

**THE ANNUAL REPORT OF
THE RADIATION ADVISORY COMMITTEE
FOR THE FINANCIAL YEAR ENDING JUNE 2015**

RADIATION ADVISORY COMMITTEE

Melbourne, Australia

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The Hon Jill Hennessy MP
Minister for Health, Minister for Ambulance Services

Dear Minister

Pursuant to Section 110 of the *Radiation Act 2005*, the Radiation Advisory Committee submits the 2015 annual report of the Committee for presentation to Parliament.

Yours faithfully

Dr Dean Morris
Chair
RADIATION ADVISORY COMMITTEE

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APPENDIX 1 TERMS OF REFERENCE OF THE RADIATION ADVISORY COMMITTEE 17

RADIATION ADVISORY COMMITTEE

The Radiation Advisory Committee (the Committee) is established under Part 10 of the *Radiation Act 2005*. The term of appointment for the outgoing Committee was the period 17 August 2011 to 16 August 2014, after which a new Committee was selected. The term of appointment for the new Committee was the period 17 August 2014 to 16 August 2017. The members of the new Committee were the same as those of the old Committee, with the exception of Dr Graeme O’Keefe, who did not apply for reappointment.

(i) Composition

The Committee met on 7 occasions from July 2014 to June 2015.

The meetings attended in the table immediately below refer to the July 2014 meeting only.

The members of the Committee up to 17 August 2014 were:

<p>Dr. David Bernshaw (Chair) Consultant Radiation Oncologist Peter MacCallum Cancer Centre</p> <p>Meetings attended: 1</p>	<p>Dr Dean Morris Head of Operations Australian Synchrotron</p> <p>Meetings attended: 1</p>
<p>Dr. Ken Joyner Director Joyner and Associates Telecommunications Consultancy</p> <p>Meetings attended: 1</p>	<p>Professor Robert Gibson Radiologist Royal Melbourne Hospital</p> <p>Meetings attended: 1</p>
<p>Mr Russell Booth Chief Nuclear Medicine Technologist Medical Imaging Department St Vincent’s Hospital</p> <p>Meetings attended: 1</p>	<p>Dr Graeme O’Keefe (up to 7 August 2014) Principal Scientist Austin Health</p> <p>Meetings attended: 0</p>
<p>Mr Christopher Perry Chief Radiographer EMI Radiology East Melbourne</p> <p>Meetings attended: 0</p>	<p>Dr Russell Horney Physicist Department of Medical Imaging and Radiation Sciences Monash University</p> <p>Meetings attended: 0</p>

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<p>Mr Paul Marks Senior Medial Radiation Scientist Australian Radiation Protection and Nuclear Safety Agency</p> <p>Meetings attended: 1</p>	<p>Dr Joanna Wriedt Physiologist, Epidemiologist and Lawyer</p> <p>Meetings attended: 1</p>
<p>Dr. Roslyn Drummond Radiation Oncologist Peter MacCallum Cancer Centre</p> <p>Meetings attended: 0</p>	<p>Dr Ray Budd Consultant medical physicist</p> <p>Meetings attended: 1</p>
<p>Mr Paul Tomlinson Senior Technician ALS Industrial</p> <p>Meetings attended: 1</p>	

The meetings attended in the table below refer to the August 2014 to June 2015 meetings.

The members of the Committee for the period from August 2014 to June 2015 were:

<p>Dr. David Bernshaw (Chair up to 7 August 2014) Consultant Radiation Oncologist Peter MacCallum Cancer Centre</p> <p>Meetings attended: 6</p>	<p>Dr Dean Morris (Chair from 7 August 2014 to 30 June 2015) Head of Operations Australian Synchrotron</p> <p>Meetings attended: 6</p>
<p>Dr. Ken Joyner Director Joyner and Associates Telecommunications Consultancy</p> <p>Meetings attended: 4</p>	<p>Professor Robert Gibson Radiologist Royal Melbourne Hospital</p> <p>Meetings attended: 6</p>

<p>Mr Russell Booth Chief Nuclear Medicine Technologist Medical Imaging Department St Vincent's Hospital</p> <p>Meetings attended: 4</p>	<p>Mr Paul Tomlinson Senior Technician ALS Industrial</p> <p>Meetings attended: 5</p>
<p>Mr Christopher Perry Chief Radiographer EMI Radiology East Melbourne</p> <p>Meetings attended: 5</p>	<p>Dr Russell Horney Physicist Department of Medical Imaging and Radiation Sciences Monash University</p> <p>Meetings attended: 4</p>
<p>Mr Paul Marks Senior Medial Radiation Scientist Australian Radiation Protection and Nuclear Safety Agency</p> <p>Meetings attended: 5</p>	<p>Dr Joanna Wriedt Physiologist, Epidemiologist and Lawyer</p> <p>Meetings attended: 4</p>
<p>Dr. Roslyn Drummond Radiation Oncologist Peter MacCallum Cancer Centre</p> <p>Meetings attended: 6</p>	<p>Dr Ray Budd Consultant medical physicist</p> <p>Meetings attended: 5</p>

(ii) Responsibilities

The Committee is to advise the Minister for Health or the Secretary of the Department of Health and Human Services, on any matters relating to the administration of the *Radiation Act 2005*, referred to it by the Minister or the Secretary including the following:

- (a) The promotion of radiation safety procedures and practices.
- (b) Recommendation of the criteria for the licensing of persons and the qualifications, training or experience required for licensing.
- (c) Recommendation of which radiation sources should be prescribed as prescribed radiation sources.
- (d) Recommendation of the nature, extent and frequency of tests to be conducted on radiation apparatus and sealed radioactive sources.
- (e) Codes of practice, standards or guidelines with respect to particular radiation sources, radiation practices or uses.

Section 110 of the Radiation Act requires that the Committee must give the Minister a report on its activities during a financial year no later than 1 November following that year.

1. INTRODUCTION

Throughout the year a number of issues were considered by the Committee including:

- the regulatory requirements for various radiation practices;
- radiation incidents;
- non-ionising radiation matters;
- justification and dose optimisation in medical radiation procedures.

The terms of reference for the Committee are provided in Appendix 1.

The Committee would like to thank the Radiation Team of the Department of Health and Human Services, in particular Mr Morrie Facci, for its continuing assistance and support.

2. IONISING RADIATION

2.1 Radiation Amendment Regulations

The Committee was advised of the progress regarding the development of the proposed Radiation Amendment Regulations. The proposed regulations are required to implement fully the changes with respect to the security of high consequence radioactive material and to prescribe the offences that would incur infringement notices and give effect to other requirements of the Radiation Act. The proposed regulations together with a regulatory impact assessment were advertised for public comment and the department is currently considering the comments received.

2.2 Use of Screening Mammograms in Women with Down Syndrome

The Committee was advised that BreastScreen Victoria had developed a draft information sheet in February 2014 in relation to the use of screening mammograms in women with Down syndrome. The information sheet was developed because of evidence that suggests that women with Down syndrome have both a lower risk of developing breast cancer and a higher sensitivity to ionising radiation. The information sheet indicated that Down syndrome women and their carers should consider the available information in order to make an informed decision regarding ongoing breast health management.

The Screening and Cancer Prevention Unit of the Department of Health and Human Services had expressed concern to BreastScreen Victoria and to the Radiation Team in respect of the difficulties in implementing the policy regarding screening of women with Down syndrome if the information sheet were adopted.

The Committee felt that it was important to provide this information as it allowed women to make an informed decision regarding breast screening. The Committee also felt that this message should be consistent across Australia and that Breastscreen Australia could be used for disseminating this information.

2.3 Presentation on Breast Tomosynthesis

A radiologist from a Victorian medical imaging practice gave a presentation to the Committee on breast tomosynthesis. He indicated that breast tomosynthesis was better at picking up breast cancers than conventional 2D mammography, had higher specificity and sensitivity and delivered radiation doses that were similar to conventional mammography.

The Committee found this information interesting and useful and expressed its thanks to the radiologist.

2.4 Presentation on the Department's CT Imaging Inspection Program

The department gave a presentation on the computed tomography (CT) inspection program carried out by the Radiation Team and the improvements that have taken place since implementation of the inspection program. In general, dose-length product (DLP) and computed tomography volume dose index ($CTDI_{vol}$) values after the inspections were reduced as compared to values before the inspections. DLP and $CTDI_{vol}$ are measures of radiation dose to the patient.

One of the significant findings of the inspection program was that there was a good deal of confusion amongst radiographers and radiologists as to what constituted justification of a medical imaging procedure. Some medical imaging centres believed that referral for a procedure by a general practitioner constituted justification of that medical procedure.

The Committee stressed the importance of individual justification by a radiation medical practitioner (such as a radiologist or nuclear medicine specialist) when a proposed medical imaging procedure does not fit into a generic justification category.

The department developed a guidance document to assist management licence holders in understanding justification and approval of medical radiation procedures (see 2.5 below).

The Committee congratulated the department on this work and agreed that the reduction in patient dose from CT procedures would be significant in reducing the overall radiation detriment to the Victorian public.

2.5 Practice Guidance Document on Justification and Approval of Medical Radiation Procedures

The department developed a practice guidance document to assist management licence holders in understanding how justification and approval of medical radiation procedures may be undertaken in practice.

The Committee provided some comments on the document. The Committee stressed the importance of individual justification by the radiation medical practitioner when a proposed radiation procedure does not fit into a generic justification category.

The Committee noted that there was no equivalent document in other Australian jurisdictions and suggested that this type of guidance document could be useful at a national level.

The practice guidance document can be downloaded at:

<http://docs.health.vic.gov.au/docs/doc/Practice-guidance-document-Justification-and-Approval-of-Medical-Radiation-Procedures>

2.6 Graduate Diploma of Mammography Run by Charles Sturt University

Professor Rob Davidson (Charles Sturt University (CSU)) briefed the Committee on this graduate diploma of mammography. The successful completion of the course was intended to act as a prerequisite for a person to obtain a licence to use mammography X-ray units for screening purposes.

A difficulty arises with the course because a course graduate will not be registered as a radiographer with the Australian Health Practitioner Registration Agency (AHPRA). Not having a title under national law means that the competency of the graduates has not been verified through the national registration process. Professor Davidson provided details in relation to the training of the students undertaking the course.

David Collier (Chief Executive AIR) advised the Committee that BreastScreen had approached the AIR to be project manager for the development of this course and that AIR had selected CSU to develop and deliver the course. He added that this course would go some way towards addressing the shortage of radiographers working in the field of mammography. The department agreed that graduates from this course would address critical workforce shortages in this area in the future.

The Committee endorsed the course as a suitable prerequisite for a licence to use mammographic X-ray units.

2.7 Vocational Graduate Certificate in Radiation Security (10009NAT) Training Course for Approved Assessors

The Committee was advised that one of the features of the 2013 changes to the Radiation Act 2005 in relation to the security of high consequence radioactive material relates to the ability of

the department to appoint approved assessors of security plans and transport security plans. These assessors are required to be appointed because licence holders are required to have their security plan and/or transport security plan endorsed by such an assessor. For a new licence applicant seeking to possess a high consequence sealed source or high consequence group of sealed sources, an endorsed security plan will have to be submitted as part of their application, when regulations under the Radiation Amendment Act are made. In order to be prepared when the regulations are made, the department is seeking to appoint approved assessors.

ARPANSA developed a training course for selected individuals to become approved assessors. This course, the 'Vocational Graduate Certificate in Radiation Security', is conducted by the Commonwealth Attorney-General's Department and has only been held once. The six individuals who participated in the course were selected because of their significant background in matters pertaining to security and because of their national security clearance. Although the six participants attended the course in July 2013, they had not been assessed by ARPANSA and, as such, had not completed the course at the time of the Committee's discussion. However, at the time of publication of this report, the Committee notes that ARPANSA have published a list of five initial graduates of the accreditation program. The Department of Health and Human Services intends making satisfactory completion of the 'Vocational Graduate Certificate in Radiation Security' training course a prerequisite for being an approved assessor. The department is therefore in the difficult position whereby security/transport security plans may be approved by an assessor who may subsequently fail to meet the pass requirements of the Vocational Graduate Certificate in Radiation Security.

The training course has been endorsed as a prerequisite for approved assessors by the Radiation Advisory Council of New South Wales.

2.8 Presentation on the 2012 International Atomic Energy Agency (IAEA) Transport Regulations

A representative of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) gave a presentation on the 2012 IAEA transport regulations (SSR-6) for the information of the Committee.

The main changes from the 2005 IAEA transport regulations are:

- A new exemption covering people being transported for medical treatment following intake of radionuclides or who are contaminated.
- An extra exclusion from the definition of fissile material to cover material with fissile nuclides < 0.25 gram.
- Introduction of a "management system" for transport stakeholders that replaces the previously termed "quality assurance program".
- Notification of non-compliances has been extended to include the consignee, carrier and any affected organisation (this applied to the consignor only in the 2005 IAEA regulations).
- A new UN number to cover "Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile-excepted" (UN3507).
- Radionuclide values not listed in Table 2 of the transport regulations are now deferred to the IAEA basic safety standards (GSR Part 3), but require multilateral approval.
- Exceptions for packages containing fissile material have been amended.
- Extra exceptions for fissile material have been added.

- Additional requirements for the transport and storage during transport of fissile material.
- Changes to marking requirements for over-packs and excepted packages.
- Changes to documentation required before first shipment of a package.
- Requirements for retention of documents have been introduced.
- Change to the order of information in the shipper's declaration that could have ramifications on shipments. For example, shipments may be refused because information is not presented in a format or order acceptable to stevedores.

The ARPANSA Code of Practice for the Safe Transport of Radioactive Material (2014), which incorporates the 2012 IAEA Regulations, has been published as RPS2 in ARPANSA's Radiation Protection Series of documents.

2.9 Presentation on the development by ARPANSA of a draft online radiation protection of the patient module for referrers

A representative of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) advised the Committee that ARPANSA had developed a draft online radiation protection of the patient module for referrers and summarised its features. The purpose of the module was to increase the understanding of referrers of ionising radiation and the role it plays in medical imaging.

After completing this module, referrers would be:

- clear as to the modalities that do and do not utilise ionising radiation;
- better informed of the risks associated with medical imaging;
- aware of their role in justification of diagnostic imaging and radiation protection of the patient; and
- provided with updated information and links.

The Committee members thought that the module was an excellent initiative and suggested that the module, when finalised, be provided to the Royal Australian College of General Practitioners and the Australian Medical Association as a means of reaching the target audience.

2.10 Second Survey of Radiation Doses from Medical Procedures

The Committee was advised that the second survey by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) of radiation doses from medical procedures (nuclear medicine, CT and interventional radiography) has commenced. Nuclear medicine is the first area being looked at. The purpose of the survey is to enable the development of a revised set of diagnostic reference levels (DRLs).

2.11 IAEA Request for Comment – "Radiation Protection and Safety in Medical Uses of Ionising Radiation" (DS399)

The Radiation Health Committee of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is slowly moving towards greater adoption of international best practice

documents published by the IAEA with the specific view of eventually replacing all Australian Codes and Guidelines with direct reference to IAEA documents, subject to any minor modifications deemed appropriate for the Australian setting.

Jurisdictions have been requested to consider the draft safety guide 399 (DS399) with a view to informing its development. Given the national movement towards greater adoption of international best practice documents, this draft was referred to Committee with a view to seeking any comments and feedback.

The comments and feedback provided by Committee members were incorporated in a collated Australian input provided by Australian jurisdictions as part of the IAEA feedback process, coordinated by ARPANSA.

2.12 Issues in Relation to Disposal of Radioactive Material in the Mineral Sands Industry

The department gave a presentation to the Committee on mining and processing of mineral sands, in particular the processes involved in the processing of the ore to produce a heavy mineral concentrate (HMC), and the processing of the HMC to produce the rutile and zircon fractions. The exposure pathways that need to be considered (external irradiation, inhalation of dust and inhalation of radon daughters) when determining occupational exposure to radiation were outlined. In determining radiation exposure of residents in proximity to the mine, radioactive isotopes in groundwater and aquifers also need to be considered. The presentation will enhance the Committee's ability to provide advice to the department on this issue.

The Committee found this information useful and expressed its thanks to the department for providing it.

The department briefed the Committee on the issues in relation to disposal of radioactive by-products of mineral sand processing by a mineral sands mining company with operations in Australia. The material in question originates from a mineral separation plant and is being disposed of in a pit that resulted from previous mining activities. Some residents living in the immediate surrounds of the pit are raising concerns in relation to the disposal of the material.

The Committee was advised that the mining company in question was applying for a planning permit with the appropriate council and a works approval with the EPA in relation to the disposal pit.

2.13 Presentation on Borehole Logging Source Stuck Down Borehole

The Committee was advised that a borehole logging company was running a probe for logging density measurements down a bore when the winch cable attached to the probe broke. The logging probe, containing a radioactive source, fell to the bottom of the bore to a depth of 200 metres. Attempts to retrieve the source were not successful. The radioactive source is a ceramic caesium 137 source encapsulated in stainless steel. This type of source is used in many industrial applications. This source is not a high consequence sealed source. The bore was filled with a bentonite-concrete grout mix so that the entire source would be surrounded by material that is relatively impermeable to water. The caesium-137 source, concreted in 200 metres down the borehole, does not pose any health risk to members of the public or workers. A plaque was erected at the top of the bore advising of the source that was down the borehole and giving its details.

2.14 Audit of Regulatory Functions of the Department by the Victorian Auditor General's Office

The department summarised the findings of the audit by the Victorian Auditor-General's Office (VAGO) of the performance of health regulators within the Health portfolio and the actions taken by the department as a result.

VAGO considered that the regulators have not taken a systematic, risk-based approach to regulation and do not fully understand the impact of their regulatory activities. VAGO recommended that all health portfolio regulators develop and implement detailed plans to address the weaknesses identified in the audit by:

- clearly defining the regulatory outcomes they are seeking to achieve;
- establishing and applying appropriate stakeholder engagement strategies;
- improving their understanding of activity-based costs and benefits and the burden imposed on the entities they regulate; and
- developing robust performance management systems to underpin monitoring continuous improvement.

The audit noted that the radiation safety regulatory function had clear objectives. The purpose of the Radiation Act 2005 is to protect the health and safety of persons and the environment from the harmful effects of radiation.

The department has commenced work on a comprehensive stakeholder communication and engagement strategy with the aim of completing this for each regulatory area by the end of 2015. This requirement will be a significant undertaking, both in its development and in its ongoing implementation, particularly in relation to the regulation of radiation safety because of the numbers and diversity of stakeholders. Ongoing implementation will require diversion of resources away from other areas but with the expectation that the strategy will deliver positive outcomes as a result of that investment.

The department has also developed an overall risk management framework and has used this to examine the radiation safety regulatory function. It is anticipated that this framework will help address the recommendations relating to clarity of objectives, performance measures and the overall thrust for risk-based regulation. The same process will be used for the other regulatory areas within the Environmental Health Regulation and Compliance Section, of which the Radiation Team is a part.

2.15 Future Directions for the Radiation Advisory Committee

The Committee reviewed its terms of reference and decided that the following changes needed to be made:

- The RAC would now meet on the first Thursday of every second month of the year, starting with February.
- A clause to be inserted to state that the RAC may call an extraordinary meeting as required or upon request by the Department of Health and Human Services.

These changes have been incorporated into the terms of reference for the Committee in Appendix 1.

3. NON-IONISING RADIATION

3.1 Disposal Scheme for Commercial Tanning Units in Victoria

The Committee was advised that the Victorian Government had announced an assistance package for commercial solarium businesses as part of the ban on commercial tanning practices. The ban was effective as of 1 January 2015. To assist practices in relation to costs associated with the removal of commercial tanning units from a premise, the Department of Health and Human Services provided a disposal assistance grant of \$2000 per commercial tanning unit for units collected before 30 June 2014. Fifty four units (26 business sites) had been disposed of up to 30 June 2014. From 1 July to 31 December 2014 a grant of \$1000 was provided per tanning unit. Twenty six units (16 business sites) had been disposed of from 1 July to 31 December 2014.

3.2 Revised World Health Organization Environmental Health Criteria Document on Radiofrequency Radiation

The Committee was advised that the World Health Organization is undertaking a health risk assessment of radiofrequency electromagnetic fields, to be published as a monograph in the Environmental Health Criteria Series. This publication will complement the monographs on static fields (2006) and extremely low frequency fields (2007), and will update the monograph on radiofrequency fields (1993).

3.3 Publications and Journal Articles Reviewed by the Committee

Hess DJ. Smart meters and public acceptance: comparative analysis and governance implications. Health Risk & Society, 2014, Vol.16. No. 3, 243 – 258.

In this paper, the author examines the reasons for public opposition to smart meters for electricity in North America and the role of concern with health risks. The paper calculates the percentages of articles on smart meters that mention specific concerns. Health concerns were the main reason for opposition to smart meters - 76% to 84% of the articles in the seven USA states examined in the study mentioned health concerns. The corresponding figure in British Columbia was 76 %. Cost (overruns, accuracy) was a significant concern with 24% to 41% of the articles in the seven USA states mentioning cost and with 33 % in British Columbia. Privacy was also a significant concern with 30% to 47% of the articles in the seven USA states mentioning privacy, with 22 % in British Columbia. Other lesser concerns mentioned included fire risk and security (power usage data indicate occupancy of premises and could be used to facilitate theft).

Conclusion: Health concerns and privacy issues were the main reasons for public opposition to smart meters for electricity in North America.

European Commission Scientific Committee on Emerging and Newly Identified Health Risks. Opinion on Potential health effects of exposure to electromagnetic fields (EMF), January 2015.

The Commission concludes that “Thorough examination of all pertinent, recent data has not produced any conclusive evidence about EMF being dangerous, which is reassuring. However,

further research should be conducted, particularly as pertains to very long-term exposure and potential risks of exposure to multiple sources.”

Conclusion: Review of all pertinent, recent data has not produced any conclusive evidence about EMF being dangerous.

Jerrold T. Bushberg, Kenneth R. Foster, James B. Hatfield, Arthur Thansandote, and Richard A. Tell. IEEE committee on man and radiation — COMAR technical information statement radiofrequency safety and utility smart meters. Health Phys. 108(3):388–391; 2015.

The Institute of Electrical and Electronics Engineers (IEEE) committee concludes that “RF exposure levels from smart meters are far below USA and major international limits. Such exposures are typically below levels of radiofrequency (RF) exposure from a multitude of RF-emitting appliances found in modern homes. Smart meters have provoked public controversy in part because of health concerns about their RF emissions. There have been few if any bioeffects studies specifically involving smart meters. However, numerous expert reviews of the large body of scientific literature related to biological effects of RF energy have consistently failed to find clear evidence of adverse health effects from RF exposures below international exposure limits.”

Conclusion: Numerous expert reviews of the scientific literature related to biological effects of radiofrequency (RF) energy have consistently failed to find clear evidence of adverse health effects from RF exposures below international exposure limits.

Stella J-H Kim, Sally J. Ioannides, J. Mark Elwood. Trends in incidence of primary brain cancer in New Zealand, 1995 to 2010. Aust NZ J Public Health. 2015; Online; doi: 10.1111/1753-6405.12338.

The authors conclude that “In New Zealand, there has been no consistent increase in incidence rates of primary brain cancers. An increase in glioma at ages over 70 is likely to be due to improvements in diagnosis. As with any such studies, a small effect, or one with a latent period of more than 10 to 15 years, cannot be excluded.”

This sort of study would be important in determining if there is any long term health concern in relation to mobile phone technology.

Conclusion: In New Zealand, there has been no consistent increase in incidence rates of primary brain cancers despite an increase in the use of wireless radiofrequency technology.

Alexander Lerchl, Melanie Klose, Karen Grote et al. Tumor promotion by exposure to radiofrequency electromagnetic fields below exposure limits for humans. Article in press. Biochemical and Biophysical Research Communications xxx (2015).

The vast majority of in vitro and in vivo studies did not find carcinogenic effects of exposure to electromagnetic fields (RF-EMF), i.e. emitted by mobile phones and base stations. Previously published results from a pilot study with carcinogen-treated mice, however, suggested tumour promoting effects of RF-EMF. The authors performed a replication study using higher numbers of animals per group and including two additional exposure levels (0 (sham), 0.04, 0.4 and 2 watts/kilogram (w/kg) specific absorption rate(SAR)). Numbers of tumours of the lungs and livers in exposed animals were significantly higher than in sham-exposed controls. In addition, lymphomas were also found to be significantly elevated by exposure. The fact that a clear dose-

response effect was absent perhaps points more to chance than an underlying mechanism. No increase in brain tumours was found. The authors hypothesise that these tumour-promoting effects may be caused by metabolic changes due to exposure. The authors state “Due to a technical mishap, sham-exposed and exposed (2 W/kg) animals were sacrificed 1-2 weeks too early or too late, respectively”. This means exposed animals had up to 1 month longer exposure than shams which is a real concern when the life span for the animals is 12 months. Transgenic mice are normally not kept for 12 months – they are used for accelerated life testing and the effects on transgenic progression are generally not well quantified. In the publication much weight is given to an original Australian PIM-1 pilot study which was not replicated in much larger studies. The reasons for this have been widely discussed in the replication studies and these reasons have not been given much consideration in this study.

Conclusion: The vast majority of in vitro and in vivo studies did not find carcinogenic effects of exposure to radiofrequency electromagnetic fields.

Lamech F. Self-Reporting of Symptom Development from Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series. Alternative Therapies, Nov/Dec 2014 Vol. 20, 6.

This paper examined symptoms reported by people exposed to radiofrequency fields emitted by smart meters. The most frequently reported symptoms from exposure to smart meters were insomnia, headaches, tinnitus (ringing in the ears), fatigue, cognitive disturbances, dysesthesias (abnormal sensation), and dizziness. The vast majority of the cases did not state that they had been sufferers of electromagnetic hypersensitivity syndrome (EHS) prior to exposure to the smart meters. This paper is of little if any scientific merit as it relies on self-reporting of effects. The symptoms reported after being exposed to the very low emissions from smart meters may well have been psychosomatic.

Conclusion: This paper is of little if any scientific merit as it relies on self-reporting of effects. The symptoms reported after being exposed to the very low emissions from smart meters may well have been psychosomatic.

New Zealand Interagency Committee on the Health Effects of Non-ionising Fields: Report to Ministers 2015.

The Ministry of Health convenes a technical advisory committee, the Interagency Committee on the Health Effects of Non-ionising Fields (ICHENF), to monitor and review research on the health effects of electromagnetic fields. The Committee reports to the Director-General of Health but also periodically prepares a report for Ministers to provide them with background information and a current summary of key research findings.

This report highlights key findings from comprehensive reviews undertaken in recent years by national and international health and scientific bodies.

Extremely low frequency (ELF) magnetic fields

The questions over whether exposures to *ELF* magnetic fields have any effect on the development of leukaemia in children, and neurodegenerative diseases in adults remain unresolved. Further studies on childhood leukaemia have not led to any more definitive conclusions on whether the associations between long-term exposure to *ELF* magnetic fields and childhood leukaemia show a true cause and effect relationship or are simply the results of biases, confounding by unidentified factors, or something else.

This work has confirmed, however, that even if there is some effect of magnetic fields, this would be responsible for only a very low percentage of childhood leukaemias. A comprehensive

review by the World Health Organization (WHO) published in 2007 recommended the use of exposure guidelines such as those used in New Zealand and Australia, together with very-low-cost measures to reduce exposures where this can be readily achieved.

Radiofrequency fields

Research into the possible effects of radiofrequency (RF) fields on health also has some open questions. Although studies into brain tumour risks associated with cell phone use have found a small association in the heaviest users, the researchers acknowledge that this could simply reflect biases in the data. Nevertheless, the suggestion that there may be a risk has meant that the International Agency for Research on Cancer (IARC) classified RF fields as a 2B “possible” carcinogen” in 2011.

Animal studies do not suggest an effect of RF fields on cancer. Analysis of brain tumour registrations in relation to numbers of cell phone subscriptions does not show any trends suggesting a link, but this could be due to long latencies, or (perhaps, more improbably) some other factor that is simultaneously acting to reduce brain tumours. Research published since the IARC classification tends to weigh against the possibility of any risk, but may just reflect the fact that exposures from the newer cell phone technologies are much lower than those in use at the time most of the data used in the IARC evaluation were acquired.

RF research is continuing in a number of areas, but data currently available provide no clear or persuasive evidence of any other effects.

The ICHENF recommends that the situation be reviewed following publication of a WHO evaluation of RF fields and health, expected in early 2016.

Overall conclusions

Much new research has been published since 2004, when the ICHENF last prepared a report for Ministers, but none of this causes the ICHENF to consider that current policies and recommendations should be reviewed. In view of the continuing public interest in this area, the ubiquitous nature of exposures and the open research questions that remain, the ICHENF will continue to monitor new research.

Conclusion: New research published since 2004, when the ICHENF last prepared a report for Ministers has not caused the ICHENF to consider that current policies and recommendations on the Health Effects of Non-ionising Fields should be reviewed.

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) fact sheet “Electromagnetic Hypersensitivity - The scientific evidence does not establish that EHS symptoms are caused by exposure to low-level electromagnetic fields”.

The fact sheet states that “on the basis of current scientific information, there is no established evidence that EHS is caused by EMF at levels below exposure guidelines. ARPANSA acknowledges that the health symptoms experienced by the affected individuals are real and can be a disabling problem, and advise those affected to seek medical advice from a qualified medical specialist.”

Conclusion: On the basis of current scientific information, there is no established evidence that EHS is caused by EMF at levels below exposure guidelines.

Global Burden of Disease Cancer Collaboration. Paper on Global Burden of Cancer. JAMA Oncol, doi:10.1001/jamaoncol.2015.0735. Published online May 28, 2015.

This study aimed to estimate mortality, incidence, years lived with disability (YLDs), years of life lost (YLLs), and disability-adjusted life-years (DALYs) for 28 cancers in 188 countries by sex from 1990 to 2013.

In 2013 there were 14.9 million incident cancer cases, 8.2 million deaths, and 196.3 million DALYs. Prostate cancer was the leading cause for cancer incidence (1.4 million) for men and breast cancer for women (1.8 million). Tracheal, bronchus, and lung (TBL) cancer was the leading cause for cancer death in men and women, with 1.6 million deaths. For men, TBL cancer was the leading cause of DALYs (24.9 million). For women, breast cancer was the leading cause of DALYs (13.1 million). Age-standardized incidence rates (ASIRs) per 100 000 and age-standardized death rates (ASDRs) per 100 000 for both sexes in 2013 were higher in developing vs developed countries for stomach cancer (ASIR, 17 vs 14; ASDR, 15 vs 11), liver cancer (ASIR, 15 vs 7; ASDR, 16 vs 7), oesophageal cancer (ASIR, 9 vs 4; ASDR, 9 vs 4), cervical cancer (ASIR, 8 vs 5; ASDR, 4 vs 2), lip and oral cavity cancer (ASIR, 7 vs 6; ASDR, 2 vs 2), and nasopharyngeal cancer (ASIR, 1.5 vs 0.4; ASDR, 1.2 vs 0.3). Between 1990 and 2013, ASIRs for all cancers combined (except non-melanoma skin cancer and Kaposi sarcoma) increased by more than 10% in 113 countries and decreased by more than 10% in 12 of 188 countries.

In the context of wireless radiofrequency technology, it is interesting to note that incidence rates of brain and nervous system (BNS) cancers show a steady increase for females in developed countries between 1990 and about 2008 but show a steady decline since 2008. For men in developed countries the curve is essentially flat for the period 1993/94 to 2013.

Conclusion: Incidence rates of brain and nervous system (BNS) cancers, which have been reported as being associated with mobile phone use, show a steady increase for females in developed countries between 1990 and about 2008 but show a steady decline since 2008. For men in developed countries the curve is essentially flat for the period 1993/94 to 2013.

3.4 The Committee's View on Possible Health Effects of Radiofrequency Radiation

The additional evidence reviewed by the Committee during the year has not altered its position that there is no substantive evidence linking exposure to radiofrequency radiation to an increased risk of cancer or other adverse health events. However in light of public concerns over mobile phones, base stations and smart meters the Committee will continue to review the relevant research.

3.5 The Committee's View on Possible Health Effects of Power Frequency Electromagnetic Fields.

The Committee's position is that, based on the total database of scientific research, there is insufficient evidence to conclude that exposure to normally encountered environmental levels of power frequency electromagnetic fields causes adverse health effects in humans. The Committee will continue to review relevant research in this area.

APPENDIX 1 TERMS OF REFERENCE OF THE RADIATION ADVISORY COMMITTEE

1. The Radiation Advisory Committee (RAC) is established under the Radiation Act 2005 and provides advice to the Minister for Health or the Secretary on protecting the health and safety of persons and the environment from the harmful effects of radiation, with a view to adopting best practice for radiation safety in Victoria.
2. The RAC may provide advice on matters including:
 - administration and amendments of the Radiation Act 2005 and the Radiation Regulations 2007;
 - licensing of persons and companies to use radiation sources and conduct radiation practices;
 - inspection and testing of radiation sources;
 - new radiation sources and technologies;
 - development, implementation and review of state and national codes, standards and guidelines;
 - transportation, storage and disposal of radioactive materials;
 - security of radioactive sources;
 - radiation incidents;
 - medical research proposals involving ionising radiation;
 - non-ionising radiation matters including:
 - solaria and their regulation;
 - health effects of radiofrequency electromagnetic fields (including mobile communications);
 - health effects of extremely low frequency (ELF) electromagnetic fields (including power frequency fields); and
 - lasers and intense pulsed light (IPL) sources.
 - the promotion and improvement of radiation safety in Victoria;
 - developments that impact on best practice for radiation safety; and
 - any other matter put to it by the Radiation Team of the department.
3. The RAC meets on the first Thursday of every second month, starting February.
4. The RAC may call an extraordinary meeting as required or upon request by the Department of Health and Human Services.
5. A minimum of five members constitutes a quorum for meetings of the RAC.
6. The RAC regulates its own proceedings.
7. The RAC may establish sub-committees and working groups to consider specific issues, and may recommend that the department engage additional expert contractors to support these entities.
8. From time to time the RAC may invite visitors to its meetings in order to hear submissions or information from them, or to take or ask questions.
9. Secretarial support for the RAC is provided by the Radiation Team.

10. The RAC will provide an annual report to the Minister for each financial year, no later than 1st November following that year.