

meaningless.

- (3) There should have been a full histopathological examination of all those animals terminated at the end of the study. This may have shown the expression of the follicular lymphoma in a way that may have eliminated any statistical difference between the RF exposed groups and the control groups.
- (4) It is important in animal studies to make sure the animals are pathogen free however there was evidence of a lethal renal disease in the mice. The bedding should have been changed more frequently to minimise the stress to the animals due to ammonia build-up and there should not have been five animals in a cage during exposure. Stress can lead to an earlier appearance of follicular lymphomas. Closer monitoring should have occurred so that dead animals could have been (sic) removed soon enough to allow successful pathological examinations.
- (5) The exposure of each animal in the cage was dependent on reflections and scattered radiation from the other animals in the cage. When animals died, they were removed and not replaced, making the dose to the other animals different than originally calculated."

There was no good answer to any of these criticisms from the witnesses for SPS.

173. Mr Hearn, for SPS, criticised Dr Meltz for only considering a small proportion of the total of bio-mechanistic studies of the effects of exposure to RFR. This criticism has some force especially since Dr Meltz himself had criticised Dr Cleary for only considering ten papers out of 17 referred to in Dr Cleary's evidence-in-chief. However, Dr Meltz himself had considered many more papers and his evidence was balanced in that he went out of his way (so it appeared to us) to examine the research which suggests there may be effects from exposure to RFR.

Is there a significant risk of adverse health effects from the proposed RFR?

174. If there are adverse health effects from the RFR discharge then they can only be effects within s 3(f) of the Act — that is potential effects of low probability but high potential impact. It was common ground that ordinary risk assessment showed "no risk". Applying the tests for s 3(f) effects which we set out in Chapter 5 we find there are hypotheses that exposure of the school community to the proposed RF radiation might cause:

* leukaemia or other cancers

* sleeplessness

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* learning disorders

* harm to foetuses.

175. Is there enough evidence to establish these hypotheses to the very limited extent we require to establish them as effects within the meaning of s 3? It will be recalled that the alternative evidential criteria include:

(1) sound consistent statistical studies of a human population;

(2) general acceptance of the hypothesis;

(3) persuasive animal studies or other bio-mechanistic evidence accompanied by an explanation as to why there is no epidemiological evidence of actual effects in the real world; or

(4) (possibly) a very persuasive expert opinion.

176. No one claimed that there was general acceptance of the idea that RFR causes athermal effects at the intensity emitted by the cellsite. The most that SPS could claim are the careful concessions by Dr Black in his rebuttal evidence. He said:

"6. ... Dr Beale states that there are 'numerous studies on animals that show adverse effects of brief radiofrequency exposure at levels much lower than the thermal threshold and which appear to be unrelated to the significant whole-body heating that occurs at higher levels of radiation'. I agree with that statement. It underscores why Standards are set at a large margin below this 'thermal threshold' which occurs at a specific absorption rate ('SAR') of 4 watts per kilogram. For example, the NZ Standard is set at 1/50th of that thermal threshold.

7. The vast majority of these animal studies show effects which occur at levels above 1/10th of the thermal effect threshold, which accounts for some Standards (like those in the UK and Japan) that are set at this level.

8. It is also important to note that the vast majority of experimental results showing

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effects at levels below 1/10th of the threshold (ie below 0.4 watts per kilogram) are not studies on whole animals. The effect of a signal falling on an isolated tissue sample is altogether different from that on a whole animal, and accordingly the levels are meaningless in terms of whole body exposure.”

We find that Dr Black accurately portrays the general scientific view of the research, for example as portrayed by ICNIRP and, directly to us, by Dr Meltz. There was no expert witness who persuaded us that the mainstream of thought is wrong and that their research is right. So the only doors left open for the finding of adverse health effects from athermal RFR at cellsite levels are the presence of sound epidemiological studies and/or the bio-mechanistic studies.

177. On the epidemiological evidence given to us we find that all the studies quoted to us as support for the various hypotheses of adverse health effects were flawed [Hocking (1996), Dolk (1997a)] although at least the authors of the Sutton Coldfield study [Dolk (1997a)] admitted the limitations of that study which is why they delayed publication until they published their later study. The leukaemia studies in particular were far less convincing than the studies which showed no significant association between RF discharges and cancer. [Selvin (1992), Dolk (1997b), Knox (1977)]
178. As for the existence of animal studies these suffered from a number of defects also. There was no attempt to explain why there was no or little epidemiological evidence of actual adverse health effects. In the absence of such explanation the usefulness of animal studies is very doubtful. [There is a significant jurisprudence on this in the USA — see for example: *General Electric Ltd v Joiner* 118 S.Ct 512] In addition, as we have already pointed out, the existence of effects does not necessarily mean they are harmful. As Dr Repacholi himself has recently written of animal studies:

“It is questionable whether reported ‘effects’, even if substantiated, can be considered to represent evidence of a hazard simply because the significance of the effect for the organism is not understood. ... Not all biological effects of exposure are necessarily hazardous; some may be beneficial under certain conditions.” [MH Repacholi “Low-Level Exposure to Radio Frequency Electromagnetic Fields. ...” *Bioelectromagnetics* 19: 1998 (pp 1-19) at p 5 [Repacholi (1998)]]

179. It was a key part of the school’s case that there may be adverse effects within the meaning of s 3(f), that is “potential effects of low probability but high potential impact”. As we suggested in Chapter 5, the first use of the word “potential” shows that it is not proven actual effects that need to be considered but also scientifically possible effects established to our satisfaction under the criteria listed in para 147. It is at this point that Mr Gould’s submission, that there is no evidence of adverse effects, falls down. We hold:
- (a) that there is very tenuous epidemiological evidence of some possible adverse health effects (effects on learning and sleep);
- (b) that on our subjective assessment these effects are of very low probability; and

- (c) that the effects may be of relatively high potential impact (but not of the devastating impact that cancers would have).

So there are adverse "effects" within the meaning of s 3(f) but only in a very weak sense.

180. In conclusion we hold that:

- (a) the risk of the schoolchildren or teachers at the school incurring leukaemia or other cancer from RFR emitted by the cellsite is extremely low;
- (b) the risk to the pupils of exposure to RFR causing sleep disorders or learning disabilities is higher but still very small. [Taking a relatively arbitrary figure, just to give an idea of what we mean: very small = 1 in a million (ie 1×10^{-6})]

To avoid confusion we emphasize that this is not a scientific assessment of risk. That is impossible in the present state of knowledge. We respectfully agree with ICNIRP that [ICNIRP Guidelines p 507]:

"Overall, the literature on athermal effects ... electromagnetic fields 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 fields."

Our assessment is of the risk which we must assess as an effect (or product of effects) under s 5(2) of the Act. It is a reasonable assessment of the risks on the evidence presented to us.

Chapter 7: Other Effects [Section 104(1)(a) continued]

Adverse Psychological Effects

181. In respect to claimed psychological effects the principal evidence for the school was that of Dr Staite, and to a lesser extent that of Dr Beale. With respect to Dr Staite's evidence Mr Fougere set out the requirements for survey validity (see Chapter 5 above and the discussion of *Imperial Group plc v Philip Morris Ltd*) and then stated that none of the required criteria were met by Dr Staite's survey. Mr Fougere recommended that the Court exercise "extreme caution" in considering this evidence. His main concerns about the survey were:

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(1) The methodology did not describe that the sample used represents any wider community. In fact Dr Staite clearly approved of the concept of focusing on 'information-rich' cases — in this case that meant interviewing those with the strongest concerns about the tower. This approach may be correct for research designed to develop a theory but not to make a conclusion on the widespread adverse psychological effects;

(2) The sample size was small. There were only a few interviews;

(3) There is no copy of all the questions asked in the survey nor all the results obtained. It is not known whether he asked all those interviewed the same questions;

(4) If he did ask all those interviewed the same questions then he was asking standard 3 and 4 pupils very complex questions and it would be safe to assume their comprehension of the questions would be jeopardised;

(5) From the way Dr Staite presented his evidence it was impossible to determine whether the questions he asked in his survey were leading. He says that one question was 'What negative psychological states such as anxiety and depression, in your mind, will be experienced by you along with your fear of future illness in respect of the cell tower?'. This is a leading question assuming 'negative psychological states';

(6) The presentation of results is too unstructured to allow formal evaluation by a third party which is unsatisfactory; and

(7) There is no dependable data to make conclusions on wide-spread effects."

182. In Chapter 4 we covered Dr Staite's evidence in some detail to give its flavour but we have to say we are troubled by it. This is not only because of the dubious validity of the survey on which it is based but for other reasons as well. Examining it as a whole and including the cross-examination, it has three rather disconnected parts: a theoretical review of some relevant psychological literature; a long summary of his survey of the parents; and a short final overview. In particular there was little apparent connection between his review and his survey.

183. In addition many pages of his evidence about his survey were full of hearsay. He included many comments from parents, teachers and children, sometimes in quite colourful language, giving their perceptions of the Telecom proposal. As far as his summary was concerned, he did not attempt to link his theoretical evidence with his survey. There was a major implicit assumption that there are adverse effects from the cellsite.

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184. Telecom's counsel submitted that the Court should be guided by the Telecom decision [W165/96 at pp 11-12] where the Court said that it did not think that "social angst and lack of well-being in the community affected by the proposal" was a material consideration in coming to its decision. Counsel also quoted Dr Zelas who said:

"... if a child is anxious or fearful of going to school when there is determined to be no 'real' reason for this, educators do not propose that the child avoid the perceived threat and remain at home."

185. In respect to Dr Staite's assertion that "... a psychological effect did in fact exist in the minds of the people and community" counsel pointed out the criticisms by Dr Zelas and Mr Fougere of Dr Staite's study. Mr Gould also referred to the opinion of Dr Beale that the Shirley community would suffer "indirect effects mediated by stress". He submitted that should be given little weight as the hypothesis lacked any foundation of fact or actual research. In contrast he said there was the evidence of Dr Black and Mr Jennings who made enquiries in schools close to where cell sites are located and found evidence of a lack of anxiety and concern.
186. Counsel opined that to the extent that claimed anxieties and fears do exist there is evidence of misinformation and therefore *Telecom* should be followed and anxieties and fears not founded on any plausible health risks ought not to be taken into account. Counsel submitted that Mr Hearn was not correct in suggesting that it would have been valuable for Dr Zelas to speak to those in the community. The purpose of her evidence was to deal with broad issues not to express opinion on the state of mind of any person.

Mr Hearn cited the case of *Meadow Mushrooms Ltd v Papanua County Council* [(1977) 6 NZTPA p 327]. He referred to the passage [the same at p 333] where the Board [The Town and Country Planning Board: a predecessor of the Environment Court]:

"observe[d] that the health of the community, which is one of the factors mentioned in s 18 of the Town and Country Planning Act 1953, is not necessarily restricted to physical health. Whether or not it is psychological there is no question that a large number of the residents of Prebbleton appear to fear methyl-bromide gas and associate illnesses they have suffered with the proximity of that gas. Fear of exposure to a cumulative poison, **whether physical damage is or is not caused thereby**, is a very real factor in relation to normal health and wellbeing." [Our emphasis]

Counsel for Telecom submitted that case is different on the key matter at issue: the fact that with cell sites any anxiety is not based on any scientifically plausible health risk.

187. There is an issue as to whether fear or other psychological effects are effects we can take into account. *Duncan v Thames Coromandel DC* [(1980) 7 NZTPA 233] recognised that under the Town and Country Planning Act 1977:

“It is proper to pay some regard to fear of the unknown. Fear for safety, and of the unknown, impinges upon psychological health and that is part of total health.” [The same at p 240]

That passage was quoted in a leading town planning case under the Town and Country Planning Act on the introduction of LPG tanks to Auckland: *Liquigas v Manukau CC* [(1983) 9 NZTPA 193]. That decision stated:

“We accept that a land use which causes so great an extent of fear or worry about danger and stress as to affect the mental health of members of the community generally (rather than individual persons who may be more fearful than people generally) may properly be a consideration in land use planning. However, there was no evidence on which we could find such circumstances in this case. ... We will concern ourselves directly with the question of the safety of the community, in the expectation that if safety is properly provided for, the mental health of the community will not be affected.” [The same at p 218]

188. We have to consider whether that is the appropriate approach under the RMA or whether the more robust position adopted in the *Telecom* [W165/96 at pp 11-12] decision is correct when it stated:

“social angst and lack of well-being in the community affected by the proposal ... cannot be a material consideration.”

189. One aspect of the Town and Country Planning Act cases (especially *Liquigas*) which is clear is that the importance of the fear or psychological element is very dependent on the objective assessment of the risk:

“What is called for is an assessment of the risk and the consequences of the proposal before us. In making that assessment we must endeavour to hold a balance between being unduly timorous in the face of danger, however remote, and being callous about other people’s safety.” [*Liquigas* at p 220]

190. In our view if a Council or the Court finds that there is an unacceptable risk of adverse physical health effects then it is likely to refuse consent anyway. If the risk is acceptable then the fears of certain members of the community or even of sufficient people to be regarded as a “community” would be unlikely to persuade the Council or at least the Court that consent should be refused, because the individual’s or the community’s stance is unreasonable. It is not irrational as we shall explain later, but it is unreasonable. Thus we do not go quite as far as the *Telecom* case in saying that fear is not an effect to be taken into account. We consider it is, but whether it is an effect which should be given any weight depends on the assessment of the risk.

191. This, as we understand it, was the approach taken in *Department of Corrections v Dunedin CC* [Decision C131/97]. That case concerned the location of a periodic detention centre in South Dunedin which was opposed by local businessmen. The Court stated [*Department of Corrections* at p 21]:

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“We accept that as a matter of law, the concerns expressed by the several members of the South Dunedin Business Association who gave evidence in this case, can be regarded as giving rise to adverse effects on the environment, if they are substantiated. Consequently, it is relevant to have regard to these concerns and the evidence about them.

The question remains however, whether this evidence establishes that there are likely to be such adverse effects on the environment.”

We consider the last sentence shows the difference between this case and *Meadow Mushrooms* as relied on by Mr Hearn. In the latter case the accumulation of heavy metals is a known hazard to humans and other animals. So the fear of that hazard may properly be taken into account. It was different in *Department of Corrections* where the existence of adverse effects on the environment had yet to be established, and in fact was not.

192. To summarise on the psychological evidence — on the SPS side — we have the evidence of Dr Staite which we find methodologically unreliable, partially incomprehensible (his answers in cross-examination tended to be repetition of psychological jargon) and inconsistent. On the other hand we have Dr Zelas’ evidence which, while clearer and consistent, is based on the assumption that there will be no adverse physical health effects from exposure of the school community to RFR. Parents who read her evidence might be offended because it suggests they are irrational in their concerns for their children. Dr Zelas’ approach seems both a little unfair, and simplistic. We cannot agree that there is no risk to the school community. There is some risk (although very small, or extremely small for leukaemia and other cancers).
193. In the end we find all the expert psychological evidence unhelpful. We had direct evidence about people’s fears of exposure to RFR from enough parents and teachers to be sure that a significant part of the school community is genuinely concerned about, even fearful of, the effects. But whether it is expert evidence or direct evidence of such fears, we have found that such fears can only be given weight if they are reasonably based on real risk.

Social and financial effects

194. We have described Dr Brown’s evidence as to the probability that parents would withdraw their children from the school. For Telecom, Mr Fougere was highly critical of that evidence. He was of the view that generally her survey failed to comply with the requirements of a proper reliable survey. The first question in Dr Brown’s survey was whether parents would consider moving their child from the school, however when she came to interpreting the results she spoke of parents who would move their children. Mr Fougere said that invalidated the remainder of the survey as this same confusion is implicit in the logic of the two questions that followed.
195. He was also of the view that the sample was almost certainly biased in that more of those who would

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consider moving their child(ren) than other parents are likely to have responded to the survey. Mr Fougere considered that since less than half the parents to whom the survey was sent actually replied the potential for bias in the sample (in overstating concern about the tower) is important. Mr Fougere suggested we attach minimal weight to Dr Brown's evidence and we agree. Accordingly the evidence of Mr Shand and Mr Walsey on financial issues which was based on Dr Brown's evidence can also be given little weight.

Visual effects

196. In relation to visual effects, we accept that subjective value judgments about the safety of cellsites have no place [see the *Telecom* decision W165/96] in the assessment of visual amenity. There is a chimney on the school grounds that will loom larger than the cellsite mast from some viewpoints. Further Ms Lucas, who gave evidence for the school, did not appear to have taken into account the new slimmer mast. Her evidence was based on the proposal as put to the Council. We prefer Mr Miskell's evidence over Ms Lucas's both for those reasons and also because we consider the tower will not be an undue imposition on the view from the school grounds. There is no visual conflict with surrounding development. We record that we would not necessarily come to the same conclusions if the cellsite was surrounded by houses. Its scale might then make it completely out of proportion, and therefore inappropriate.

Beneficial effects

197. Finally we should mention that there will be some beneficial effects eg improved mobile phone coverage on the Telecom network from the presence of the cellsite. As the Telecom witnesses pointed out, the RF spectrum is a limited physical resource under s 5 of the RMA. These advantages would be nearly [the RMA may still require a cost/benefit analysis under ss 5(2)(c) and 7(b)] insignificant if a scientific assessment of risk showed that there was a real and unacceptable danger to the school community. The advantage of recalling the benefits is that they remind us of the wider context of this application which we should take into account — that is the general exposure of the wider population (including the school community) to RFR from all sources. We will return to this issue in our assessment under s 105(1)(c) of the Act (Chapter 10).

Chapter 8: Statutory Instruments (Section 104(1)(d))

The transitional plan

198. In the city section of the transitional district plan ("the transitional plan") the site is zoned Commercial Service ("C/S"). This zone covers approximately seven separate titles (comprising approximately 5570m²) on the north eastern intersection of Hills Road and Shirley Road. Shirley Primary School is located to the north east of the site. It is zoned Residential 1 and designated for "Primary School" purposes. Diagonally opposite the site is a Commercial 1 zone which has been recently developed with a new shopping centre called "The Dates". The zone statement for the C/S zone states:

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“These zones generally adjoin shopping centres and are designed to provide for service and small scale industrial activities which mainly, although not exclusively, serve local needs and which provide some local employment. These uses are often associated with uses within adjoining Commercial 1 and 2 zones.” [Transitional Plan, para 43 [p 119]]

199. Activities permitted in the C/S zone include administrative, commercial and professional offices, medical and community facilities, service industries, places of assembly, parks and recreation grounds, local taverns, service stations, public utility substations and exchanges. [Transitional Plan, Ordinance, 43.1 para 43.1A-F [pp 119-120]] As the zone rules do not mention radio communication facilities such as the proposed cell site, the proposal is non-complying under s 374(4) of the Act.
200. There are a number of performance standards in the C/S zone relating to floor space, visual amenity, sunlight outlook and amenities, access, parking and loading. Height is controlled indirectly by recession planes where the site adjoins two of the residential boundaries of the school.
201. The transitional plan sets out what the development of commercial centres shall have regard to in respect to design. The list includes avoiding visual conflict with surrounding residential development and providing landscaping to act as a buffer between residential and non residential uses where necessary. [Transitional Plan, Scheme Statement, cl 26 p 23]
202. We find that the proposed cellsite sits comfortably within the objectives and policies of C/S zone of the transitional plan. It is the wire-less equivalent of a public utility such as a telephone exchange which is a permitted activity. As we have found in relation to visual effects there is no conflict with surrounding residential development. We appreciate that the school is zoned “Residential” — although as a public work it is obviously not used for residential purposes — but we understand the recession planes for the cellsite are met in respect of the school’s boundaries.

The proposed plan

203. Under the Proposed Christchurch City Plan (“the proposed plan”) the site is zoned Business 4 which is a suburban industrial zone. Any activity can establish in this area as a permitted activity providing it complies with all the development standards and all the community standards. [Proposed Plan, Vol 3, r 4.1.1, p 3/17] Height is again controlled by recession planes and these are relevant to the two boundaries adjoining cultural zones. [Proposed Plan, Vol 3, r 4.2.5, p 3/18]
204. Chapter 9 of the proposed plan makes specific provision for utility structures:

Rule 4.2.1 reads:

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“Application of these rules

(a) These rules on utilities replace any zone rules which may otherwise apply to utilities in zones through which utilities pass, or within which they are sited unless specifically stated to the contrary.” [Proposed Plan, Vol 3 [p 9/21]]

So rather remarkably, the utilities rules generally replace all other zone rules.

205. Under Chapter 9 the facility is a discretionary activity:

“4.4.2 Telecommunication and radio communication facilities

Any utility is a discretionary activity where it involves any of the following:

(a) Erecting any telecommunication or radio communication facility above ground level (including any mast, antenna, tower, or support structure) which is:

(i) so designed and operated as to emit microwave or ultra high frequency emissions of any type within any living zone, or within 300 m of the boundary of any living zone

(ii) so designed and operated as to emit more than 50 microwatts per square centimetre at any time within any zone or within 300 m of a living zone ...” [Proposed Plan, Vol 3, [p 9/22]]

206. In the “Reasons for Rules” for the utilities it says:

“Pending the review of the New Zealand Standard 6609 (1990) in respect to microwave and ultra high frequency emissions, a conservative approach has been adopted having regard to the potential effect of such facilities on the health of persons in the vicinity.” [Proposed Plan, Vol 3 para 4.6, [p 9/23]]

The proposed plan thus turns risk into a key element when considering the approval of the cellsite as a discretionary activity. Risk is not spelled out clearly as an objective or policy but we assume that an objective or policy about it can be inferred from the reason for the rule stated above. So whether or not

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the cellsite proposal is consistent with the objectives and policies of the proposed plan depends on whether there is a significant risk to persons in the vicinity of the cellsite. In other words the proposed plan does no more than refocus on the principal issue in the case: whether there is a risk from exposure to RFR at athermal levels.

207. Little weight should be given to the proposed utilities section of the plan because there are submissions to the Council challenging aspects of the section — including submissions from both appellants in these proceedings.

Chapter 9: Other Matters (Section 104(1)(i))

Introduction

208. There are a number of other matters we have to consider in this case:

- * the application of the ANZ Standard and the ICNIRP Standard

- * whether alternative sites for the cellsite should have been considered, and if so, were adequately covered by Telecom;

- * the application of the “precautionary principle”; and

- * whether the “prudent avoidance” principle or the policy of “as low as reasonably achievable” (“ALARA”) is relevant.

The Standards

209. We have to consider the two new standards both published in 1998. The ANZ Standard [the ANZ Standard is AS/NS2772.1 (Int): 1998 expires on 5 March 1999] states that the variables considered when developing the safety factors were:

“(a) Absorption of electromagnetic energy by humans of various sizes, with particular reference to whole body or partial body resonant absorption of energy.

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(b) The lack of knowledge of the relationship between peak SAR and biological effects.

(c) Environmental conditions — the exposure limits should be protective under adverse conditions of temperature, humidity and air movement.

(d) Reflection, focusing and scattering of the incident fields in such a way that enhanced absorption occurs.

(e) Possible altered response of humans taking medicines.

(f) Possible combined effects of RF electromagnetic energy with chemical or other physical agents in the environment.

(g) The possible effects of modulated microwave fields on the central nervous system and the possible existence of 'power' and 'frequency' windows for such effects.

(h) Possible non-thermal effects [AS/NZS 2772.1 (Int): 1998 Part 1, p 25].”

This list shows that the Committee which set the standard was aware of the types of (potential) risk which have been raised in this case.

210. The Foreword then compares the standard with that endorsed by ICNIRP:

“At frequencies between 400MHz and 2GHz the ICNIRP literature gives progressively rising derived levels and thereafter a level which is constant with frequency. This Interim Standard does not, however, follow this methodology and requires a lower and constant level to be met across the entire frequency range above 400MHz. Furthermore, a lower spatial peak SAR is prescribed for all parts of the body except hands, feet, wrists and ankles. This approach was followed because of the existence of ongoing research projects by WHO and public concerns about RF radiation, particularly from cellphone systems. The higher ICNIRP derived levels in the frequency range above 400MHz are given in this Interim Standard for information only [AS/NZS 2772.1 (Int): 1998 (p 4)].”

The standard itself then states:

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“6.1 General

The exposure limits have been developed on the basis of there being a threshold of 4W/kg whole body SAR before any adverse health consequences are likely to appear. Whilst occupational limits are based on reducing exposure by a factor of 10 below the 4W/kg threshold, non-occupational exposure limits are derived from values one fifth (or less) those of clause 5.2 [Clause 5.2 refers to the new limiting values for persons exposed to RF in the course of their occupation]. The non-occupational limit is therefore 0.08W/kg whole body average SAR [AS/NZS 2772.1 (Int): 1998 (p 13)].”

211. On the issue of whether there could be athermal effects from RF radiation the ANZ Standard states:

“The Committee responsible for this Interim Standard considered both thermal and non-thermal effects of RF exposure. The Committee found that, when established scientific literature is used, exposure limits can only be based on thermal effects at frequencies above about 10MHz. This is consistent with the findings of organisations developing standards in all Western countries. The Committee noted that while some researchers had found effects at body cell levels, there has been no **conclusive** evidence that such effects constitute a health hazard to humans” (Our emphasis). [AS/NZS 2772.1 (Int): 1998 Foreword (p 4)]

The use of the word “conclusive” in the last sentence is likely to cause some concern about the ANZ Standard amongst lay people. It suggests a very high standard of proof before standards would be altered. For example if there was merely a “significant” but not conclusive evidence of a health hazard would the standard be altered?

212. Most causes of cancer (to take one hazard as an example) were initially recognized as a result of epidemiological studies, even though the causes cannot be “proved” by such studies. Bearing that in mind we would have thought that if there are such studies suggesting a link between low-level (ie athermal) chronic RF exposures and cancer then their significance should have been discussed, rather than simply summarising the issue by stating that athermal effects had been considered but that there were no “conclusive” results. Because we consider the public is entitled to ask for action taken under the Act if the impact of the potential hazard is sufficiently severe even if the effect has

* not been conclusively proved (including an explanation of the biological mechanism)

* possibly not even been significantly established at an epidemiological level

-- the ANZ Standard cannot guide us on this issue.

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213. Turning to the ICNIRP Standard, the individuals who comprise ICNIRP including Dr Repacholi as Chairman Emeritus explain that:

“These guidelines for limiting exposure have been developed following a thorough review of all published scientific literature. The criteria applied in the course of the review were designed to evaluate the credibility of their various reported findings (Repacholi and Stolwijk 1991; Repacholi and Cardis 1997). Only established effects were used as the basis for the proposed exposure restrictions. Induction of cancer from long term EMF exposure was not considered to be established and so these guidelines are based on short-term, immediate health effects such as stimulation of peripheral nerves and muscles, shocks and burns caused by touching conducting objects and elevated tissue temperatures resulting from absorption of energy during exposure to EMF. In the case of potential long-term effects of exposure, such as an increased risk of cancer, ICNIRP concluded that available data are insufficient to provide a basis for setting exposure restrictions, although epidemiological research has provided suggestive, but unconvincing, evidence of an association between possible carcinogenic effects and exposure at levels of 50/60 Hz magnetic flux densities substantially lower than those recommended in these guidelines.

...

Transient, cellular and tissue responses to EMF exposure have been observed, but with no clear exposure – response relationship. These studies are of limited value in the assessment of health effects because many of the responses have not been demonstrated in-vivo. Thus in-vitro studies alone were not deemed to provide data that could serve as a primary basis for assessing possible health effects of EMF.”

214. The ICNIRP standard was the last word in scientific consensus on the issue of athermal effects from chronic exposure to RFR at the time we heard the case. We are reassured to find that it confirms our findings on the other evidence before us that the risk of adverse health effects on humans of chronic low-level exposure to RFR is very low. Strengthening our reassurance is the fact that at cellphone frequencies the ANZ Standard becomes almost 2 1/2 times lower than the international standard in the ICNIRP guidelines.

Alternative sites

215. In response to the argument by Mr Hearn that Telecom was obliged to consider alternatives, counsel for Telecom responded that there is no onus on Telecom to give evidence or provide information regarding alternative sites unless:

(a) A matter of national importance is at issue with regard to the selected site [*TV3 Network Services Ltd v Waikato DC* [1997] NZRMA 539 at 551]; or

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(b) There is a likelihood of significant adverse effects — cl 1(b) of the Fourth Schedule [*Trans Power and Dumbar v Gore DC* W189/96]; or

(c) The activity is a non-complying activity and granting consent for the activity within the zone would reduce public confidence in the administration of the district plan [*Stark v Auckland RC* [1994] NZRMA 126 and *Manos v Waitakere CC* (1993) 2 NZRMA 226].

Counsel for Telecom was of the view that none of these applied.

216. Referring to the evidence given on behalf of Telecom by Messrs Moran, Jennings and Gledhill, counsel for Telecom emphasised that in practical terms the proposed site is realistically the only one available to achieve Telecom's service objectives. He also pointed out that in response to questioning from Mr Hearn, Telecom's witnesses, Mr Moran, Mr Gledhill and Dr Black explained that micro cells (as opposed to the macro cells as proposed in this case) as an alternative are not realistic as they are not the correct technology for the engineering purpose sought to be achieved. Further Telecom witnesses, Doctors Elwood, Black and Meltz all denied the contention made by Mr Hearn that the proposed site is "unsuitable" due to its close proximity to a primary school attended by children aged 5-10 with a special sensitivity to RFR discharges. Counsel for Telecom pointed out that in *McIntyre* consent was granted despite the relative proximity of the site to dwellings and a creche, as the Tribunal found no evidence of effects, actual or potential.

Additional Principles and Policies

217. Mr Gould submitted there are three further matters that arise for consideration under s 104(1)(i):

- * the "precautionary principle";
- * the policy of prudent avoidance; and
- * the concept of keeping RFR "as low as reasonably possible".

218. Mr Hearn relied on the general "precautionary principle" of environmental law referred to in *McIntyre*. The Court then considered the principle under both s 104(1)(i) [*McIntyre* at p 304] and then because it was relevant in its overall evaluation under s 105(1)(c) where it stated [*McIntyre* at p 305]:

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“The influence of the general precautionary principle in the evaluation and ultimate judgment is a matter of discretion. None of the cases supports the application of a formal threshold. Like all elements that contribute to the ultimate judgment, the weight to be given to the precautionary principle would depend on the circumstances. The circumstances would include the extent of present scientific knowledge and the impact of otherwise permitted activities. However we think that in an appropriate case they would also include the gravity of the effects if, despite present uncertainty, they do occur.”

219. There is some confusion apparent over the applicability of the precautionary principle. We hold that the correct position is that the RMA is precautionary and thus justifies a precautionary approach [*Trans Power* used the words “precautionary approach” and so did the Australian case of *Greenpeace Australia v Redbank Power Co* (1994) 86 LGERA 143. Other New Zealand cases that have used “approach” rather than “principle” have been cases involving the New Zealand Coastal Policy Statement which specifically mentions a precautionary approach: *Clyma v Otago RC* W64/96; *North Shore CC v Auckland RC* [1997] NZRMA 9 and *Trio Holdings v Marlborough DC* 2 ELRNZ 353]. We consider, without deciding, that the precautionary principle is a limited consideration introduced by international law. The precautionary principle, a subset of the precautionary approach, derives from the *Rio Declaration* [Rio Declaration on Environment and Development adopted at the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, [1992] *International Legal Materials* 876, 879] principle 15 which states:

“In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to protect environmental degradation.”

220. It will be seen that the precautionary approach applies where there is a threat of “serious or irreversible damage” and entails that just because it is not, say, 99 percent certain that the threat will materialise, or perhaps that the damage will be irreversible, does not mean that no step should be taken to minimise risk. To paraphrase in the language of s 3 of the RMA the principle is, if a potential effect is only of high (and not very high) probability and high potential impact that is no reason for failing to take action to guard against the effect. The position facing us of course is quite different in that the alleged effect is clearly one of low probability and of unknown potential impact.
221. The reason we doubt why a wider “precautionary principle” is useful is precisely because a precautionary approach is inherent in the Act. As a result of the wording of s 3(f) — as discussed earlier — we are to have regard to potential effects of low probability but high potential impact. In our view this is precisely what the precautionary approach is about. Nor does the “principle” help (any more than does s 3(f)) by indicating how much weight is to be given to it.
222. Reference to principles or policies *outside* the Act which can already be found inside it is simply confusing. We think Occam’s razor should apply and reference to the precautionary principle either eschewed or, if used, should be recognized as a restatement of s 3(f) and the precautionary approach. That position is encouraged by the fact that in this case we were also referred to the “prudent avoidance” policy or principle; and to the ALARA policy (“as low as reasonably achievable.”) In our view all of these are simply ways of expressing concern about future effects of low probability (so that we do not know whether they will occur) and high potential (again because we do not know) impact.

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223. In summary, we do not consider it is appropriate to apply the "precautionary principle" or the other policies suggested by witnesses and supported by counsel, for three reasons. First a precautionary approach is already implicit in the Act and emerges in the flexibility of the standard of proof applied by the Court and (as we shall see) in the weight given to evidence that has only been "proved" to a low standard (probability). Secondly such a "principle" is an unnecessary complication in an already complex statutory and factual matrix. Thirdly, application of the precautionary principle (or any of the other rules of thumb) to our decision under s 105(1) would lead to double-counting of the need for caution. If the appropriate standard of proof is on a sliding scale between the balance of probabilities and beyond reasonable doubt, depending on the impact of the effect, the fact is that the appropriate caution has been exercised when deciding under s 104(1)(a) what the effects are to be considered under s 105. If the Court applies the "precautionary principle" as another matter under s 104(1)(i) [as McIntyre suggests at p 305] then the need for caution will have been considered twice.

Chapter 10: Section 105

Threshold Tests

224. Since the proposed cellsite is deemed to be non-complying [s 374 RMA] we have to consider whether it passes either of the threshold tests in s 105(2)(b). This states:

"(2) A consent authority shall not grant a resource consent —

...

(b) Notwithstanding any decision made under section 94(2)(a), for a non-complying activity unless it is satisfied that —

(i) The adverse effects on the environment (other than any effect to which s 104(6) applies) will be minor; or

(ii) Granting the consent will not be contrary to the objectives and policies of the plan or proposed plan;"

In our extensive coverage of the adverse effects we have already come to the conclusion that none of them are more than minor. Hence the first threshold test is met.

225. Although we do not strictly need to consider the second threshold test under s 105(2)(b) we find that

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the proposal is not contrary to the objectives and policies of the proposed City plan. That is hardly surprising given that the use of the cellsite is a discretionary activity in that plan. And there is nothing in the transitional district plan to which the proposal is contrary.

The Ultimate Test

226. Since the application passes the threshold tests we now turn to the exercise of our discretion under s 105(1)(c). The overall test to be applied when exercising that discretion is stated in *Baker Boys Ltd v Christchurch CC* [[1998] NZRMA 433 para 109] as follows:

"[109] As for our discretion under s 105(1)(c) we have to make an overall judgment to achieve the single purpose of the Act. This is arrived at by:

- * taking into account all the relevant matters identified under s 104
- * avoiding consideration of any irrelevant matters such as those identified in ss 104(6) and 104(8)
- * giving different weight to the matters identified under s 104 depending on the Court's opinion as to how they are affected by application of s 5(2)(a), (b) and (c) and ss 6-8 of the Act to the particular facts of the case, and then
- * in the light of the above

'allowing for comparison of conflicting considerations, the scale or degree of them, and their relative significance or proportion in the final outcome.'
North Shore CC v Auckland RC (1996) 2 ELRNZ 297."

227. Mr Hearn submitted that Part II of the RMA was the essence of this case especially that part of the definition of sustainable management which refers to the health and safety of people and communities [s 5(2) RMA]. In a sense he is right but then almost every relevant factor under the RMA can be brought back to some part of the definition of sustainable management. However, we do accept that because the health of the people potentially affected by the RFR discharge is an element of sustainable management we must place a great deal of weight on that issue.

228. The main factors we have to balance in this case, but overlooking neither the other issues raised, in particular under s 104(1)(i), nor the purpose of the Act, are:

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- (1) The very low risk, subjectively but reasonably assessed, of adverse learning effects and/or sleeplessness from exposure of pupils at the school to RF radiation;
- (2) A very low risk to pregnant women of miscarriages;
- (3) The extremely low risk of exposure to RFR causing cancer, eg leukaemia in humans;
- (4) The minor adverse visual effects from the cellsite mast [points 1-4 come under s 104(1)(a)]
- (5) The provisions of the city plans [point 5 arises under s 104(1)(d)];
- (6) The ANZ Standard, and the ICNIRP standard;
- (7) The fear of some teachers, pupils and parents of RFR;
- (8) The possibility that the school might close (but acknowledging that such a possibility derives from SPS' own actions); and
- (9) The context given by other sources of RFR and public acceptance of them [points 6-9 come under s 104(1)(i) and Part II of the Act].

229. There is nothing else we need to say about considerations (4) and (5) in that list. They are either of little weight or (in the case of the proposed plan) subsumed in later considerations. When allotting the weight to be attached to the key considerations (1)-(3) we have to recognize that there is no objective risk assessment of these because it is common ground that it is impossible, on current knowledge, to say that there is a causal connection between RFR exposure and the adverse effects mentioned, or that there is a dose-response relationship, or that there is a threshold beyond which athermal harm will occur. In the end the weight given by the Court to the issue depends to a substantial extent on how far it is persuaded that there is a risk of really severe injury, or ultimately death.

230. Measuring the proposal against the other relevant issues we found first that the cellsite is not contrary to the objectives and policies of the plans. Rather it is recognized by the proposed plan. It is consistent with the ANZ Standard and the ICNIRP standard. Finally, the purpose of the Act is met in that the use

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by Telecom of its resource (part of the EM spectrum) is managed in a way which enables Telecom and its subscribing community to provide for their wellbeing, while not in any significant way putting at risk the health and safety of children and teachers at the school.

231. The last (ninth) consideration — the overall circumstances of the case — is important. We have to recognize how much EMR citizens of New Zealand are exposed to both voluntarily and involuntarily. As we pointed out in Chapter 1, everyone in the whole world is exposed to EMR all the time. That includes exposure to the most dangerous EMR which is high-frequency ionising radiation (such as cosmic rays). At lower frequencies there is ultraviolet light and then the narrow band of visible light with frequencies of between 10^{14} and 10^{15} Hertz. The important and conspicuous EMR we all receive is direct from the sun. Sunlight gives each and every living thing a continuous exposure of about $80,000 \mu\text{W}/\text{cm}^2$. Below the frequencies of visible light there is no danger from ionising radiation. This radiation can of course still be dangerous — it contains enough energy to cause heating or thermal effects. However, greater exposures are needed at lower frequencies to cause those effects.
232. So there is nearly nothing special about radio frequency (RF) radiation — it is just one of the many forms of EMR that humans have evolved to live with. However, the background natural level of RFR is very low. It is only in the last 100 years that we have become exposed to much more “unnatural” ie human-generated RFR. Now we receive it from televisions, microwave ovens, electric blankets, visual display units and of course cellphones.
233. As a link between the adverse (physical) health effects as we have found them, and the psychological effects discussed in Chapter 7 we observe that there is often a large gap between scientists and the public’s assessment of risk. Scientists attempt to calculate risk on a probabilistic basis, whereas the public is swayed by other factors or, possibly, by the same factors viewed in a different way. One aspect of this is that [Justice S Breyer: *Breaking the Vicious Circle* (1993) p 35]:

“Most people have considerable difficulty understanding the mathematical probabilities involved in assessing risk ... People consistently overestimate small probabilities. What is the likelihood of death by botulism? (One in two million). They underestimate large ones. What is the likelihood of death by diabetes? (One in fifty thousand). People cannot detect inconsistencies in their own risk-related choices.”

234. There is a useful discussion of the public perceptions of risk in part B of the *Woodward Report*. Most of the items in the report’s list, except for suspicion of multinational companies, were exhibited by one or other of the individual witnesses for the school in this case, for example:

- * concern for vulnerable groups (eg children)
- * uncertainty of knowledge
- * lack of confidence in the standard-setting process

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- * imposition of involuntary risk
- * (to which we add) scepticism about scientists.

235. In this case there is definitely concern for a vulnerable group — the children who go to the school. But we note that their vulnerability is because they are children not because they are exposed to RFR. There was no evidence given to us (only speculation) that children are more vulnerable to exposure to RFR.
236. As for uncertainty of knowledge, while it is true that we cannot be 100 percent sure that RFR does not cause adverse health effects there is no demonstrable basis for saying that it does either. There is so little evidence for an adverse health effect that it cannot be scientifically calculated as a percentage probability in small fractions of a percent. And it must be remembered that many health effects such as cancers are stochastic. For example, one can expose a group of animals to a known carcinogen and only a percentage of them will get cancer.
237. There are of course well-documented cases of scientists approving technology that turns out later to be harmful, eg thalidomide or growth hormone. The birth defects caused by thalidomide were referred to in this case; and the deaths from Creutzfeldt-Jakob Disease (CJD) transmitted through growth hormone are well known. The public in general and the school in particular are entitled to ask whether microwave RFR could also have unpredicted effects in the future, possibly years into the future. The answer is that it possibly could, but we find that the possibility is very, very remote having assessed all the evidence as carefully and sceptically as we could.
238. As for the possibility that the school might suffer financially or even have to shut down, we consider the first is probable. However, that is a problem of SPS' own making. The possibility of closure is also there, but the other side of that argument is that Telecom should find an alternative site. We are satisfied there is no other available site on which Telecom could place the cellsite in the Shirley area, so its options are to keep the cellsite as proposed or move to other technology eg micro cellsites that are not next to the school. Although the latter would be possible (as Mr Moran for Telecom conceded), we consider it unfair to force Telecom to move to this new (and apparently expensive) technology when the need has not been demonstrated. **In the situation as we assess it** there is very little (or extremely low) risk to the school from the presence of the cellsite.
239. For these reasons, we consider that SPS should have to make the accommodation. If SPS has generated an atmosphere of fear and distrust amongst parents, teachers and pupils then it might have to live with the consequences of that. Having said this, SPS does have a practical remedy available to it in the light of its witness Dr Beale who said in his evidence-in-chief:

"the operation of this cellsite **could** cause adverse health effects in people spending a significant amount of time on the ground and in buildings within 30 metres of the

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installation.” (Our emphasis).

The obvious answer for those who still consider the cellsite will cause adverse health effects is for the school to fence off and not use the area within 30m of the cellsite. We consider that step is entirely unnecessary, but obviously it is within the SPS’ capacity to undertake and they should do so if they consider that prudence requires it.

240. To explain why the parents and teachers at the school held some of the opinions they did, counsel for Telecom suggested they had been fed misinformation. We heard insufficient evidence to establish whether that was so, or who may have been responsible. However, the information (as produced to us) circulated to the school and the wider Christchurch community does have a very subjective and unbalanced tone to it. As Dr Black pointed out in his evidence there are a number of published fallacies about exposure to RFR and the ANZ Standard controlling such exposure. He mentioned three of these:

“For example, it has been said that the Australasian Standard is set at ‘1/50th of the lowest level at which any harmful effects occur.’ This is quite wrong because the SAR of 4 watts per kilogram is nothing more than a benchmark. It is a threshold of **effect**, not a threshold of **harm**.

Others who criticise the standard [in the ANZ Standard] of 0.08 W/kg claim that because the standard is based on a heating effect only, it is purely a thermal standard and does not take into account any other possible effects (eg athermal effects). This is also incorrect. The thermal benchmark was chosen only because it is a definite, repeatable level. By setting the non-occupational standard for RF at 1/50th of this thermal benchmark, any detectable thermal effects have long vanished. Indeed thermal effects are not observable at 1/5th of 4 watts per kilogram and this level (0.8 watts per kilogram) has formed the basis of some Standards overseas.

Moreover, the [ANZ] Standard takes into account both thermal and non-thermal effects of RF exposure.” (our emphasis)

241. In the end we have to say to the members of the school community that we consider they have greatly exaggerated the risks of exposure to RFR. We do not find SPS or the school community to be irrational, but we do find that they have assessed Telecom’s proposal unreasonably. Perhaps there is a psychological analogy with the risk of an asteroid — we refer to the lines in Les Murray’s poem *Corniche* which read:

“The rogue space rock is on course to snuff your world, Sure. But go acute, and its oncoming fills your day.”

242. Looking at the issue that the wider public is also concerned with — whether exposure to RFR is very

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safe — we have concluded that the argument over cellsites is different from other health scares such as the fiasco in England over mad cow disease (BSE) and its human equivalent nv CJD. The differences are:

- * So far as we can judge the scientists and doctors who gave evidence to us for Telecom did so honestly and conscious of their responsibilities;
 - * RFR is not new — it is not like tampering with food by feeding previously vegetarian animals with bits of other animals (the cause of BSE) or the modification of plants by insertion of 'alien' genes (the debate over genetic modification);
 - * Humans are exposed to RFR (indeed EMR in all its forms) all the time;
 - * While the school and its inhabitants may have isolated themselves from other sources of 'unnatural' RFR (microwaves, cellphones, electric blankets etc) the rest of the community has not. If we are to stop the cellsite from operating where would this issue stop?
 - * There is international agreement by responsible scientists in the ICNIRP Guidelines that exposure to less than 450 $\mu\text{W}/\text{cm}^2$ is very likely to be safe; and
 - * There is no sense of an international conspiracy of scientists hiding information from us (or the public). On the contrary, there appear to be wide attempts to spread information dispassionately (for example via the *Woodward Report* which we strongly recommend to everyone interested in the issue) and to continue research into various hypotheses about possible adverse health effects.
243. In our final balancing of all the factors, we place a very heavy weighting (under s 5(2) RMA) on the need to protect the school community from harmful health effects. In the end we are persuaded to the very high standard that we require, by the evidence of scientists called by Telecom and by the view of ICNIRP, that the risks to the Shirley Primary School community are very low and are acceptable and accordingly we consider that the Telecom proposal should be allowed to proceed as achieving the purpose of the Act.

Chapter 11: Telecom's Appeal as to Condition 4

244. The appeal by Telecom asserts that condition 4 as inserted by the Council in its decision is neither a necessary or appropriate condition for dealing with RF emissions. The condition reads:

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“4. The total power flux density of radio frequency radiation emitted by the facility, measured in accordance with the principles and methods of measurement set out in Part 2 of NZS 6609:1990:

(a) at 30 metres from the mast at 2 metres above ground level (in the 90 GN sector) shall not exceed 6 microwatts per square centimetre; and

(b) in addition at the nearest outside wall of the residence at 222 Hills Road at 2 metres above ground level, if permission from the owner and the occupier can be obtained, shall not exceed 6 microwatts per square centimetre.”

245. Counsel for Telecom acknowledged that in terms of fostering public confidence, consent conditions can serve a valid purpose but was however of the view that condition 4 (which is similar to the condition imposed in McIntyre) sets an arbitrary limit different from (and much lower than) the ANZ Standard [200 $\mu\text{W}/\text{cm}^2$] and would:

(1) serve to undermine public confidence in the ANZ Standard and any standard setting process;

(2) contravene the principle of “prudent avoidance” as expressed in that standard;

(3) tend to suggest there is a health issue above but not below that level (thereby fostering community anxiety);

(4) possibly expose the consent holder to jeopardy for technical breach for no environmental purpose; and

(5) serve no valid purpose under the RMA.

246. Dr Black explained that prudent avoidance in the context of the ANZ Standard requires:

(a) All other things being equal, the way in which people most comfortably behave is to take the apparently safer course of action;

(b) RF should be kept as low as possible (notwithstanding the maximum limiting values in the new Standard) but not limited to the point that there is detriment to the desired performance of the

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installation, or excessive additional cost to the operators;

- (c) Prudent avoidance can be readily attained with cellphone technology, as the use of “just enough but no more” power is inherent in the basis of technology; and
- (d) Prudent avoidance is not to place reliance on arbitrary levels, but to require best contemporary practice (as stated in the standard) to achieve minimum exposure. To set specific limits sends the message to the community that there are health effects above that limit.

247. Counsel for Telecom was of the view that there was no real inconsistency between how the *Woodward Report* and Dr Black and other witnesses describe “prudent avoidance”, but to the extent inconsistency is perceived, he submitted that the evidence of Dr Black be preferred. This is because the *Woodward Report* was published in 1996 and although commissioned by the Ministry of Health is not the policy of the Ministry; it did not take into account the ANZ Standard or the 1998 ICNIRP Guidelines; and the authors were not witnesses in this case.

248. For the Council in support of condition 4, Mr Hughes-Johnson’s submissions have been summarised in Chapter 3 of this decision. For SPS, Mr Hearn argued that, far from justifying the approach to prudent avoidance given by Dr Black, a proper understanding of the policy as explained in the *Woodward Report* would mean that, if the Court was to grant consent it should be subject to a condition that the total power flux density at the boundaries of the school be no more than $1\mu\text{W}/\text{cm}^2$. Such a condition would provide for certainty, clarity and public confidence in the application of the principle of prudent avoidance.

249. For the reasons given in Chapter 9 we are reluctant to apply yet another ‘principle’ not already stated in the Act. We consider the idea of prudent avoidance is simply an aspect of the Act’s inherent precautionary approach. Further we are concerned that the ANZ Standard contains the seeds of inconsistency. The recommended conditions of operation for RF discharges can be seen as ways of staying within the standard. Or they can be seen as Dr Black suggested as an aspect of an extra prudent approach. But if they are seen as the latter then any undermining of the standard is of its own making. There is some discussion of the difficulties with the prudent avoidance and ALARA (as low as reasonable achievable) approaches in the *Woodward Report*. This reinforces our conviction we should disregard them. As does the fact that the ICNIRP guidelines do not contain any reference to the prudent avoidance principle.

250. Turning more directly to the appropriateness of condition 4, we bear in mind that:

- (1) a precautionary approach is already inherent in the ICNIRP and ANZ Standards:
 - (a) in the ANZ Standard the level for non-occupational exposure to RFR is set at 1/50th of the exposure level at which thermal effects occur;

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