THE INTERNATIONAL EMF PROJECT

Progress Report

June 2006-2007

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 develop 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,
- encourage internationally acceptable 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 12 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 2010. After this, WHO will continue to monitor and assess the health impact of new technologies. The Department of Public Health and Environment is committed to ensuring 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.

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 06-June 07)

Agency	Meeting	Activity
ICNIRP	- Scientific meeting of the Commission (Tokyo, Japan, 8-11 Nov., 2006) - Joint ICNIRP, EMF-NET and WHO International Workshop on "Current Trends in Health & Safety Risk Assessment of Work-Related Exposure to EMFs", (Milan, Italy, 14-16 February, 2007)	- Review of health effects from RF fields, commissioned by WHO in 2005. The work is in progress and is expected to be finalized in 2007. - ICNIRP co-publisher of the EHC on ELF fields
IARC	- Meeting with E. Cardis on radiation matters	- Participation in the Oversight Committee of the INTERPHONE study to identify any relationship between mobile phone use and head and neck cancer
ILO	- Participation of Dr S. Niu in the Occupational Exposure meeting in Milan in Feb. 2007	- Assistance with the drafting of the brochure on occupational EMF management and standard setting - ILO co-publisher of the EHC on ELF fields
EC	- Joint ICNIRP, EMF-NET and WHO International Workshop (Milan, Italy, 14-16, February, 2007) - Joint workshop with EC EMF-NET, EC JRC, WHO and Society of Risk Analysis on EMF risk communication: "Effective Risk Communication in the context of uncertainty" (Stresa, Italy, 2-4 May, 2007 - Third Mobile Communications Seminar on Health, Environment and Society---Risk Assessment, Risk Evaluation, Deployment Risks, Brussels, 20-21 Nov. 2006, with EC DG Enterprise And Industry - COST 281 - Potential Health Implications from Mobile Communication Systems, Brussels, 17 Nov. 2006 - EMF-NET - Advisory Board meeting, 11 October 2006	- EMF-NET co-publisher of proceedings on base stations and wireless networks - Review of SCENIHR report from DG SANCO
ITU		- Preparation of a joint meeting for November 2007 in Geneva
IEEE	Various meetings related to EMF standards	Assisted with reviews and provision of graphs and documents
IEC		No joint EMF activities
NATO		No joint EMF activities

UNEP		No joint EMF activities

WHO collaborating centres

A WHO collaborating centre (CC) is an institution designated by the Director-General to form part of an international collaborative network carrying out activities in support of the Organization's programme at all levels. Such designation follows a formal procedure within WHO, with specified terms of reference and annual reporting of joint activities (http://intranet.who.int/homes/kcs/collaborating_centres).

The EMF Project works with several independent scientific institutions that are recognized as collaborating centers of WHO (http://www.who.int/peh-emf/project/Org_Stru/en/index.html). Collaboration with these institutions over the reporting period is described in Table 2 below. With effect from 1 June 2007, processing of designations, redesignations and discontinuations of CCs will be done electronically.

Table 2 - Activities with collaborating centers (July 2006-June 2007)

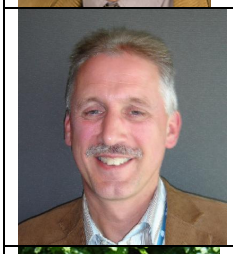
Institution	Activity
Air Force Research Laboratory, TX (USA)	- Co-organization of the International EMF Conference 2007 (Kuala Lumpur, Malaysia, June 4- 8)
ARPANSA (Australia)	- Major contributor to the draft RF brochure for local authorities (C. Roy)
BfS (Germany)	- WHO attended most of the international workshops on projects conducted under the German Telecommunication Research Programme - EvD provided a Rapporteur's report for the workshop on Risk Communication, October 18-19
Karolinska Institute (Sweden)	- Participation in drafting of documents (A. Ahlbom)
NIOSH (USA)	- Draft brochure on occupational EMF management - Participation in the Milan meeting on occupational exposures (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) - Assistance with editing of WHO documents (A. McKinlay)
McLaughlin Centre for Population Health Risk Assessment, University of Ottawa (Canada)	No joint EMF activity

1. 3. SECRETARIAT

The WHO staff involved in the EMF Project 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

Public Health and Environment (PHE). RAD has the responsibility for all WHO activities related to ionizing and non-ionizing radiation. Dr Michael Repacholi, formerly Coordinator of RAD, retired at the end of June 2006 because of UN mandated age requirements. Since then, Dr van Deventer has been Acting Coordinator for the RAD Unit, with administrative responsibility of the ionizing and non-ionizing areas of the Unit as well as leading the WHO EMF Project. Professor Chiyoji Ohkubo left WHO in March 2007 at the end of his two-year contract. It is expected that a staff position for EMF will be advertised in the coming months.

Personnel

	Dr Emilie van Deventer leads the activities of the EMF Project. She has been involved as a scientist in the Project since 2000.
	Professor Chiyoji Ohkubo joined the team from April 2005 after retiring from the National Institute of Public Health, Japan. He has been the Japanese representative to the IAC since 1996 and has participated at several WHO expert working groups. During his stay, Chiyoji responded to EMF queries from the general public, was a key editor of the ELF EHC documents and updated 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 Static Fields and Extremely Low Frequency fields EHC monographs.
	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 instrumental in the development of the Static Fields and Extremely Low Frequency fields EHC monograph.
	Mrs Lisa Ravenscroft has been working as a Secretary with RAD since August 2005. She provides administrative support in all aspects of the Unit's non-ionizing activities and outputs, as well as maintaining the EMF Project web site.

WHO attempts to fulfill requests for information and presentations, with priority given to national authorities. This year, with staff departures, sick leaves and added responsibilities of the remaining staff, not all requests could be honored. For the list of meetings with presentations by WHO staff, see Section 4.6 below.

Funding

The project is currently funded solely through extra-budgetary contributions from participating countries and other agencies. All contributions and accounting are audited by WHO.

- Several governments provide either periodic or ad-hoc direct contributions to the WHO EMF Project, while others support financially specific activities.
- Through an agreement set up in 1995 between WHO and the Royal Adelaide Hospital (RAH) in Australia, RAH provided financial management of funds received from contributions of non-governmental entities on behalf of the Project. Dr Repacholi was seconded from RAH to WHO from the time of the agreement until his retirement from WHO in June 2006. Following Dr Repacholi's departure, the agreement was terminated in early 2007. New funding sources are now being sought.
- 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 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, have provided funds for speakers to attend WHO meetings.

A summary of funds received and spent is given in Table 3 below.

Table 3 - Funding summary for the International EMF Project (July 2006 - June 2007)

	INCOME
$249,682	**Governments**
$529,820	**Others**
USD 779,502	**TOTAL INCOME**
	EXPENDITURE
$361,287.40	Salaries for EMF Project Staff
$9,011.44	Management and administration costs
$62,304.33	EMF Outputs (APWs, publications, translations, …)
$38,333.66	Meetings costs and contribution to meetings worldwide
$14,696.70	Staff travel costs
$45,245.98	Temporary Advisers travel
$69,014.34	Programme Support Costs (PSC)
USD 599,893.85	**TOTAL EXPENDITURE**

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:

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

2. 1. HEALTH RISK ASSESSMENTS

Background

The health risk assessments related to chemicals, and biological and physical agents developed by WHO are published in the Environmental Health Criteria (EHC) series (http://www.who.int/ipcs/publications/ehc/en/). Three monographs on electromagnetic fields (EMF) have previously addressed possible health effects from exposure to extremely low frequency (ELF) fields (1984), static and ELF magnetic fields (1987), and radiofrequency (RF) fields (1993). They were produced in collaboration with the United Nations Environment Programme (UNEP), the International Labour Office (ILO) and the International Non-Ionizing Radiation Committee (INIRC) of the International Radiation Protection Association (IRPA) and from 1992 the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

EHC monographs are usually revised if new data are available that would substantially change the evaluation, if there is public concern for health or environmental effects of the agent because of greater exposure, or if an appreciable time period has elapsed since the last evaluation. The EHCs on EMF are being revised and published as a set of three monographs spanning the relevant EMF frequency range (0-300 GHz); static fields (0Hz), ELF fields (up to 100 kHz, this volume) and RF fields (100 kHz – 300 GHz).

Process

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

The EHC monograph on static fields (N° 232) was reviewed by a Task Group meeting in Geneva, December 2004 and published in March 2006. It is available at (http://www.who.int/peh-emf/publications/reports/ehcstatic/en/index.html).

To accompany this document, several other outputs were developed, including

- A WHO fact sheet on "Static Fields" (N° 299) http://www.who.int/mediacentre/factsheets/fs299/en/index.html)
- A Research Agenda for static fields, whose aim is to inform researchers and funding agencies alike. Since its publication, it has been referenced by several funding agencies, including the European Commission in their FP7 call for proposals, as well as the Dutch and other national funding agencies.
- An Online summary of the Static Fields monograph, developed by GreenFacts, a non-profit, non-advocacy organization (http://www.greenfacts.org/en/static-fields/).

The first chapter of the monograph, providing a comprehensive summary and research recommendations is available in several languages in the print version (French, Spanish and Russian) and additional ones on the Project website (Japanese and Italian).

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 EHC monograph on extremely low frequency fields (N° 238) was reviewed by a Task Group meeting in WHO Geneva, October 3-7 2005 (chaired by Dr. Chris Portier, NIEHS, USA). The text of the EHC was subsequently edited for clarity and consistency by an Editorial Group consisting of Dr Rick Saunders, Health Protection Agency, Chilton, UK, Dr Eric van Rongen, Health Council of the Netherlands, Prof. Leeka Kheifets, UCLA School of Public Health, Los Angeles, CA, USA, Dr Chris Portier, NIEHS, Research Triangle Park, NC, USA, and Prof. Emilie van Deventer and Prof. Chiyoji Ohkubo, both from WHO, Geneva, Switzerland.

Following three editorial meetings within the reporting period (Rome, 27 Sept. 2006; Geneva, 9-10 Oct. 2006 and 8-9 March 2007), a final review by the Task Group and further editing and formatting, the EHC was published on the International EMF Project's website in June 2007. It is available at (http://www.who.int/peh-emf/publications/elf_ehc/en/index.html).

To accompany this document, several other outputs are being developed, including

- A WHO fact sheet (no. 322) entitled *Electromagnetic fields and public health: Exposure to extremely low frequency fields*
  http://www.who.int/mediacentre/factsheets/fs322/en/index.html
- An ELF Research Agenda for extremely low frequency fields, based on the research recommendations of the EHC Task Group
  http://www.who.int/peh-emf/research/agenda/en/index.html
- A number of scientific peer-reviewed papers will be developed based on the findings of the ELF EHC
- A Local Authorities brochure related to ELF policies (see Section 3.6 below).

Radio Frequency (RF) fields

A review of scientific knowledge on the health effects of radiofrequency (RF) fields has been commissioned by WHO to ICNIRP for the end of 2007. This review will serve as an input to the WHO Environmental Health Criteria monograph on RF fields.

Chapters for the monograph will first be developed by individual experts or working groups, and then the collated document will be sent for extensive review, prior to the Task Group meeting. The procedures for the development of the monograph are clearly delineated, but the timing is still uncertain. The development of some of the chapters of the RF EHC will start in Autumn 2007. However, the schedule of the Task Group review meeting will depend on the publication of key studies (e.g. the INTERPHONE epidemiological study) and on the completion of the IARC monograph on the carcinogenicity of RF fields, currently scheduled for end of 2009.

2. 2. SCIENTIFIC REVIEWS

WHO co-sponsored workshops

WHO considers that a co-sponsored meeting is one organized by an external entity and for which WHO provides a high level support and technical input. WHO co-sponsorship is subject to approval by the WHO Legal Office and by the Assistant Director General of the Cluster.

Over the past year, three workshops have been co-sponsored by WHO according to these rules. These meetings were useful in providing information to specific WHO activities, or to provide an opportunity to discuss EMF issues at country and regional level.

- **International Workshop on "Current Trends in Health & Safety Risk Assessment of Work-Related Exposure to EMFs"** (Milan, Italy, February 14-16, 2007)
  This meeting was co-organized with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - an NGO in formal relations with WHO - and the European Commission EMF-NET FP6 Co-ordination Action.

The meeting was set up to discuss practical problems related to the risk assessment of work-related exposure to electromagnetic fields (EMFs). One of the catalyst for this meeting is the forthcoming implementation of EMF exposure limits to workplaces as requested by the European Directive on protecting workers from health risks of exposure to EMFs. Gaps in knowledge were identified on real exposure of workers, and on provisions for appropriate protective measures to reduce exposure and health risks. In addition, practical methods for risk characterization and exposure assessment on specific workplaces are not well established. The interdisciplinary approach at this workshop aimed at summarizing the current scientific knowledge and the uncertainties in regard to risk assessment of workplaces, which provided the basis for discussion between scientists, national radiation protection authorities and relevant stakeholders. All frequency ranges, from static fields up to radiofrequency fields, were covered. Special attention was given to the compliance testing and uncertainties in measurements and numerical dosimetry. The particular needs of workers with medical electronic implants and pregnant workers were also discussed. The meeting was co-sponsored by ISPESL, VITO, ISIB-CNR, CIOP-PIB, ICEmB, NIWL and FIOH.. Abstract and presentations of all lectures are available at http://www.icnirp.de/JointWorkshopEMFabstracts.htm.

- **2nd Workshop on EMF risk communication on "Effective Risk Communication in the context of uncertainty"** (Stresa, ITALY - May 2-4 2007) This meeting was co-organized with the European Commission, Joint Research Centre (JRC), Institute for Health and Consumer Protection, Physical and Chemical Exposure Unit (Ispra, Italy), the European Commission EMF-NET FP6 Co-ordination Action - Istituto di Ingegneria Biomedica, CNR, Milano, Italy , and in collaboration with the Society for Risk Analysis (SRA): SRA-Europe section section and SRA's Risk Communication Specialty Group. http://www.jrc.ec.europa.eu/eis-emf/stresa2007.cfm

  This workshop aimed at discussing the communication of risk from both a theoretical and practical level, and the methods and conditions for an effective risk communication in the context of uncertainty. Practical experiences in different areas were discussed, with particular emphasis on the communication of uncertain risks from exposure to EMF non-ionizing radiation.

- **International EMF Conference 2007 Electromagnetic Fields, Bioeffects Research, Medical Applications, and Standards Harmonization**, (Kuala Lumpur, Malaysia, June 4-6, 2007) and a **Short course on EMF Safety Management** (Kuala Lumpur, Malaysia, June 7-8, 2007)
  The conference was co-organized with the University of Malaya and the United States Air Force Research Laboratory (United States Air Force Office of Scientific Research, a WHO Collaborating Centre).

  The conference provided an opportunity for research scientists, technical experts, engineers, physicians, medical technologists, system users, safety managers, and standards setters to discuss some of the most recent activities in their area of interest. http://radiology.um.edu.my/emf2007/

Other meetings in collaboration with WHO

- **Cancun, Mexico - BEMS,** 11-15 June 2006: This scientific meeting of researchers provides a forum for announcing preliminary results and discussing research methodology and projects.

- **4th International Workshop on Biological Effects of Electromagnetic Fields**, 16-20 October 2006, Crete, Greece on Biological Effects of Electromagnetic Fields.

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 (http://www.who.int/peh-emf/research/database/en/index.html)

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).

Recently updated research agendas were published for static fields in early 2006, followed by an update of the RF fields in Spring 2006. The Research Agenda for ELF fields has been compiled following the ELF EHC monograph review and is available on the web.

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. The EMF Project also works with national programs to encourage them to assist with the research needs identified by WHO. WHO has been represented on the scientific committees of the Mobile Telephone Health Research program (MTHR) in the UK and the French foundation, "Fondation Santé et Radiofrequences".

3. RISK MANAGEMENT ACTIVITIES

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

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. FRAMEWORK FOR DEVELOPING STANDARDS

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. 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 Framework is 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. 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.

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 available on the website in English and Spanish (thanks to the help of INICTEL in Peru) at: http://www.who.int/peh-emf/standards/emf_model/en/index.html, and is being translated in Chinese.

Several countries are currently studying this document, and discussions have been held with the Chamber of Deputies of Brazil, a delegation of the Czech Parliament and other bodies in Pakistan and Saudi Arabia.

3. 3. POLICY FRAMEWORK

The WHO "*Framework for guiding public health policy options in areas of scientific uncertainty"* has been further edited over the past year. However, final clearance is on hold pending internal discussion within WHO.

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 update it. (http://www.who.int/docstore/peh-emf/EMFStandards/who-0102/Worldmap5.htm)

3. 5. OCCUPATIONAL EMF MANAGEMENT

WHO has been developing a document entitled "Occupational EMF Management" with the US National Institute of Occupational Safety and Health (NIOSH), one of its collaborating centre, and the International Labour Organization (ILO). The objective of this document is to provide information and guidance for appropriate occupational applications and interventions and to develop strategies to prevent occupational harm resulting from such exposures. The booklet deals with occupational exposures to electromagnetic fields, including those fields associated with the delivery and use of electricity, electrical equipment, and devices that emit radio frequency electromagnetic radiation. It is intended to provide practical advice to workers, managers, industrial hygienists and occupational safety and health and other professionals who are not experts in EMF exposure assessment, but require more than a general understanding of workplace EMF exposures in order to carry out the evaluation, management and control of such exposures in all types of workplace environments.

A first draft has been completed and reviewed. After the February meeting in Milan, (co-sponsored by ICNIRP and EMF-NET), it was decided to refine the content of the document to complement a number of other related products that are currently being developed prior to the implementation of the EC Directive in April 2008. The final document will be a general guide, targeting an international audience beyond the European countries that will have to implement the EC Directive.

3. 6. LOCAL AUTHORITIES BROCHURES

At the local level, municipalities often have authority over land use and building and installation permits for power lines and mobile telephony base stations. As such, they are often confronted directly by public anxiety and discontent. Municipalities sometimes override national regulations, and introduce further conservative measures based on political considerations rather than science. It is therefore important that local authorities be given a minimum knowledge of the EMF issue to answer questions from the public or be ready to direct requests to appropriate sources of information. To that end, the following documents are being finalized:

- A brochure for local authorities is being developed on ELF fields, which will provide local authorities with information regarding the current public health knowledge about exposure to 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 Swinburne University, Melbourne has been assisting in the preparation of the brochure.

- A similar brochure for local authorities has been developed on Base Stations and Wireless Networks and will provide local authorities with information needed 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.

3. 7. 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 significant concerns with respect to EMF.

Countries visited over the past year to support national or regional EMF programs include: Brazil, El Salvador, Germany, Greece, France, Ireland, Italy, Japan, Malaysia, Peru and the United Kingdom.

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. Depending on the nature of the enquiries, these are usually handled by the Project staff or by communications officers of WHO. Requests in other languages are often forwarded to IAC members for translation and/or response.

4. 2. WEBSITE INFORMATION

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. We wish to thank all the colleagues who have provided translations in their own languages.

Home page

The EMF Project website (http://www.who.int/emf/) is regularly updated and has much useful current information.

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. DISTANCE LEARNING PROGRAMS

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

Web-based course for young researchers

The website will be opened to a forum where young scientists can ask questions and share their experience. The course is entitled is “Methodology in Bioelectromagnetics research”. It spans across the whole spectrum: DC to mm. Its content is based in part on existing material (e.g. Erice course and other various university courses in Europe). This work has been spearheaded by Professor B. Veyret, University of Bordeaux (while on sabbatical at the University La Sapienza, Rome). The primary audience is the community of young scientists world-wide undertaking Bioelectromagnetics research as it introduces physics to the biologists and biology to the physicists. However, the course should be useful to other audiences: teachers, general public, etc. It is in its initial format accessible for comments at: http://www.jrc.ec.europa.eu/emf-net/bioEMF/index.html

Web-based Distance Learning Program for adolescents about EMF

This work is being developed by Professor Ng (University of Malaya, Kuala Lumpur) to design and implement a web-based educational portal on electromagnetic fields (EMF), targeted towards adolescents. The project is now well into its implementation stage. Designs for three core modules – the fundamentals of electromagnetism, a brief glimpse into the discovery of electromagnetism, and highlights of the electromagnetic spectrum – have been finalized and are undergoing implementation and testing. Modules yet to be completed include an overview of communication technology, electric power in daily life, and safety issues in radiofrequencies. The application has

also undergone a complete restructuring to enable support for multiple languages. Work in the near term will now focus on improvements to the syllabus based on feedback from selected test groups. http://radiology.um.edu.my/emf/.

4. 4. CAPSTONE REPORT

The EMF Project was asked to host a capstone project within the Master of Public Affairs (MPA) at the Ecole de Sciences Politiques in Paris (http://mpa.sciences-po.fr). This program is run in partnership between Sciences Po Paris, the London School of Economics and Political Science, and Columbia University in New York.

A capstone is a small-group consultancy project, designed to provide a response to a policy problem. The goal of the capstone was to design a methodology of communication on the risks of ELF. The capstone was supervised by two senior fellow researchers, Olivier Borraz (CNRS) and Pierre-Benoit Joly (INRA). The team comprised four students from the MPA and spanned from February to May 2007. The report will be available on the WHO website as soon as it is finalized.

4. 5. 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 sheets

Simple, easy to read information is provided through fact sheets that are formally approved by the Director General's Office. The latest Fact Sheets published by the Project web site can be found at: http://www.who.int/mediacentre/factsheets/en/

These include:

- Exposure to extremely low frequency fields (Fact sheet N° 322)
- Base station and wireless networks (Fact sheet N° 304)
- Static electric and magnetic fields (Fact sheet N° 299)
- Electromagnetic hypersensitivity (Fact sheet N° 296)

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

Refereed publications

- 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 (June 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., Biological and Medical Aspects of Electromagnetic Fields, F. Barnes and B Greenebaum, eds., CRC Press (2007)
- P. Valberg, E. van Deventer, and M. Repacholi. Workgroup Report: Base Stations and Wireless Networks: Radiofrequency (RF) Exposures and Health Consequences. Environmental Health Perspectives, March 2007, vol. 115, no. 3
- E. van Rongen, R. Saunders, E. van Deventer and M. Repacholi (2006). Static fields: Biological effects and mechanisms relevant to exposure limits. Health Physics, June 2007, vol. 92, no. 6

4. 6. MEETINGS

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

12-15 June 2006 (MR, CO, EvD)	Cancun, Mexico	BEMS 2006
19-20 June 2006 (EvD)	Lima, Peru	
29 August 2006 (EvD)	Zurich, Switzerland	Nokia EMF Day
30 Aug-1 September (EvD)	Didcot, Oxfordshire, UK	HPA Editorial meeting
20 September 2006 (EvD)	Paris, France	Fondation Santé et Radiofréquences
27-28 September 2006 (EvD)	Rome, Italy	ELF EHC Editorial meeting & visit to WHO EURO office
6 October 2006 (EvD)	Ispra, Italy	Organizing Committee: Second Workshop EMF Risk Communication
11 October 2006 (EvD)	Brussels, Belgium	EMF-NET Advisory Board meeting
16-20 October 2006 (CO)	Crete, Greece	4th International Workshop on Biological Effects of Electromagnetic Fields
18-19 October 2006 (EvD)	Munich, Germany	International Workshop on Results Related to Risk Communication from the German Mobile Telecommunication Research Programme
27 October 2006 (EvD)	Paris, France	Fondation Santé et Radiofréquences
14-15 November 2006 (CO)	Tokyo, Japan	2006 Joint Workshop on Radio Frequency (RF) and Health
17 November 2006 (EvD)	Brussels, Belgium	COST 281 - Potential Health Implications from Mobile Communication Systems presentation
20-21 November 2006 (EvR)	Brussels, Belgium	Third Mobile Communications Seminar on Health, Environment and Society--- Risk Assessment, Risk Evaluation, Deployment Risks
27-29 November 2006 (CO)	Stuttgart, Germany	Workshop: 'Do Children Represent a Special Sensitive Group for EMF-Exposure? - State of Research'
7-8 December 2006 (EvD)	Paris, France	Fondation Santé et Radiofréquences, Capstone project

17-18 January 2007 (EvD)	Paris, France	Fondation Santé et Radiofréquences and Capstone Project
13 February 2007 (EvD)	Paris, France	Fondation Santé et Radiofréquences
14-16 February 2007 (EvD)	Milan, Italy	Joint ICNIRP, EMF-NET and WHO Workshop
22 March 2007 (EvD)	Paris, France	Fondation Santé et Radiofréquences
10-13 April 2007 (EvD)	Bordeaux, France	8th Meeting of the European BioElectromagnetics Association
16 April 2007 (EvD)	San Salvador, El Salvador	OAS/CITEL II RNI Seminar

18 April 2007 (EvD)	Brazilia, Brazil	SEMINÁRIO INTERNACIONAL - Radiação Eletromagnética
2-4 May 2007 (EvD)	Stresa. Italy	EMF Risk Communication Workshop
4-6 June 2007 (EvD)	Kuala Lumpur, Malaysia	International EMF Conference 2007
22 June 2007 (EvD)	Chilton, Oxfordshire	HPA seminar series

5. FUTURE ACTIVITIES

5. 1. PUBLIC HEALTH MANAGEMENT

As a complementary report to the occupational management brochure, a report on Public Health Management of EMF will be developed that uses 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.

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 should be completed in 2008.

5. 3. UPCOMING MEETINGS

WHO Meetings

- **WHO workshop on Developing and implementing protective measures for ELF EMF** (Geneva, Switzerland, June 20-21, 2007) The aim of this workshop is to provide a forum for discussing low cost policy options, as recommended in the upcoming WHO ELF Environmental Health Criteria. The audience is expected to include representatives from governments, industry, and consumer groups.

  The goals of this workshop are:
  1. to describe the scientific background and sustained uncertainty that underpins the recommendations for low-cost protective measures in the ELF EHC;
  2. to provide a public health perspective with health economics arguments;
  3. to review residential sources of ELF and the types and costs of mitigation measures to reduce field exposure;
  4. to review different national policies in a view to assist governments and other stakeholders in developing practical and effective policy measures;
  5. to discuss the cost and feasibility of different options, including other factors (e.g. land cost; land scale, economical development, public concerns, energy demands);
  6. to assist governments in communicating on this issue with the public.

Other conferences with WHO participation

- **South African Mobile Phone Symposium (**Johannesburg, South Africa**,** October 7-9 2007) The purpose of the Symposium is to provide an opportunity to all interested parties (especially from the Southern African Development Community (SADC)) to obtain the latest information on aspects of mobile telephony as it relates to health, standards, compliance and precaution.
  https://www.sabs.co.za/code/index.html

- **5th International Seminar on Electromagnetic Fields and Biological Effects** (Zhangjiajie, China, October 17-19, 2007)
  This seminar aims to promote international EMF research cooperation and

harmonize standardization of EMF around the world. The former four seminars were successfully held, the seminars have been recognized as the conventional affairs for related administrative governmental departments (MOH and EPA, etc.), researchers and graduates specialized in EMF study in China.
Contact person: Prof. Zhaojin Cao, National Institute of Environmental Health & Related Product Safety (NIEHS), Chinese Center for Disease Control and Prevention (China CDC), People's Republic of China.
http://www.emfhealth.com/english/

- **12th International IRPA Congress** (Buenos Aires, Argentina, October 19-24, 2008)
  The Congress agenda will address both ionizing and non-ionizing radiation and will promote a full and wide engagement of the radiation protection profession.
  The Congress will focus on three major areas: (1) The epistemology of radiation, namely the methods, the validity and the scope of current knowledge of the physical and biological sciences in relation to the effects of radiation exposure; (2) the paradigm of radiation protection, namely the conceptual model for keeping people safe from the health effects due to radiation exposure; (3) the practice of radiation protection, namely the actual application and use of radiation protection plans and methodologies by practitioners and industries making use of radiation.
  http://www.irpa12.org.ar/

FOR FURTHER INFORMATION ON THE INTERNATIONAL EMF PROJECT
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