THE INTERNATIONAL EMF PROJECT

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

Minutes of the Sixth International Advisory Committee meeting
7-8 May, 2001, Geneva

OPENING

The meeting was opened at 0910hrs by Dr Michael Repacholi, unit Coordinator Occupational and Environmental Health. . He observed that there were more than 40 countries and several International Organizations participating. He promised a full agenda for the meeting with major tasks including:

- Reviewing the progress of the Project;
- Taking reports on National concerns;
- Review of documents prior to publication and
- Discussion of future directions of the Project.

WELCOME

Dr Richard Helmer, Director, Department of Protection of the Human Environment, welcomed the delegates to the meeting on behalf of Mrs Ann Kern, Executive Director of the cluster on Sustainable Development and Healthy Environments. He indicated that Mrs Kern would attend later in the day.

Dr Helmer remarked on the opportunity the meeting provided for the participants to meet so many national representatives and to discuss EMF issues of mutual concern. In particular the meeting provided the opportunity to:

- Review outputs from the Project;
- Discuss EMF issues of community concern;
- Further discuss the possibility, raised by recent pooled analysis, that low frequency (power frequency) magnetic fields may be associated with an increased risk of childhood leukemia and
- Assess recent reports concerning RF emissions from mobile phones and base stations.

Dr Helmer welcomed delegates attending for the first time or new delegates from existing partner countries. The welcome was extended to delegates from: Turkey, Singapore, Philippines, Poland, Bulgaria, Switzerland, France, Peru and South Korea.

Dr Helmer spoke of the Health Risk Assessment to be conducted by IARC and WHO and of the importance of the body of research (estimated at approximately $US100 million) currently underway worldwide. He acknowledged that the public's fears and concern are not always consistent or rational and the current work being undertaken on risk perception and communication is very important.

Dr Helmer again welcomed the delegates to what he hoped would be a successful meeting and thanked them for their partnership in the project.

INTRODUCTIONS

All present introduced themselves and provided a brief background of their position and responsibilities.

Agenda item #1
Election of Chair, Vice Chair and Rapporteur and the adoption of the Agenda

The delegates supported Dr John Loy, ARPANSA as Chair, Professor Barney de Villiers as Vice Chair and Dr Colin Roy, WHO as rapporteur.

The Agenda was adopted.

Agenda item #2
Project organization and update

Dr Repacholi tabled the sixth progress report for the International EMF Project covering activities and outputs for the period October 2000 to May 2001. The report is also given as Appendix A. The report was formatted according to scheduled EMF Project activities: scientific reviews; research co-ordination; health risk assessments; harmonization of EMF standards; risk perception and communication and environmental impacts of EMF.

Dr Repacholi summarized some of the more significant aspects of the report.

Scientific reviews

The scientific review process for the EMF Project has now been completed. Biological effects from exposure to EMF in the RF range (10 MHz to 300 GHz) were reviewed at meetings in Munich, Germany (1996) and RF pulse-modulated fields in Erice, Sicily (1999); low frequencies (0 to 300 Hz) were reviewed in Bologna, Italy (1997); psychosocial impacts of EMF exposure in Graz, Austria (1998); intermediate frequencies (300 Hz to 10 MHz) were reviewed in Maastricht, The Netherlands (1999); and environmental impacts of EMF were reviewed in Ismaning, Germany (1999).

Stewart report

WHO participated in the scientific review of the health effects from mobile phones conducted by the Independent Expert Group on Mobile Phones established by the UK Minister for Health. The so-called Stewart Report was issued in May 2000 is available from the committee's web site at: http://www.iegmp.org.uk/IEGMPtxt.htm.

One of the more important recommendations: “If there are currently unrecognised adverse health effects from the use of mobile phones, children may be more vulnerable because of their developing nervous system, the greater absorption of energy in the tissues of the head and a longer lifetime of exposure. In line with our precautionary

approach, at this time, we believe that the widespread use of mobile phones by children for non-essential calls should be discouraged. We also recommend that the mobile phone industry should refrain from promoting the use of mobile phones by children." Although not everyone would agree that the recommendation is well supported by the science the possibility should be tested and could be part of the current £7.5m research program in the UK.

Research Coordination Committee

A research coordination committee meeting was held in San Antonio on 13 November 2000. This meeting was the last for identification of research needs for static and ELF fields since the process for health risk assessment for these fields commences in 2001-2002.

The WHO Research Agenda has proved invaluable for many countries as National research programs get underway.

Health Risk Assessment Schedule

Following agreement with IARC and ICNIRP the schedule for formal reviews of the EMF literature have been scheduled as shown below:

2001	IARC carcinogen identification and evaluation of static and ELF fields
2002	WHO/ICNIRP health risk assessment of static and ELF fields
2003	IARC carcinogen identification and evaluation of RF fields
2004	WHO/ICNIRP health risk assessment of RF fields

There has been some discussion whether the assessment process should be delayed so that the results of important studies nearing completion can be published and assessed. This will be discussed further during this meeting.

IARC will publish the results of their meetings in the IARC monographs and WHO will incorporate the IARC conclusions into the results of the WHO task group meetings and publish them as WHO monographs. It is anticipated that all reports will be published by 2005.

EMF Risk Perception, Communication and Management

A user-friendly handbook for organizations and individuals interested in this topic is in the final stages of preparation. It will be a 'how-to' manual on risk perception and communication on EMF issues. The handbook has been progressed following meetings in Geneva (December 1999), a small working group meeting in New York (April 2000) and an editorial meeting in Geneva in March 2001.

The draft of a WHO monograph on risk perception, communication and management has been prepared. More effort will be put into finalizing the monograph following the completion of the handbook. This will be achieved through the convening of task groups to review the text with publication anticipated in 2002.

EMF Environmental Impacts

Levels of EMF in our environment have increased steadily over the past 50-100 years EMF sources include major development projects such as high voltage transmission lines, undersea power cables, radars, telecommunication and broadcast transmitters and transportation systems. Research has been focused on human health with scant study of the influence of EMF on plants, animals, birds and other living organisms.

An international seminar, organized by WHO and ICNIRP, was held in Germany (4-5 October 1999). It summarized scientific knowledge on the environmental consequences of EMF in the frequency range 0-300 GHz. A paper has been prepared for publication in a scientific journal. A WHO fact sheet on the subject will be available in late 2001.

Harmonization of EMF Standards

In November 1998, WHO commenced a process aimed at the harmonization of EMF standards worldwide. With 45 countries and 8 international organizations involved in the International EMF Project there is a unique opportunity to develop a consensus framework for standards. This activity comes at a time when many countries are considering new EMF standards. Large differences exist in standards and this can lead to public concern and the reluctance to accept new technologies. The standards harmonization process will be finalized before the formal evaluation of EMF health risk assessments are published by WHO and IARC. Thus, the next generation of standards should be able to incorporate this health risk assessment information.

A number of regional meetings have already taken place on the issues. The next WHO EMF biological effects and standards harmonization regional meeting will take place in South Korea on 22-25 October 2001.

Information

The following fact sheets and press releases have recently been published or are awaiting final approval.

- Electromagnetic Fields and Public Health: WHO Backgrounder on Cautionary Policies. March 2000
- Electromagnetic Fields and Public Health: EMF Hypersensitivity. WHO Fact Sheet (in preparation)
- Electromagnetic Fields and Public Health: Guidance on protection of the public. WHO Fact Sheet (in preparation)
- Electromagnetic Fields and Public Health: EMF Intermediate Frequencies and Health. WHO Fact Sheet (for approval)
- Electromagnetic Fields and Public Health: Environmental Impacts of EMF. WHO Fact Sheet (for approval)
- More information necessary to establish health effects of mobile phones. Press release WHO/45, 28 June 2000.

Scientific publications

Ken Foster and Michael Repacholi are drafting a paper on Pulse Modulation. The paper will review the existing literature and provide technical guidance for researchers. It will also discuss the influence of different pulsing regimes on biological mechanisms.

The Chairman then invited open discussion

Mr John Collins (representing ITU) requested information on the likely publication date of the pulse modulation paper. Much research has been done using GSM modulation but as the move to new technologies occurs, it will be important to be able to predict modulation effects. Equally with new modulations it will be necessary to conduct a few key studies.

Dr Tom McManus (Ireland) asked that a comprehensive project flowchart be drawn up.

Dr Repacholi indicated a flowchart is available but without the level of detail requested.

ACTION: Dr Repacholi will have a flowchart drawn up that includes outputs completed and then distributed.

Agenda item #3
Highlights of National Concerns

Dr Paolo Vecchia (National institute of Health, Italy) provided the following papers to the meeting:

- Health policies and standards for electromagnetic fields in Italy;
- Research on biological and health effects on electromagnetic fields in Italy;
- Open letter of Italian scientists to the President of the Italian Republic;
- The case of Vatican radio and
- Health policies and standards for electromagnetic fields in Italy and Switzerland.

A framework law was passed by the Italian Parliament and enforced on 22-2-2001. The law establishes basic principles of protection, assigns responsibilities and sets out procedures for licensing and monitoring. Further decrees will be issued to regulate different EMFs (i.e. ELF and RF) or different sources.

Italian approach differs drastically from ICNIRP; there no dosimetric quantities but three different exposure levels are defined:

- 'immission' levels (basically exposure levels which cannot be exceeded);
- attention levels (field levels which cannot be exceeded in residential areas) and
- 'emission' levels for sources.

Although the exposure limits for RF are similar to ICNIRP the attention levels are an order of magnitude lower and have no scientific basis.

The issue of 'Vatican Radio' was raised. The Vatican has a broadcasting facility that complies with ICNIRP but exceeds Italian limits in Italian territory.

The open letter of Italian scientists to the President of the Italian Republic protested the development of a precautionary approach to 'electromagnetic pollution' that ignores the most credible scientific evaluations and the recommendations of the European union.

The research outline presented to the meeting shows the high level of research activity currently underway in different areas of bioelectromagnetics.

Dr Repacholi suggested that the regulatory action being undertaken in Italy showed clearly why there was an urgent need for standards harmonization.

Science can be ignored and low limits can be set but compliance may be difficult and the cost prohibitive. The 'flow on' into other countries may also be a problem.

Dr Loy indicated that measures such as being undertaken in Italy may serve to actually increase rather than decrease public concern.

Mrs Ann Kern (WHO Executive Director, Sustainable Development and Healthy Environments) joined the meeting.

Dr Leeka Kheifets (EPRI, USA) described the California Electric and Magnetic Fields Program which has almost completed its 6-year program. The program includes research and risk evaluation by California Department of Health Services (DHS) and details can be found on their webpage at **www.dnai.com** . The Risk Evaluation and the Policy Integration are awaiting Government approval before being released for public comment.

Dr Marilyn Fingerhut (NIOSH, USA) the current concern to the organization was the question of siting of mobile phone base stations and ELF occupational exposures.

Dr René de Seze (INERIS, France) presented the following highlights of National activities:

- Public concerns are largely about are about mobile communications Base Station Antennas (BSA) with campaign of protests.
- Governmental actions – following the publication of the Stewart report, a French expert group was set by the Health Ministry to evaluate health risks from mobile communications. The report is published on the Health Directorate website: www.sante.gouv.fr/index.htm and is being translated into English.
- Measurements of RF EMF around BSA is now going on, managed by the National RF Agency (ANFR).
- Research - A large program (8 projects) on the biological effects of mobile communications (COMOBIO) is now ending. Other ongoing projects including cellular studies of ELF, mobile phones and cognitive processes and other research projects within the COST244 framework.
- An EMF group is developing dosimetry, support to occupational physicians and teaching at the National Research and Safety Institute (INRS website: www.inrs.fr). A database has been developed to record symptoms and pathologies linked to EMF.

- Standards National regulations are now under consideration, some of them based on the European recommendation.

Dr Art Thansandote (Health Canada) tabled a documents on 'Highlights of National Concerns' and a Fact Sheet titled 'Electric and Magnetic Fields from Video Display Terminals'. His report indicated:

- Public concern about mobile phone base stations including siting issues was currently high. Other areas of concern were about the possibility of adverse health effects resulting from low level exposure to RF. The issues of microwave oven safety and of the effects of microwaves on food are often raised;
- Department of Health (Health Canada) plans to publish fact sheets on cellular phones and ELF fields which will be available from the appropriate Health Canada web page: www.hc-sc.gc.ca/ehp/ehd/rpb/index.htm;
- Research: an in-house study to assess the biological effects of 1.8 GHz RF fields is in progress; and
- Department of industry has published 'Guidelines for the measurement of radiofrequency fields at frequencies from 3kHz to 300 GHz' available in pdf format at: www.strategis.ic.gc.ca/SSG/sf01347e.html

There was general discussion about microwave ovens; measurements in several countries revealed no problems, even after many years of use.

Questions were asked about Health Canada's Safety Code 6 (Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz). The Code is not mandatory but are guidelines establishing safety requirements for the installation and use of RF radiation emitting devices.

Dr Chiyoji Ohkubo (National Institute of Public Health, Japan) A paper titled 'Japan Standards was tabled. The following points were made:

- ELF – an electric field standard of 3 kV/m for power frequency ELF has been in place since 1976. There was considered to be no urgency to regulate or standardize power frequency magnetic fields based on their effects on human health and
- RF – 'Radio-Radiation Protection Guidelines for Human Exposure to Electromagnetic Fields' have been in place since 1990 and were used mainly by radio operators and manufacturers. The rapid growth of mobile telecommunications (64 million subscribers at end of 2000) has necessitated the revision of the guidelines and the change to a mandatory standard (1 October 1999).
- SAR – a standardized measurement method and limit will be enforced in 2002.
- Research – A paper from the Ministry of Public Management, Home Affairs, Posts and Telecommunications titled 'Interim Report by Committee to Promote Research on the possible biological Effects of Electromagnetic Fields' was tabled.

Mr Arwel Barrett (Health and Safety Executive, United Kingdom) provided the following documents:

- United kingdom Statement on EMF Activities and
- Department of Health information leaflets titled 'Mobile phones and Health' and Mobile phone Base stations and Health'.

There has been an increase in public concern over the siting of base station masts. In response to the Stewart report fact sheets have been published, audit of base station

emissions has been carried out and a joint Government/Industry sponsored research programme (Chaired by Sir William Stewart) has been established.

The HSE is involved in a number of research programmes including the IARC Interphone Project and the development of a project to assess the RF exposures of physiotherapists using 27 MHz diathermy.

Dr Tom McManus (Department of Public Enterprise, Ireland) commented that there was more research underway or planned than was envisaged when the EMF Project timelines were drawn up 5 years ago. He asked whether the assessment process should be delayed so that the research could be completed. Other points included:

- Maintenance of public concern over both HV transmission lines and mobile phone base stations;
- A programme of ambient monitoring of public EMF exposures is to be undertaken;
- A medical committee has been established to report on the recent AGNIR report on ELF fields; and
- Two brochures will be produced dealing with electricity transmission and mobile telecommunications.

Chair suggested that this was an important issue that would be discussed further during the meeting.

Mrs Ann Kern reported that over the last weeks WHO has carefully reviewed the procedure for producing guidelines and standards. The following points were made:

- The process should be independent;
- The process should involve the best independent experts;
- The WHO Director General believes that all guidelines and standards should be reviewed every 3 years and
- WHO would never attempt to restrict research – the process never stops.

Dr Marc Seguinot requested more information on mast siting. Referred to the FEI web page (**www.fei.org.uk**) where there is a Press Release in which UK mobile phone operators pledge a commitment to best practice in issues relating to mast siting.

Dr Paolo Vecchia asked about EMF policy in the UK. Requested information on mobile phone fact sheet sand the position about placing HV powerlines underground.

Dr Hilary Walker indicated that the information leaflets are provided at point of sale. The powerline issue is with the NRPB AGNIR.

Mrs Shaiela Kandel suggested that the leaflets provided little information on SAR determinations for the phones being purchased. It was suggested that the European standard on the measurement of SAR is currently on hold.

Dr Marc Seguinot indicated that SAR values will be printed on UK phones by the middle of 2001.

Professor Jeong-Ki Pack (Chungnam National University, Republic of Korea) tabled three documents:

- Highlights of concerns in the Republic of Korea;
- EMF activities in the Republic of Korea and
- Standards Harmonization Conference Announcement (Seoul, Korea, 22-24 October 2001).

In January 2001 Government announced four ordinances (non-mandatory) for exposure limits and the installations and the devices to which they apply and measurement methods for EMF intensities and SARs. SAR testing of mobile phone handsets is planned. A 5 year, $US8.5m research project has been launched with projects on epidemiology and *in vivo* and *in vitro* studies involving MF and RF exposures.

Mr Gert Anger (Swedish Radiation Protection Institute, Sweden) covered the following EMF activities:

- Reports – an expert group has produced a report on electromagnetic hypersensitivity and the health risks of EMF and a supplementary report on exposure to RF fields and mobile telephony.
- Limit values – SSI will implement EU recommendations to limit exposure of the general public to EMF. Swedish Work Environment Authority is to prepare limit values for occupational exposure to EMF based on ICNIRP. Support for the precautionary principle at ELF but not for RF.
- Research – Sweden is involved in the IARC Interphone project. Moves to initiate a national research program on the effects of EMF on biological systems.
- Information – public is concerned about 3G and relevant authorities are preparing a common information package.

Mrs Shaiela Kandel – is the precautionary principle for ELF voluntary or mandatory?

Mr Gert Anger – voluntary.

Dr Ehud Neeman (Ministry of the Environment, Israel) tabled two papers at the meeting:

- Highlights of national concerns in Israel including discussion of two bills which had passed preliminary hearing in the Knesset; the first to force cellular phone ads to include a warning about possible health effects and the other for the establishment of research fund to investigate potential hazards of wireless phones.
- 'Public Risk Perception Concerning Cellular Base Stations' a paper by S. Kandel and E. Ne'eman detailing the Israel's approach to the siting of base stations and the steps that needed to be taken to attempt to alleviate public concern.

Mrs Shaiela Kandel (Soreq NRC, Israel) Spoke about the move to establish a radiation protection organization, based on the NRPB model, in Israel. An EMF database is being established. There is a move to put SAR information on mobile phone handsets but this is waiting on the European standard on the measurement of SAR.

Ms Agnette Peralta (Department of Health, Philippines) provided a Department of Health press release titled 'No study proving cell sites cause cancer'. Final draft on exposure guidelines expected to be approved. Local government has power to approve mast siting. However public hearings can be held if there is expressed opposition.

Mr Victor Cruz (Peruvian Institute for Research and Training in Telecommunications, Peru) spoke about the highly successful South American Regional EMF scientific Meeting and WHO EMF Standards Harmonization Meeting held in Lima in March 2001.

Local authorities are very concerned about the EMF issue. A report is about to be completed on measurements at a number of telecom sites. An EMF standard will be issued in 2002.

Dr Eric van Rongen (Health Council of the Netherlands, Netherlands) tabled a paper on 'Recent developments concerning electromagnetic fields in the Netherlands'.
Main issues:

- Low frequency fields - The report 'Exposure to electromagnetic fields (0 Hz – 10 MHz) has been updated to reflect the recent meta analysis of Ahlbom et al. A leukemia risk analysis for children living in the vicinity of overhead powerlines is being completed.
- Mobile telephony – public concern over GSM has subsided somewhat. Base station construction now requires a permit.
- National Antenna Policy has been sent to Parliament. Important components include adoption of recommendations of Council of Europe on general public exposure limits, creation of a National Antenna Bureau who will maintain database on each antenna and an agreement on the provision of information to the public.

Mr Gyorgy Thuroczy (National Research Institute for Radiobiology and Radiohygiene, Hungary) indicated that there was still some public concern about base stations. It was difficult to get a harmonized approach to the issue when the ministries of Health, Communications and the Environment were all involved in the issue.

At this stage there was no National EMF research program in Hungary. A Ministry of Health ordinance has declared a stricter public exposure limit for frequencies above 300 MHz.

Mr Leon du Toit (Department of Health, South Africa) made the following points:

- The department of Health has adopted ICNIRP for occupational and general public exposure to EMF – however low power devices and installations such as mobile phone handsets and base stations are excluded.
- There is considerable current concern over the siting of cell phone masts at schools and in residential areas
- The siting of powerlines is not subject to regulatory control (with respect to EMF)
- South Africa is hosting the WHO Standards Harmonization Meeting for the African region in December 2001.

Dr Qinghua He (Ministry of Health, People's Republic of China) spoke about the Second International EMF Seminar held in Xi'an, China on 23-26 October 2000. Most of the papers are available on the web at: www.emfhealth.com

- Standards – being developed by a cooperative group include hygiene, health and occupational standards;
- Measurements have been made around base stations with only 5 out of 300 assessed exceeding 40 : W/cm^2 and

- MPE's have been established for mobile phones with values similar to that of IEEE.

Professor Yuori Grigoriev (Institute Biophysics, Russia) tabled a document outlining EMF activities in Russia, highlights included:

- Activities of the Russian National Committee of Non-Ionizing Radiation Protection including the development of a research plan for mobile phone standards;
- Difficulties with standards harmonization particularly because of the inadequate consideration of non-thermal effects by ICNIRP and other national authorities;
- Current research activities including volunteer and *in vivo* animal studies at 450 MHz and 900/1800 MHz GSM exposures and
- Conference: The 3rd International Conference on Problems of Electromagnetic Safety of the Human Being: EMF and Standards, Fundamental and Applied Research to be held in Moscow, Russia on 22-26 September 2002 (www.pole.com.ru).

Dr Tom McManus indicated that both ICNIRP and IEEE consider non-thermal effects. The issue is whether any of the observed effects could be a health hazard and thus would be able to influence exposure limits.

Dr Dina Simunic (University of Zagreb, Croatia) described:

- NIR protection law which was published in late 1999. It covers the frequency range 0 to 300 GHz as well as optical radiation and ultrasound. All sources need operational permits. For transmitting devices the exemption limit is for less than 6W.
- Research including two epidemiological studies dealing with radiotechnicians and telecom personnel and
- Public concern directed at mobile phone base stations and electrical transformers.

Dr Carlos Barcelo Pérez (National Institute for Hygiene, Epidemiology and Microbiology, Cuba) provided a document summarizing national concerns.

- Responsibility is through the Ministries of Public Health and Science, Technology and Environment but regulations do not exist;
- Research: only some small NIR programs exist. Some engineering and computational research on power transmission and radiofrequency transmitters has been carried out and
- Standards: work has started on a National EMF exposure standard as well as a risk communication initiative.

Mr Stephen Chong (Radiation Protection Inspectorate, Singapore) described EMF activities:

- Mobile phones: currently there is a penetration rate of 70% with licences soon to be issued for 3G;
- Regulation: the Radiation Protection Act controls devices including lasers and microwave ovens and ultraviolet radiation emitting devices and
- Public concern is tackled in a proactive way with newspapers and relies on the use of WHO Fact Sheets

Dr Mirjana Moser (Swiss Federal Office of Public Health, Switzerland) described a number of current EMF activities in Switzerland including:

- 'Ordinance relating to Protection from Non-Ionising Radiation ' which has been in place since the end of 1999. English versions (translation is not legally binding) of the standard and the explanatory report are available on the SAEL (Swiss Agency for the Environment, Forests and landscape) website at: www.buwal-recht.ch/index-en.htm
- In accordance with the Federal Law relating to the Protection of the Environment (LPE) and in accordance with the precautionary principle, NIR must be limited to the lowest level that is technically and operationally possible and economically feasible;
- Installation limit values for overhead transmission lines are 1∶T (rms magnetic flux density) and for mobile telecommunication systems 4 V/m (900 MHz) and 6 V/m (1800 MHz);
- Continual need for consumer information on trains, mobile phones and shielding devices and
- Research: ongoing programs related to sleep disturbance and hypersensitivity.

Dr Andreas Georgiou (Ministry of Health, Cyprus) indicated that the public held concerns about EMF issues. Currently there is no ongoing research – one of the problems in doing appropriate cancer research with mobile phones is the long latency period for head and neck cancers. One of the other problems with contemporary research is that the answers are never black and white.

Professor Stanislaw Szmigielski (Military Institute of Hygiene and Epidemiology, Poland) provided a detailed account of current EMF activities including:

- Responsibility for EMF safety standards is held by two ministries which brings politics and diverse opinions into the issue;
- Research is coordinated by the Commission of Biological Effects of Non-ionizing Radiation at the Committee of Medical Physics, Polish Academy of Sciences;
- Research activities are carried out at three centres Military Institute of Hygiene and Epidemiology, Warsaw, Institute of Occupational Medicine, Lodz and the Technical University;
- Ongoing research includes:
  - Functional abnormalities of cardiovascular system in RF/MW exposed workers
  - Influence of radar radiation on the living environment
  - Cellular effects of EMF
- In January 2001 a new ordinance for EMF occupational Safety limits was issued in Poland, limits similar to ICNIRP, but permissible exposures for 8-12 hour working day are 10 times lower; and
- Public EMF safety limits issued in 1998 by Ministry of Environment and Natural Resources are being revised.

Professor Maurice Hinsenkamp (University of Brussels, Belgium) tabled a document outlining current EMF research activities in Belgium including the following:

- Study of the effects of electromagnetic fields on cell differentiation *in vitro*;
- Effects of ELF EMF on cell proliferation;
- Psychological, psychophysiological and neuroendocrine effects of human 50 Hz magnetic field exposure and sensitivity to electricity;
- Effects of EMF on the intracellular calcium signalling; and
- Effects of EMF on bone cells.

Dr Axel Böttger (Federal Ministry for the Environment, Nature Conservation and Nuclear Energy, Germany). The report included the following highlights:

- an epidemiological study on childhood leukaemia and electromagnetic fields of power lines and other 50 Hertz sources (published by Prof. Michaelis, University of Mainz) showed a clear association between magnetic flux densities higher than 0.2 µ Tesla at home and the incidence of childhood leukaemia for children younger than 15 years of age. Analysis of these results suggested that less than 1 % of childhood leukaemia cases in Germany could be caused by ELF;
- the EU recommendation on the limitation of exposure of the general public to electromagnetic fields makes it necessary to revise the national EMF ordinance. A key point is precaution and it is necessary to find out whether there are health effects occurring below the ICNIRP values. The report will be finished in the third quarter of 2001;
- an overview of the world wide regulations on protection public against electroma gnetic fields a compilation is in preparation and should be finished in mid-2001;
- public has been involved in issues relating to the sale of spectrum and in base station siting;
- the Federal Government plans to make public the SAR-values of cellular phones and
- Additional research activity is planned with an expert meeting to identify new research needs in mid-2001.

Dr Michel Israel (National Centre of Hygiene, Medical Ecology and Nutrition, Bulgaria) tabled a report on the activities of the Bulgarian National Program Committee: International EMF Project the highlights of which included:

- An account of the Eastern European Regional EMF Meeting and Workshop "Measurements and Criteria for Standard Harmonization in the Field of EMF Exposure" held in Varna, 28 April to 3 May, 2001 (proceedings to be published);
- Legislation: changes in the Law for Environmental Protection will mean that the need for evaluation of the EMR for new sources in residential areas will not longer be required; new concepts for EMR protection of the general population are included in an Ordinance – calculation of safety zones around new sources should be made only for sources with a power above 10 W;
- Research: projects completed included: "Comparative Investigations of the influence of ultra-high EMF in the meter, decimeter and centimeter bands on some structural and functional changes in the CNS"; "Analysis of the changes in the luminescent characteristics of the thylakoid membrane by pisum sativym l. – impact of physical and chemical factors – independent and in combination"; "Influence of 2,45 GHz, and 53,53 GHz on isolated muscle fibres, on the activity of some ATPase systems in frog skeletal muscle, and on enzyme activity"; and
- New research included: "Evaluation of the Effect of RF EMR on the cardiovascular system on the melatonin secretion, and on the level of stress hormones in medical personnel and in operators in broadcasting", and "Criteria for standards in the field of RFR in some East European countries - Standard harmonization worldwide.

Dr. Israel provided abstracts of the completed projects.

Professor Ludek Pekarek (National Reference Laboratory, Czech Republic) discussion of activities included:

- The adoption of the ICNIRP guidelines;
- Concern of the public with respect to non thermal effects of EMR although there is no supportive evidence in the Czech Republic; and
- Discussed the measurement of base station emissions and found that they were very low and often met the old standards which were a factor of 100 below ICNIRP.

Ms Sally Gilbert (Ministry of Health, New Zealand) provided the following documents but was not able to attend the meeting:

- Review of the report 'Criticism of the proposal to adopt the ICNIRP Guidelines for cellsites in New Zealand' by N. Cherry;
- New Zealand report on EMF activities; and
- Fact Sheets on 'Cellsites' and 'Safety of Cellphones'.

Dr John Loy (Australian Radiation Protection and Nuclear Safety Agency, Australia) tabled papers on 'Does electricity cause cancer' and a draft Fact sheet titled 'Electricity and Health'. Discussion of Australian activities included:

- Development of a draft RF standard which has just completed the 2-month public consultation period and it is hoped to be published during late 2001. The draft which includes reviews of the low level literature and RF epidemiology is based largely on the ICNIRP guideline values and is downloadable at: www.arpansa.gov.au/rf_dft_standard.htm
- EMR from mobile phones and base stations remains an issue of considerable public concern and is given wide press coverage;
- ELF has had more reporting following the release of the AGNIR report;
- The Australian EME program which was funded for 4.5 years to June 2001 has received Government funding for a continuation; and
- An Australian Senate committee has released a report on EME issues including research and the RF standard development following a 12-month enquiry.

This concluded the National reports. Reporting continued with presentations from Collaborating Centres and International Organizations (this followed the presentation by Mrs Kern.

Mrs Ann Kern (WHO Executive Director, Sustainable Development and Healthy Environments) provided comment from the perspective of the Executive. Highlights being:

- This meeting is important for the participants and their national perspective but also because the topic is of such currency with both the media and the public;
- Timing is important, not only in terms of the decision to write or revise a standard or guidelines but in the development process itself;
- The process is important in terms of the separation of powers and in the detail i.e. the establishment of a Steering group, a Development Group, a sound methodology and a commitment to revise every 3 years, and
- WHO needs a clear indication of 'what we might do to move ahead'.

General discussion followed.

Dr John Loy (ARPANSA, Australia) asked 'What is the problem?'

-is it overexposure?

-is it persistent evidence of ELF and childhood leukemia?

There are many other concerns and people also want to believe that there is a problem being concealed from them.

Dr Tom McManus (Ireland) People are dying of other diseases but the media is ignoring that and driving the EMR health area. Good information is important including the latest research findings.

Dr Paolo Vecchia (National Institute of Health, Italy) It is important to be able to recognize what good science is. WHO should be a reference point or clearinghouse for good science and good scientific review.

It is important to recognize that science and legal measures follow the technology – it is not possible to do a mobile phone epidemiological study before the introduction of the technology! Given the pace of new technological development it is not possible, even now, to envisage the complete set of new research that will be needed.

Dr Marc Seguinot (European Commission, Luxembourg) What is needed is a more flexible approach to regulation review.

Dr Mirjana Moser The problem (as above) is dealing with emerging technology by allowing the application and then doing the research, providing the information and drafting the regulation. Precautionary approach can be used when available knowledge is insufficient.

The main role of WHO is in the provision of information and in the promotion and coordination of research.

Dr Paolo Vecchia (National Institute of Health, Italy) Personally very concerned about 'defensive science', we are overcautious and overemphasize uncertainties. Scientists should be more confident 'about the state of art'.

Dr Leeka Kheifets (EPRI, USA) Disagree, studies can be used in both extremes. Public can understand uncertainty.

Dr John Loy (ARPANSA, Australia) Another issue is the addressing of public confidence (or lack of) through public participation. Can WHO do this?

Mrs Ann Kern (WHO Executive Director, Sustainable Development and Healthy Environments) To get confidence one needs to be totally honest. WHO has a variety of mechanisms to involve the public: managing body and public meetings.

Dr Michael Repacholi (WHO), described the process used to develop Fact Sheets under the WHO International EMF project:

-topic decided,

-International review conducted by a multi-discipline group,

-Working Group assembled to synthesize into draft,

-Draft widely distributed for comment,
-Revised draft sent to IAC for further review,
-Finally editing and
-Fact Sheet published.
Fact Sheets remain as a major output from the Project.

Mrs Ann Kern (WHO) expressed some concern about Fact Sheets, namely,
-is credibility maintained? and
-are the Fact Sheets prepared with the required speed?

Agenda item #5
Report on NIR activities from collaborating centres and international organizations

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Dr Marc Seguinot (European Commission, Luxembourg) gave a presentation titled 'EMF Public Protection: Towards a European Regulation'. Points covered included:

- Council adoption of the Recommendation of 12 July1999 which included Article 152 §1 : 'Ensure high level of human health protection' and 'improve public health';
- The need for action was emphasized by the likely increase in population exposure to EMF, mounting public concern and varying national protection regimes which tend to undermine public confidence;
- An invitation was issued to member states to adopt exposure limits, provide good information to the public and to promote research activities;
- In regard to European Standards, CENELEC and ETSI have the mandate to produce product standards and the first on mobile phones should be available in mid-2001;
- An area of concern is the differences in legislation between EC countries. In particular legislation is not uniform and usually not binding, often countries rely on voluntary acceptance of guidelines;
- In most countries the scientific basis for limits are the ICNIRP guidelines;
- Several countries including Italy, Belgium and Switzerland have adopted a precautionary approach. This will be developed in the implementation report to be prepared in 2002 by the Commission.
- The European Commission has decided to increase the speed of the reviewing process of the Council Recommendation: the Scientific Steering Committee will deliver in October 2001 a new opinion which might form the basis of new legislative proposal.
- The Commission will organize a conference on November the 30th to follow-up various legislative initiatives taken in Member States.

Dr Paolo Vecchia (representing ICNIRP) briefly mentioned current workplans including the following:

- No new guidelines are currently under development,
- A 'philosophy of Protection' document is being drafted,
- Statements on 'MRI' and 'Pulsed Fields' are in preparation,
- Reviews of the physics, biology and epidemiology in the ranges 0-100 kHz and 100 kHz-300 GHz are well-advanced,
- A EU Concerted Action on security devices is being drafted and

- A workshop on thermophysiology is planned for 2002.

The meeting was closed at 1730 hrs.

Tuesday 8 May 2001

Dr Loy reopened the meeting at 0900 hrs and moved to Agenda Item 6(c)

Agenda item #6
Discussion of key issues: 6(c) Fact Sheets
Fact sheet:
ELECTROMAGNETIC HYPERSENSITIVITY: AN ENVIRONMENTAL ILLNESS
The FS was discussed in some detail. The meeting agreed to its publication following a review of IAC comments provided at, or in the three weeks following, this meeting.

Fact sheet:
ENVIRONMENTAL IMPACTS OF EMF
In general the IAC considered that the content and approach taken was good. A number of written comments were provided. Some participants warned against recommending an environmental research agenda as they did not want to see human health funds diverted. The FS would be revised and resubmitted to the IAC.

Fact sheet:
INTERMEDIATE FREQUENCIES (IF)
This fact sheet addresses the known effects of IF fields on human health, and offers recommendations for further study. Information on this subject comes from a WHO-sponsored international seminar held in June 1999 in Maastricht, Netherlands. Participants commented that obviously not all the Maastricht data could be included.

Some participants asked for firmer conclusions about what we know and what the knowledge gaps were. A request for more information on electronic surveillance equipment was also made. The FS would be revised and resubmitted to the IAC.

Fact sheet:
MEDICAL RESPONSE TO RADIOFREQUENCY OVEREXPOSURE
Dr Repacholi indicated that this was a first draft and he appreciated that there was still much work to be done.

A number of points were made which were added to the FS. It was suggested that RF burns, a common occurrence in the welding industry, should be addressed. Following further work on the draft it will be again circulated to the IAC.

Fact sheet:
PROTECTION OF THE PUBLIC

Written comments were provided by several participants. The IAC was generally happy with the FS and suggested that following final revision it could proceed to the WHO process and publication.

Agenda item #5 (continued)
Report on NIR activities from collaborating centres and international organizations

Dr Shengli Niu (International Labour Office, Switzerland) outlined the current activities of the ILO and these included:

- The ultraviolet protection of outdoor workers;
- A Code of Practice on ambient factors for protection – to be published in mid-2001; and
- A Meeting of Experts to take place to consider a Code of Practice on Safety and Health Management Systems. This will take the form of a practical guide and will be widely distributed for review.

Mr John Collins (British Telecom, United Kingdom and representing the International Telecommunication Union) discussed the world Telecommunication Standardization Assembly held in Montreal Canada in 2000 to approve the texts for questions for study by Study Group 5 for the period 2001-2004 were approved. The question 'Radiofrequency environmental characterization and health effects related to mobile equipment and radio systems'. The purpose of the question:

- To study measuring techniques, procedures and calculation techniques; and
- Two recommendations (standards) will be prepared dealing with exposure due to telecommunications plants (including broadcast emitters) and due to mobile communications.

Close cooperation is maintained with WHO, ICNIRP, IEC, IEEE/ANSI, CENELEC, ETSI and EBU.

Dr Marco Martuzzi (WHO European Centre for Environment and Health, Italy) spoke about the restructuring of the regional office and indicated that the environment was a priority and not radiation health. However, a number of significant activities were still occurring and these included:

- A promotion of EMF activities;
- Addressing precautionary policies in protection issues; and
- Details of an International Conference being held in 28/29May 2001 dealing with precaution and public health and using EMF as a case study.

Dr Michinori Kabuto (National Institute for Environmental Studies, Japan – WHO Collaborating Centre) tabled a paper providing details of 'An epidemiological study on childhood cancer in Japan (1999-2001). Some points of interest:

- Considerable care and consultation was used in the design of the protocol;
- The study will involve 1000 new cases during the three years, three controls randomly selected , matching for sex, age and residential area;
- A questionnaire and measurements will be used; and
- Transients in the power frequency exposure will also be assessed.

Dr Michael Murphy (US Air Force Research Laboratory, USA – WHO Collaborating centre) tabled copies of the printed powerpoint presentation. Some highlights of the presentation included:

- One hundred people were working in the radiofrequency research area;

- Research continuing on HPM systems with peak E field up to 1500 kV/m;
- Human response to RFR exposure (Dr Eleanor Adair) – research is continuing with 100 MHz, 450 MHz and 2450 MHz (cw and pulsed);
- International projects under way in Russia and Bulgaria on standards and cellular studies in Russia; and
- Involvement in a number of upcoming meetings including the Joint IEEE/ICNIRP Thermophysiology Workshop in Dublin, Ireland (Spring 2002) and Asia pacific EMF Conference in Phuket, Thailand (Winter 2002).

Dr Michael Murphy (US Air Force Research Laboratory, USA – representing NATO, WHO Collaborating Institution) provided details of recent activities including:

- General Medical Working Group met in Brussels (5-8 June, 2001) to look at the Standardized Agreement (STANAG) 2345 titled 'Evaluation and Control of Personnel Exposure to Radiofrequency Fields 3kHz to 300 GHz'. New sections 'Actions to be taken in the case of a suspected or actual overexposure above PEL' and 'The role of the Physician;
- STANAG 2345 has been approved and is now in force; and
- Radio and Radar Radiation Hazards Working Group (RADHAZ) met in Brussels (18-22 September, 2000) in part, to look at differences between STANAG 2345 and the proposed EU standard.

Dr Tom McManus (Ireland, representing IEEE – a WHO collaborator) reported on current activities:

- Currently there are more than 300 000 members;
- Producing standards through 'Standard Coordination Committee 28, will be called ICES (International Committee on Electromagnetic Safety) as it attempts to move from North America to the International setting;
- First publication expected in late 2001/early 2002 to be an EMF standard in the 0-3 kHz frequency range; and
- There will be on-going cooperation between ICES and ICNIRP especially in the area of Standards Harmonization.

Agenda item #6-8
Discussion of key issues

General discussion covered key issues as well national and international management of the EMF issue.

Dr John Loy summarized some of the issues now being addressed:
- ELF and childhood leukemia
- EMF established health effects but what about low level exposure – do any of the observed (but unreplicated) biological effects have a health implication?
- if there is an effect, how to protect the public;
- need to address community concerns and their oft-stated desire for a precautionary approach; and
- does the adoption of a precautionary approach discredit the science?

Dr Leeka Kheifets suggested that the precautionary principle was not well-defined, can be compatible with science but should only be invoked if there is some uncertainty.

Dr Michael Repacholi: Scientists believe that safety factors in the standards/guidelines cover the uncertainty. A lot is already known about the science. If there is a low-level effect it will be subtle.

Mr John Collins: Scientists do the science but it is generally the case that the politicians make the law.

Dr Eric van Rongen: Safety factors are not a Precautionary Approach but a measure of uncertainty.

Dr Kjell Hansson-Mild: It is important to remember that standards are based on acute effects not chronic.

Mrs Shaiela Kandel: Safety factors in standards are not a precautionary approach There is a problem with the definition of the Precautionary Principle scientists and legislators use and apply this term in different ways. With respect to EMF, a cost/benefit analysis is not possible and therefore applying the precautionary principle is not practical. If this principle is taken into account into legislation it should be in a voluntary form. Quantification of the Principle is problematic.

Dr Mirjana Moser: Difficulty with EMF is that we are talking about precautionary measures and an unknown effect. Perhaps precaution should be applied in the direction of promotion of more directed research.

Dr Shengli Niu: There is no difference between Precautionary Principle and Precautionary Approach (PA). The application of the PA:
- does not discredit the science,
- should be encouraged,
- encourages participation by stakeholders,
- can be through the provision of information and allowing the stakeholders to decide.

Dr Hilary Walker: From the policymaker's perspective, the standard is based on science and a voluntary code of practice can address the issue of precaution. A dilemma arises when the code of practice is not voluntary.

Dr John Loy: WHO should revise the Fact Sheet in the light of this discussion. It should not be pitched at the public rather at the policymakers – us!

Dr Michael Repacholi: There are three questions that need to be addressed:
- what is the nature of the problem?
- what is WHO doing?
- what process is being followed?

The WHO International EMF Project (IEMFP) was established with very clear steps and a transparency that would engender public confidence. We need to assess whether we are heading in the right direction and whether we are gaining or losing public confidence.

Dr Tom McManus: WHO has a great reputation and when the IEMFP was established in 1995 WHO's veracity and morality was put on view. WHO is not just gathering

opinions but is adding value. Yes, the IEMFP is going in the right direction but perhaps not fast enough.

Dr Mirjana Moser: Yes, the IEMFP is heading in the right direction. The Fact Sheets should clearly state the problem, provide clearer statements with less provisos.

Dr Marc Seguinot: One problem that we are facing is that in the past WHO was involved in policymaking. IEMFP needs to draw up the evidence and forget about policymaking. Need to ask whether WHO should be taking a PA.

Dr Michael Repacholi: WHO is stepping outside of its bounds in dealing with precaution. WHO is a technical health agency which makes announcements on science. The PA is very different – it is the politicians who have to apply precaution.

Dr John Loy: Unfortunately it is not always so neat. When can WHO normalize this issue? Whatever is said must be reviewed every 3 years.

Dr Michael Repacholi: The current schedule followed from discussions with IARC and ICNIRP and is as follows:

2001 IARC carcinogen identification and evaluation of static and ELF fields;
2002 WHO/ICNIRP health risk assessment of static and ELF fields;
2003 IARC carcinogen identification and evaluation of RF fields; and
2004 WHO/ICNIRP health risk assessment of RF fields.

There is a large body of ongoing research and much of this will not be published in time for the 2003 review of RF carcinogenicity.

Considerable general discussion followed.

Dr John Loy: It is clearly the decision of the IAC that the current schedule should remain. However, there is the understanding that there will be continual review of the area.

Agenda item #9
Discussion of upcoming meetings and future activities

The Cape Town meeting (WHO EMF Biological Effects and Standards Harmonization regional meeting, Cape Town, South Africa 5-7 December 2001) will now have an extra day with IEMFP Research Coordination Committee meeting to discuss RF research requirements.

The Israel review (WHO/Israel Government seminar: Bioeffects and EMF Standards Harmonization, Israel, 26-29 March 2001) was delayed and will now be in early 2002.

Additional meetings are being planned in Russia (22-24 September 2002), China and in Thailand.

Agenda item #10
Timetable of activities

Dr Michael Repacholi: We do not want to increase current activities. International reviews are completed. Risk perception/communication is almost complete. Environmental impacts are finished.

Dr Jon Loy: A reminder that there is an agreed action to provide a comprehensive visual chart of the whole IEMFP with appropriate timelines included.

Agenda item #11
Progress on funding

Initially the IEMFP was a 5-year program with some financial reserves. Some countries are currently reviewing the program and deciding on their financial commitment.

Agenda item #12
Other business

The next meeting was tentatively set for June 2002.

Dr Repacholi thanked Dr John Loy for his excellent job of chairing the meeting, Dr Colin Roy for taking the minutes and especially to Ms Sarah Bullock for her excellent meeting organization.

Meeting closed at 1250 hours.