Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Quarterly Report

of the

Chief Executive Officer of ARPANSA

July to September 2014

ARPANSA
619 Lower Plenty Road
Yallambie VIC 3085
email: info@arpansa.gov.au

Further information about this publication

If you would like to know more about the content of this publication please contact ARPANSA on 1800 022 333 or e-mail at ***info@arpansa.gov.au***. Further information about ARPANSA can be found on the Agency's website at ***www.arpansa.gov.au***.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection and nuclear safety. ARPANSA regulates Commonwealth entities using radiation with the objective of protecting people and the environment from the harmful effect of radiation. ARPANSA undertakes research, provides services, and promotes national uniformity and the implementation of international best practice across all jurisdictions.

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Letter of Transmittal

11 November 2014

Senator the Hon Fiona Nash
Assistant Minister for Health
Parliament House
Canberra ACT 2600

Dear Minister

The *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act) requires the Chief Executive Officer (CEO) of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) to submit to the Minister, at the end of each quarter, a report on:

- the operations during the quarter of the CEO, ARPANSA, the Radiation Health and Safety Advisory Council (the Council), the Nuclear Safety Committee (the NSC) and the Radiation Health Committee (the RHC)
- details of any direction given by the Minister to the CEO under section 16 of the Act
- any breach of licence conditions by a licensee, of which the CEO is aware
- all reports received by the CEO from the Council and the NSC under Part 4, paragraphs 20(f) or 26(1)(d) of the Act, and
- facilities licensed under Part 5 of the Act.

I am pleased to provide you with a report, meeting the requirements of the Act, covering the period 1 July 2014 to 30 September 2014.

Please note that Part 6, paragraph 60(6) of the Act requires you to cause a copy of the report to be laid before each House of the Parliament within 15 sitting days of the day on which this report was given to you.

Yours sincerely

CEO of ARPANSA

Report on the Operations of the CEO and ARPANSA

As a portfolio Agency of the Department of Health, the following Portfolio Budget Statement outcome and delivery program identifies the results we intend to deliver to the Australian community:

Protection of people and the environment through radiation protection and nuclear safety research, policy, advice, codes, standards, services and regulation

To deliver on this outcome, we focus our activities into a **Radiation Protection and Nuclear Safety Program**.

This program is made up of four components to deliver our radiation protection and nuclear safety outcome and provide benefits and services to the Australian Government and community:

- protect the public, workers and the environment from radiation exposure
- promote radiological and nuclear safety and security, and emergency preparedness
- promote the effective use of ionising radiation in medicine, and
- ensure effective and proportionate regulation and enforcement activities

The report on the operations of the CEO and ARPANSA is based on these components.

Protect the public, workers and the environment from radiation exposure

Uranium Mining and Naturally Occurring Radioactive Materials Industries

ARPANSA maintains the Australian National Radiation Dose Register which involves the collection, storage and auditing of radiological dose histories for uranium industry workers in Australia. The Dose Register has been successfully implemented to all four uranium mines that are licensed to operate in Australia: Olympic Dam, Beverley and Honeymoon (presently in caretaker mode) in South Australia, and Ranger in the Northern Territory. The Dose Register currently holds dose history records for more than 32,000 workers from the uranium mining and milling industry. In September 2014, the Dose Register received its first uranium exploration data.

To ensure consistency with international best practice, ARPANSA is investigating the expansion of the Dose Register to cover occupationally exposed workers in other industries, such as mineral sands mining and processing operations, and applicable Commonwealth practices.

During this quarter, ARPANSA published the first Annual Dose Register newsletter, the '*ANRDR in Review*' which describes key activities since its establishment in 2010, including the current operational status, analysis of data, stakeholder engagement activities, and plans for future expansion of the Dose Register beyond the uranium mining industry.

Monitor and Mitigate Population Exposures to Electric and Magnetic Fields (EMF) and Electromagnetic Radiation (EMR) and Solar Ultra Violet Radiation (UVR)

During this quarter work was completed on Technical Report Series No. 170 *Measurement of Extremely Low Frequency Fields Associated with Electricity Supply and Distribution Infrastructure*. The objective of this study was to provide better understanding of the levels of extremely low frequency (ELF) electric and magnetic fields (EMF) in residences which are in close proximity to different types of electricity infrastructure commonly found in Melbourne.

Electricity sub-stations, transformers, transmission lines and other electrical sources such as common electrical appliances and wiring, all emit ELF EMF. Exposure to ELF EMF at high levels can affect the functioning of the nervous system. While such exposures are very unusual, there are exposure limits issued by the National Health and Medical Research Council ("NHMRC") which are aimed at preventing established harmful effects (NHMRC, 1989). The NHMRC limits for exposure to the general public are 5,000 V/m and 100 μT, for the electric and magnetic field, respectively.

The study surveyed a total of 52 separate sites where electricity infrastructure was present. These sites, all of which were in Melbourne, included 20 substations of various types, 12 cable risers, 5 transformers, 2 terminal stations, and 13 transmission line routes. Spot measurements of ELF EMF were taken at incremental distances away from the electrical infrastructure and at the nearest boundary of residential properties and other public places. Public places included bus stops, playgrounds, schools and childcare centres.

The key findings of this study were that:

- All measurements of ELF EMF around electricity supply infrastructure were well below the NHMRC exposure limits (generally below 1% of the limits).
- The levels of ELF EMF generally decreased rapidly with increasing distance. However, the rate of decrease with respect to distance was highly variable for all types of infrastructure apart from transmission lines. Residential properties (at the boundary) and other public places in close proximity generally had higher than normal magnetic fields however these areas are not considered to represent 'prolonged residential exposure'.
- The electric fields measured at the boundary of residential properties near transmission lines were higher compared to homes near other types of infrastructure.

In conclusion, the study found that the magnetic fields of power infrastructure (power lines, substations, etc.) located in close proximity to residential properties and other public places were, in general, well below NHMRC exposure limits. People living close to power infrastructure can be reassured that there are no established harmful health effects at these levels.

Ultraviolet Radiation (UVR)

On 16 September 2014, ARPANSA attended a meeting to review and update the Australian Standard, *AS/NZS4174:1994, Synthetic Shadecloth* and the Committee agreed to developing a working draft of the Standard for final review before going out for public comment.

On 25 September 2014, ARPANSA attended an initial meeting to review and update the Australian Standard, *AS/NZS 4399:1996, Sun protective clothing - Evaluation and classification* with members agreeing to complete redrafting of the Standard by February 2015.

International Monitoring Network

As part of Australia's commitment to the Comprehensive Nuclear-Test-Ban Treaty (CTBT), ARPANSA continued to operate and maintain radionuclide air particulate monitoring stations at Melbourne, Perth, Townsville, Darwin, the Cocos Islands, Macquarie Island, and Mawson Base (Antarctica), plus two noble gas monitoring facilities, co-located with the air particulate monitoring stations in Melbourne and Darwin. To support the effective operation of the monitoring stations a new Memorandum of Understanding was signed on 19 September 2014 with the Department of Environment, Australian Antarctic Division (AAD), for the provision of maintenance and operational support by the AAD for the Macquarie Island and Mawson Base Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO) monitoring facilities.

During this quarter, ARPANSA continued to operate the Australian CTBT Radionuclide Laboratory (CRL) which is a certified laboratory for analysis of air particulate samples, as part of the CTBT laboratory network. Nine samples were analysed during the quarter. The laboratory also analysed a spiked filter for the annual proficiency test exercise conducted by the CTBTO. ARPANSA has also agreed to host, in cooperation with the CTBTO, the next CRL Workshop which will be held in Melbourne in February 2015. These workshops are held about every two years and will bring together approximately 50 managers and operators from the international CRL network of sixteen laboratories and the CTBTO.

Stakeholder engagement

The Electromagnetic Energy Reference Group (EMERG) was initially established to provide the CEO of ARPANSA with stakeholder input into EME issues. During July and August 2014, ARPANSA appointed members of EMERG for the period July 2013 to June 2016 following an advertised application process. EMERG comprises representatives from the community and industry as well as representatives from relevant government agencies and academic organisations. More information on EMERG is available from ***www.arpansa.gov.au/AboutUs/Committees/emerg.cfm***.

In August 2014 ARPANSA submitted comments to the Australian Communication and Media Authority's (ACMA's) proposal to remake the *Radiocommunications Licence Conditions (Apparatus Licence) Determination 2003*. This ACMA regulatory instrument imposes conditions on fixed radiofrequency (RF) transmitters such mobile phone base stations including requirements on RF exposure. ARPANSA supports the continued adoption of the exposure limits in *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz (2002)* (the ARPANSA Standard) in the redrafting of this ACMA regulatory instrument.

On 10 September 2013, an ARPANSA scientific officer delivered a guest lecture on radiation safety at Monash University. The lecture is part of a teaching block on environmental influences on health for students enrolled in the Masters of Public Health course.

Between 15 to 19 September 2014, scientists from the Swedish Radiation Safety Authority visited ARPANSA as part of an information exchange focusing upon issues related to non-ionising radiation (EMR and UVR), and how the two agencies can potentially work together in the future.

Australian Standards Work

On 3 September 2014, ARPANSA staff members attended the annual major meeting of Standards Australia Committee *TE-007 – Human Exposure to Electromagnetic Fields*. ARPANSA Chairs this Committee which oversees the update of relevant Australian Standards related to exposure to electromagnetic fields. At this meeting, the work program for the update of Australian Standard 2772.2:2011 *Radiofrequency fields – Principles and methods of measurement and computation – 3 kHz to 300 GHz* was discussed and agreed noting that ARPANSA will undertake a key role in the revision of this standard.

Publications

Durvasula, S, Gies, P, Mason, R S, Chen, J S, Henderson, S, Seibel, M J., Sambrook, P N, March, L M, Lord, S R, Cok, C, Macara, M, Parmenter, T P, Cameron, I D, (2014) Vitamin D response of older people in residential aged care to sunlight derived ultraviolet radiation. In Press. *Osteoporosis International.*

Guo, S, Gies, P, King, K, Lucas, R, (2014) Vitamin D and acculturation in cardio-metabolic health: A community-based study of East Asian Australians living in Canberra, Australia. In Press *Photochem Photobiol.*

Urban, D, Tjong, L, and Karipidis, K (August, 2014) Measurement of Extremely Low Frequency Fields Associated with Electricity Supply and Distribution Infrastructure, *ARPANSA Technical Report Series No. 170*.

Promote radiological and nuclear safety and security, and emergency preparedness

ARPANSA maintained specialised radiation emergency capabilities in line with Australian emergency planning arrangements. ARPANSA's Emergency Preparedness and Response Group continued its training cycle by providing emergency response training to ARPANSA staff.

ARPANSA completed the analysis of the summer food samples, for anthropogenic radionuclides, for the Australian Total Diet Study. ARPANSA analyses these samples under a memorandum of understanding with Food Standards Australia and New Zealand.

The Joint ARPANSA and the Australian Safeguards and Non-Proliferation Office (ASNO) Physical Protection and Security Working Group (PPSWG) completed the Regulatory Assessment Report on the Periodic Security Review of the Australian Nuclear Science and Technology Organisation (ANSTO) which identified a number of recommendations for implementation.

During this quarter, ARPANSA worked closely with Australian Customs and Border Protection Command and the Australian Bureau of Statistics to implement new codes for the Export of High Activity Radioactive Sources. These changes will strengthen the control of radioactive sources being exported from Australia and result in greater community safety outcomes.

Promote the effective use of ionising radiation in medicine

From 4 to 7 September 2014, ARPANSA staff delivered eight technical presentations and contributed seven posters at the national Combined Scientific Meeting (CSM) of radiologists, radiographers and medical physicists, held in Melbourne. Topics included Diagnostic Reference Levels, dose reduction using Iterative Reconstruction in CT, improvements in radiotherapy dosimetry, a summary of the Australian Clinical Dosimetry Service pilot phase, and graphite calorimetry at high dose rates.

Calibration Services

As a part of ARPANSA's regular calibration services for radiotherapy providers and industry users of radiation, three therapy dosemeters and six radiation survey meters were calibrated. New calibration services for megavoltage photons and electrons were made available from July 2014.

ARPANSA staff measured the dose rate in the Australian Synchrotron Imaging and Medical Beamline using a graphite calorimeter at the third experimental location (Hutch 2B). These measurements complement previous measurements made in two other locations on the beamline.

Australian Clinical Dosimetry Service

The Australian Clinical Dosimetry Service (ACDS) is a joint initiative between the Department of Health and ARPANSA providing an integrated national approach to promoting safety and quality in radiotherapy, which is expected to lead to further improvements in radiotherapy treatment outcomes. The ACDS provides radiation specialists with a source of independent checks for equipment and patient doses.

The ACDS has continued therapeutic dose auditing operations beyond the original Memorandum of Understanding under a Variation with the Department of Health. The ongoing auditing and data collection has identified issues with dose calculation that have been resolved without patient consequence. The ACDS continues to provide assurance to clinicians and patients that the treatment is being delivered as planned.

During this quarter, the Minister for Health, The Hon Peter Dutton, endorsed continuation of the ACDS for a further two years. Continuation of this important project, at a cost of $2.8m ($1.4m per annum) will be the subject of a new Memorandum of Understanding between ARPANSA and the Department of Health. Accordingly, the ACDS is preparing for the next development phase which will engage stakeholders and position the service for an ongoing program with user contribution.

Diagnostic Imaging

Stakeholder engagement for development of a Radiation Protection of the Patient training module was expanded to include general practitioners, facility practice managers, rural and remote general practitioners, national prescribing service, radiologists and radiographers. The first meeting of the project management group was well attended and the content for the draft module will be tabled at their next meeting in November.

Draft DRL surveys for nuclear medicine and interventional fluoroscopy have been finalised and website access has been developed. Multi-detector computed tomography (MDCT) 2011-2014 DRL data was presented at the 2014 national combined scientific meeting of radiologists, radiographers and medical physicists. Emphasis was given to the finding that the use of iterative reconstruction algorithms in MDCT scanning significantly reduces patient dose without loss of diagnostic image quality.

Publications

Shimizu, M, Morishita, Y, Kato, M, Tanaka, T, Kurosawa, T, Takata, N, Saito, N, Ramanathan, G, Harty, P D, Oliver, C, Wright, T, Butler, D J, Comparison of the NMIJ and the ARPANSA standards for absorbed dose to water in high-energy photon beams, *Radiation Protection Dosimetry 2014*; doi: 10.1093/rpd/ncu272.

Butler, D J, Ramanathan, G, Oliver, C, Cole, A, Lye, J, and Harty, P D, Wright, T, Webb, D V, Direct megavoltage photon calibration service in Australia, *Australas. Phys. Eng. Sci. Med.* 2014 Aug 22 [Epub ahead of print]

Ensure effective and proportionate regulation and enforcement activities

Delivering national uniformity in radiation safety regulation

The main vehicle for the promotion of national uniformity of radiation protection throughout the jurisdictions is the *National Directory for Radiation Protection* (the National Directory) which is jointly developed by ARPANSA with the state and territory jurisdictions through the Radiation Health Committee (RHC).

The aim of the National Directory is to provide nationally uniform requirements for the protection of people and the environment against exposure or potential exposure to ionising and non-ionising radiation and for the safety and security of radiation sources, including provision for the national adoption of codes and standards. The National Directory addresses the needs of radiation protection regulators but also benefits other sectors involved in implementing radiation controls, such as mining and occupational health and safety regulators.

The most recent edition of the National Directory (which includes amendments 1-6) was published in February 2014. During this quarter, ARPANSA invited public submissions on a draft amendment to the National Directory concerning the disposal of radioactive material with public submissions closing on 1 August 2014. The new amendment covers the following:

- criteria for exemption from authorisation for disposal of very low-level radioactive material to landfill, to the air and to the sewer
- associated changes relating to that criteria
- Schedule 14 specifying authorisation exemption values for nominated radioisotopes for disposal to landfill, to the air and to the sewer
- Annex 4 explaining the methodology and rationale behind the development of the exemption and the values listed in Schedule 14.

Comments were also invited on the potential regulatory impact to industry (described in the Best Practice Preliminary Assessment) of the proposed amendment. Eight individuals and organisations provided comments on the proposed amendment which were subsequently considered by the Working Group and incorporated into the amendment as necessary. The updated National Directory amendment will now be submitted to the Radiation Health Committee for their endorsement before final submission to Health Ministers through the Standing Committee on Health.

Standards and Guides

During this quarter, ARPANSA invited public submissions on the draft *Safety Guide for Radiation Protection of the Environment* (***www.arpansa.gov.au/publications/drafts/dr_environment.cfm***), with the public consultation period closing on 10 October 2014. The purpose of this Safety Guide is to provide best practice guidance on how to assess environmental exposures and demonstrate protection of the environment from the human activities that give rise to such exposures. When finalised, it is expected that this guidance will be used by industry, regulators and others, and will assist in promoting a nationally uniform approach and understanding of what is meant by protection of the environment from the harmful effects of ionising radiation.

Significant Licensing Activities

On 5 August 2014, ARPANSA approved a request from ANSTO to change the airborne discharge notification levels for the Molybdenum-99 operations facility under Regulation 51. As a consequence of this approval, Schedule 2 of the Facility Licence F0262 was amended.

On 9 September 2014, ARPANSA approved a Regulation 51 change related to modification of a Building 54 (B54) crane at ANSTO's Molybdenum-99 operations facility.

On 18 September 2014, ARPANSA approved a Regulation 51 change related to exemption from personal monitoring for beam-line users and short-term contractors of the Synchrotron Light Source Australia.

Two Regulation 51 changes were approved for ANSTO:

1. Modification of the three OPAL fuel assemblies that were previously found with loose handling pins in 2012.

2. Modification of the Heavy Water Upgrade System that includes the Automatic Cover Gas Transfer System installation.

On 14 August 2014, ARPANSA approved the construction of two items important for safety under Regulation 54 at the ANSTO Nuclear Medicine Molybdenum-99 Facility, which is currently under construction (F0285).

Inspections

ARPANSA continued its licensee inspection program and undertook 13 inspections and site visits during the quarter. Inspection reports are posted on ARPANSA's website at ***www.arpansa.gov.au/regulation/inspections/index.cfm***

International Engagement

Technical Training Programe for PKI Operators on Public Key Infrastructure and Data Surety, Vienna, Austria 2-4 July 2014

Between 2 to 4 July 2014, ARPANSA attended the Technical Training Program for Public Key Infrastructure Operators held in Vienna, Austria, which focused upon data retrieval and management for certificates for radionuclide and other stations. ARPANSA's participation in this training means that ARPANSA has trained staff capable of operating Australia's radionuclide stations in a manner that meets data accuracy requirements required under Australia's Comprehensive Nuclear Test Ban Treaty.

61st Session of the United Nations Scientific Committee on the Effects of Atomic Radiation, Vienna, Austria, 21-25 July 2014

From 21 to 25 July 2014, the CEO of ARPANSA, Dr Carl-Magnus Larsson, chaired the 61st Session of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). A senior ARPANSA scientist attended as the alternate representative of Australia.

At this session, UNSCEAR's focus was returned to its usual ongoing work which had been delayed during extensive assessment of the health effects arising from the March 2011 Fukushima Dai-Ichi nuclear power plant accident.

Three publications were reviewed and discussed in detail and progress reports were received on a number of other documents currently under development and activities being undertaken by the secretariat. The three reports reviewed were:

- Methodology for estimating human exposures due to radioactive discharges
- Radiation exposures from electricity generation, and
- Biological effects of selected internal emitters (tritium and uranium).

Progress reports were discussed in relation to ongoing work concerning:

- Epidemiology of low-dose-rate exposures of the public to natural and artificial environmental sources of radiation
- Development of an evaluation of medical exposures, and
- Outreach activities.

ARPANSA also chairs UNSCEAR's Expert Group on Medical Exposures (EGME) which collates and evaluates international data on medical exposures to update and expand the information on medical exposures last presented in the 2008 Report. The EGME advised the Committee that they would be launching the UNSCEAR Medical Radiation Usage and Exposure Survey by September 2014.

Dr Larsson will continue as Chair of UNSCEAR until the commencement of the 62nd session. UNSCEAR is a key priority engagement for ARPANSA and constitutes an important knowledge source on health effects from exposure to radiation. ARPANSA's active involvement in UNSCEAR strengthens its and Australia's profile internationally, which can be used to further promote our regional activities. Part of the cost for ARPANSA's engagement with UNSCEAR was covered by United Nations Environment Programme (UNEP).

IAEA Third Consultancy Meeting – Implementing Guide on Security of Radioactive Material – Vienna, Austria, 25-29 August 2014

From 25 to 29 August 2014, ARPANSA attended the IAEA's Third Consultancy Meeting on Security of Radioactive Material. This consultancy meeting was designed to further develop the *Implementing Guide on the Security of Radioactive Material in Use and Storage and of Associated Facilities* (revision of NSS 11). This is the third consultancy attended by ARPANSA tasked with the revision of this document - NSS 11. The meeting concluded that a first draft of the document would be completed by the end of 2014 with further technical meetings scheduled for 2015. ARPANSA's participation at these consultancy meetings is a useful opportunity for Australia to provide input to these key IAEA security documents. Part of the cost was covered by the IAEA.

Forty Third Session of Working Group B – CTBT - Vienna, Austria 20-28 August 2014

From 20 to 28 August 2014, ARPANSA attended the Comprehensive Test Ban Treaty (CTBT) Working Group B held in Vienna, Austria. Working Group B is comprised of Member State representatives meeting to discuss technical issues related to the CTBT and includes representatives from other Commonwealth Government agency representatives from the Australian Safeguards and Non-Proliferation Office (ASNO) and Geoscience Australia.

ARPANSA's participation at this forum is vital to our continued work in the Australian CTBT atmospheric radionuclide measurement stations (seven particulate and two noble gas stations partnership) as part of Australia's treaty commitment under the CTBTO. These meetings were productive, resulting in progression on a number of topics including station performance, logistics, recapitalisation, future developments and radionuclide lab workshop. ARPANSA's attendance at Working Group B ensures that ARPANSA is able to contribute to the technical aspects of implementing the CTBT and verification regime. This has a direct impact on ARPANSA's work as we are the third largest operator of radionuclide stations in the International Monitoring Station network. These meetings also allow both the CTBTO and ARPANSA to discuss issues in real-time allowing for progress in both our work programs. The cost of attending this meeting is met through the contract ARPANSA has with the CTBTO.

ARGOS Consortium Meeting and ERMIN Workshop - Copenhagen, Denmark, 1-5 September 2014

From 1 to 5 September 2014, ARPANSA attended the Accident Reporting Guidance and Operating System (ARGOS) consortium meeting held annually in Copenhagen, Denmark which was attended by delegates from nine consortium member countries. The Steering Group meeting considered the consortium fees and proposed allocation of PDC-ARGOS development hours and a variety of issues related to the ARGOS system. Participation in the ARGOS Consortium is significant for ARPANSA as provides an opportunity to meet with the steering group and negotiate and influence the future direction of the software and the investment of consortium funds. It also gives ARPANSA insight into new features in ARGOS, how other countries are using ARGOS and a chance to work with the other countries to develop future work programs/upgrades. This has a direct impact on ARPANSA's ability to maintain and use ARGOS as the primary tool for atmospheric dispersion modelling.

Communicating UNSCEAR's assessment of exposure levels and health effects following 2011 nuclear accident in Japan, Fukushima City and Koriyama, Fukushima Prefecture, 3-6 September, 2014

From 3 to 6 September 2014, the CEO of ARPANSA, together with other authors of the UNSCEAR '*Assessment of Levels and Effects of Exposure after 2011 nuclear accident in Japan*' delivered a series of presentations in Fukushima City and Koriyama, Japan, to communicate the outcomes of the UNSCEAR health assessment of the 2011 nuclear power plant accident. Participants from UNSCEAR were Larsson (UNSCEAR Chair), Balanov (Russia, one of the lead writers), Crick (UNSCEAR Scientific Secretary), Yasuda (Project Coordinator, UNSCEAR Secretariat) and Mohan (Communications Specialist, UNSCEAR). These presentations were favourably received by the Japanese audience of educators, health care practitioners and media representatives. The ARPANSA CEO also met with the Prefecture Government and Mayors of Fukushima City and Koriyama, and with national and local media which received positive coverage. Part of the costs was covered by the United Nations Environment Programme (UNEP).

3rd International Conference on Radioecology & Environmental Radioactivity, Barcelona, Spain, 7-12 September 2014

Between 7 to 12 December 2014, ARPANSA attended the 3rd International Conference on Radioecology and Environmental Radioactivity (ICRER) in Barcelona, Spain. This conference is held every three years and presents recent achievements in radioecology and fields of expertise related to radioactivity in the environment. The 3rd ICRER was the largest to date and built on the success of the previous conferences in Bergen, Norway in 2008 and Hamilton, Canada in 2011. Attended by almost 400 participants from 45 countries, this conference covered the following themes:

- Nuclear legacy
- Risk characterisation & assessment
- Emergency Preparedness, Rehabilitation, and Management
- NORM including technologically enhanced NORM from industry, and radon
- Radioactive Waste Management & Disposal
- Radionuclides Speciation & Ecological Transfer

- Radioecological Sensitivity in extreme environments
- Environmental protection and risk management
- Multistressor and radiobiological effects
- Lessons learnt from the Fukushima accident, and
- Monitoring and metrology.

ARPANSA delivered three oral presentations and co-authored one poster presentation covering a range of activities undertaken by ARPANSA's Radiation Health Services Branch including:

- Emergency Preparedness, Rehabilitation and Management: Oral Presentation - Modelling and Monitoring in preparedness for nuclear powered warship visits in Australia
- Radionuclide speciation and ecological transfer: Oral presentation - Whole-organism concentration ratios in wildlife inhabiting Australian uranium mining environments. Poster presentation (co-author) - Recent development of wildlife transfer databases, and
- Lessons learnt from the Fukushima accident: Oral presentation: Monitoring Australia's northern coastline in advance of signs from Fukushima.

ARPANSA's attendance at this event is significant from the perspective of maintaining an understanding of the broad range work being done internationally and provided an excellent opportunity to network with colleagues working in the fields associated with radioecology and environmental radioactivity. A number of side meetings and presentations provided updates on international programs and initiatives being coordinated through the IAEA (MODARIA; Protection of the Environment-Coordination meeting), the European Commission, the European Radioecology Alliance and the International Union of Radioecology. The conference enabled discussions related to future collaborative work opportunities, and understanding challenges in other countries particularly with respect to implementation of radiation protection of the environment into regulatory frameworks.

Third International Symposium in Fukushima; Beyond Radiation and Health Risk – Towards Resilience and Recovery, Fukushima City 8-10 September 2014

From 8 to 10 September 2014, the CEO of ARPANSA attended the Third International Symposium, 'Beyond radiation and health risk – towards resilience and recovery'. This symposium was organised by the Nippon Foundation, the Sasakawa Memorial Health Foundation, the Fukushima Medical University and the Nagasaki University and held in Fukushima City. The symposium included assessments by international organisations (including UNSCEAR – where Dr Larsson presented the UNSCEAR health assessment), updates on the Fukushima Health Management Survey and research conducted in Japan on exposures and health effects following the March 2011 Fukushima nuclear accident. The information presented confirmed findings by the UNSCEAR assessment. Data presented also indicated that UNSCEAR's estimate of thyroid exposures of children is realistic while some uncertainty remains about thyroid exposures in the first days and weeks following the nuclear accident. The Symposium also presented data on general health for the 210,000 evacuees including measurements of post-traumatic stress disorder. The symposium organisers delivered recommendations to the Japanese Government. The meeting concluded with a formal ceremony on 11 September 2014 attended by Japanese Prime Minister Abe and delegates from the symposium and the UNSCEAR outreach team.

Between 10 to 11 September 2014, the CEO of ARPANSA also attended meetings with Ministry of Foreign Affairs and subsequently with the National Institute of Radiological Science (NIRS), to secure national coordination of data gathering for UNSCEAR's future work on Fukushima-related issues.

The Symposium findings supported UNSCEAR's dose assessment much of which was coordinated by key ARPANSA staff. Measurement 'on the ground' in Japan carried out by Japanese researchers and by NGOs illustrate that the assessment of external exposures is basically sound. This symposium was an important benchmarking exercise for the UNSCEAR health assessment and presentations confirmed the accuracy of UNSCEAR's findings, noting that the largest uncertainties were associated with thyroid exposures. Costs were covered by the Nippon Foundation.

European Federation of Medical Physicists Conference, Athens, Greece, 11-13 September 2014

ARPANSA attended the ECMP series of conferences held under the auspices of the European Federation of Medical Physicists Conference in Athens, Greece from 11 to 13 September, 2014. Work at this conference focused upon diagnostic reference levels (DRLs) and dosimetric audit of radiotherapy with progress reports presented from auditing programs across European nations. Some of these audits were based upon IAEA protocols already used by ARPANSA's Australian Clinical Dosimetry Service. The conferences also outlined progress on regional research projects funded by the European Union on the development of European DRLs (including CONCERT in Greece, paediatric DRLs (PiDRL) and IAEA support for the development of national dosimetric audit programs.

The European Federation of Organisations in Medical Physics (EFOMP), serves as an umbrella for all National Member Organisations (NMOs) within Europe and represents more than 5,000 physicists and engineers working in the field of medical physics. The value of ARPANSA's attendance at this key forum was that it provided up to date information on DRL programs in Europe, dosimetric audit information, workforce planning including accreditation standards and new directions in the European Union for medical radiation.

Presentations to IAEA Auditing Laboratories, Siebersdorf, Vienna, 15-16 September 2014

From 15 to 16 September 2014, ARPANSA staff attended the IAEA auditing laboratories at Siebersdorf, Vienna and delivered a presentation to the combined IAEA audit staff on the Australian Clinical Dosimetry Service pilot. A full day was spent reviewing the Vienna laboratories and discussing the future of radiotherapy audits and this visit was particularly relevant in terms of explanations about IAEA experiences with equipment which ARPANSA is considering purchasing for the ACDS.

Visit to Federal Authority for Nuclear Regulation, Abu Dhabi, United Arab Emirates, 18 September 2014

ARPANSA visited the Federal Authority for Nuclear Regulation (FANR) in Abu Dhabi, United Arab Emirates (UAE) and delivered a presentation to UAE counterparts in radiotherapy and radiology on the Australian Clinical Dosimetry Service including its rationale, audit design, findings and recommendations to facilities, the pilot outcomes, and reasons for its success. The presentation was well received with numerous questions on many aspects of the presentation. Previous presentations by ARPANSA and email exchanges established the UAE's interest in the Australia's ACDS audit program and ARPANSA's CTDRL survey.

58th Regular Session of the IAEA General Conference, Vienna, Austria, 22-26 September 2014, followed by Preparatory Meeting for follow-up Intergated Regulatory Review Service Mission to the United Arab Emirates

From 22 to 26 September 2014, the CEO of ARPANSA attended the 58th session of the IAEA General Conference held in Vienna, Austria. The 2014 General Conference was attended by over 3,000 delegates from 162 Members States, and international organisations including NGOs.

ARPANSA's participation in the annual IAEA General Conference is a unique networking opportunity for regulators and policy makers. ARPANSA's role is primarily to coordinate the input from Australia to the Safety Resolution following initial negotiations completed by the Australian Mission in Vienna. ANSTO has strong input in the Security Resolution including discussion in the Committee of the Whole, whereas ASNO has a prominent role in the safeguards resolution and others. The Australian delegation is comprised of staff from ARPANSA, ASNO, ANSTO and the Department of Foreign Affairs and Trade.

Back-to-back with the General Conference, the CEO of ARPANSA participated in the planning of a follow up of the 2011 Integrated Regulatory Review Service (IRRS) Mission, which was led by Dr Larsson who will also lead the follow-up mission. Part of the costs was covered by the IAEA.

Details of any Breach of Licence Conditions by a Licensee

Breaches with Safety Implications

No breaches with safety implications were recorded during the quarter.

Breaches with No or Minor Safety Implications

There was one breach with minor safety implications recorded during the quarter. This relates to a deviation from the standard operating procedure. The breach was assessed to have minor safety implications, and corrective actions were taken by the licence holder. No enforcement action was considered necessary.

Facilities Licensed Under Part 5 of the ARPANS Act

No new facility licences were issued in this quarter.

Transport of Radioactive Material

ARPANSA validated the Certificate of the package design, F/366/B(U)F-96 (ch), issued by the French Competent Authority for a Type B(U) Package and issued the following certificate of validation to ANSTO:

- AUS/2014-55/B(U)F-96.

ARPANSA approved the shipment of nuclear material from Sydney Airport to Lucas Heights and issued the following certificate to ANSTO:

- AUS/2014-54/B(U)F-96T.

Operations of the Radiation Health and Safety Advisory Council, the Radiation Health Committee and the Nuclear Safety Committee

Radiation Health and Safety Advisory Council

During this quarter, the Radiation Health and Safety Advisory Council (Council) met at ARPANSA's Sydney offices in Miranda, New South Wales, on 21-22 August 2014.

Members reviewed the proposed changes to Council's Mission, Vision, Values, Strategic Goals and Strategic Directions that were discussed at the previous meeting. Members agreed to a number of minor changes to provide better clarification and to further highlight the communication between the Council and the Radiation Health Committee (RHC) and the Nuclear Safety Committee (NSC).

The Member representing the interests of the general public presented the Council with a report outlining submissions from the community on a number of issues including smart meters, WiFi in schools and radioactive waste management.

Two members of the public made a presentation to inform Council of their concerns about the potential risk of long term, low level exposure to Electro-Magnetic Radiation (EMR) or Energy (EME). They made a number of recommendations to Council, particularly in relation to the current EME exposure standard RPS3, the state of scientific research in this area and the application of the Precautionary Principle.

Members thanked the presenters for their attendance and presentations. Further dialogue and working together to achieve the common goal of protection of children was encouraged. The Chair affirmed that Council will consider their presentation and will respond to their questions and recommendations in writing. He noted that RPS3 is currently under review and also that ARPANSA's EME Reference Group (EMERG) may be an appropriate forum where these issues could be discussed in more detail. Members supported continuing to invite members of the public to speak at Council meetings.

Council reviewed the updated *Code for the Safe Transport of Radioactive Material* prepared by the Radiation Health Committee with Council recommending that the CEO of ARPANSA adopt the Code.

Council was briefed on:

- work being undertaken at ARPANSA to develop a common framework for non-ionising radiation (NIR) protection with the aim of developing a fundamentals document for NIR based on the new ARPANSA Fundamentals document (RPS1) for ionising radiation (IR). Members welcomed the presentation and were supportive of further work in this area;
- the draft IAEA Safety Guide DS460 which will be released for Member State comment in September. Members agreed this was an important document and that Council should review it and provide feedback to ARPANSA that can be passed on to the IAEA; and
- the outcome of the Australian National Audit Office (ANAO) Report on Regulation of Commonwealth Radiation and Nuclear Activities. The CEO of ARPANSA advised that ARPANSA has agreed to implement the recommendations of the report in full. The Report is available on the ARPANSA website.

Members reviewed the draft Council Statement on the application of the Linear No Threshold (LNT) approach in radiation protection. Following careful discussion, Members agreed that considering all of the available evidence, LNT remains a useful and practical framework for radiation protection. Members agreed that the current draft document should be revised with a view to making a clear Council Statement on LNT preferably for approval at the next meeting of Council.

Members noted the previous advice published by Council and ARPANSA on the Precautionary Principle and agreed that as previous Council advice on this matter is now twelve years old the advice should be reviewed and updated. Members discussed the merits of both a single page statement about the Precautionary Principle and a longer, more detailed document, and agreed to attempt to produce a short document designed to communicate Council's understanding of the Precautionary Principle to the public.

Members were briefed by representatives from the Australian Mobile Telecommunications Association (AMTA) on the protections in place at mobile telecommunications radio base station sites ('towers') in Australia and of the information on these sites that is available to the public. Members then visited the Westfield Miranda mobile base station site. AMTA representatives pointed out the site features and demonstrated the process for taking live readings of EME levels at the site.

Members discussed the processes in place to ensure that industry complies with RPS3. The level of information provided in Australia is highly advanced in both quality and accessibility compared to most other countries. AMTA emphasised that the current detail of information available to the public is made possible by the mobile telecommunications carriers' commitment to sharing information.

Members discussed the need to set safety limits for EME based on scientific information, noting that when limits are arbitrary the focus moves to compliance rather than optimisation. Precaution and radiation protection are best driven by actively addressing safety rather than by just meeting limits.

Reports to the CEO from the Radiation Health and Safety Advisory Council (s.20(f) of the Act)

No reports from the Council were provided to the CEO of ARPANSA during the quarter.

Radiation Health Committee

The Radiation Health Committee did not meet during this quarter. The next meeting is scheduled for 19 November 2014, at ARPANSA's Miranda Offices.

Nuclear Safety Committee

The Nuclear Safety Committee did not meet during this quarter. The next meeting will be 31 October 2014.

Details of Directions Given by the Minister

No directions were given by the Minister under section 16 of the Act during the quarter.

Radioactive Material Import Permits

The importation of radioactive material into Australia requires permission under Regulation 4R of the *Customs (Prohibited Imports) Regulations 1956*. These regulations are made under the *Customs Act 1901*. Under the *Customs (Prohibited Imports) Regulations 1956,* the Minister for Health and Ageing may authorise ARPANSA officers to approve import permissions.

ARPANSA authorised officers issued 338 permits for medical radioisotopes including 0 urgent permits, 10 twelve-month permits and 328 single shipment permits.

ARPANSA authorised officers also issued the total of 191 permits for customs release of non-medical radioisotopes, comprising of: 101 urgent permits, 85 standard permits; and 5 twelve-month permits.