

## Chapter 5

### A case Study on ICNIRP Harmonization and the Australian RF exposure standard

*“The weight of national and international scientific opinion is that there is no substantiated evidence that exposure to low level RF EME causes adverse health effects.”<sup>1</sup>*

#### Overview

The thermally based RF standard setting paradigm, originally established by the U.S. military in the 1950s, and embodied in the IEEE C95.1 standard revisions (Chapter 3), through to the current ICNIRP RF guidelines (Chapter 4), was the central issue of conflict in the development of the Australian RF standard. An examination of this development makes a convenient case study to further explore the restrictions placed upon the scientific risk assessment of RF bio-effects by vested interests working through standard setting committees.

A driving factor in the various revisions of the Australian RF standard from the 1970s to the 1990s was the introduction of new wireless technological innovations, operating at increasingly higher frequencies. In many cases these new devices operated with emission levels that were close to, or in excess of, the then current Australian RF exposure standard. This led to calls from both government and industry to relax (increase) the RF standard limits in order to assure compliance of new technologies with the RF standard. The fact that the standard was supposed to be health based, while very little research had been carried out on the possible health hazards at these higher frequencies, posed moral and ethical questions for the committee members charged with updating the RF standard. Did the benefits to society from the technology justify the possibility that some members of society may be placed at increased risk? Would public participation enhance the standard setting process? Should the telecommunications industry have inordinate influence in setting standards? As the government was a major share-holder of Telstra, the major Australian telecommunications company, and therefore a major benefactor of the roll-out of new wireless technology, would this bias its judgement on evaluating possible health impacts? Could agency scientists freely give advice without fear of repercussions if that advice ran counter to both government and industry corporate policy? In such a committee, made up of various stake holders with significantly differing views on hazard protection, was a consensus even possible?

To address the setting of RF exposure standards for both the workforce and general public, successive Australian federal governments had long relied on committees created and run under the auspices of the Standards Association of Australia, later re-named Standards Australia. In these committees scientific, industry and other professional experts, as well as community representatives in the later years, addressed the above questions in attempting to reach a consensus for a health based RF standard. During this time the Commonwealth Scientific and Industrial Research Organisation (CSIRO) played an active role in the standard setting process, essentially acting in the public interest and recommending areas that urgently needed research. After the Standards Australia TE/7 Committee failed to reach a consensus and was wound up,

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<sup>1</sup> ARPANSA, Electromagnetic energy and its effects, Fact Sheet, EME Series No. 1, Apr. 2008.

the job of drafting the RF standard was taken over by the Australian Radiation Protection And Nuclear Safety Agency (ARPANSA). This Chapter will follow the above questions to determine what has been the impact of this complex interplay of stakeholders and the public participatory interests on the Australian RF standard setting process, and whether the final outcome reflects an unbiased understanding of the scientific literature.

The story of the development of the Australian RF exposure standard is intimately bound up with the involvement of the CSIRO from the very beginning in the late 1970's by Dr. David Hollway, up till October 2003 when CSIRO representative on the ARPANSA RF standard working group, Dr. Stan Barnett, resigned after consultation with CSIRO management because he saw no further benefit to CSIRO continuing its involvement in the RF standard setting process. The long involvement of CSIRO in the RF standard setting process was very much in the mould of the traditional role of government scientific advisers providing objective information to the policy makers, or as the turn of phrase goes, "speaking truth to power" even when that advice was counter to government policy. As this Chapter examines however, there were many other influences at work, quite unrelated to the scientific literature, which had a major impact in determining the eventual policy on RF exposure that was established by the Australian Radiation Protection & Nuclear safety Agency (ARPANSA) on behalf of the Australian government.

#### **CSIRO and the Standards Association of Australia's (SAA) Committee 1979 - 1984**

Following the original US military standard, a limit of 10,000 uW/cm<sup>2</sup> (for both public and workers) had been informally adopted in Australia through a series of recommendations passed by the relevant Australian radiation authorities during the years 1955 to 1979. At that time Australia had no official RF exposure standard. It was Dr. David Hollway, from the CSIRO's National Measurement Laboratories, who was instrumental in having the Standards Association of Australia (SAA) establish in 1979 a committee to draft an Australian RF exposure standard. This committee (renamed the TE/7 Committee in 1984) finally reached an uneasy agreement after seven years of discussions and in 1985 Australia's first RF standard, AS 2772-1985, was established, which set RF limits for both the general population and in the workplace<sup>2</sup>.

The philosophy of the SAA was that the best people to set standards were those with the relevant technical expertise and managerial experience in handling the technology. Accordingly membership of the RF committee was limited to technical experts from the military services, the electronic communications industry and allied professional bodies, including Hollway from the CSIRO.<sup>3</sup> The problems with such a narrow body of expertise on advisory committees were examined by Sheila Jasanoff in *The Fifth Branch*. According to Jasanoff the 'ideal' committee member needs to be more than a mere technical expert, but one who can transcend disciplinary boundaries with a breadth of knowledge from several fields, as well as understanding the limitations of regulatory science.<sup>4</sup> Only by a balanced representation in make-up will committee advice to government be widely

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<sup>2</sup> A. Doull, C. Curtain, 'A Case For Reducing Human Exposure Limits Based On Low Level, Non Thermal Biological Effects', Unpublished, 1994, p. 1.

<sup>3</sup> L. Dalton. *Radiation Exposures. The hidden story of the health hazards behind official 'safety' standards*, Scribe publications, 1991, p. 37.

<sup>4</sup> Jasanoff S, *The Fifth Branch Science Advisers as Policymakers*, Harvard University Press, 1990, pp. 243 – 245.

accepted by most sections of society. Only after the drafting process was well underway were trade unions allowed membership. Community, environment and public health organisations were not invited on the committee<sup>5</sup>. The CSIRO always pushed for community representation on the committee<sup>6</sup> but it was not until 1998, as a result of CSIRO insistence, that two community representatives (representing the Consumer's Federation of Australia) were finally allowed on the TE/7 standard committee. This was a move that was to prove crucial to the eventual outcome of TE/7 and brought up questions about whether a democratic voting process was possible in RF standard setting.

From the outset Hollway, as the CSIRO's representative on the SAA committee, pushed for a standard that, at least to some measure, gave protection against low-level RF exposures. In the later TE/7 Committee meetings such a position was termed a 'precautionary approach'. Hollway stated at the time:

The proper course to adopt in setting a standard of this kind, where the effects of "low" levels of radiation are largely controversial, is to give first priority to the safety of people<sup>7</sup>

One of the factors in Hollway's stand was his awareness of the divergence in thinking between the U.S. and Russian RF standards. He was also well aware of and supported the stringent RF exposure standard used by the Applied Physics Lab at Johns Hopkins University (Chapter 3). His concern was to establish an Australian Standard that provided a sufficient margin of safety for adequate protection of the Australian general public – and he clearly supported the adoption of exposure limits that took into account non-thermal effects for the general population.<sup>8</sup> During the seven years of debate in the SAA committee Hollway was outnumbered by the representatives of institutions and industry which were fundamentally opposed to any restrictions and denied or minimised all of the published evidence of harm<sup>9</sup>. Getting agreement was not an easy matter. The thousands of scientific papers in the international literature that were available in the late 1980s were divided on the issues of thermal vs. non-thermal bio-effects and how non-ionizing radiation interact with living systems. Above all, there was disagreement in the SAA committee over what could be considered a "safe" dose.<sup>10</sup> The majority of the members on the SAA committee favoured the U.S. ANSI limit of 5mW/cm<sup>2</sup>, which was based on limiting but not eliminating the heating effect of RF<sup>11</sup> whereas Hollway favoured a standard designed on preventing more subtle (non-heating) effects such as those on the nervous and endocrine system which, it was claimed, could lead to chronic health problems<sup>12</sup>.

The initial proposal to the SAA committee by Hollway, representing the CSIRO's stand, was 40 uW/cm<sup>2</sup> for the general public, and was based on the possibility of non-thermal effects. This was unacceptable to the industry and military representatives and so a 100uW/cm<sup>2</sup> limit was initially accepted for the public over a 24 hour period. As the

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<sup>5</sup> Dalton, 1991.

<sup>6</sup> Discussion with John Hunter, CSIRO representative on TE/7 at TE/7 meeting, Nov. 1998.

<sup>7</sup> Doull, Curtain, 1994.

<sup>8</sup> Correspondence with A. Doull, Apr. 19, 2006.

<sup>9</sup> *ibid.*

<sup>10</sup> *ibid.*

<sup>11</sup> *ibid.*

<sup>12</sup> *ibid.*

work on drafting the standard drew to a close, the Department of Communications pointed out that levels around Broadcast House in Adelaide exceeded the proposed 100 uW/cm<sup>2</sup>. In addition the electronic media representatives then pointed out that they could not meet the 100uW/cm<sup>2</sup> limit. The allowable 'safe' level for public exposure was then increased to 200uW/cm<sup>2</sup> to accommodate all the requirements of the various SAA committee members.<sup>13</sup> The final limits set by the SAA committee were 200uW/cm<sup>2</sup> public exposure for a 24 hour day and an occupational 1000uW/cm<sup>2</sup> exposure (in the microwave band) for an 8 hour day. Committee chairman Dr. Michael Repacholi took an opposing view to the CSIRO in later statements about the level negotiated in the 1985 standard. To quote:

I was involved in the early attempts to develop an Australian standard. The standard was developed primarily on the international standard at the time and follows the international standard except in one region, called the microwave region. There was so much discontent about this that the level ended up being a negotiated level. It was not based on the science. Everything was based on the science up to that point, but the last part was not based on the science - it was negotiated between the unions and the government at the time.<sup>14</sup>

Repacholi's recommendation in the Australian RF safety standard committee during his time as chairman was to use the World Health Organization's review of the scientific literature which he had edited for the WHO. This WHO publication recommended the exposure limits published by the International Non-Ionizing Radiation Committee (INIRC) in 1988<sup>15</sup>. The INIRC limit recommendations were later incorporated into the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 1993. A foundation for both INIRC and ICNIRP limits was a 1984 IRPA proposal written by Repacholi that set out that the only health issue to address in standard setting was tissue heating from acute exposure levels.<sup>16</sup> Although Repacholi's position as Chief Scientist at the Royal Adelaide Hospital cast him as an independent advisor on TE/7 and as such, suitable for an impartial Chairman, a conflict of interest was revealed in documentation from a 1990 New Zealand High Court decision, where Repacholi testified as an expert witness on behalf of Broadcast Communications Limited (BCL) contesting a legal challenge from community groups regarding transmitter emissions from the BCL transmitter at Waiatarua. The resident groups withdrew their case when costs started to get out of their budget, and because BCL had reduced exposure levels to a fraction of what they had been. The judge then gave a judgement for BCL's legal costs against the residents' group. As part of BCL documentation filed with the High Court in Wellington, the corporation provided documentation for its expenses which included a \$40,000 NZ payment to Repacholi for his services.<sup>17</sup>

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<sup>13</sup> Dalton, 1991, op. cit., p. 41.

<sup>14</sup> M. Repacholi, Inquiry into Electromagnetic Radiation, Standing Committee on the Environment, Communications, Information Technology and the Arts, (Australian Senate) May 2001. Testimony of Michael Repacholi, Sect. 4.39, p. 131.

<sup>15</sup> *ibid.*, Sect. 4.52, p. 134.

<sup>16</sup> R. Repacholi, Problems with Regulating Radiofrequency (RF) Radiation Exposure, IRPA 6, May 1984, pp. 1291-1294, [http://www2000.irpa.net/irpa6/cdrom/VOL.3/B3\\_96.PDF](http://www2000.irpa.net/irpa6/cdrom/VOL.3/B3_96.PDF), accessed Sept. 4, 2008.

<sup>17</sup> Correspondence with former TE/7 member Dr. Ivan Beale who assisted the Waiatarua Action group in the High Court Case, November 23, 24, and 25, 2005.

Due to the inevitable negotiations and trade-offs that had led to the 1985 standard's 200uW/cm<sup>2</sup> limit, Hollway was concerned that this level did not provide a sufficiently large safety margin for the general population and urged this to be addressed in future reviews. He also pointed out aspects of the occupational exposure standard that he considered very good (in comparison to the old U.S. ANSI occupational standard of 5000uW/cm<sup>2</sup>) and which should be adopted in international standards.<sup>18</sup> Hollway's concerns were expressed in his 1985 paper, somewhat aptly titled: "The Australian Safety Standard for RF Radiation – A Curate's Egg".<sup>19</sup>

One view is we should 'play safe' by setting low levels now and raise them only if later research shows higher levels to be harmless. This view usually appeals to those who are actually being irradiated in the course of their daily work. The opposed view is that the level of radiation that everyone agrees causes demonstrable harm, should be found as accurately as possible and the permitted level should be set at a not-too-large factor of safety below the danger level. This view has more appeal to those owning and controlling sources of RF radiation. Eloquent claims are made that this is the only scientific method of setting maximum exposure levels because they are then based on proven facts. My view is that far from being scientific this procedure is unintelligent at best and is often disingenuous.<sup>20</sup>

Perhaps with a bit of foresight Hollway warned that in the future there may be attempts to weaken the 1985 limits and the most likely the way these attempts would be presented.

As the good features listed above are departures from the ANSI standard, there is a danger of there being removed in some future revision on the pretext of compliance with standards in use overseas. The community should be on guard against this. . . Is it over optimistic to hope that instead of taking this retrograde step, the Standards Association, through its representation on international bodies will be able to convince other countries that they should adopt the good features of the Australian standard?<sup>21</sup>

When the final 1985 standard was finalised controversy almost immediately erupted when the Australian Council of Trade Unions (ACTU) withdrew from the committee and refused to endorse the standard, on the grounds that it was not in accord with the most recent research findings on non-thermal effects<sup>22</sup>

However the important feature of the 1985 Australian RF standard, even though it was basically a thermal standard, was that it did recognise the possibility that more subtle non-thermal effects could not be entirely discounted. In an unusual step for a Western country, Australia had taken a stand on considering the possibility of non-thermal

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<sup>18</sup> Doull, Curtain, 1994. op. cit., p. 3.

<sup>19</sup> Cu-rate's egg (plural cu-rate's eggs) noun U.K. something with good and bad parts; something that may be described as only partly bad, especially when this makes the whole thing unacceptable. From a cartoon in *Punch* magazine, 1895, in which a curate, when served a bad egg at the bishop's table, assured his host that "parts of it are excellent."

<sup>20</sup> D. Hollway, The Australian Safety Standard for RF Radiation – A Curate's Egg. CSIRO Manuscript, 31st Jan. 1985.

<sup>21</sup> Hollway, 1985.

<sup>22</sup> Dalton, 1991.

effects by establishing tougher standard limits than the U.S.<sup>23</sup> To quote from the Foreword of the 1985 Standard:

It has been demonstrated that low-level, long term exposure can induce a variety of effects in the nervous, haematopoietic and immune systems of small animals. Such exposure may influence the susceptibility of such animals to other influencing factors. Thermal influences seem inadequate to account for these and other effects.<sup>24</sup>

### **The Standards Australia TE/7 Committee: Human Exposure to Electromagnetic Fields, 1984 to 1999.**

The Standards Australia TE/7 Committee: Human Exposure to Electromagnetic Fields was established in 1984, taking over in name from the previous SAA committee with essentially the same membership. It became a joint Australian/New Zealand committee in 1992. As Hollway had predicted, attempts to alter the standard limits began soon after the first standard was approved in 1985 and by 1990 the standard had its first revision, though still retaining the 1985 limit restrictions. These years saw an ongoing series of committee meetings where members continued to argue their particular viewpoints over what were acceptable limits for the standard, positions that were virtually unchanged since the very beginnings of the standard setting process in the late 1970's. Changes to the Standard were wanted by the representatives from the telecommunications and broadcasting industries, allied professional bodies, the military and government representatives<sup>25</sup>. According to CSIRO scientist Alexander Doull, who was one of the CSIRO representatives on TE/7, ever since the 1985 Standard, the pressure from these representatives was to push for much higher levels of exposure (the ICNIRP limits); to completely delete any references to fundamental principles of radiation safety; to minimise any explicit references to harmful effects; and to delete the previous acknowledgment of the existence of non-thermal effects on living organisms. Mr. Doull stated that he believed that the changes in the official Standard that the industry wanted would have probably have the effect of protecting the industry from future litigation.<sup>26</sup>

The alternative viewpoint on TE/7 came from eight committee members representing organisations<sup>27</sup> which were against any relaxation of the standard due to the possibility of non-thermal effects at levels far lower than ICNIRP 'safe' levels. They questioned various aspects of the scientific validity of the risk assessment of ICNIRP and whether or

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<sup>23</sup> Doull, Curtain, 1994, op. cit., p.1.

<sup>24</sup> Standards Association of Australia, Foreword: Australian Standard 2772, Maximum Exposure Levels – Radiofrequency Radiation – 300kHz to 300 GHz, 1985.

<sup>25</sup> As of August 1998 these consisted of representatives from: the Australasian Radiation Protection Society, Australian Communications Authority, Australian Electrical and Electronic Manufacturers Association, Australian Mobile Telecommunications Association, Australian Radiation Laboratory, Australian Telecommunications Users group, Broadcast Communications Ltd. NZ, the Department of Communications and the Arts (Aust.), Department of Defence (Aust), Institute of Engineers Australia, National Radiation Laboratory NZ, NZ Association of Radio Transmitters, Optus Communications, Telecom NZ, Telstra (Aust.), Wireless Institute of Australia, Electrical Supply Association of Australia, Ministry of Commerce NZ, Institute of Occupational, Environmental Medicine NZ., and the Australasian Faculty of Occupational Medicine.

<sup>26</sup> A. Doull, Inquiry into Electromagnetic Radiation, Standing Committee on the Environment, Communications, Information Technology and the Arts, (Australian Senate) May 2001, Testimony of Anthony Doull, Sect. 4.42, p. 132.

<sup>27</sup> Commonwealth Science & Industrial Research Organisation; Australian Council of Trade Unions; Adopt Radiation Controls NZ; Consumers' Federation of Australia (two voting members); Communications Electrical Plumbing Union; National Occupational Health & Safety Commission; and Local Government NZ (later to change no vote on the separate NZ standard).

not the proposed limits provided adequate protection in both the public and occupational settings. What constituted “adequate protection” and what constituted a “precautionary approach” occupied much of the debate.

Essentially the TE/7 committee was charged with conducting an evaluation of the risk assessment of the ICNIRP RF guidelines as it applied to radiofrequency and microwave exposure in order to come up with what was called a “health based” standard. ICNIRP was presented by both government and industry as the preferred “international” standard, which all national governments should adopt in order to “harmonise” standards in a global economy. This was the line specifically pushed by Michael Repacholi while he served as chairman of TE/7 after 1985 and currently through WHO. According to Doull, Repacholi was specifically brought in to overturn the 1985 standard.<sup>28</sup> There was very much an impression given during the committee meetings that ICNIRP was ‘state-of-the-art’ in its approach to assessing the relevant scientific literature and was above reproach.

### **TE/7 Standard Revisions**

From 1984 to its demise in 1999 the TE/7 committee published three interim RF standards, with a separate fourth revision approved by the New Zealand contingent in May of 1999. Standard AS2772.1:1985 reviewed but found inadequate an American National Standards Institute (ANSI) proposal for exposure limits in the frequency range 300 kilohertz (300 kHz) to 100 gigahertz (100 GHz). The SAA committee took a more cautious approach by choosing lower exposure levels for the radiofrequency and microwave emissions; and an averaging time of one minute was adopted for all exposure conditions, regardless of the field strength, rather than the six minute averaging time suggested by ANSI. It also contained reference to the ALARA Principle<sup>29</sup> whereby all doses should be kept as low as reasonably achievable, economic and social considerations being taken into account.<sup>30</sup>

AS 2772.1:1985 also established differing exposure limits for the general public and those occupationally exposed to RF. The rationale behind this was the idea that the occupationally exposed population consists of adults who are exposed under controlled conditions, and who are supposed to be trained to be aware of potential risks and to take appropriate precautions. The duration of occupational exposure was limited to the length of the working day or duty shift per 24 hours, and the duration of the working lifetime.<sup>31</sup> The general public (the non-occupationally exposed population) was seen to be comprised of individuals of all ages and different health status. It was recognized that the resonant range is different for adults and children affecting the level of RF energy absorption in various body parts. It was recognized that some individuals may be particularly susceptible to radiofrequency radiation. In addition, members of the public are not always aware that exposure takes place and they can be exposed 24 hours per day, and over their entire lifetime. They cannot reasonably be expected to take precautions against radiofrequency and particularly burns and shocks. For these

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<sup>28</sup> Correspondence with A. Doull, Aug.31, 2005.

<sup>29</sup> As Low As Reasonably Achievable (ALARA).

<sup>30</sup> Parliament of Australia, ‘Inquiry into Electromagnetic Radiation’, Report of the Senate Environment, Communications, Information Technology and the Arts References Committee, May 2001, Sect. 4.34-4.35, pp. 130-131.

<sup>31</sup> Parliament of Australia, ‘Inquiry into...’, 2001, op. cit., Sect. 4.36, p. 131.

reasons lower basic (and derived) exposure levels were adopted for the non-occupational population than for the occupationally exposed population.<sup>32</sup> The 1985 Standard had excluded devices which operated below 1 GHz and had a power output of below 7 watts from compliance with the Standard. It was decided that it would be unlikely that these devices could couple enough energy into any size human body such that the average whole body Specific Absorption Rate (SAR) of 0.4 W/kg would be exceeded. In addition, it was not expected that there could be any spatial peak SAR in the human body exceeding 8 W/kg averaged over any one gram of tissue.<sup>33</sup> The limits set out in the 1985 Standard are specified in basic restrictions which affected industries argued were difficult and, in many cases, impractical to measure<sup>34</sup>

In 1988, the Standard was renamed Australian Standard 2772 - 1985 Radio Frequency Radiation Part 1 - Maximum Exposure Levels - 300 kHz to 300 GHz.<sup>35</sup>

The 1990 Standard superseded the 1985 standard and introduced changes which included extension of the frequency range down to 100 kHz, and included limits for body-to-ground radiofrequency currents. However, the limits for both occupational and non-occupational maximum exposure remained unchanged.<sup>36</sup> There was added a 'deemed to comply' provision for all radio-communications transmitters like mobile phones operating below the frequency of 1 GHz. If the output power of the transmitter was less than 7 watts, the device was automatically deemed to comply with the Standard. Concern was expressed that, because of the proximity of the radiating antenna to the head, mobile phones on the market were exceeding the exposure limits of the Standard for the general public despite being deemed compliant.<sup>37</sup>

In 1994, Amendment 1 introduced various corrections and changes, in particular, more explicit requirements for exposure limits for users of transmitters, including hand-held and mobile transmitters. It also lowered the "deemed to comply" threshold for hand-held digital mobile phones to 0.7 watts and introduced a requirement to label devices.<sup>38</sup>

### **Consideration of public submissions to TE/7 in 1995.**

As standards are reviewed every five years the proposed draft of AS 2772.1:1990 , (DR 95900) proposed rationalizing exposure levels with international standards, which, if approved, would have seen a significant increase in allowable exposure levels, to harmonize with those of the ICNIRP Guidelines. DR 95900 was advertised for public comment on 15 January 1995 with submissions closing on 15 March 1995. 35 written submissions were received along with a public petition of 80 signatures. An additional three submissions were received from the technical committee TE/7/1 or TE/7 itself, making 38 submissions in all. Of these, one supported a relaxation of the standard and another four did not oppose it. The remaining 33 submissions and public petition expressed strong opposition to the proposed relaxation of the standard. All submissions

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<sup>32</sup> op. cit., Sect. 4.37, p. 131.

<sup>33</sup> op. cit., Sect. 4.44, p. 132.

<sup>34</sup> op. cit., Sect. 4.38, p. 131.

<sup>35</sup> op. cit., Sect. 4.45, p. 133.

<sup>36</sup> op. cit., Sect. 4.46, p. 133.

<sup>37</sup> op. cit., Sect. 4.47, p. 133.

<sup>38</sup> op. cit., Sect. 4.48, p. 133.

had been circulated to committee members well before the April 1995 TE/7/1 (technical subcommittee of TE/7) meeting.<sup>39</sup>

Consideration of the draft, submissions and voting took place on the sub-committee TE/7/1 meeting in Melbourne, held on 20-21 April 1995. The meeting started with a debate over how the committee should proceed with the chairman Michael Repacholi proposing that the technical committee should formally vote on a New Zealand proposed<sup>40</sup> motion to approve a relaxation of the standard before consideration of the 38 submissions. Voting was then carried out and the motion was carried nine for, seven against with five abstentions. This meant that TE/7/1's recommendation to the full TE/7 committee was to approve the increased exposure standard before even considering any submissions. After the voting was finalized, a brief examination of each submission was carried out to see if it identified any new scientific studies not previously known to the committee. If not then the submission was dismissed.<sup>41</sup> This was to be a continuing restriction in TE/7: the existing RF literature was not to be reviewed and only new research not seen previously by the committee would be considered. In a surprising twist TE/7/1's motion was unanimously opposed by the Australian industry representatives and unanimously supported by the New Zealand industry representatives. In fact, Telecom Australia stated at the April meeting that they would stick with the 1990 levels as an in-house standard regardless of the outcome.<sup>42</sup>

According to Roger Matthews, Representative for Local Government NZ, on TE/7 and TE/7/1, the final position of the technical committee TE/7/1 on RF standard setting was as follows:

- New Zealand/Australian Standards should be rationalised with international ones, almost at all costs; Standard setting and public policy development are different and separate processes; The Standard is a scientific document that should reflect proven data only; Submissions are only relevant when they identify factual, grammatical or spelling errors and new scientific studies unknown to the committee; As Standards are based on science, Government policy is not a relevant consideration; Public concerns are largely uninformed and irrelevant to the process.<sup>43</sup>
- The Waitakere City Council submission was dismissed as the majority of the committee was of the opinion that the draft standard was a science based standard and not a consensus document, therefore the submission was dismissed on the grounds that it contributed no new scientific data.<sup>44</sup>
- The submission of the Hutt City Council was dismissed on the basis that a precautionary approach should be put into perspective with other hazards, such as cars on the road.<sup>45</sup>

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<sup>39</sup> R. Matthews, Consideration of Public Submissions on the Draft Australian/New Zealand Standard DR 95900, Report to the New Zealand Local Government Association and Auckland City Council. May 1995.

<sup>40</sup> Proposed by Trevor Woods, BCL NZ Ltd. and Andrew McEwan, Director NZ National Radiation Laboratory.

<sup>41</sup> Matthews, 1995.

<sup>42</sup> *ibid.*

<sup>43</sup> R. Matthews, Letter to Walter Secord, Sutherland Shire Council, Sydney from Roger Mathews, May 8, 1995

<sup>44</sup> *ibid.*

<sup>45</sup> *ibid.*

- The submission from the professor of Physics, Monash University, Victoria, and three of his academic staff was dismissed because it did not contribute anything new and they claimed it showed a poor understanding of the science.<sup>46</sup>

The majority of nine were of the firm opinion that standards should be based purely on scientific data, therefore a public policy approach (precautionary approach) had no place in the process. Dr. McEwan from the New Zealand National Radiation Laboratory (NRL) stated at the time that:

The nature of making a standard is that it's based on good science. Whether people feel comfortable with it or not is irrelevant.<sup>47</sup>

Though the small majority of the technical committee were able to push forward its recommendations 9 to 7, those seven who voted against the recommendations were of the opinion that the relaxation was unjustified at that time and that all environmental standards should include a precautionary approach.<sup>48</sup>

The full TE/7 committee, when considering the above recommendations from its technical committee, was unable to reach agreement on the draft's proposal to increase allowable exposure limits. The draft was therefore released as an Interim Standard, AS/NZS 2772.1:1998, while being further considered in a later round of meetings, starting in 1998.<sup>49</sup>

The Interim Standard was based on the International Radiation Protection Association (IRPA) Specific Absorption Rate (SAR) Guidelines, but covered an extended frequency range down to 3 kilohertz (kHz). The basic limits (whole body average SARs) between the Interim Standard and its predecessor standards did not change - occupational exposure limits to radiofrequency fields were based on the 0.4 W/kg level and the non-occupational exposure limit of 0.08 W/kg were derived from values one-fifth (or less) those of the occupational limit.<sup>50</sup> However, there were changes in the derived exposure levels in the frequency range around 1 megahertz (1 MHz) to bring the Interim Standard into line with the recommendations of ICNIRP. On the other hand, the derived exposure levels in relation to frequencies between 400 MHz and 2 GHz were set lower than other International Standards, in accordance with the precedent set in the 1985 Standard. Evidence suggested that the IRPA/ICNIRP methodology would lead to progressively rising derived levels and thereafter to a level which is constant with frequency between 400 MHz and 2 GHz. The TE/7 Committee did not support this approach.<sup>51</sup>

The Interim Standard was criticized by those members concerned with the public interest because the limits were to be relaxed, and the peak exposures diluted by the use of the six minute averaging time rather than the 1 minute averaging time in the 1985 standard. The non-uniform exposure levels were also criticized.<sup>52</sup> Faced with opposition to increased exposures AS/NZS 2772.1(Int):1998 introduced different "deemed to

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<sup>46</sup> *ibid.*

<sup>47</sup> *ibid.*

<sup>48</sup> *ibid.*

<sup>49</sup> Parliament of Australia, 'Inquiry into...', 2001, *op. cit.*, Sect. 4.49, p. 133.

<sup>50</sup> Parliament of Australia, 'Inquiry into...', 2001, *op. cit.*, Sect. 4.50, p. 134.

<sup>51</sup> *op. cit.*, Sect. 4.51, p. 134.

<sup>52</sup> *op. cit.*, Sect. 4.53, p. 134.

comply” provisions for handheld and portable transmitters. The new provisions were based not only on output power, but also on the transmitter’s duty cycle and the body-antenna separation distance. The result of the new provisions is that mobile phone handsets need testing to demonstrate compliance with the Standard.<sup>53</sup>

The AS/NZ S2772: 1998 Interim standard departed significantly from AS 2772..1: 1990 in that it introduced significant changes to the exposure limits, similar to the older DR 95900, which brought it more into line with the limits set by ICNIRP. (For instance at the mobile phone frequency range of 800-900 MHz the increase was from the old 200uW/cm<sup>2</sup> maximum to 450 uW/cm<sup>2</sup>). It was this increase in the public exposure levels that was opposed by the CSIRO and other organizations on TE/7. According to the CSIRO, it was because of this opposition that the Standard was published as an Interim Standard, which was due to expire in March 1999.<sup>54</sup> The interim standard was extended but the failure by TE/7 to approve the interim standard and public disquiet resulted in the interim standard being withdrawn with effect from 1 May 1999.<sup>55</sup> Public concerns over the Interim Standard were reflected a statement from the May 2001 Senate “Inquiry into Electromagnetic Radiation” where the committee acknowledged that the Interim Standard limits “represent a weakening of protection for both occupational and public exposure”.<sup>56</sup>

At the very beginning of the last series of TE/7 meetings to consider the Interim standard in March of 1998, the committee chairman, Mr. Ian Hutchings (Ministry of Commerce NZ) proposed by a show of hands how many of the members were in favour of incorporating the ICNIRP Guidelines into the interim standard. It was taken that if there was a clear 80% in favour approving the interim standard it would be a quick process. However, the show of hands resulted 20 in favour, 6 against and 2 open to the possibility with qualifications. This presented those in favour of incorporating ICNIRP with the possibility of having the required 80% to approve the standard, provided they gained the votes of the two representatives from the Consumer’s Federation of Australia (CFA), of whom I was one<sup>57</sup>. An extra bonus was that both representatives were representing the public interests and were known as community activists. If they gave their approval that would have done much to deflate community concerns and protests. Both CFA representatives were concerned over the high level of uncertainty that existed in the RF literature base in relation to safety from prolonged, low level (non-thermal) RF exposures. This understanding was reinforced by their reading of the January 1994 report by CSIRO scientists A. Doull and C. Curtain, “A Case for Reducing Human Exposure Limits Based on Low Level, Non Thermal, Biological Effects”, the June 1994 CSIRO report by Stan Barnett, “Status of Research on Biological Effects and Safety of Electromagnetic Radiation: Telecommunications Frequencies” and *Radiation Exposures* by retired CSIRO scientist Les Dalton.

### **A precautionary approach becomes centre stage**

It was the opinion of the two CFA representatives that most likely the ICNIRP limits would eventually be approved, due to the overwhelming representation on the committee by industry and others pushing for ICNIRP. Therefore, their main aim was to

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<sup>53</sup> op. cit., Sect. 4.65, p. 137.

<sup>54</sup> op. cit., Sect. 4.90, p. 142.

<sup>55</sup> op. cit., Sect. 4.29, p. 129.

<sup>56</sup> op. cit., Sect. 4.5, p. 124.

<sup>57</sup> The other CFA representative was John Lincoln.

introduce into the discussion a suitable precautionary approach and not an outright rejection of the Interim standard. The CFA community representatives both considered that a suitable trade-off was wording in the standard that stated the standard only gave protection from RF thermal effects and did not address the issue of possible low-level, long term exposures, namely that the standard was not the final word and liable to change as the science progressed. This concept was termed taking a “precautionary approach” and this concept was the main, non-technical issue that thereafter took up most of the discussions within TE/7. This proposed precautionary approach was distinct from the term “prudent avoidance” that was originally proposed for power frequency standard setting by the U.S. Congressional Office of Technology Assessment in 1989<sup>58</sup>. While prudent avoidance looks for ways to reduce unnecessary exposure relative to cost involved, the proposed precautionary approach in TE/7 was restricted to acknowledging the limitations of the standard.

However the idea of the community representatives ‘doing a deal’ with industry was a surprise and concern to some of the other members who were openly opposing the interim standard altogether, notably CSIRO’s John Hunter and an outside observer from the Australian Democrats. Soon word was out in the community that their community representatives were ‘selling out’ to the industry for precautionary principles that may not be of sufficient practical utility to be worth trading against a more lenient standard.<sup>59</sup>

A ‘precautionary approach’ statement, as originally proposed by the CFA representatives and re-stated at all subsequent meetings in 1998-1999 was as follows:

This Standard [Guideline] provides guidance on human exposure to radiofrequency and microwave (RF/MW) energy and sets limits intended to avoid acute and obvious detrimental effects on health from high level (thermal) exposures. It does not cover the possible chronic or long-term effects of low-level prolonged exposures (non thermal) which are outside the scope of this Guideline. Following this line of thinking, the thermal nature of the Guidelines should be also mentioned in the title of the document, referring to "Maximum Acute Exposure Levels."<sup>60</sup>

The two CFA reps considered that such an admission was the best that could realistically be expected and were willing to give an affirmative vote - provided the spirit of the above statement was included in the final version presented for voting. The position of the CFA representatives remained unchanged and at the meeting in November 1998 they were still willing to consider voting for incorporating the ICNIRP Guidelines into the Australian standard, provided a suitable precautionary approach was clearly stated in the standard.<sup>61</sup> A precautionary approach statement that had been included in the draft sent out for public comment did acquiesce to some of the CFA’s requests, as follows:

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<sup>58</sup> I. Nair, M.G. Morgan, H. K. Florig, ‘Biological Effects of Power Frequency Electric and Magnetic Fields’, Office of Technology Assessment, 1989.

<sup>59</sup> D. Mercer, ‘From Prudent Avoidance to Bureaucratic Avoidance: lessons from the recent RF standard setting process in Australia’, Paper delivered to the Gothenburg conference on Mobile Telephones and Health, Sweden, 16-17 Sept, 1999.

<sup>60</sup> D. Maisch, Discussion Paper: The case for a strong Precautionary Approach, and statement of intent, which takes into account possible non thermal effects, to be included in the Australian Standard, Submission to Standards Australia Committee TE/7: Human Exposure to Electromagnetic Fields. Oct. 20, 1998. Presented at the Wellington New Zealand Meeting, Nov. 4-5, 1998. Online at: , <http://www.emfacts.com/papers/submissions.html>

<sup>61</sup> *ibid.*

There is currently a level of concern about RF exposure, which is not fully alleviated by existing scientific data. It is acknowledged that data regarding biological effects, at levels below those determined in this Standard, are incomplete. As these data are neither clear nor consistent, these have not been used in setting the levels for basic restrictions in this Standard.<sup>62</sup>

However after the 18-19 February 1999 meeting, where the public submissions were discussed it became apparent that those members wanting ICNIRP Guidelines had hardened their views and the wording of a precautionary approach that had been included in the draft sent out for public comment (above) had been changed to state:

While the basic restrictions in this Standard shall not be exceeded, the manufacturer/supplier, installer, employer/service provider and user must be able to demonstrate that exposure to workers and the general public is being kept to the lowest level that can be achieved, consistent with best contemporary practices and the cost effective achievement of service objectives. This is consistent with taking a precautionary approach. This precautionary approach involves application of best contemporary practice in achieving service, or process requirements to minimize incidental RF exposure.<sup>63</sup>

In the final statement, any mention of uncertainties, limitations of the standard limits or incomplete data bases were removed and it was considered by those wanting to approve the Interim draft standard that this was an acceptable compromise to the CFA's original "precautionary approach". It was expected that the CFA should accept the new wording as it was the best they would get. However, in describing the final precautionary approach in the draft standard, Dan Dwyer of the Communications, Electrical and Plumbing Union (CEPU) described it as little more than a "feel good dose of prudent avoidance" and I, representing CFA, described it as a "homeopathic dose of avoidance".<sup>64</sup> The CFA representatives did not consider that the final statement in any way contained the spirit of their original position and therefore they could not justify either to their organization, or the Australian community, an affirmative vote.

By the conclusion of TE/7 however, it was apparent to the dissenting voters that even though Standards Australia had opened up the process to include community representatives no effective dialogue was possible. The members wanting an ICNIRP based standard were unwilling to compromise for a precautionary approach that expressed any uncertainty about the science on the grounds that it was counter to ICNIRP standards.

### **Is a precautionary approach incompatible with standards?**

Members on the committee wanting an affirmative vote saw the dissenters, particularly the CFA reps, as not being willing to compromise to reach a consensus so that the standard could be approved. This was a viewpoint given by Roger Lyle from Standards Australia and David Black at the May 2001 Senate Inquiry when asked how they accounted for the failure of the TE/7 Committee. Lyle said:

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<sup>62</sup> Standards Australia, Draft Standard 98627 – Maximum exposure Levels – 3KHz to 300 GHz, Foreword.

<sup>63</sup> *ibid.*

<sup>64</sup> Mercer, 1999.

Consensus building means coming up with compromises. After the third meeting of the committee, my view was that there probably would be an outcome. But a few weeks later when the postal ballot was held it was fairly obvious that various members [CFA] on the committee had hardened their views, for whatever reason... We asked people when they vote in the negative to actually provide the reasons for that in order to help the committee try to work through compromises to be able to reach a consensus. It was fairly obvious that people just were not finding those compromises.<sup>65</sup>

TE/7 committee member Dr. David Black made the observation at the Inquiry that, in his opinion, democracy does not work in scientific consensus building. Black stated:

In my opinion the support from Standards Australia during this time was particularly good, and the committee worked well. The limiting factor was the fundamentally flawed idea that a scientifically based document could be produced by a democratic process of requiring virtual consensus from a group which deliberately included people with inevitably dissenting views.<sup>66</sup>

Vitas Anderson, representing Telstra Research Laboratories, made an important point in his submission to TE/7 that if a precautionary approach was included in the draft it would be in breach of Standards Australia's Standardization Guide, which states:

A Standards committee is required to ensure that an Australian, New Zealand or Joint Australian/New Zealand Standard does not act as a barrier to innovative development, or otherwise unreasonably or unlawfully restrain competition or trade.

Anderson argued that the precautionary approach conflicts with the above requirement, as it would place unreasonable requirements on industry, suppliers, and users that are not required overseas. In addition, changes to the basic restrictions would stifle "innovative development". Other areas where Anderson saw the precautionary approach being in conflict with the rules laid out in the Standard Guide is that while the Guide stresses the need to avoid ambiguity and conflict with legislative requirements, Anderson said "the precautionary approach is not clear and precise, and is inherently ambiguous". Anderson quoted from the Guide that "Standards Australia and Standards New Zealand have a firm policy of adoption, wherever possible, of international Standards prepared by ISO and IEC as Australian, New Zealand or joint Standards". This, Anderson argued, gave support to adopting the international 1998 ICNIRP Guidelines.<sup>67</sup>

If we take Anderson's comments as valid, and verified by what is written in the Standards Australia Standardization guide itself, then it was inevitable that insistence on a precautionary approach to be incorporated in the RF standard was doomed to fail. Even though the Australian/New Zealand RF standard and the ICNIRP Guidelines are

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<sup>65</sup> Parliament of Australia, 'Inquiry into...', 2001, op. cit., Sect. 4.102, p. 147.

<sup>66</sup> op. cit., Sect. 4.103, p. 147.

<sup>67</sup> V. Anderson, Analysis of technical breaches of SA/SNZ Standardization Guidelines in the AS/NZS 2772.1:1990 draft.

promoted as being health based<sup>68</sup>, uncertainties over the assurances of safety that should trigger a precautionary approach cannot be used as a reason to oppose the standard as that would be a hindrance to industry. In essence, the RF risk assessment that TE/7 was charged to perform was cast within an economic and thermalist framework for those members pushing for the incorporation of ICNIRP. In opposition was the minority of TE/7 members who conducted their own risk assessment based on different scientific assumptions incommensurable with economic or thermal considerations.

Essentially the failure of the two TE/7 groups to come to an accommodation mirrored the wider EMF controversy internationally which was examined by Carolyn Miller, Professor of Rhetoric and Technical Communications at the North Carolina State University. In her discussion of the concept of *incommensurability*<sup>69</sup> specific to the EMF controversy. Miller examined the two sides of the controversy in the overall EMF debate (Thermal only vs. non-thermal bio-effects) and the various defensive strategies employed by those resisting paradigm change such as those of industry and military interests.<sup>70</sup> These strategies also played a central role in the arguments deployed by TE/7 members supporting the adoption of the ICNIRP limits.

### Uncertainty or not?

Throughout the TE/7 process those members wanting to increase exposure levels to those of ICNIRP pictured the guidelines as a body of sure and certain knowledge that was above reproach. This was the sentiment expressed in a submission to TE/7 by the civil engineering firm Montgomery Watson, from New Zealand. Montgomery Watson, submitting on behalf of two of its clients, expressed concern that the inclusion of the precautionary approach undermined the intent and purpose of the standard and suggested that the body promulgating the standard had some uncertainty about the effects of the standard that it was setting. They felt that on the basis of current knowledge no such reservations were needed as the standards adopt a very large safety margin against known effects.<sup>71</sup>

It would be fair to assume that whatever level of scientific uncertainty that existed in 1999, if any, would have further decreased with ongoing research that had taken place in the intervening 5+ years. However, a 2004 investigation by ICNIRP's peer review Standing Committee on Epidemiology concluded otherwise. The Committee undertook "a comprehensive review of epidemiologic studies about the effects of radiofrequency fields (RFs) on human health in order to summarize the current state of knowledge, explain the methodological issues that are involved, and aid in the planning of future studies."<sup>72</sup>

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<sup>68</sup> See ICNIRP Statement, *USE OF THE ICNIRP EMF GUIDELINES*, Mar. 31, 1999. <http://www.icnirp.de/documents/Use.htm>, Accessed Sept. 24, 2007.

<sup>69</sup> Paul Feyerabend is credited with coining the term "incommensurability" that can be defined as situations where competing scientific frameworks or theories are lacking a common quality on which to make a comparison in order to determine which one is more accurate. This includes the interpretation of scientific observations or paradigms as being inexplicably bound up with underlying theoretical assumptions.

<sup>70</sup> C. Miller, 'Novelty and Heresy in the Debate on Nonthermal Effects of Electromagnetic Fields', in Harris, Randy Allen (ed.) *Rhetoric and Incommensurability*, Parlor Press, 2005, p. 464 - 505.

<sup>71</sup> Montgomery Watson Inc., Standards Australia submission DR 98627 PuCo-057, Feb. 1 1999.

<sup>72</sup> A. Ahlbon, A. Green, L. Kheifets, D. Savitz, A. Swerdlow, 'Epidemiology of Health Effects of Radiofrequency Exposure', *Environmental Health Perspectives*, vol. 112, no.17, Dec 2004, p. 1741 - 1754.

The committee concluded from their review that:

Despite the ubiquity of new technologies using RFs, little is known about population exposure from RF sources and even less about the relative importance of different sources. Other cautions are that mobile phone studies to date have been able to address only relatively short lag periods, that almost no data are available on the consequences of childhood exposure and that published data largely concentrate on a small number of outcomes, especially brain tumour and leukemia... Another gap in the research is children. No study population to date has included children, with the exception of studies of people living near radio and TV antennas. Children are increasingly heavy users of mobile phones. They may be particularly susceptible to harmful effects (although there is no evidence of this), and they are likely to accumulate many years of exposure during their lives.<sup>73</sup>

This conclusion is broadly in agreement with the conclusions of the CSIRO scientists mentioned above, Curtain, Doull, Barnett and Dalton. And indicates that perhaps TE/7's ultimate failing was an unwillingness on the part of industry members to admit to any uncertainty, which would have been the case if the possibility of non-thermal adverse bio-effects were mentioned in a precautionary approach statement. However, such a statement would have brought into question ICNIRP 's claims of being a source of sure and certain of expert knowledge and therefore threatened its hegemony if other nations took note and then pushed for a higher level of protection for their citizens.

With such a situation, where two groups within TE/7 had such irreconcilable differences, and an 80% consensus could not be reached, gridlock was the outcome.

### **The Shirley School Decision**

During the final round of TE/7 meetings in 1998/99 discussions included an examination of a 1998 Environment Court case in Christchurch New Zealand. That case ruled that the ICNIRP Guidelines incorporated a precautionary approach and therefore any extra level (tier) of precaution was unnecessary. This was used in TE/7 by David Black to argue that no extra tier of precaution was therefore needed in the Standard. It was argued, however, in the meetings that Black's assertion was only true for thermal effects but not so for possible non-thermal effects. For clarification, a brief examination of the Shirley School case is hereby given.

Growing concerns over the possibility of health hazards from the growing number of mobile phone towers appearing in New Zealand led to a one-day scientific symposium on November 18, 1995 in Christchurch to debate the potential health impacts. Among the speakers was Professor Ivan Beale from Auckland University, Dr. John Goldsmith from Ben-Gurion University, Israel, Dr. Richard Luben from the University of California and Neil Pearce of the Wellington NZ Clinical School. The meeting was prompted by "local officials' lack of sufficient knowledge and information for making critical decisions about safety and siting within residential areas".<sup>74</sup> The attendees urged a

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<sup>73</sup> *ibid.*

<sup>74</sup> L. Slesin, 'Opposition to Communication Towers on the Rise in the U.S. and Around the World', *Microwave News*, vol. 15, no. 6, Nov./Dec. 1995, p. 12.

“precautionary approach on the most vulnerable groups in our society”<sup>75</sup> In 1996 New Zealand’s Ministry of Education issued a policy statement, following a precautionary approach, that prevented cellular phone transmitters from being built at public schools. In the official statement from the ministry it is was stated that:

Of paramount importance to the ministry is the provision of an environment where boards of trustees, parents, teachers, pupils and other occupants of the school site can feel comfortable. For this reason the ministry has decided cell phone transmitters will not be sited on Crown-owned school sites in the future.<sup>76</sup>

In 1997 the New Zealand Environment Court was asked to rule on a high profile case involving a proposed Telecom cellular phone base station site at 9 Shirley Road, Christchurch, that was adjoining the Shirley Primary school. Both the Shirley Primary School and some nearby residents lodged objections to the Christchurch council which then enacted a by-law on the site, requiring Telecom to ensure that the maximum emissions to the school property not exceed 2 uW/cm<sup>2</sup> as a precaution. Telecom NZ then appealed this decision. Due to the high publicity given to the case, especially the school’s threat to relocate if the facility was erected, a back-down by Telecom NZ could have seen other precautionary emission requirements being used in other facility locations and so the case ended up in the Environmental Court for a ruling.<sup>77</sup>

Though it was estimated that exposure levels at the Shirley School would be far below the New Zealand RF standard of 200uW/cm<sup>2</sup> for the general public it was argued by several expert witnesses, including TE/7 member Professor Ivan Beale that a precautionary approach should be followed by not allowing the Telecom facility near the primary school grounds.

Beale concluded, (to quote):

The operation of this cell-site could cause adverse health effects in people spending significant amounts of time on the ground and in buildings within 30 metres of the installation.” And that “Persons residing, working or playing in the vicinity of the proposed cell-site would be exposed, in places, to levels exceeding 10 uW/cm<sup>2</sup>. On the roof of the DSW building exposure levels as high as 52 uW/cm<sup>2</sup> are predicted. These levels are 1000 times greater than my estimates of the current levels in this vicinity. They are well within the range at which adverse neuro-behavioural effects have been reported in humans chronically exposed to comparable types of radiation. In addition to the direct effects of radiation exposure on some people, many more would experience adverse effects related to the stress caused by imposition of an unacceptable risk.”<sup>78</sup>

The decision by the New Zealand Environment court rejected any consideration of a precautionary approach for the Shirley school site on the grounds that “a precautionary

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<sup>75</sup> L. Slesin, ‘New Zealand Bans Cellular Antennas at Public Schools’, *Microwave News*, vol.16, no. 5, Sept/Oct 1996, p. 7.

<sup>76</sup> *ibid.*

<sup>77</sup> Correspondence with Ivan Beale, Nov 8, 2004.

<sup>78</sup> I. Beale, (Statement of Evidence). 1997/8, Decision No: C 136/98. Between Shirley Primary School and Telecom Mobile Communications Ltd. New Zealand Environment Court, Document RMA NO /97, May/June 1998, pp. 89, 113.

approach is already implicit in the Act.” This was on the grounds that the judge considered that the Australia /New Zealand RF standard already “provides for a factor much greater than is required to eliminate the possibility of any thermal effects”.<sup>79</sup>

In making his decision Judge Jackson quoted from ICNIRP that:

Overall, the literature on athermal effects. . is so complex, the validity of reported effects so poorly established, and the relevance of the effects to human health is so uncertain, that it is impossible to use this body of information as a basis for setting limits on human exposure to these [a-thermal] fields.<sup>80</sup>

It was on these grounds David Black in TE/7 reasoned that the N.Z. Environment Court ruling validated ICNIRP as already having a precautionary approach and therefore a further tier of precaution was unnecessary. However, as a CFA member pointed out to the TE/7 Committee, the decision by the Environment Court Judge to reject a precautionary approach on the grounds that it is already incorporated in the standard was not relevant to the discussions in the TE/7 Committee. There was no argument in TE/7 about ICNIRP Guidelines providing protection against the well established thermal effects. The precautionary approach statement as called for by CFA was specifically meant to cover the possibility of low-level non-thermal effects, similar to what was stated in the foreword of the 1985 standard. However, this did not stop those TE/7 members wanting ICNIRP standards from using the Shirley School Decision to try to deflect member’s insistence of a precautionary approach to cover the possibility of these effects.

It was also noted in the CFA submission to TE/that while the judge in the Shirley decision accused the expert testimony of some of the witnesses who supported a precautionary approach in the siting of transmitters near the school as being biased, he uncritically accepted the industry’s evidence as correct in its interpretation of the science.<sup>81</sup>For instance Judge Jackson stated that ICNIRP accurately portrayed the general scientific view of the research<sup>82</sup>, a viewpoint very much disputed by the many public and member submissions to TE/7.

ICNIRP chairman Paulo Vecchia set the record straight about ICNIRP’s definition of a precautionary approach at a Conference on Mobile Communications and Health, held in Moscow, Russia in September of 2004. During Vecchia’s presentation on ICNIRP he explained ICNIRP’s understanding of the precautionary principle. To quote:

ICNIRP only considers acute effects in its precautionary principle approach. Consideration of long term effects is not possible. Precautionary actions to address public concerns may increase rather than mitigate worries and fears of the public.

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<sup>79</sup> J.R. Jackson, Decision No: C 136/98. Between Shirley Primary School and Telecom Mobile Communications Ltd. New Zealand Environment Court, Judge JR Jackson, May/June 1998, p. 113.

<sup>80</sup> *ibid*, p. 89.

<sup>81</sup> FINAL VOTE submission by Don Maisch, March 3<sup>rd</sup> 1999. Available at: <http://www.emfacts.com/papers/submissions.html> .

<sup>82</sup> Jackson, 1998, *op. cit.*, p. 87.

This constitutes a health detriment and should be prevented as other adverse effects of EMF<sup>83</sup>

### **A ‘paper tiger’ to stifle dissenting voting within TE/7**

In the email ballot sent out to all members in March of 1999 was a written requirement that all negative votes must be accompanied with a detailed technical explanation to justify their “no” vote. No such requirement was placed on assenting votes. Standards Australia Roger Corrigan wrote that:

Note: A negative vote MUST be supported by DETAILED TECHNICAL REASONS. These reasons MUST be returned as an ATTACHED FILE to this ballot paper. Editorial matters are not considered relevant grounds for a negative vote.<sup>84</sup>

This was seen by all of dissenting members as an attempt to rule out reasons based on the removal of a precautionary approach in the final draft standard. Voting ‘NO’ because it was considered that the draft no longer contained a precautionary approach was an ‘editorial matter’ and therefore invalid. However, the dissenters simply decided to ignore Corrigan’s requirement, reasoning that to reject any vote on this pretext would be a public relations misadventure for Standards Australia. It was seen as simply a ‘paper tiger’ – a desperate attempt to get the required 80% majority to approve the proposed standard. After all votes were registered with Standards Australia for the March 4<sup>th</sup> ballot, nothing further was said about not fulfilling the technical voting requirement. However this episode did suggest that Standards Australia had departed from its supposed neutrality in chairing committee decisions. A bias to get the draft standard approved was apparent with the attempt to insist on technical reasons for a no vote and to exclude concerns over the precautionary approach as not constituting technical reasons.

### **Final TE/7 voting**

The final ballot on the interim draft standard closed on March 4<sup>th</sup>, 1999 without Standards Australia’s required 80% affirmative vote to approve a standard. As the interim standard was originally scheduled to be to be withdrawn on March 5<sup>th</sup>, the TE/7 members agreed to extend its expiry date to 30 April 1999, in order to give time to work out the differences within the committee to reach the required 80 % consensus. During this time the Standards Australia representative on the committee Roger Lyle tried to get at least some of the no voters to change their vote to the affirmative. This was unsuccessful and the interim standard was withdrawn on 30 April. As recounted by a representative from Standards Australia in the May 2001 Senate Inquiry into Electromagnetic Radiation, it was rare for a committee not to reach consensus. He stated that over the previous six or seven years he could not remember a Standards Australia committee not reaching consensus and he called it “a very rare event”.<sup>85</sup>

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<sup>83</sup> D. Maisch, Report on the International Conference: ‘Mobile Communications and Health: Medical, Biological and Social Problems, Sept 20-22, 2004, Moscow, Russia, *European Biology and Bioelectromagnetics*, vol. 1, issue 1, Jan. 2005.

<sup>84</sup> Mercer, 1999.

<sup>85</sup> Parliament of Australia, ‘Inquiry into...’, 2001, op. cit., Sect. 4.101, p. 146-147.

A detailed summary of the 7 submissions from TE/7 committee members who voted against accepting the proposed ICNIRP based RF standard is included in Annex 1 of this thesis. A brief combined summary of the organisational submissions is as follows:

The CSIRO representative John Hunter considered that with the high level of uncertainty a precautionary policy was appropriate by re-instating the levels in the 1985 standard. Local Government New Zealand representative Roger Matthews was concerned that the standard was difficult to verify in the field by local governments, that it emphasised the interests of industry over that of the community, there was no requirement for industry to minimise exposure levels and that the final draft ignored submission calls for a precautionary approach. Therefore it was not a balanced document. The Communications, Electrical and Plumbers Union (CEPU) representative Dan Dwyer and the Australian Council of Trade Unions (ACTU) representative Sue Pennicuik considered the standard as nothing more than a 'cooking standard' that was written to suit the needs of the industry with any reference to a precautionary approach reduced to just a deceitful "feel good" statement that was aimed at misleading the public. They saw the increased limits as a significant benefit to the mobile phone industry while inconsistent with both a precautionary approach and public safety. They considered the entire process as "fundamentally flawed". The Australian Consumers Federation representatives, John Lincoln and myself saw the draft standard as one designed to suit the needs of industry at the expense of public health. It was considered as essentially flawed in both omissions and the incorrect interpretation of the scientific literature. Submissions that questioned ICNIRP were ignored and the precautionary approach that was initially agreed upon was totally excluded from the final document for voting. Therefore it was inconsistent with public health standards. We specifically disagreed with claims that the ICNIRP Guidelines contained a precautionary approach specific to non-thermal adverse effects and called for a statement in the Draft Standard Foreword that acknowledged the limitations of the standard. These were ignored by the full TE/7 committee and therefore we could only vote against the proposed standard. The National Occupational Health and Safety Commission (NOHSC) representative Jim Leigh called for the standard discussion to halt the process until the International Agency for Research on Cancer (IARC) completed its evaluation on RF exposures. He saw the draft standard as inadequate for assurances of public safety and was concerned about the conflict of interest whereby the creators of RF involved in standard setting were giving their industry sector legal protection for their activities. He concluded with concerns over the almost arrogant dismissal of the public comments to the committee and the failure to follow a precautionary approach. Adopt Radiation Controls' (ARC), New Zealand representative Ivan Beale rejected the thermal basis for the draft standard in that it failed to consider recent research that found adverse effects at levels below the standards maximum permissible levels. He noted that he and other members on the committee had consistently argued for inclusion of this evidence in standard setting and that the standard did not serve the public health protection needs of the community. Beale concluded by supporting the CFA in calling for plain language in the standard to make it clear that the standard limits are not intended to provide protection from other effects not related to heating. As the final draft did not reflect these concerns he could not support it.

### **Attitudes to public participation**

As mentioned previously, the majority of TE/7 government representatives as well as all of the varied industry members firmly supported the ICNIRP Guidelines as the 'gold standard' that accurately reflected the conclusions of the vast body of scientific literature on RF biological effects. As was seen at a Melbourne TE/7 meeting, where the whole day was taken up with submissions, the many public submissions were only briefly mentioned and then dismissed. Even extensive submissions criticising the ICNIRP Guidelines by Dr. Neil Cherry and others received scant attention and were dismissed. This was the same fate that met committee member submissions questioning ICNIRP standards. In comparison, industry technical submissions received extensive discussion – all dealing with technical matters and exact wording in various sections of the draft. At one point Telstra representative Vitas Anderson, when referring to the concerns contained in the public submissions, mentioned the need to "comfort the community". This was taken to mean the public submissions were based on unfounded fears and not reflecting the weight of expert scientific opinion as expressed by ICNIRP. Therefore Anderson saw the main issue as a need to comfort the community that there was really nothing to worry about.

What was seen in many of the public submissions to TE/7 however was that a large number of submissions had access to detailed scientific information and to a large extent reflected the concerns of dissenting members of TE/7. A common thread in the public submissions was a reliance on the 1994 CSIRO report, other literature from a number of serving and retired CSIRO scientists, Dr Neil Cherry in New Zealand and myself which are briefly described in Appendix 2. These documents, all specific to Australia and New Zealand, gave the public access to a large amount scientific information from which to draw upon for their submissions to TE/7. The common theme of these documents was a critical examination of the limitations of the Western thermally orientated RF standards, specifically focussing on the ICNIRP Guidelines. Besides these documents, activist groups in Sydney and Adelaide had access to Dr. Ross Adey's research material through him directly and other research material on RF from various library information retrieval systems and the Library of the Sydney County Council (NSW). In addition a number of activist groups had access to the U.S. industry watchdog newsletter *Microwave News*.<sup>86</sup>

A level of scientific expertise of a concerned citizenry based on the above material was demonstrated by the residents of Waterfall, NSW, who were protesting against construction of the mobile base station close to the Waterfall school in 1995. At a community meeting with Telecom officials and scientists, one was overheard to remark to his colleagues "How did these people get to know so much?".<sup>87</sup> As a result of public pressure Telecom dismantled and removed the base station. The official reason given by Telecom was "the base station was relocated for technical reasons."<sup>88</sup> At a subsequent meeting chaired by Spectrum Management Agency a representative of SMA remarked that they had no idea that the public were so interested and concerned about the RFR issue until they received an extensive submission from the Sutherland Shire Environment Centre.<sup>89</sup> In spite of the many detailed public submissions sent into TE/7 during the public submission phase, these submissions received scant attention by

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\* Correspondence with Betty Venables, convenor of the The Electromagnetic Radiation Alliance of Australia (EMRAA) Sutherland Shire Environment Centre, Sutherland, NSW. July 27, 2003.

<sup>87</sup> *ibid.*

<sup>88</sup> *ibid.*

<sup>89</sup> *ibid.*

industry and government. On one occasion, at an earlier meeting chaired by Michael Repacholi, he actually proposed to vote on the proposed 1998 Interim standard before public submissions were even considered. This met with opposition from several members, especially trade union and CSIRO representatives and was rejected.<sup>90</sup>

### **Comforting the community**

Telstra's TE/7 representative, Vitas Anderson, summed up the industry's viewpoint on the worth of public concerns by mentioning the need to "comfort the community" over their fears of "hypothetical" risks at the March 1999 TE/7 meeting. This author took this to mean that there was a need to give information to the community that would encourage them to stop worrying with irrational fears - according to the industry's viewpoint. Efforts to "comfort the community" later included education campaigns consisting of information sheets, videos and DVD presentations to create a more "scientifically literate" public who then would be more supportive of scientific research programs, be more enthusiastic about technological innovations, as well as being willing consumers of the technology. An example of this sort of viewpoint was given in 2003 by Associate Professor Andrew Wood, from Swinburne University, based in Melbourne, Victoria. Dr. Wood is a consultant to WHO/ICNIRP, a consultant to a number of industry groups including the Electrical Supply Association of Australia (ESAA) and Telstra. At the annual 2003 conference of the Australian Radiation Protection Society (ARPS), Wood gave a Powerpoint presentation that humorously compared the public's concerns over health hazards from EMF (including RF) exposure to a newspaper article about Russian museum worker's fears over a curse supposedly placed on a particular sacred antique icon painting on display in the museum. Apparently some of the workers were stricken with ailments that they blamed on the curse. Wood made a direct comparison with the public's supposedly irrational fears over EMF, possibly causing adverse health effects as well.<sup>91</sup>

An example of government attempts to "comfort the community" over the safety of telecommunications was an Australian government /Australian Communications Authority 6 minute video presentation created to inform the public on the science of "Mobile Communications and Health" (since withdrawn). This presentation was initiated by Telstra, supported by the Mobile Carriers Forum, and had "expert and independent" commentary by a representative from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The presenter in the video was Australian TV broadcaster and journalist Jeff Watson, who is best known for his 1979 TV science production. Watson started off by giving a brief explanation of radiofrequency and microwave radiation which he terms Electromagnetic Energy (EME). To quote:

Putting it in basic terms, EME stands for Electro-Magnetic Energy ...A fact of everyday life...Almost everything in our homes emits electro magnetic fields to some degree... So if it's natural energy... and already in our everyday life, why do so many see it as harmful?<sup>92</sup>

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<sup>90</sup> Correspondence with TE/7 committee representative Dan Dwyer, Nov. 1998.

<sup>91</sup> A. Wood. 'Effective Protection against Non-Ionizing Radiation (NIR) or: the Devil's in the Detail', ARPS-28 Conference, Hobart Function and Conference Centre, Oct. 28, 2003.

<sup>92</sup> ARPANSA/ ACA, etc., Mobile Communications and Health, produced by the Australian government /Aust. Communications Authority, initiated by Telstra, supported by the Mobile Carriers Forum with commentary from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Dec. 2004.

Watson then introduced the ARPANSA representative who stated:

The EME safety limits provides protection for people of all ages and health conditions whether they're exposed to EME irregularly, or for 24 hours a day, 7 days a week.<sup>93</sup>

This statement was contradicted by ICNIRP Chairman Paolo Vecchia in 2004 at a international cell phone conference in Moscow, while speaking about the ICNIRP Guidelines, that "Consideration of long-term effects [is] not possible."<sup>94</sup>

During the TE/7 meetings and in the public submissions it was pointed out that the "EME safety limits" the ARPANSA representative referred to (the ICNIRP limits), were in fact only addressing acute-short-term exposures as they are largely based on lab studies of animals following acute exposure to relatively high levels of RF/MW. ICNIRP itself has admitted that because of this, very few studies used as the foundation of the limits are relevant to the evaluation of RF exposure on the development of cancer in humans.<sup>95</sup> Thus, it was disingenuous that a representative from ARPANSA claimed that the EME safety limits provided protection to everyone over extended amounts of time when that is plainly not what the limits were designed to do.

According to the ARPANSA representative, "[t]he EME safety limits are well below the thresholds where health effects [ thermal only] have been shown to occur" He said that EME radiations "are only known to heat...we can feel more relaxed over the issue of radiation." He then made a comparison to an electric heater. When asked if there are any long-term health effects (such as cancer) he simply stated that "the evidence is saying that there isn't really a problem".

The presentation then quoted from the ARPANSA website that "The weight of national and international scientific opinion is that there is no substantiated evidence that RF emissions associated with living near a mobile phone base station or telecommunications tower poses a health risk".<sup>96</sup> Also quoted is a WHO statement, "Despite extensive research to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health."<sup>97</sup> These are the same arguments heard in TE/7 back in the late 1990's and they failed to comfort the concerned community, as seen in the many public submissions to TE/7. In addition, simply deferring to international scientific opinion as the final say in the matter was rejected by a number of TE/7 committee members, including the CSIRO (See Appendix 1).

The dismissive attitude over public health concerns on part of ARPANSA, the Australian Communications Authority (ACA) and industry from TE/7 up to the present day, as illustrated in the December 2004 video presentation mentioned above, can be understood in the context of these agencies following a deficit model of public

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<sup>93</sup> *ibid.*

<sup>94</sup> Maisch, 2005.

<sup>95</sup> ICNIRP. 1996, 'Health Issues Related to the use of Hand Held Radiotelephones and Base Stations', *Health Physics*, vol. 70, no. 4, Apr. p. 3.

<sup>96</sup> ARPANSA, Fact Sheet, EME Series no.9, 'What about base stations and telecommunications towers - are there any health effects?', 2007, <http://www.arpansa.gov.au/pubs/eme/fact9.pdf> , Accessed Sept. 12, 2007.

<sup>97</sup> WHO summary of Health Effects, <http://www.who.int/peh-emf/about/WhatIsEMF/en/index1.html> , Accessed Sept. 12, 2007.

understanding of science.<sup>98</sup> In this model, the agencies see a deficit in public scientific understanding or knowledge that has led to an unjustified scepticism toward technological/scientific progress. Lacking a proper understanding of the scientific facts, the public are prone to fall back on irrational, and even paranoid fears of the new and unknown.<sup>99</sup> In the context of TE/7, the concerned public and by default, members of TE/7 who were against adopting ICNIRP limits were considered to be deficient in their understanding of the scientific literature and reasoning embodied within the ICNIRP Guidelines. In contrast, the ICNIRP standard was considered sufficient to assure safety – an ‘unprobabilistic body of sure and certain knowledge’ that was above reproach. The very questioning of ICNIRP science was therefore an admission of ignorance according to the deficit model. The deficit model of public understanding of science dovetails in well with the “revisionist” technocratic model of risk assessment as promulgated by John D. Graham at a WHO EMF Risk Perception and Communication Seminar in 1998. Graham saw the public’s general reaction to health, safety, and environmental dangers as best described as “a syndrome of paranoia and neglect”. Graham saw the public as paranoid in the sense that they devote large amounts of resources and attention to alleged dangers that are speculative at best and probably small or non-existent.<sup>100</sup> The fact that this was from Graham’s Keynote presentation at a seminar on EMF perception clearly puts public concerns over possible health hazards from EMF’s squarely into that syndrome. (See Chapter 1, for a further discussion of Graham’s views, as well as a description of the revisionist philosophy by Adam Finkel.

### **Public trust in the experts**

Such a dismissive, condescending attitude towards the public submissions to TE/7, coming from both industry and government regulatory agencies, did little to engender trust amongst the public. Add the conflicting views on the experts’ science (CSIRO vs. ICNIRP) and the regulator’s exemptions from community planning laws enjoyed by the telecommunications industry, there is the likelihood that the concerned public can lose trust in the regulator’s determinations of acceptable risks for the community. In this case the concerned public have no recourse but to do their own informal risk assessment based on their own experience – including their negative experience dealing with the experts and telecommunications carriers. Such a risk assessment, though it may contain many subjective elements, should not be ignored as it reflects valid concerns of those who are being exposed, not just the views coming from those who, directly or indirectly, are responsible for the exposures. Such an informal risk assessment may include vastly different definitions of acceptable and unacceptable risks than those of industry. For example: Risks perceived by the public as the possibility of adverse health effects from technology, versus an industry that considers their primary risk (to the speedy rollout of new technology) as being interference from the concerned public.

Besides the issue of health risks that may be associated with RF exposures, the industry and government, by their tendency to label community concerns as public irrationality,

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<sup>98</sup> For a concise analysis of the concept see: P. Sturgis, and N. Allum, ‘Science in society: re-evaluating the deficit model of public attitudes’, *Public Understanding of Science*, vol.13, 2004, pp. 55-74.

<sup>99</sup> *ibid*, p. 57.

<sup>100</sup> J. Graham, ‘Making Sense of Risk: An agenda for Congress’, EMF Risk Perception and Communication, Proceedings of the International Seminar on EMF Risk Perception and Communication, WHO, Ottawa, Ontario, Canada, Aug. 3–Sep. 1, 1998, Repacholi MH, Muc A (eds), pp. 1 – 31.

are imposing another level of unacceptable risk on the public - psychological stress. There is abundant research showing the creation of psychological stress in people who are chronically exposed to uncertain environmental risks.<sup>101 102</sup> In other words, events impacting on people can contribute significantly to the development of physical or psychological disorders. Well-established stress reactions include changes in blood and urine chemistry, changes in cardiovascular reactivity, muscle potential, skin conductance and sleep patterns. Environmental stressors on the immune system can make the victim less resistant to infectious diseases. Stress reactions also include psychological symptoms such as depression and anxiety.<sup>103</sup> These psychological risks which can be directly associated with the siting of a particular technology, say a mobile phone base station tower next to a school or residential community, are not a consideration in expert risk assessments of the 'impact' of that particular technology. For example, in Australia the only 'impacts' on the community that are considered in siting base stations are 'visual impacts', ignoring the possibility of adverse psychological impacts on nearby residents by the imposition of the facility with the community given no say on where the facility was to be placed.

Daniel Westall from ARPANSA admitted at a conference in September 2001 that the regulators are suffering a loss of prestige and respect in the community. Westall said:

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.<sup>104</sup>

Westall went on to report on the outcomes of an Organization for Economic Co-operation and Development (OECD) Nuclear Energy Agency workshop in Switzerland in 2001. At this meeting leaders of the radiation protection and regulation community discussed the involvement of the community in regulatory decision making. Westall reported that "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."<sup>105</sup> Westall's viewpoint is in agreement with a 2008 report by The U.S. National Academy of Sciences, National Research Council (NAS/NRC) 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

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<sup>101</sup> P. Martin, *The Sickening Mind: Brain, Behaviour, Immunity & Disease*, (Mind and Immunity) Flamingo Press (Harper Collins) 1998, pp. 81-105.

<sup>102</sup> I. Beale, 'The Effects of Electromagnetic Fields on Mental and Physical Health', *Journal of Child and Family Studies*, vol. 6. no. 3, 1997, pp. 273-288.

<sup>103</sup> *ibid.*

<sup>104</sup> D. Westall, Will Radiation Regulation Matter in the 21<sup>st</sup> Century?, Australian Radiation Protection Society (ARPS 26), Surfers Paradise, 17-21 Sept. 2001.

<sup>105</sup> *ibid.*

public participation to avoid conflicts on important issues is counterproductive in the long run.<sup>106</sup>

### **Beyond TE/7: ARPANSA's Radiation Health Committee incorporates an ICNIRP based RF Standard for Australia.**

TE/7's failure to approve the 1998 Interim standard left the Australian Government with a major dilemma, just at a time when they planned to sell further parts of the electromagnetic spectrum in the higher microwave range for new wireless technology.

Under the old 1990 standard exposure limits, much of the new high frequency communications systems, operating in the Gigahertz range (GHz), would have been in violation of the old limits. For both the Federal Government and Standards Australia, to be seen in the public eye as allowing technology to be sold in Australia that had emissions in excess of the "health based" standard was clearly unacceptable. The communications industry had a similar problem to be seen selling "unsafe" products would have clearly been unacceptable from a marketing perspective. To solve the government and industry's dilemma, the issue was passed over to the Australian Communications Authority that gave the job of incorporating the ICNIRP Guidelines into a Standard to the newly created Australian Radiation Protection And Nuclear Safety Agency (ARPANSA). ARPANSA then gave the job to its Radiation Health Committee which then commissioned a working group committee to prepare a draft Standard. The working group had no voting rights but could only refer its recommendations on to the Radiation Health Committee and its chair, Colin Roy, would make the final determination.<sup>107</sup> When ARPANSA's Radiation Health Committee convened the new working group to carry on with the work of the now defunct TE/7 Committee, the CSIRO was asked to nominate an expert member. CSIRO management then selected Dr. Stan Barnett, from the Telecommunications and Industrial Physics (TIP) division, to attend the first two-day meeting. After discussion with CSIRO TIP management, Barnett tendered his resignation from the new committee. His reason was that:

[The] purpose of the new committee (although it had the same faces<sup>108</sup> as TE/7 but with a new chair) seemed to be way to push through a Standard that had failed to reach consensus under Standards Australia processes. I did not see how this could be achieved by the same group of people without a considerable amount of energy being spent on non-scientific issues. My concern was that there was no benefit to CSIRO in continuing its involvement. . . There was a very high risk that the exercise would be more of a public relations activity than a genuine attempt to pay attention and properly deal with the issues of "non-thermal bioeffects" and the "Precautionary Principle". I held some concerns about the process that was proposed. There was a clear reluctance to answer questions about the definition of "consensus". This was to be an agreed standard and the CEO of ARPANSA seemed to hold sway over whatever was accepted or rejected. Furthermore, this committee

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<sup>106</sup> 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> , Accessed Sept. 15, 2008.

<sup>107</sup> Correspondence with ARPANSA working group member John Lincoln, Oct. 20, 2004.

<sup>108</sup> Virtually all of the faces that had voted in favour of the ICNIRP limits in TE/7 but with only a few members that had voted no. Thus ensuring the final vote would be overwhelmingly in favour of ICNIRP.

was to report to another committee which reported to the CEO. The Chair of this higher committee objected strenuously when questioned about the process. The CEO retained the authority to decide if any dissent by committee members need be considered.”<sup>109</sup>

Shortly after Stan Barnett resigned from the working group he was followed by David McKenna, representing the Community and Public Sector Union (CPSU), for reasons not stated.<sup>110</sup>

Out of the 8 members making up the working group, only two were against incorporating the ICNIRP Guidelines in the Australian RF standard. These were John Lincoln, representing the Electro Magnetic Radiation Alliance of Australia, and Dan Dwyer, representing the Telecommunications Officers Association. In addition to the 8 on the working group, there were 2 consultants, 2 on the Secretariat and 7 Observers, who sat in at the meetings; all of these people were firmly in favour of an ICNIRP based standard.<sup>111</sup> The final recommendation of the working group to the Radiation Health Committee was in favour of the proposed ICNIRP based RF Standard. Having no input from the public, other than the token representation of only one community representative on its non-voting working group, ARPANSA’s RHC was able to simply ignore the many scientific and public submissions to the previous TE/7 Committee. Using virtually dictatorial powers the CEO of the Health Research Council (HRC) and ARPANSA was able to push through a Standard in a manner that Hollway warned about 19 years earlier. ARPANSA’s Radiation Health Committee published its ICNIRP based RF Standard on 7 May 2002, titled: “Radiation Protection Standard – Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz”.<sup>112</sup>

### **Democracy excluded from the RHC decision making process**

As mentioned previously, Dr. David Black stated to the Senate Inquiry in May 2001 that he saw that democracy does not work in scientific consensus building. Black said, to quote:

The limiting factor was the fundamentally flawed idea that a scientifically based document could be produced by a democratic process of requiring virtual consensus from a group which deliberately included people with inevitably dissenting views.<sup>113</sup>

From Black’s comments, it would be fair to assume that those on TE/7 who had pushed for many years for ICNIRP standards, considered that the only way to get a satisfactory outcome was to exclude from future committees those who had a dissenting view - or only allow a small minority, with no power to influence the desired outcome. This would be not far from the viewpoint of the original 1978 SAA committee that the best people to set standards were those with the relevant technical expertise and managerial experience in handling the technology. This was essentially reinstated within ARPANSA

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<sup>109</sup> Correspondence with Stan Barnett, Snr. Principal Research Scientist, CSIRO, 10 Oct., 2003.

<sup>110</sup> Parliament of Australia, ‘Inquiry into...’, 2001, op. cit., Sect. 4.106, Table 4.4.

<sup>111</sup> Correspondence with working group member John Lincoln, representing the Electro Magnetic Radiation Alliance of Australia (EMRAA), Oct. 24, 2004.

<sup>112</sup> ARPANSA, Fact Sheet, EME Series no.4, ‘The ARPANSA radiofrequency radiation exposure Standard’, <http://www.arpansa.gov.au/pubs/eme/fact4.pdf>, Accessed Sept 24, 2007.

<sup>113</sup> Parliament of Australia, ‘Inquiry into...’, 2001, op. cit., Sect. 4.103, p. 147.

after TE/7 concluded. Even though the ARPANSA working group would have contained four out of the ten members who were against an ICNIRP based standard (if Barnett and McKenna had not resigned), the working group had no voting rights, only an advisory role, to another higher committee. So any dissent within the advisory group would have had no impact on the final outcome as the CEO and head of the RHC had the absolute final say in the process. ICNIRP standards were a foregone conclusion. It would appear that the lesson learned by ARPANSA as a result of the failure of TE/7 to approve the Interim standard was that public participation was detrimental to their desire to reach a particular decision: ICNIRP standards. This clashes with the view that public participation in agency decision making processes is more likely to improve than undermine the quality of agency decisions and that avoiding public participation to avoid conflicts is counterproductive in the long run.<sup>114</sup>

### **Political considerations end CSIRO's involvement with telecommunications**

In September 2003 Barnett, from CSIRO's Telecommunications and Industrial Physics Department (TIP), circulated a letter to announce that he had been forced to accept "involuntary redundancy" from CSIRO and that his division had been told by senior management to cease all further research into the bioeffects and safety of ultrasound and non-ionizing radiation (RF). Barnett stated in his 2003 letter that:

CSIRO has chosen to stop all research into bioeffects and safety of diagnostic ultrasound and cease any involvement in safety of non-ionizing radiation in general. It seems that research for the good of the community is not considered a priority area unless it is politically attractive or able to attract funding from industry. Clearly, that is not the case for safety related research in a taxpayer-funded research organisation.<sup>115</sup>

This move ended CSIRO's long involvement in telecommunications research and standard setting which began in 1979 with Hollway's work establishing the original SAA RF committee. Henceforth, any research into possible health impacts of mobile phones or other health issues related to telecommunications would go through the National Health & Medical Research Council's (NH&MRC) EME committee that had been established in 1996 by the government for this purpose. Concerned about the potential involvement of the telecommunications industry in this committee, a researcher for the Australian Democrats Senator Lyn Allison, wrote to the NH&MRC in early December 1996 asking about industry representation. On December 30 Richard Morris, Assistant Secretary of the Health Research Branch, replied in writing, stating that members of the telecommunications industry would not be involved. Morris stated that:

In regard to your concern about the involvement of industry in the NH&MRC process, let me assure you that members of the NH&MRC Expert Committee will be active researchers without links to the telecommunications industry. This independence from industry is seen as being of great importance to NH&MRC.<sup>116</sup>

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<sup>114</sup> Dietz, Stern, (eds.), 2008.

<sup>115</sup> Correspondence with Dr. Stan Barnett, Sept 22, 2003.

<sup>116</sup> R. Morris, Letter from Richard Morris, Assistant Secretary, Health Research Branch, NH&MRC, to Sarah Benson, researcher for Senator Lyn Allison, 30 Dec. 1996.

Despite this assurance from the NH&MRC, when it came to appointing a key expert radiation adviser to its EME Expert committee, Dr. Ken Joyner, Motorola's Director of "Global EME Strategy and Regulatory Affairs", was given the position<sup>117</sup>. Dr. Joyner has also represented an industry group, the Australian Mobile Telecommunications Association (AMTA), on the standards committee<sup>118</sup> and has represented the Mobile Manufacturers Forum.<sup>119</sup> Such a complete reversal of their former stance that "independence from industry is seen as being of great importance" would likely have come about after pressure from within the government. Joyner had been closely associated with the formulation of government policy on RF exposure. This is seen in the *Bioelectromagnetics Newsletter* of July/August 1998. In his article titled "Australian Government Action on Electromagnetic Energy Public Health Issues" Joyner's affiliation was given as representing the Australian Federal Department of Communications and the Arts<sup>120</sup>.

A direct comparison can be made here between the dismissal of Barnett and the removal of the CSIRO/TIP from the debate with similar contemporary events in the Czech Republic. In the case of the Czech Republic Dr. Jan Musil, chair of the National Reference Laboratory and the National Institute of Public Health's Advisory Board on Non-Ionizing Radiation, was removed and replaced by a person who was in favour of accepting ICNIRP Guidelines.<sup>121</sup> As with Barnett, Musil had opposed the acceptance of ICNIRP Guidelines on similar grounds to that of the CSIRO and had called for the application of precautionary principles.<sup>122</sup> (See Chapter 4, pages 160-162). In both cases, government advisory agencies were giving advice inimical to political and economic interests and in both cases the agencies were silenced for reasons unrelated to science.

## Conclusions

Ostensibly the task given to the original SAA committee and later the Standards Australia TE/7 Committee was to conduct a risk assessment on the available peer reviewed scientific literature for RF exposures and then draft a standard specifically for Australia (and New Zealand). However, two distinct and different risk assessments took place and by the time TE/7 was wound up, these proved to be irreconcilable.

On one hand the CSIRO played a central role in critically examining all the available information, including the Russian literature and the more restrictive RF in-house standard set by the Applied Physics Laboratory at Johns Hopkins University. As a result David Hollway from the CSIRO took a more conservative risk assessment approach taking into consideration the possibility of hazards from low-level RF exposures not related to heating. This assessment was scientifically supported by a number of publications by CSIRO and former CSIRO scientists.

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<sup>117</sup> National Committees for Science (Australia), ANNUAL REPORT TO COUNCIL on 2004 Activities, <http://www.ncrs.org.au/annual/2005.pdf>, Accessed Mar. 6, 2007.

<sup>118</sup> Standards Australia, Committee TE/7: Human Exposure to Electromagnetic Fields, meeting No. 1/98, Minutes, 12 Aug. 1998.

<sup>119</sup> Parliament of Australia, 'Inquiry into...', 2001, op. cit., Sect. 4.68.

<sup>120</sup> K. Joyner, 'Australian Government Action on Electromagnetic Energy Public Health Issues'. *Bioelectromagnetics Society Newsletter*, no. 143, July/Aug. 1998.

<sup>121</sup> L. Slesin, 'Czech Government Now Follows ICNIRP', *Microwave News*, vol. 21, no.1, Jan./Feb. 2001, p. 7.

<sup>122</sup> L. Slesin, 'Czech Panel on the Precautionary Principle and Numerical Limits', *Microwave News*, vol. 20, no. 3, May/June 2000, p. 14.

Following CSIRO's lead, in the later TE/7 committee, a number of other standard committee members took a similar stance in their various written submissions to the committee. Their shared stand can loosely be termed as calling for a precautionary approach due to the many uncertainties and gaps in the literature. Some opposed the proposal to increase the limits to that of ICNIRP outright, while others indicated that they might support the increase, provided a strong precautionary statement was incorporated into the standard that acknowledged the level of uncertainty that existed in relation to low-level non-thermal exposures.

On the other hand, the opposing assessment supported by the majority of committee members (the telecommunications industry, broadcasters, the military, allied professional bodies, including government representatives from the Australian Radiation Laboratory) was that the assessment promoted by ICNIRP (originally proposed by Repacholi in 1984, see Chapter 4, page 1) was sufficient. This was that the only health issue to address in standard setting was short-term effects due to the absorption of RF energy of sufficient power to heat up biological tissue. Their shared viewpoint was that the ICNIRP risk assessment was beyond question. This is seen in the TE/7 committee requirement that the only information they would consider in submissions was new scientific information not previously seen by the committee. Re-analyses of pre-existing data, such as referenced by ICNIRP was not to be considered. An example of the unwillingness to re-examine data was seen in a statement by David Black at a 2004 EMF Health Forum held in Hamilton, New Zealand on November 15, 2004. Black, a former TE/7 member and current consulting expert for ICNIRP, was replying to a criticism of another speaker who had incorrectly stated that the 1997 National Cancer Institute Linet study of 638 children with leukaemia was a negative study with no association with the disease and power-frequency EMF exposures. This writer pointed out that the higher exposed children in the Linet study did in fact have a positive association between leukaemia and EMF exposure but that these children had been removed from the analysis and so it was deceptive to claim, without this qualification, that no association was found. Black agreed that there was a positive association at a 3 milliGauss (mG) exposure level but then dismissed it by claiming that one must go with the published statements by the authors / journals for the purposes of standard setting. In this context this would suggest that one must take uncritically published statements used in standard setting regardless of their validity. This was apparently the case in TE/7 with those members wanting to approve ICNIRP Guidelines without qualification.

At the conclusion of TE/7 in 1999 the two opposing risk assessments could not be reconciled and the committee was concluded without approving the proposed ICNIRP based standard. This placed the Australian government in an unviable situation just when it was planning to sell off further parts of the electromagnetic spectrum in the microwave range to accommodate new technology as well as planning on selling more of its shareholdings in Telstra. With the failure of TE/7 to approve the draft ICNIRP based standard there was now no RF standard in force. In addition, the longer the stalemate continued the greater risk that the public would become increasingly concerned about possible health hazards from the technology. The task of drafting and approving an ICNIRP based standard was then given to a newly created agency, ARPANSA, which convened a Radiation Health Committee (RHC) to finish the task of drafting an ICNIRP based standard for Australia and therefore end the uncertainty.

Thus it is concluded that the long push to increase Australia's former RF exposure standard's limits had little to do with better science but all to do with the 'realpolitik' of pushing through ICNIRP's thermal-effects-only paradigm in order to advance economic interests. This situation belies the claim by ICNIRP chairman Paolo Vecchia that ICNIRP's advice was solely based on established health effects, with no consideration given for economic or social issues.<sup>123</sup> The Australian experience was that the push to accept ICNIRP standards was, above all else, an economic imperative. This was borne out by essentially the same debate in the Czech Republic, examined in Chapter 4.

The whole history of SAA, TE/7 and finally ARPANSA's RHC committee is one where CSIRO scientific advice to government was largely ignored in favour of economic considerations in government policymaking. This is compatible with Collingridge and Reeve's observations in their analysis of technical policy in which they concluded that the impact of science advice on rational government policy was negligible. They saw science advice as always being placed in either an "under-critical" or "over-critical" environment and in each situation science loses out.<sup>124</sup> In the case of RF standard setting and ICNIRP's attempted hegemony over science this is especially the case because both environments apply.

In an "under-critical" environment a policy paradigm (such as ICNIRP Guidelines) already exists and any scientific claims or research findings that appears to support the paradigm are easily accepted, such as by pro-ICNIRP-standards TE/7 members. In the "over-critical" environment adversaries are sharply divided over science claims and research findings (such as the existence of low level non-thermal bioeffects from RF exposures) are subjected to intense analysis and differing conclusions by opposing factions. This was very much the case with TE/7 where all research that was presented to the committee to support a precautionary approach to RF standard setting was summarily dismissed as it conflicted with ICNIRP.

Collingridge and Reeve's observations about the fate of scientific advice in supposedly rational government policy making is reflected by the actions of the Australian government in ignoring CSIRO's advice, and later silencing CSIRO altogether. The government's actions can be attributed to the fact that CSIRO advice ran counter to its economic policy to facilitate the roll out of telecommunications technology. This was the underlying theme that was played out in the final round of TE/7 meetings.

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<sup>123</sup> P. Vecchia, P, 'Electromagnetic Fields and Health: Effects, Perception, Protection', ICNIRP, Montevideo, Uruguay, Mar. 5, 2009, <http://www.msp.gub.uy/andocasociado.aspx?2819,16619>, accessed April 3, 2009.

<sup>124</sup> D. Collingridge, C. Reeve, *Science Speaks To Power*, New York, St Martins Press, 1986.

## **Overall Conclusions: RF standard setting: a weighted assessment of science**

*“In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist.”*

Public Papers of the Presidents, Dwight D. Eisenhower, 1960, p. 1035- 1040

This thesis has shown that the creation and maintenance of the thermal paradigm in RF standard setting for the past half century has not been one of a straight forward case of advancing scientific knowledge, but one of convenience in order to facilitate the unfettered development of technology free of regulatory restraints. During the opening years of the Cold War, RF standard setting decisions, made in an era of scientific ignorance and fear of Soviet malevolence, led directly to a pragmatic solution to meet the nation’s urgent security needs of the day. Consideration of possible health hazards from chronic low-level RF exposures was seen as not only a potential barrier to technological development but also as a threat to national security. In addition, the existence of strict Soviet RF standards that claimed to take into consideration the possibility of low-level non-thermal hazards was a challenge to the scientific hegemony of the U.S. standard. In this situation, scientists involved in the U.S. standard development research found that focussing their research on gaining better understanding over thermal biological effects was what was wanted, not research that questioned that line of inquiry.

The marginalisation of criticisms of the validity of the thermal approach to RF standard setting has been an important issue raised in this thesis and is what I call the Procrustean Approach, where all scientific evidence not in conformity with the thermal bed of knowledge is simply cut off from consideration. Such a state of affairs has been maintained by the creation of restricted risk assessment methodologies, conflicted peer review and expert committees constituted primarily by individuals who have a vested interest in maintaining the status quo. This has been illustrated in this thesis by the analysis of the IEEE's peer review processes for accepting research papers for consideration in RF standard setting, the IEGMP / ICNIRP's risk assessment committees and the case study of the Australian RF standard setting process. In all three cases the problem of conflict of interest can be more accurately described as a majority shared interest in maintaining the status quo in standard setting for vested interest considerations.

### **The extent of the problem for public health**

A critical examination of the current RF standard setting approach is also important for public health considerations. When the need for an RF exposure standard first arose over half a century ago it was not considered a public health matter as the concern was restricted to military personnel and civilian contractors developing high power military radar systems. The restricted focus of exposure limits from that time, however, has been steadfastly maintained to become a foundation for the global telecommunications revolution. Besides the ubiquitous mobile phone, a large number of communication devices are continually being developed and marketed globally as telecommunications companies struggle to keep up their profit margins under market-place competition. As the electromagnetic spectrum frequencies inevitably become congested as a result, newer wireless devices are then introduced that operate at ever-higher frequencies. The predictable result of this on-going development is increasing RF exposures for society in general, in both the so-called developed and developing nations. If there are deficiencies in the telecommunications risk assessments conducted by RF standard setting organizations, both on a national and international level, the sheer number of people exposed to even a slightly increased risk that is ignored by the standards can equate to a significant risk for society. This was pointed out by the U.S. National Toxicology Program on the inadequacies in the existing thermally based RF standard. To quote:

Over 100 million Americans currently use wireless communication devices with over 50 thousand new users daily. This translates into a potentially significant public health problem should the use of these devices even slightly increase the risk of adverse health effects. ... The existing exposure guidelines are based on protection from acute injury from thermal effects of RFR exposure. Current data are insufficient to draw definitive conclusions concerning the adequacy of these guidelines to be protective against any non-thermal effects of chronic exposures.<sup>125</sup>

This thesis argues that the current data is insufficient because for too long the investigation has been hampered by a Procrustean Approach that has cut off avenues of

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<sup>125</sup> National Toxicology Program, Fact Sheet, Studies on Radiofrequency Radiation Emitted by Cellular Phones, 2005. <http://ntp.niehs.nih.gov/files/Cellphone05.pdf> , accessed Feb. 12, 2009.

research that were considered inimical to the maintenance of the existing thermal paradigm.

This should no longer be acceptable given the implications for global society if the standard setters have it wrong.

### **Future directions**

There is obviously an immense problem in recommending how to reform an existing RF standard setting process that has been controlled from the start by individuals who have staked their scientific credibility, and careers, on defending the existing thermal paradigm for standard setting. There is also the problem of whether or not biologically relevant standards that address chronic low-level non-thermal exposures are even compatible with the continuing wireless revolution. These are problems, however, that urgently need addressing due to the possibility of a significant adverse global public health impact of the technology. This calls for an international re-assessment of the biological relevance of the existing RF standards: IEEE's C95.1 and ICNIRP's guidelines. This is already happening to an extent in the European Parliament, as examined in Appendix 3. A standard setting process is needed that can open up the assessment process to cover all possible health hazards that might be a consequence of RF technology, regardless of the economic consequences of that assessment.

It is important to note that the concerns raised in this thesis also apply to other broader environmental debates where industry and other vested interests, following revisionist principles, have been able to influence the parameters for regulation of their activities. In this context, this thesis contributes to the debate over the role played by peer review and expert advisory committees by illustrating that these processes, far from being a source of unproblematic and objective expert advice, can be prone to conflict of interest and a biased interpretation of scientific information, as exemplified herein by the RF controversy.

