INTERNATIONAL EMF PROJECT
17th International Advisory Committee

Salle C, WHO Headquarters, Geneva, Switzerland
Tuesday 5 and Wednesday 6 June 2012

Rapporteur – Martin Gledhill, representative of the Ministry of Health of New Zealand

Tuesday 5 June

Opening of the meeting

Maria Neira, WHO Director of the department of Public Health and Environment (PHE), opened the meeting and welcomed the participants. She commented on the IARC classification of RF fields, and the concerns that this had raised amongst Member States and some members of the public. This highlighted the need to provide a full, well-communicated risk assessment, and the best policy advice to Governments.

The role of the PHE department is to determine environmental determinants of health, promote the prevention of environmental risks communicate about them. In order not to miss possible risks, they must also define the research agenda.

Election of Chair and Vice-Chair

Lindsay Martin (ARPANSA) and Efthymios Karabetsos (Greece) were elected chair and vice chair respectively.

Lindsay Martin took the Chair and delegates introduced themselves. The proposed agenda was adopted.

Update on the International EMF Project *E. van Deventer*

Emilie van Deventer spoke to her report, and said that while in many areas WHO sets norms and standards, this is left to other organisations in the field of non-ionizing radiation (NIR). The role of WHO is to facilitate the work programme of the EMF Project, as advised by the IAC.

ARPANSA and BfS are active collaborating centres for the Project, the HPA is under designation and ANSES is under discussion. The Project is entirely funded by extra-budgetary contributions. Contributions are currently low, and in-kind contributions (e.g. to translate documents) are always welcome.

The RF Health Risk Assessment has begun and will continue through 2013, with publication of the EHC monograph expected in 2014. Update of the Standards database has been in progress for several years, and is now expected to be set up in the WHO Global Health Observatory (GHO) platform. This will be discussed further during the afternoon.

Some areas of the website, and some of the Fact Sheets, also need to be updated. .

Reports from collaborating centres and international organizations

Reports from collaborating centres

ARPANSA, Australia **(***L. Martin)* - The focus of ARPANSA activities over the past year has been on public and political concerns. ARPANSA staff answers about 1,000 calls per year, split fairly evenly between ELF and RF issues. New areas of public concern include Smart Meters and millimetre wave security scanners. These concerns tend to be driven by reports such as the Seletun Report, new technologies which are perceived as different, "precautionary" limits set in some countries, and a lack of awareness of relative magnitudes of exposures.

ARPANSA carries out a few base station surveys, and has formed an EME Reference Group, which includes various stakeholder representatives.

A review of RF/health literature is in progress, to determine whether the RF exposure Standard (RPS3) needs to be updated.

After feedback from regulators in State governments, the proposed ELF exposure Standard will now be issued as a Guideline. Some States were not happy with the treatment of precaution, and considered that there was no justification for the potential compliance costs.

Federal Radiation Authority (BfS), Germany **(***R. Matthes)* - BfS has a Research Agenda for 2012-16, driven by previous results suggesting risks, gaps in knowledge and new technologies.

- For Static and ELF fields, childhood leukaemia is still a concern and data are still sparse for neurodegenerative diseases and for static fields. There will be many changes to the grid in coming years with over 4000 km of new lines expected after the change from nuclear energy, which is anticipated to create a lot of public concern.
- There are increasing numbers of applications using IF (intermediate frequency) fields, such as wireless power transmission.
- In the RF range, there is need for a risk assessment of new technologies, and research on long term effects of cellphone exposures.

Research on childhood leukaemia will be mostly based on human and animal studies. Work on risk communication will focus on ELF as the grid is being redesigned following the decision to move away from nuclear power. An existing round table on mobile phones has been extended to include ELF fields.

Health Protection Agency (HPA), United Kingdom (*S. Mann*) - In the UK, it is anticipated that smart meters will not be compulsory as there is no national roll-out programme at the moment. In 2013 the HPA will become Public Health England (PHE – which unlike the name indicates will also cover Scotland). It will continue to be a centre of expertise at arm's length from government.

Following the two SAGE reports (April 2007 and June 2010) and the responses from the UK government, the HPA will review public information on their website and prepare material on precautionary measures. These will link to the background science.

Work on WiFi is now complete and published, and available on the HPA website. Exposure from Wi-Fi is well within the exposure guidelines.

The AGNIR (Advisory Group on Non-Ionising Radiation), report on RF fields has been published on 26 April 2012, and is available on the HPA website. The AGNIR Group is independent of HPA.

The HPA has carried out some work on the effectiveness of protective suits for people working on live lines. One of the findings is that if these are used for RF work, with no face mask, SAR in the head is increased. The HPA is contributing to exposure assessment in the UK arm of the Mobikids study. Work is continuing on characterising the dielectric properties of pregnancy-specific and fetal tissues, to be used in RF exposure modelling.

Reports from international organizations

International Agency for Research on Cancer (IARC), France *(prepared by J. Schuz)* - In the ELF region, IARC is looking at exposure to ELF fields and survival from childhood leukemia, and is participating in the ARIMMORA project (on interactions between ELF fields and organisms). Regarding RF fields, the IARC monograph on RF fields (Vol. 102) should be available in the near future. With regard to IARC's classification of RF fields in Class 2B "possible", WHO has updated the Fact Sheet on mobile phones which notes that no effect of RF fields has been established.

International Labour Organization (ILO), Switzerland *(Shengli Niu)* - The ILO is updating its 4th edition of the Encyclopedia of Occupational Health and Safety, which will be web-based and include a section on EMF. It has adopted a code of practice to ensure that exposure limits are not exceeded on machinery that includes RF generators.

ILO's work on the List of Occupational Diseases does not include EMF but something on UV. An open item on the revision process of the 11th edition of the International Classification of Diseases (ICD-11) relates to the formulation of guidance on diagnostic criteria for occupational diseases (RF-related cataracts).

The ILO will be a partner in preparing the EHC on RF, and participated in the kick-off meeting in January 2012 in Geneva.

International Telecommunications Union (ITU), Switzerland *(Istvan Boszocki)* – The ITU has several projects on RF fields, including modelling and measurement approaches. Mr Boszoki introduced relevant projects from the 3 sectors, i.e. ITU-D (Q23-1 which met in September 2010 and May 2011), ITU-R and ITU-T. The ITU exposure estimator program has been updated and is now available.

European Commission (EC), Belgium and Luxembourg *(prepared by V. Garkov, presented by E. van Deventer)* - SCENIHR will undertake a new EMF risk assessment, and work has started with a review of the current state of knowledge, areas of uncertainty in the science and remaining gaps. A stakeholder dialogue group had four productive meetings but is currently in abeyance. A report on progress will be prepared. The next implementation report on the 1999 Recommendation on limiting exposures to EMFs (EC/519/1999) is due in 2013.

Revision of the 2004 Physical Agents Directive is continuing.

Reports from NGOs and professional bodies

International Commission on Non-Ionizing Radiation Protection (ICNIRP) *(R. Matthes)* - The draft Guidelines on movement in static magnetic fields are being reviewed, with publication expected in late 2012 or early 2013. Exposure guidelines covering RF fields (including THz frequencies), and RF dosimetry, are being revised. ICNIRP's philosophy, terminology for risk assessments and general protection concepts are also being reviewed.

Several publications covering optical radiation (eg EHC 23 on lasers, EHC 160 on UV) are due for a review. Ultrasound is also due for a review, and exposure Guidelines. ICNIRP propose to prepare a Statement on wellness and cosmetic uses of NIR. ICNIRP is also interested in working on safety topics related to the cosmetic and wellness industry.

ICNIRP held its triennial workshop in conjunction with the IRPA International Congress in Scotland in May 2012. Video clips from the recent Edinburgh workshops will be made available online. The next such workshop will take place in South Africa in 2016.

EFHRAN *(Paolo Ravazzani)* – The EFHRAN programme finishes in July 2012. The risk analysis for human health is currently being updated. The RiskAssets risk assessment training programme, which has a focus on chemicals and EMFs, has been completed.

International Union of Radio Science / Union Radio-Scientifique Internationale (URSI) (*G. d'Inzeo*) - URSI encourages and promotes radio science for humanity. Commissions K cover electromagnetics in biology and medicine. The next General Assembly will be in Beijing in 2014. The previous one was held in Istanbul in summer 2011 where J. Schuz gave a tutorial. Several documents are being drafted, on emerging issues, including a White Paper on Wireless Communications and Health.

COST BM 0704 (*M. Moser*) - This EU action has just been completed, and a range of reports is available on the project website. Several opportunities for future COST actions have been considered:

- Exposure assessment, health and monitoring (a pre-proposal has been submitted)
- Medical applications of EMF, with a focus on cancer treatment.
- Health protection/risk management from NIR, both EMF and Optical

WHO assessment of radiofrequency fields

*The IARC carcinogenicity classification of RF field***s** *(K. Straif)* - Kurt Straif of IARC head of the Monographs Section, presented via Internet from Lyon, an overview of the IARC classification of RF fields, and the reasons behind their final decision to classify these fields as "possibly carcinogenic to humans" (Class 2B). The full monograph is scheduled for publication later in 2012, after it has been circulated to the working group members.

Martin Gledhill raised the problem he faced when the classification was delivered to the media, as the Lancet Oncology paper only came out several days later.

The WHO RF health risk assessment (E. van Rongen) - Eric van Rongen presented an overview of the process adopted to prepare the WHO health risk assessment of RF fields. The process will be streamlined by building on the experience gained preparing previous assessments of static and ELF fields, and there is a strong emphasis on ensuring transparency and consistency in the assessment by setting quality criteria for the literature review. This will enable the Task Group to concentrate on conclusions, rather than on details. The goal is to have the assessment published in Q2 2014.

A core group, whose members will be available until the end of the project, has been working on developing a first draft since January 2012. Each member is responsible for their topic of expertise, and can convene their own working group towards that end.

The assessment will be organised by disease type, and cover the frequency range 100 kHz – 300 GHz. Medical/beneficial applications and effects will not be included. It will take the RF monograph from 1993 as a starting point and will refer back to original publications, and update the review while cross-checking with the ICNIRP 2009 review and other recent reviews.

The Task Group members will be selected in due course following WHO rules covering diversity of expertise, opinions, while ensuring as far as possible geographical distribution, and satisfy their rules on conflict of interest.

The total cost of the work is estimated at around US$400,000, which will mostly be used to fund Task Group and other meetings. To satisfy WHO rules this is to be sourced from governments. If funds cannot be raised, the activity will be not be finalized.

Update on WHO activities: Work in progress

WHO Global Health Observatory (GHO) (P. Boucher) - Participants were given a demonstration of the WHO GHO platform through which about 60% of WHO data is accessible. There is some flexibility on the options available for data presentation, all the way down to adding specific information (footnotes) on individual data points. It is a strong option for relocation of the EMF Standards database. Data gathered from countries need to be vetted before dissemination. In the future, there may be a possibility to provide data at the sub-national level.

Update on the EMF Policy database (S. Kandel) - Shaiela Kandel presented examples showing how the GHO could be used to accommodate the EMF Policy database. A questionnaire will be developed and piloted, with the aim of populating a complete database during the coming year.

There was some concern that many countries do not fit into a standard format, leading to difficulties in the presentation of data. The need for simplicity was emphasised, as if the data is too complicated it will be difficult to understand and compare.

Brochure for local authorities (M. Gledhill) - The brochure has been redrafted and now contains seven sections. There is now a need to agree the style and content, and provide feedback on the draft to ensure that it is fit-for-purpose. Comments from participants were that the document needed to be simple, and provide information to allow local authority staff to assess competing claims. Ideas to pilot test the document included developing a small accompanying leaflet, collaborating with local authority's unions.

Update on WHO activities: Strategic decisions

Policy for revision of published documents (E. van Deventer) - Monographs are normally updated only if there is a major change in the science or the exposure situations.

It was agreed that the shelf life of a publication like the Model Legislation was very long as it provides guidance, not a recipe. An error in the model legislation has been noted – WHO does not "endorse" the ICNIRP Guidelines (as endorsement would require the completion of specific

processes within WHO), but "advises" establishing international standards such as ICNIRP or IEEE.

- Dr Efthymios Karabetsos commented that the draft legislation had been very useful in helping draft legislation for Albania.
- Dr Radhey Sharma said that India will look at the model legislation as part of their RF work programme.
- Dr Michel Israel mentioned a previous meeting in Bulgaria a few years ago and suggested a review of it.
- Dr Njunoma from Namibia expressed need for assistance on such matters.

Redesign of WHO website and Update on fact sheets

Several Fact Sheets need to be updated, and they are currently stored in two separate areas of the website (corresponding to current and older Fact Sheets).

There was a request that the status of Fact Sheets should be made clear on the website, and that perhaps a revision or withdrawn date should be shown at the top. At the same time, there was concern about the removal of any documents (even those considered to be out-dated) as they may be referenced from elsewhere. There is still value in having the information from a trusted third party.

Emilie van Deventer spoke of the changes in WHO procedures which now made it more difficult to publish new Fact Sheets (or reanimate old ones). The emphasis should be placed on ensuring that key Fact Sheets are relevant and kept up to date.

Wednesday 6 June

Review of recent research activities

Impact of WHO research agendas: Results of the 2011 survey (C. Ohkubo) - Shaping the research agenda, and stimulating the generation, translation and dissemination of valuable knowledge is one of the core functions of the WHO. Chiyoji Ohkubo presented results of the survey on the impact of the WHO EMF research agendas. Twenty one countries responded, reporting 282 studies. This figure must be treated cautiously as some states responded with numbers of papers published. The total research expenditure was around US$130 million, but as some countries (e.g. France and USA) did not respond, the true figure could be up to 30% higher.

Summary of GLORE 2011 (Global Coordination of Research on EMF and Health) (J. Pack) - GLORE has become an annual global inter-governmental scientific workshop with a particular interest in policy issues. The most recent meeting was held in Korea and dosimetry of wireless power transfer systems was discussed. Extrapolation of RF effects data to new frequencies and modulations is being addressed in collaboration with COST BM 0704. The next meeting will be held in Tokyo, Japan on 15/16 Nov 2012, hosted by the Ministry of Internal Affairs and Communications (MIC).

Review of reports published over the past year

AGNIR Report on RF fields (S. Mann) - Simon Mann provided an overview of the 2012 AGNIR

report on RF fields, which is available on the HPA website. This report builds on previous UK reviews, such as the Stewart Report and 2003 AGNIR report, and concentrates on research undertaken since 2003. The report concludes that a substantial amount of research has been conducted in this area, showing that there is no convincing evidence that RF field exposure below guideline levels causes adverse health effects in adults or children. With regard to cancer, the accumulating evidence, notably in relation to mobile phone use, is not definitive, but overall is increasingly in the direction of no material effect of exposure.

Health Council of the Netherlands report on RFF and Children's brains (E. van Rongen) - Eric van Rongen discussed the latest report on RF fields and children's brains (available on the Health Council of the Netherlands website). There are differences in RF absorption between adults and children, and while the average SAR may be similar the peak SAR may be higher in children. For far field exposure conditions, the reference levels may exceed the basic restriction on SAR at frequencies around 2 GHz, but in realistic situations the limits are not exceeded. The report concludes that there are no clear or consistent effects on: brain development and function, behaviour, cognition, or on the blood-brain-barrier, and no physiological effects harmful to health. However, the data are limited and so do not exclude the possibility of effects, and mostly come from children over 10 years old.

Research review of laboratory studies (B. Veyret) - Bernard Veyret grouped his overview by frequency range:

- *Static magnetic fields*: Recent publications are difficult to interpret due to the wide range of conditions and endpoints considered, and they do not cover the high fields used in MRI. Animal navigation and radical pair/cryptochrome mechanisms are being actively researched.
- *ELF* – Here too there has been a wide variety of exposures and end points investigated. Most positive findings used fields at or above 1 mT. There has been little research addressing the childhood leukemia question.
- *IF* – There has again been little research published in this area. 23 kHz magnetic fields had no effect on gene expression.
- *RF* – While many items on the WHO research agendas are being addressed, there is still a large variety of exposure conditions being used and little coordination. There is little evidence of effects at non-thermal levels, and recent laboratory data does not suggest an effect on cancer. The questions about effects on the EEG and sleep are still unanswered.

Research review of epidemiological studies (J. Schuz) - Joachim Schüz reviewed the findings of mobile phone studies, and their methodological strengths and weaknesses. Brain tumour incidence data provide a check on the results of epidemiological studies, and can help rule out particular latency periods if there is no evidence of an increasing trend. At present, small effects cannot be ruled out in heavy users, or any effects after induction periods of <15 years. For non-cancer endpoints the data are still sparse. Base station studies seem to point to "nocebo" effects.

Arwel Barrett noted that, because the UK Stewart Report commented effects are most likely to be seen in the most highly exposed individuals, a Register of RF Workers had been set up in the UK. The first analysis is underway and should be out in 2013.

Exposure review: A mobile RF monitoring system (J. Estenberg) - Jimmy Estenberg gave a brief overview of a mobile RF exposure system developed in Sweden. An isotropic antenna mounted on the roof of a car (with RF absorbers below it to prevent reflections) can be driven at speeds up to 30 km/hr. The system sweeps 30 MHz-3 GHz / 700 MHz-6 GHz, and has a frequency

resolution of 1 MHz, and can measure down to 10 nWm^{-2} per MHz. It acquires one spectrum per second.

Emerging technologies: Smart meters (J. Mc Namee) - Smart meters used for electricity, water and gas metering, have caused some public concern in Canada, prompting Health Canada to carry out a detailed study of RF exposures from such home equipment. Different provinces use different manufacturers with varying specifications. Transmissions occur in brief, intermittent bursts, so a key part of the work was characterising the duty factor, which was found to be (on average) 0.0006. Even assuming continuous transmission, exposures both inside and outside the house were well below the Canadian Safety Code 6 limits, and were slightly lower than those measured by EPRI. Levels inside were strongly affected by the building materials used.

Ralph Bodemann mentioned that COMAR was developing a technical document which will be shared with the IAC.

Discussion after the presentation focussed on the involuntary nature of the exposures, which tends to affect the perception of possible risks.

EMF Policy Issues

A survey of RF policies and recommendations (D. Zmirou-Navier) - Professor Zmirou previewed a questionnaire which will be sent to IAC members seeking information on national RF policies, and requested feedback on the draft questions to help improve the survey. The information will be used in the development of the chapter on policies within the RF fields EHC monograph.

National EMF legislation and policy issues around the world

There was a broad ranging discussion on national EMF legislation and policy approaches.

In South America, there is a forum for regional coordination and assistance (CITEL). Argentina, Peru and Brazil have national legislation. Peru reported that there has been pressure from local authorities to lower limits in some areas. Brazil has a monitoring regime in place.

In North America, responsibilities in the USA from a health perspective are the responsibility of the FDA. The FDA has a regulatory role if a health risk can be demonstrated. The proposed SAR labelling law in California has been withdrawn. The Canadian Safety Code 6 is brought into effect by some regulations. There is no requirement for precaution.

In Africa, there has been some regional cooperation, and Tanzania reported that there is a desire to have harmonised legislation in East Africa. However, this is not currently a priority. Zambia recommends the ICNIRP Guidelines and would like to have them cited in legislation. There is a problem with dissemination of poor quality information, which needs to be corrected. There have been surveys of base stations, which all comply with ICNIRP limits. Namibia has the possibility to regulate NIR under their Atomic Energy Act, but to date this has not been done. The Ministry of Labour also has an interest in NIR exposures. Exposures from mobile communications sites have been audited and found to be well below the ICNIRP limits. South Africa has added NIR to its hazardous substances act, but this has not made it possible to regulate, for example, mobile phones as there is a reluctance to classify them as a hazardous substance. The Ministry of Health recommends application of the ICNIRP Guidelines, and no precautionary measures. Mauritius has a Standard similar to the Australian standard (RPS3).

In the Eastern Mediterranean area, Bahrain has legislation which follows the ICNIRP Guidelines. There are occasional complaints about base stations in residential areas, and on-going measurement campaigns. In Israel it was noted that the introduction of new technology often gives rise to concern, and in 2005 it was decided that before new technology is introduced there should be a public discussion and consideration of alternatives. A document on the introduction of 4G has just been completed and will be released for public comment. Other issues are exposures of children, especially in school, and the distinction between voluntary and involuntary exposures.

In Saudi Arabia the IARC 2B classification aroused some concern, and there is a need for reassurance that the current limits are still valid. There is also concern about what might be concluded in the future. Tunisia also reported an increase in public concern following the IARC classification, and that they have received 2,000 claims of EMF health effects. Tunisia would like a clear statement from WHO on precautionary measures. Emilie van Deventer responded that WHO can only recommend actions based on evidence, and make recommendations on prevention rather than precaution. In this case there are no established effects. Precautionary approaches must be left to national authorities, and are usually very specific to each country, as they account for national socio-economic realities, values and preferences.

In Palestine, the public are invited to take part in measurement campaigns, and base station operators sign a document accepting responsibility for health effects caused in the vicinity.

In the South East Asia region, India, there is a high population density and many base stations being erected. India will implement its own Standards, and will also require that local residents give approval for new sites. SAR information must be provided with phones.

In the Western Pacific region, Malaysia has legislation for base stations based on ICNIRP, but there are sometimes problems with perceived risks and people accessing poor information on the internet. Japan also has policies based on the ICNIRP recommendations, and no requirement for precautionary measures. Korean regulations are set by local government, and do not include precautionary measures.

New Zealand and Australia both have mandatory RF Standards based on the ICNIRP limits, which include requirements to minimise unnecessary exposures. New Zealand has also required that ELF fields around transmission lines comply with ICNIRP limits, and new lines follow the EHC 238 recommendations on low cost precautionary measures.

In Europe, there are big differences in public concern between countries. Mediterranean countries tend to show high concerns compared to Northern Europe. EU surveys have shown the highest concerns in countries with the lowest exposure limits. This could be due to a feeling that if precaution is needed, then concerns are well grounded. In Germany, regulations based on ICNIRP are in place for ELF and RF fields. There has been discussion on whether to include precautionary measures. Hungary reported public concerns with base stations. The EU has been developing occupational exposure limits (the Physical Agents Directive) for several years, and made recommendations on limiting public exposures (based on ICNIRP) in 1999. Some countries, such as Italy, have established real time RF monitoring networks with data available over the internet, but these are being phased out. In Cyprus it is felt that some people use arguments about health effects from EMF exposures as a lever to gain some advantage, for example on property values.

Other points emerging from the discussion are summarized below:

- The value of having a good database of national standards to provide reliable information
- The importance of trust, and for all government agencies involved at national level in the issue to present a consistent message
- Subtleties in different languages where meanings of words (such as "precaution", and "possible" vs. "probable") might not translate exactly or carry the same nuances.
- The impossibility of proving the absence of effects, and the disparity between those who have concerns about effects which are not established, against the willingness of others to indulge in risky behaviours such as texting while driving.

International EMF exposure limits

ICNIRP Guidelines (R. Matthes) - Rüdiger Matthes, Chairman of ICNIRP, provided an overview of the philosophy and development of ICNIRP Guidelines. With regard to possible effects of long-term exposures from ELF and RF fields, ICNIRP's view is that there is no convincing evidence to provide a basis for setting limits. The RF limits will be reviewed in 2014, following the publication of the WHO EHC monograph.

IEEE/ICES (R. Bodemann) - Ralf Bodemann provided a similar overview of the IEEE/ICES process for developing exposure Standards. He highlighted the open membership structure, and multidisciplinary nature of the membership. All IEEE/ICES publications can be downloaded at no cost. IEEE/ICES are currently merging their ELF and RF Standards.

In response to a question about the relationship between IEEE/ICES and ICNIRP, which are both working on similar projects, Ralf said that IEEE/ICES has offered to work with ICNIRP, and has partially aligned its Standards. On behalf of ICNIRP, Mr Matthes said that they had considered this, but there are different policies on membership as ICNIRP does not include industry representatives. The differences in reference levels between the two organizations can be scientifically explained.

Meeting wrap-up

Emilie van Deventer thanked all representatives for their participation, and repeated the request for funding to ensure the completion of the RF Health Risk Assessment. She also asked for as great participation as possible in online surveys to get the best value out of them. Internships or secondments are also valuable for assisting the EMF Project, and some volunteers to look at the website and recommend updates and deletions are needed.

To save time during meetings, it was proposed that collaborative web tools be considered, and that meeting documentation be provided ten days in advance so that presentations could be shortened. It may also be helpful for new participating countries to have information on some of the Project history.

It was agreed that there should be an IAC meeting in 2013 preferably at a time to tie in well with related meetings (eg BEMS/EBEA).

The meeting closed at 16.30