March 12, 2012

Committee Secretary
Senate Standing Committees on Environment and Communications
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Parliament House
Canberra ACT 2600
Australia
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Re: Inquiry into the Telecommunications Amendment (Mobile Phone Towers) Bill 2011

Dear Secretary and Committee members

A central issue at the heart of this bill is the longstanding controversy over the extent of possible health hazards from chronic exposure to low-intensity (non-thermal) radiofrequency and microwave (RF/MW) emissions from mobile phone tower antennas. In this submission I will restrict my comments to a brief examination of the health hazards controversy specific to telecommunications frequencies as a reason to take a precautionary policy towards the siting of facilities as outlined in the Bill.

This is a topic that I have been involved with for the past twenty years, first as a science writer for Senator Robert Bell in Tasmania, then as a committee member on the Standards Australia TE/7 Committee: Human Exposure to Electromagnetic Fields. As a result of my various writings on the topic, in 1993 I commenced a PhD candidature at the University of Wollongong, NSW with a research topic of examining the history of RF/MW standard setting with an emphasis on how institutionalized conflicts of interest in national and international standard setting bodies affected the development of RF standard setting since WWII.[1] This thesis passed external review and was accepted in 2010.

It is my experience that official announcements of RF/MW safety, such as that emanating from the WHO, need to be critically examined, because of the high level of conflict of interests endemic in the area. This includes the risk assessment process used by the WHO's International EMF Project (IEMFP).

[1] D. Maisch, The Procrustean Approach: Setting Human Exposure Standards for Telecommunications Frequency Electromagnetic Radiation (2009), http://www.emfacts.com/the-procrustean-approach/ .

If we uncritically accept the advice of WHO/IEMFP it would seem reasonable to conclude that there are no health issues to consider at all and therefore no need for a precautionary policy. For example, on the WHO's website the following is stated under the section "Conclusions from scientific research":

> In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research.[2]

And under their "Key Points" the following is concluded:

> Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.[3]

For decision makers this can be quite appealing for, after all, this is from a WHO agency that does the health risk assessment for the International Commission on Non Ionizing Radiation Protection (ICNIRP). However an analysis of the establishment and activities of both IEMFP and ICNIRP show that they work very much in tandem to maintain a paradigm that the only hazards from RF/MW are tissue heating (thermal effects) from high-level acute exposures. This is achieved by a continuing refusal to consider other biological effects from low-level chronic exposures not related to heating. In effect, in my opinion, the ICNIRP standard operates more as an economically based document designed to allow the continuing development of telecommunications technology free of restrictive regulation.[4]

To quote from my thesis:

> Abstract
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> Since the 1950s there has been an ongoing controversy regarding the possibility of health hazards from exposure to non-ionizing radiation emissions from radiofrequency and microwave (RF/MW) technology: from military radar to telecommunications. In response to these concerns, and with support from the World Health Organization's International EMF Project (IEMFP) human exposure limits have been developed by the Institute of Electrical and Electronics Engineers (IEEE) and the International Commission on Non-Ionizing Radiation protection (ICNIRP). These limits, although differing in detail, are founded on the same scientific literature base and deem that the primary hazard to be

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[2] WHO, What are electromagnetic fields?, http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html, accessed March 10, 2012

[3] ibid.

[4] D. Maisch op. cit, pp 155-191.

considered in setting human exposure limits is thermal. This is defined as an excessive and harmful rise in body temperature as a consequence of exposure to high-level RF/MW emissions. This viewpoint has come to dominate the debate at an international level and is justified by these organizations as a product of expert risk assessments of peer reviewed data. The thesis challenges the validity of this viewpoint by critiquing regulatory risk assessment and the peer review and advisory processes that have shaped RF/MW regulation. It will be shown that these processes have been prone to political manipulation and conflicts of interests leading to various scientific perspectives being marginalised with reluctance on the part of regulators to make decisions that might inconvenience industry interests. To substantiate these claims the thesis provides an assessment of the development of the American RF/MW standard from the 1950's and its later revisions under the IEEE, the ongoing development of guidelines and standards by ICNIRP and IEMFP and RF/MW standard development in Australia. The thesis concludes with the argument that, given the sheer number of people exposed to RF/MW from telecommunications devices, there is an urgent need to reform the standard setting process and to conduct an international re-assessment of the biological limits placed on current RF/MW standards.

WHO claims on the adequacy of RF research

In the WHO (IEMFP) statement quoted previously, under "Conclusions from scientific research", the writers claimed that approximately 25,000 articles relevant to non-ionizing radiation have been published over the past 30 years, giving an impression that this body of literature is somehow adequate to assure RF safety. This is disingenuous for it has been admitted by Adair and Black (2003), who were members of the International Committee on Electromagnetic Safety (ICES), that most of the published thermoregulatory[5] RF research on laboratory animals were using animals that were poor models for human beings.[6] In other words most of the RF laboratory literature is based on exposing small animals to acute RF exposure and then trying to equate that to humans. Not only is this inadequate for determining acute thermal effects in humans but it is totally useless for possible chronic effects of low-level exposure.

The WHO statement then goes on to state, "scientific knowledge in this area is now more extensive than for most chemicals". This is not reassuring considering that as of 2008 (US data), while basic safety data has been collected on around 3,000 widely used chemicals, there was little publically available toxicological data on around 10,000 chemicals used extensively in commerce. As a result of industry influenced restrictive testing requirements, the US EPA has only been able to do mandatory testing on less than 250 chemicals since 1980, though a greater number have been subject to negotiated testing agreements with the chemical industry. [7] Despite efforts to

[5] Exposing laboratory animals to short-term acute RF in order to determine at what point the animals' bodies are unable to compensate for the increased body temperature.
[6] E. Adair E, D. Black, 'Thermoregulatory Responses to RF Energy Absorption', *Bioelectromagnetics, Supplement 6*, 2003, pp. S17 – S38.
[7] J. Tickner, Y. Torrie, Presumption of Safety: Limits of Federal Policies on Toxic Substances in Consumer Products, Univ of Mass Lowell, Feb 2008.

improve the situation, according to a paper published in June, 2011 by the Environmental Law Institute, Washington DC: "a chemicals management framework that truly protects public health and the environment, promotes innovation and provides for the transition to safer chemicals has yet to be achieved".[8] As for the adequacy of the limited testing on chemical substances that has been conducted, it does not normally include tests for brain, immune, neurodegenerative, autoimmune, or hormonal effects.[9] As for the situation in the European Union, the European Environment Agency (EEA) has stated that out of the many thousands of chemical substances now in the environment "little is known about the toxicity of about 75% of these chemicals".[10]

Considering the above, the claim that "scientific knowledge in this area (RF) is now more extensive than for most chemicals" is really an admission of ignorance, not safety. This shows a distinct lack of scientific discipline on part of the WHO/IEMFP and brings into question their ability to objectively evaluate the available literature on non-ionizing radiation effects. Their statement can only be considered as PR spin, not science.

"Guiding principles" maintain the thermal paradigm

In direct contravention to the WHO assurance that "there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health", there is a substantial body of scientific literature that finds adverse biological effects far below that which will cause the established thermal effect. Why this has all been excluded from consideration in setting exposure limits is essentially because it does not conform to the maintained paradigm that only "established" effects can be considered. This is clearly stated in the 12 "guiding principles" established by the industry body, the International Committee on Electromagnetic Safety (ICES-subcommittee 4) when revising the IEEE's RF standard. These "principles" proclaim, in part, that only established (thermal) effects can be considered in setting maximum exposure limits and that non-thermal RF biological effects have not been established.[11] When it is considered that the experts who are members of ICES have established their scientific careers on denying the importance of possible non-thermal effects, any change to this viewpoint in the near future is highly unlikely.

The alternative viewpoint: Scientific reviews that include consideration of low-level chronic exposures

1) *Non-Thermal Effects And Mechanisms Of Interaction Between Electromagnetic Fields and Living Matter*, An ICEMS Monograph, The Ramazzini Institute,

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[8] J. Schifano, K. Geiser, J. Tickner, 'The Importance of Implementation in Rethinking Chemicals Management Policies: The Toxic Substances Control Act', Environmental Law Institute, Washington, DC, June 2011.
[9] Hazardous Substances, http://www.chemicalinjury.net/hazardoussubstances.htm
[10] EEA, 'Many chemicals, but limited toxicity data', http://www.eea.europa.eu/publications/NYM2/page006.html
[11] C-K. Chou, J. D'Andrea, 'Reviews of the Effects of RF Fields on Various Aspects of Human Health: Introduction', *Bioelectromagnetics, Supplement 6*, 2003, pp. S5-S6.

Edited by Livio Guiliani and Morando Soffritti, European Journal of Oncology, National Institute for the Study and Control of Cancer and Environmental Diseases "Bernardo Ramazzini", Bologna, Italy, 2010.[12]

2) *BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)*, Editors C Sage and D Carpenter, Contributors: Blackman, C., Blank, M., Kundi, M., Sage, C., Carpenter, D., Davanipour, Z., Gee, D., Hardell, L., Johansson, O., Lai, H., Hanson Mild, K., Sobel, E. Xu, Z., Chen, G., Sage, A. Aug. 2007.[13]

3) *Biological Effects of Electromagnetic Fields on Humans in the Frequency Range 0 to 3 GHz: research and development. Summary and results of Russian medical literature from 1960 – 1996*. Editors: Prof. Karl Hecht and Dr. Hans-Ullrich Balzer, I.S.F. Institut für Stressforschung (Institute for Stress Research) Research & Development, Berlin, Germany, 1997.

In this summary of about 1500 original papers from the Russian medical literature from 1960 to 1996, Hecht and Balzer found a number of symptoms reported by company physicians involving several thousand industrial workers from both high voltage power plants and radar installations (RF/MW). Among these symptoms were sleep disorders, exhaustion, weariness, lack of concentration, headaches, dizziness. This was at power levels too low to cause heating or other effects related to acute exposures. As a consequence the Russian RF/MW exposure standard limit was set at a level approximately 1000 times more restrictive than most Western standards. [14]

What the above reviews illustrate is that the exposure levels where biological effects were observed are uncomfortably close to what might be experienced by people living in close proximity to a mobile phone tower especially in nearby multi-story buildings as RF levels will increase as elevation in relation to the tower increases (at the same distance). This was an issue not considered in ARPANSA's audit of base stations in Australia when they took measurements at a maximum height of 1.5 meters from the ground. Another limitation of the ARPANSA base station audit is that since 2007 only 21 base station sites have been surveyed out of an estimated 18,000 sites in Australia.[15] That is 0.001% of all base station sites. This is hardly what could be considered an adequate base station audit!

The advantages of enhanced community consultation

The importance of improving community consultation was mentioned by Daniel Westall from ARPANSA at an Australian Radiation Protection Society meeting in Sept. 2001. Westall was reporting on the outcomes of an Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency workshop in Switzerland. At the OECD meeting leaders of

[12] http://www.icems.eu/papers.htm
[13] http://www.bioinitiative.org
[14] Translation available at: file:///Users/donmaisch/Desktop/IFS-Study%202/emfde/e/isfe_000.htm

[15] ARPANSA Base Station Survey 2007- 2012, http://arpansa.gov.au/RadiationProtection/BaseStationSurvey/index.cfm

the radiation protection and regulation community discussed the involvement of the community in regulatory decision making. According to Westall:

> It was clear that interaction, not information, is needed, and that the community should be a part of the decision making process. The extent of this type of consultation and its form may vary, but in all cases it must be genuine.

Westall also mentioned that the regulators were suffering a loss of prestige and respect in the community:

> We have seen the community lose faith in regulators. It seems to some that society is the problem: 'people don't understand' or "they don't trust us'. In fact society could provide the solution, if we change our expectations of being understood and trusted, and respond to community expectations.[16]

The importance of improved community consultation was also mentioned in a 2008 report by The U.S. National Academy of Sciences, National Research Council (NAS/NRC). The report states that public involvement in environmental decision-making is more likely to improve than undermine the quality of agency decisions. The report found that even though scientists may be in the best position to make technological based decisions, public values and concerns are important to frame the scientific questions asked and ensure that decisions address all of the issues relevant to those affected. The report goes on to say that when there were cases of public involvement making matters worse, it is usually when participatory processes were set up to divert the public's energy away from criticism and into activities that were considered safe by an agency. The report concludes, in part, that the improper use of public participation to avoid conflicts on important issues is counterproductive in the long run.[17]

The need for an Australian RF standard review every five years

Another important issue raised in the Bill is the need to periodically review the Australian RF standard. In my opinion, this is vital given the amount of controversy over the available scientific data. A good starting point for such a review would be a discussion of the points raised by the US Radiofrequency Interagency Work Group (RFIAWG) in 1999 in relation to the US IEEE RF standard review. In particular, RFIAWG criticised the biological rationale of the standard on a number of fronts. A fundamental issue was the standard's failure to address chronic (low intensity/prolonged) as opposed to acute (high intensity/short term) exposures. This was seen in the standard's limiting the definition of an "adverse effect level" to only acute exposure situations and the use of time-averaged calculations that were not suitable for

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[16] D. Westall, Will Radiation Regulation Matter in the 21th Century?, Australian Radiation Protection Society (ARPS 26), Surfers Paradise, 17-21 Sept. 2001.

[17] T. Dietz, P. Stern, (eds.), Panel on Public Participation in Environmental Assessment and Decision Making, National Research Council, *Public Participation in Environmental Assessment and Decision-making*, National Academies Press, Aug. 22, 2008.
http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12434

prolonged exposure situations and therefore may not adequately protect the public. RFIAWG recommended that a clear rationale needed to be developed to also include chronic exposures.[18]

Conclusion

Given the high level of scientific controversy in this issue, the conflicting science and the seeming inability of various advisory bodies (such as WHO/IEMFP/ICNIRP) to be able to consider the possibility of adverse biological effects other that "established" effects, this should be sufficient to trigger a precautionary policy as recommended in the Telecommunications Amendment (Mobile Phone Towers) Bill 2011 and I strongly recommend its approval in full.

Thank you for your consideration.

Sincerely,

Don Maisch PhD

[18] G. Lotz, RFIAWG, RF Guideline Issues: Identified by members of the Federal RF Interagency Work Group, June 1999, letter from Gregory Lotz to Richard Tell, Chair of IEEE SCC28 IV, http://www.emrnetwork.org/position/exhibit_a.pdf,