

Low-Emission Office Environments A Canadian Perspective

As early as 1989, the EU issued a guideline on occupational health as part of its Framework Programme that went beyond mere accident prevention and instead demanded health prevention.¹ Seven years later, the EU guideline „on the minimum safety and health requirements for work with display screen equipment“² was adopted as federal law³ in Germany. Here in Canada, most provinces can only dream about such things. In my home province British Columbia, minimum technical requirements for VDTs, including the workstation and work organization, have been issued since 1999.

In contrast to the European VDT guideline, which also takes electromagnetic emissions into account and demands that „all radiation with the exception of the visible part of the electromagnetic spectrum shall be reduced to negligible levels from the point of view of the protection of workers' safety and health,“ this important environmental factor is not even mentioned in most Canadian regulations. This may not come as a surprise when considering that Canada does not even have any limits to protect the general public (or workers) from the exposure to ELF electric and magnetic fields, not even astronomically high ones. In its current edition of *Radiation Risk Ergonomics & VDTs*,⁴ the BC Centre for Disease Control explicitly recommends against the purchase of „electromagnetic shields“ for computer screens.

This absurd recommendation caused me to write a paper about low-emission office environments⁵ whose scope is not only limited to ELF magnetic fields but also considers exposures to the electrical component of ELF fields as well as RF radiation and static fields. Since none of the Canadian regulations concerning electromagnetic fields addresses preventive health care, I have compiled a catalogue which lists the exposure data of the most common office equipment so that everybody can decide for him- or herself how much radiation they would like to be exposed to. The technical details are

¹ Council of the European Union. 1989 June 12. Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML>

² Council of the European Union. 1990 May 29. Council directive 90/270/EEC on the minimum safety and health requirements for work with display screen equipment: fifth individual directive within the meaning of Article 16(1) of directive 89/391/EEC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31990L0270:EN:HTML>

³ Bundesministerium der Justiz. 1996. Verordnung über Sicherheit und Gesundheitsschutz bei der Arbeit an Bildschirmgeräten (Bildschirmarbeitsverordnung - BildscharbV) [Health and Safety Regulation for VDT Workstations in Offices]. Berlin: Bundesministerium der Justiz; German. www.gesetze-im-internet.de/bildscharbv/BJNR184300996.html

⁴ BC Centre for Disease Control: Radiation risk ergonomics & video display terminals (VDTs). Vancouver (BC): BC Centre for Disease Control, 2002. <http://www.bccdc.org/downloads/pdf/rps/reports/vdtbooklet.pdf>

⁵ Katharina Gustavs: Options to Minimize Non-Ionizing Electromagnetic Radiation Exposures (EMF/RF/Static Fields) in Office Environments. Final Paper of Environmental and Occupational Health Certificate Program at University of Victoria, 2008. <http://www.buildingbiology.ca/healthyoffice.php>

complemented with specific recommendations on how to reduce one's exposure to the various types of electromagnetic fields. Therefore, I hope that this paper can also be of use to office workers in other countries.

As part of the research project "Indoor Environments"⁶ at Queensland University in Australia, comprehensive data about energy-efficient building and healthy workplaces has been gathered. It was revealed that the financial gain from reducing a building's energy consumption by 50% would be equivalent to the one achieved if productivity were increased by only 1%. Saving energy is vitally important but a healthy workplace even more though. In my search for science-based recommendations on how a person's electromagnetic radiation exposure in office environments can be lowered and on how well-being and productivity can be increased, I made some interesting discoveries.

Standards for Low-Emission VDTs

In its above-mentioned document, the BC Centre for Disease Control is busy quoting from all those scientific studies that were unable to observe any association between e.g. miscarriage rates and VDT work. The authors, of course, are correct when stating that the worldwide first guideline for low-emission VDTs from Sweden (TCO/MPR⁷) is not a health-based standard but what is technically achievable. However, they conveniently forget to mention that, for the past 15 years, all computer screens sold in Sweden—as well as in Germany—are low-emission and TCO certified. Here in Canada, most people have not even heard of TCO certification yet.

Still, this does not change the fact that news about adverse health effects of low-level exposures keep accumulating. In a study from 2002⁸, for example, the peak values (above 1,400 nT/1,600 nT) of 24-hour data logging showed a clear dose-effect relationship between magnetic field exposure and the miscarriage rate in pregnant office workers.

Russia has obviously taken this research more seriously and, in 2003, issued a health regulation⁹, which not only applies to computer screens in occupational settings but also includes preschools, educational institutions, and video game machines. Interestingly, the permissible threshold values for the EMF emissions from VDTs, which in Russia are regulated by its chief

⁶ Bell J: Indoor environments: design, productivity and health: literature database. Report no.: 2001-005-B. Brisbane, Australia: Cooperative Research Centre for Construction Innovation, 2004.

http://www.construction-innovation.info/images/pdfs/Research_library/ResearchLibraryB/FinalReports/Indoor_Environment_Design_Productivity_and_Health.pdf

⁷ www.tcodevelopment.com

⁸ Lee GM, Neutra RR, Hristova L, Yost M, Hiatt R. 2002. A nested case-control study of residential and personal magnetic field measures and miscarriages. *Epidemiology*. 13(1):21-31.

Li DK et al. 2002. A population-based prospective cohort study of personal exposure to magnetic fields during pregnancy and the risk of miscarriage. *Epidemiology*. 13(1):9-20.

⁹ Ministry of Health of the Russian Federation. 2003 Jun 30. [Sanitary and epidemiological norms on hygienic requirements for personal computers and work organization]. Norm No.: SanPiN 2.2.2./2.4.1340-03. Russian.

medical officer, are much closer to the limits of the „technical“ Swedish TCO standard than the usual 5,000 V/m or 100,000 nT of so-called „safety standards.“

	Frequency Range	Swedish Standard TCO 2003 (since 1992) (30 cm distance)	2003 Russian VDT Regulation SanPin 2.2.2./2.4.1340-03 (50 cm distance)
Electric Field	ELF 5-2000 Hz	10 V/m	25 V/m
	VLF 2-400 kHz	1 V/m	2,5 V/m
Magnetic Field	ELF 5-2000 Hz	200 nT	250 nT
	VLF 2-400 kHz	25 nT	25 nT
Electrostatic potential of VDT screen		500 V	500 V

Furthermore, the Russian VDT regulation also addresses the special needs of pregnant women who are allowed to reduce their VDT work to three hours a day, otherwise a VDT-free workplace has to be provided. This, however, is of very little help if the alternative workplace is located directly above or beside the main electrical room of the office building because the ambient radiation level would exceed any low-emission VDT guideline. I, therefore, favor the building biology approach: First take measurements, then make decisions.

Do Headsets Emit Less Radiation Than Cell Phones?

Though the final results of the Interphone study on brain tumors and cell phone use are a long time in coming, the results of the Hardell group in Sweden were confirmed by the Interphone’s interim report¹⁰ in fall 2008: After ten years of cell phone use, the brain tumor risk doubles.

Time and again we are told that the use of a headset would reduce the user’s RF radiation exposure. There have been various investigations looking into this very issue since the beginning of the 2000s. Consumer magazines in Germany (Ökotest¹¹) and Great Britain (Which?) warned that the use of headsets would actually increase the RF radiation exposure. Right away, they were accused of having used unscientific testing methods.

The measurements of lowered RF radiation levels found in an investigation by Motorola’s laboratory¹² were only provided for the head region, referring to the rest of the body as a „lossy cylinder“. What this means in plain English is that the closer the headset wire runs along the body, the more energy gets

¹⁰ Interphone: Results latest update. 8 October 2008. <http://www.iarc.fr/en/research-groups/RAD/Interphone8oct08.pdf>

¹¹ Becker S. 2000. Test Headsets für Handys: heißer Draht [Mobile phone headset test: hot wire]. Ökotest Magazin. 8:48-49. German. Summary available from: <http://www.oekotest.com/cqi/ot/otqs.cqi?suchtext=headset&doc=10608>

¹² Bit-Babik G et al. 2003. Estimation of the SAR in the human head and body due to radiofrequency radiation exposure from handheld mobile phones with hands-free accessories. Radiation Research. 159:550-557. <http://www.ncbi.nlm.nih.gov/pubmed/12643800>

„lost“ or, put another way, is absorbed into the body, the less energy makes it into the brain. The authors of this particular investigation also concluded that reducing radiation levels had not been the purpose of a headset to begin with but that a headset was simply meant to offer more convenience.

Electrical engineers from Northern Ireland¹³ traced this lost energy and measured that when the cell phone is clipped to the waist during a phone call, the user's whole-body exposure almost doubles when using a headset! From this follows that even when using a headset with an air tube and ferrites, the cell phone with its actively transmitting antenna always needs to be held or put as far away from the body as possible in order to actually achieve a reduction in radiation exposure. A speakerphone—preferably combined with an external antenna—offers even more opportunities to keep a respective distance. The greatest reduction, of course, occurs when the cell phone is not used but a corded landline instead.

In addition to computer screens and cell phones, there are many other sources of radiation in modern office environments. And many of the resultant radiation exposures are totally unnecessary. Further information about reduction strategies in office environments can be found here (p. 39-66): <http://www.buildingbiology.ca/healthyoffice.php>

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¹³ Troulis SE, Scanlon WG, Evans NE. 2003. Effects of a hands-free wire on specific absorption rate for a waist-mounted 1.8 GHz cellular telephone handset. *Phys Med Biol.* 48:1675-1684.