWEEP (Safe Wireless Electrical and Electromagnetic Policy), July 2005
2002	PEI, Cell Phone Towers, May 2002
2002	REVIEWER: National Policy Research Awards.
1993-1998	ASSOCIATE DIRECTOR: KEY Foundation (Knowledge of the Environment for Youth).
1991-1993	EDITOR: *KEYnotes*, Environmental Newsletter sent to 17,000 educators across Canada.
1988	SCIENCE ADVISOR: Trees for Today and Tomorrow on their Tree-Decline School Program
1988	SCIENCE ADVISOR: Boy Scouts of Canada on their Tree-Decline Program
1985-1993	DIRECTOR: KEY Foundation (Knowledge of the Environment for Youth).
1988-1990	MEMBER: Science and Technology Advisory Committee, CBC.
1987	COORDINATOR: Twenty-Second Canadian Symposium on Water Pollution Research, University of Toronto, February 19, 1987.

PROVINCIAL

2011-present	MEMBER: Expert Working Group on Ground Current, Ontario Ministry of the Environmental
2006	ADVISOR: Private Member's Bill, Ground Current Pollution Act, Mpp2006.080.e5-CW in Ontario.
2005	TRAHVOL, Tsawwassen Residents Against Higher Voltage Overhead Lines, Vancouver, BC. October 2005
2004	Adviser, STOP (Stop Power lines Over People), Markham, Ontario
1988-1990	MEMBER: Environmental Appeal Board, Ontario.

LOCAL

1999-2004	EDITOR: View from Trent, in cooperation with the Peterborough Examiner, fortnightly column written by Trent Faculty. See end of this section for list of articles.
1998, 2000	JUDGE: Science Fair, Trent University, Peterborough, ON.
1996	MEMBER: Co-ordinating Committee, Conference on Environmental Health and Alternative Medicine.
1992	EVALUATOR: Science Fair Competition, Peterborough.
1989-1991	MEMBER: Peterborough Committee on Sustainable Development, Mayor's Committee.

TRENT UNIVERSITY (incomplete list)

2011-12	Student Awards, ERS
2010-11	Hill Tenure Committee, ERS
	Student Awards, ERS
2008-9	Curriculum Committee, ERS
	Hill Probationary Reappointment Committee, ERS
	Merit Committee, ERS
	Student Awards, ERS
	Website Committee, ERS
2002-pres	MEMBER: Institute for Health Studies (now Centre for Health Studies)
2002-3	CHAIR: Senate Budget Subcommittee on Graduate Studies
2002-3	MEMBER: Senate Budget Subcommittee, Trent University
2002-3	MEMBER: Senate, Trent University
2002	MEMBER: Management Committee, Oliver Ecological Centre
2002	CO-ORDINATING TEAM: Simply Water? Workshop, Trent

	University, Peterborough, On, February 18-20, 2002
2000-04	MEMBER: Interactive Learning Centre (ILC)
2000-01	MEMBER: Search Committee for Chair of ERS Program
2000-01	MEMBER: COTTL
2000-01	MEMBER: Indigenous Environmental Studies Program (IESP) Steering Committee
2000	ORGANIZER: David Shepperd Family Lecture Series with Dr. Sheela Basrur, Medical Officer of Health, Toronto and later Ontario.
1995-97	Board of Governors
	Board of Governors-Development Committee
	Senate
	Faculty Council Steering Committee
	Faculty Board
	WEGP--ERS Representative
	ERS REPRESENTATIVE: Arctic College
1994-2000	MEMBER: Health Research Group Health Research Group
1994-97	Trent International Program Committee
1996	Trent International Program--Recruitment
1995-97	MEMBER: Board of Governors, Trent University.
1995-2004?	CO-FOUNDER and MEMBER: TAcTIC, Trent Academic Technological Innovation Centre
1994-2002	MEMBER: Health Working Group, Trent University
1994-98	CO-ORDINATOR: Energy Fields Working Group, Trent University
1994	MEMBER: PEAC, President's Environmental Advisory Committee
	MEMBER: Tenure Committee for Raul Ponce, ERS Program
	MEMBER: Search Committee for Director of WEGS Program
	MEMBER: Search Committee for Chair of ERS
	MEMBER: PPP-CMT, Computer and Technology for Teaching Committee
1992-1994	MEMBER: Senate, Trent University
	MEMBER: Board of Governors, Trent University
	MEMBER: President's Advisory Environmental Committee
1992-pres	MEMBER: ERS Personnel Committee
1991-92	MEMBER: Adjusting our Focus Forum, Teaching Methods Subcommittee
1991-1993	MEMBER: Chemistry, First Year Courses Committee
	COORDINATOR: Library Acquisitions for Environmental & Resources Studies.
	COORDINATOR: Environmental Resource Centre

1990-93	MEMBER: Committee on Educational Development, (originally known as the Teaching Effectiveness Committee), Trent University Committee
	MEMBER: Visitors Committee, Lady Eaton College
1990-92	COORDINATOR: BEGIN newsletter
1990	COORDINATOR: Science in Developing Countries, Trent International Program, Trent University, Peterborough, Ontario, March 2 to 30.
1989-pres.	MEMBER: Watershed Ecosystem Graduate Program.
1989-94	COORDINATOR: Library Acquisitions for Science Education.
1989-93	COORDINATOR: Library Acquisitions for Science Education.
1989-90	MEMBER: Admissions and Scholarships

UNIVERSITY OF TORONTO

1985-87	COORDINATOR: Drinking Water Working Group (DWWG), Institute for Environmental Studies, University of Toronto.
1986-89	COORDINATOR: Ecology Seminar Series, Institute for Environmental Studies, University of Toronto.
1983-89	MEMBER: Acid Rain Working Group, Institute for Environmental Studies, University of Toronto.
1983-89	MEMBER: Metals Working Group, Institute for Environmental Studies, University of Toronto.
1983-89	MEMBER: Forest Decline Working Group, Institute for Environmental Studies, University of Toronto.
1987-89	MEMBER: Research Advisory Committee, Faculty of Forestry, University of Toronto.
1987	MEMBER: Graduate Studies Advisory Committee, Faculty of Forestry, University of Toronto.

11 INITIATIVES IN TEACHING AND & COMMUNITY OUTREACH

2002-4	EXECUTIVE EDITOR: Trent Times, Newspaper of the Trent University Faculty Association
2000-4	COORDINATOR: SPARK, NSERC funded program for student writing about research
1997	DESIGNER: Trent Research Map indicates research of Trent faculty around the globe. Also indicates where students come from (International Program)

1996	MEMBER: TacTic, Trent Academic Technological Innovation Centre, to design educational software and other educational initiatives
1994-6	COORDINATOR: Energy Fields Working Group brought together members of the Peterborough Community with Trent faculty and students to discuss energy fields. Meetings held every other month.
1992	PRINCIPLE INVESTIGATOR: Design, Development and Marketing of Education Software DDAMES; computer program development designed to enable students to interact with the virtual world and solve environmental problems.

12 REVIEWER: GRANTS AND MANUSCRIPTS

2010	The American Journal of Medical Sciences,
2008	Parlar Scientific Publications, Fresenius Environmental Bulletin, Germany,
2008	Acta Pharmacologica Sinica,
2007	British Medical Journal, London
1995	Rutledge Press,
1992	Environmental Reviews,
1986	International Association on Water Pollution Research and Control,
1985	Water, Air and Soil Pollution,
1985	Hydrobiologia,
1985	Canadian Journal of Zoology,
1984	Environmental Science and Technology,
1984	Canadian Journal of Fisheries and Aquatic Sciences,
1982	Science,
1981	National Science Foundation, (Grant Reviewer)

13 ENVIRONMENTAL ORGANIZATIONS

I am Co-founder of the **WEEP Initiative** and **the Electrohypesensitivity Society**. Both are non-profit organizations dedicated to helping people who have developed electrohypersensitivity.

I am Co-founder and Past President of the **Uxbridge Conservation Association,** which is a local non-profit organization aimed to promote a deeper understanding of and a greater appreciation for the natural environment and agricultural land. This group act as a liaison between government and local citizens, they organize lectures and field trips, they also co-ordinate projects within our community that contribute to a cleaner, safer, healthier environment for people and wildlife (1988-1991).

I was a member of the Board of Directors of the **KEY** (Knowledge of the Environment for Youth), which is a non-profit organization dedicated to educational excellence in Canada (1985-1994). One of our projects is the *Chemical Literacy Series,* which is aimed at promoting a better understanding of chemicals in the environment and is intended for teachers (kindergarten to high school) and their students across Canada. We organize workshops for teachers and co-ordinate the production of classroom material. In 1992 I became editor of *KEYnotes*, an environmental newsletter that is sent to every school in Canada (13,000) 3 times during the academic year.

14 VOLUNTEER WORK

I taught a Creative Writing course called *Writing Your Memoirs* to Senior Citizens through **Community Care** in Uxbridge (1988-92). In 1990 we wrote a "book" called *Capturing Memories*, and in 1991 we wrote a children's book. The Seniors have continued and have written several more books. They regularly contribute articles to the local newspaper (*Uxbridge Times*); give guest workshops in the Uxbridge High School; visit homes for senior citizens and read form their stories; give advice to other senior groups wanting to start a writers' group; and have appeared on *CBC Ideas*.

I also worked with chronically ill patients in the **Uxbridge Cottage Hospital** (1988-1991).

15 OTHER

For 18 years I lived on a farm and raised heritage breeds (rare in Canada of sheep (Cotswolds), pigs (British Large Black); and chickens (several breeds) along with non-heritage breeds of ducks, geese, and donkeys. We were members of the Rare Breeds Conservancy of Canada and helped maintain important and dwindling pools of genetic diversity of farm animals.

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E-Mail: twbpc@pcez.com
Local Counsel for Plaintiffs

United States District Court

District of Oregon

Portland Division

Alexandra Helene Morrison, by and through her Guardian *ad litem* and father, David Mark Morrison**,** and **David Mark Morrison**, individually,

v.

Portland Public Schools,

Defendant.

Civil Action No.

Declaration of Dr. David O. Carpenter, M.D.

I, Dr. David O. Carpenter, M.D., under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of a preliminary and permanent injunction enjoining Portland Public Schools' use of WI-FI:

1. I am a public health physician, educated at Harvard Medical School. My current title is Director of the Institute for Health and the Environment at the University at Albany and Professor of Environmental Health Sciences within the School of Public Health. Formerly, I was the Dean of the School of Public Health at the University of Albany and the Director of the Wadsworth Center for Laboratories and Research of the New York State Department of Health.

2. I served as the Executive Secretary to the New York State Powerlines Project in the 1980s, a program of research that showed children living in homes with elevated magnetic fields coming from powerlines suffered from an elevated risk of developing leukemia. After this I became the spokesperson on electromagnetic field (EMF) issues for the state during the time of my employment in the Department of Health. I have published several reviews on the subject and have edited two books.

3. I am a Co-Editor and a Contributing Author of the *BioInitiative: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)*, www.bioinitative.org. It documents bioeffects, adverse health effects and public health conclusions about impacts of non-ionizing radiation (electromagnetic fields including extremely-low frequency ELF-EMF and radiofrequency (RF) /microwave or RF-EMF fields). The public health chapter from this report was subsequently published in a peer reviewed journal.

4. Additionally, I am a Co-Author of *Setting Prudent Public Health Policy for Electromagnetic Field Exposures*, Reviews on Environmental Health, Volume 23, No. 2, 2008, attached as Addendum A-2.

5. In addition, in 2009, I was invited to present to the President's Cancer Panel on the subject of powerline and radiofrequency fields and cancer, and have testified on this issue before the Unite States House of Representatives.

6. I am a public health physician who has been involved in issues related to EMF for a number of years.

7. It is generally accepted within the relevant scientific community and has been established beyond any reasonable doubt that many bioeffects and adverse health effects occur at far lower levels of RF exposure than those that cause measurable heating; some effects are shown to occur at several hundred thousand times below the existing public safety limits, which are set based on the fallacious assumption that there are no adverse health effects at exposures that do not cause easily measureable heating.

8. Exposure to EMF has been linked to a variety of adverse health outcomes. The health endpoints that have been reported to be associated with ELF and/or RF include childhood leukemia, adult brain tumors, childhood brain tumors, genotoxic effects (DNA damage and micronucleation), neurological effects and neurodegenerative disease (like ALS and Alzheimer's), immune system disregulation, allergic and inflammatory responses, breast cancer in men and women, miscarriage and some cardiovascular effects. The strongest evidence for adverse health effects of EMFs comes from associations observed in human populations with two forms of cancer: childhood leukemia and chronic lymphocytic leukemia in occupationally exposed adults.

9. There is also strong evidence for elevated risk of brain cancer followed long use of cell phones, but only on the side of the head where the cell phone is used regularly.

10. There is suggestive to strongly suggestive evidence that RF exposures may cause changes in cell membrane function, cell communication, metabolism, activation of proto-oncogenes, and can trigger the production of stress proteins at exposure levels below current regulatory limits. Resulting effects can include DNA breaks and chromosome aberrations, cell death including death of brain neurons, increased free radical production, activation of the endogenous opioid system, cell stress and premature aging, changes in brain function including memory loss, retarded learning, performance impairment in children, headaches and fatigue, sleep disorders, neurodegenerative conditions, changes in immune function (allergic and inflammatory responses), reduction in melatonin secretion and cancers.

11. There is also strong and consistent evidence for increased risk of leukemia in individuals who live near to high power AM radio transmission towers. This is particularly relevant because like WI-FI, radio transmission towers give continuous whole body radiation, not just to the head. In addition WI-FI transmitters are indoors, where children may be very close to them.

12. Like second-hand smoke, EMF is a complex mixture, where different frequencies, intensities, durations of exposure(s), modulation, waveform and other factors are known to produce variable effects. *Many years of scientific study has produced substantial evidence that EMF may be considered both carcinogenic and neurotoxic*.

13. Sources of concern include, but are not limited to, power lines, cell and cordless phones, cell towers, Portland Public Schools' WI-FI, WiMax and wireless internet.

14. Based on existing science, many public health experts believe, myself included, that it is possible we will face an epidemic of cancers in the future resulting from uncontrolled use of cell phones and increased population exposure to WI-FI and other wireless devices. Thus it is important that all of us, and especially children, restrict our use of cell phones, and limit exposure to background levels of WI-FI.

15. Children are more vulnerable to RF fields because of the susceptibility of their developing nervous systems. RF penetration is greater relative to head size in children, and they have a greater absorption of RF energy in the tissues of the head at WI-FI frequencies because their skulls area thinner, their brains are smaller, and their brain tissue is more conductive than that of adults since it has a higher water content and ion concentrations. The Presidential Cancer Panel found that children 'are at special risk due to their smaller body mass and rapid physical development, both of which magnify their vulnerability to known carcinogens, including radiation.'

16. The exposure of children to RF has not been studied extensively, although one study from Sweden reports that regular use of a cell phone by children increases risk of development of brain cancer by a factor five times greater than that observed in adults. However, the FCC standards for exposure to radiofrequency radiation are based on the height, weight and stature of a 6-foot tall man, not scaled to children or adults of smaller stature. They do not take into account the unique susceptibility of growing children to exposures. Moreover, there is clear and strong evidence that intensive use of cell phones increases the risk of brain cancer, tumors of the auditory nerve, and cancer of the parotid gland, the salivary gland in the cheek by the ear. WIFI uses similar radiofrequency radiation (1.8-2.5 to 5.0 GHz), although the intensity of exposure in the immediate environment is much lower than what one gets from holding a cell phone close to their head. The difference between a cell phone and a WI-FI environment, however, is that while the cell phone is used only intermittently a WI-FI environment is continuous. In addition WI-FI transmitters are indoors, where children may be very close to them. Because radiation is the same as those for cell phones, there is every reason to assume that the health effects would be the same, varying only in relation to the total dose of radiation. There is evidence from Scandinavian studies of cell phone usage that children who use cell phones are about five times more likely to develop brain cancer than if use starts as an adult. Thus, it is especially important to protect children.

17. There is reason to believe that children are susceptible to the effects of EMF exposure since they are growing, their rate of cellular activity and division is more rapid, and are at more risk for DNA damage and subsequent cancers. Growth and development of the central nervous system is still occurring well into the teenage years so that neurological changes may be of great importance to normal development, cognition, learning, and behavior. Prenatal exposure to EMF has been identified as a risk factor for childhood leukemia. Children are largely unable to remove themselves from exposures to harmful substances in their environments. Their

exposure is involuntary.

18. When WI-FI is installed in a school, children and their parents have no choice but to allow the school to expose themselves/their children. In fact, the children will be exposed to as much as 30-40 hours per week of constant digitally encoded WI-FI signals from each wireless device in the child's vicinity. Based upon are review of the Mount Tabor WI-FI Floor Plan, a given child is subject to direct signals from multiple WI-FI transmitters and rooms full of students transmitting numerous laptop or other wireless signals. There is a major difference between an exposure that an individual chooses to accept and one that is forced on an individual who can do nothing about it, especially a child.

19. In biology and medicine there is nothing that is 100 percent proven. We rely on statistical significance and weight of evidence when drawing conclusions about health effects. When one uses these definitions there is strong scientific evidence for adverse health effects of WI-FI in humans.

20. The evidence for adverse effects of radiofrequency radiation is currently strong (beyond just a known controversy) and grows stronger with each new study. Educating by way of the internet via cabled systems does not increase exposure.

21. Based on a high degree of medical certainty, Portland Public Schools' use of WI-FI is causing and will continue to cause Alexandra Morrison, other students, and school staff and faculty adverse health effects and should be discontinued immediately.

Dated this 1st day of June, 2011.

/s/ David O. Carpenter, M.D.

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United States District Court

District of Oregon

Portland Division

AHM, by and through
her Guardian *ad litem* and father,
David Mark Morrison**,** and
David Mark Morrison, individually,

v.

Portland Public Schools,

Defendant.

Civil Action No. 3:11-cv-00739-MO

Declaration of
Dr. Andrew Goldsworthy, BSc, PhD

I, Dr. Andrew Goldsworthy, BSc, PhD, under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of an injunction against Portland Public Schools' use of WI-FI:

1. After a conventional Grammar School education, I obtained a First Class Honors Degree in Botany followed by a PhD for research into plant physiology and biochemistry at the University of Wales.

2. I went on to lecture in biology at Imperial College London, where I spent the rest of my career. I have had many teaching and research interests, ranging from the biochemistry of photorespiration to the biology of space flight. I retired in 2004, but remain as an honorary lecturer.

3. I was also a scientific advisor to the European Space Agency and continue to be a scientific advisor to several European charities whose work pertains to relationships between the environment and electromagnetic fields and radiation, including the Bio Electromagnetic Research Initiative, the Radiation Research Trust, and Electrosensitivity-UK.

4. I have always had a strong interest in how living organisms use internally generated electric currents to control their growth and metabolism, and in their disruption by externally applied currents, fields and radiation.

5. In my retirement, I have synthesized information from a wide range of scientific journals and created simple layperson's explanations of how weak electromagnetic fields affect us all. The first of these can be found at: http://tinyurl.com/2nfuj j.

6. I will receive no compensation for my testimony beyond out-of-pocket expenses.

7. **Modern Studies**. There are a number of modern studies that explain that describe the sorts of damage that can occur, e.g. as a result of the peroxidation of polyunsaturated lipids in cell membranes and changes to the nucleic acid metabolism of cells by modulated microwave radiation such as that from cellphones and Wi-Fi. Many describe visible or detectable damage to a wide variety of components in living cells, including DNA. Others describe epigenetic changes in which the existing DNA is modified by keeping the normal base sequence but adding chemical structures to alter its normal function. These alterations survive normal cell division and may even be passed on to subsequent generations. Just how harmful they are remains to be

seen but I would strongly advised the application of the precautionary principle and not to take the risk.

a) Examples of molecular effects caused by cell phone radiation

i. Ozgur, E., G. Güler, et al. (2010). "Mobile phone radiation-induced free radical damage in the liver is inhibited by the antioxidants n-acetyl cysteine and epigallocatechin-gallate." *International journal of radiation biology*(00): 1-11.

ii. Gutteridge, J. and X. C. Fu (1981). "Enhancement of bleomycin-iron free radical damage to DNA by antioxidants and their inhibition of lipid peroxidation." *FEBS letters* **123**(1): 71.

iii. Yan, J. G., M. Agresti, et al. (2009). "Qualitative Effect on mRNAs of Injury-Associated Proteins by Cell Phone Like Radiation in Rat Facial Nerves. *Electromagnetic Biology and Medicine* **28**(4): 383-390.

iv. Yan, J. G., M. Agresti, et al. (2008). "Upregulation of specific mRNA levels in rat brain after cell phone exposure." *Electromagnetic Biology and Medicine* **27**(2): 147-154.

v. Simbürger, E., A. Stang, et al. (1997). "Expression of connexin43 mRNA in adult rodent brain."*Histochemistry and cell biology* **107**(2): 127-137.

vi. Chen, J., H. C. He, et al. (2010). "Effects of Pulsed Electromagnetic Fields on the mRNA Expression of RANK and CAII in Ovariectomized Rat Osteoclast-Like Cell." *Connective Tissue Research* **51**(1): 1-7.

vii. Currenti, S. (2009). "Understanding and Determining the Etiology of Autism." *Cellular and Molecular Neurobiology* **30**(2): 161-171.

viii. Tice, R. R., G. G. Hook, et al. (2002). "Genotoxicity of radiofrequency signals. I. Investigation of DNA damage and micronuclei induction in cultured human blood cells." *Bioelectromagnetics*, **23**(2): 113-126.

ix. Lerchl, A. (2009). "Comments on "Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes" by Schwarz et al. (Int Arch Occup Environ Health 2008: doi: 10.1007/s00420-008-0305-5)." *Int Arch Occup Environ Health* **82**(2): 275-278.

x. Vijayalaxmi and T. J. Prihoda (2009). "Genetic damage in mammalian somatic cells exposed to extremely low frequency electro-magnetic fields: a meta-analysis of data from 87 publications (1990-2007)." Int J Radiat Biol **85**(3): 196-213.

xi. Sannino, A., M. Sarti, et al. (2009). "Induction of adaptive response in human blood lymphocytes exposed to radiofrequency radiation." *Radiat Res* **171**(6): 735-742.

b. **DNA repair disruption**:

i. Brusick, D., R. Albertini, et al. (1998). "Genotoxicity of radiofrequency radiation. DNA/Genetox Expert Panel." *Environ Mol Mutagen* **32**(1): 1-16.

ii. Belyaev, I. Y., E. Markova, et al. (2009). "Microwaves from

UMTS/GSM mobile phones induce long-lasting inhibition of 53BP1/gamma-H2AX DNA repair foci in human lymphocytes."*Bioelectromagnetics* **30**(2): 129-141.

iii. Sun, L. X., K. Yao, et al. (2006). "[Effect of acute exposure to microwave from mobile phone on DNA damage and repair of cultured human lens epithelial cells in vitro]." *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* **24**(8): 465-467.

c. **Micronuclei formation** - When DNA becomes fragmented inside the cytoplasm, some fragments are not able to recombine properly. Those fragments that can often function well enough, form a membrane around themselves called micronuclei. However, when the cell divides they are usually lost and the daughter cells will be genetically incomplete and probably lose their normal function.

d. **Immune response suppression**:

i. Lyle, D. B., P. Schechter, et al. (1983). "Suppression of T-lymphocyte cytotoxicity following exposure to sinusoidally amplitude-modulated fields." *Bioelectromagnetics* **4**(3): 281-292.

ii. Elekes, E., G. Thuroczy, et al. (1996). "Effect on the immune system of mice exposed chronically to 50 Hz amplitude-modulated 2.45 GHz microwaves." *Bioelectromagnetics* **17**(3): 246-248.

iii. Dabala, D., D. Surcel, et al. (2008). "Oxidative and Immune Response in Experimental Exposure to Electromagnetic Fields." *Electromagnetic field, health and environment:*

proceedings of EHE'07: 105.

iv. Surcel, D., D. Dabala, et al. (2009). "Free Radicals, Lipid Peroxidation and Immune Response in Experimental Exposure to Electromagnetic Fields." *Epidemiology* **20**(6): S118.

v. A 2011 study by Buchner and Eger found that, after the activation of a PM MW radiation-emitting base station, the levels of the stress hormones adrenaline and noradrenaline increased significantly during the first six months; the levels of the precursor dopamine decreased substantially. In children, the decrease was somewhat more pronounced than in adults. The initial levels were not restored even after one and a half years. As an indicator of the dysregulated chronic imbalance of the stress system, the phenylethylamine (PEA) levels dropped significantly until the end of the study period. The effects showed a dose-response relationship and occurred well below current limits for technical RF radiation exposures. Chronic dysregulation of the catecholamine system has great relevance for health and is well known to damage human health in the long run.

vi. In 2010, Augner *et al.* found that that pulse-modulated RF/MW radiation in considerably lower field densities than FCC guidelines can influence salivary cortisol, alpha amylase and immunoglobin A. They point out supportive findings of a "whole cascade" of biochemical reactions (Friedman 2007) from induction of transcription and other cellular processes to proliferation with such

exposure. Schwartz et al (2008) showed that PM MW radiation at 1.95 GHz could cause genetic alterations in human cells in vitro. They and others observed a significant increase in comet tail factor and centromere-negative nuclei in human cultured fibroblasts, chromosomal instabilities, genotoxic effects, double-strand DNA breaks and effects on the blood-brain barrier. These could lead to severe health consequences.

vii. A 2011 study shows that children's bodies are more sensitive than adults', and conclude that there are serious harmful effects on cognitive, memory, and other functions in children who are exposed to PM MW radiation by the use of wireless communications devices. Khorseva N. I.

Mechanisms

8. Many people suffer immediately or in the short- or long-term one or more of a wide variety of symptoms when exposed to weak, radiofrequency (RF) radiation, including microwave (MW) radiation, including that from laptops and Wi-Fi.

9. I will explain just how these effects can arise, and virtually all of them share a common mechanism. The evidence fits together and leaves little doubt that the majority of the reported effects are real and must be taken seriously.

10. I have researched the frequently reported effects of RF/MW electromagnetic fields to see if there are any underlying threads that may indicate a common mechanism and then to try to change the characteristics of the signal to minimize these effects. The most important is due to effects on calcium efflux from cell membranes. These include cognitive impairments, early dementia, multiple allergies, DNA fragmentation, loss of fertility, increased cancer risk, and electromagnetic hypersensitivity.

Calcium Efflux Effects

11. Most of the damage done by digital telecommunications is not due to heating but rather by the electrical effect their pulsating signals have on living tissues, which occurs at much lower energy levels.

12. The human body can act as an antenna; and the signals from external RF/MW radiation make electric currents flow through the body in time with the pulsations. It is these that do the bulk of the damage, by destabilizing the delicate membranes that surround each cell and which also divide it into internal compartments such as mitochondria (the energy factories of the cell), and the lysosomes (the cell's recycling factories).

13. All of these membranes are just two molecules thick and have a similar basic structure. They are liquid crystals, made largely of negatively charged molecules (which repel one another) stabilized by divalent positive ions (mostly calcium) that sit in between them by mutual attraction and hold them together like mortar holds together the bricks in a wall.

14. It was first shown by Bawin *et al.* in the 1970s that weak, amplitude-modulated (AM) radio waves, where the strength of the signal rises and falls in modulation at low frequencies, could remove some of this calcium from brain cell membranes. This destabilizes these membranes and makes them more likely to leak. The effects are strongest with modulation in the extremely low frequency (ELF) range and in radio waves that have been amplitude-modulated with ELF. Pulse-modulation is an extreme form of amplitude modulation, where the signal goes entirely off for a short period of time, resulting in bursts of energy.

15. The low-frequency pulsations of Wi-Fi infrastructure and Wi-Fi laptops will behave in much the same way upon biologic tissues. This is important in the brain, because the normal function of brain cells depends on the controlled passage of specific ions through their membranes. When these membranes leak, ions flow through them in a relatively uncontrolled way, which results in brain hyperactivity and may cause result in attention deficit hyperactivity disorder (ADHD) in some people. When this occurs in the brain of a fetus or young child, it

prevents normal brain development, which may result in autism (http://mcs-america.org/june2011pg2345.pdf), as discussed further below. Wi-Fi should therefore be considered as an impediment rather than an aid to learning and may be particularly hazardous for children and pregnant teachers.

Modulation

16. In theory, unmodulated radio and microwaves should not release calcium from cell membranes; because there is not enough time to replace the calcium with another ion before the field reverses. However, as shown by Bawin *et al*. (1975) calcium release does occur if the RF/MW signal is modulated at biologically-active low frequency, which suggests that living cells can demodulate it. The simplest way to demodulate a signal is to rectify it. Living cell membranes contain countless voltage-gated ion channels that open only when voltage across the cell membrane reaches a pre-determined value. These can rectify low-frequency signals but, because they require the mechanical opening and shutting of the channels, cannot work at MW frequencies. However, any ion channel, provided it is open at all, should be able to rectify, even at MW frequencies, due to the presence of the membrane potential. The membrane potential is a natural voltage of the order of 100mV across living cell membranes, which gives a voltage gradient of about 10 million volts per meter along each ion channel (which is about 10nm long). This voltage gradient gives the channel different electrical properties in either direction. In effect, the whole membrane behaves as an array of point contact Schottky diodes, which allows even MW signals to be rectified and demodulated. The extracted low frequencies then appear across the membrane, where they can do most damage. This principle has been nicely illustrated by the construction of a complete radio set from a single carbon nanotube having a similar diameter to an ion channel (see http://tinyurl.com/m4u75o). When a voltage gradient was applied along the tube it could both **amplify** and **demodulate** a radio signal, even at MW frequencies. We should therefore not be surprised to find that the human body can extract biologically active and potentially damaging low frequencies from weak Wi-Fi

radiation and that such radiation, when continued throughout the school day, and perhaps overnight at home, presents a serious threat to many children.

Consequences of Leaky Cell Membranes

17. **Immediate Effects on the Blood Brain-Barrier** – The brain is separated from the bloodstream by a barrier in which the gaps between the cells are normally sealed by 'tight junctions,' which prevent unwanted materials entering the brain. Exposure to pulse-modulated MW radiation, such as WI-FI deploys, can breach this barrier to allow toxic materials such as albumin in the blood to enter, which can kill neurons (Salford *et al*. 2003). Prolonged exposure will cause progressive brain damage and may be partly responsible for the increase in early dementias and Alzheimer's Disease. This could be due to these materials leaking through perforated cell membranes or to an opening of the tight junctions themselves.

18. **Effects on Metabolism** – The concentration of calcium in the cytosol (the main part of living cells) is extremely low, usually much lower then that outside. If the external membrane leaks, free calcium enters the cell, where it has many effects on metabolism. It may stimulate growth and repair (which may account for the apparent short-term beneficial effects of certain electromagnetic fields) but can also initiate several stress responses and inhibit cell growth.

19. **Cardiac Arrhythmia** – The heart muscle contracts in response to a wave of electrical activity passing through it, which is what we see in an electrocardiogram. This is generated by an ordered exchange of ions across its cell membranes. When these membranes leak as a result of electromagnetic exposure, this electrical wave becomes weakened and disordered, which can result in cardiac arrhythmia and risk of a heart attack. It is not surprising that the introduction of Wi-Fi into public schools has seen a concomitant increase in reports of cardiac irregularities in children.

20. **Effects on Allergies** – There are similar tight junction barriers protecting all of our body surfaces, including the skin (in the *stratum granulosum*[1]) and the linings of the lungs, nose and gut. These normally stop foreign chemicals and allergens entering the body, but if electromagnetic radiation were to open these barriers too, it could explain the current increase in a variety of illnesses, including asthma showing increasing asthma risk, multiple allergies, autoimmune disorders such as multiple sclerosis, and multiple chemical sensitivities. More recently, this has been confirmed by a 2011 study showing an increased risk of asthma in children born to mothers exposed to magnetic fields (Li et al. 2011) More on these, including references is discussed in my paper, *The Cell Phone and the Cell: the Role of Calcium*, Goldsworthy, A. (2008) (I hereby adopt and incorporate herein the findings in this paper) http://www.hese-project.org/hese-uk/en/papers/cell_phone_and_cell.pdf. Calcium release is probably involved in these effects, since low external calcium or EGTA (a substance that removes calcium ions from surfaces) increase the permeability of respiratory epithelia to ions and particles as large as viruses.

21. **Effects on the Skin** – If many cells leak some of their contents into the surrounding matrix, it will cause inflammation which is a normal response to cellular damage. The redness is due to an increased blood supply needed to effect a repair and it also activates the immune system in an attempt to fight of possible pathogenic attack. Rashes of this sort have frequently been associated with electromagnetic exposure and radiation from some computer screens. When it occurs, it is a clear indication of cellular damage has and raises the possibility that there may be further but less obvious damage to the cells. Anyone suffering this should

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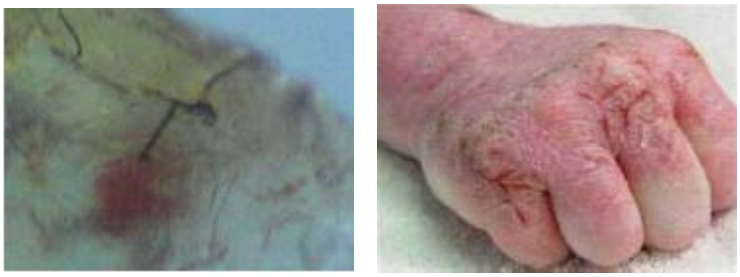


[1] Michrowski, A., *Electromagnetic fields: High-level microwave technology concerns*, 2011, http://media.withtank.com/42391c31ef.pdf.

immediately take steps to minimize his exposure since it seems to get worse with repeated exposures.

22. **Effects on hormones** - Of particular interest is the Eskander 2011 study, in that it showed a **highly significant** reduction in both T3 and T4 (thyroid) hormones after prolonged exposure to cell phone base station RF/MW radiation, which is similar to, but by way of exposure levels, not quite as harmful as school WI-FI radiation. This would be expected to result in hypothyroidism, the main symptoms of which are fatigue and obesity. Indeed, society's almost universal exposure to such RF/MW radiation could be held **responsible, at least in part, for the current epidemic of what is often diagnosed as chronic fatigue syndrome and obesity.** Obesity in itself is associated with many other illnesses such as diabetes, cardiac conditions, kidney failure and cancer. Members of the public might find it particularly galling to be told that obesity (which may result in having to go on a lifelong diet) is their entire fault for eating too much, when a considerable amount of the blame for it lies with the telecommunications industry.

Autism

23. **What is Autism** - Autism is a group of life-long disorders (autistic spectrum disorders or ASD) caused by brain malfunctions and is associated with subtle changes in brain anatomy (see Amaral *et al*. 2008 for a review). The core symptoms are an inability to communicate adequately with others, abnormal social behavior, with poor verbal and non-verbal communication, unusual and restricted interests, and persistent repetitive behavior. There are also non-core symptoms, such as an increased risk of epileptic seizures, anxiety, and mood disorders. ASD has a strong genetic component, occurs predominantly in males and tends to run in families; however, it can also be induced by environmental factors after birth.

24. **Genetic ASD may be caused by calcium entering neurons** - Some genetic forms of ASD can be accounted for by known mutations in the genes for ion channels that result in an increased background concentration of calcium in neurons. This would be expected to lead

to neuronal hyperactivity, the formation of sometimes unnecessary and inappropriate synapses, which in turn can lead to ASD (Krey and Dolmetsch 2007).

25. **Electromagnetic fields let calcium into neurons** - There has been a 60-fold increase in ASD in recent years, which cannot be accounted for by improvements in diagnostic methods and can only be explained by changes in the environment. This increase corresponds in time to the proliferation of mobile telecommunications, Wi-Fi, and microwave ovens as well as extremely low frequency fields (ELF) from mains wiring and domestic appliances. We can now explain this in terms of electromagnetically-induced membrane leakage leading to brain hyperactivity and abnormal brain development. The most potent source of such environmental exposure, in terms of frequencies, power densities and durations to a schoolchild with Wi-Fi at his or her school would be the compulsory, continuous and close range radiation from the school system.

26. **RF/MW radiation makes cell membranes leak -** As mentioned previously, an effect of RF/MW radiation is to generate small, alternating voltages across the cell membranes, which destabilize them and make them leak. This can have all sorts of consequences, as unwanted substances diffuse into and out of cells unhindered, and materials in different parts of the cell that are normally kept separate, become mixed.

27. **Why weak RF/MW fields are more damaging than strong ones** – As mentioned previously, we have known since the work of Suzanne Bawin and her co-workers (Bawin *et al.* 1975) that modulated RF/MW electromagnetic radiation that is far too weak to cause significant heating can nevertheless remove calcium ions (positively charged calcium atoms) from cell membranes in the brain. Later, Carl Blackman PhD of EPA showed that this also occurs with ELF electromagnetic radiation but only within one or more "*amplitude windows*," above and below which there is little or no effect (Blackman *et al.* 1982; Blackman 1990). A proposed molecular mechanism for this can be found in Goldsworthy (2010), which is adopted and incorporated by reference herein. In particular, it explains *why weak*

electromagnetic fields can have a greater effect than strong ones and why prolonged exposure to weak fields (where cells are maintained in the unstable condition for longer) *is potentially more damaging than relatively brief exposure to much stronger, e.g., measurable heat-producing, ones.*

28. **How calcium ions stabilize cell membranes -** This loss of calcium is important because, as mentioned previously, calcium ions bind to and stabilize the negatively charged membranes of living cells. They sit between the negatively charged components of the cell membrane and bind them together rather like mortar binds together the bricks in a wall. Loss of just some of these calcium ions destabilizes the membrane and makes it more inclined to leak, which can have serious metabolic consequences. Among these are the effects of membrane leakage on the neurons of the brain as described in my "Cell Phone and the Cell article".

29. **How membrane leakage affects neurons.** Neurons transmit information between one another in the form of chemical neurotransmitters that pass across the synapses where they make contact. However, the release of these is normally triggered by a brief pulse of calcium entering the cell. If the membrane is leaky due to electromagnetic exposure, it will already have a high internal calcium concentration as calcium leaks in from the much higher concentration outside. The effect of this is to put the cells into hair-trigger mode so that they are more likely to release neurotransmitters and the brain as a whole may become hyperactive (Beason and Semm 2002; Krey and Dolmetsch 2007, Volkow *et al.* 2011). This may not be a good thing; since the brain may become overloaded, leading to a loss of concentration and what we now call attention deficit hyperactive disorder (ADHD).

30. **How does this impact on autism? -** Before and just after its birth, a child's brain is essentially a blank canvas, and it goes through an intense period of learning to become aware of the significance of all of its new sensory inputs, e.g. to recognize its mother's face, her expressions and eventually other people and their relationship to him/her (Hawley & Gunner 2000). During this process, the neurons in the brain make countless new connections, the

patterns of which store what the child has learnt. However, after a matter of months, connections that are rarely used are pruned automatically (Huttenlocher & Dabholkar 1997) so that those that remain are hard-wired into the child's psyche. The production of too many and often spurious signals due to electromagnetic exposure during this period will generate frequent random connections, which will also not be pruned, even though they may not make sense. It may be significant that autistic children tend to have slightly larger heads, possibly to accommodate unpruned neurons (Hill & Frith 2003).

31. Because the pruning process in more electromagnetically-exposed children may be more random, it could leave the child with a defective hard-wired mind-set for social interactions, which may then contribute to the various autistic spectrum disorders. These children are not necessarily unintelligent; they may even have more brain cells than the rest of the population; and some may actually be savants. They may just be held back from having a normal life by a deficiency in the dedicated hard-wired neural networks needed for efficient communication with others. The very hard-wiring of the brain also informs us how and why the hard-wiring of technologic devices is advantageous: hard-wiring carries a signal with efficiency and integrity. By contrast, the degradation of the neural myelin sheath, which is protective, lipid insulation for the body's natural electrical impulses, produces a loss of motor control. Similarly, the carriage of a technologic communications signal through the atmosphere and many absorbent bodies in the environment, rather than through an insulated wire, requires far more energy and results in slow, sometimes incorrect processing, not to mention the vulnerability to an unintended another's receipt of the information, as in surveillance or hacking.

32. Effects on the peripheral nervous system are equally damaging since hyperactivity here causes sensations such as pain, heat, cold, and pins-and-needles in some people (i.e. symptoms of electromagnetic hypersensitivity). Hyperactivity in the cells of the inner ear can cause tinnitus and affect the sense of balance causing dizziness and symptoms of motion sickness, including nausea. School children and staff showing any of these symptoms

should be treated with sympathy and the WI-FI switched off in the school.

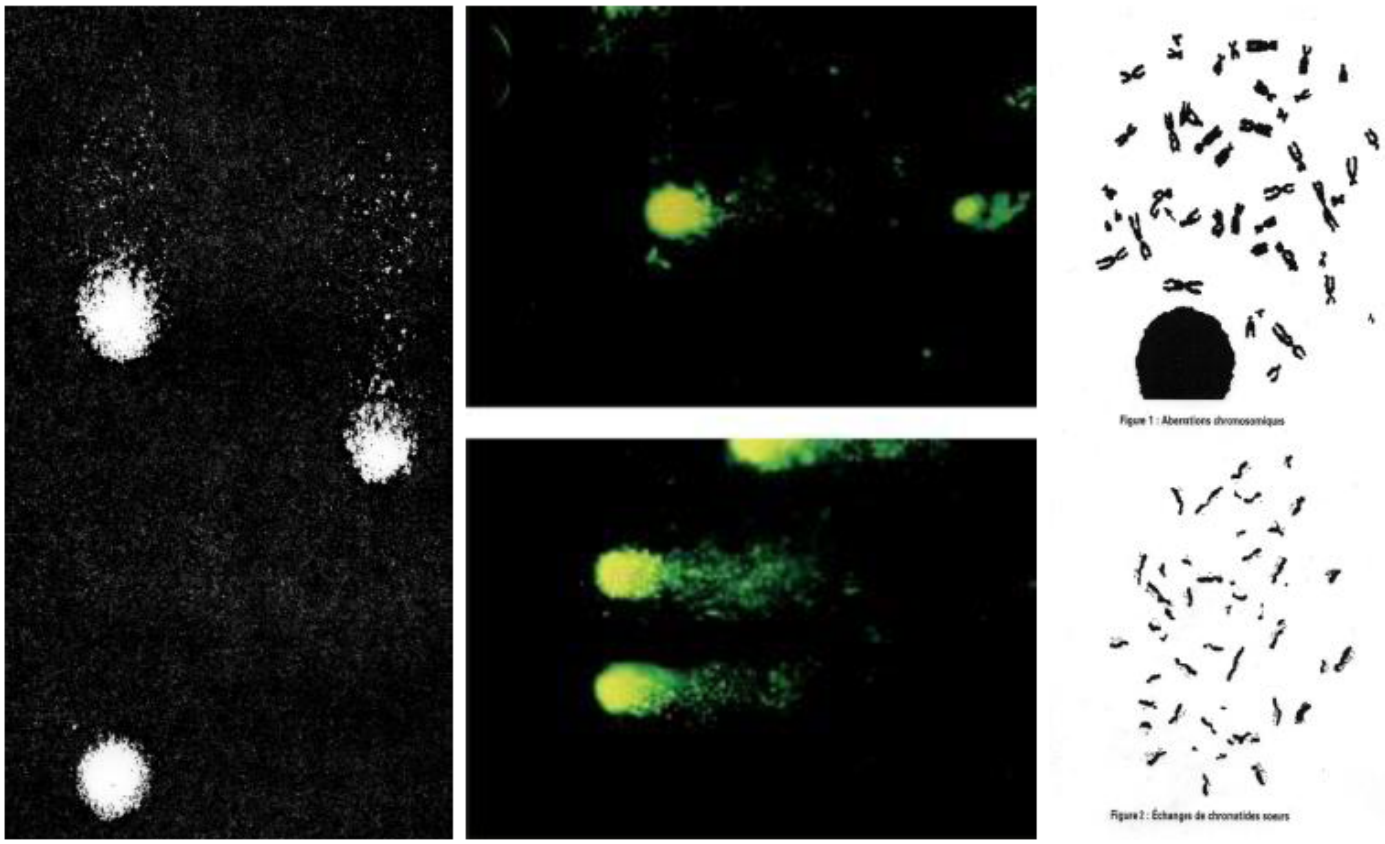
33. Lai and Singh demonstrated in replicated studies through the 1990s cognitive impairments in rats exposed to subthermal-level MW radiation, and demonstrated as well mechanisms therefore; and Erdinc (2003) and Lopez-Martin (2006) induced seizures at low dosages of MW radiation. Fragopoulo (2009) showed cognitive deficits that remained at least a day after a 2 hour/day exposure for four days to PM MW radiation. In humans, Maby 2006 found that epileptics had a significant increase in EEG signal energy when exposed to short-term PM MW radiation.

34. Many other effects on health can be attributed to membrane leakage, including damage to DNA due to the release of reactive oxygen species (ROS) from mitochondria, and digestive enzymes from lysosomes.

DNA

35. **DNA Fragmentation** - Many experiments have shown both single and double stranded DNA breakage in cell cultures after several hours of cell phone radiation (Lai and Singh 1995, Deim *et al*.).

36. Although DNA molecules are too stable to be damaged directly by non-ionizing radiation, they can still be damaged indirectly as a result of enzyme leakage from lysomes. Lysomes are membrane bound structures in the cells of most higher organisms that normally digest waste for recycling. They contain many digestive enzymes, including DNase, which destroys DNA. Were these to leak as a consequence of electromagnetic exposure, we would expect to see DNA fragmentation and possible collateral damage to other cellular components**.** Cells that have been affected in this way lose some of their normal function and also have an increased risk of becoming cancerous.



Top: A comet assay of a normal cell shows little DNA damage. Bottom: The same assay of cells exposed to microwave radiation shows "tails" of damaged DNA. Michroski, A., *Electromagnetic field: High-level microwave technology concerns*, from Henry Lai, at 7, 2011. The assay gets its name from the appearance of a damaged cell that takes on the appearance of a comet, with the bits of damaged DNA forming the tail. The longer the tail, the more damage has resulted.

37. Such DNA damage can cause a loss of fertility and an increased risk of getting cancer and in some cases, could lead to abnormalities in future generations. Most of the studies have been based on epidemiology since it is unethical to do controlled experiments on humans. ***The human genome****, which has taken countless millions of years to evolve,* ***is now under very serious threat***. We are talking about the future of our society.

38. Many factors in addition to genetics contribute to whether an individual suffers adverse health outcomes. Due to the sheer complexity of all living systems and the importance of ion-flow (electric currents) in their normal metabolism, not everyone will suffer the exactly the same symptoms and there is no guarantee that even those that do not show obvious symptoms at

the moment will remain so or that no hidden damage or loss of fertility that will appear at a later date. For this reason, Wi-Fi is entirely inappropriate in schools, particularly since a safe alternative, corded Internet, is readily available and inexpensive.

39. **There is an even more worrying line of research** because we also see biological effects in water lines "conditioned" with a weak electrical signal. Goldsworthy, *et al*. (1999) showed that ordinary town water supplies, when treated with pulsed radio frequencies (as used to remove lime scale from plumbing) becomes biologically active in yeast, probably by removing calcium from cell membranes. The results were broadly similar to those of direct exposure to electromagnetic fields and is what prompted me to conclude that calcium removal from cell membranes was a likely mechanism for most of the observed biological effects on animals. **The chilling possibility to emerge from this is that the biological effects of electromagnetic fields can be transmitted in the bloodstream and exposure in any part of the body could have an effect all over the body, not just the parts that are directly exposed. Nowhere in the body is safe from the effects of the radiation. No part of the body should be exposed to it.**

41 As someone who has studied the effects of electromagnetic radiation on animals and humans for many years, my advice is for all schools that have Wi-Fi equipment to remove it immediately, replace it with cable, and disable the Wi-Fi on any laptops that they wish to retain (quite easy to do given the schools have existing operating Ethernet systems).

42 It is my belief that the use of Wi-Fi in Portland Public Schools is and will continue to have adverse health effects on AHM, other students, school staff and faculty and should be discontinued immediately.

Dated this 19th day of December, 2011.

/s/ Dr. Andrew Goldsworthy

DR. ANDREW GOLDSWORTHY, BSc, PhD
Lecturer in Biology (retired)
Imperial College London

References

Amaral DG, Schumann CM, Nordahl CW (2008), Neuroanatomy of Autism, Trends in Neurosciences 31: 137-145

Augner C et al, (June 2010) Effects of exposure to GSM mobile phone base station signals on salivary cortisol, alpha-amylase, and immunoglobulin A, Biomed Environ Sci. 2010 Jun;23(3):199-207.

Bawin SM, Kaczmarek KL, Adey WR (1975), Effects of modulated VHF fields on the central nervous system. Ann NY Acad Sci 247: 74-81

Beason RC, Semm P (2002), Responses of neurons to an amplitude modulated microwave stimulus. Neuroscience Letters 333: 175-178

Bell, C. C., Bodznick, D., Montgomery, J. and Bastian, J. (1997a). The generation and subtraction of sensory expectations within cerebellum-like structures. Brain Behav. Evol. 50, 17–31

Bell, C. C., Caputi, A. and Grant, K. (1997b). Physiology and Plasticity of morphologically identified cells in the mormyrid electrosensory lobe. J. Neurosci. 17, 6409–6422

Blackman CF (1990), ELF effects on calcium homeostasis. In: Wilson BW, Stevens RG, Anderson LE (eds) Extremely Low Frequency Electromagnetic Fields: the Question of Cancer. Battelle Press, Columbus, Ohio, pp 189-208

Blackman CF, Benane SG, Kinney LS, House DE, Joines WT (1982), Effects of ELF fields on calcium-ion efflux from brain tissue in vitro. Radiation Research 92: 510-520

Buchner K, Eger H (2011) Changes of Clinically Important Neurotransmitters under the Influence of Modulated RF Fields—A Long-term Study under Real-life Conditions Original study in German, Umwelt -Medizin-Gesellschaft 24(1): 44-57.

Chu Q, George ST, Lukason M, Cheng SH, Scheule RK, Eastman SJ (2001) EGTA enhancement of denovirus-mediated gene transfer to mouse tracheal epithelium in vivo. Human Gene Therapy 12: 455-467

Li DK, Chen H, Odouli R., Maternal exposure to magnetic fields during pregnancy in relation to the risk of asthma in offspring, Arch Pediatr Adolesc Med. 2011 Oct;165(10):945-50. Epub 2011 Aug 1.

Eskander EF, et al, How does long term exposure to base stations and mobile phones affect human hormone pro-files?, Clin Biochem (2011), doi:10.1016/j.clinbiochem.2011.11.006

Friedman J, Kraus S, Hauptman Y, et al. (2007). Mechanism of short-term ERK activation by electromagnetic fields at mobile phone frequencies. Biochemical Journal 405(3), 559-568

Goldsworthy A (1999), Whitney H, Morris E, Biological Effects of Physically Conditioned Water (available upon request), Biology Department, Imperial College of Science Technology and Medicine, London, Wat. Res. Vol. 33, No. 7, pp. 1618-1626, 1999

Goldsworthy A (2010),Witness Statement, http://mcs-america.org/june2010pg910111213141516.pdf

ley T, Gunner M (2000), How early experiences affect brain development. http://tinyurl.com/5u23ae.

Hardell L, Sage C (2008). Biological effects from electromagnetic field exposure and public exposure standards. Biomedicine & Pharmacotherapy 62(2), 104-149

Hill EL, Frith U (2003), Understanding autism: insights from mind and brain. Phil Trans R Soc Lond B **358** 281-289.

Huttenlocher PR, Dabholkar AS (1997) Regional differences in synaptogenesis in human cerebral cortex. J Comparative Neurology **387** 167-178

Johansson SGO, Hourihane JO & Bousquet J *et al*. A revised nomenclature for allergy. An EAACI position statement from the EAACI nomenclature task force. *Allergy* (2001) **56**: 813–824,
http://www.ncbi.nlm.nih.gov/pubmed/11551246?dopt=Abstract&holding=npg

Khorseva N. I., Important New Russian Research on Cell Phone Radiation's Effect on Cognitive and Other Functions in Children; Radiation Biology. Radiation Ecology. 2011. Volume 51, No.5, p.611-623; http://www.emfacts.com/2011/11/important-new-russian-research-on-cell-phone-radiation%e2%80%99s-effect-on-cognitive-and-other-functions-in-children/ .

Krey JF, Dolmetsch RE (2007) Molecular mechanisms of autism: a possible role for Ca^{2+} signaling. Current Opinion in Neurobiology. **17**: 112-119

Koukkari WL, Sothern RB (2006). Introducing Biological Rhythms. Springer

Lai H, Singh N P (1996). Single- and double-strand DNA breaks in rat brain cells after acute exposure to radiofrequency electromagnetic radiation. International Journal of Radiation and Biology 69(4), 513-521

Lai H, Singh N P (2004). Magnetic-field-induced DNA strand breaks in brain cells of the rat. Environmental Health Perspectives 112(6), 687-694

Schwarz C, Kratochvil E, Pilger A, et al. (2008). Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes. International Archives of Occupational and Environmental Health 81(6), 755-67

Volkow ND, Tomasi D, Wang G, Vaska P, Fowler JS, Telang F, Alexoff D, Logan J, Wong C (2011), Effects of Cell Phone Radiofrequency Signal Exposure on Brain Glucose Metabolism. JAMA. **305** (8):808-813. doi: 10.1001/jama.2011.186

Curriculum Vitae – 2011

Full Name: Dr. Andrew Goldsworthy.

Born: April 3rd 1939.

Degrees:

B.Sc. (Wales) First Class Honours in Botany (1960).

Ph.D. (Wales) Plant Physiology and Biochemistry (1964).

Membership of Professional Bodies:

Society for Experimental Biology.

Appointments:

Lecturer at Imperial College from 1963 to 2004 (Now Retired)

This includes a six-month sabbatical in the **Genetics Dept. of the Connecticut Agricultural Experiment Station** (1970) working on somatic hybridisation and new methods to measure photosynthesis and screen for plants with a C_4 capability.

There was also an eighteen-month secondment with **RHM Research Ltd**. (1975-1976) where I successfully developed electronic instrumentation to measure seed vigour and to predict crop-yield.

Publications

PhD THESIS

GOLDSWORTHY, A. 1964. The carbohydrate nutrition of tomato roots. Ph.D. Thesis. University of Wales.

REFEREED PAPERS

GOLDSWORTHY, A., STREET, H.E. 1965. The carbohydrate nutrition of tomato roots. The mechanism of the inhibition by D-mannose of the respiration of excised roots. Ann. Bot. N.S. **29**, 45-58.

GOLDSWORTHY, A. 1966. A simple apparatus for generation a constant concentration of CO_2. J. Exptl. Bot. **17**, 147-150.

GOLDSWORTHY, A. 1966. Experiments on the origin of CO_2 released from tobacco leaves in the light. Phytochemistry **5**, 1013-1019.

GOLDSWORTHY, A. 1968. Comparison of the kinetics of photosynthetic CO_2 fixation in maize, sugarcane and tobacco, and its relation to photorespiration. Nature **217**, 62.

GOLDSWORTHY, A. 1969. The riddle of photo-respiration. Nature **224** (Centennial Supplement), 501-502.

GOLDSWORTHY, A., DAY, P.R. 1970. Further evidence for the reduced role of photorespiration in low compensation point species. Nature **228**, 687-688.

GOLDSWORTHY, A. 1970. Photorespiration. Botanical Review **36**, 321-340.

GOLDSWORTHY, A., DAY, P.R. 1970. A simple technique for the rapid determination of plant CO_2 compensation points. Plant Physiol. **46**, 850-851.

GOLDSWORTHY, A. 1971. A method for the rapid measurement of photosynthesis. J. Exptl. Bot. **22**, 753-755.

LESTER, J.N., GOLDSWORTHY, A. 1973. The occurrence of high compensation points in *Amaranthus* species. J. Exptl. Bot. **24,** 1031-1034.

GOLDSWORTHY, A., GATES, R., RIDGLEY, D.L. 1977. An electronic coleoptile measuring device. J. Exptl. Bot. **28**, 744-750.

GOLDSWORTHY, A. 1978. An instrument for measuring crop density by light absorbance. Ann. Bot. **42**, 1315-1325.

GOLDSWORTHY, A., DOVER, M.B.J. 1980. Drip tubes; a method for the continuous measurement of seedling growth and the production of seedlings for biochemical investigation. Seed Sci. & Technol. **8**, 305-315.

FIELDING, J.L., GOLDSWORTHY, A. 1980. Tocopherol levels and ageing in wheat seed. Ann. Bot. **46**, 453-456.

GOLDSWORTHY, A., FIELDING, J.L., DOVER, M.B.J. 1982. "Flash Imbibition" a method for the re-invigoration of aged wheat seed. Seed Sci. & Technol. **10**, 55-65.

FIELDING, J.L., GOLDSWORTHY, A. 1982. The evolution of volatiles in relation to ageing in dry wheat seed. Seed Sci. & Technol. **10**, 277-

GOLDSWORTHY, A. 1983. The evolution of plant action potentials. J. Theor. Biol. **103**, 645-648.

RATHORE, K.S., GOLDSWORTHY, A. 1985. Electrical control of growth in plant tissue cultures. Bio/Technology **3**, 253-254.

GOLDSWORTHY, A., RATHORE, K.S. 1985. Electrical control of shoot regeneration in plant tissue cultures. Bio/Technology **3**, 1107-1109.

GOLDSWORTHY, A. 1986. Switched-on tissue cultures.
Trends in Biotechnology **4**, 227-232.

GOLDSWORTHY, A. 1987. Why did nature select green plants? Nature **328**, 207-208.

GOLDSWORTHY, A., MINA, M.G. 1991. Electrical patterns of tobacco cells tobacco cells in media containing indole-3-acetic acid or 2,4-dichlorophenoxyacetic acid. Planta **183**, 368-373.

MINA, M.G., GOLDSWORTHY, A. 1991. Changes in the electrical polarity of tobacco cells following the application of weak external currents. Planta **186**, 104-108.

MINA, M.G., GOLDSWORTHY, A. 1992. Electrical polarization of tobacco cells by Ca^{2+} ion channels. J. Exptl. Bot. **43**, 449-454.

GOLDSWORTHY, A., LAGOA, A. 1992. Electrical control of differentiation in callus by natural electric potentials. Plant Cell, Tissue & Organ Culture **30**, 221-226.

GOLDSWORTHY, A., WHITNEY, H., MORRIS, E. 1999. Biological effects of physically conditioned water. Water Research. **33**, 1618-1626.

PATENTS

GOLDSWORTHY, A., RATHORE, K.S. 1983. Method of plant tissue culture. UK patent application No. 8330680.

CONFERENCE PROCEEDINGS

GOLDSWORTHY, A. 1987. Electrical control of growth in plant tissue cultures. In "Plant and Animal Cells: Process Possibilities". Eds. Webb, C. and Mavituna, F. (Ellis Horlwood, Chichester 1987).

BOOKS AUTHORED

GOLDSWORTHY, A. 1976. "Photorespiration" - Carolina Biology Readers No. 80. (Carolina Biological Supply Co., Burlington).

CHAPTERS IN BOOKS EDITED BY OTHERS

GOLDSWORTHY, A. 1975. Photorespiration in relation to crop yield. In "Physiological Aspects of Dryland Farming". Ed. Gupta, U.S. (Oxford & IBH Publishing Co. New Delhi).

GOLDSWORTHY, A. 1988. Growth control in plant tissue cultures. In "Advances in Biotechnological Processes - Volume 9". Ed. Mizrahi, A. (Alan R. Liss, New York).

GOLDSWORTHY, A. 1991. The Phycobilins. In "Photoreceptor Evolution and Function" Ed. Holmes, M.G. (Acad. Press, London).

GOLDSWORTHY, A. 1995. Photorespiration. In "Production and Improvement of Crops for Drylands". Ed. Gupta, U.S. (Oxford & IBH Publishing Co., New Delhi).

GOLDSWORTHY, A. 1996. Electrostimulation of cells by weak electric currents. In "Electrical Manipulation of Cells". Eds. Lynch, P., Davey, M.R. (Chapman and Hall, New York).

GOLDSWORTHY, A, 2006. Effects of Electrical and Electromagnetic Fields on Plants and Related Topics. In "Plant Electrophysiology; Theory and Methods." Ed. Volkov, A.G (Springer-Verlag Berlin Heidelberg)

POPULAR SCIENCE ARTICLES

GOLDSWORTHY, A. 1984. The cell electric. New Scientist **102** (1407), 14-15.

GOLDSWORTHY, A. 1986. The electric compass of plants.
New Scientist **109** (1489), 22-23.

GOLDSWORTHY, A. 1987. Why trees are green.
New Scientist **116** (1590), 48-52.

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United States District Court

District of Oregon

Portland Division

Alexandra Helene Morrison, by and through her Guardian *ad litem* and father, David Mark Morrison**,** and **David Mark Morrison**, individually,

Plaintiffs,

v.

Portland Public Schools,

Defendant.

Civil Action No. Cv 11-739-MO

Declaration of Curtis Bennett

I, Curtis Bennett, under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of a preliminary and permanent injunction enjoining Portland Public Schools' use of WI-FI:

1. I am the world's foremost authority on applying infrared technologies at molecular levels. I am committed to contributing to the overall improvement of the Earth's ecosphere by extending mankind's vision beyond the visible.

2. I am a Canadian Interprovincial Journeyman Electrician (Red Seal) with a theoretical and practical background in electromagnetic field designing. My education included extensive mathematical theory substantiated in a practical, laboratory environment. Ultimately, I earned Canadian provincial and national credentials.

3. I earned a construction engineering technologist (building construction and design) Diploma from the Northern Alberta Institute of Technology. This education consisted of every aspect of construction, from contracts to completion.

4. I am the only person in the world who has completed an education in engineering, magnetic fields, heat transfer, and electron flow specifically to compliment my extensive background with a technology that allows us to see temperature beyond our visible spectrum.

5. I have consulted with defense agencies, oil, gas, lumber, mine, and manufacturing industries, hydrologists, fire departments, medicine, energy, governments, municipalities, and insurers.

6. As a first response consultant, I consulted the Defense Minister for the Canadian Military (Canada's Chief in Command) on the vulnerability of Canadian (and other countries') ports after 9/11.

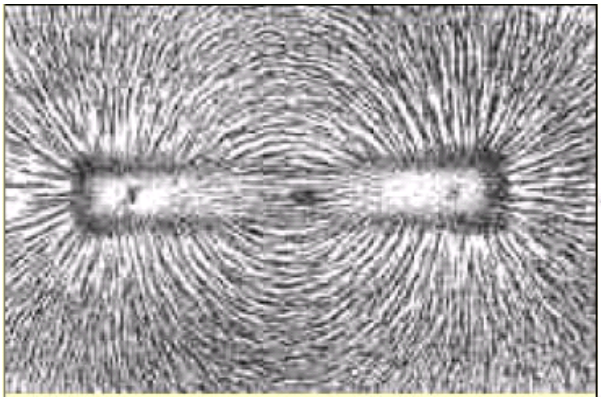
7. I have extensively studied theory on magnetic and electromagnetic fields, including radiofrequency fields, for many years. It is how we produce electricity.

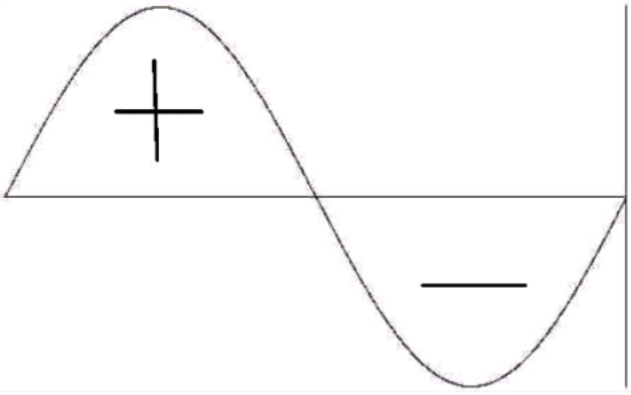
8. I have presented to Canada's Standing Committee on Health specific to "An Examination of the Potential Health Impacts of Radiofrequency Electromagnetic Radiation." http://www.magdahavas.com/wordpress/wp-content/uploads/2010/04/HESA-Report-final.pdf. Prior to presenting to the committee, I informed Health Canada of the error in safety code as our jurisdictional authority regarding the dangers of radio frequency interaction with humans. I reported that safety standards and Canada's Safety Code 6 (Canada's requirements for the use of

radiation emitting devices) contained errors or omissions substantiating harm is being done. Specifically, in September, 2010, I discovered an error in Health Canada's Safety Code 6, which I reported to Health Canada and followed-up in October as expert witness for Canadian Parliament's Standing Committee. The error is that Safety Code 6 failed to consider that any given person is an intricate unprotected electrical unit with its own frequencies and voltages. Safety Code 6 treats humans as a piece of tissue or furniture and negates to mention human frequencies or electrical sensitivity. Safety standards negating the electrical conflicts made the process miss causation or the mechanism scientifically linking harm with electromagnetic frequencies (EMFs). Thus, the failure to include people has resulted in no consideration for the frequency conflicts between radiofrequency radiation and humans.

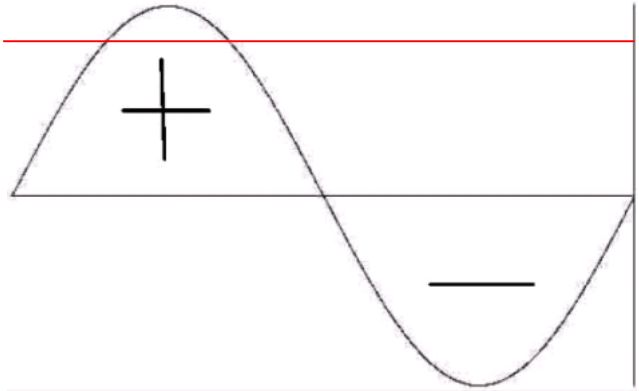
9. Academia of the world is literally blind to temperature, and after decades of advanced research as an infrared consultant (all applications), I now lecture for education credits needed for medical licensing. I have presented in the United States to Medical Doctors and health professionals regarding the dangers of radio frequency interaction with humans. By employing infrared at the molecular level, we are able to see things such as breast cancer, below surface groundwater (nature's hidden treasure), and forest fires through blinding smoke. Another application is showing how solar electromagnetic fields are causing buildings to 'burn,' or generate extreme heat, which they are not designed. It is a program where concepts of cellular energy and the function of the human body are integrated with the growing focus on the dangers of radiofrequency radiation, including WI-FI, and cellular technology. My participation in the medical program includes magnetism, electromagnetic frequencies, and the mechanism as to how they are dangerous. Additionally, I lecture regarding buildings and their toxins, groundwater, forest fires and their toxicity, medical imaging including before and after images of physiology changes with treatment. My presentation of environmental pollution is of electromagnetic fields versus magnetic fields. In the application of schools and electromagnetic fields, what I teach and offer as testimony herein, includes the following:

a. The following show a magnetic field versus an electromagnetic field:





The picture top left is a magnetic field of a bar magnet. The top right diagram is an electromagnetic field, represented by a frequency. Unlike the electromagnetic filed, the magnetic field doesn't have a frequency and would measure as a straight line (red) which is demonstrated below:



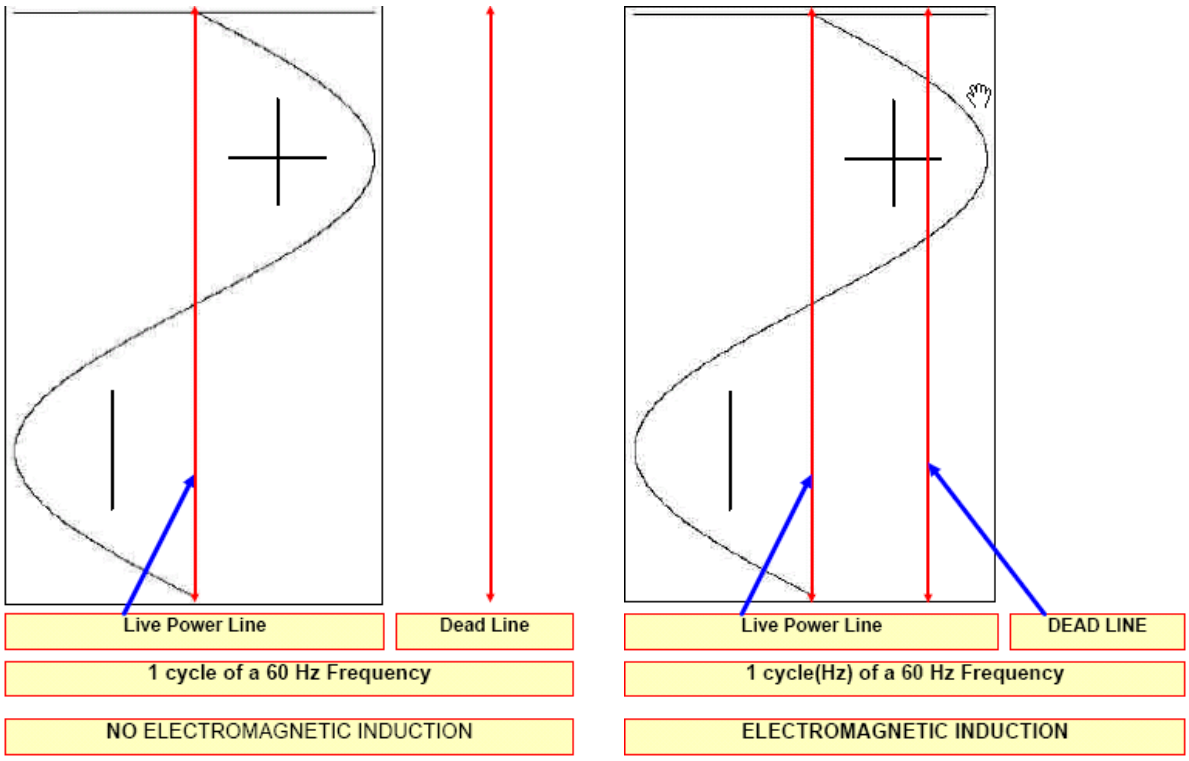
b. To create electricity you need a **magnetic field, a conductor, and motion**. We create electricity by moving a conductor through a magnetic field or by moving the magnetic field around the conductor. When it comes to children in a WI-FI environment, the WI-FI router is providing the magnetic field while also moving the field (at 2.4 or 5 GHz), children are the conductors.

c. As conductors within the electromagnetic fields, children, teachers, and staff are very precise, as well as intricate, electrical beings functioning healthily at approximately 7.8 Hz and 25 to 100 Mv.

d. WI-FI is installed to communicate with the wireless devices called computers. The other wireless devices in the room, called children, do not function at wireless

frequencies. Human cells operate at low voltage, their own frequencies, and to impose a very fast foreign frequency at GHz speeds on the human electrical system causes serious electrical problems.

e. At a molecular level, these fast radiofrequency waves are going through humans causing atoms and molecules to change direction or polarize at twice the frequency. Other results are ***electrical induction of and*** eddy currents within human biological systems. The resultant heat can be caused by electromagnetic induction as (i) heat is a byproduct of creating currents in the body, (ii) the body polarizing at twice the frequency produces heat (microwave effect), or (iii) heat[1] could result from electrical failure from mixing frequencies. The diagrams below evidence electrical induction (the 'Dead Line' represents a conductor/child):



f. Electromagnetic induction on a bare conductor (a child) running at its own frequency brings on a host of electrical problems for the unprotected child including nerve and muscle depolarization, in addition to heat. Canada's Safety Code 6, which is based on similar

[1] Safety standards admit heat is generating, which is why a heat load (specific absorption rate) was assigned to tissue of 1,000 microwatts/cm2 of localized heat. What causes the heat is electromagnetic induction. The error or mechanism missing in safety standards is they negated to consider all the frequencies or electromagnetic fields, such as humans.

international standards as used in the United States, provides that the unintentional excitation of tissue is to be **avoided** as is **heat effect** because studies show it can lead to nerve and muscle depolarization.[2] Depolarization is part of the natural process but should not be initiated because of electromagnetic induction. By way of example, recent work by Zhou *et al*., suggests intermediate frequency fields allow large segments of the DNA molecule, but not its entire length, to become polarized. This polarization causes charge to pile up at bends or clumps, which then attract one another, causing the DNA polymer to collapse. Zhou *et al*., *Collapse of DNA in ac Electric Fields*, Phys Rev Lett 106, 248103(June 16, 2011), quoted from *The DNA also collapses* http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.106.248103. Finally, on June 22, 2011, this phenomenon was discussed by the The Lancet, summarizing the latest International Agency for Research on Cancer's reclassification of radiofrequency electromagnetic frequencies as a "possibly carcinogenic to humans" (Group 2B):

> *EMFs generated by RF sources couple with the body, resulting in induced electric and magnetic fields and associated currents inside tissues.* The most important factors that determine the induced fields are the distance of the source from the body and the output power level. Additionally, the efficiency of coupling and resulting field distribution inside the body strongly depend on the frequency, polarisation, and direction of wave incidence on the body, and anatomical features of the exposed person, including height, body-mass index, posture, and dielectric properties of the tissues. Induced fields within the body are highly non-uniform, varying over several orders of magnitude, with local hotspots. http://www.lancet.com/journals/lanonc/article/PIIS1470-2045(11)70147-4/fulltext.

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[2] 'For frequencies from 3 to 100 kHz, *the predominant health effect to be avoided is the unintentional stimulation of excitable tissues*, since the threshold for electrostimulation in this frequency range will typically be lower [less radiation or slower frequencies] than that for the onset of thermal effects. *Experimental studies have demonstrated that exogenous electric and magnetic field exposures can induce in situ electric fields and currents within biological tissue that can lead to nerve and muscle depolarization* * * *. Limits for maximum external electric and magnetic field strengths have been established in Safety Code 6 to avoid *in situ* electric field strengths greater than that of the minimum excitation threshold for excitable tissues.' (Italics added) Health Canada, Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz Safety Code 6 (2009), http://www.rfsafetysolutions.com/PDF%20Files/Health%20Canada%20Safety%20Code%206%20Standard_2009.pdf.

10. I have personal knowledge of Portland Public Schools WI-FI installation, which operates between 2.4 – 5.8 GHz frequencies or between 2.4 and 5.8 billion Hz. Conflicting electromagnetic frequencies (electromagnetic compatibility) between WI-FI and children (7.8 Hz & 25 to 100 mV) are producing severe electrical problems that would cause function failure in similarly tuned electro-mechanical devices in use for commercial industry or homes, computers.

11. Based upon are review of the Mount Tabor Middle School WI-FI Floor Plan (Complaint, Ex. A), a given child is subject to signals from multiple WI-FI transmitters and numerous laptops. Each child has different DNA, hydration, toxicity, nutrition, lifestyle, etc.; with the point being every one of them is a different electrical device in the WI-FI application. WI-FI is interacting with each child differently and as it goes through walls, it is going through the children, as well as teachers and staff.

12. EMFs will interact differently with all material depending on that material's emissivity. Emissivity is a materials ability to absorb or emit wavelengths of radiation. The more absorbent the material, the higher the emissivity. Reflective materials will reflect the EMF radiation and it may hit absorbent material with the reflected angle. The children, and other absorbent material will be interacting with the frequencies. The EMFs are ultimately absorbed by children's body tissue, which is one of several substances that absorbs the radiation. The only upside is that the absorbent materials including the children will heat the classrooms and save Portland Public School on energy costs.

13. The digital wireless signals used in WI-FI are pulsed, ultra high frequency signals, emitted in bursts, at regular intervals, in very rapid succession. Imposed on these pulsed ultra high frequency microwaves are extremely low frequency modulations of the radiofrequency carrier

waves. Carrier waves transport data and are also referred to as Information Carrying Radio Waves. This man-made and very complex radio frequency electromagnetic radiation product cannot be compared to the naturally occurring and biologically compatible radiation of our environment where electromagnetic frequencies are billions of times higher than levels from which all life evolved.

14. WI-FI is only installed for a superficial cost convenience or profit because radiating an entire area is arguably cheaper than construction/electrical costs to install a safe cabled system. However, while the basic initial installation costs of setting up wireless routers may at first appear more 'cost effective,' this does not take into account their long-term, overall costs. The staff and equipment required to manage wireless capacity and to monitor usage, puts the overall costs much higher. Smart wireless devices associated with wireless networks can cause unexpected congestion, adding to the costs. The demand for these devices will only increase and result in the need for additional and more powerful access points. Additionally, wired computer stations deliver data faster, safer, and more sustainable while providing real economy and advancing technology in education. Educational technology advancements are important and can be achieved safer and faster. Wiring is the only option and is real sustainable economic growth.

15. Within the relevant scientific community it is generally accepted many bioeffects and adverse health effects occur as a result of low level radiofrequency exposure with unrealized domino-effect costs.

16. In my opinion as a professional with Canadian national and provincial credentials, Portland Public Schools' use of WI-FI is causing and will continue to cause Alexandra Morrison, other students, and school staff and faculty adverse health effects and should be discontinued immediately as this as a national and global emergency.

Dated this 24th day of June, 2011.

/s/ Curtis Bennett

CURTIS BENNETT

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United States District Court

District of Oregon

Portland Division

AHM, by and through
her Guardian *ad litem* and father,
David Mark Morrison**,** and
David Mark Morrison, individually,

v.

Portland Public Schools,

Defendant.

Civil Action No. 3:11-cv-00739-MO

Amended Declaration of Barrie Trower

I, Barrie Trower, under penalty of perjury pursuant to 28 U.S.C. § 1746, hereby make the following declaration in support of a preliminary and permanent injunction enjoining Portland Public Schools' use of WI-FI:

Background

1. I trained at the Government (Ministry of Defense) microwave warfare establishment(s) early in the 1960s covering all aspects of microwave (MW) radiation technology, uses and health dangers. Later works included underwater bomb-disposal, which incorporated MW technology.

2. In the late 1960's and 1970's a part of my task was to extract confidential (hitherto secret) information from master criminals, terrorists, and spies. This included Cold War MW technology.

3. My first degree is in Physics with a specialization in microwaves. My second degree is a research degree. I have a teaching diploma in human physiology. Before retiring, I taught advanced physics and mathematics at South Dartmoor College.

4. I am Scientific Advisor to the Radiation Research Trust and the H.E.S.E. (Human Ecological Social Economical) Project.

5. I am the author of both Tetra Reports for the Police Federation of England and Wales and the Public and Commercial Service Union.

6. In April 2010, I gave a speech for the King of Botswana. http://www.magdahavas.com/wordpress/wp-content/uploads/2010/08/Barrie_Trower_SA.pdf. I hereby adopt and incorporate by reference my opinions and findings therein.

7. My work is done entirely free of charge and I have never accepted money from any person or organization in the years I have been doing this research. I consider myself absolutely independent.

8. I reserve the right to amend to add new studies as they may become available through the time of trial.

Origins

9. To my knowledge, 'microwave' or 'radiowave sickness' was first reported in August 1932 with the symptoms of severe tiredness, fatigue, fitful sleep, headaches, intolerability and high susceptibility to infection. Hecht, K *et al.*, *Overloading of Towns and Cities with Radio*

Transmitters (Cellular Transmitter): A hazard for the human health and a disturbance of ecoethics, International Research Centre of Healthy Ecological Technology (IRCHET), Berlin-Germany, at l ¶ 3 (2007). These symptoms were reported to be from athermal (which are sometimes also called subthermal or microthermal) effects.

10. By 1971, the US Naval Medical Research Institute (NMRI) referenced 2300 research articles listing in excess of 120 impairments and illnesses attributed to radiofrequency and microwave radiation. Biography of Reported Biological Phenomena (Effect) and Clinical Manifestations Attributed to Microwave and Radio-Frequency Radiation, Research Report. MF12.524.015-0004B, Report No. 2. NMRI, National Naval Medical Centre (1971). Under the Freedom of Information Act, extracts from published US Defence Intelligence Agency (DIA) Documents confirmed the NMRI research and stated: 'If the more advanced nations of the West are strict in enforcement of stringent exposure standards, there could be unfavourable effects on industrial output and military functions,' in order to protect industrial profit and military function, and to avoid litigation from military employees. It was suggested that governments in the West chose a safety level compatible to industrial output and military function. The governments that adopted the thermal level only denied and still to this day deny any adverse effect from subthermal levels. DIA Documents: DST - 1810S - 076-76, ST-c5-01-169-72, DST-18105-074-76 (1972-1983).

11. In 1975, after an extensive study, the United States DIA warned all of its personnel of the risk from low-level microwaves including illnesses ranging from microwave sickness (flu like symptoms, depression, suicidal tendencies) to cancers and leukaemia. *Biological effects of electromagnetic radiation (radiowaves and microwaves) – Eurasian Communist Countries*, Defence Intelligence Agency: DST-1810S-074-76, March (1976).

12. During the Cold War, the Russian Embassy microwaved the United States Embassy in Moscow with low-level microwaves for many years from across the road; why and how is outside the scope of this Declaration. After changes of staff for serious neurologic impairments, miscarriages, multiple cancers / leukaemias and other illnesses to both male and female employees and their children, the late John R. Goldsmith, M.D., was invited to investigate this matter. His investigative report on this incident showed that continuous, long-term low-level microwaves were responsible for those illnesses. Goldsmith, J. R., *Radiofrequency Epidemiology*, Environmental Health Perspectives, Vol 105, at 1585, Supp 6, Table 8, Dec (1997). Dr. Goldsmith held 11 Professorships and was the World Health Organization (WHO) representative for Europe. Interestingly, the power of the microwaves used by the Russians in some cases was less that the power used by modern-day transmitters, with the average ranging <0.02 – 0.05 $\mu W/cm^2$and the maximum ranging 5 – 18 $\mu W/cm^2$. Goldsworthy JR. Epidemiological evidence of radiofrequency radiation (microwave) effects on health in military, broadcasting, and occupational studies, Intl J Occ and Env Health, 1:47-57, 1995. http://www.radiationresearch.org/goldsworthy_bio_weak_em_07.pdf. Dr. Goldsmith's warning on health and fertility: http://omega.twoday.net/stories/1755556/.

13. Debriefing spies during The Cold War extended my military education into the full diversity of stealth microwave warfare and communication systems. In so doing, I learned a list of approximately 30 pulse frequencies that could induce some 50 physical and mental ailments by entrainment.

14. As soon as ordinary MW transmitters became commonplace, residents started to complain of neurologic impairments, illnesses and later of cancer clusters. Independent researcher Sue Webster took data from just 19 transmitters and found approx 92 cancers (breast, thyroid, bowel, leukaemia), where the average age of those affected was roughly only 39. Health

Dangers from Wireless Laptops, Sue Webster was quoted in Canceractive's ICON magazine in January 2003 article, http://www.canceractive.com/shop/product.php?productid=16157&cat=255&page=1.

15. Microwave sickness was well documented by 1997, when over 100 further research documents pertaining to it were referenced. Grant, L., *Microwave Sickness*, Electrical Sensitivity News, Vol I No 6, Vol 2 Nos 1-4 (1997).

16. Portland Public Schools are transmitting electromagnetic, specifically MW, frequencies at low exposure levels compared to thermal levels. However, these exposure levels are very high compared to natural background levels at the frequencies deployed: 2.45 GHz and 5 GHz frequency, which means between 2.45 and 5 billion cycles per second. When I realized that power densities and frequencies similar to those used as weapons during the Cold War were being used as WI-FI in schools, I decided to come out of retirement and travel around the world free of charge and explain exactly what the problem is going to be in the future.

17. HAARP – High Frequency Active Auroral Research Program – was originally researched by Sister Dr. Rosalie Bertell, who investigated its electromagnetic interference to our atmosphere. HAARP reflects electromagnetic waves off the ionosphere and can influence any part of the air or land on this Planet. This has the potential to cause physiologic and neurologic effects on humans, animals and plants.

18. The paradox of course is how microwave radiation can be used as a weapon to cause impairment, illness and death and at the same time be used as a communications instrument. Therefore, WI-FI cannot be safe for the schoolchildren and teachers exposed to it. Also, there still exists an ongoing stealth microwave warfare industry, continuing from the 1950's.

Technology

19. The International Commission for Non-Ionizing Radiation (ICNIRP) classifies microwaves as electromagnetic waves from 300 MHz to 300 GHz. ICNIRP Guidelines, Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (Up to 300 GHz), Health Physics April 1998, Vol 74, No 4, 522, www.icnirp.de/documents/emfgdl.pdf. Therefore, everything discussed in this report is in the microwave 'band.'

20. Microwaves react very differently in our water-based bodies than do radio waves. The term 'Radio Frequency' is often used to describe MW-based communications systems. It is important that the term 'Radio Frequency' is not associated solely with Radio Waves, but rather primarily with Microwaves. Microwaves are the preferred medium for communication, over radiowaves, due to their *superior penetrative properties*. Penetration occurs in living tissues in particular, with more absorption due to water content; and microwaves will also penetrate most dwellings and other buildings.

21. What is all this really about? Imagine the field around a magnet and imagine ordinary everyday static electricity. If you put the force field from the magnet with the force field from the static electricity, you make a wave. This is called an electromagnetic wave. There are lots of different types of electromagnetic waves, but they are all made of the same two things, magnetic and static fields. The main difference between these waves is their wavelength or the length of the wave, hence the number of waves that can be produced per second, i.e. the frequency. All electromagnetic waves are included in a table called the electromagnetic spectrum.

22. At one end of this electromagnetic spectrum you have the very shortest lengths, namely cosmic, gamma rays and x-rays, and at the other end of the spectrum you have the very long ways, namely TV and radio. Physicists sometimes take the radiofrequency spectrum further yet, all the way to extreme low frequency (ELF), such as the electrical power frequency. All

waves have the same basic properties: they can be reflected, diffracted, and they all travel at the same speed, which is the speed of light. For interest, if you were one wave of light you would be able to travel around the world nearly seven times every second; that is the speed of light. The electromagnetic spectrum is ordered; starting with the shortest wave end you have cosmic and gamma rays, x-rays, ultra-violet, visible light, infra-red, microwaves, TV and radio being the longest, in that order. The ultra-violet and higher frequencies are known as ionizing waves; and they are damaging to the body. Longer than ultraviolet and visible light is the radiofrequency side of the spectrum, which is also damaging. The microwaves deployed for the WI-FI system are on this radiofrequency side of the electromagnetic spectrum. I will be discussing microwaves and health herein.

Adverse Health Effects

23. There is a plethora of extensive, well-researched documents from around the world highlighting impairments and illnesses caused by MW radiation. These papers (in their thousands) discuss adverse health outcomes caused by low-level (below thermal) microwaves as: arrhythmia, heart attack, cell death, diseases of the blood, interference to bone marrow, brain tumours, DNA damage, altered calcium level in cells, reduction in night-time melatonin, suppression of the immune system, arthritis, rheumatism, skin problems, lymphatic diseases, vaginal discharge, vascular system disease, tinnitus, leukaemia, childhood cancer, sleep problems, mental problems involving depression, irritability, memory loss, difficulty in concentrating, headache, dizziness and fatigue, suicidal tendencies, miscarriage and infertility.

24. Some have asserted that such symptoms and illnesses are psychogenic. For example, when a neighbourhood sees the erection of a transmitter, subsequent health problems are often attributed to that transmitter. Psychologically the mast is deemed to have caused the illnesses. However, an argument against this is the many cases where disguised, stealth, or concealed transmitters have been erected without local knowledge and similar illnesses still occur.

Moreover, when similar conditions arise in animals near new transmitters, and in laboratory trials under controlled circumstances, the animals do not have such a psychologic component, yet still respond similarly in the ways that humans do.

25. Advancement in microwave technology since the Cold War necessitated concurrent experimentation. Thousands of research studies exist concerning ill effects from low-level, below thermal irradiation levels, involving almost every organ in the body. Possibly the most comprehensive explanation for this phenomenon is written by Dr. A. Goldsworthy of Imperial College London: *The biological effects of weak electromagnetic fields* (2007), http:tinyurl.com/2nfujj; also: a.goldsworthy@imperial.acuk.

26. Before I go further, I wish to comment on the telecommunication industry's own research. In February 2007, I was invited to give a short presentation concerning low-level microwave irradiation and cancer at London's Great Ormond Street Hospital for Children. One of the other speakers present was Dr. George Carlo. Sharing the same hotel afforded me the opportunity to engage in several conversations with Dr. Carlo during the two days we were in London. Dr. Carlo explained how he was commissioned by the mobile industry to conduct research on its products. His study (www.health/concerns.org) involved 200 research doctors and 15 epidemiological studies (1993-1999), at a cost of 28.5 million US dollars. 'Our data showed *increased risk to children*, concerning tumours, genetic damage and other problems,' explained Dr Carlo. He continued, 'my results were suppressed by the telecommunications industry.'

27. Further discussion of industry influence is warranted as The University of Berne, Switzerland, published a data synthesis of 59 research studies involving ill health from low-level MW irradiation. The Department of Social and Preventive Medicine concluded: 'Studies funded exclusively by industry reported the largest number of outcomes, but were least likely to report a

statistically significant result. The interpretation of results * * * should take sponsorship into account.' Huss, A. *et al*., Source of Funding and Results of Studies of Health effects of Mobile Phone Use: Systematic Review of experimental Studies, (2006), University of Berne, Finkenhubelweg II, Switzerland (egger@ispm.unibe.ch).

28. Moreover, the 'Journal of Industrial Medicine' published the fact that industrial affiliation was being concealed by research scientists, suggesting that biases from conflicting interests in risk assessments cannot be evaluated properly. Hardell, L., *et al*., *Secret Ties to Industry and Conflicting Interests in Cancer Research*, American Journal of Industrial Medicine, at l, May (2006), [Wiley-Liss Inc.]; www.interscience.wiley.com; Dept of Oncology, University Hospital, Orebro University, Sweden. Examples of these problems from Sweden, the United Kingdom and the United States are presented.

29. Notwithstanding industry's attempts to influence research, even their own studies continued to find adverse health effects. One example is a worldwide epidemiological study (commissioned by T-Mobile, on its own product) that concluded, 'On the cellular level, a *multitude of studies* found the type of damage from high frequency electromagnetic fields which is important for cancer initiation and cancer promotion.' Mobile Telecommunications and Health, ECOLOG Institute, Sec 7, April (2000) (mailbox@ecolog-institut.de). This document also describes DNA damage on the same page.

30. The US Environmental Protection Agency (EPA) recommended that electromagnetic radiation (which includes WI-FI radiation) be classified as a 'probable human carcinogen.' United States Environmental Protection Agency, Evaluation of the Potential Carcinogenicity of Electromagnetic Fields, External Review Draft, No. EPAl600/6-901005B, October 1990. With many new studies since 1990, there is certainty that microwave radiation in particular is carcinogenic.

31. Following a spate of illnesses in their practices, on October 9, 2002, a group of doctors produced the Freiburger Appeal. http://omega.twoday.net/stories/555926/, scroll down for cluster listing. Initially signed by 270 medical consultants, scientists, GPs, MPs and physicians, it now has many thousands of signatories worldwide. It is a warning to decision-makers concerning illnesses from low-level microwaves. This appeal lists 13 severe, chronic illnesses and various disorders involving: behaviour, blood, heart, cancers, migraines, tinnitus, susceptibility to infections and sleeplessness, all of them ascribed to 'pulsed microwaves from mobile communications technology.' *Interdisziplina re Gesellschaft fur Umweltmedizin e. V.* http://www.e-smognrw.denews/skandal/wewelsburg/HESEProject!FreiburgerAppell/LivelistenderunterschriftensammlungfurdenFreiburgerAppellArztelists.htm.

32. During September 2002 at the University of Vienna, 19 of the world's top scientists met to discuss electromagnetic waves. This was known as the Catania Resolution. They stated 'we take exception to arguments suggesting that weak, low-intensity EMF cannot interact with tissue. There are plausible mechanistic explanations for EMF-induced effects that occur below present ICNRP guidelines and exposure recommendations by the EU.'

33. An international study of schools near cell towers or with a cell tower on school premises published a list of impairments and illnesses amongst staff and students, finding with large numbers of cancer clusters and other illnesses. There were 47 cancer clusters. Schools and Cell Tower Antennaes, 2003, http://members.aol.com/gotemf/emf/schools.htm; www.omega.twoday.net/stories/55592.

34. Another report, *School References (school and cell tower antennas)* from 138 schools, dated November 2003, lists miscarriages, brain tumours, cancers, breast cancers and teachers ill within this report. One single school had transmitters on its roof in the Saint-Cyr-l'Ecole quarter of France, where eight cases of cancer were confirmed amongst children in the district.

35. The Stewart Report 2004 asks that anecdotal evidence be taken seriously in the absence of long-term epidemiological studies, regarding illnesses around the area of mobile phone transmitters. Such anecdotal evidence produced July 2002 refers to 92 cases of cancer around just 19 mobile phone transmitters. Other illnesses in the same paper refer to breast cancers, thyroid, bowel and blood problems. Now, of course, there are many epidemiological studies, and they are consistent in showing such illnesses and other harmful effects.

36. In 2007, an international group of scientists studied 2000 peer-reviewed and published research papers. They recommended an acceptable level of radiation of not more than 0.6 V/m = ~1μW/cm^2 outdoors, and 0.2 V/m = ~0.1 μW/cm^2 indoors, based on the interaction between low-level microwaves and the cellular processes. This became known as the Bioinitiative Level, which has since been lowered by a factor of 10, to 0.01 μW/cm^2 .

37. A project called EU-Reflex or European Union Risk Evaluation of Potential Environmental Hazards from Low Frequency Electromagnetic Field Exposure using sensitive in Vitro Methods shows that cells exposed to cell phone radiation exhibit chromosomal damage well below the exposure guidelines of the WHO.

38. The following studies: Naila, Hutter, Santini, Oberfeld, Bamberg, Wolf, etc. all show increased neurologic impairments and/or cancers and/or other illnesses from low-level microwave irradiation. A good summary of these studies, with details, can be found on the Radiation Research Trust's website: www.radiationresearch.org.

39. The International Association of Fire Fighters opposes the use of fire stations as transmitter sites, because of the health problems of its members. International Association of Fire Fighters, www.iaff.org/safe/content/celltower/celltowerfinal.htm.

40. The world-renowned Irish Doctors' Association listed 70 research papers showing the dangers from low-level microwaves. Dr. Santini listed 20 similar studies; the

EM Radiation Research Trust listed 9 studies; Dr. Blackwell listed 6 similar studies in his report, and finally 4 international universities completed the Spanish Study, which verified all of these known illnesses. The authors of the Spanish study (The Microwave Syndrome-Further Aspects of a Spanish Study, 2004) recommended a level 10 million times below ICNIRP guidelines (discussed below), or 0.1 μW/cm^2. Dr. Gerd Oberfeld, one of the authors of the study, is the Director of the Public Health Office in Salzburg, Austria, which lowered its precautionary value for indoor exposures to GSM frequencies to comply with the recommendation made by the study. See: http://www.ideaireland.org/emrresearch.htm; Santini paper (2006): http://next-up.org/pdf/Roger_SANTINI_Scientific_arguments_to_prove_application_of_precaution_principle_mobil_phone.pdf, Dr. Grahame - Six studies showing ill effect: http://www.starweave.com/masts/; The Microwave Syndrome Further Aspects of a Spanish Study: http://www.hese-project.org/hese-uk/en/papers/navarro_n%20045%20_p353%20-%20p358_.pdf.

41. Listing and referencing all such epidemiological studies would be too extensive and repetitive for this article; suffice to say, by 2006, it was reported that 80 percent of the extant epidemiological studies on the WHO database list symptoms from microwave sickness, including up to fourfold increase in cancers from low-level microwaves. Guilmot, Jean-luc, *WHO EMF Database*, Watch - Understand - Act 26, Sept (2006), www.001be.cx. I was curious to investigate the remaining 20 percent that showed no symptoms. However, this had already been looked at by Swiss scientists who said 'the interpretation of results * * * should take sponsorship into account.' By that time, Michael Meacher, Minister for the Environment 1997-2003 (United Kingdom), had published a report blaming some universities for accepting lucrative contracts in reporting favourable results from scientific research. In the same month, United States Congressman Henry Waxman published a similar report in Scientific American stating that science was being corrupted by industry. http://www.next-up.org/pdf/Ope

nLetterWHODrvanDeventer.pdf; Swiss Study on funding sources; http://www.ehponline.org/docs/2006/9149/abstract.html; Michael Meacher quote, http://www.epolitix.com/EN/MPWebsites/Michael+Meacher/c8afdecc-b15e-41ad-b9cf-25354790d2dc.htm, also published in The Times, May (2004); Henry Waxman in The Scientific American, http://www.sciam.com/article.cfm?articleID=0000FF81-A7DD-1084-A73E83414B7F0000 (May 2004).

42. In April 2011, the Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP) found:

> Preventing childhood and juvenile diseases from exposure to EMF sources is of paramount social and economic importance. * * * This problem has been already recognized by the international community: in May 2011, the World Health Organization (WHO) will be organizing the Second International Conference: 'Non-ionizing Radiation and Children's Health' dedicated to health protection of children exposed to EMF sources of various frequency ranges. It is the WHO's opinion that a 'child is more vulnerable to environmental factors.' * * *
>
> Human brain and the nervous system tissues directly perceive EMF *and react irrespective of its intensity*, and in certain cases it depends on EMF modulation. * * * Analysis of scientific peer-reviewed national and international publications as well as analysis of actual population exposure to EMF have allowed the RNCNIRP to formulate 10 postulates. * * * *(Note: here and following, 'EMF' includes RF/MW radiation).*
>
> 1. For the first time in human evolution, the brain is daily exposed to modulated EMF at all developmental stages.
>
> 2. Absorption of EMF in a child's brain is greater than in adult phone users; larger brain areas including those responsible for intellectual development are exposed in a child's brain.
>
> 3. A child's brain is undergoing development * * *
>
> 8. Better safety criteria for children and teenagers are required *in the nearest term*. Features of the developing organism should be taken into account, as well as the significance of bioelectric process for human life and activities, present and future conditions of EMF, prospects of technological and technical development should be addressed in a document of legal status. (Italics added). RNCNIRP, *Electromagnetic Fields From Mobile Phones: Health Effects on Children and Teenagers*, (Italics added) April 2011, www.scribd.com/doc/55420788/Electromagnetic-Fields-from-Mobile-Phones-Health-Effect-on-Children-and-Teenagers.

43. On May 6, 2011, the European Parliament was presented with a report recommending that wireless networks and mobile phones be totally banned from schools on health grounds. Council of Europe, *The potential dangers of electromagnetic fields and their effect on the environment*, Parliamentary Assembly, Committee on the Environment, Agriculture and Local and Regional Affairs, assembly.coe.int/documents/workingdocs/doc11/edoc12608.pdf. This document notes that young people are most susceptible. *Id* at 2. The Assembly recommends that we take all reasonable measures to reduce exposure to electromagnetic fields on 'as low as reasonably achievable' (ALARA) (*Id.*) The Parliamentary Assembly asked education and health authorities to develop information campaigns 'aimed at teachers, parents and children to alert them to the specific risks of early, ill-considered and prolonged use of mobiles and other devices emitting microwaves.' *Id* at 3. The Assembly also asked that Governments '*ban all mobile phones, DECT phones or WI-FI or WLAN systems from classrooms and schools*, as advocated by some regional authorities, medical associations and civil society organizations.' (Italics added) *Id*.

44. In conclusion, ***even so-called 'low' levels of microwave radiation are very serious***! Emphasis supplied. It is impossible to MW-irradiate the body without an effect. Low-level MW radiation is as dangerous or even more dangerous than high-level radiation.

45. I reserve the reserve the right to amend to add new relevant studies as they may arise and pending analysis, additional testing, and recently received voluminous discovery.

Current Regulations and Thermal Heating

46. The guidelines set by ICNIRP and the National Radiological Protection Board (NRPB), and which are followed by the United States' FCC, are amongst the least protective in the world. Being thermally based – no account whatsoever is given to the effect of the electric and magnetic of the wave interacting with the physiology of the body – it is very unlikely, if not impossible, for any person to receive warming of the body with exposure exceeding the guidelines, if this person

is not sitting right on top of the transmitter. Guidelines in units of microwatts per cm2, the maximum level for 1,800 MHz transmitters, 1,000 of these units. By contrast, Russia and China have a total maximum of 10 of these units, $\mu W/cm^2$, Toronto has a maximum of 6 $\mu W/cm^2$ and in Salzburg, the limit is 0.1 $\mu W/cm^2$. The June 2000 International Conference at Salzburg, consisting of 19 of the world's top scientists in this field, set the level at 0.1 units.

47. The EU Parliament on September 4, 2008, by 522 votes to 16, stated that the 'ICNIRP guidelines were obsolete and out of date.' Mast Action UK - Legal Services (2010).

48. By way of example, Russia has recommended the banning of children under 16 from using cell phones when possible.

49. As a result of research that documents the harmful effects of MW radiation on fetuses, the British government warned in the cell phone handbook under ‘safety,’ that pregnant women should not have a cell hone near the abdomen, children under 16 should avoid carrying phones near their abdomen, like boys in their trouser pockets, and children should text rather than phone. The handbook recommends that if they do phone, they use hands-free, so the phone is away from the head; that, if one is going to make a long call, one should use a landline telephone; and that the phone should never be closer than 0.98 inch from the body. The government advice for children is ‘essential calls only’ to avoid exposure to MW radiation. See Statz, P., The Cell Phone Handbook: Everything You Wanted to Know About Wireless Telephony (But Didn't Know Whom or What to Ask) (1999) http://www.amazon.com/Cell-Phone-Handbook-Everything-Telephony/dp/1890154121.

50. These international bodies’, NRPB’s and ICNIRP's, guidelines are based purely on thermal effects. Looking at scientific papers, most of the rest of the world disagrees with this assessment. Dr. Cletus Kanavy, Chief of the Biological Effects Group of the Phillips Laboratory's Electromagnetic Effects Division at Kirkfield Air Force Base in New Mexico, says there is a 'Large amount of data, both animal, experimental and human clinical to support the existence of

chronic, non-thermal effects * * * these include behavioural, neural, fetal, blood, metabolic, endocrine and immune problems.'

51. Professor Adey, a Fellow of the US American Academy of Scientists and a distinguished visitor of the Royal Society of Medicine said of his own research, in parallel with similar studies in Russia in the early 1980s, that they showed that radio frequency and microwave radiation affected enzyme systems that regulate growth and the division of white blood cells.

52. Clearly there are experts worldwide, both in military-intelligence and from Universities, from the long before Cold War to the present, who have shown that microwave radiation below thermal effects can impinge on human and other living organisms' physiologic functions.

Pulse and Modulation

53. Carrier waves may be used to carry information (video or audio data) that can be superimposed on them by modulation.

54. Sometimes academic arguments arise where the word 'pulsing' is not used and a word like 'modulated' substituted. Theoretically, there can be very little difference between a modulated wave and a pulsed wave.

55. Scientists argue over what constitutes a modulation or pulse. A modulation is a superimposition of data upon a carrier wave; modulations are usually connected with an infinitesimally thin thread of 'energy.' A pulse has no such attachment to the following pulse. A reader may wonder why this distinction is relevant. Scientists specializing in this field blame pulsed microwaves for various biological reactions within our cellular structures, which may then cause illness and impairment.

56. Further arguments suggest that there is no biological difference between a frequency modulated transmission or pulse when it comes to resonance with our cyclotronic and circadian rhythms.

57. Transmissions may be directional or isotropic (equal in all directions), may be analogue (with continuously variable quantity e.g. spatial position) or digital (sometimes called 'frequency-modulated'). However, all transmissions are electromagnetically propagated. In the world of nuclear and atomic physics, electronic switches can make tens of millions of decisions a second; and all transmissions travel at the speed of light.

58. Transmissions can be increased by possibly up to 40 percent, with side lobe technology. Vector mathematics can demonstrate whether any of these transmissions are incident upon another transmitted wave, such as a low-frequency radio wave, as there can be a piggy-back effect (constructive interference).

59. The Health Council of the Netherlands Radio Frequency Radiation Committee says in its 200 page 1997 report, concerning frequencies of 300 Hz to 300 GHz: 'The experimental data indicate that the effects of EM fields occur at lower power densities when the object is exposed to pulsed electromagnetic fields.' In other words, you will get impairments and illnesses quicker if the microwaves are pulsed. Health Council of the Netherlands: Radiofrequency Radiation Committee, *Radiofrequente elektromagnetische velden (300 Hz – 300 GHz)*, at 134 (1997).

60. Professor Salford at Lund University in Sweden has shown in his work in the year 2000 that pulsing can alter the permeability of the blood/brain barrier in rats. This would reasonably occur in human brains as well, and could have profound effects on brain function.

61. The Freiburger Appeal (2002), as previous mentioned, says, 'One can no longer evade these pulsed microwaves. They heighten the risk of already present chemical/physical influences, stress the body's immune system and can bring the body's still functioning regulatory mechanisms to a halt. Pregnant women, children, adolescents, elderly and sick people are especially at risk.'

62. Assimilating knowledge from the Cold War and other sources, I accumulated a plethora of data describing how pulsed / modulated microwaves interfere with our cellular biochemistry.

Believing the communications industry to be spiralling out of control with its new innovations, I published my list on the Internet in the hope that the industry and policymakers would take note. (*The Communications Industry is in the position where it is spiralling out of any person's ability to control it*, An open letter from Barrie Trower (undated); http://omega.twoday.net/search?qBarry+Trower; http://www.mastsani ty.org),

Transduction

63. I will try to summarise the thousand or so research papers written over the last 20 or so years and explain or summarise what happens when the electric and magnetic part of the wave goes into our bodies. We, being water-based animals, act like aerials to these waves. As the waves penetrate our bodies, an electric current is generated inside our bodies, which is how aerials work. Waves come in and electricity is generated. The electricity generated in our bodies, like all electric currents, goes to ground through our bodies; and like all electric currents, it takes the path of least resistance. Unfortunately, the path of least resistance through our bodies, although only representing 10 percent of our pathways, carries 90 percent of our traffic rather like the M1 motorway. The traffic in our bodies, namely hormones, antibodies and neurotransmitters, know where they are going because they also carry an electric charge. The hormones, antibodies and neurotransmitters know where to 'get off' the pathway, because there is a corresponding opposite charge at the site of delivery – rather like the positive and negative ends of a battery. The problem is, if you have an electric current passing through the body it can change this charge, either on the hormones, antibodies or neurotransmitters, or at the site of delivery.

64. A similar effect is that the destination for some of these hormones, neurotransmitters, and antibodies is a surface of a cell where chemicals will pass through a membrane into a cell. If you think of a cell in our body, be it a brain cell, bone cell, etc., as having a positive and negative charge on the outside and the inside similar to a battery the difference in these charges will draw

the chemical into the cell or draw poisonous substances out of the cell. If the charge is changed on the outside of the cell, then necessary chemicals may not go in or poisonous chemicals may not go out.

Children

65. WI-FI in a classroom is more powerful energy than having a cell tower 300m away. It makes no sense to have WI-FI in the class, especially where cell masts are disallowed.

66. My position as scientific advisor requires that I read and translate papers from all around the world, and, I have never, ever, no matter which country I lecture in, which paper I have read, I have never seen a single scientist brave enough to submit for peer review a safety level of microwave radiation for a child or embryo. There is not one that exists. Last year I lectured in six countries. When I'm in a country I challenge on TV the industry and the government to produce a scientist who will come on air with me and cite a safe level for children. In 12 years, no one has ever come forward.

67. Children act like antennas and absorb more radiation than adults because they are smaller, and their very dimensions approximate the deployment's wavelength. See example of humans acting as antennae: Cohn G, Morris D, Patel S, Tan D, *Your Noise is My Command: Sensing Gestures Using the Body as an Antennae*, http://research.microsoft.com/en-us/um/redmond/groups/cue/publications/chi2011_rfgestures_cohn.pdf:

> A basic receiving antenna can be thought of as an apparatus that converts electromagnetic waves into electrical current * * * It turns out that the human body is also a very effective antenna over a broad frequency range. As an electrical conductor, when exposed to electromagnetic fields, it behaves as an antenna with a frequency resonance determined by various factors including height, posture, etc.

68. Children are not merely small adults. They are physiologically and neurologically immature; their systems have not yet formed. Microwave radiation alters the blood-brain barrier

so that toxins leak into the brain. This can cause neurologic and psychologic amongst many other problems more easily in children. A child's immune system, which fights off infection, takes 18 years to develop. Additionally, 122 layers of protein – myelin – insulate the electrically generated signals used by the nervous system to control muscles and organs. These layers of protein take 22 years to develop. MW radiation has been shown to affect protein synthesis. This could lead to muscular dystrophy-like symptoms in later life.

69. I have always predicted that any school that allows itself to be 'bathed' in microwaves from whatever source will see its sicknesses rise and behaviour fall. I have received many phone calls to confirm this. In all of the schools I have visited around the world with WI-FI, every one has reported the same symptoms in students: fatigue, headaches, nausea, chest pain, vision problems. I argue that one could experience from microwave radiation psychologic problems, with increase in aggression and other bad behaviour, as well as reduced immune symptoms, leading to more and longer colds and coughs, depression, anxiety, bad behaviour and suicidal tendencies from sleep deprivation and finally – leukaemia.

70. The effects of microwaves will continue long after the children are exposed at school. A study has been carried out on children using an ordinary microwave transmitter, a cell phone. What it found was that after just two minutes' use of a cell phone, the children had their natural brain waves disrupted for up to two hours thereafter. This is called long-term potentiation, and it can last up to six weeks.

71. Research suggests children and women (females have more complex hormone-based systems to be disrupted than males) exhibit more vulnerability to illnesses from MW irradiation than do adult males.

72. The problem with young girls is that microwave irradiation has been shown to damage the genetic structure in their ovaries. Girls are born with all of the eggs they need in their ovaries at

birth. They are immature eggs, hence susceptible to damage during growth. ***Microwaves are genotoxic*** (experiments can be linked to children showing low-level mobile telephony radiation disrupts the biochemistry of follicle cells in a mammalian egg chamber), hence the microwaves irradiation could affect the genetic structure within the eggs. The problem here is that the mitochondrial DNA, the genes inside the ovaries, is irreparable.[1][2][3] If you have a little girl in whom there is damage through this mechanism to the genetic structure in one of her eggs, and she has a daughter, that daughter will carry that genetic problem. It is irreparable. And her daughter in turn will carry that genetic problem, because it is irreparable. And every female *forever*, in that line, will carry that problem in perpetuity, because it is irreparable. Attached as Addendum 'A' is a diagram further explaining this process.

73. I believe the most important research I have read is from Dr. Goldsworthy, *The biological effects of weak electromagnetic fields* (2007), http:tinyurl.com/2nfuj; also, a.goldsworthy@imperial.ac.uk. Dr. Goldsworthy not only shows the mechanism by which microwaves disrupt cells, but also predicts that a genetically damaged sperm and egg can lead to mutant offspring. If you think of children with these transmitters near their laps, the question must be, 'Why do this for the sake of a piece of cable and a plug, which could replace WI-FI with no loss of performance, and in fact improved performance?'

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[1] Acharya, PVN; The Effect of Ionizing Radiation on the Formation of Age-Correlated Oligo Deoxyribo Nucleo Phospheryl Peptides in Mammalian Cells; 10th International Congress of Gerontology, Jerusalem. Abstract No. 1; January 1975. Work done while employed by Dept. of Pathology, University of Wisconsin, Madison.

[2] Acharya, PVN; Implicatons of The Action of Low-Level Ionizing Radiation on the Inducement of Irreparable DNA Damage Leading to Mammalian Aging and Chemical Carcinogenesis.; 10th International Congress of Biochemistry, Hamburg, Germany. Abstract No. 01-1-079; July 1976. Work done while employed by Dept. of Pathology, University of Wisconsin, Madison.

[3] Acharya, PV Narasimh; Irreparable DNA-Damage by Industrial Pollutants in Pre-mature Aging, Chemical Carcinogenesis and Cardiac Hypertrophy: Experiments and Theory; 1st International Meeting of Heads of Clinical Biochemistry Laboratories, Jerusalem, Israel. April 1977. Work conducted at Industrial Safety Institute and Behavioral Cybernetics Laboratory, University of Wisconsin, Madison.

74. This represents permanent, low-level microwave damage, and it also involves the induction of chronic nitrosative and oxidative stress.

Warnke, http://www.hese-project.org/de/emf/WissenschaftForschung/Warnke_Dr.%20rer.%20nat._Ulrich/20050219_VortragDrWarnke.pdf (2005) (in German, English translation in progress). It is known that chronic nitrosative/oxidative stress damages the mitochondria, the 'powerhouses' of each cell in the body. Mitochondropathy is at the root of many of today's chronic illnesses, such as MS, Alzheimers, Parkinsons, Fibromyalgia Diabetes, Artherosclerosis and Obesity. Kuklinsli, http://www.kpu-berlin.de/For_Neu_Kuklinski_1_en.html (2004). Even more disturbingly, when chronic nitrosative and oxidative stress is present, irreversible mitochondrial DNA damage will occur sooner or later (see also Kuklinski, http://www.kpu-berlin.de/For_Neu_Kuklinski_1_en.html (2004)). The mitochondrial DNA is ten times more susceptible to nitrosative / oxidative stress than is the DNA in the cell nucleus. Whilst regular cell DNA has built-in repair mechanisms, mitochondrial DNA is irreparable, due to its low histone protein content. The mitochondropathy is therefore irreversibly transmitted to the children by the maternal egg cell, causing cumulative irreparable damage to future generations.

75. There is no known safe level of MW irradiation for an embryo, a fetus, a child or a pregnant woman.

Electro-hyper-sensitivity

76. The World Health Organization (WHO) recognizes and describes electro-hyper-sensitivity. Electro-hyper-sensitivity can be compared to a food allergy that exposes the person to great harm on each occasion that the food is absorbed. If a food received this much adverse publicity from research all over the world, it would be immediately taken off the shelf.

77. In Sweden, it is published that 3.15 percent of its population is medically recognized and registered as being handicapped from electro-hyper-sensitivity. This number is comparable in California and it is believed to be similar in Australia. The Irish Doctors' Association believes this figure may actually be as high as 15 percent.

Experimentation

78. In 2008, the European Parliament wrote to its 27 countries urging them to ignore WHO guidelines and set exposure limits at lower levels. Ries, *European Parliament 2004-2009 Commission on the Environment. Public Health and Food Safety*, 2008/2211/INI (translation by www.nexyt-up.org) Editor: Frederique Ries (2008). In response, the WHO (which only began studying microwave radiation effects on children in 2009) stated it will not comment on microwave radiation effects on people until 2015, when it will be able to establish effects on human beings. Their researchers are watching people to see how many will become sick. We are being experimented upon.

The Cumulative Dose

79. Professors Sosskind, Provsnitz, Lai, and Cherry and a Russian International Medical Commission have all warned about the cumulative effect of these microwaves. See, Effects of chronic microwave irradiation on mice, S Prausnitz & C Susskind, 1962.

80. Professor Sosskind and Provsnitz write, 'An accumulated cellular level damage mechanism is not necessarily related to the intensity but can relate to total dose.' This is not surprising; a property of electromagnetic radiation exposure is that the effects are cumulative. By way of example, if we go out on a cloudy day we can still get sunburned, it just takes longer.

81. In the report *Mobile telephones, their base stations and health*, from the French Health General Directorate, January (2001), they warn of the cumulative exposure over the lifetime of a child. This body concluded with an interesting sentence stating, 'Biological

effects occur at energy levels that do not cause any rise in local temperature.' As it may be argued that biological effects may not be hazardous, ***the responsibility for this decision concerning children should lay with the parents***, guardians or those in loco-parentis and not the school.

82. Based upon a review of the Mount Tabor School WI-FI Floor Plan, schoolchildren will be exposed to as much as 30-40 hours per week of constant, digitally encoded pulsed WI-FI signals from each wireless device in the child's vicinity, in addition to the infrastructure, making the cumulative exposure over a child's lifetime successively higher.

83. When reviewing this case, it occurred to me to compare the relative cumulative dose of WI-FI in the classrooms with a commonly known device that emits the same frequencies. That device is a microwave oven. Both WI-FI and microwave ovens operate at a frequency of ~2.4 GHz. An average WI-FI transmitter operates on 0.2 J/s [0.2 Watts] power. Therefore, if using only 20 computer/laptop transmitters in a classroom, there is a combined 4 J/s [4 Watts]. A typical microwave oven (output) is 800 J/s [800 Watts] (magnetron input equals 1,200 J/s [1,200 Watts]). A classroom equals 4 J/s [4 Watts]; a microwave oven 800 J/s [800 Watts]. A ratio of 1:200. Thus, if WI-FI is used in morning and afternoon sessions, and if 200 seconds in a classroom (at 4 J/s [4 Watts]) equals 1 second inside a microwave oven (at 800 J/s [800 Watts]), then over a school day a child or adult receives the equivalent of 2 minutes in a microwave oven, 10 minutes per week.[4]

[4] It should be noted these calculations will vary according to the following factors:

i. There can be approximately 13 mathematical variations to wave formulae;
ii. The $1/d^2$ rule will apply to distance;
iii. The wall transmitter and main transmitter are not included/calculated;
iv. Constructive interference patterns are not calculated;
v. WI-FI sets and transmitters in nearby classrooms are not included/calculated; and
vi. Reflective materials are unknown: i.e. wall insulation.

To understand fully the actual exposures, a reading will be taken in a classroom with 20 or more fully operational

84. As a final word about cumulative dose, it must be stressed that a long-low exposure can be more dangerous than a short-high exposure. By way of example, as I wrote in my published paper (co-written with Scientist Andrea Klein), *Wireless Laptops and Their Transmitters Using Microwaves in Schools*, http://www.mastsanity.org/wifi/17/154-wireless-laptops-and-their-transmitters-using-microwaves-in-schools-a-report-by-barrie-trower.html, Permanent low-level microwave exposure can induce chronic nitrosative/oxidative stress; hence damage to mitochondrial DNA.

Conclusion

85. There is a simple solution, use a cable and a plug or fibre optic cable to deliver the Internet.

86. With all of this evidence pointing to physical, mental and long-term disorders even long into the future (including cancers and mutant newborns), is this honestly worth the risk to our next generations for the sake of just a few metres of wire and a plug. As shown, the dangers of low-level, below-thermal microwaves, have been known to governments for >50 years. I was educated in microwave technology by the Military (United Kingdom) in the early 1960's, and even then we were instructed of these dangers. Nothing has changed to suddenly make microwaves safe.

87. The evidence for adverse effects of low-level microwave irradiation is currently strong and grows stronger with each new study. Using a cabled Internet system does not increase exposure.

88. I ask you, if a drink were reported in the 1950's to cause cancer and other ill effects, and if countless reports and epidemiologic and toxicologic studies and expert associations since showed these reports to be correct, would you give this to your children to drink, knowing they have their whole lives ahead of them? So what is the difference? It is simple. This product, pulse-modulated microwave radiation from WI-FI, is backed and financed by the most powerful

computers and WI-FI transmission devices next to other classrooms (below, above, adjacent, etc.) with 20 or more fully operational transmission devices in each of those rooms.

industry on the planet. This is an industry that apparently does not have to prove its product is safe (unlike a drug company). Incredibly, the public is rather told to prove it is not! Thence take this industry to court with your list of impairments, illnesses, cancers, leukaemias, early deaths, etc.

89. Within the relevant scientific community, it is generally accepted that that many bioeffects and adverse health effects occur at far lower levels of radio wave and MW exposure where no measurable heating occurs; some effects are shown to occur at several hundred thousand times below the existing public guidelines.

90. In my opinion, Portland Public Schools' use of WI-FI is causing and will continue to cause AHM, other students, and school staff and faculty adverse health effects, and should be discontinued immediately.

Dated this 21st day of December 2011.

/s/ Barrie Trower

BARRIE TROWER