THE INTERNATIONAL EMF PROJECT

HEALTH AND ENVIRONMENTAL EFFECTS OF EXPOSURE TO STATIC AND TIME VARYING ELECTRIC AND MAGNETIC FIELDS

Minutes of the Fourth International Advisory Committee Meeting
3-4 June 1999, Geneva

WELCOME

Dr Richard Helmer, Director, Department of Protection of the Human Environment, welcomed the delegates to the meeting on behalf of Mrs Poonam Khetrapal Singh, Executive Director of the Cluster on Sustainable Development and Healthy Environments. He outlined the new WHO structure that had evolved over the past year which situated the EMF Project within a new Occupational and Environmental Health Unit in his Department. Special welcomes were extended to Dr He of the People's Republic of China whose country was being represented for the first time.

It was noted that the Ministry of Environment of Israel had assisted the EMF project recently by providing translations of the EMF fact sheets into Hebrew. Discussions with the Chinese Ministry of Health could also produce Chinese translations of the fact sheets to be added to the EMF Project web site. In closing he expressed Mrs Singh's gratitude to the members for their participation and collaboration in the WHO's International EMF Project. The complete text of Mrs. Singh's welcoming remarks appears in Appendix A.

1 (a). Election of Chair and Vice-Chair

Dr Repacholi proposed and the delegates appointed Mr Arwel Barrett as Chair, Dr Eric van Rongen as Vice-Chair and Dr. Tony Muc as Secretary/Rapporteur.

1 (b). Adoption of Agenda

Mr Barrett took the Chair and opened discussion to adopt the draft agenda, noting that a portion of Item 2. "Project Organization" had been covered by Dr Helmer in the course of his welcoming remarks. In the absence of any suggested changes, the draft agenda was adopted.

2 (a). Project Organization

Covered during welcoming remarks.

2 (b). Project Update

Dr Repacholi made reference to the draft Progress Report for the current year (September 1998 - September 1999) and asked delegates for input on its content so that the final version can be completed by September. He underscored the importance of the IAC as a forum for the discussion of EMF issues and concerns as they develop as well as in providing direction to the EMF Project. He reviewed the benefits of the project for national governments and outlined the progress and outputs over the past year. Particular attention was drawn to dosimetry issues and their importance with regard to eventual standards that will arise from the project's standards harmonization efforts.

The meeting scheduled for 4-6 October in Munich will focus attention on possible questions about EMF effects on the environment. EMF Risk Perception and Communication issues had been addressed in preceding years and the input generated from the reviews would result in and WHO Environmental Health Criteria document on the subject and a Handbook to assist governments, agencies and industry in understanding and communicating concerns of the public regarding EMF exposure and health

consequences. He went on to summarize the progress on standards harmonization and outlined the benefits that would accrue from a successful conclusion of the effort. He also noted that work on the web site continues with a frequently asked questions section soon to be introduced and work continuing on development of EMF training packages. Finally he drew attention to a newly issued WHO European Regional Office document on EMFs noting that it was one of the best (despite some almost imperceptible errors) publications for the general public to appear in recent times.

The Chairman then opened the floor to discussion.

Dr Brenner (Israel) noted there was an attitude among members of the public verging on hysteria particularly regarding cellular telephones. He asked why a more definitive stand cannot be taken on the matter of standards and risks now, or very soon, rather than several years in the future. It is a matter of growing concern for Israel and undoubtedly for other national governments.

Dr Repacholi indicated that the meeting in Erice toward the end of November would provide an opportunity for an interim review of the situation and would be particularly relevant to the issue of cellular telephones and their base stations. Thus the earliest opportunity for an update would not be until late this year. However, the present fact sheet is up to date and the conclusions continue to be supported. It remains, nevertheless, impossible for the EMF Project or WHO to respond to all the media or public enquiries that arise.

The Chairman noted that the process of establishing a consensus position is incremental and often impaired by public concern inflamed by the media based on premature release of information by researchers about their work before it has gone through the peer review process.

Dr Pekárek (Czech Republic) indicated that despite having the strictest of standards, the attitude of the public is more fearful than ever. They face a dilemma in that, being in Europe and interested in actively participating in the EU, they are faced with a choice between CENELEC and ICNIRP which are in conflict with their current standards. The continuing rapid expansion of the cellular installations and the proliferation of competing designs makes it essential to come to a harmonized approach sooner rather than later.

Dr Repacholi pointed out that a similar sense of urgency exists in many countries. It is anticipated that the imminent vote by the EC Council on acceptance of the ICNIRP recommendations will go a long way toward improving the situation since there is a good prospect that the vote will be positive. He then reminded the delegates that, while standards remain a very important issue, the focus of their attention in the present meeting should be advice and direction for the EMF Project.

The Chairman noted that the process was slow because of the difficulties arising from establishing a consensus of the framework for standards.

Dr Seguinot (Luxembourg, EC) made the clarification that acceptance of the ICNIRP recommendations was still at the proposal stage. Final recommendations from the EC were an open question for the time being.

Mr Goldberg (IEC) also added, for clarification, that discussions will be undertaken regarding coordination of efforts directed at standards and harmonization by IEC and CENELEC.

Dr Portier (USA, NIEHS) enquired whether the EMF Project was working toward establishing a literature database across the whole spectrum. Dr Repacholi responded that such an endeavour was far beyond the resources currently available.

Dr Murphy (USA, USAF) advised that a very extensive literature review has been undertaken by the IEEE and that it could be made available but not until the process is completed.

Dr Böttger (Germany) advised that Germany has established a literature database that will soon be published on the web.

The Chairman commented that web sources need to be looked at sceptically because of the great variability in their quality.

Dr Repacholi requested that the URLs for such sites be provided to the EMF Project so that links to them can be included in the Project's web site.

Dr Portier emphasized that the need for a standardized, carefully evaluated, annotated database of literature remains critical. He also enquired whether the WTO (World Trade Organization) might have any interest in EMF issues. Dr Repacholi replied that the WTO is indeed involved but still only as an element in their initial consideration of the occupational and environmental health issues associated with trade practices.

The Chairman noted that standards for evaluation of publications have been established and published so that there are accepted criteria for quality assurance against which publications can be judged.

Dr Brenner enquired whether there is a comprehensive list of all existing standards noting that, almost daily, there are reports of "new" standards being adopted by one country or another - most recently from Switzerland. Dr Repacholi replied that the minutes of the Standards Harmonization Round Table held in Zagreb last fall contained the most comprehensive recent compilation of the standards and guidelines currently adopted by national agencies and international organizations.

Dr Paulsson noted that the International Union of Radio Science (URSI) has been collecting literature related to EMF issues for the past decade using very strict rules. The bibliographies are published at each URSI Congress.

Dr Vecchia (Italy) commented that the experience in Italy is that the public has great difficulty in understanding what is meant by "accepting" studies and why "replication" needs to be carried out. It appears there is a need for some way of "dismissing" studies or "removing" papers from consideration at least in the context of public communications.

The Chairman responded that whatever is done the process needs to be kept completely open and public to ensure credibility and Dr Repacholi added that, while unreplicated studies leave open questions, the relevance of every study must be assessed with respect to design, quality and applicability. In the end ALL articles and reports need to be reviewed and dealt with.

Dr McKinlay (UK) returned to the issue of standards noting that the word is used loosely and is often substituted for guidelines or equipment performance specifications. Inferences that mobile phones are designed with health standards in mind are not correct in that IEC and similar agencies deal with technical (equipment performance) standards and nothing more. Nevertheless he argued that there already has been effective harmonization of standards because there is broad agreement that they have a good biophysical basis whereas there is similar broad agreement that the outcomes of epidemiological studies remain questionable as a motive for changes;similarly cancer studies do not provide a basis and even Eastern/Western standards do not differ in extreme ways. Generally it should be recognized that a convergence is occurring and the WHO has an important role in helping to facilitate that convergence through the work of the EMF Project.

Dr Portier returned to the comments about replication noting that if an attempted replication "opposes" or "contradicts" the originally reported result, are both reports to be discarded? Does one "choose" one or the other as more acceptable? Caution always needs to be exercised in accepting evidence as establishing health effects. At best, it is only possible to deal in terms of strength of evidence. He concluded with the suggestion that a plan should be developed for dealing with "proof" issues in elaborating the standardization framework.

3. Highlights of National Concerns

NETHERLANDS (E. van Rongen): The situation is similar to that which exists in other countries. Mobile telephone base stations are the main focus of concern. The situation is made more difficult by the fact that three new operators are in the process of setting up adding still more base stations.

CANADA (A. Thansandote): The revision of Canada's exposure standard SC-6 has been completed and it is due to be published sometime during the coming summer. Public concerns remain similarly focused on mobile telephones but there is a growing opposition to siting of base stations. The Royal Society of Canada Panel established at the behest of the Canadian Government last summer presented its report in Vancouver on 17 May. It affirmed SC-6 for both workers and the public. ELFs continue to be of concern and concern over VDTs has risen as a result of another cancer cluster report. The Canadian Childhood Leukaemia Study results were released in April. No significant findings were reported.

SWEDEN (L. Paulsson): Mobile telephone base stations are the principal concern at present as they have been for several years. The new development is that the Ministry of Environment will be setting up a committee to review ALL aspects of mobile telephones. Difficulties arise because towers pop up without any public notification since the licence to the operators gives them the privilege of setting up anywhere. Emissions are not actually regulated - only the building/installation.

SOUTH AFRICA (B. de Villiers): Formal structures in South Africa remain as previously. Attention until recently has been primarily focused on power frequency fields and a programme for ELFs has been developed with a similar one in place for RFs. Most recently the focus has shifted to mobile telephones rather than base stations.

NEW ZEALAND (S. Gilbert): Most concerns relate to RFs. The New Zealand Environment Court has ruled there are no established adverse health effects arising from cellsites. Controls follow from ICNIRP recommendations. (see also Appendix B)

GERMANY (A. Böttger): After the Council recommendation on the limitation of the general public to electromagnetic fields (0 Hz to 300 GHz) has passed the German Government will revise the ordinance on electromagnetic fields. Other items of interest which have to be reported are: 1) A national 2-day conference on risk communication and risk perception will take place in October. All stakeholders are invited to participate. People will have the chance to get information and their questions answered. On the second day, examples of successful and less successful risk communication will be discussed. 2) The Ministry of Labour is preparing a regulation to cover occupational exposure on the basis of ICNIRP guidelines. 3) The regulation authority on telecommunications and post is preparing a third campaign to measure high frequency fields.

CHINA (Q. He): The research results reported in China seem to be radically different from what has been or is being reported in the West.

UK (N. Smith): A broad range of activities is under way and it will continue over the next 12 to 18 months. An expert group has been set up to address mobile telephone issues which have generated a large and growing level of concern for some time. An attempt will be made to engage all stakeholders. Focus will be on giving guidance to municipal planning departments in issuing siting permits. There will also be close involvement by a range of government departments and agencies.(see also Appendix B)

JAPAN (C. Ohkubo): Work continues as reported last year. Power frequency issues remain. A recent study looking at mammary tumours in rats showed no effects from 50 Hz magnetic fields up to 350 μT. A study of cellular telephone effects on blood-brain barrier was negative. The large childhood epidemiological study is starting and will be described in detail later. A review of the existing legislation in Japan found it to be suitably protective. (see also Appendix B)

SWITZERLAND (V. Mercier): The second draft of a NIR Ordinance is in process but will be discussed further later.

FRANCE (L. Miro): Levels of concern remain rather low in France. However, publicity about concerns expressed in other countries is leading to more concerns being expressed in France. Commissions have confirmed current processes for resolving disputes associated with EMFs. Research continues to be funded and carried out to a moderate extent. (see also Appendix B)

NORWAY (T. Tynes): The power lines issue has calmed down to be replaced by the mobile telephone base station issue. A guidance has been established not to site such stations on schools and kindergartens. The VDT issue has also calmed down. The use of cellular telephones (handsets) is still a big issue.

SLOVENIA (P.Gajsek): Recent meetings held in Slovenia included one on basic standards harmonization and a NATO Advanced Research Workshop. Legislation is currently on hold. Two major research projects are under way. One is a feasibility study to consider industrial exposures and the other is a power installations study. Mobile communications have caused growing concerns and to address them public information packages have been prepared. (see also Appendix B)

CZECH REPUBLIC (L. Pekárek): COST 244bis is very active in the Czech Republic and currently investigating questions related to SAR for the ear. A study comparing temporary memory loss after the use of normal and cellular telephones found no differences for both cases. Due to too tight standards in our country, microwave ovens with radiation leakage exceeding 2.5 W/m^2 at 5 cm distance from the oven are not allowed to be imported into our country.

BELGIUM (L. Verschaeve): The situation is similar to that in other nearby countries. There is an increasing opposition to cellular telephone base stations. One major pressure group is very active in this regard. Extensive use is made of the internet and spectacular claims from unconfirmed sources. There are no specific regulations but ICNIRP recommendations are followed in giving advice. The main research being carried out involves ELF.

ITALY (P. Vecchia): The situation in Italy is complicated. New legislation is in place. It has provided lots of food for discussion. There is a conflict in Italy between public officials and opposition groups. The latter remain unconvinced of the independence of Elettra 2000 from industry. The public sees the guidelines as suspiciously close to what the cellular telephone industry "needs." The Italian scientific community will in all likelihood come out in support of the ICNIRP recommendations in the EC. (see also Appendix B)

RUSSIA (Yu. Grigoriev): Research activities continue to investigate mechanisms of action and explore modulation effects. Two new standards have been promulgated for power frequency and VDTs. A National Committee on Non-Ionizing Radiation Protection has been established in Russia. A Second International Conference "Problems of Electromagnetic Safety of the Human Being. Fundamental and Applied Research. Development of EMF Standards: Philosophy, Criteria and Harmonization" will be held in Moscow in September. (see also Appendix B)

REPUBLIC of KOREA (Y-M. Gimm): Troublesome questions regarding EMFs arose in the 1980s and the Electromagnetic Engineering Society formed two groups in the 1990s. One reviewed national guidelines across the world and the other looked at measurements and effects on animals. It has been found that actual levels are low with respect to guidelines. However, at levels in the range of ICNIRP recommendations, some effects have been observed in rats. Nevertheless, the group has advised that the ICNIRP recommendations be followed as voluntary guidelines. A study of power line effects on sheep found none.

BULGARIA (M. Israel): Recent efforts have turned to "other" non-specific sources like ultrasound equipment used for diagnostic purposes, fluorescent lighting systems, NMR tomographs and spectrographs. Exposures in power stations have also been investigated. Levels have been found to be below recommended limits, including those for persons with pacemakers. In physiotherapy and diathermy applications, high levels are observed. On the other hand mobile telephone base stations produce only low level exposures. Two epidemiological studies have been completed involving 1200 broadcasting systems. 28 AM and 18 TV stations have been evaluated with respect to relative residential exposures in their vicinities.

ISRAEL (S. Brenner): Presently conditions are rather difficult because of public opposition, especially in regard to mobile telephones. Responsibility rests with the Ministry of Environment. They follow IRPA guidelines and have adopted the principle of prudent avoidance. There are already several thousand cellular telephone base stations and about 30% of the population are users. Approvals go through two stages. They start with issue of a construction permit and then issue an operation permit based on

measurements. "Hands free" systems are being advocated and marketed but an established policy is needed for their acceptance as being preferable. Concerns are spreading to other forms of broadcasting, to radars and power lines. A research programme is being established. (see also Appendix B)

USA - FDA (R. Owen): The final report from NIEHS to Congress on power frequency fields was close to being issued but there are currently no plans for legislative action on that account. There remains support for continuing public information programmes but RF is the main area of concern because of the growth of electromagnetic radiation emitting electronic products. The FDA is charged with coordinating activities across government agencies and with industry. Special attention is being paid to avoiding overlaps in research. There has been a noticeable "re-dedication" of industry to funding research on possible effects. Public and Media concerns have not been particularly high in the US. The work of the WHO EMF Project and its outputs have been helpful. Recently there has been a burst of publicity over "leaked" research results.

The Chairman invited delegates to raise points of clarification with regard to the individual country reports that had just been completed.

Dr McKinlay enquired as to the follow-up to be anticipated in Canada on the recommendations made by the Royal Society Panel of Experts. Dr Thansandote stated that the Panel had accepted the SC-6 revision. The Panel's report would be incorporated into the consultation process that was to be carried out prior to adoption of the revised SC-6. The Panel had raised some points regarding local exposures that would have to be addressed. The details were available on the Royal Societies web page. Dr McKinlay noted that there were new concepts being introduced.

4. Problem Elaboration from Collaborating Organizations

NIES, Japan (M. Kabuto): The most prominent issue is the epidemiological study on childhood leukaemia. Full funding has been approved. Epidemiological studies have not been widely accepted in Japan. Plans are to include intermediate frequencies as well.

BfS, Germany (R. Matthes): No new EMF projects are being started but projects presently under way are being carried through.

NRPB, UK (A. McKinlay): Principal focus recently has been mobile telephones and their base stations. Concerns have been fuelled principally by the media. A programme in the "Panorama" series had been particularly widely discussed recently. A response from NRPB to the issues raised there is available at their web site. The results of the UK childhood epidemiological study are due to be published in September. A large scale pilot study to examine the feasibility of an occupational RF study is expected to provide a much better handle on dosimetry. (see also Appendix B)

NIEHS, USA (C: Portier): The NIEHS report to the US Congress had been completed in the fall of 1998 but was still being held in the Secretary of Health's office. It had nonetheless been updated with information arising from the McBride report and questions connected with 24-hour versus 48-hour measurements were being resolved. In other areas the NIEHS is continuing with its review of cellular telephone studies and with protocol reviews.

USAF Laboratory, Brooks AFB, USA (M. Murphy): Funding continues because the military are among the largest users of EMFs and there is a recognized need to know about effects on personnel and incidental exposures to the public. Studies related to UWB (Ultra Wide Band) radars have found a lowering of blood pressure in rats. DTFR dosimetry is being carried out using a digitized man. Development of an RF dosimeter using a "chemical" that "remembers" its RF exposure history and can be "interrogated" is being pursued.

The Chairman opened the floor to questions or comments for the collaborating organizations.

Dr Repacholi noted that there was a full reference to the NRPB dosimetry report on the WHO and NRPB web sites. In addition, the USAF Armstrong Labs are producing a first draft on medical procedures for over exposures. Dr Murphy pointed out that there were several documented cases in the US from which

a consistent pattern was emerging and requested that other countries provide any additional input they might have available. The Chairman noted that Dr de Seze at Nîmes in France and the corresponding group in the UK might be fruitful contacts.

5. Reports on NIR Activities from International Organizations

NATO (M. Murphy): The Standardization Agreement (STANAG) on RF is being revised again despite having come out only last year. The new IEEE standard is being incorporated. The Radio and Radar Radiation Hazards Working Group (RADHAZ) Manual has been ratified by the member countries. Consideration is being given to "secondary" effects such as "anxiety" etc. among pilots, or arising from the use of anti-electronics "weapons." (see also Appendix B)

IEEE (M. Murphy): Dr Murphy noted that he acts in the capacity of international liaison for the IEEE C95.1 Committee which is one of the longest standing committees with interests in EMF and RF matters in the world. It functions through a very open process which includes all stakeholders. Their recommendations are reviewed and certified by ANSI (American National Standards Institute). The C95.1-1999 field and SAR limits remain unchanged. Changes that have been made relate to details regarding contact currents, measurement distances, spatial averaging, averaging volume and such. The areas covered are similar to those covered by ICNIRP.

ICNIRP (J. Bernhardt): A document covering all of non-ionizing radiation protection philosophy is expected to be completed by the spring of 2000. A revision of risk assessment for the static to 100 kHz range is expected for the end of 2000. A statement on pulsed fields below 30 MHz is due soon. ICNIRP European members are getting together for a concerted action under EC Framework 5 to apply for meeting funding to carry out a risk assessment for the intermediate frequency region. Dr Owen has been elected to the commission and is now confirmed as the head of the Standing Committee on Biology. Many countries have accepted the ICNIRP guidelines in their totality or with only slight modifications.

IARC (E. Cardis): An international study on mobile telephones and cancer has been undertaken. A feasibility study has concluded that such a study is feasible and four more countries in addition to those of the EU have joined so that there is now a total of 13 countries involved. It is a large study expected to cost 12 M euros. **(J. Rice):** IARC Monographs on Carcinogenesis are being expanded to include a series on Physical Agents over the next five years. A monograph on Ionizing Radiation has just been completed.

ILO (S. Niu): A Code of Practice containing two chapters related to EMFs and Optical Radiation (Chapters 6 and 7) has been adopted. It protects workers and enhances protection of the public and the environment. Consideration is being given to risk structuring; non-ionizing radiation in medical practice is also being explored.

ITU (J. Collins): Study Group 5 is in the process of preparing a document which will identify three groups of devices; the first, very low level, definitely under ICNIRP guidelines; the second, moderate level, near ICNIRP guidelines; the third, high level. Distinctions will be made on the basis of ERP (effective radiated power). The document will be made available to the WHO. A new group with interests in EMF effects has also been established at the IEC. (see also Appendix B)

EC (M. Seguinot): There is no official report to be made from the EC. Recommendations put forward to the EC for a vote on June 8 are expected to be adopted. They use the concept of basic restrictions and reference levels and follow ICNIRP 1998.

IEC (G. Goldberg): A Task Force on Human Effects of EMF has been established by IEC. Exposure standards are recognized as not the province of IEC whereas product standards for emissions are. It is intended to deal with the technical aspects covering the description of EM environments, measurements and calculation methods. (see also Appendix B)

6. Discussion of Key Issues
(a) Standards, (b) Precautionary Approaches, (c) Handling of Base Stations, (d) Other

The Chairman requested that Dr Repacholi introduce the discussion of key issues.

(a)(b)(c)(d) Dr Repacholi drew particular attention to the issues indicated on the agenda and specifically that of handling enquiries and concerns about mobile telephone base stations which had already been raised repeatedly during the course of the meeting. He underscored the need to attend to other issues such as standards, the precautionary principle, public information and the research agenda.

(a)(d) Dr Bernhardt pointed out that any framework for harmonized standards would have to encompass social and economic impacts which are of political concern to national governments plus technical advice for compliance which arise from agencies and organizations like IEC, CENELEC and IEEE or URSI in addition to the scientific basis which had already been addressed in the ICNIRP and other recommendations.

(a) Dr Goldberg noted that within IEC a specific TC will concentrate on human exposure issues. Mitigation issues will be delegated to the various concerned equipment manufacturers.

(a) The Chairman invited Dr Mercier to provide input on the Swiss experience with their draft ordinance on non-ionizing radiation (which does not include optical radiation).

(a)(b) Dr Mercier stated that existing legislation requires protection be provided against "harmful" and "disturbing" effects. The aspect of "harmful" effects has been dealt with satisfactorily by adopting the ICNIRP recommendations. The proposal addressed the "disturbing" effects using a precautionary principle based on limiting emissions as much as possible and technically feasible but economically acceptable and taking into account any possible long term effects. As a result, for all new installations, a "clear zone" would be defined where levels were 1% to 10% of guidelines with some exceptions allowed where no other alternatives are available. However, "mountains" of comments have been generated.

(a) Dr Goldberg commented that as a Swiss citizen he was not surprised that many reactions would be forthcoming even on the matter of economic feasibility. However, it is still early and responses are not fully tabulated yet.

(a) Dr Tynes enquired whether the 10% limit applied to the so-called clear zone was only for EMFs or would it apply more generally to other regions of the spectrum or agents. The response was that it is not generally applicable.

(a)(b)(c) Dr Brenner asked if he were a service provider, how would he go about setting up in Switzerland. The response was to follow ICNIRP recommendations and use the precautionary principle.

(a) Dr Böttger commented that it was questionable whether the ICNIRP reference levels could be used as a basis for legislation in view of ongoing discussions about interpretation.

(a) Dr Portier enquired about the process for establishing an ordinance in Switzerland and more generally as to what process was followed by ICNIRP for appointing members. Dr Mercier stated that a scientific committee was appointed to review the literature and it made recommendations for the ordinance. Ms Gilbert added that in New Zealand there had been a two month consultative process to establish legislative guidelines for implementing EMF standards. It was concluded that the ICNIRP guidelines should be strictly applied and recognized there were no established harmful effects and risks were negligible under those circumstances. However, because of remaining uncertainties, low cost, or no cost interventions were recommended such as minimizing transmitter power, minimizing out of band and out of sector emissions for antennas. Both industry and community groups recommended random monitoring. The guideline has been posted to the New Zealand web site. In response to the second part of Dr Portier's question, Dr Bernhardt stated that ICNIRP strictly avoided members with direct ties to industry and looked to identify individual experts from universities and government agencies. Next spring 3 to 5 commission members have to be replaced. The commission, having very close ties to IRPA will draw replacement members from among the IRPA national member societies. As for the review process itself, it drew on experts from various national societies (incidentally 30 % of present members are from the US) and received comments from industry. A final decision was then made by the commission. Dr Repacholi pointed out that ICNIRP was funded by the EC as outlined on the ICNIRP web site.

(a)(c) Dr Vecchia returned to the issue of standards noting that the Swiss ordinance had many "dangerous" words associated with the concepts of "clear zone" and "disturbing" effects. Base stations had been "cleared" repeatedly, by one country after another over the years but nonetheless problems continue in Italy with claims for damage. Without a clear statement to the effect that whatever guidelines prevent acute effects and limit chronic effects, only a pessimistic outcome can be expected. Such a statement is especially crucial for the case of mobile telephone base stations. Dr Mercier assented particularly in the matter of "disturbing" effects and agreed that a clear statement regarding base stations was needed more than ever since new systems were currently using installed powers of 750 W.

(b) Dr Pekárek noted that a precautionary approach had been in use in the Czech Republic for the past thirty years. Recently it also is being questioned. He also pointed out the danger that it leads to unjustifiably low levels becoming entrenched and without prospect of being increased even for the best of reasons.

(b) Dr Portier expressed concern with the concept of advocating precautionary principles. Forthright disclosure and a concept like that of minimum technologically feasible as is used for chemical agents might be considered.

(d) Dr Brenner emphasized the importance of having a clear message from the WHO. It was too long to wait until the end of the year. The member governments need to have indications regarding policy coming from WHO.

(b) Dr Repacholi made reference to a publication on EMFs issued by the WHO European Regional Office which discussed prudent avoidance and the precautionary principle. He asked the delegates to consider whether it might serve their needs while pointing out that the subject was not directly within WHO's mandate. Consideration might be given to the IAC's formally adopting cited text.

(b) Dr McKinlay suggested that prudent avoidance should, perhaps, be considered on a personal rather than societal basis. He noted his agreement with Dr Brenner on the need for clearer specific guidance for national governments and went on to suggest a working group to consider the matter. Dr Goldberg wondered whether prevention, precaution and prudent avoidance were really that different. There followed an extensive discussion of the connotations and overall implications of "precautionary" recommendations. It was summed up by the observation from Mr Collins that the most alarming consequence is that established standards get ignored because the precautionary recommendations become new *de facto* standards (e.g. the 10% level proposed in the Swiss ordinance).

(a) Dr He advised that there were currently three standards dealing with EMFs in China but that they were in the process of being combined. The Chinese Ministry of Health would be publishing the new combined standard later this year.

(b) Dr Repacholi asked for a show of hands on whether the IAC should issue a formal statement developed by an IAC working group incorporating a precautionary principle. A wide majority was in favour of such a draft using the statement in the WHO European Office EMF Booklet as a starting point. Drs McKinlay, Vecchia, Paulsson, Brenner and Portier volunteered to participate in the working group.

(c) Dr Portier returned to the question of a definitive statement about mobile telephone base stations. He noted that a similar situation exists in the area of foods - additives and naturally-occurring trace chemicals. The EMF Project might consider following the model of the IPCS and simply never make any statements about safety. The result may then be like the situation with aflatoxins for which wide variances in accepted concentrations exist throughout the world.

(b) Dr Vecchia commented that prevention can be accomplished by limits but precaution can't. The latter is totally a matter of acceptability. There is some prospect for harmonization if there are known effects and prevention is to be the basis but it can never be accomplished with "precautionary" approaches. This point of view was supported by Drs Böttger and Owen. The latter added that any precautionary statement should be restricted to a Fact Sheet rather that presented as a formal position of the IAC.

(b) Dr Tynes stated that they have not "gone as far" in Norway in the matter of adopting a precautionary principle and thus would not consider adopting anything comparable to the WHO European Office EMF Booklet model.

(b) Dr Repacholi noted that any work on a precautionary principle statement must be kept separate from the standards harmonization process and also clear of risk communications matters.

(a) Dr McKinlay returned to the question of the "clear zone" introduced in the Swiss ordinance noting that the factor to use (say 10%) was problematic since 10 % would not "avoid" cancer which on the basis of some studies would require 250 nT.

(a)(b) Dr Borras expressed his strong concern that health authorities do not comprehend distinctions such as those between standards harmonization and the precautionary principle.

(b) The Chairman noted that explanations of the precautionary principle might be useful but advised against incorporating such into IAC policy.

(b) Mr Smith noted that the WHO European Office precautionary statement was already like a fact sheet.

(b) Dr Repacholi emphasized that input from the IAC on the prudent avoidance issue was essential in guiding the EMF Project in that area. Nonetheless, prudent avoidance and recommendations regarding informing and engaging the public were already treated in fact sheets. In these regards, the Chairman drew attention to the fact that regulators pressure service providers to cover certain percentages and communications are hampered by the fact that the engineering community does not talk the same language.

7. Discussion of Key Issues (continued)
(a) Standards, (b) Precautionary Approaches, (c) Handling of Base Stations, (d) Other

(c) Dr Brenner suggested preparing a compilation of the licensing procedures used by various authorities around the world. The Chairman noted that the delegates from Korea had circulated a questionnaire asking for similar information. While this would undoubtedly be a monumental task and outside the resources of the IAC or the EMF Project he asked the other delegates to assist in any way they could either by filling the questionnaire or communicating with Dr Brenner. Then he and the Korean delegates could consolidate the information and provide it to the EMF Project to disseminate.

(a)(d) Dr Paulsson pointed out that the pressure groups recognize the same names appearing on the various national and international committees and see that as yet another reason to be sceptical of recommendations. The Swedish government has the same problem and has therefore asked the Swedish Radiation Protection Institute to assemble information on what has been the situation over the past 50 years or so. It has become apparent that adding one base station in a certain location would add some 1% to local levels while in another it might be as much as 14%. Comparisons need to be carried out in new ways.

(d) Dr Vecchia raised a comment prompted by the planned symposium on environmental effects of EMFs. He expressed concern about comparisons being made with "natural" levels as being very dangerous and bound to lead to increased problems in communicating with the public about risks. He suggested that care be taken to avoid such comparisons in the context of EMFs.

(d) Dr Portier suggested that attempts be made to evaluate what communities think is being installed - a water tower (relatively positive image) or a toxic waste dump (decidedly negative image). He also stated he considered it ill advised for WHO to suggest that providers try to condition communities in which facilities are to be installed.

(d) Dr Paulsson commented that fact sheets should be time limited.

(c) Dr Tynes stated that recommendations regarding power lines have largely been accepted. However, there are indications that even installers of mobile telephone base stations do not want to accept

such installations in their own communities. A similar assessment of risks needs to be made and similarly definitive recommendations made by the EMF Project.

(d) Dr Repacholi responded that efforts are continuing but remain difficult. Turning to the point raised about "conditioning" communities he noted that it was rather a matter of providing clear, transparent and credible information and that openness is the key.

(d) Dr Portier emphasized that such communication was very difficult to carry out effectively. In particular, in the context of the ELF EMF issue, a number of the risks identified can look very different and take on very different significance depending on how they are presented.

(c)(d) Dr McKinlay pointed out that it was quite incorrect to assume that WHO or the EMF Project actually provides information directly to the public. The primary focus must be to get the messages across to the media who then may transmit information to the public.

(a) Dr Bernhardt noted his agreement with Dr Repacholi in the matter of not defining acceptable risk. He suggested, rather, dealing with such matters through safety factors during the process of standards harmonization.

(d) Dr Vecchia recommended that the EMF Project avoid any communication on matters of acceptable risk but rather it should confine itself to more strictly scientific and technical issues. The fact a risk is identified in the first place is all that really matters to the public. Just as flying tends to be rejected (presumably irrationally) despite its being relatively safe on a per km basis, it must be accepted that EMF exposure will tend to be rejected. Such matters are complicated by confusing terminology in the IARC criteria which the EMF Project should undertake to explain and clarify.

(d) The Chairman noted that a Repacholi/Cardis paper had addressed those questions in some detail some time ago. He thanked the delegates for their spirited participation throughout the day, pointed out that the key issues discussion had ranged such that it had covered Agenda Item 8. "Discussion of national and international management of the EMF issue" and then invited Dr Repacholi to take the floor, deal with some administrative matters and close the session for the day.

Dr Repacholi added his thanks for a day of work well done and invited the delegates to a reception.

8. Discussion of National and International Management of the EMF Issue

(Covered in preceding discussion of key issues)

9. Discussion of Upcoming Meetings and Future Activities

The Chairman reconvened the meeting at 0900 and invited Dr Repacholi to summarize coming meetings scheduled within the WHO EMF Project.

A major meeting within the EMF Project is scheduled to be held in Maastricht next week. It will focus attention on intermediate frequencies - 300 Hz to 10 MHz. Later in the year a two-day scientific meeting (4-5 October) followed by a workshop (6 October) is scheduled to be held in Munich. Attention there will focus on the Environmental Aspects of EMF effects. Prior to that there will be a meeting (20-24 September) in Moscow - the Second International Conference on Problems of the Electromagnetic Safety of the Human (Dr Grigoriev gave a brief summary of the planned programme and invited as many delegates as possible to attend). There is a link to the web site for further information about the meeting available on the EMF Project's web site.

Later in the year (21-25 November) there is scheduled a scientific meeting in Erice to address health consequences and standards connected with pulsed exposures. This meeting will include one-day meetings of the Research Coordination Committee and the EMF Project Standards Harmonization group. At the standards harmonization meeting, attention will be focused on criteria for evaluation of the literature, models for transferring scientific information into standards, compliance issues, whether or not

to divide into regions, etc. It is anticipated that activity on the standards harmonization front will be stimulated by associating its working group meetings with annual more major scientific evaluation and review meetings.

Dr Matthes described the coming EMF workshop in Kyoto. Information about it was to be posted shortly on the ICNIRP web site.

Dr Repacholi noted that Armenia had expressed interest in organizing a meeting on EMFs in October 2000. Work on the risk communication issue is progressing and meetings are scheduled to develop a very user friendly risk communication handbook based on the proceedings of the Risk Perception and Communication meeting (Ottawa, September 1998). An advanced draft is expected by this year end. It will be preceded by a WHO EHC (Environmental Health Criteria) document which will have two sets of recommendations - one for guidelines and one for communications. The handbook will address the EMF issue while the EHC will be on risk perception and communication. It is anticipated that there will be broad interest and involvement within WHO in this work because of its general applicability in other areas of interest to WHO and because WHO is strongly encouraging cross-cluster activities.

An enquiry was made to Dr Bernhardt as to the expected fee for the Kyoto meeting. He stated it was too soon to tell with any precision but he expected it would not exceed US$ 500.

The Chairman asked the delegates if they had any information about other meetings that might be of interest.

Dr Portier noted that a meeting of the European Society for Risk Analysis was due to be held later this year. Information was available on their web site at: www.sraeurope.com. Dr Murphy noted there would be a meeting preceding the upcoming BEMS (Bioelectromagnetics Society) meeting in Long Beach where Dr Huang would be speaking on standards in China. There were also to be meetings of WTR, USAF and IEEE SC 34 held in conjunction with the BEMS meeting.

10. Time-Table of Activities

Dr Repacholi summarized the schedule of activities for health risk assessments, first by IARC regarding cancer risks of EMFs and then by WHO regarding non-cancer risks. The latter was scheduled to occur in two stages, first for ELF and then for RF. It is anticipated that by 2005 there will be a winding down of activity.

The Chairman enquired whether it was in the plans to produce an EHC on environmental effects to which Dr Repacholi responded in the negative. However, there would be a proceedings of the Munich meeting, a summary report for the peer-reviewed literature and a fact sheet which all should be completed by the end of 2000. It was noted from the floor that effects on farmers and agricultural production need to be addressed among the other environmental issues.

In the matter of the precautionary principle, the drafting group had undertaken to have a first draft by the end of August. That would permit review and comments to be incorporated by the end of 1999, internal review by WHO Information Services early in 2000 and publication shortly after that.

Dr Repacholi also stated that an initial draft on psycho-social issues had been prepared and asked for volunteers to review it. Barrett, Brenner, van Rongen, Miro, Bergqvist and Pekárek volunteered. The initial draft should be available for the working group's review in the near future. There is a need for information on surveys that may have been done so that some quantitative material can be included in the final fact sheets. A formal first draft should then be available for circulation and review by the end of 1999. Dr Murphy suggested Drs David, Portier, Greey, Wood, Asanova, Silny, Liskov and Marino be included among those to whom the final draft is circulated.

Dr Repacholi also reported that an advanced draft has been completed on radars. It has been circulated to a number of countries and authorities for final review and would be issued shortly after the present meeting.

A first draft document on medical assessment of overexposures is due from Dr Murphy in mid-August. It will identify procedures for medical approaches to be used in evaluating claims of people who have been "overexposed." Dr Repacholi envisaged there would be a report and then a fact sheet issued on the subject. (Miro, Barrett, Israel and Bernhardt)

Dr Repacholi noted that, although it might not be of direct applicability to the delegates areas of interest, a fact sheet on eclipses had been prepared in anticipation of the coming (11 August) total solar eclipse which would also be visible as a partial eclipse from temperate latitudes to the arctic through North Africa, Europe, the Middle East, West and Central Asia and India.

Noting that cellular telephone base stations remain a sore point, Dr Repacholi stated that the possibility of a revision or update would be addressed very seriously especially after the Erice meeting. To assist that activity he requested the delegates to provide input on the issues that should be incorporated in a revised fact sheet - for example, the newer systems that are being introduced and the peculiarities that might be associated with their base stations.

The Chairman noted that there was a CENELEC report which has a summary of the characteristics of the various existing and proposed mobile telephone systems. It had appeared as an early draft two years ago but there had also been other publications by J Wiart in France, others in Sweden and from CENELEC. Dr McKinlay noted that care needs to be taken to include the newest satellite-based systems as well as the currently more common terrestrial-based systems.

An enquiry was made with regard to the status of training packages. Dr Repacholi stated that attention was to be given first to FAQ’s and specific attention to training materials would follow. In response to his question about how much interest there might be in such training materials Dr Miro affirmed that there was, indeed, a great deal of interest.

The Chairman enquired about publicity for the EMF Project, pointed out a lack of it and suggested a "What's New" block at the Web site accompanied with more careful updates would be desirable. From his experience the service from IT groups within organizations is less than adequate to the needs of the projects they nominally serve. An email dissemination of current events was suggested and widely agreed by the delegates as being useful.

Dr Vecchia pointed out that there was an EC document (DG 24 of the EC, Evaluation of Health Risks, 17 October, 1998) on the precautionary principle, among other things, that has been circulated and might be of some assistance to the group considering the matter for the IAC.

11. Progress on Funding

Dr Repacholi summarized the financial status of the EMF Project updated to the end of May. In order to allow for adding a staff position there would need to be some additional funding over the near term. In addition, publications activities have accelerated and so have associated costs. The Project's statement of income and expenditures appears in the Project's progress report issued separately.

In response to a question as to whether funding was secure through to 2005 Dr Repacholi responded that sufficient commitments were in place to carry the project through. Though the coming scheduled meetings have costs associated with them, such costs are often borne by the various national governments where the meetings are held. The budget as presented represents administrative and publications costs.

12. Other Business

Dr Thansandote enquired whether there was a policy in place to permit IAC members to have an opportunity to review and comment on the content of fact sheets. Dr Repacholi stated they have been prepared at various collaborating centres but that in the future he anticipates that they will be circulated to IAC members. As that begins to happen he requested that the members treat them as confidential until finalized and not circulate drafts prematurely.

13. Date of Next Meeting

The date of the next meeting was tentatively set for 7-8 June, 2000, in Geneva.

14. Close of Meeting

The Chairman invited Dr Repacholi to present a few closing remarks with the conclusion of which the meeting would be considered adjourned.

Dr Repacholi expressed his thanks to the delegates for their attendance and lively contributions to the discussions of the key issues facing the Project in the coming year. He invited each delegate to provide a brief summary of their activities (see Appendix B). He expressed his thanks to Mr Barrett for ably chairing the meeting and to Dr Muc for his work as Rapporteur. He expressed his personal gratitude and that of the assembled delegates to Mrs Peter for her consistent, thorough and able administrative support.

APPENDIX A

Welcoming Remarks of Mrs P Singh EXD/SDE

International Advisory Committee Meeting: International EMF Project

I am pleased to welcome all participants to the fourth International Advisory Committee of WHO's International EMF Project and to thank you for kindly accepting our invitation to participate. Over the next 2 days, you will have the opportunity to discuss concerns about electromagnetic fields.

As you know WHO has been reorganized and the new structure is shown in this slide. The location of the International EMF Project is shown in the diagram.

It is evident that in many countries EMF continues to be a source of concern, particularly about low-frequency fields associated with electric power generation, distribution and use, and radiofrequency fields associated with mobile telephones and their base stations. The increasing number of nations attending this International Advisory Committee is an indicator of this world-wide interest.

I am most pleased to welcome for the first time Dr He, representing the Ministry of Health of the People's Republic of China, and Dr Brenner representing the Ministry of the Environment of the State of Israel. I would like to point out that the Ministry of the Environment of Israel has just sent a translation of our EMF fact sheets in Hebrew and these have been placed on the Project home page. Dr Repacholi has already had discussions with the Chinese Ministry of Health about having translations of these fact sheets in Chinese and WHO hopes to receive these shortly.

This is also the first meeting for Mr Petersen, the Secretary of the IEEE C95 standards committee in the USA. It is important that there is good representation from EMF standards setting organizations to contribute to our harmonization of EMF standards activity. The contributions of all new members to this committee, as well as those of our longer term members, will be gratefully received.

Concerns about the effects of EMF exposure, particularly from long-term exposure to fields too weak to produce acute health effects, continue to grow with the increasing use of RF-based technology and electricity. Mobile telecommunications is a very rapidly-growing industry, affecting large sectors of our societies. It is estimated that by 2002 there will be 700 million mobile telephone users worldwide. RF field intensities received by users of these telephones are below current international guidelines, but the research on effects of long-term exposure is sparse.

At lower frequencies controversies over possible health effects of magnetic fields from electric power transmission lines continue to erupt around the globe. Epidemiological studies of childhood cancer suggest a weak association with exposure to low frequency magnetic fields, even though a great many of the studies themselves are not statistically significant. One of WHO's Collaborating Centres, the National Institute of Environmental Health Sciences (NIEHS), has completed its work to determine if low frequency fields pose a risk to health. An international working group convened by NIEHS, using IARC criteria for categorizing potential cancer risk from exposure to low frequency fields concluded that they were a "possible human carcinogen". Obviously this is an important result that needs further investigation. Given the very large numbers of people exposed to EMF in their daily living, confirmation of even a weak adverse health effect could have significant public health impact. It is important that this EMF issue be resolved as soon as possible so mitigation measures are instituted, or if there are no adverse effects from low-level EMF exposure, the resources and worries now devoted to this concern can be redirected to more pressing issues.

The EMF Project has made considerable progress since it was established in 1996. It has completed the first round of scientific reviews for both static and low frequency fields and for radiofrequency fields. The final review of biological and health effects from exposure to EMF in the intermediate frequency range (300 Hz to 10 MHz) will be completed in Maastricht immediately after this meeting. These reviews identify specific programmes of research to be completed before there is sufficient scientific knowledge for a more definitive assessment of whether exposure to low-level EMF has any adverse health.

The Project has also devoted considerable effort to understanding the public's perception of risks from EMF exposure. Mention of possible health effects from exposure to EMF raises strong opinions among both experts and the general public. Public fears are not always consistent with the findings of scientific research. This year the Project held a meeting to consider what information is available on factors that contribute to risk perception and the ways risk communication programmes can affect this perception. Follow-up working group meetings are scheduled to produce monographs that should assist governments, scientists, the concerned public and industry to establish an effective dialogue about EMF.

The ultimate goal of the International EMF Project is to foster the development and adoption of universally-accepted, scientifically-based health standards limiting exposure to EMF. Before this goal can be achieved, many intermediate steps must be taken, and these are part of the plan of activities of the EMF Project. The success to date would not be possible without the active participation of our partner institutions from national and international bodies, ICNIRP and specialized institutions that collaborate with the EMF Project. The EMF Project offers a clear example of WHO's responsibility to provide internationally unbiased reference and guidance on public health issues which have global implications. This guidance would have a significantly higher authority than a statement from an individual country, particularly in a situation where the implications of any findings would have wide ranging global significance.

So, I welcome and thank you for your partnership and collaboration in the International EMF Project. I hope that in the next two days, and over the remainder of the term of the EMF Project, we will work fruitfully together. I also hope that by the end of the Project we will have jointly reached conclusions that address the concerns about EMF raised by the national authorities, general public and workers. Finally, I hope that you enjoy your visit to Geneva and thank you once again for making the effort to travel to WHO for this meeting.

Mrs Poonam Khetrapal. Singh
Executive Director, Sustainable Development and Healthy Environments
World Health Organization
3 June 1999

APPENDIX B

Activity Statements from Countries, Collaborating and other Organizations.

BULGARIA

Ass.Prof.M. Israel - Member of the International Advisory Committee,
NCHMEN, Ministry of Health, Sofia, Bulgaria

I. MEASUREMENT AND EXPOSURE ASSESSMENT OF EMF:

AROUND "NON-SPECIFIC"* SOURCES OF RADIATION

1. Dopler-sonograph ultrasound equipment used for diagnosis of both central nervous and cardiovascular systems.
2. Ultrasound equipment for diagnosis of gyneacological and genito-urinary diseases.
3. Cavitators for ultrasound surgery.
4. Equipment for fluorescent lighting in hospitals.

*Here, "non-specific" sources are equipment normally not studied for any EMF irradiation.

IN THE VICINITY OF EQUIPMENT FOR DIGITAL NUCLEAR MAGNETIC RESONANCE (NMR) IMAGING

1. NMR imaging tomographs
2. NMR spectrographs

All measurements have been made in wide frequency ranges without any frequency analysis.

EMF measured was above the reference levels (compared with the ENV 50166) in few work places where "hot spots" occurred when EMF from different frequency ranges are added.

IN HYDRO-ELECTRIC POWER STATIONS

Measurements were made in 10 power stations at the work places in command halls, machines', generators', and turbines' premises, in open and closed distribution stations, etc. All measurements were made using the HI 3604 low frequency device, and Gaussmeter (Narda Microwave Corp.).

The results show that the electric and magnetic field strengths are much below the standards, including for people with pacemakers. Only in several cases (near turbines) were there magnetic field values exceeding those for people with pacemakers.

PHYSIOTHERAPY

D'Arsonval devices, magnets for pulse therapy, equipment for UHF and VHF diathermy have been studied for possible EMF exposure to medical personnel. The efficiency of EMF shielding of the Faraday chambers were also evaluated.

High levels of exposure were detected close to the emitters. Most sources were situated in Faraday chambers. Despite that, medical personnel sometimes are exposed to electromagnetic energy above the standards. A special protective programme is prepared for the physiotherapy.

MOBILE PHONE BASE STATIONS

More than 20 base stations were studied for population exposure. The results show that EMF from base stations are much below the standard levels. Only few base stations are mounted in places where they, in combination with other EMF sources, can expose people with higher levels of EMF.

EPIDEMIOLOGICAL STUDIES:

RISK ASSESSMENT OF THE EMF EXPOSURE TO WORKERS AND POPULATION FROM RADIO AND TV BROADCASTING SYSTEMS IN BULGARIA

More than 1200 broadcasting systems were studied for determination of the hygienic zones around the sources of radiation using numerical and metric methods. 28 AM radio broadcasting and 18 TV stations were investigated for exposure levels. More than 300 workers in 16 stations were also studied to explain the high level of complaints among them. The results show an increase in disorders of the neurovegetative, germinative, cardiovascular systems, in biochemistry, pscyhosomatic changes in workers engaged for more than 12 hours in such workplaces.

RISK ASSESSMENT OF EMF EXPOSURE TO OPERATORS IN ELECTRICAL POWER STATIONS 110 kV

Measurements, exposure and risk assessment have been made in power stations 110 kV - 13 open and 28 closed distribution systems. The risk assessment showed the need for periodical (6 monthly) monitoring of the exposure levels, and of the health status of the operators. A special programme for health promotion was prepared.

Each study concluded with a special programme for avoiding the EMF exposures or with safety measures for the workers. Reports for every study will be available in future, as a part of the International EMF Project.

FRANCE

E.M.F. ACTIVITIES IN FRANCE

1- Assessment of EMF risk perception in France

Compared to others European countries, French people are little concerned about biological risk due to EMF exposure. However, media reports about concerns developed in other countries and results of research have lead to an increase in public fears.

The French Ministry of Health considers that the situation is good. He notes that the concerns about Power lines' bioeffects are decreasing and those about base stations for cellular phones are increasing but not excessively. Consequently, with the ministry in charge of housing, they are producing regulations limiting antennas on balconies.

Representatives of EDF (French Electricity Company) note a stabilization of complaints and lawsuits about the human risk in relation with power lines.

Representatives of INRS (French National Research and Safety Institute) note a progressive increase in workers' fears concerning effects of EMF on health and consequently require more information about this risk and protective measures. The federation of employers of electrical and electronical industry have the same assessment of the situation.

A commission of the consumers' Ministry is writing a report about the possible bioeffects linked to the development of base stations. A working group created by the French Academy of Sciences is assessing the real risks of EMF exposure.

2- French activities in EMF risk assessment

In relation with the possible health risk linked to telecommunications, the Ministry of Research with the Ministry of Industry have initiated an important research programme within the framework of "National Network of Radio-Telecommunications" (RNRT). It is a comprehensive programme

addressing non-cancer issues, incorporating eight projects being carried out by both academic and industrial groups. It is planed for 2 years and should allow French research teams to provide high quality research proposals to the EC 5th framework programme.

It is funded at the level of two Mega Euros, 50% of the funds being provided by industry (manufacturers and carriers) and 50% by the Ministries.

It consist of 3 main topics:

Dosimetric studies

- Checking procedures for mobile phones
- Dosimetric study of cell and animal exposure systems.

Human study

- Effects of mobile phone emissions on EEG and hearing evoked potentials

Animal studies

- Effects of microwave GSM on the rat memory and learning,
- Effects of cellular phones on the brain activity in rats including their behaviour.
- Effects of cellular phones on brain neurotransmitters in rats,
- Effects of microwave GSM on the permeability of the BBB and headache provocation in rats,
- Effects of microwave GSM on the inner ear in guinea pig

In relation with the possible health risk linked to power lines,

Electricité de France (EDF) carried out various research programmes:

Epidemiological studies concerning:

- The re-analysis of 3 occupational studies
- The evaluation of hydroxymé1atonin urinary excretion in a population living near 735 kV line. Joint Hydro-Quebec/EDF study
- Leukaemia childhood survival according to magnetic field exposure (5 years following). Joint EPRI/EDF study.

Dosimetry studies:

- Evaluation of residential exposure in Bourgogne. Joint EDF/Bourgogne University

In vitro studies:

- Effects of 50 Hz magnetic fields on spatial configuration of serotonin lymphocyte receptors. Joint EDF/Institut Pasteur of Paris.
- Effects of 50 Hz magnetic fields long-term exposure on C-Myc oncogen expression in the P388D1 cells (Iymphoid tumour). Joint EDF/CHU Cochin

In vivo-studies:

- Effects of 50 Hz magnetic fields on transplanted leukaemia development in rats. Joint EDF/Pharmacology Faculty
- Effects of intense magnetic fields on free radical cells. EDF/National Veterinary School of Maisons Alfort.
- Effects of magnetic fields exposure on iron cinetic in rats. EDF/National Veterinary School of Maisons Alfort

Human studies:

- Variations of melatonin, anti-pituitary and peripheral hormones in workers exposed to electromagnetic fields. EDF/CHU Pitié Salpétrière.
- Effect of 50 Hz, 60 Hz and 20 to 50 kHz magnetic fields on implanted pacemaker. EDF/J. Rostand Hospital Cardiology Department/EPRI.

Pr. Luis MIRO

INTERNATIONAL ELECTROTECHNICAL COMMISSION - IEC

ACEC Task Force on Human exposure to EM Fields

Programme of work on Human Exposure
as proposed by the ACEC TF EMF - April 1999

In the context of human exposure to EMF, it is usual, according to the biological effects, to consider two frequency ranges (different from the two ranges in the field of EMC).
- low frequency range 0 to 100 kHz (max. up to 10 MHz)
- high frequency range 10 MHz to 300-400 GHz

The ACEC TF has identified the following tasks.

A. Horizontal standards (General standards)

1. Measurement of low-frequency magnetic and electric fields with regard to human exposure of human beings - Special requirements for instruments and guidance for measurements (Existing IEC 61786)
2. Measurement and evaluation of high-frequency (9 kHz to 300 GHz) electromagnetic fields with regard to human exposure. (in progress - future IEC 61983)
3. Measurement methods and instrumentation for induced low-frequency currents (Priority 2..3)
4. Calculation methods for low-frequency induced currents (Priority 1)
5. Calculation methods for high-frequency EM fields (Priority 1)

B. Vertical standards or Technical Specifications (Application standards)

B.1 Low frequency range

1. Domestic equipment (Priority 1)
2. Power lines
   - Public exposure (possibly IEC 61000-2-7 for magnetic fields)
   - Line workers (Priority 1)
3. Industrial power equipment (heating) (Priority 1..2)
4. Small and medium-sized industrial equipment (e.g. electric welding) (Priority 1..2)
5. Railways (Priority 2)

B.2 High frequency range

6. Handheld and body mounted wireless communication devices (Priority 1)
7. Base stations for cellular phones (Priority 1)
8. Antitheft devices (Priority 1)
9. Smart card readers (Priority 1)
10. Broadcast emitters (Priority 2..3)
11. Radars (Priority 2..3)

B.3 Low and high frequency range

12. Active medical implants

Note: This proposal for a programme of work is coordinated with ICNIRP, ITU, CENELEC TC 211

INTERNATIONAL TELECOMMUNICATIONS UNION - ITU

ITU study group 5 is currently preparing a recommendation related to the safety of telecommunications systems which intentionally transmit rf radiation. The document will sub divide telecommunications systems into 3 groups, the first group of equipment is those items which emit radiation at very low levels which are deemed to be so far within the ICNIRP guidelines that they are inherently safe. The second group is equipment which emits at a relatively low level but where assessments have to be made to ensure that the telecomms worker and the general public cannot come into contact with radiation at a level approaching the ICNIRP limit (Base stations and the like). The 3rd section is equipment which emits at a sufficiently high level that the use of specific working practices is the best option for ensuring safety (an example would be sites which are shared with broadcast transmitters.

The three groups will be subdivided mainly on the basis of ERP (effective radiated power) and the document will also provide guidance on safe working practice. (The document is called Kemf and can be circulated to the WHO if they would like to see it)

There is currently no work going on in the ITU on mobile handsets.

While on this subject it is worth reporting that the European Telecommunications Standardisation Institute (ETSI) has just set up a new technical committee to deal with rf related safety. (TC Safety). The remit for this group is mainly for safe working practices on shared sites but it will also provide an input to ETSI on progress in the area of rf biomedical issues in general.

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ISRAEL

ISRAEL - Update Statement on NIR Activities

There is a growing concern among the Israeli population regarding potential adverse health effects from exposure to Non-Ionizing Radiation (NIR). The main objection of the public is to be exposed today to radiation levels which might in the future be determined to be harmful. The supervising body responsible for setting standards, granting permits and enforcement concerning EMF applications in the civilian sector is the Ministry of the Environment.

The existing policy is based on ICNIRP guidelines taking into consideration the prudent avoidance principle. Currently the main activities relate to base stations and cellular telephones though there is considerable interest in power lines, radar installations and lasers.

There are now about 7,000 base stations in the country for which the licensing procedure involves two stages. At the first stage a permit for construction is granted for each base station following a theoretical risk assessment carried out by a certified agency. In the second stage the operating license is issued after the completion of an actual set of measurements of the field strength surrounding the facility. Efforts are underway to coordinate with the local authorities the mechanism for approval or rejection of applications to construct base stations in sensitive areas.

Mobile telephones are now being used by about 30% of the population. Some people are concerned about the long term non thermal effects of exposure and consider the use of "hands free" devices in order to reduce exposures. The ministry is confronted with many questions concerning this subject.

Recently, following, the initiative by the Ministry of Science a steering Interministerial and Academy committee for NIR was established in order to serve as a focal point for information collection and dissemination as well as coordination of the local research studies and surveys.

The committee already decided to conduct its activities via a National Scientific Center at the Medical School of the Tel-Aviv University with the collaboration of the Ministry of the Environment. Prof. Rafi Korenstein from Tel-Aviv University was elected to serve as the director of the center (e-mail: Korens@post.tau.ac.il).

Within the framework of research, initiated by the center, a study was started to examine the genomic instability in human peripheral blood lymphocytes following in-vitro exposure to 900 MHz.

MINISTRY OF THE ENVIRONMENT
E-mail: Samuel@environment.gov.il

ITALY

Italian Standards on Protection against Electromagnetic Fields

Paolo Vecchia

At present, a limited number of regulations exist in Italy, part at national and part at regional level. The development of standards has been heavily influenced by controversies and pressure exerted by the public opinion and the media. That is made evident by the much lower attention to the protection of workers, for whom no standard at all exists. The only reference in this area is the European Pre-norm ENV 50166 issued by CENELEC in 1995 and adopted by the Italian Electrotechnical Committee (CEI) in the same year. It has however the value of a voluntary standard, with no force of law.

National standards

Based on a general assignment of responsibilities, establishing exposure limits (to any physical, chemical, or biological agent) for the general public is the responsibility of the Ministry of the Environment, which is assisted by the Ministry of Health. Limits for the exposure of workers, on the contrary, are established by the Ministry of Health with the assistance of the Ministry of the Environment and the Ministry of Labour.

Up to now, only limits for the exposure of the population and for selected sources have been enforced. A decree issues in 1992 sets exposure limits for power frequency (50 Hz) electric and magnetic fields. The limits are identical to those recommended by IRPA/INIRC in 1998, both for the electric and the magnetic fields. The norm has however been criticized for internal inconsistencies. Though it applies to any 50-Hz source, an article specially devoted to power lines requires, in addition to compliance with the limits, also minimum distances from the conductors. These equal 28, 18, and 15 m for 380, 220, and 150 kV lines respectively. It is easy to check that the actual values of the fields at such distances are well below limits, which are set in a different article of the same decree.

Regional standards

For power frequency fields, the Region Veneto issued a Regional law in 1993. It sets much more restrictive limits than the National decree, namely 0.5 kV/m for the electric field and 0.2 mT for the magnetic flux density; in addition, a minimum distance of 150 m from the lines is required for buildings and residential areas. Due to controversies and problems of practical implementation, the enforcement has however been postponed to the year 2000. Similar laws have later been approved by other regions (e.g. Latium and Puglia) but have been suspended due to the opposition of the national government.

A number of regional laws exist regarding exposure to radiofrequency and microwaves. They show relevant differences, which create confusion and mistrust within the public. Limits adopted by the Region Pedmont correspond to an old hypothesis (later abandoned) of IRPA/INIRC, and are characterized by step-function dependencies on frequency. In Abruzzo, a law similar to Pedmont was modified in 1997 to take into account hypothetical long-term effect. In

particular, minimum distances from residential buildings are required for any antenna, irrespective of its directivity (i.e. of ERP). This distance is 50 m for power delivered to the antenna between 5 and 350 W, and 1,000 m for power above 350 W. The law applies to any kind of antennas, including base stations for mobile telephony.

Future standards

The Italian Parliament is presently discussing a draft of "framework law" stating basic principles, responsibilities (national vs. regional or local), penalties, control procedures, etc. In the basic principles, a new concept is introduced besides the established scheme of basic limits and reference levels. So-called "quality goals" are in fact defined as additional values which are well below reference levels. They are to be complied with in the case of new installations, and are to be reached within a certain time for existing ones. In theory, quality goals should be different for different technologies, sources, environments, etc. However, even before they are formally introduced with the enforcement of the framework law, their actual implementation seems completely different.

The development of regulations for specific frequency ranges or sources should be deferred until the framework law is issues. However, due to a complicate superposition of norms which make reference to one another, a decree concerning fixed plants radiating electromagnetic fields between 100 kHz and 300 was passed in September 1998 and enforced in January 1999. The main characteristics of the standard are the following:

- no basic limits
- exposure limits given by step-functions, namely:
- 60 V/m and 0.2 A/m in the frequency range 100 kHz - 3 MHz
- 20 V/m and 0.05 A/m in the frequency range 3 MHz - 3 GHz
- 40 V/m and 0.1 A/m in the frequency range 3 - 300 GHz
- "quality goals": 6 V/m and 0.016 A/m for any frequency
- all limits and quality goals averaged over 6 min.

In summary, the present activity of development of standards seems to take into account the urgent need for harmonization within the Country (i.e. different regional regulations), but seems to be very far from any effort for an international harmonization, and insensitive to it.

JAPAN

Ministry of Posts and Telecommunications (MPT), Japan

The Telecommunication Technology Council (TTC) which belongs to Ministry of Posts and Telecommunications (MPT) published a report entitled "Radio-Radiation Protection Guidelines for Human Exposure to Electromagnetic Fields" in June 1990. This report indicated measures that should be taken to protect the public. The guidelines set out safety factors that were considered to adequate.

Based on the report, the Association of Radio Industries and Businesses (ARIB) set up private guidelines, "Radiofrequency-Exposure Protection ARIB
Standard" (ARIB STD-38) in September 1993. This standard has been used a guideline by the radio operators and manufacturers.

The recent rapid growth of mobile telecommunications is due mainly to the development of small handy sized radio equipment such as cellular phone terminals. (At the end of September 1998, the number of cellular service subscribers was 42,807,000 in Japan.). Up until

recently mobile telecommunication terminals were used with their antennas of radiation sources not in close proximity to the human body, however, now this is not the case. Therefore, the study group of MPT recommended to protect human body from radio-radiation. The report made a comparison study between Japanese guidelines and various foreign ones, and made the following recommendations. A. It is not necessary to revise the basic part of the current TTC guidelines of 1990. B. It is necessary to establish additional radio-radiation protection guidelines for the radio equipment whose radiation sources are in close proximity to the body.

In April 1997, the TTC published a report titled "Radio-Radiation Protection Guidelines for Human Exposure to Electromagnetic Fields". In this report, A. Additional guidelines on local absorption are considered concerning the radio equipment which is used in close proximity to the human body, such as cellular phone terminals. B. The introduction of the radio-radiation protection regulations are considered.

In March 1998, the MPT's Panel that Studies on Desirable Application of Radio-Radiation Protection Guidelines for Human Exposure to Electromagnetic Fields made a report favoring a shift toward compulsory standards from private guidelines.

In September 1998, the Radio Regulatory Council submitted a report to MPT stating that an amendment the "Rules for Enforcement of the Radio Law" to establish "Radio-Radiation Protection Regulations for Human Exposure to Electromagnetic Fields" was appropriate. MPT promulgated the revised rules on October 1, 1998. The rules will come into effect on October 1, 1999.

NATO

NATO LIAISON REPORTS ON RADIO FREQUENCY RADIATION WORKING GROUPS TO WORLD HEALTH ORGANIZATION EMF PROJECT

1. Liaison Report from the NATO General Medical Working Group

Ad Hoc Team Meeting 16-17 September 1999, Brooks AFB, Texas USA: Revision of Standardization Agreement (STANAG) 2345, (EDITION 2) Evaluation and Control of Personnel Exposure to Radio Frequency Fields - 3 kHz to 300 GHz.

The United States Custodian of STANAG 2345 was directed by the 47th meeting of the General Medical Working Group (16 June 1998), to convene a custodial meeting with interested nations in August/September 1998 to review the need to amend STANAG 2345. Norway and the United Kingdom sent representatives and The Netherlands responded by email with comments. Latvia, a Partner for Peace (PfP) Nation sent a representative. The newly updated major international standards were reviewed and compared to STANAG 2345 (EDITION 2). The STANAG was reviewed in depth and numerous editorial and technical changes were recommended. The group agreed to adopt the IEEE induced and contact current limits (controlled environment) for inclusion in the STANAG. The change proposal/study draft was circulated to the NATO nation members of the General Medical Working Group for comment. Minor comments were received from the International Military Stag (IMS) Medical Staff officer at the 48th meeting of the General Medical Working Group on 20 Apr 99. Technical comments from the nations were due by the 1 June 99. Comments on format, language, and minor technical language will require an additional Ad Hoc meeting to be held in August.

2. Liaison Report on 21st Radio and Radar Radiation Hazards (RADHAZ) Working Group took place 1 to 3 September 1998 at NATO HQ, Brussels, BE

Partner for Peace (PfP) nations Poland, Austria, Bulgaria, and Romania attended.
Three presentations on the operational effects of STANAG 2345 (MED) were made. UK noted that introduction of new National and NATO (STANAG 2345) safety standards and measuring techniques

has highlighted an increase in the areas and structures that may be deemed hazardous. UK reviewed degree of degradation of operational effectiveness due to new standards and options available for reducing impact. DA reported on a Tri-service meeting that recommended DA ratify STANAG 2345, but not to implement until 2002, due to extensive calculations and costly measurements that would be necessary. NL described incorporation of STANAG 2345 in RADHAZ considerations for shipboard design. NL noted with concern the low peak-values of the recently published ICNIRP standard and indicated possible impact on radar systems operations.

Previously Reported at Research Coordination Committee meeting Dec 98.

3. Report on NATO Advanced Research Workshop: Radio Frequency Radiation Dosimetry, Measurements: The Relationship Between SAR, Power Density And The Biological Effects Of The Electromagnetic Fields. 12-16 Oct 98 Gozd Martuljek, SLOVENIA.

The NATO Scientific Affairs Division High Technology Priority Area and the United States Air Force were the principal funding sources. The NATO RTA provided funds for one speaker from each of the six PfP countries.

This five day workshop was the largest ever held on Radio Frequency Dosimetry and Bioeffects. It brought together over 80 world-class scientists from nine NATO countries (Belgium, France, Germany, Greece, Italy, The Netherlands, Norway, United Kingdom, United States), six NATO Partner for Peace (PfP) countries (Bulgaria, Czech Republic, Hungary, Poland, Russia, and Slovenia), and Croatia and Finland to review the state-of-science dealing with Radio Frequency Radiation dosimetry, measurements and the relationship between SAR, power density and the biological effects of the electromagnetic fields. The NATO Scientific Affairs Division High Technology Priority Area and the United States Air Force were the principal funding sources.

Presentations were made by 54 invited speakers on topics as follows: basics of electromagnetics, dielectric properties, measurement techniques, theoretical and experimental dosimetry, thermal responses of man and animals, thermal distribution modelling and applications of dosimetry in biology and medicine. Papers are in final editorial review and will be published by Kluwer publishers. The proceedings will be the most comprehensive review on the topic.

Working groups were formed to evaluate the material presented in the sessions and reach a consensus about what material should be included in the revision of the Radiofrequency Radiation Dosimetry Handbook. The new Handbook will be the second R&D product of the ARW. Previous Handbooks, produced by the USAF have become classic references.

Liaison Report of the NATO Research and Technology Organization Human Factors and Medicine Panel Task Group 002 "*Health Effects of Non-Ionizing Radiation in theMilitary Setting.*" meeting, 15-16 Apr 99. TNO/FEL, Scheveningen, The Netherlands and Royal Netherlands Navy, Naval Electronics and Optics Establishment Consultancy (MEOB) Oegstgeest, The Netherlands.

The meeting was the second biannual meeting. Topics of discussion included reports of research from NL on High Power Microwave technologies, from NO on an epidemiological evaluation of offspring of personnel from a missile torpedo boat, from US on primate ocular studies showing no effect of RF, and a report on the effort to consolidate NATO electromagnetic groups under one umbrella unified group called UE3. A long discussion on the probable impact of the ICNIRP guideline for human exposure to Radio Frequency Radiation on NATO member military radar systems was held. The health and safety guidance issued by the International Commission for Non-lonizing Radiation Protection (ICNIRP) is being assessed. Preliminary evaluations indicate significant restrictions would be required that would have negative impact on pulsed radars.

NEW ZEALAND

Fourth International EMF Project Advisory Committee Meeting
3-4 June 1999

1. Towards National Guidelines for Managing the Effects of Radiofrequency Transmitters

In March 1998 the Government directed the Ministry for the Environment in partnership with the Ministry of Health, and following consultation with interested groups, to draft national guidelines on managing the health effects of radiofrequency transmission facilities. The content of a discussion document has been finalised and Government permission for consultation is currently being sought. It is expected that the discussion document will be distributed before the end of June 1999.

The Ministries for Environment and Health consider that the value in providing national guidance on managing the health effects of radiofrequency fields is to:

- increase public understanding of how radiofrequency transmission facilities operate and how international exposure standards are developed;
- provide the Ministry of Health's advice on health effects;
- encourage a consistent approach by territorial authorities in managing the effects of radiofrequency transmission facilities;
- encourage industry to reduce community concern through non-regulatory approaches; and
- ensure people are aware of the implications of the Environment Court decision.

In the discussion document, the Ministry of Health recommends strict application of the exposure guidelines published in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and adopted in the NZ Standard. The Ministry of Health considers there are no established adverse effects from exposures to radiofrequency fields which comply with the ICNIRP guidelines and the New Zealand Standard.

Even if future research does eventually show that health effects exist, the risk from exposures to radiofrequency fields is likely to be very small or negligible. In view of the residual scientific uncertainty and the impossibility of proving any agent completely safe, where possible, low-or no-cost interventions should be applied in order to avoid or reduce exposures. However, this should not be done by arbitrarily imposing exposure limits lower than those recommended by the voluntary NZ Standard.

If there are different options available when designing or siting a radio transmitter, then those resulting in the lowest incidental exposures around the site should be chosen, all other things being equal. These measures could include minimising transmitter power to that required to achieve coverage objectives, choosing or designing antennas which minimise emissions in directions not required for coverage, and (if alternative sites are available or if there are different options for mounting antennas on a single site), selecting the option that results in the lowest exposures.

The discussion document recommends that non-regulatory methods be used to encourage the telecommunications industry to voluntarily minimise exposures to the public and suggests actions industry could take to reduce community concern about siting.

- Recognise that there is value in communicating with concerned residents
- Recognise that particular skills are necessary for communicating with concerned people effectively
- Address community concerns where this involves no- or low-cost action.

While the Ministry for the Environment and the Ministry of Health agree that it is essential to ensure the credibility of the ICNIRP guidelines and assure people that there will be no health effects if they are complied with, they see no reason why industry could not provide people with additional assurances by publicising any commitment to best engineering practice. In this way, industry can demonstrate to people that it is actually in industry's own business interests to minimise exposures.

The discussion document also outlines how the Ministry for the Environment and the Ministry of Health intend to address the lack of information for the public on radiofrequency issues. The two Ministries:

- will provide technical and scientific information in these guidelines;
- support the telecommunications industry/community group suggestion that a nation-wide monitoring programme of randomly selected sites be initiated to provide the public with more assurance that these facilities operate within international standards; and
- propose to establish an interagency committee, reporting to the Director-General of Health, to report on future research.

2. Media Interest in Radiofrequency Radiation

The New Zealand news media have demonstrated interest in radiofrequency fields on an issues basis. Individual cellsite and radio/television transmitter consent applications have stimulated generally short-lived media interest on those issues. Particular focus has been paid to cellsites near schools with some high profile protests and threats of civil disobedience linked with proposals to construct cellsites near schools. Most recently there has been media interest in reports of scientific studies showing an increased risk of brain tumours associated with cellular phones.

3. New Standard for exposures to electric and magnetic fields and RF radiation in the frequency range 3 kHz - 300 GHz

In 1990, New Zealand adopted the existing Australian radiofrequency exposure Standard (published in 1985) as NZS 6609:1990 Part I *Radiofrequency Radiation - Maximum exposure levels 100 kHz - 300 GHz.* This Standard had interim status, pending further review.

In 1991 the New Zealand and Australian radiofrequency committees combined, and in March 1998 the joint committee released a revised Standard (AS/NZS 2772.l(Int): 1998) which also had interim status, and was valid for one year. This was based largely on the 1988 International Radiation Protection Association (IRPA) recommendations. The reason for publishing an interim Standard was to allow further time for committee consideration and public input.

The 1998 Interim Standard was reviewed by an enlarged committee, made up of representatives of sectors of interest nominated by government bodies, industry associations, community-based and consumer organisations, trade unions and professional, technical or trade associations. While committee participation is sought through nominating organisations, Standards New Zealand and Standards Australia may also co-opt individuals who have expertise in a particular area.

The draft produced by this enlarged committee was released for public comment in December 1998. Exposure limits were taken from the 1998 ICNIRP guidelines, and further sections added to aid implementation and verification of compliance. There was also a clause requiring operators to minimise exposures to the public.

Although it was understood that there was fairly widespread acceptance of the revised draft, the final committee ballot did not receive the required 80 percent votes in favour for adoption as a joint Standard. (Representatives of Standards NZ and Standards Australia do not vote.). Considering votes from each country separately, there were still insufficient votes in favour from either Australia or New Zealand.

Therefore efforts were made to resolve differences. The New Zealand representatives managed to make amendments to the Standard which, when put to a further ballot of the New Zealand representatives, received sufficient votes to be adopted. This final version included the ICNIRP limits, and clarified sections referring to implementation, verification of compliance, and minimisation of public exposures.

No resolution was reached in Australia, and the most likely outcome is that the Australian Communications Authority will draw up regulations based on the draft.

4. Environment Court hearing on RF exposures from cellsite

Very few cellsite cases have actually proceeded to the New Zealand Environment Court. There are likely to be even fewer in the future, given the firmness of the Environment Court's latest decision in *Shirley Primary School v Telecom Mobile Communications Limited* [1999] NZRMA66.

The Environment Court has ruled that there are no established adverse health effects arising from the emission of radio waves from cellular facilities.

The Court found that there are potential adverse health effects of low probability, but only *in a very weak sense* (and this was not a reason for declining resource consent).

This latest case involved an application for a resource consent to establish, operate and maintain a cellular base station on land at Shirley Road, Christchurch, adjacent to the Shirley Primary School.

The Council granted consent subject to conditions. The school appealed the decision, alleging four main adverse effects:

- the risk of adverse health effects from the radiofrequency radiation emitted from the cellsite
- the school's perception of the risks and related psychological adverse effects on pupils and teachers
- adverse visual effects
- reduced financial viability of the school if pupils were withdrawn.

This case emphasises a *risk assessment* approach. The Court started by the premise that no one can guarantee that there is no risk from cell sites - a no risk approach is logically impossible. Everybody lives with some risk every day of their lives. However, the risk may be so very small that it is acceptable, compared with other risks that parents expose their children to daily.

In addition, the Court emphasised that radiofrequency radiation is just one form of radiation that pervades the universe.

It was held:

(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 section 3(f) but only in a very weak sense.

In conclusion we hold that:
(a) the risk of the schoolchildren or teachers at the school incurring leukaemia of other cancer from radiofrequency radiation emitted by the cellsite is extremely low;
(b) the risk to the pupils of exposure to radiofrequency radiation 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 ...*

The Court concluded

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.

Sally Gilbert
Senior Advisor (Health Protection)
Implementation Group
Ministry of Health

RUSSIA

EMF RESEARCH ACTIVITIES IN RUSSIA

I. RUSSIAN SCIENTISTS ARE CARRYING OUT THE INVESTIGATIONS IN THE FOLLOWING FIELDS:

- Mechanisms biological effect of EMF
- Research on modulation in the EMF effects
- EMF and nervous system
- Research on the influence of EMF mobile phone on the organism of the user
- Modification of the EMF bioeffects under other environmental factors
- Possibility of some somatic state and diseases changing the sensitivity of human being organism to EMF and the wrong side out.
- EMF medical treatment application.

Two new standards have been prepared (50 Hz and VDT).

II. AT PRESENT THERE ARE LABORATORIES INVESTIGATING BIOLOGICAL EFFECTS OF EMF AT THE:

- Institute of Biophysics of Cells (RAS, Pushchino).
- Institute of Higher Nervous Activity and Neurophysiology (RAS, Moscow)
- Institute of Brain (RAS, St. Petersburg)
- Russian State Research Centre - Institute of Biophysics (Moscow)
- Centre of Electromagnetic Safety (Moscow)
- Institute of Health Medicine (RAMS, Moscow)
- Institute of Labour Hygiene and Occupational Diseases (St. Petersburg)
- Institute of Medical Radiology (RAMS, Obninsk)

The chief coordinator of research is conducting fundamental biological EMF studies is the Scientific Council on Radiobiology of the Russian Academy of Sciences (Chairman is Prof. E.B. Burlakova). This Council has a section "Radiobiology of non-ionizing radiation" headed by the Vice-president of the Council, Prof. Yu.G. Grigoriev. The Council is responsible for considering perspective plans of scientific work on EMR biological effect, organizing symposiums and conferences, considering the most significant results and giving recommendations for their publication.

III. NATIONAL COMMTTEE ON NON-IONIZING RADIATION PROTECTION (NCNIRP)

Chaiman Prof Yu. Grigoriev
Vice Chairman Dr. V. Petin

NCNIRP is an independent scientific organization airming to provide guidance and control of the health hazards of non-ionizing radiation exposure.

IV. SOME RUSSIAN PUBLICATIONS

J. Biomeditsinskaya radioelectronica. 1998. No.1.

PARTICULAR ROLE OF A "MM WAVE - WATER MEDIUM" SYSTEM IN THE NATURE. Sinitsyn, V.L Petrosyan, VA.Yolkin, N.D. Devyatkov, Yu. V. Gulaev, O.V. Betskii. P. 5-23.

CENTRAL HUMAN NERVOUS SYSTEM REACTIONS ON ELECTROMAGNETIC FIELDS WITH VARIOUS BIOTROPIC PARAMETERS. N.N. Lebedeva. P. 24-37.

MILLIMETER WAVES IN THE SYSTEM OF REHABILITATION. R.K Kabisov. P. 48-55.

THE EFFECTS OF LOW ENERGETIC PULSING EHF AND MICROWAVE RADIATION WITH A

NANOSECOND DURATION AND HIGH PEAK POWER ON BIOLOGICAL STRUCTURES (MALIGNANT TUMOURS). N.D. Devyatkov, O.V. Betskii, R.K. Kabisov, N.V. Morozova, S.D. Pletnev, V.V. Faikin, Z.S. Chernov. P.56-62.

PAVLOV A.N. EMF AND VITAL ACTIVITY (Manual). Moscow. 1998.148p.

J. RADIATION BIOLOGY AND ECOLOGY. 1998. V. 38. No.1

RADIOPROTECTIVE EFFECT OF WEAK MAGNETIC FIELD OF ULTRA LOW FREQUENCY WITH EXCLUDING OF CORTICOADRENAL MECHANISM OF ADRENAL GLANDS BY ADRENALEKTOMIA. A.M Stashkov. P.110-114.

MODIFICATION OF RADIOSENSITIVITY OF MICE BY COMBINATION OF WEAK MAGNETIC FIELD AND FRACTIONED RADIOACTIVE IRRADIATION OF MANY DAYS IN SMALL DAILY DOSE. A.M Stashkov, LE. Gorolhov. P. 116-120.

NON-SPECIFIC REACTION OF NERVOUS SYSTEM TO NON-IONIZING RADIATION. Yu.A. Kholodov. P. 121-125.

V. WE ORGANIZED EXPLANATORY WORK AMONG THE POPULATION ON POSSIBLE EMF HAZARDS, SAFETY AND PROTECTION MEASURES.

VI. Second International Conference "Problems of Electromagnetic Safety of the Human Being. Fundamental and Applied Researches. Development of EMF Standards: Philosophy, Criteria and Harmonization" (Moscow, September 20-25, 1999).

Topics:

- Results of DC, ELF and RF EMF biological effects fundamental and applied investigations as essential part for hygienic norms substantiation
- Criteria for assessing EMF health risk and principles of standards in different countries
- EMF standards harmonization
- Principles of mobile telephone ENT standards substantiation
- EMF medical treatment application

Deadline for abstracts is June, 15, 1999

VIII. The future EMF issue (key research).

Harmonization of standards
Research on modulation in the EMF effects
Research on the influence of EMF mobile phone on the organism of the user
Modification of the EMF bioeffects under other environmental factors
EMF medical treatment application.

SLOVENIA

Highlights of Activities in the field of EMF in Slovenia - 1998/99
Peter Gajsek

A number of activities in connection with EMF have been done including:

1. Meetings

- International seminar on EMF - Global need for standards harmonisation. Seminar was organised in October 1998 by National Institute of Public Health of Slovenia in Ljubljana in collaboration with WHO, ICNIRP, Airforce Research Labs, IEEE ...

- NATO Advanced Research Workshop on RF Radiation Dosimetry and Its Relation to the Biological Effects of EMF was organised in October 1998 in Gozd Martuljek, Slovenia.

2. Legislation

The Ministry of Health is preparing an act on radiation protection which will focus on surveillance on the human exposure to various non-ionizing sources. Many draft versions are being reviewed and represent a good basis for implementation of a different ordinances which will rely on ICNIRP guidelines with regard to the whole NIR spectrum.

3. Research Activities

Occupational Exposure to Radiofrequency Fields

A research project has started on 1 July 1998 to investigate occupational exposure to radiofrequency (RF) electromagnetic fields and radiation from various sources, including **industry, medicine, broadcast and telecommunications**. The study aims to assess the feasibility of conducting an industry wide pilot study to investigate any relationship between RF radiation and the risk to human health.

This study is carried out by a research team from the National Institute of Public Health (NIPH), the University of Ljubljana and the Slovenian Institute of Quality and Metrology. The study is sponsored by the Ministry of Science and Technology of the Republic of Slovenia that supports the need for this study.

It is anticipated that the work will take about three years.

The study has two main objectives:

- to assess the feasibility of a study to investigate possible associations between causes of death, (or surviving registered cancer cases) and RF exposure, using advanced exposure protocol, measured fields, and data on personnel in participating industries.
- to develop a protocol to estimate a common radiofrequency (RF) exposure during a period of employment.

This study brings together the main national enterprises dealing with telecommunications and broadcasting in a co-operative project and should be the first in the Slovenia to provide detailed information on exposures of workers to RF radiation for consideration of possible health effects.

Power RF Transmitters in living- environment

Ministry of Environment has launched an applicable project on evaluation of public exposure to power RF transmitters that are situated next to or in the middle of the urban areas. Of particular interests are radio amateur stations whose output power exceeds 1 kW.

The results of the project will be evaluated in the sense of the Ordinance on EMF in living environment and will be used for annual report on environment protection.

On the basis of actual data also protective measures and guidelines for further installations will be proposed.

4. Risk communication

Systems of Mobile communications represents in Slovenia very fast growing industry. Latest development which has resulted in more and more base stations being set up all over the country, has caused some alarm among the general public, especially among those live close to these new stations. This has caused a considerable risk communication problems for our institute as well as for other

authorities. Some fact sheets and other brochures were made and delivered to the public (printed media, internet...).

The real problems represent some "quasi" experts that have a great ascendancy over public and strong political background. Some of them have also brought an action against the owner - national TV broadcasting company (Short wave transmitter site).

mag. Peter Gajsek
Counsellor/Non-ionizing Radiation

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SWITZERLAND

«Ordinance on Non-Ionizing Radiation (ONIR)»

Draft for public consultation
(1999/02/16) (Public hearing)

Swiss agency for the Environment, Forest and Landscape
CH-3003 Bern

ONIR has been derived from the Federal laws relating to the protection of the environment.
The purpose of ONIR is the protection against harmful and/or disturbing effects of non-ionizing radiation. The principles of prevention (precaution) and causality are stated in the Ordinance.
The exposure limit values are mostly the same as defined by the International Commission for Non-Ionizing Radiation Protection (ICNIRP).

The principle of prevention: Clear zones as precaution

The principle of precaution should apply to places where people stay for a long time. The ordinance draft defines these places as areas of sensible use like, for example, flats, schools, hospital rooms or old people's homes, offices, children playgrounds, etc.

The most efficient means of minimising the exposure to non-ionizing radiation is to keep the greatest possible distance between those areas of sensible use and the emitting installation.

Clear zones around the emitting installation are defined in the draft of the Ordinance on Non-Ionizing Radiation (ONIR). As defined by the principle of precaution, the location of any new emitting installation has to be chosen in order to avoid any area of sensible use to be situated in the clear zones.

It has to be pointed out that the clear zones apply to the principle of precaution. In any case, this so-called clear zone has to be assimilated to a zone of nuisance or possible health injury.

These regulations are valid for installations which are originating long term exposure of the neighbourhood, such as power lines, transformers or radar and broadcasting stations which are emitting longer than 800 hours per year. For example, and regarding power lines, the exposure in the periphery of the clear zone is of about 1/100 of the exposure limit values defined by the International Commission for Non-Ionizing Radiation Protection (ICNIRP), while for mobile phone basic stations it is of about 1/10.

This ordinance text can be downloaded at :

German: http:// www.admin.ch/buwal/presse/1999/d9902161.htm

French: http:// www.admin.ch/buwal/presse/1999/f9902161.htm

UNITED KINGDOM

WHO International EMF Project, International Advisory Committee Meeting
3-4 June 1999, Geneva

UK Update Statement on NIR Activities

1. Independent expert group on mobile phones
The Minister for Public Health has arranged for a Committee to be set up to look at mobile telephone technology and its impact on society. The purpose is to provide 'An assessment of existing research and identification of areas where further research is needed so that the public can receive clear advice about the use of mobile phones and a clear risk assessment from independent experts'. The work is expected to take six
months.

The Parliamentary Select Committee on Science and Technology is also looking at EMF matters.

2. Study of occupational exposure to radiofrequency fields
The work started in Nov '98 and includes broadcast and telecommunications. It aims to assess the feasibility of conducting an industry wide study to investigate any relationship between RF radiation and risk of harm to health. The objectives are to develop a protocol to estimate RF exposure and to assess the feasibility of a study
to investigate possible associations between causes of death and RF exposure.

3. Planning guidance consultation on electromagnetic fields
A draft joint circular was issued for consultation in Dec '98 giving guidance to Local Authorities when considering planning applications for developments which give rise to electromagnetic fields. The consultation is complete and future progress awaits the publication of the UK Coordinating Committee for Cancer Research (UKCCCR) childhood cancer study. This is investigating several possible causes of childhood cancer and includes exposure to em fields. A report is expected in Sept '99.

4. EU Recommendation on public exposure to electromagnetic fields.
This should be considered at Council of Health Ministers next week. We have prepared an Explanatory Memorandum and Regulatory Impact Assessment for Ministers to present to Parliament.

5. Department of Health (DH) research programme
DH is funding a wide ranging research programme which includes basic studies as well as work on risk perception. Recent completed work includes studies on mobile phones to test reaction times amongst volunteers. (Preece Int. J. Rad. Biol. April 1999. Effect of 915 MHz simulated mobile phone signal on cognitive function in man).

6. The National Radiological Protection Board advice to Government.
As part of its function to provide scientific advice to Government, NRPB has reviewed the ICNIRP guidelines and will shortly be publishing their views.

7. Other departmental initiatives include:
- Issuing specific advice to Inspectors on telecommunication base stations and broadcast towers
- Publishing research reports and issuing basic advice to Inspectors on general control of exposure to electromagnetic fields and application of guidelines
- Encouraging the railway industry to review emissions in and around trains
- Seeking ideas for well targeted research under our 'Competition for Ideas' programme (which referred to the WHO Research Agenda)
- As part of the Health and Safety Executive 'Health Risk Review' process, we take a forward look to identify emerging trends in technology in order to try and assess whether they will have novel safety implications or will introduce new or increased risks. This is an ongoing process.

APPENDIX C

LIST OF PARTICIPANTS AT THE FOURTH INTERNATIONAL ADVISORY COMMITTEE MEETING ON ELECTROMAGNETIC FIELDS

3-4 JUNE 1999

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