

TORONTO STAFF REPORT

September 8, 2000

To: Board of Health
From: Dr. Sheela V. Basrur, Medical Officer of Health
Subject: International Conference on Cell Towers

Purpose:

To report on the outcome of the International Conference on Cell Tower Siting: Linking Science and Public Health, held in Salzburg, Austria, June 7-8, 2000.

Financial Implications:

There are no financial implications from this report.

Recommendations:

It is recommended that:

- (1) The Board of Health recommend to Health Canada that public exposure limits for radio frequency fields under Safety Code 6 be made 100 times more strict as previously recommended by the Board of Health for the siting of cellular telephone base transmitters in Toronto and by the International Conference on Cell Tower Siting held in Salzburg, Austria during June 7-8, 2000;
- (2) The Board of Health forward this report to the federal Minister of Industry; and
- (3) The appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

Background:

At its meeting of December 6, 1999, the Board of Health had before it a detailed staff report entitled "Health Concerns of Radio Frequency Fields near Base Telephone Transmission Towers". Based on this report, the Board recommended that the City of Toronto adopt a policy of prudent avoidance with respect to siting of cellular telephone base antennas. On December 9,

1999, the Telecommunications Steering Committee received this report from the Board of Health and directed Urban Development Services to develop a planning protocol for the siting of cellular telephone base antennas in the City of Toronto and to incorporate the recommendations of the Board of Health to include a policy of prudent avoidance. Urban Development Services is scheduling stakeholder consultation meetings in September 2000.

Toronto Public Health was invited to present a paper at the International Conference on Cell Phone Tower Siting on June 7-8, 2000 in Salzburg, Austria. This conference was organised by the State of Salzburg's Public Health Department and the University of Vienna's Institute of Environmental Health. All expenses for Toronto Public Health's attendance at the conference were paid by the organisers. This report provides highlights from the conference.

Comments:

There were about 300 participants at the conference. Speakers came from Western and Eastern Europe, North America and Asia. The 21-member panel of speakers were public health officials and researchers from both governments and universities. Topics covered were the health effects of radio frequency fields (RF), levels of exposure, prudent avoidance with respect to base antennas and cell phone handsets. The aims of the Conference were to present the current state of knowledge on the biological and health effects of radio frequency fields and current exposure levels, and to discuss these from a public health perspective. In addition the Conference considered preliminary exposure limits, which would incorporate the precautionary principle so as to protect human health from radio frequencies emitted by cellular telephone base transmitters.

The consensus of the 21-member panel (with two abstentions) was that current evidence suggests that there is no threshold below which there are no effects of radio frequencies on human health. The panel therefore concluded that exposure levels from radio frequencies should be kept "as low as technologically achievable". Although there is still insufficient data to accurately estimate the risk of low level exposure to radio frequencies, as a preliminary measure to protect public health, the panel recommended that the total of all high frequency radiation should not exceed 0.1 W/m^2 . (This is approximately 100 times below Canadian exposure limits, in keeping with the Toronto Board of Health recommendations of December 1999.) It further recommended that the total emissions from a single site should not exceed 0.001 W/m^2 (or approximately 10,000 times below Canadian exposure limits). It also recommended that the approval process for the installation of cellular telephone base station should allow for public input, address health and aesthetic concerns, and include post-installation monitoring. In addition, a database that contains all cellular telephone antenna sites should be made accessible to municipalities to facilitate the planning process. A summary of the conference presentations is attached (Attachment 1).

Attachment 2 provides a selection of various standards and recommendations for health-based exposure limits to radio frequency fields. It is difficult to compare these exactly since different countries use different measures (e.g. watts per square meter, as in Canada, or volts per meter). As well, because humans are more sensitive to some frequencies, some countries, including Canada, have set different limits for different frequencies. As a result, Canadian exposure limits

vary between 2 and 10 Watts per square meter (W/m²). Other countries (e.g. China, Italy) have set one exposure limit for all frequencies. Attachment 2 ranks the proposed or existing limits in other jurisdictions based on approximate equivalence.

Conclusions:

Evidence presented at the Salzburg conference is consistent with the concerns expressed by Toronto Public Health in its report of November 1999 to the Board on the siting of cellular telephone base transmitters. The evidence presented at the Conference, and the consensus statement of its panel members reinforces the validity of a prudent avoidance policy based on keeping exposure levels to radio frequency fields 100 times below current Canadian Safety Code 6 guidelines, as adopted by the Board at its meeting of December 6, 1999.

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Reference:

Toronto Public Health. Health concerns of radio frequency fields near base telephone transmission towers. Toronto Public Health, November 1999.

Attachments:

- (1) International Conference on Cell Tower Siting – Linking Science and Public Health, Summary Report
- (2) Comparison of Public Exposure Limits for Cellular Telephone Base Antennas

Attachment 1

International Conference on Cell Tower Siting – Linking Science and Public Health: Summary Report

Background:

At its meeting of December 6, 1999, the Board of Health recommended that the City of Toronto adopt a policy of prudent avoidance with respect to siting of cellular telephone base antennas. Toronto Public Health was invited to present a paper at the International Conference on Cell Phone Tower Siting organised by the State of Salzburg's Public Health Department and the University of Vienna's, Institute of Environmental Health June 7-8, 2000, in Salzburg, Austria. Speakers at the conference came from Western and Eastern Europe, North America and Asia. Topics covered were the health effects or radio frequency fields (RF), levels of exposure, prudent avoidance with respect to base antennas and cellphone handsets. This report provides highlights from the various presentations made at the conference.

Health-based Standards:

- (1) Based on medical evidence of effects on the immune system, reproduction and behaviour, China has established guidelines of 0.1 W/m^2 (or approximately 100 times below levels recommended in Canadian Safety Code 6) for areas where people are present for long duration (e.g. residences, schools, hospitals) and 0.4 W/m^2 (or approximately 25 times below Safety Code 6) in other areas.
- (2) Using data from experiments in humans on the impact of radio frequencies on sleep, the Salzburg Department of Public Health has derived its recommendations for exposure limits of 0.001 W/m^2 (or about 10,000 times below Safety Code 6). This voluntary guideline has been achieved in Salzburg by agreement with the carriers.
- (3) A comparison of selected health-based exposure limits from various jurisdictions is given in Attachment 2.

Health Effects:

- (1) A ten-year study around a radio tower in Switzerland has shown a relationship between sleep disturbances and intensity of radio frequency fields.
- (2) A study in Poland showed effects on the cardiovascular system.
- (3) Radio frequency fields result in the clustering of calcium on the cell membrane. Although this is a reversible effect, it cannot be ignored under continuous ambient exposures such as those that occur from cellular telephone base antennas. This clustering could help explain effects such as the increase in permeability in the blood-brain barrier and non-specific symptoms such as headaches.
- (4) There was an increase in infertility in mice exposed to low level radio frequency fields for 5 generations.
- (5) More studies are needed to determine if radio frequency fields can cause cancer. Current data suggest that they may act as promoters of cancer.

Exposure Data:

- (1) Average levels of radio frequencies measured around cellular phone base antennas in Glasgow (Scotland) are 0.00024 W/m^2 , with a high of 0.17 W/m^2 . [The maximum value is between 50 to 100 times below Canadian exposure limits.]
- (2) Monitoring in Sweden found higher levels of radio frequency fields in cities than in rural areas. Outdoors in urban areas, cellular telephone transmission accounted for about 60% of total exposures. Indoors, fields from radio and TV were more dominant. Average outdoor values at the 26 sites monitored were 0.0005 W/m^2 [or more than 1000 times below Canadian limits].

Prudent Avoidance:

- (1) When deciding whether or not there is a need to reduce or limit exposures to hazardous substances, a key area of dispute is the level of evidence that is necessary before action is taken. In civil law, the balance of probabilities is sufficient; that is, a 51% probability that an adverse effect has occurred is sufficient. Comparatively, in scientific circles, evidence is generally considered sufficient when the probability of a certain adverse effect occurring is 95%. Prudent avoidance is a health-protective policy response to an indication of concern. It was suggested by one presenter that 25-35% probability of harm is sufficient to warrant prudent avoidance. [Author's note: One of the reasons there is a divergence of perception between experts and the public is that, when making decisions in their daily lives, people use a standard of "on balance of probabilities" whereas researchers more often use the stricter scientific requirement of statistical significance.]
- (2) A decision to adopt a policy of prudent avoidance may prove at a later date to be unwarranted, but conversely, waiting for more evidence can result in harm that could have been prevented earlier.
- (3) The introduction of third generation technology, which would allow, for example, access to the Internet through hand-held phones, will likely increase the level of radio frequency fields in the environment. There is a need for more public debate on the technology and alternative means of providing services such as fibre optics, which would deliver information without increasing radio frequency emissions.

Cellular Phones:

- (1) Patterns of radio frequency fields measured around the head while a telephone is in use show that the head absorbs these fields. In a child, the fields penetrate deeper into the brain than for an adult.
- (2) A study in Sweden showed a large variation in the exposure to radio frequency fields from the phones. Some phones result in 98 percent of radio frequencies being absorbed by the head, while in others only 20 percent did. This indicates that phones can be designed to minimise radio frequency emissions directed at the head.
- (3) Several studies, which have recently been published or will soon be published, do show a higher rate of symptoms such as headaches or dizziness in users who use phones more frequently. It is difficult to determine if symptoms reported by phone users are due to the phone or other causes. For example, high users of phones may also be in high stress jobs.

- (4) Recent studies show effects on brain wave patterns (EEG) from the use of cellular telephones.
- (5) As an increasing proportion of people in society become cellular telephone users, it will become even more difficult to use epidemiological studies to discern their health impacts because of the lack of “control” populations not exposed to RF.

Conclusions:

The Conference concluded with a consensus declaration which stated:

- (1) Current evidence suggests that there is likely no threshold below which there are no effects of radio frequencies on human health.
- (2) Exposure levels from radio frequencies should be kept “as low as technologically achievable”.
- (3) There is still insufficient data available to accurately estimate the risk of low level exposure to radio frequencies. As a preliminary measure to protect public health, the total of all high frequency radiation should not exceed 0.1 W/m^2 . [Note: This is approximately 100 times below Canadian exposure limits, and similar to the recommendation by the Toronto Board of Health.]
- (4) Total emissions from a single site should not exceed 0.001 W/m^2 . [Note: This is approximately 10,000 times below Canadian exposure limits.]
- (5) The process for approval of installation of cellular telephone base station should allow for public input, address both health and aesthetic concerns, and include post-installation monitoring.
- (6) To facilitate planning, there is a need for governments to have a database that contains all cellular telephone antenna sites within their jurisdiction.

Attachment 2
Comparison of Public Exposure Limits for Cellular Telephone Base Antennas

W/m ²	
10	Canada at 1800 MHz; Proposed International and European recommendations & German standards at 2000 MHz
9	Proposed International and European recommendations & German standards at 1800 MHz
8	
7	
6	Canada at 900 MHz
5	Proposed International and European recommendations & German standards at 1000 MHz
4	
3	
2	Australia
1	
0.9	
0.8	
0.7	
0.6	
0.5	
0.4	
0.3	
0.2	
0.1	Standard for China, Italy; Approx. Swiss standard at 1800 MHz; Proposed for Toronto (1800 MHz), Scotland
0.09	
0.08	
0.07	
0.06	Proposed for Toronto at 900 MHz
0.05	
0.04	Approx. Swiss Standard for 900 MHz
0.03	
0.02	
0.01	
0.009	
0.008	
0.007	
0.006	
0.005	
0.004	
0.003	
0.002	
0.001	Proposed for Salzburg for each site
0.0009	
0.0008	
0.0007	
0.0006	
0.0005	
0.0004	
0.0003	Proposed for Salzburg per operator per site (0.25 mW/m ²)
0.0002	Proposed by Dr. Cherry for New Zealand for 2000
0.0001	Proposed by Dr. Cherry for New Zealand for 2010
0.00009	
0.00008	
0.00007	
0.00006	
0.00005	
0.00004	
0.00003	
0.00002	
0.00001	Proposed at conference in Bonn, Germany, October 1999 for waking areas – sleeping areas 10-times lower

