

Residential Survey Around a TETRA Installation in a town in Sussex

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Copies of this survey report are available by email from:

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where the author may also be contacted for comment, or advice on similar surveys.

Contents

Quick Summary	5
Background and Location	6
The Survey	9
Purpose of the survey	9
The survey instrument	10
Method	10
Response profile	11
Results of the Survey	12
DECT factor	12
Profile of the health reports	13
Comments on health	14
Profile of non-health reports	15
Range	16
Conclusion	17
What this report does not do	17
What this report does do	17
Final questions	18
Appendix 1: The Survey Instrument	20
Appendix 2: Written Comments From the Survey	25
Appendix 3: ICNIRP Guidelines	30
Appendix 4: TETRA Signal Construction Characteristics	33
Glossary	35
Bibliography of relevant references	37
Sussex TETRA survey	3

Quick Summary

The operation of an O2 Airwave TETRA (police communications) mast raised concerns when clear indications of adverse health and well-being symptoms began to be heard, and widespread TV interference was reported.

Every attempt was made to involve official and health agencies in investigating the cause, the extent of the problems, and whether there was an association with the operation of the mast, sited alongside four other mobile phone base stations and surrounded by dense housing.

When all attempts failed, local residents organised a survey to record the extent and nature of effects that were felt to have started since the TETRA mast was switched on.

This survey recorded responses from a weighted population sample of 448 individuals living within about 250 metres of the mast, after seven months of operation.

- 58.5 per cent of respondents recorded symptoms ranging from sleep disorders to headaches and nausea, that were in over 90 per cent of cases both unusual and only since the mast was switched on.
- Of those affected, over 40 per cent had sleep disorders, nearly 38 per cent had problems with headaches, and over 16 per cent had rashes or itchy skin.
- The cost to the community *within this range* to correct TV interference is around £170,000.

Whether or not the results of this survey indicate a long-term risk to the health and well-being of the community around the TETRA mast, they do raise questions of social acceptability of such installations, without regard to precaution or consent.

These apparent consequences of the mast or masts remain unexplained. However, there is suggestion that at least among people with sleep disorders, this problem is almost certainly likely to give rise to long-term and more serious effects. Therefore proper investigation should be undertaken to understand the apparent correlation between the reported problems and the likely source.

Background and Location

The mast location is a leisure facility, surrounded on three sides by gardens of surrounding properties, and on a fourth by gardens and a second leisure facility, itself backed by housing. The local housing to the south and west is small terraced properties, and to the north and east, semi-detached properties. It is a small but active facility, and the housing is very close. There has not been a history of resentment or feeling, and most residents appear to accept that for this kind of community activity, the effects of sound, lights and parking can be annoying but largely should be tolerated. From time to time requests have been made to reduce the volume, and more recently to have floodlights shrouded to reduce light pollution. Apart from that, relations have on the whole been good.

Since 1998, the facility has been furnished with new floodlights. Residents who have maintained an interest in this issue now understand that these were sponsored, financed or donated, by BT. This appears to have coincided with the intention to install mobile phone base stations in the facility, affording additional income to the owners. Certainly, two of the new lighting pylons are lattice constructions suited to mobile phone antennae as well as lights. Their height has been contested and variously reported since developments in 2004, but at the planning stage they were presented as 15 metres, avoiding the need for full planning applications.

Since 1998, mmO2 mobile phone antennae arrived on the South West pylon, Vodafone arrived on the South East pylon, followed by Hutchinson 3G in the form of a 15m flagpole between them. Application was made by Orange in 2001 to place at the site of a former microcell, a full base station. After petitioning by local residents, the local Council refused the application. However, HM Planning Inspectorate allowed the development in 2002, on grounds that it would not affect visual amenity of residences. In the meantime, in January 2004, mmO2 Airwave (a subsidiary unit of mmO2) installed TETRA antennae and cabinets as an addition to the South West pylon, on notification, as requiring no planning permission. Absolutely no public consultation took place. Construction took place in the night, and after losing the previous battle to Orange, residents raised the issue in the surrounding roads. Two public meetings were held, TETRA was discussed, and a campaign was started. On February 26 2004, the TETRA mast was switched on, and has been on ever since, excepting a short period in April 2004 when the installation was vandalised, apparently by damage to wiring. Finally, in September 2004, the Orange mast allowed in 2002, was erected in place of one of the new lighting poles. Lighting shares the new monopole mast, which stands some 20 metres from the gardens of houses on the North East corner of the leisure facility.

The TETRA campaign

Concerns were raised in February in the local population, comprising mainly those living on the perimeter of the facility, and a local committee formed. The aims of the

committee were principally to have the mast removed and resited away from the facility altogether.

An initial public meeting was called prior to the activation of the TETRA mast, to go over the issues of the Airwave system, its inception, its features and likely performance, its costs and the impact on future council tax, and the scientific concerns of possible risks to health. Over 120 residents attending also heard the experiences of people living near TETRA elsewhere in the UK and along the south coast in particular. Caroline Lucas MEP was an invited guest, with panel members from the local Police Authority and the local council. The senior board member of the facility was also present, volubly declaring the concerns as scaremongering. The closing mood was one of concern and indignation at the absence of any consultation or warning from O2 Airwave, and from frustration at correspondence with O2 being unproductive. A number of people were determined to work together to a resolution, to persuade the landowner to revoke permission, to make representations to the facility management, and to have dialogue with O2 Airwave.

The mast was activated on February 26, and a subsequent meeting that had already been planned took place. Before the meeting, press had attended residents' homes and heard of their initial experiences. On TV and in the local papers, TV reception problems featured most highly, but health concerns were emerging.

At the meeting, where maybe 100 residents were present, it was abundantly clear that, unprompted, there was great anger at the general loss of TV reception, and O2 and Ofcom's refusal to acknowledge any responsibility for the cause being the TETRA mast, despite this being an entirely expected outcome by both parties. It was more startling to discover that a range of adverse health symptoms were being experienced by the majority of the attendees, presented calmly but with increasing anger as people realised that these experiences were shared by so many others.

From this meeting the committee began to tackle the issues of what to do. This is not the place to relate details, but one issue was to find out how extensive the experiences were. It was agreed that performing an amateur and lightweight survey may be counterproductive, and taint the validity of the evidence forever. It was decided that representation to health authorities, and indeed to government and government agencies, would produce better investigation and any outcome would be taken more seriously. Many serious and well-researched letters were written at the highest level, engaging the local Council Planning and Housing departments, the regional Director of Public Health, local doctors, the regional Health Protection Agency, the Department of Health, The Home Office, the Health and Safety Executive, the National Radiological Protection Board, the Health Protection Agency, even mmO2 under the terms of its widely promoted commitment to corporate social responsibility. Every avenue was explored and pushed to solicit an official epidemiological survey that would at the very least assess and measure the extent of the experiences being reported, establish any correlation, and maybe attempt some causation.

The results of this effort were related to local residents at a third public meeting, where great frustration was felt. Subsequently, a prospective councillor, with the sitting local MP, arranged two meetings with O2 Airwave in closed session, including 2 residents, other councillors representing all parties, and a Council planning representative. The intention was to have the mast resited if possible. Residents representing the view that the technology might be dangerous *per se*, were not invited. Pursuant to this effort, seven alternative sites were suggested to O2, and after several months of supposed consultation, only one was deemed possible, but refused by the prospective landowner. O2 Airwave declared that none of the other alternatives was suitable.

An interesting experience from this period (March to August) was that in April the TETRA installation was sabotaged in some way and ceased operation for maybe two weeks. The reason was not known amongst local residents, who interpreted the inactivity (made apparent by restoration of the TV signal) as a gap in O2's testing. Interestingly, health symptoms were reported to have abated.

By late August it was abundantly clear that whatever was reported, and to whom, was not being accepted as valid. People were effectively being told that whatever they said would only be accepted as 'anecdotal', and of no concern as evidence of anything worth investigating. So after seven months of petitions, a town-centre demonstration, an information stand, liaison with similar local groups and other local meetings, attendance at police consultation meetings, a huge number of letters from many people, almost weekly press coverage of the issue and involvement with planning applications elsewhere and at public inquiries on mast siting, it was finally felt that the experiences of residents should be recorded and analysed for formal presentation.

The result is understandably simplistic. This does not mean that many people are not suffering daily discomfort, and indeed endangerment to their health in the mid to long term. Measurement of the exposure to radiation from the masts also would be simplistic. Ofcom could indeed visit, place their instruments in the area and confirm very comfortable ICNIRP compliance (see appendix 3). Even if they were to go into homes and measure the hot spots of increased radiation resulting from interference, reflection, re-radiation, diffraction, diffusion or multi-path propagation, this would make no difference. There is an absence of people feeling hot as a result of the radiation! And that is all that ICNIRP certification is about (appendix 3).

The Survey

Purpose of the survey

It was recognised from the start that any survey conducted by residents would have limited validity in comparison to a professionally conducted one. This is inevitable, since residents did not have the financial or other resources to fill the gap. The purpose therefore was to create as dispassionate a record as possible of what people were actually saying their own experience was. At one level there would be a simple count of particular experiences that had been noted, but if possible some more detailed correlation may be evident from the data, such as incidence in respect of distance from the mast, or a relationship between effects. It was clear that there had certainly been problems, and a great deal of anger about the situation with TV and other interference, especially since costs are incurred in cars being towed away to start or be opened, or in the fitting of previously unnecessary TV aerial filters.

During the period from switch-on to survey, several points should be noted, as affecting the quality of response.

1. It became clear that the original residents' meetings had been less than comprehensively attended, and many people surveyed were not aware of the arguments about TETRA.
2. The local campaign group, whilst registering a presence in the media around the siting and the cost of the Airwave system, was careful not to encourage specific perceptions of effects. However, they did keep hearing casual reports about neighbours' exchanges over garden fences, noting headaches or sleep problems for which they could not understand the cause.
3. Initial focus in the media had been about TV interference, and this is where the real anger had been expressed. This is borne out by comments in the survey returns. This was so obviously attributable, that when the sabotage incident took place, one resident phoned O2 Airwave for confirmation that the mast had been turned off, to be reassured that no, it had not, and that it must be that the TV transmitter must have been turned up!
4. There is not normally an association between electrical malfunctions and interference such as to cause psychosomatic responses. People are used to periodic poor signals due to weather. However, the coincidence between the onset of particular human symptoms and the interference, and the switching on of the mast was at the very least interesting, and had an apparent temporal and spatial correlation not been suggested, then the survey would not have been carried out.

The survey instrument

Several options were considered. The organisation Mast Sanity has a comprehensive survey in the field, with more rigorous questions, covering two pages. The advantage of this would have been dual purpose, contributing also to a national picture. However, it was felt that two pages would be too 'official' and too much to expect a general population to self-complete.

Local groups elsewhere in Sussex had conducted simple questionnaires to gain an immediate impression of the extent of problems. However, these were not truly comparable with each other, and it was felt further questions were necessary in any case. A bid for an official survey in the Isle of Wight had also been sought, and refused on grounds that it was neither necessary, nor could possibly indicate anything. People felt that the official response to their request was a whitewash, rather than affording suggestion that further investigation was warranted. The thrust of the official response had been based on what ICNIRP and NRPB say, and on presupposed theory that TETRA could not possibly cause any effects.

It was concluded that by asking what we most felt was likely to represent the mix of actual experience, we would at least come to understand the extent of what we were hearing, without unduly prompting people to 'remember' things that had not in fact taken place. The questionnaire did emphasise that we were looking only for unusual occurrences, and it was noted during the course of collections and conversations, that people were more likely to under-report on the health and express anger on electrical problems.

The questionnaire had two parts: health, and electrical interference. The analysis therefore would allow two levels: individual effects and household effects. The question about DECT phones was asked because these present the largest source of microwave radiation in the home, and there is a body of international evidence that people can be sensitive to these with similar health symptoms to those on the questionnaire. One respondent recorded that they had previously ceased using DECT for this reason.

The survey was drawn up to be light in demand, but provide a sufficient indicator of the extent of problems. It was provided with a covering letter of explanation and printed at the expense of the campaign group.

Method

It was recognised from the outset that such a survey would be relatively demanding in time, so volunteers from early days were co-opted back in to deliver the forms. The range was devised such that it was felt we might begin to reach the limits of the effects. A week after delivery, volunteers would revisit to collect, provide replacements for lost forms, and note houses where no-one was in. A second visit, and even a third were recommended where people seemed ready to respond but

wanted more time. The forms provided a local address for self-return, and many people dropped their forms in, or indeed took the trouble to post them back.

The results were entered into a spreadsheet, divided into household/electrical profiles and health/individual profiles and analysed with SPSS (statistical package) by professional researchers.

Response profile

The impression from the self-returned responses, though not formally recorded, was that trouble was taken as much for TV interference as issues of personal health and well-being, and indeed some replied simply to express a sense of injustice even though their return was nil effects all round.

At the close of the survey it had to be accepted that in some areas collection had been too difficult, as in the case of multiple occupancy houses and flats where people did not answer the door, or showed no interest at all. Also, some areas were less than comprehensively collected because of a lack of resources. All those who collected realised after the event how demanding it could be, in the dark and the rain, to spend the necessary hours. Nevertheless, the roads in closest proximity were comprehensively collected, and it was felt that the response rate was sufficiently high and representative of the total population within this range.

Since the group did not have Data Protection registration, no personal details could be recorded. Tracing incidence to particular houses was therefore not possible, so reliance on self-assessment of distance from the mast had to be made. For many returns, even roads could not be identified.

Approximately 1,300 forms were delivered, and 204 were received back by the cut-off point (a response rate of 15.7 per cent), between mid-September and mid-October. This represents just over 10 per cent of the population living within 250m of the leisure facility where the TETRA and other masts are sited.

A further twelve forms were received after this date, so are not included. All were from greater than 250 metres from the mast, and represent nine further individuals, with problems with headaches, skin complaints and sleep disorders.

Results of the Survey

204 forms were returned. 262 people from 118 households reported health matters, and 84 households reported no health issues. Those with something to report under health completed for all individuals in the household, those without did not, and number in household was not asked. There is no reason to suspect that the average number in a household should differ between those with health reports and those without, so the non-health responses were weighted to represent non-health reporting households as individuals, based on the same average occupancy (2.22 persons) as the rest. Thus 262 people recorded health issues on the forms, and an equivalent of 186 reported no health issues, with a total weighted response of 448.

This means that 58.5 per cent of all respondents reported health issues within the list presented on the form. These are detailed in Table 1 and Figure 1.

DECT factor

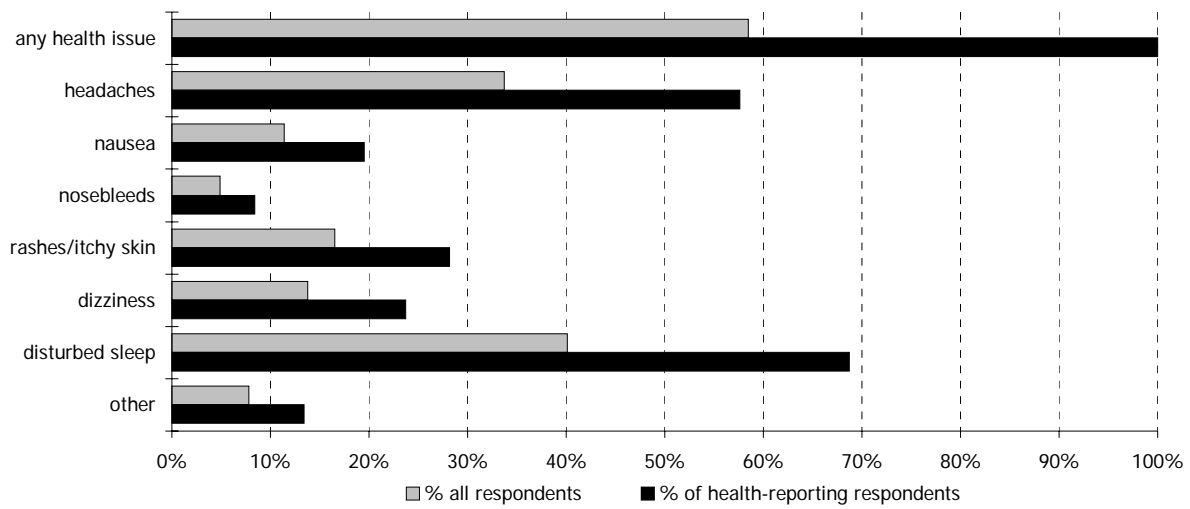
The survey included a question on DECT phones, since, not unreasonably, these contribute significantly to the amount of overall continuous pulsed microwave radiation within a house (mobile phones only make a contribution when in intermittent use). The difference between those households with and without DECT is also presented in Table 1 and Figure 2, and shows noticeable differences. On the whole, reports of the listed symptoms are higher among those with DECT in their homes. What is not indicated is how DECT in an adjoining house or apartment might affect neighbours.

Of those reporting the listed symptoms, 90.5 per cent indicated that these were not present prior to the time of the turn-on of the TETRA mast (T). This is slightly higher among the non-DECT owners, at 93.1 per cent.

Table 1: Health reports

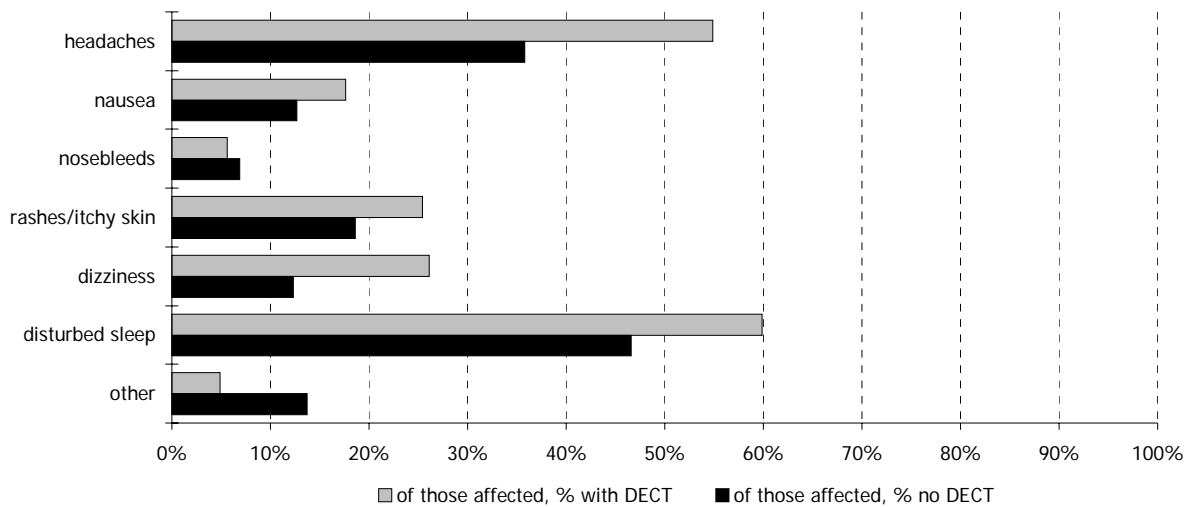
	% all responses	% of affected	of those affected, % with DECT	of those affected, % no DECT
any health issue	58.5	100.0	100.0	100.0
headaches	33.7	57.6	54.9	35.8
nausea	11.4	19.5	17.6	12.7
nosebleeds	4.9	8.4	5.6	6.9
rashes/itchy skin	16.5	28.2	25.4	18.6
dizziness	13.8	23.7	26.1	12.3
disturbed sleep	40.1	68.7	59.9	46.6
other	7.8	13.4	4.9	13.7
	N=346	N=262	N=142	N=204
		90.5% not prior to T	86.6% not prior to T	93.1% not prior to T

Figure 1: Health reports



Responses: N=346
Reporting on health: N=262

Figure 2: Comparison of DECT and non-DECT users reporting health issues



DECT: N=142; 86.6% saying occurrence not prior to T
No DECT: N=204; 93.1% saying occurrence not prior to T

Profile of the health reports

The most common report was disturbed sleep. 97 individuals reported this with a double tick indicating that the problem was frequent, and a further 83 said they sometimes had a sleep problem. 80 individuals described their sleep problem (see appendix 2).

Pearson correlations were run on the figures, using a statistics package (SPSS). This showed strong correlation between sleep and headaches (.338), between sleep and dizziness (.444), and between dizziness and nausea (.778). Perhaps these are not unexpected, since lack of sleep has many and cumulative side-effects. However, it does indicate that these symptoms may share a common cause.

Comments on health

See appendix 2 for these. The most interesting perhaps is what is said about sleep disorders. Only 5 respondents reported that this was present before TETRA, and that the problem was frequent. A further 9 suggested this was not a frequent problem (single tick) and that it was present before.¹

Of greatest interest is that people are waking after only a few hours and are unable to get back to sleep properly. Whilst each and every one of these people's problems are unlikely to be due to the operation of the TETRA mast since February, it is highly suggestive that many of them share a common cause. Since they all live in proximity to the TETRA and their problems began after February 26, it must surely be unwise to discount this as a likely cause.

Whether or not any special characteristics of TETRA are possible factors (see appendix 4), the issue of total ELF EMR (extremely low frequency electromagnetic radiation) exposure is plainly up for consideration. The main point may be that the irrelevance of ICNIRP to these kind of problems is obstructive to proper investigation.

Can this be psychosomatic? This is unlikely. People have been living with all of these masts for several years, and with TETRA for seven months before the survey.

Is there any other apparent cause? No other major environmental cause is known. No new noise factors have arisen, no recent complaints from a local plant to the east of the town have been raised, and from the diversity of the population it would seem unlikely that everyone has suddenly started suffering from increased stress. There is no presumption that TETRA alone is the cause. It may be so, but no survey such as this could ever prove a single cause in such a complex ELF EMF environment, and something in that accumulating mix is as likely a cause as anything else that may be suggested. Statistical and epidemiological studies around microwave transmission masts in Britain, Switzerland and Spain (for example), have been done, showing a very similar picture to this one.

Are respondents telling the truth? There seems to be no especial reason for them to offer biased or 'sympathetic' answers, and it was apparent from the doorstep collectors that many people were completely unaware of the issues, despite coverage

¹ Here the survey would have been better constructed for each health heading to have a before Yes/No question; these figures for previous problems may be too high..

from time to time in the local press. Local meetings had not included anything like the area covered by this survey.

Profile of non-health reports

As already known, the main cause of concern was TV interference. This was reported by 155 households. A number reported that they had no TV, many more that they used Sky digital or cable (the area is served completely by NTL). However, at 76.7 per cent of all households responding, this is important. Interference generally amounts to one channel being unwatchable, others being strongly patterned.

People in the area have been seeking solutions or answers since February 26, since the TETRA mast is unequivocally the cause. Some are known to have had filters fitted early on, and some soon reported that they did not completely solve the problem. Those previously reporting costs for remediation, reported an average of £85 to do so. Television engineers have been unanimous in confirming TETRA as the cause. Whilst Ofcom asserts that the TETRA is not in contravention of its license, the cause of the change in reception is the TETRA. The reason given is that TV and aerial equipment is below the standard required for the co-operation of TETRA, and that the domestic commercial systems are too indiscriminating where signal amplification is concerned, whether within TVs or videos, or in the aerial system. With some 2,000 residences within 250m of the TETRA mast, this amounts to a net cost to the community of £170,000 to restore terrestrial television viewing.

Table 2: Those affected by TV interference

Range from Mast	% respondents	range area as ratio of closest range area	no. reporting TV interference
0 to 50m	11.6	1	14
50 to 100m	24.0	3	41
100 to 250m	32.2	21	51
more than 250m	32.2	75	49

N=155
% of all responses =76.7%

Table 3: Reports of electrical problems

	No.
Electrical interference	34
TV interference	155
Radio interference	13
Car	2
Other malfunctions	5

Range

72.1 per cent of those reporting the listed health issues lived within 250m of the masts (39.7 within 100m); 67.8 per cent of all respondents lived within this range (35.6 within 100m). Table 3 below also shows however, that the proportion of survey forms collected (collection density) from each range 'ring' fell off sharply after 100m. Little can therefore be inferred by range, without a more exhaustive survey and extension well beyond 250m.

Table 3: Those affected (health), by distance (more than 250m taken as 250 to 300m)

Range from Mast	% respondents	range area as ratio of closest range area	no. affected per range	of those affected, %, per range	% collected as proportion of nearest
0 to 50m	11.6	1	34	13.0	100.0
50 to 100m	24.0	3	70	26.7	68.6
100 to 250m	32.2	21	85	32.4	11.9
more than 250m	32.2	75	73	27.9	0.03

Conclusion

What this report does not do

This report does not in any way attempt to *explain* a connection between telecommunications technology situated at the leisure facility and the observations made. These observations do not lay claim to disputed characteristics (eg a pulsing effect from the 17.64Hz frame rate of TETRA) nor to undisputed characteristics (eg the actual power level in homes, the TETRA carrier frequency, the hotspots that occur in people's homes, the interference between the several masts, and the 70.56Hz pulsed slot rate of TETRA). (See also appendix 4.)

Nor can this report indicate with any degree of certainty whether TETRA alone is the cause of problems. It appears to have decisively tipped the balance for many local residents, but it also raises the issue of personal thresholds of tolerance to electromagnetic fields in the microwave range (MW EMFs) where emitted by mobile telecommunications systems. For some, their own, or their neighbours' DECT phones may be as much a contributing factor as the TETRA.

However, this in itself is a very important issue. We have a climate where *everyone* says that more research is needed in order to be sure of safety, whilst the industry and NRPB defend its 'probable safety', however many pulsed microwave sources are present, at whatever distance from each other, with whatever frequency mix, whatever surrounding topographical and structural influences, and placing people under chronic exposure for a long period of time (see appendix 3 on ICNRIP exposure guidelines).

What this report does do

This report sets out observations made concerning experiences of people within a certain range of the TETRA mast. It asks whether these experiences coincide with the activation of the mast. It therefore illustrates a pattern of experience. If anything in this report suggests a correlation, temporal or spatial, then further investigation would seem due. Either the patterns are no different from populations where there are no such telecommunications masts, or they suggest that wholesale assertions that telecommunications masts *cannot* have any effect, may be unsafe.

Certainly, any assertion that these observations could not possibly be predicted by what is known about electromagnetic fields in the microwave range, and from international experience elsewhere, *and therefore are assuredly unrelated*, is untenable. It may even be regarded that there are 'sides' in the microwave/health argument, and that each side has preferences for certain research findings. However, there is certainly peer-reviewed research indicating that EMFs, especially with extremely low frequency modulation, do have biological, non-thermal and non-linear effects at very low power levels.

This report should therefore invite acceptance of the ICNIRP guidelines on emissions to be re-evaluated. The basis on which the NRPB has recently chosen these in preference to its own much higher levels, should be questioned on the principle that they are not actually relevant in respect to observations such as ours (see appendix 3). Since ICNIRP certification is the supposed 'proof' of safety as far as planning is concerned, this is obviously of paramount importance.

As regards the current situation at this location, this report invites remedial action to the situation in which installations in close proximity to surrounding housing include:

- Vodafone GSM
- Vodafone UMTS
- Hutchinson UMTS
- mmO2 GSM
- O2 Airwave TETRA
- Orange (GSM? UMTS? currently being installed)

With what degree of confidence can we say that this is unrelated to the results of this survey?

Final questions

1. Can we safely say that the profile of reports of adverse symptoms such as sleep disorders and headaches are unrelated to mast emissions? If the official response is adamant on this, then how acceptable is the situation if some other cause is not to be investigated?
2. Is this a case of electrical hypersensitivity? We have avoided this tag, since there is no immediate suggestion that the people affected are sensitive to any other electrical fields or equipment. The problem with tagging the issue as 'people with EHS' is that the solution becomes fixing the people, not identifying and removing the cause. Suppose we called people who get cancer or heart disease from cigarettes 'THS' (tobacco hypersensitive) and decided to promote cigarettes and process the people in hospital? If we got treatments for cancer successful enough, cigarettes would not present a problem.
3. What are the 262 people we know about from this survey to do? They can either hope their symptoms go away, or they can go away. Who will live in their place? Is it fair to sell their homes, if it is the location of their homes that cause their problems? Let us suppose only half share a common cause for their symptoms. If they all move and 58 per cent of the incoming population suffer similarly, then they too could move. After five such population replacements, only nine people will be suffering in this way instead. Is this the way we should be dealing with a

situation like this? To let people solve the problem by being forced from their homes? Should we really be saying to people: 'we don't know why you have headaches, nausea, and can't sleep, but we will not try to find out, so you had better put up with it or move house. We can't tell you where you should go, because with the rate at which masts are being constructed, one could be erected on the street outside your bedroom window at any time, and you can't do anything about it.'

4. What are our protection agencies, local and national to do? Should they continue to accept that people have unexplained health problems, and because they are attributed to a source regarded as impossible to be a cause, stand by and do nothing? And not even watch? Or should a more critical eye be cast on the assurances of the safety guidelines, the potential mechanisms for biological and physiological interaction of ELF EMF, and why certain research is routinely discredited?

Whatever response this survey evokes, let it not be said that 58 per cent of our respondents are suffering from psychosomatic effects from something of which they have only a low awareness. Nor that the 262 people involved most certainly have 262 separate causes for the effects on their well-being. And let us not walk away from them as if it doesn't matter.

Appendices

1. The survey instrument
2. Written Comments from the Response Forms
3. ICNIRP guidelines
4. TETRA Signal Construction Characteristics

Masts at (location) : please help us co-ordinate information

Dear Neighbour

The issue of mobile phone masts at (location) has long been an issue, with objections, petitions and local get-togethers over several years. Currently there are two outstanding issues: TETRA and Orange.

The TETRA mast has been given extra prominence because of the adverse health symptoms and electrical interference that we know have been widely experienced since February 26. These have been reported in the press, by word of mouth and in public meetings. Not everyone has been personally affected, but in fairness to those who have, please can we ask you to take part in this small survey?

The Orange mast has now arrived, two years after appeal was approved to Orange, against refusal by the local Council. The Council said the mast would detract from the amenity of our properties, HM Planning Inspectorate disagreed, saying that adding another mast would make no difference. Well, most of us would disagree with that.

Whilst we have a single issue with the landlord in their attitude towards residents, we need to tackle some of the issues separately. **TETRA** affects the well-being of some of us directly, and we must get that addressed by the proper authorities. TETRA is not going to go away, and there is no political intervention to rescue the situation. Furthermore, we are still challenging the Council on the compliance of the TETRA mast under planning law, since the height of the mast appears to contravene the planning permission under which it arrived.

Orange is a case of 'not yet known', but certainly unsightly. It may affect the value of properties, it certainly turns the treeline into an industrial aspect. We shall be watching the development closely to ensure that it complies with what the Inspectorate allowed in the original plans. We shall seek to challenge this mast within two months of completion under the Electronic Communications Code (Communications Act 2003) for "spoiling the enjoyment of our land".

The issues around mobile phone masts and TETRA are complex, but the reasons to doubt their safety in such proximity as ours are clear. If you would like more information, you can visit www.tetrawatch.net (which began because of the problems experienced by residents living near the TETRA mast) or phone, or call for more information. We are careful not to be scaremongering. We don't want to frighten anyone, but we do feel that we have been under-informed or misinformed about the known scientific research concerns.

Any concerns we might have held while the leisure facility filled up with mobile phone masts have only been deepened by further research. That has been further confirmed by all our conversations with communities around the UK like ours, who have been told they

must have mobile phone masts, that they have no real say, and that no-one is going to look out for their welfare.

Please don't be swept under the carpet. Fill in our survey, and if you would like to help in any way, let us know. We shall be returning to collect surveys within about one week.

yours sincerely

(names)

or email watch@tetrawatch.net

I am willing to help out in a TETRA campaign to raise awareness of local feeling about planning and safety. (Name and phone number only, if you wish.)

Name

Address

.....

Tel.

email

Please hand in or post to:

(name and address)

or email the same information to watch@tetrawatch.net

TETRA at (location)

August 2004

Please help yourself, your family and your friends in this community by taking a couple of minutes to complete this questionnaire.

Your answers to these questions are *vital* in finding out if local people *have* had problems with their health and/or television reception *etc.* at any time since late February when the TETRA mast was switched on. Please only note anything that is *unusual* during this period.

The results from this questionnaire may not be proof that there *is* a problem locally, but they are the best, possibly the only, way that we can get the authorities to take the TETRA issue seriously and hopefully carry out their own *official* investigation into affects on our lives, in terms of health, interference, or general sense of well-being. We have tried, unsuccessfully, to get the Director of Public Health or the Regional Health Protection Unit of the Health Protection Agency to take an interest and undertake a proper survey for analysis, so therefore we feel it timely to gather the information ourselves.

Your name or address are not needed (though feel free to note them on the questionnaire if you wish) so the results are entirely anonymous. **No names will be passed on to any third party, and all information will be kept in the strictest confidence.** If you would like any further information or follow-up, please use the email address or contact details at the end of this sheet and the cover letter.

Health Questions: Please tick once ✓ for sometimes, twice ✓✓ for frequently

Symptoms since 26 Feb 2004: please tick for you & your household	You	2nd member	3rd member	4th member
Headaches or migraines?				
Nausea?				
Nosebleeds?				
Rash or itchy skin?				
Dizziness?				
Anything else that you want to mention? (including problems with pregnancy/miscarriage)				
Disturbed or poor quality sleep? (please describe)				

Appendix 2: Written Comments From the Survey

The comments recorded below are from responses where effects prior to 26 February had not been present. It is important to emphasise that these reports cannot be attributed wholesale to the TETRA mast; that is unlikely to be the case. What is noteworthy is the similarity in the comments, especially regarding sleep patterns, and that these are only recorded as occurring since operation of the mast. It is therefore equally unlikely that none of them are attributable to the operation of the mast. It is also important to recognise that reports of tiredness will follow reports of disturbed sleep.

R= range or distance from the mast.:

R=1 : less than 50 m

R=2 : 50 to 100m

R=3 : 100 to 250m

R=4 : over 250m

Sleep

(40.1% of all respondents (weighted) reported some or frequent problems)

Seems to have become a problem for the three of us. We thought old age was the culprit. (R=2)

I awake nightly at 3am and find it difficult to get to sleep again. (R=4)

Wake up at about 1.30 to 2 every night. (R=4)

Wake up 1.5 to 2.5 hours after falling asleep. Disturbed sleep for rest of night. (R=4)

Waking up during the night difficult to get to sleep. (R=4)

Regular waking 12 o'clock to 2 o'clock. (R=4)

Waking up all the time. (R=2)

Have to take sleeping pills every night. (R=1)

Disturbed (restless and waking). (R=3)

Restless nights. Not sleeping for long periods. (R=3)

Very restless during night. Keep waking up (R=1)

Waking up every two hours. (R=2)

I wake up many times a night. (R=2)

No sleep (work shifts). Hour and a half if I'm lucky. (R=2)

Shallow sleep. Continually waking. (R=4)

Very restless. (R=2)

Waking every two hours. (R=3)

Poor quality sleep – waking approximately every 2.5 to 3 hours – being wide awake. (R=3)

Wake very early and unable to get back to sleep, *ie* 2am/3am. (R=3)

Wake up suddenly around 2am; odd hours. Have difficulty getting to sleep some nights. (R=2)

Wake up either 2.30-3.30 am or every hour. (R=3)

Wake up abruptly after 2 hours. Difficulty getting back to sleep. If I do, I awake after another 2 hours. (R=2)

General restlessness, sometimes wide awake and alert. (R=3)

Not able to sleep well at all. (R=2)

Wake up at 5am in hot sweat. (R=4)

Wake frequently at around 2am. (R=3)

Frequently wake in the night approx 0300hrs and cannot sleep. Not worried about anything. Sleep pattern is disturbed. (R=4)

I find it hard to get to sleep after waking up in the night. (R=4)

Unable to get to sleep and waking up once asleep. Weird dreams. (R=3)

Keep waking up before completing sleep pattern. (R=2)

Waking most nights about 3am. (R=2)

Restless sleep. Waking in middle of night and not going back to sleep. (R=1)

Very wakeful at night. (R=4)

Awake several times during the night. (R=4)

Waking up frequently. (R=4)

Restless. (R=1)

Can't sleep at night since TETRA. (R=2)

Both suffer disturbed sleep – waking every couple of hours leads to continual tiredness. (R=2)

Shallow sleep, waking early still tired. (R=1)

Wake up in night unable to go back to sleep. (R=1)

Disturbed sleep. (R=1)

Keep waking up through night. Tired but can't seem to sleep. (R=2)

Daughter keeps waking through night. (R=2)

Keep waking up all hours. (R=1)

Waking frequently during night. (R=3)

Very wakeful during night, wake up in early hours, unable to get back to sleep. (R=2)

Sometimes unable to sleep continuously for long periods. Nightmares, vivid dreams more often than is usual. (R=1)

Wake up at least 3 or 4 times a night. (R=4)

Sleep for only 1.5 to 2 hours at a time. Wake up for no apparent reason. (R=4)

Both of us waking 2am and weird, vivid dreams. (R=3)

Headaches or migraines

(33.7% of all respondents (weighted) reported some or frequent problems)

A heaviness in the head all the time. (R=3)

Suddenly sometimes *most unusual* headaches during night. (R=3)

Have suffered from migraine in the past, but recent pain/dizziness very different. Due to severity of migraines and dizziness *etc.* had to have a CT scan recently. Thankfully results were negative but no diagnosis confirmed. (R=4)

Skin problems

(16.5% of all respondents (weighted) reported some or frequent problems)

Severe flare up of psoriasis, which haven't had since childhood. (R=2)

Other

(7.8% of all respondents (weighted) reported some or frequent problems)

A prolonged and continuous production of earwax. (R=2)

Very runny ears. (R=4)

Constant tiredness and lack of energy. All the time. (R=4)

Irritation to my eyes. (R=3)

Sudden ringing in the ears. (R=3)

All of us feel 'out of it' sometimes. (R=4)

Youngest daughter (aged 5) said her heart hurt!! (R=4)

Jumpy, wandering, forgetful. (R=4)

Gastric complications. (R=4)

Arthritic joints more troublesome. (R=4)

Wake up with feeling of getting a cold. ((R=2)

Waking up several times during the night. (R=2)

Irritability, confusion. (R=4)

Baby has oesophageal reflux since 2 weeks old. (R=3)

Constant tiredness, lack of energy. (R=2)
Body warming. (R=3)
Constant tiredness. (R=1)
Reduced concentration when attacking problems. (R=2)
Problems with earaches. The ear problem suffered by myself and my 3 yr old daughter was noted by the doctor, for which he could find no explanation. (R=2)
Always tired. (R=3)
Poor memory, lack of concentration, inability to mentally focus. (R=4)
Loss of appetite. (R=4)
General malaise and tiredness. (R=4)
Lethargy, loss of agility in legs. (R=2)
Miscarriage. (R=2)
Pregnancy complications. (R=1)
Miscarriage. (R=1)
Our cat will no longer go upstairs at all now – very different to last year and before. (R=3)

TV interference

(76.7% of responding households reported problems)

Require booster. Confirmed by TV engineer was caused by TETRA. (R=4)
ITV non-existent. (R=4)
Paid £70 for filter. Sometimes poor reception still. (R=3)
ITV unwatchable. (R=2)
ITV obliterated and sounds like a scanner picking up TETRA. (R=2)
Paid to have aerial in upstairs bedroom, picture perfect, mast must have been off. ! week later, unwatchable on ITV and poor picture on other channels. Had to pay for a booster. If I put up an aerial [mast] in my garden stopping people watching TV I wouldn't get away with it! (R=2)
Haven't been able to get channel 3 at all. (R=1)
Had to have an added appliance fitted to my aerial, costing over £50. (R=3)
No channel 5 at all. (R=4)
Had to buy filter box for TV! (R=4)

Radio interference

(26.7% of responding households reported problems)

Repetitive pulsating noise. (R=3)

Same sound as a scanner, near Radio 4. (R=2)

Other electrical

(8.4% of responding households reported problems)

Big problems with computers. (R=4)

Car alarm has been going off recently on both our cars. (R=2)

We had a new bedroom fitted in May. We had three sets of lights operated by touch sensitive controls. These lights intermittently switch themselves on and off with no regular time or pattern. (R=4)

[Car] always cuts out when taken from garage up the driveway, maybe twice in reversing. (R=2)

Interference with baby monitor. (R=3) (Whilst not written much, this is locally known to be a frequent problem)

Appendix 3: ICNIRP¹ Guidelines

Current planning guidance from the Office of the Deputy Prime Minister states:

‘In the Government’s view, if a proposed mobile phone base station meets the ICNIRP guidelines for public exposure it should not be necessary for a local planning authority ... to consider further the health aspects and concerns about them.’

The ICNIRP guidelines (1988, amended, 1998) say:

‘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 temperature resulting from absorption of energy during exposure to EMF. In the case of potential long-term effects of exposure, such as 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.

‘*In vitro* effects of short-term exposure to ELF or ELF amplitude-modulated EMF are summarized. 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.’

What this means is that, even in 1988 and 1998, these guidelines subsequently adopted by Government to protect the public from adverse reactions and ill-health to installations emitting oscillating, amplitude-modulated or pulse-modulated electromagnetic fields, specifically exclude:

1. long-term effects of any kind
2. cancer, brain disorders, motor-neurone disease *etc.* (conditions suggested by *in vitro* research) caused not by intensity, but by particular frequencies.

What it means also is that the guidelines *only* apply to short-term acute exposures, based on the premise that only thermal effects of EMFs present any risk to health. In excluding this research, ICNIRP has been extensively criticised internationally.

¹ International Commission on Non-Ionising Radiation Protection

Reliance on ICNIRP

These guidelines apply to mobile phones, DECT phones, TETRA handsets, and base stations of any characteristic. From these sources we experience ELF pulse-modulated signals characterised by frequencies that figure in the scientific research as presenting particular concern through biological interaction. The research has demonstrated repeatedly that exposure at very low levels, and certainly well below the thermal safety guidelines, can cause physiological effects. In the case of TETRA two factors are of specific concern:

1. TETRA handsets are pulse modulated at 17.65 Hz
2. TETRA base stations do not employ adaptive power control; they therefore transmit on all four slots per frame at full power, all the time. This in itself creates a background modulated EMF at 70.56 Hz, with a rhythmic 17.65 Hz 'marker' caused by the join in slot 4 of one frame and slot 1 of the next. (See appendix 4 and further notes.) Whilst this has been defined away as not constituting a pulsed waveform, it is similar to the rhythmic pattern of a train's, wheels which are never silent, yet which we all recognise.

The ICNIRP guidelines are therefore applied entirely inappropriately to protection from chronic low-level exposure and athermal biological effects arising from particular frequency windows. *Therefore there is no protection from these effects by adherence to these guidelines.* It is for this reason that the TE/7 Committee in Australia, in March 1999, would not approve the ICNIRP guidelines.

Dosimetry

Examination of dosimetry research for ELF EMR appears to indicate that it is still in its infancy concerning low-level long-term exposure. Primarily, this appears to be because for thermal effects it is simpler to measure absorption than for athermal effects. Thermal effect dosimetry is proportional to radiation intensity, whereas athermal effect dosimetry must relate equally to the frequency mix. In addition, some effects are paradoxical, *ie* while certain thermal effects decrease with intensity, other effects simultaneously increase towards certain frequencies. So whilst there is any disagreement that athermal effects occur, the dosimetry cannot progress.

Without frequency-related dosimetry for low-level chronic exposure, there can be no progress on guidelines. Therefore, it must be acknowledged that the ICNIRP guidelines have no bearing on athermal effects and no basis to suggest they might.

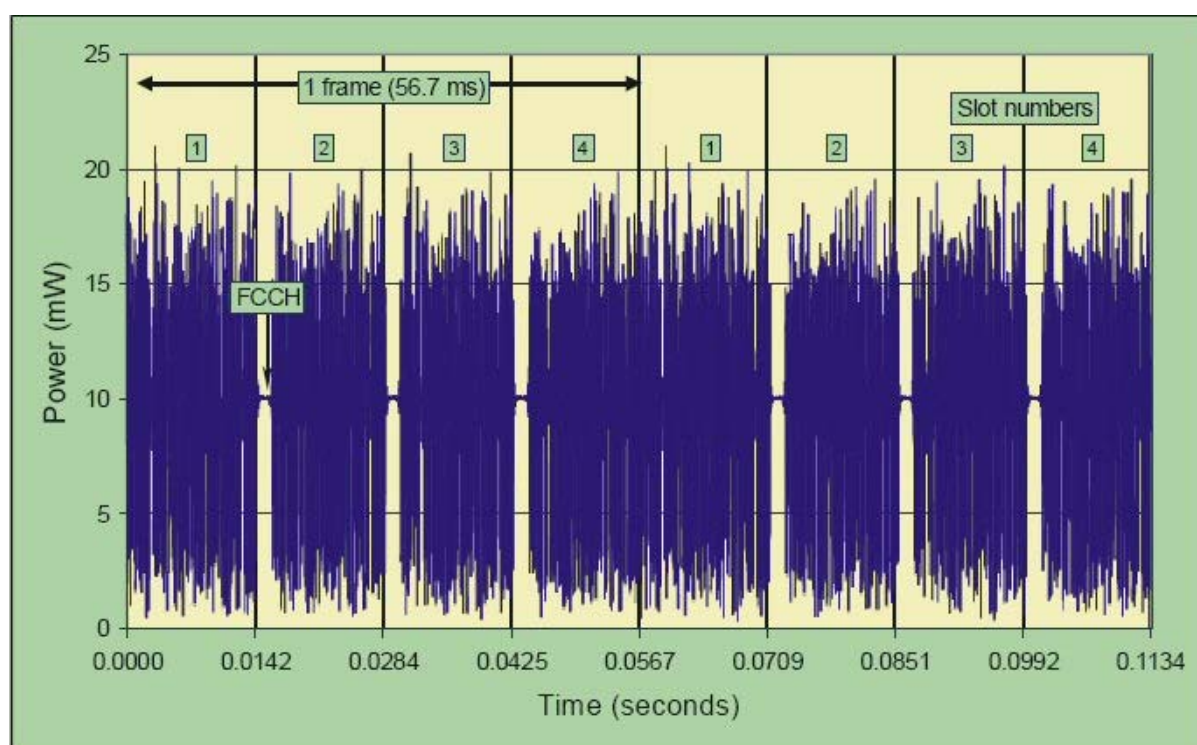
The table below of Government research under the Mobile Telephone Health Research Programme (MTHR) exemplifies the current situation regarding dosimetry and base station exposure, but examination of the substance of the dosimetry research reveals that it primarily concerns energy absorption, not frequency response or entrainment.

MTHR programme of research

No. of studies:	19
Human studies on biology of mobile phone use:	7
Non-human studies on biology of mobile phone use:	3
Studies on psychology of mobile phone use:	3
Non-health studies of mobile phones:	1
Studies on how to study mobile phone use, <i>eg</i> dosimetry:	4
Studies on mobile phone base stations:	1
Studies that include TETRA signals:	3
Studies involving human biology and TETRA handsets:	1
Studies involving dosimetry and TETRA handsets:	2
Studies on TETRA base stations:	0

Appendix 4: TETRA Signal Construction Characteristics

The familiar TDMA (time division multiple access) trace of a TETRA base station signal (Source: AGNIR, and confirmed by local spectrum analyser measurements at this location)



Notes:

1. In this TDMA signal, each 'bunch' of modulations is a slot, and there are four slots in a frame. The overall wave envelope is characterised by 70.56 Hz, marked by a pronounced changes in amplitude modulation. Frames occur at 17.64 Hz, marked by missing changes, (long bursts where slot 4 is joined to the next slot 1). Were this acoustic, the rhythmic pattern 'di-di-dah-di-di-dah' would be quite apparent, with every 'dah' at 17.64 Hz. The question is whether induced currents in the body from EMF, reflecting this rhythm, are perceived in any way similar to the body's own bioelectromagnetic frequencies, in the same way as the same rhythm would be perceived acoustically: does an electrical pattern "set the brain's foot tapping", as it were? Research has revealed the phenomenon of frequency entrainment, where bioelectromagnetic frequencies 'fall in' with imposed field frequencies: you can kill a frog by tuning into and turning down its heart beat, for example. TENS pain relief works by interfering with nerve impulses at 70 Hz.
2. Whilst the 16 Hz concern relating to cellular Calcium efflux underpins one of the issues of TETRA, especially in the case of the aggressive pulse of handsets, another is that of our underlying beta brain frequencies between 13 and 40 Hz. This may be part of an explanation of the abrupt waking, experienced by many people living near TETRA base stations, at intervals coinciding with the transition from alpha to beta brain activity.
3. The primary objection to frequency-dependent biological effects is not that this is not borne out by laboratory experiments (which it is), but that there is apparently inadequate understanding of a mechanism in the body whereby these signals can be recognised (*i.e.* separated out from the

400 MHz carrier wave). Several mechanisms have been suggested, by Becker, Hyland, Cherry and Coghill, amongst others, but rather than test these hypotheses, the official view is that whatever is seen in the laboratory, in the absence of an established mechanism, coherent signals such as these simply cannot be having an effect. Hence the absence from ICNIRP of coherent frequency effects, continues to be accepted. Effects, such as those on calcium, melatonin production and the blood-brain barrier, however, do present well-defined health risks.

Glossary

EMR/F

Electro-magnetic radiation/fields

A spectrum of interacting magnetic and electrical fields that ranges from ultra-low frequencies, through radio waves, microwaves (TETRA and mobile phones), visible light, ultraviolet, to x-rays, measured in increasing frequency

Frequency

The rate of regular variation in transmission waves: how many waves arrive per second. TETRA operates around 400 million cycles per second (Mega Hertz, or MHz), the latest mobile phones operate at 2000 MHz (2 Giga Hertz, or GHz)

TETRA / Airwave

Terrestrial Trunked Radio. A European specification for a microwave radio system, marketed under the brand name of "Airwave" in the UK, and contracted to mmO2, operating as O2 Airwave

Base station

Otherwise called a mast: the structure with associated electronics cabinets that carries aerials, or antennae. Single antennae are also used as "repeaters" to fill in gaps between base stations.

Ionising radiation

EMR at the top of the spectrum that destroys cellular structures through its destructive effects at molecular and atomic level, eg ultraviolet, X-rays, gamma rays ("atomic" or "nuclear" radiation)

Non-ionising radiation

Radiation that apparently does not affect cellular material in the same way: atoms are not broken up into "ions" by this radiation

ELF

Extremely low frequency: typically 0-200 cycles per second (Hz)

Pulsing

Signals transmitted in bursts at regular frequencies. Not to be confused with transmission frequencies. TETRA and mobile phone masts use various ELF pulse frequencies, including ones that coincide with critical bio-electrical frequencies such as brain waves.

DECT

Digital Electronic Cordless Phones: the new variety without telescopic antennae, typically with a digital display, that look like a mobile phone. These phones sit on bases that transmit pulsed microwaves 24 hours a day with a range of around 300 metres.

GSM

Ordinary original 'second generation' and '2.5G' mobile phones

UMTS

Third generation or '3G' mobile phones. Hutchinson is the main player to date but all operators will be going 3G much more during 2005.

Thermal effects of radiation

Radiation can vibrate molecules and generate heat. This underlies the way microwave ovens work. It is generally recognised that heating living organisms up is dangerous.

Non-thermal, or biological effects of radiation

Radiation is known to affect living organisms by inducing currents that interfere with life processes. For example, pulsed EMR at ELF is used to heal bones and soft tissue injuries, and miniscule currents in the body affect the ways in which chemicals travel through cell membranes.

Exposure guidelines

Suggested levels of human exposure to EMR, scaled on power levels at the point of exposure, the frequency of the radiation, and the duration of exposure. An Airwave TETRA mast, for example radiates at a continuous power level 24 hours a day, whereas exposure to a mobile phone handset lasts a few minutes. Generally the lower the frequency the greater the penetration into the body. TETRA therefore penetrates much more than mobile phones.

ICNIRP

International Commission on Non-Ionising Radiation Protection

ICNIRP Guidelines

Based on the premise that "if it can't heat you it can't hurt you" these international standards ensure that electromagnetic radiation cannot even come close to raising the body heat of anyone in range of an EMR source, by 1 degree C over a period of several minutes.

NRPB

The UK's National Radiological Protection Board. Now embraced by the Health Protection Agency, headed by Sir William Stewart, chairman of the Independent Expert Group on Mobile Phones (IEGMP) that produced the 2000 'Stewart Report' recommending a precautionary approach to mobile technology, and avoidance of frequencies around 16Hz (see ELF).

AGNIR

Advisory Group on Non-ionising Radiation. Produced a report in response to Stewart in 2001 "Possible Health Effects from Terrestrial Trunked Radio (TETRA)", and updated the Stewart in 2004 as "Health Effects from Radiofrequency Electromagnetic fields".

Bibliography of relevant references

This list is highly selective. The intention has not been to create a definitive argument, but to point out the obvious problems in the current approach to ELF EMF safety assurance and protection. The literature on biological effects of ELF EMF is overwhelming; the Cherry paper below, for example cites 461 other papers.

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