



Submission to the Royal Society of Canada's Expert Panel Reviewing Safety Code 6

Electromagnetic Hypersensitivity “EHS”

and

Safety Code 6 Recommendations





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Background

Safe Living Technologies is comprised of expert Electromagnetic Field (EMF) service providers and Radio Frequency (RF) service providers throughout Canada and the USA. These professionals each have unique talents and extensive experience in a variety of fields. Our team is proficient in EMF measurements, EMF troubleshooting, EMF shielding and RF shielding, mitigation of Electromagnetic Fields and Electrical power engineering.

Rob Metzinger, the President of Safe Living Technologies Inc., is an Electronics Engineering Technologist, Certified Building Biologist and Certified Electromagnetic Radiation Safety Advisor (CERSA). He is one of Canada's top EMR Technical Experts relating to Electromagnetic Hypersensitivity (EHS) and EMF exposure measurements. Rob has been conducting EMR inspections for the past 10 years. He is also a factory certified Gigahertz Solutions Test Equipment Technician and Instructor. Rob also instructs a one week Electromagnetic Emissions Seminar for the Institute of Building Biology USA. See here for details: <http://hbelc.org/pdf/events/syllabus212.pdf>

Radio Frequency Testing

Safe Living Technologies Inc. and its associates offer a comprehensive range of professional consulting services to address Exposure and Interference in Residential and Commercial applications. Our Certified EMF Technicians are equipped with professional testing equipment which covers a large range of electromagnetic frequencies, 27 MHz – 10 GHz, in the High Frequency Spectrum. We also cover low frequency Electromagnetic Radiation 5 Hz – 1 MHz.

Commercial RF Testing

From a commercial standpoint, we have seen RF pollution produce various forms of Electromagnetic Interference (EMI) and cause equipment failures. This is particularly true for sensitive medical equipment in the health care industry as well as computer electronics gear. We have also seen a dramatic increase in the need for intellectual / virtual information protection, hence an increased demand for the RF shielding. Industry is now interested in keeping confidential signals in and to keep suspicious signals out.

Residential RF Testing

Our residential customers are primarily interested in lowering long term RF exposure, and especially in lowering long term RF exposure in sleeping areas. From a Health and Safety point of view, research tells us that constant exposure to this low level radiation is detrimental to health. Current exposures primarily involve Information Carrying Radio Waves (ICRW) or digital communications pollution. This form of high frequency electromagnetic radiation has a pulsed digitized component which has a higher biological impact than older technologies known as analogue. The use of Radio Frequency "RF" Wave technology plays an integral part in our daily lives. With the expansion of wireless technologies, exposure levels of these types of signals are ever increasing.

We are EHS Specialists

Many of our residential clients suffer from Electromagnetic Hypersensitivity “EHS” and we have 10 years of experience of serving those people who must deal with this condition. Over the years, we have dealt with hundreds of cases and understand what is involved with creating a comfortable and safe environment that promotes recovery.

Symptoms of Environmental Sensitivities / EHS

Environmental Sensitivity Agents as described in the [Canadian Human Rights Commission, Medical Perspective on Environmental Sensitivities](#)

Page# 17, Table 6: Typical agents that trigger reactions in susceptible individuals (and may contribute to initiation of environmental sensitivities)

Electromagnetic Radiation: Examples of Incitants: light, radiowaves, microwaves, very low frequency electromagnetic fields, ground currents

Examples of sources: lighting, video display screens, fluorescent light bulbs, “dirty electricity,” wiring problems, energy-efficient devices, computers, televisions, telecommunications equipment, power lines, power supply services that allow current to flow through the ground, pipes or structures

Environmental Sensitivity Symptoms as described in the [Canadian Human Rights Commission, Medical Perspective on Environmental Sensitivities](#)

Page# 19, Table 7: Environmental sensitivity symptoms/reaction

Nervous System: difficulty concentrating, difficulty remembering, apparent variability in mental processes, feeling dull or groggy, feeling “spacey”, headaches, restlessness, hyperactivity, agitation, insomnia, depression, lack of coordination or balance, anxiety, seizures, tinnitus, heightened sense of smell

Upper respiratory system: stuffy nose, itchy nose (the “allergic salute”), blocked ears, sinus stuffiness, pain, infections

Lower respiratory system: cough, wheezing, shortness of breath, heavy chest, asthma, frequent bronchitis or pneumonia

Eyes: red, watery eyes, dark circles under eyes, pain in eyes, blurred, disturbed vision

Gastrointestinal system: heartburn, nausea, bloating, constipation, diarrhea, abdominal pain

Endocrine system: fatigue, lethargy, blood sugar fluctuations

Musculoskeletal system: joint and muscle pain in the extremities and/or back, muscle twitching or spasms, muscle weakness

Cardiovascular system: rapid or irregular heartbeat, cold extremities, high or low blood pressure

Skin (dermatological system): flushing (whole body, or isolated, such as ears, nose or cheeks), hives, eczema, other rashes, itching

Genitourinary system: frequency and urgency to urinate, painful bladder spasms

[BioInitiative Report 2012](#) (page 14, 15)

People who are chronically exposed to low-level wireless antenna emissions report symptoms such as problems in sleeping (insomnia), fatigue, headache, dizziness, grogginess, lack of concentration, memory problems, ringing in the ears (tinnitus), problems with balance and orientation, and difficulty in multi-tasking. In children, exposures to cell phone radiation have

resulted in changes in brain oscillatory activity during some memory tasks. Although scientific studies as yet have not been able to confirm a cause-and-effect relationship; these complaints are widespread and the cause of significant public concern in some countries where wireless technologies are fairly mature and widely distributed (Sweden, Denmark, France, Germany, Italy, Switzerland, Austria, Greece, Israel). For example, the roll-out of the new 3rd Generation wireless phones (and related community-wide antenna RF emissions in the Netherlands) caused almost immediate public complaints of illness.

Long Term Health Effects

Adult cancer, tumours, childhood leukemia, breast cancer, DNA strand breakage, abnormal cell division, nerve damage, MS, ALS, Alzheimer and Parkinson disease, brain damage, melatonin reduction, and miscarriages.

Prognosis

The severity of the symptom usually indicates the degree or stage of EHS. The stages vary from slight discomfort to debilitating long term effects. The complete minimization of artificial electromagnetic radiation is necessary for relief. Recovery is possible and has proven to be a multi-step process unique to each individual: assistance from medical professionals is recommended.

Our Findings

We are finding individuals who have been physician-diagnosed with EHS, or who are self diagnosed, react to levels many times less than the Safety Code 6 guidelines. We believe the level of RF radiation that affects most people with EHS can be as low as $10 \mu\text{W}/\text{m}^2$ and even less in some cases. When measures are taken to lower radio frequency radiation in high occupancy areas and sleeping areas to less than $10 \mu\text{W}/\text{m}^2$, our clients tell us they experience a reduction in the severity of symptoms.

On this basis, we follow the following [Building Biology](#) and [Austrian Medical Association Guidelines](#).

BUILDING BIOLOGY GUIDELINES (SBM-2008) AND THE AUSTRIAN MEDICAL ASSOCIATION PRECAUTIONARY For Sleeping Areas

Power density in microwatt per square meter $\mu\text{W}/\text{m}^2$ per square cm $\mu\text{W}/\text{cm}^2$	No Concern	Slight Concern	Severe Concern	Extreme Concern
	< 0.1	0.1-10	10 - 1000	> 1000
	< 0.000,01	0.000,01 - 0.001	0.001 - 0.1	> 0.1

International Exposure Guidelines are too High for Electrically Sensitive Persons

Radio Frequency Radiation guidelines for Canada, the USA and most Western European countries are typically $2,000,000 - 10,000,000 \mu\text{W}/\text{m}^2$. We have conducted hundreds of site assessments and the typical measurement values we encounter are between $20 \mu\text{W}/\text{m}^2 - 7,000 \mu\text{W}/\text{m}^2$. These levels are enough to trigger symptoms of EHS.

International RF Exposure Guidelines

Exposure Levels in $\mu\text{W}/\text{m}^2$	National and International Exposure Guidelines
100,000,000	U.S. Standard C95.1-1966 (occupational exposure) The first standard limiting exposure to microwaves in the Western world.
10,000,000 - 2,000,000	Canada Safety Code 6 (1999-2009) 100MHz - 300GHz
10,000,000 - 2,000,000	ICNIRP International Guidelines (1998) 10MHz – 300GHz These guidelines are based on biological effects of short-term, high-level exposures only, also referred to as thermal effects. Germany (1996), USA (1997), Japan (1997), Switzerland (2000), Australia (2002), Finland (2002), Sweden (2002), UK (2004), Austria (2006), etc.
1,000,000	India (2012) Exposure limit of cell tower radiation for general public
up to 1,000,000	RF radiation exposure from cell phone handset at 1 foot
up to 400,000	DECT cordless phones at 1 foot: 100,000-400,000 $\mu\text{W}/\text{m}^2$
up to 200,000	Wi-Fi access points/clients at 8 inches: 100,000-200,000 $\mu\text{W}/\text{m}^2$
up to 100,000	In the vicinity of cell towers (400-m radius): 1,000-100,000 $\mu\text{W}/\text{m}^2$
~100,000	China Ministry of Health Standard (1987) Exposure limit for “first grade environment” or sensitive areas
~100,000	Toronto Board of Health, Canada (1999) 100MHz - 300GHz Prudent Avoidance Policy for Siting of Cell Phone Base Stations:
~100,000	Italy Decree (2003) Precautionary attention level not to be exceeded in sensitive areas
~95,500 – 42,500	Switzerland Ordinance (NISV 2000) (1800MHz, 900MHz) Precautionary cell tower exposure limit for sensitive areas
40,000	DECT cordless phone at 1 m: 2,000-40,000 $\mu\text{W}/\text{m}^2$
30,000 - 5000	Smart meter Emissions at 100 cm
~24,000	Ukraine Health & Safety Guideline (1996) Regional Ordinances in Brussels (2007), Wallonia (2009), Flanders (2010)
20,000	Wi-Fi router/access point/PC card at 50 cm: 1,000-20,000 $\mu\text{W}/\text{m}^2$
20,000	Standard RF baby monitor at 30 cm: 2,000-20,000 $\mu\text{W}/\text{m}^2$ Low-emission baby monitor (Germany) at 30 cm: only 35 $\mu\text{W}/\text{m}^2$
10,000	ECOLOG Institute in Germany (2000) Precautionary recommendation based on review of scientific literature
3,000	Emissions from single RF sources (e.g. cell tower) at max. 30% of precautionary limit
1,700	Seletun Consensus Statement (2010) Precautionary recommendation
1,000	Salzburg Resolution on Mobile Telecommunication Base Stations (2000) Precautionary recommendation
1,000	BioInitiative Working Group (2007) Precautionary recommendation
1,000	Parliamentary Assembly of Council of Europe (2011) Precautionary recommendation for indoor environments
1,000	Austrian Antenna System Siting Guideline (2012)

	Precautionary target threshold level inside and outside a building
100	Working Group of EU STOA Panel (2001) Precautionary recommendation
100	BUND (Friends of the Earth Germany) (2008) Precautionary recommendation for hazard protection
100	Parliamentary Assembly of Council of Europe (2011) Precautionary recommendation for indoor environments for medium-term
10	Health Department of the Federal State of Salzburg (Austria 2002) Precautionary recommendation for outdoor environment (GSM sum total)
10	TQB Green Building Rating System (Austria 2009) Largest number of credit points for indoor environment
3-6	BioInitiative Working Group (2012) Precautionary recommendation
1	Health Department of the Federal State of Salzburg (Austria 2002) Precautionary recommendation for indoor environment (GSM sum total)
1	BUND (Friends of the Earth Germany) (2008) Precautionary recommendation for general protection
1	EMF Working Group of Austrian Medical Association (2012) EMF guidelines for diagnosis and treatment of EMF-related health problems “within normal limits”
0.1	Building Biology Evaluation Guidelines (SBM-2008) “No Concern” Specifically designed for sleeping areas associated with long-term risks
0.001	Minimum power level required for cell phone communication
~0.000 001	Natural background (30 MHz-30 GHz)
Information in the Table above provided by Rainbow Consulting Click Here for the Direct Link	

Smart Meter Radio Frequency Data Collection - Guelph, Ontario, Canada

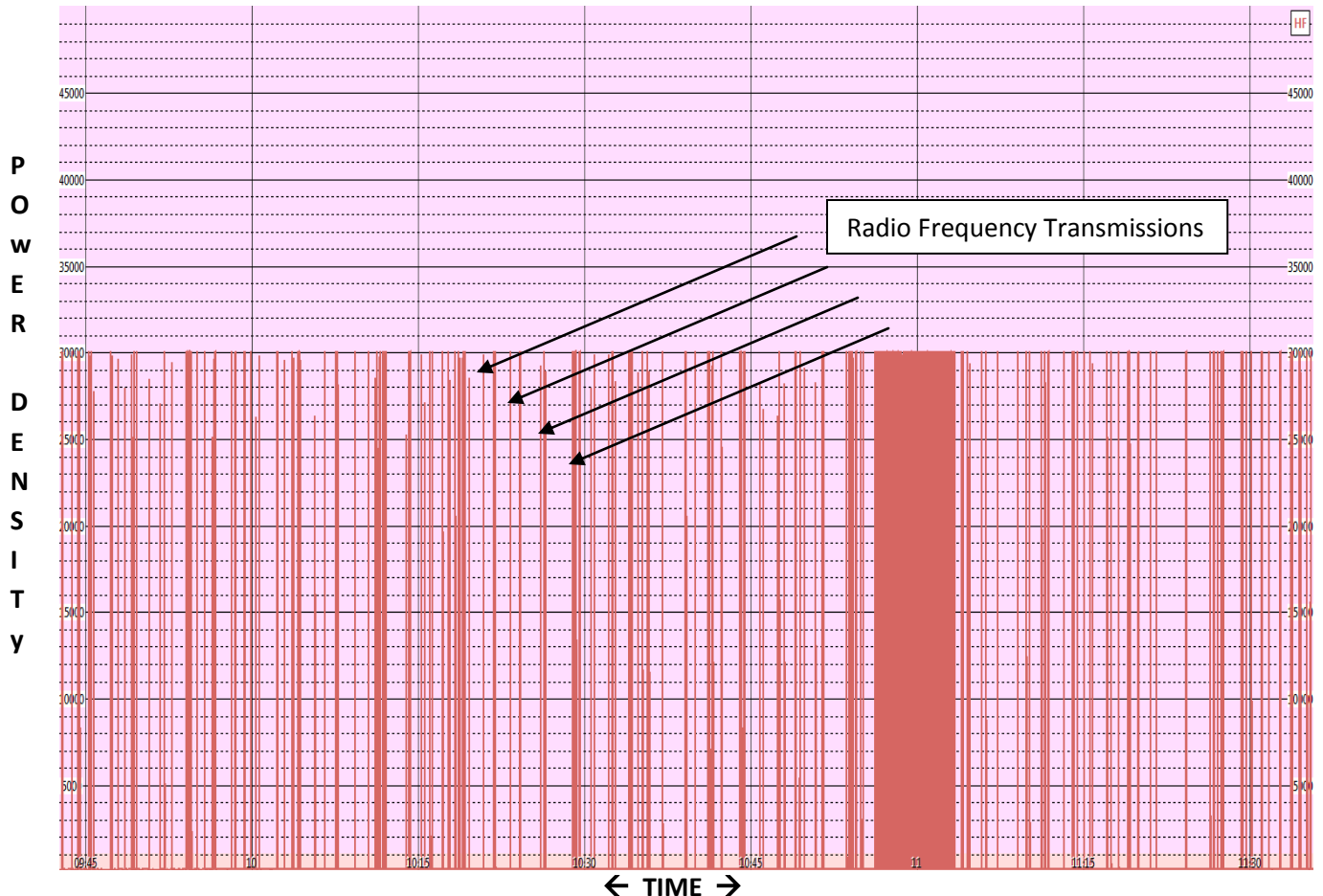
Meter Model – Guelph Hydro Electric Systems – GE - I 201+

Smart Meter Data Log: Outdoor Smart Meter Log @ 3 feet in front of Smart Meter

Logging Time: Approx (10:42am – 11:35am)



Smart Meter Radio Frequency Data Collection - Guelph, Ontario, Canada



Maximum Reading: Over 30,000 $\mu\text{W}/\text{m}^2$ Microwatts / Square Meter (30,000 is max range of this measurement scale)

Average: 1596.90 $\mu\text{W}/\text{m}^2$ Microwatts / Square Meter

Average of Peaks: 29693.73 $\mu\text{W}/\text{m}^2$ Microwatts / Square Meter

Transmissions Per Hour (Edges): 162

Safety Code 6 Safety Limit for 900 MHz, General Public: (Appendix B) $f/150 = 900/150 = 6 \text{ W}/\text{m}^2$ or 6,000,000 $\mu\text{W}/\text{m}^2$

% Safety Code 6 (max peak reading): $(30,000 \times 100)/6,000,000 = 0.5 \%$

Smart Meter Reading Conclusions:

Smart meters use RF Radiation to transmit a home owner's power usage data back to the utility company. Utility companies state that usage data is being transmitted back to the power company once a day. Most Smart meters are part of a wireless mesh network which requires background communication in order to maintain connectivity within the network. In the example above, the Smart meter is transmitting at 162 transmissions per hour which is a bit surprising as it only needs to transfer data once per day. This Smart meter transmits RF information at a level of approximately 30,000 $\mu\text{W}/\text{m}^2$ (peak reading) at a distance of 3 feet , 162 times per hour or 2.7 times per minute. We have measured dozens of Smart meters and found they all emit RF radiation from 1 time per hour to hundreds of times per hour.



Many of our customers have developed EHS shortly after the installation of their Smart meter. The most common symptoms are insomnia, fatigue, headache, dizziness, grogginess, lack of concentration, memory problems, ringing in the ears (tinnitus), problems with balance and orientation.

A mitigating measure that has proven helpful in some cases is use of telephone modems. Some power companies (Toronto Hydro for example) has replaced the radio transmitters inside of their Smart meters with telephone line modems in order to send the power usage data back to the power company via telephone lines instead of radio transmissions. The elimination of the radio frequency transmitter from Smart meters, has given instant relief of EHS symptoms to some of our clients.

Moving forward we would recommend using a hard wired system instead of a radio frequency based system. Telephone modem systems are outdated technology and could be replaced with an Ethernet interface which would allow for a direct connection to the internet.

Problems with Existing Public Health Standards (Safety Limits)

The problem has been well described by the [BioInitiative Report 2012](#) page 6

Quote:

"Today's public exposure limits for telecommunications are based on the presumption that heating of tissue (for RF) or induced electric currents in the body (for ELF - extremely Low Frequency) are the only concerns when living organisms are exposed to RF. These exposures can create tissue heating that is well known to be harmful in even very short-term doses. As such, thermal limits do serve a purpose. For example, for people whose occupations require them to work around radar facilities or RF heat sealers, or

for people who install and service wireless antenna tower, thermally-based limits are necessary to prevent damage from heating (or, in the case of power-frequency ELF from induced current flow in tissues). In the past, scientists and engineers developed exposure standards for electromagnetic radiation based on what we now believe are faulty assumptions that the right way to measure how much non-ionizing energy humans can tolerate (how much exposure) without harm is to measure only the heating of tissue (RF) or induced currents in the body (ELF).

In the last few decades, it has been established beyond any reasonable doubt that bioeffects and some adverse health effects occur at far lower levels of RF and ELF exposure where no heating (or induced currents) occurs at all; some effects are shown to occur at several hundred thousand times below the existing public safety limits where heating is an impossibility.

Effects occur at non-thermal or low-intensity exposure levels thousands of times below the levels that federal agencies say should keep the public safe. For many new devices operating with wireless technologies, the devices are exempt from any regulatory standards. The existing standards have been proven to be inadequate to control against harm from low-intensity, chronic exposures, based on any reasonable, independent assessment of the scientific literature. It means that an entirely new basis (a biological basis) for new exposure standards is needed. New standards need to take into account what we have learned about the effects of ELF and RF (all non-ionizing electromagnetic radiation) and to design new limits based on biologically demonstrated effects that are important to proper biological function in living organisms. It is vital to do so because the explosion of new sources has created unprecedented levels of artificial electromagnetic fields that now cover all but remote areas of the habitable space on earth. Midcourse corrections are needed in the way we accept, test and deploy new technologies that expose us to ELF and RF in order to avert public health problems of a global nature."

Conclusion

We have found radio frequency exposure levels which affect people that suffer from EHS to be many times lower than that of Safety Code 6. Safety Code 6 guidelines are solely based on thermal effects and do not consider the non-thermal effects. We would ask the Panel reviewing Safety Code 6 to recommend to Health Canada that these two aspects be fully investigated by independent, unbiased scientists in a transparent process open to public scrutiny and have Safety Code 6 amended appropriately.

Please contact me if you have any questions or would like clarification.

Sincerely,

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