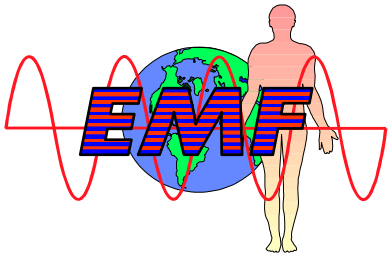

THE INTERNATIONAL EMF PROJECT

Progress Report

June 2005-2006

World Health Organization

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1. OVERVIEW

In May 1996, in response to growing public concern in many Member States over possible health effects from exposure to an ever-increasing number and diversity of EMF sources, the World Health Organization (WHO) launched an international project to assess the health and environmental effects of exposure to electric and magnetic fields, which became known as **the International EMF Project**.

The International EMF Project brings together current knowledge and available resources of key international and national agencies and scientific institutions in order to arrive at scientifically-sound recommendations for health risk assessments of exposure to static and time varying electric and magnetic fields in the frequency range 0-300 GHz**.**

This Project has been devised to provide authoritative and independent peer-review of the scientific literature. Since its inception, the objectives of the EMF Project have been to:

- review the scientific literature on biological effects of EMF exposure;
- identify gaps in knowledge requiring research that will improve health risk assessments;
- encourage a focused agenda of high quality EMF research;
- formally assess health risks of EMF exposure after the required research is completed;
- encourage internationally acceptable uniform and harmonized standards;
- provide information on risk perception, risk communication, risk management; and,
- advise national programs and non-governmental institutions on policies for dealing with the EMF issues.

An **International Advisory Committee** (**IAC**), consisting of representatives of international organizations, independent scientific institutions and national governments supporting the Project, provides oversight. The IAC meets on a yearly basis.

Over the last 11 years, activities have closely followed the original work plan, and most activities have or are being finalized. It is expected that all the health risk assessments will be completed and published by the end of 2008. After this WHO will continue to monitor and assess the health impact of new technologies. The Department of Public Health and the Environment has been re-organized to ensure that the work of the International EMF project continues.

1. 1. MEMBERSHIP

The EMF Project is open to any WHO Member State government, i.e. department of health, or representatives of other national institutions concerned with radiation protection. Over 60 national authorities are currently involved in the Project.

Over the past year, the Greek Atomic Energy Commission, that also has responsibility for EMF, has become a member of the IAC.

1. 2. COLLABORATION

The EMF Project has *formal* collaboration with two types of entities, i.e. international

agencies and independent scientific institutions (see below for details). It also collaborates in an *ad-hoc* manner with other institutes (e.g. co-sponsoring of meetings, etc) and with individuals.

International agencies

Eight international agencies are involved in the Project (http://www.who.int/peh-emf/project/intorg/en/index.html). Over the reporting period, there has been active collaboration with most of the collaborating agencies (see Table 1 below).

Table 1 - Meetings and activities with international agencies (July 05-June 06)

Agency	Meeting	Activity
ICNIRP	- Annual meeting, Sept. 2005 (Munich) - Annual meeting, May 2006 (Chicago, USA)	- co-sponsored WHO Workshop on Base stations & wireless networks: Exposure & health, Geneva June 2005 - Workshop on EMF dosimetry and biophysical aspects relevant for setting exposure guidelines, Berlin, March 2006 - agreement on preliminary review on health effects for RF EHC (to be completed by mid-2007)
IARC	- WHO participated in the INTERPHONE International Scientific Oversight Committee (Lyon, Sept 05; Geneva, May 06)	- Conduct INTERPHONE study with 13 countries to identify any relationship between mobile phone use and head and neck cancer
UNEP	-	No joint EMF activities
ILO	- ILO representative participated to the 4th International Seminar on EMFs & Biological Effects. September 2005 (Kunming, China)	- Assisting with the drafting of the brochure on occupational EMF management and standard setting
EC	-	- EMF-NET co-sponsored WHO Base Station workshop - EMF-NET co-published Special BEMS issue of Children and EMF - EMF-NET to publish Proceedings of Base stations and Electrical hypersensitivity workshops - WHO co-sponsored COST 281 Graz meeting (April 2006)
ITU		No joint EMF activities
IEC		- Participation in mobile phone SAR measurement standard with IEEE - Preparation of standard measurement techniques for EMF fields - Preparation of base station emission standard.
NATO		No joint EMF activities
IEEE	Various meetings related to	Assisted with reviews and provision of

	EMF standards	graphs and documents

Collaborating centers

The EMF Project also works with independent scientific institutions that are recognized as collaborating centers of the WHO EMF Project (http://www.who.int/peh-emf/project/Org_Stru/en/index.html). Such designation follows a formal procedure within WHO, with specified terms of reference and annual reporting of joint activities. Collaboration with these institutions over the reporting period are described in Table 2 below.

Table 2 - Activities with collaborating centers (July 2005-June 2006)

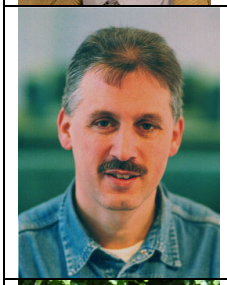
Institution	Activity
Brooks Air Force Base, TX (USA)	- Co-sponsored and participated in RF Dosimetry Workshop, Moscow Dec. 2005
ARPANSA (Australia)	- Co-sponsor of WHO regional meeting in Melbourne (Nov. 2005) - Sponsor of Australian Radiation Protection Society Conference in Melbourne (Nov. 2005) - Major contributor to the draft RF brochure for local authorities (C. Roy)
BfS (Germany)	- Reviewer on all WHO documents
FDA (USA)	- No EMF activity
Karolinska Institute (Sweden)	- Participation in workshops and provided review docs (A. Ahlbom, M Feychting)
NIES (Japan)	- Review of docs and participation in meetings (M Kabuto) - Exposure metrics of magnetic fields related to power lines and electric appliances. Bioelectromagnetics, 307-321,2006
NIEHS (USA)	- Contributor to the ELF EHC and chair of the ELF Task Group (C. Portier)
NIOSH (USA)	- Draft brochure on occupational EMF management (G. Lotz)
HPA (UK)	- ELF EHC document preparation (40% of R. Saunders time) - Major contributor to the draft RF brochure for local authorities (A. McKinlay) - Agreement on future review on health effects for RF EHC
McLaughlin Centre for Population Health Risk Assessment, University of Ottawa (Canada)	- Hosted WHO workshop on guiding public health policy in areas of scientific uncertainty, Ottawa (July 2005)

1. 3. SECRETARIAT

WHO acts as the Secretariat to coordinate, facilitate and implement the Project's workplan. The International EMF Project is part of the Radiation and Environmental

Health Unit (RAD), within the Department of Protection of the Human Environment (PHE). RAD has the responsibility for all WHO activities related to ionizing and non-ionizing radiations.

Personnel

	Dr Michael Repacholi is the Coordinator of the RAD Unit. He proposed the EMF Project to the World Health Organization in 1995 and set it up the following year. Mike will retire from WHO at the end of June 2006 and plans to have a rest until something better comes along..:-)
	Dr Emilie van Deventer oversees most of the activities of the EMF Project. Emilie works closely with Mike to complete key activities. She has also written many of the publications resulting from the WHO workshops. In addition to being Mike's right hand "man", Emilie is an adjunct professor of electrical engineering at the University of Toronto.
	Professor Chiyoji Ohkubo joined the team from April 2005. He retired from the National Institute of Public Health, Japan in March 2005. He has been the Japanese representative to the IAC since 1996 and has participated at several WHO expert working groups. Chiyoji currently responds to EMF queries from the general public, is a key editor of the ELF EHC documents and updates the research databases of the Project.
	Dr Richard Saunders spent a sabbatical year at WHO (2004-05). Since his return to the Health Protection Agency (UK), Rick has been contracted to continue to support the EMF Project for 2 days per week from March 2005 to February 2007, assisting in the preparation, development and editing of the draft ELF and RF EHCs.
	Dr Eric van Rongen has been working part-time for the EMF Project, on secondment from the Health Council of the Netherlands. He has been actively involved in the Static Fields EHC monograph and is now collaborating on the ELF fields EHC document.
	Ms Lisa Ravenscroft, a new administrative officer, started working at RAD in August 2005. She provides the administrative support for the Unit's NIR activities. She organizes meetings and workshops, and maintains the Project web page.

WHO attempts to fulfill requests for information and presentations, with priority given to national authorities. This year, the staff of the secretariat have been very busy with requests for presentations on the state of science and the EMF Project is well in excess of what could be handled. For the list of meetings with presentations by WHO staff, see below.

Funding

The project is funded only by extra-budgetary contributions from participating countries and agencies. WHO provides in-kind contributions through office space

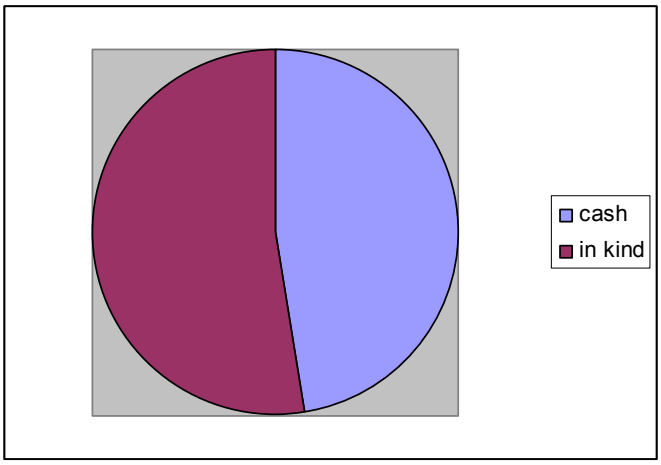
and services, and has very strict requirements regarding funds from non-government agencies. All contributions and accounting are audited by WHO.

In-kind contributions of staff time are provided by some countries. These have included contributions from Dr Colin Roy from the Australian Radiation Protection and Nuclear Safety Agency, Dr Eric van Rongen from the Health Council of the Netherlands, Dr Alastair McKinlay from the UK HPA, Dr Victor Cruz, from the Peruvian National Institute for Research and Training in Telecommunications (INICTEL) and others who have provided translations of fact sheets and other documents free of charge. In addition, some countries will host meetings or provide funds to third parties to cover costs of meetings. Entities such as the European Commission, through EMF-NET and COST 281, provide funds for speakers to attend WHO meetings. Various government or government-funded agencies contribute to the costs of meetings either directly or by supporting the travel costs of speakers. Forschungsgemeinschaft Funk e.V. supports updating the research database.

A summary of funds received and spent is given in Table 3 below. As shown, the Project expenses exceeded income. While there is considerable in-kind support given by governments and universities to the activities of the EMF Project, as shown in the figure below, funds are needed to cover WHO staff salaries and operational expenses. Funds contributed to the Project have decreased over the years. While a small reserve of funds was built up, this has now been fully depleted. A concerted funding drive is under way to complete the Project activities already started. However, if sufficient funds are not received by the end of 2006, the activities of the EMF Project will cease early in 2007.

Table 3 - Funding summary for the International EMF Project (July 2005- June 2006)

$725,000	**INCOME**
	EXPENDITURE
119,000	11.5% taken at source for WHO Program Support Costs
94,000	EMF Project staff travel
660,000	Salaries for EMF Project Staff
37,000	EMF Project management, administration, IT equipment
55,000	Activities (contributions to meetings, APWs etc)
190,000	Temporary Advisers (non-WHO staff members) travel
1,155,000	**TOTAL EXPENDITURE**



Source of resources for EMF Project in 2005

2. RISK ASSESSMENT AND SCIENTIFIC ACTIVITIES

The primary goal of the International EMF Project is to assess the health risks from EMF within the frequency range 0 to 300 GHz and to develop policy options for protection of people from EMF exposure.The key **scientific objectives** of the Project are to:

- Incorporate research results into WHO's Environmental Health Criteria (EHC) monographs where formal health risk assessments are conducted on EMF
- Assess the scientific literature and make a status report on health effects,
- Identify gaps in knowledge needing further research to make better health risk assessments,
- Encourage a focused research program in conjunction with funding agencies and the global scientific community,
- Provide a coordinated international response to concerns about possible health effects of exposure to EMF

2. 1. HEALTH RISK ASSESSMENTS

Health risk assessments, published as EHC monographs, are the result of in-depth weight-of-evidence critical reviews conducted at independent, scientific group meetings on various topics related to exposure of people to static and time varying electric and magnetic fields.

Once the draft chapters are completed, they are circulated among experts and comments are incorporated. The reviewed report is then subjected to a formally constituted WHO Task Group meeting. Membership of WHO Task Groups are approved by the Assistant Director General (Sustainable Development and Healthy Environments) of WHO and comprises representatives of the drafting committees and experts appointed by specialty, gender and geographical distribution, representing a wide range of diverse opinions on the subject under deliberation. WHO staff cannot be members of any EMF Project Working Group but are present at meetings to facilitate reaching consensus agreement on conclusions or recommendations. Following WHO technical review and editing, the final document is published by WHO.

The EHC monographs are intended to assist national and international authorities in making risk assessments and subsequent risk management decisions. They represent a thorough evaluation of risks and are not, in any sense, recommendations for regulation or standard setting. These latter are the exclusive purview of national and regional governments. However, the EMF EHCs do provide bodies such as ICNIRP with the scientific basis for reviewing their international exposure guidelines.

Static Fields

Based on the large literature on static fields, which has never been thoroughly reviewed, it was decided to draft separate monographs for static fields and another for ELF fields. The EHC on static fields was reviewed by a Task Group meeting in Geneva, December 2004. The WHO Static EHC 232 was published in March 2006 and is available at (http://www.who.int/peh-emf/publications/reports/ehcstatic/en/index.html). In order to make the monograph as useful as possible to other countries, the summary and recommendations chapter has been translated into several other languages (French, Spanish and Russian).

Extremely Low Frequency (ELF) fields
This EHC addresses the possible health effects of exposure to extremely low frequency (>0 Hz – 100 kHz) electric and magnetic fields. By far the majority of studies concern the health effects resulting from exposure to power frequency (50-60 Hz) magnetic fields; a few studies address the effects of exposure to power frequency electric fields. In addition, a number of studies have addressed the effects of exposure to the very low frequency (VLF, 3-30 kHz) switched gradient magnetic fields used in magnetic resonance imaging, and, more commonly, the weaker VLF fields emitted by visual display units (VDU's) and television receivers. The ELF EHC is organized by disease category; separate expert working groups met in order to develop drafts addressing neurodegenerative disorders, cardiovascular disorders, childhood leukaemia and protective measures.

The WHO Task Group meeting for health risk assessment of exposure to ELF fields was held in WHO Geneva, October 3-7 2005 (chaired by Dr. Chris Portier, NIEHS, USA). The ensuing draft of the EHC on ELF fields is undergoing scientific editing with the assistance of Drs Richard Saunders, Eric van Rongen and others. The final draft EHC will be distributed for comments in June 2006. The ELF EHC monograph is expected to be published by the end of 2006.

Radio Frequency (RF) fields
The draft monograph on the health risk assessment of exposure to RF fields has now been scheduled. Preliminary reviews of the health effects of RF fields are being conducted by ICNIRP. These reviews will then be updated by the Health Protection Agency Radiation Protection Division (HPA-RPD, formerly the National Radiological Protection Board in the UK) and put into the format of the EHC monographs prior to extensive reviews and final assessment by a WHO RF Task Group, most likely in early 2008. The exact timing for the RF EHC review will depend on publication of the INTERPHONE study and other key EC-funded studies and completion of the IARC carcinogen identification and classification process for RF fields.

2. 2. SCIENTIFIC REVIEWS

WHO workshops
Over the past year, four WHO specialized workshops have been conducted to assist the development of the Environmental Health Criteria monographs for EMF fields, and to provide information useful for development of EMF exposure standards.

- **WHO Workshop on Base stations & wireless networks: Exposure & health** (15-16 June 2005, WHO Geneva, Switzerland): Given the significant public concern about possible health effects caused by the fields emitted by these devices, a specialized workshop was held to assess the science. This workshop addressed exposures from mobile phone base stations and other wireless networks, future wireless technologies, a review of possible health consequences from the above, risk communication to the public and response from governments & other stakeholders to this issue. Two days of open sessions where invited speakers presented papers on the above topics The meeting was co-sponsored by the European Commission Coordination Action EMF-NET, European Cooperation in the Field of Scientific and Technical Research (COST 281), the Research Association for Radio Applications (FGF), International Commission on Non-Ionizing Radiation Protection (ICNIRP).

The outputs of this meeting are:

- A Rapporteur's report (by Dr C. Roy): http://www.who.int/peh-emf/meetings/rapporteurs_report_basestation_workshop_june2005.pdf
- A WHO Fact Sheet published in May 2006: http://www.who.int/mediacentre/factsheets/fs304/en/index.html
- Proceedings of papers are scheduled to be published soon.
- A scientific paper submitted to Bioelectromagnetics May 2006.

➢ **Workshop on guiding public health policy in areas of scientific uncertainty (**Ottawa, Canada, 11-13 July 2005**):** This workshop reviewed in detail a draft framework guiding public health policy in areas of scientific uncertainty, and provided an opportunity for discussion on its practical application and case studies. Workshop objectives were to review the draft framework, to explore the use of measures in the development of public health policy, to discuss the implications of the implementation of the draft framework with stakeholders and to explore the use of measures to guide public health policy through a series of relevant case studies. The Rapporteur's report and PowerPoint presentations are available at http://www.who.int/peh-emf/meetings/ottawa_june05/en/index.html

➢ **WHO Workshop on Radiofrequency fields: Health effects and policy options for protection** (Melbourne, Australia, 17-18 November 2005) to review the health effects of RF fields, use of additional measures when dealing with uncertainty in the science, and communication of risks to the public. This WHO workshop was held jointly between WHO and the Australasian Radiation Protection Society (ARPS). The meeting was co-sponsored by the Australian Centre for RF Bioeffects Research and Swinburne University of Technology. For the Workshop proceedings and PowerPoint presentations see http://www.who.int/peh-emf/meetings/rfworkshop_melbourne_nov05/en/index.html

➢ **WHO Workshop on Dosimetry of RF Fields** (5-7 December 2005, Moscow, Russia) Aimed at RF dosimetrists and researchers, standards setters and national authorities in Eastern Europe, the workshop provided an overview of the fundamentals of RF dosimetry and facilitated discussions on the need for high quality dosimetry in RF studies and the usefulness of the SAR concept. For PowerPoint presentations see http://www.who.int/peh-emf/meetings/dosimetry_workshop_dec05/en/index.html

Other workshops and meetings partially sponsored by WHO

Dublin, Ireland - BEMS, 19-24 June 2005: This meeting of researchers provides a forum for announcing preliminary results and discussing research methodology and projects. WHO is pleased to support this important meeting and to encourage scientists to complete projects that contribute towards WHO's research agenda.

Kunming, China - 4th International Seminar on Electromagnetic Fields & Biological Effects, 12-16 September 2005: This workshop was a biannual scientific meeting that provided researchers, public health workers and policy makers with the opportunity to discuss their results and to review their policies with respect to managing EMF issues. This meeting is also important for the harmonization of EMF standards world wide and focused discussion was held on the future of the Chinese EMF standard.

Nuremberg, Germany - 14th International Conference of Medical Physics,. 14-17 September 2005: The European Federation of Organizations for Medical Physics (EFOMP) and the American Association of Medical Physics (AAPM) jointly organize this meeting. WHO organized a symposium on EMF in Medical Physics to provide an up-to-date overview on the state of the art and on the latest developments in imaging and therapy related to radiation oncology. The conference dealt with all topics in medical physics (http://www.icmp2005.org/)

Helsinki, Finland - WHO Workshop on Application of Proteomics and Transcriptomics in EMF Research, 30 October - 1 November 2005: The use of the high-throughput screening techniques (HTST) of proteomics and transcriptomics have been proposed as a useful approach to determine all possible biological targets of EMF on the sub-cellular level. The Workshop addressed following questions: Which of the presently available HTST are the most suitable for studying EMF-induced biological effects? How can the data obtained with the use of HTST help in discovering the biophysical mechanism(s) behind any biological effects of EMF? Are we ready, and is it possible at this time, to develop a standardized test for screening future EMF frequencies in order to compare their effects with the effects of EMF frequencies already in use? The PowerPoint presentations are available from COST 281 web site at http://www.cost281.org/documents.php?node=109&dir_session= and a rapporteur's report is available at http://www.who.int/peh-emf/meetings/archive/Final%20Report%20of%20Rapporteurs%20March%2015%202006.pdf.

Melbourne, Australia - Australasian Radiation Protection Society Conference, 13-16 November 2005: In line with the conference theme of 30 Years of Radiation Safety, Research and Practice in Australia, presentations contributed papers detailing their experiences, theoretical work, practical applications and innovative techniques covering ionising and non-ionizing radiation protection of occupationally exposed persons, patients, the public and the environment. The conference held a seminar in conjunction with WHO on "Radiofrequency Fields: Health effects and policy options for protection".

Berlin, Germany - ICNIRP International Workshop on EMF Dosimetry and Biophysical Aspects Relevant to Setting Exposure Guidelines, 20-22 March 2006: The Workshop covered the whole frequency range from static to terahertz fields. Invited experts presented lectures on those topics and discussed the relevance of recent research findings with regard to exposure limits for workers and the general public. Some of the key issues included the scientific basis of safety factors for the general public and for specific subgroups (children, elderly persons, pregnant women, etc.), the dosimetric and biophysical comparison of different basic quantities, the questions associated with inhomogeneous or partial body exposure, the concepts for assessing exposure from different sources with the same or different frequencies, considerations on different exposure characteristics (non-sinusoidal, pulsed or intermittent), and the issues of temporal and spatial averaging. Existing standards were compared and biological effects and epidemiological evidence relevant to developing guidelines summarized. The workshop's main goal was to provide a forum for experts to discuss in detail the above mentioned key topics. Furthermore, the overview will serve as an input to ICNIRP when the Commission re-evaluates its exposure guidelines.

Graz, Austria - Emerging EMF-technologies Conference, 20-21 April 2006: The dramatic speed of development of new and emerging technologies results in a change

of the use pattern such as site of exposure, frequency and duration of use, and of exposure signatures such as EMF signal structure, time course, frequency and frequency bandwidth. Emerging technologies are going to involve nearly everybody of the population including potential sensitive groups such as children, pregnant, in particular their fetus, ill and elderly. Telemedicine will monitor patients with potential increased vulnerability due to their illness and/or drug treatment. The meeting reviewed scientific investigations of health-relevant aspects on emerging technologies and identified lacks of knowledge prior to market penetration of the emerging technologies and gave advice to different stakeholders such as health authorities, manufacturers and the public.

2. 3. RESEARCH COORDINATION

Research database
The EMF Project has assembled a web-based database of research projects as a service to the research community. Its purpose is to inform researchers about ongoing projects relevant to the EMF Project's mandate. It is important to stress that the database is accurate only if researchers provide timely information to the EMF Project. The Research Database is being updated and maintained with the support of COST 281 and Forschungsgemeinschaft Funk e.V. (FGF). WHO sincerely appreciates the help provided for such an important and time-consuming task.
(http://www.who.int/peh-emf/research/database/en/index.html)

As of April 2006, a link has been added on the WHO research database website to the German EMF-Portal "Knowledge-based literature data base" (http://www.who.int/peh-emf/research/database/en/index1.html). It has been developed by the Research Center for Bioelectromagnetic Interaction (femu) at the University Hospital of Aachen University and co-funded by Research Association for Radio Applications (FGF). Currently the database comprises approximately 10,000 studies.

Research agenda
In 1997, the WHO International EMF Project developed a Research Agenda in order to facilitate and coordinate research on the possible adverse health effects of non-ionizing radiation. In subsequent years, this agenda has undergone periodic review and refinement. (http://www.who.int/peh-emf/research/agenda/en/index.html).

Over the past year, two Research Agendas have been published following the completion of the Static Fields EHC and an *ad hoc* committee meeting to consolidate the RF Research Agenda.

- **Static fields:**
  http://www.who.int/peh-emf/research/smf_research_agenda_2006.pdf

- **RF fields:**
  http://www.who.int/peh-emf/research/rf_research_agenda_2006.pdf

- **ELF fields:**
  Following the finalization of the ELF EHC, a Research Agenda will be developed covering the related frequency range.

WHO input to funding agencies

The EMF Project has actively worked with international donors and national authorities to promote and fund research needs identified by WHO.

- **European Commission:** WHO has asked the EC directly and through EMF-NET to consider possible health consequences from static magnetic fields as a priority research area for their 7th Framework. The EC used WHO's EMF Research Agenda as a basis for their 5th Framework research priorities 5 years ago, making almost 20 million euros available for important EMF research areas.

- **National programmes:** The EMF Project also works with national programs to encourage them to assist with the research needs identified by WHO. Outstanding among these has been the Mobile Telephone Health Research program (MTHR) in the UK where research needs were broadly based on the WHO research agenda and approximately £18million is being spent. Results of this excellent program are now beginning to be published and are responding to key health issues raised by non-replicated studies and areas of concern not properly addressed by previous research. The newly established French foundation, "Fondation Santé et Radiofréquences" has launched a call for proposals in its first round for about 1M euros. WHO staff are represented on the scientific committees of both foundations.

3. RISK MANAGEMENT ACTIVITIES

The key **risk management objectives** of the Project are to:

- facilitate the development of internationally acceptable standards for EMF exposure,
- provide information on the management of EMF protection programs for national and other authorities, including monographs on EMF risk perception, communication and management, and
- provide advice to national authorities, other institutions, the general public and workers, about any hazards resulting from EMF exposure and any needed mitigation measures.

3. 1. STANDARDS FRAMEWORK

WHO's International EMF Project provides a unique opportunity to bring countries together, identify criteria for science-based standards setting and develop a framework for developing health-based EMF standards. It is intended that this should encourage the establishment of exposure limits and other control measures that provide the same or similar level of health protection for all people.

While WHO strongly promotes the use of international (ICNIRP, 1998) standards, some countries feel the need to develop or refine their own standards. This Framework is intended for national advisory and/or regulatory bodies that are developing new standards for EMF, reviewing the basis of their standards, or reconsidering specific quantitative values such as reference levels and safety factors. The overall purpose of this framework is to provide advice on how to develop science-based exposure limits that will protect the health of the public and workers from EMF exposure.

After several regional meetings and reviews the Framework is now available on the website at: http://www.who.int/peh-emf/standards/framework/en/index.html.

3. 2. MODEL LEGISLATION

To assist countries not having appropriate legislation to protect their population, the EMF Project has developed a Model Act and Model Regulation that provide the legal framework to provide this protection. An important aspect of this legislation is that it recommends the use of international standards that limits EMF exposure of people (ICNIRP exposure standards) and international standards that limit the emissions of EMF from devices (IEC and IEEE device emission standards). This model legislation is now available on the website at: http://www.who.int/peh-emf/standards/emf_model/en/index.html.

The Model Legislation follows the widely accepted practice among lawmakers of setting out an enabling Act which permits the responsible Minister to subsequently issue Regulations, Statutory Orders or Ordinances, as appropriate, to deal with specific areas of concern.

3. 3. POLICY FRAMEWORK

This Framework is designed as a guide for decision-makers to develop policies that are rational and based on available science. Public health policy makers need to consider measures that are reasonable and cost-effective, taking account of the uncertainties in the science.

Scientific uncertainty over the potential health effects from EMF has led several governments to adopt a cautious approach when managing EMF risks. This represents challenges and opportunities for scientists, policy makers and the public but also leads to confusion.

To discuss and test the Framework in terms of practicality, usefulness and applicability to a range of other public health issues, a workshop was held in Ottawa 11-13 July 2005. Following this meeting the document has been subjected to extensive internal and external review and it will be further discussed at the next IAC meeting.

3. 4. STANDARDS DATABASE

The International EMF Project has compiled a database of EMF standards worldwide, with the help of Professor Dina Simunic, who continues to updated it. (http://www.who.int/docstore/peh-emf/EMFStandards/who-0102/Worldmap5.htm)

3. 5. OCCUPATIONAL EMF MANAGEMENT

WHO is working with one of its collaborating centre, the US National Institute of Occupational Safety and Health (NIOSH), to draft a document entitled "Occupational EMF Management". Inputs from the directive issued by the European Commission on this topic and a monograph published by the Finnish Institute of Occupational Health contribute to this report. It is expected that the International Labour Organization will provide input and cosponsor the final report. The first draft has been completed and has been sent for review.

3. 6. COUNTRY FOCUS

In line with WHO's greater focus on country work, the **Country focus initiative**, announced in May 2002, provides a basis for WHO at all levels to intensify its response to the needs of countries. For the EMF Project, this has translated into increased technical support for meetings held in regions and countries that face a significant concerns with respect to EMF.

Countries visited over the past year to support national or regional EMF programs include: Australia, Brazil, China, Cuba, Ireland, Japan, New Zealand, Russia and Spain.

4. RISK COMMUNICATION ACTIVITIES AND RESOURCES

4. 1. ENQUIRIES

A large number of enquiries are sent to the EMF Project from the general public, the media (newspapers, TV, radio) and governments. These enquiries are usually handled by the Project staff.

4. 2. WEBSITE

The general WHO website is now set up to provide information in 6 languages (Arabic, Chinese, English, French, Russian, Spanish). The EMF Project website has partly been translated in some of these languages.

Home page

The EMF Project home page (at http://www.who.int/emf/) is continually updated and has much useful current information. It is the second most visited website in the SDE cluster.

National contacts and information

Many enquiries to the EMF Project are of a local nature. Therefore a country-focused database of information, that lists the Member States of the EMF Project, has been set up thanks to the input of the IAC members (http://www.who.int/peh-emf/project/mapnatreps/en/). Countries are encouraged to provide updated information for their respective pages.

4. 3. WHO PUBLICATIONS

All publications of the EMF Project are reviewed by the International Advisory Committee. Formal approval by WHO management is required for all publications.

Fact and Information sheets

Simple, easy to read information is currently provided through two formats: Fact Sheets and Information Sheets. Fact Sheets provide a list of facts only and are formally approved at the Director General's level. Information Sheets contain both facts and general recommendations for national authorities and are approved at Director level within WHO.

Fact Sheets published by the Project web site over the past year can be found at: http://www.who.int/mediacentre/factsheets/en/

These include:

- Electromagnetic hypersensitivity (Fact sheet no. 296)
- Static electric and magnetic fields (Fact sheet no. 299)
- Base station and wireless networks (Fact sheet no. 304)

Over the past year, many of the fact and information sheets have been translated into Arabic, Chinese, French, German Italian, Japanese, Russian and Spanish.

Policy documents

- .Framework for Developing Health-Based EMF Standards
  http://www.who.int/peh-emf/standards/emf_model/en/index.html
- Model Legislation
  http://www.who.int/peh-emf/standards/framework/en/index.html

Refereed publications

- L Kheifets, M Repacholi, R. Saunders, T.E. van Deventer, Sensitivity of Children to Electromagnetic Fields, *Pediatrics* (August 2005)
- L Kheifets, J Sahl, R Shimkhada, M Repacholi**,** Developing policy in the face of scientific uncertainty: interpreting 0.3 μT or 0.4 μT cut points from EMF epidemiologic studies, *Risk Analysis* (August 2005)
- Sensitivity of Children to EMF, Bioelectromagnetics, Supplement issue, S1-S160 (September 7, 2005)
- L Kheifets, T. E van Deventer, G. Lundel, J. Swanson, Le principe de précaution et les champs électriques et magnétiques : mise en oeuvre et évaluation, *Environnement, risques et santé* (Jan-Feb 2006)
- T.E. van Deventer, D. Simunic, M Repacholi, EMF standards for human health, chapter in *Handbook of Biological Effects of Electromagnetic Fields*, 3rd ed., F. Barnes and B Greenebaum, eds. (to be published September 2006)
- K. Hansson Mild, M. Repacholi, E. van Deventer and P. Ravazzani (Editors) Electromagnetic Hypersensitivity. Proceedings of the International Workshop on EMF Hypersensitivity, Prague, Czech Republic, October 25-27, 2004. World Health Organization, EMF_NET, Geneva (2006).
- P. Valberg, E. van Deventer, and M. Repacholi. Base stations and wireless networks: RF exposures and health consequences. Bioelectromagnetics (submitted)
- E. van Rongen, R. Saunders, E. van Deventer and M. Repacholi (2006). Static fields: Biological effects and mechanisms relevant to exposure limits. Health Physics (submitted)

4. 4. MEETINGS

WHO staff members participated in a number of local, national and regional scientific meetings:

11-13 July 2005	Ottawa, Canada	Workshop on guiding public health policy in areas of scientific uncertainty
12-16 September 2005	Kunming, China	The 4th International Seminar on EMF & Biological Effects
15 September 2005	Paris, France	Fondation Santé et Radiofréquences
20-23 September 2005	Havana, Cuba	Inter-American Congress on Environmental Health
26-29 September 2005	Sao Paulo; Rio de Janeiro, Brasilia, Brazil	Meetings on EMF Project organized by Ministry of Health
12-14 October 2005	Madrid, Spain	EMF Seminar on country recommendations
31October -1 November 2005	Helsinki, Finland	Workshop on Application of Proteomics and Transcriptomics in EMF Research
3-5 November 2005	Bordeaux, France	First Meeting of French Russian study
14 November 2005	Paris, France	Fondation Santé et Radiofréquences
7-8 November 2005	Seoul, Korea	2005 Joint Workshop on Mobile Telephony and Health
12-20 November 2005	Melbourne, Australia	WHO / Australian Radiofrequency fields: Health effects and policy

		options for protection
20-24 November 2005	Monte Verita, Switzerland	EMF Health Risk Research: Lessons Learned and Recommendations for the Future
21-22 November 2005	Wellington, New Zealand	Meeting with Ministry of Health
21-23 November 2005	Dublin, Ireland	Irish EMF Expert Group
3-8 December 2005	Moscow, Russia	Regional EMF Dosimetry Workshop, Institute of Biophysics
8-9 December 2005	Paris, France	Fondation Santé et Radiofréquences
11-13 December 2005	Helsinki, Finland	European Environment and Health Committee (EEHC)
15-16 December 2005	Copenhagen, Denmark	WHO EURO
19-20 January 2006	WHO-Geneva	EMF Meeting for Irish EMF Expert Group
24 January 2006	Brussels, Belgium	ELF Meeting with EU
31 January 2006	Paris, France	Fondation Santé et Radiofréquences
16-17 February 2006	Dublin, Ireland	Irish EMF Committee Meeting
9 March 2006	Paris, France	Fondation Santé et Radiofréquences
17-22 March 2006	Berlin, Germany	ICNIRP/WHO International Workshop on EMF Dosimetry and Biophysical Aspects relevant to Setting Exposure Guidelines
29-31 March 2006	The Hague, the Netherlands	Irish EMF Expert Group Meeting
20-21 April 2006	Graz, Austria	COST 281 meeting
24 April 2006	London, United Kingdom	MTHR committee meeting
3-5 May 2006	Dublin, Ireland	Irish EMF Expert Group meeting
4-5 May 2006	Berlin, Germany	Workshop on characterizing scientific evidence
11 May 2006	Paris, France	Fondation Santé et Radiofréquences
1-2 June 2006	Dublin, Ireland	Irish EMF Expert Group meeting

5. FUTURE ACTIVITIES

5. 1. PUBLIC HEALTH MANAGEMENT

Several documents are planned for the coming year:

- As a complementary report to the occupational management brochure, a report on Public Health Management of EMF will be started soon and use the many inputs from national programs and especially the policy options drafted along with the EHC reviews. WHO will be approaching its collaborating centres to assist on the completion of this document.

- A brochure for local authorities is being developed on ELF fields, and will provide local authorities with all the information they need to plan and approve the siting of power lines and similar installations. The Brochure is also intended to provide information on levels of ELF fields and risks of exposure to all sources of ELF magnetic field exposure. Dr Andrew Wood from Swinburn University, Melbourne have been assisting in the preparation of the brochure.

- A similar brochure for local authorities is being developed on Base Stations and Wireless Networks. and will provide local authorities with all the information they need to plan and approve the installation of mobile phone base stations. The Brochure is also intended to provide information on levels of RF fields and risks of exposure to all current wireless network fields. Drs Colin Roy (ARPANSA) and Alastair McKinlay (UK HPA) have been assisting in the preparation of the brochure.

5. 2. INTERNATIONAL RECOMMENDATIONS

A booklet with the recommendations on EMF standards, protection and safety will be produced by the international organizations participating in the EMF Project. It is intended that a booklet, published by WHO, will have all the international logos will be completed in the 2007.

5. 3. DISTANCE LEARNING PROGRAMS

Another activity undertaken by the Project is a series of distance learning programs.

Quality criteria for studies to be useful in health risk assessments: A Web-based course is being built for young scientists who undertake bioelectromagnetics research. The Web course package will be available on the Website of the International EMF project. It spans across the whole spectrum: DC to mm. The approach is experimental (i.e. laboratory investigations and not epidemiology), but in the context of health risk assessment and standard setting. The content is based in part on what already exists (2004 Erice course, various university courses in Europe). The website will be opened to a forum where young scientists can ask questions and share their experience. The title is the same as that of the Erice course: “Methodology in Bioelectromagnetics research”, but with a broader scope. It will benefit to other audiences such as teachers and the general public. The Web course will be accessible in the Autumn of 2006.This work has been spearheaded by Professor B. Veyret, University of Bordeaux (on sabbatical at the University La Sapienza, Rome).

- **Web-based Distance Learning Program for children about EMF**. This work is being developed by Professor Ng (University of Malaya, Kuala Lumpur). With the rapid advances in EMF technologies and communications, children are increasingly exposed to EMF at earlier ages. This program is designed to provide scientific and health information to children and teenagers (aged 5 to16 years) about EMF. A global online survey has started to compile information on school children's understanding of EMF and mobile phone technology. The findings of this survey provide the baseline for developing this Web-based program, which will include interactive animation and sound, educational games, quizzes, cool facts, resources and a readers' forum. Work-in-progress of the Web learning program can be viewed at http://radiology.um.edu.my/emf/.

5. 4. UPCOMING MEETINGS

2006 Bioelectromagnetics (BEMS) Conference (Cancun, Mexico, June 11-15, 2006). This is a meeting of researchers that provides a forum for announcing preliminary results and discussing research methodology and projects. WHO is pleased to support this important meeting and to encourage scientists to complete projects that contribute towards WHO's research agenda.

28th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (New York, USA, 30 August to 3 September 2006)**.** The general theme of the IEEE EMBS 2006 Conference is "Engineering Revolutions in BioMedicine" covering the broad spectrum of the medical physics, biological and biomedical sciences, and biomedical and clinical engineering. Specific themes include Molecular Imaging, Neural Engineering, Nano-Technologies for Biomedical Applications, Computational Biology and Bio-Informatics, Technical Innovations in Pharmaceutical Industry, and Bio-Counterterrorism and Bio-Defense Technologies. Special symposium and workshops would be conducted with leaders in the respective fields providing an overview as well as in-depth description of the cutting-edge research technologies.

International Conference on Environmental Epidemiology & Exposure (Paris, France, Sept. 2-7, 2006) This Conference is a unique opportunity for the scientific community concerned with the future of human environment including our village, our planet and current and future generations and will discuss how the precautionary principle may change the way scientists work.

4th International Workshop on Biological Effects of Electromagnetic Fields (Crete, Greece, 16-20 October 2006) This workshop is a biannual scientific meeting that provides researchers and policy makers with the opportunity to discuss their results and to review their policies with respect to managing EMF issues. This popular meeting also provides an opportunity for the EMF project to give an update of the results of activities to a wide geographical audience.

International Seminar on Electromagnetic Fields: Problems and perspectives of EMF exposure assessment. (Ljubljana, Slovenia and Zagreb, Croatia, 12-15 September 2006). The aim of the Seminar is to facilitate a proactive discussion of upcoming issues on human exposure assessment to ensure high quality assessment and reliable results. Three areas will be discussed: legislation and accreditation; numerical and measured exposure assessment; and dealing with uncertainty.

FOR FURTHER INFORMATION ON THE INTERNATIONAL EMF PROJECT

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