

Part 1: Review by the CEO

Review by the CEO of ARPANSA – Dr Carl-Magnus Larsson

I am pleased to present the fourteenth Annual Report of the CEO of ARPANSA, the third under my stewardship of ARPANSA.

2011-12 will be remembered as the year that the world came to terms with the aftermath of the Fukushima nuclear accident and took new initiatives to promote and improve nuclear safety. From the organisational point of view, it was also the year that our organisational restructure began to materialise with the aim of supporting ARPANSA's continuous development into a more mature, streamlined and responsive agency with an expanded presence in Canberra.

A vital role our agency performs is to assist evidence-based decision making by Government as it sets the policy agenda for Australia in radiation safety. This is achieved by deepening our understanding of sources and effects of radiation, and to apply international best practice in radiation regulation to keep our portfolio department and the Government briefed on important existing and emerging science and regulatory issues. We also strive to maintain regular and meaningful dialogue with other government agencies on issues of mutual interest.

ARPANSA's Canberra office works closely with ministerial advisers in the Parliamentary Secretary's Office and the Department of Health and Ageing to respond effectively to the Government's policy agenda and to support our Ministers. ARPANSA does this by providing high quality technical information and policy advice in relation to radiation protection and nuclear safety in the form of ministerial and parliamentary briefing material and responses, minutes on ARPANSA's operating activities and responses to ministerial correspondence as well as complying with our statutory reporting obligations.

This financial year, the ARPANSA Board changed its name to the Strategic Management Committee to more accurately describe its function and role within ARPANSA's governance structure and to better reflect governance arrangements for a Financial Management and Accountability Act agency, such as ARPANSA, where the focus is on achieving strategic objectives.



Significant issues and developments

Nuclear safety following the Fukushima Dai-ichi Nuclear Power Plant accident, Japan

It is not possible to reflect on the events of the past twelve months without reference to the Fukushima accident in March 2011. ARPANSA has been continually assessing the nuclear situation in Japan following the Great East-Japan Earthquake and Tsunami of 11 March 2011. Through our links with the International Atomic Energy Commission (IAEA), the World Health Organization (WHO) and other international and Australian Government agencies, ARPANSA continues to monitor the radiation situation in Japan and beyond in order to properly advise the Australian Government and public on radiation protection and nuclear safety issues. Our radiation protection advice is provided through the ARPANSA website which is updated on a regular basis.

Our advice has focused upon reactor status, current and likely future spread of radioactive substances, doses to workers and the population, and health and environmental consequences in Japan, Australia and elsewhere and is based on information from the IAEA and a range of other reputable sources.

The Japanese authorities announced in December 2011 that the reactors stricken by the earthquake and tsunami of 11 March 2011 have now been brought to 'cold shutdown' and that conditions are stable. However, ARPANSA's monitoring of the situation continues.

As expected, the Japan nuclear accident continued to drive much of our international engagement activities.

In August 2011, ARPANSA attended as a member of the first meeting of the IAEA Regional Co-Operative Agreement on Marine Benchmark Study to establish a work program for Member States to evaluate the extent and possible impact of the radioactive releases from the Fukushima Dai-ichi nuclear power plant into the marine environment and make scientific assessments of the data.

ARPANSA attended various Asian Nuclear Safety Network meetings in September, November 2011 and May 2012 in Thailand, Korea and Indonesia respectively, focusing upon emergency preparedness, protective measures, nuclear safety and lessons learned from the Fukushima nuclear accident.

I attended the 55th General Conference of the IAEA from 19 to 23 September 2011 as a member of the Australian Delegation. A significant part of the General Conference was devoted to nuclear safety as well as transport, radiation and waste safety and to discuss the *IAEA Action Plan on Nuclear Safety* which arose in response to the Fukushima nuclear crisis.

ARPANSA represented Australia at the 30th and 31st meetings of the Commission on Safety Standards held in Vienna in November 2011 and March

2012, which considered lessons learned from the Fukushima nuclear emergency and potential for revision of *Safety Requirements* covering all aspects of radiation protection, radioactive waste safety, transport and nuclear safety including a major rewrite of the IAEA *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards*.

In May 2012, I attended the 59th Session of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) as Vice-Chair and Australia's representative. I was elected Chair of the Committee for its 60th and 61st sessions and will be responsible for managing the Committee's work program and reporting to the UN General Assembly until 2014. UNSCEAR is currently undertaking a comprehensive assessment of radiological exposures and environmental impacts caused by the 2011 Great East-Japan Earthquake and Tsunami, which is expected to be published in late 2013.

The International Atomic Energy Agency Integrated Regulatory Review Service

The IAEA Integrated Regulatory Review Service (IRRS) provides Member States with an independent assessment of their effectiveness of their national regulatory infrastructure to ensure the safety of nuclear and radiological activities from 'cradle to grave'.



ARPANSA staff examining the radioactive fallout plume from the Fukushima Dai-ichi Nuclear Power Plant Accident, Japan

Photo by Joerg Lehmann

Between 7 and 15 November 2011, the IAEA's IRRS conducted its follow-up mission at ARPANSA which captured the implementation of the 2007 recommendations and review according to the IRRS module on patient protection. This mission also included policy issue discussions on emergency preparedness and response, radioactive waste management, patient protection and national uniformity. The IRRS concluded that the recommendations and suggestions from the 2007 review have largely been addressed, noting that that significant progress had been achieved and many improvements made, particularly in the twelve months preceding the mission.

The international peer review system allows the receiving countries to draw on the expertise of international colleagues, looking at the domestic infrastructure against the backdrop of their national experience, leading to recommendations, suggestions and the identification of good practices. Naturally, Australia (ARPANSA) also offers such advice to other countries through participation in the international peer review program. In line with this commitment, in December 2011, I led an IRRS mission team to the United Arab Emirates (UAE), assessing the regulatory infrastructure with particular regard to the mandate and activities of the federal regulatory body, the Federal Authority for Nuclear Regulation, located in Abu Dhabi. Details of the UAE IRRS mission are available at www.iaea.org/newscenter/pressreleases/2011/prn201131.html.

In May 2012, ARPANSA participated, with ARPANSA's Professor Peter Johnston as Deputy Team Leader, in an IRRS mission to Greece to examine the work of the Greek Atomic Energy Agency which includes regulation of industrial, medical and research facilities as well as transport and security of radioactive materials.

National uniformity and regulation

ARPANSA promotes national uniformity and international best practice in radiation and nuclear safety through its *National Directory for Radiation Protection* (NDRP) which is jointly developed by ARPANSA and the state and territory radiation regulators through the Radiation Health Committee. During this financial year, draft NDRP Amendment No. 6 was developed covering various topics including exemptions of krypton-85

lighting products; new licensing requirements for chiropractors; clarifying incident reporting requirements and other matters.

Protect the public and environment from radiation exposure

ARPANSA continued to monitor levels of radioactivity in the environment through our accredited Environmental Radiochemistry Laboratory which provided a range of commercial services and participated in proficiency testing programs and screening of food samples from Japan as part of the Department of Agriculture, Fisheries and Forestry Imported Food Program. Some 600 food samples from Japan have been screened with mostly very low activity levels. A report on ARPANSA's monitoring program related to the nuclear accident is expected to be published in September 2012.

In this financial year, ARPANSA's Radiochemistry Laboratory also assessed levels of naturally occurring radioactive materials (NORM) from samples collected from selected metal mines, collieries and quarries in New South Wales and in August 2012, ARPANSA published its findings in *A survey of naturally occurring radioactive material associated with mining*. The survey found that most mining operations do not have issues related to elevated levels of NORM and that average radon concentrations were below the action level for occupational exposure. The report is available at www.arpansa.gov.au/pubs/technicalreports/tr161.pdf.

This year we continued our work under the *Maralinga Land and Environment Management Plan* which completed radiological surveys reassessing the health impact on the Oak Valley community of radionuclide contamination from historical British nuclear weapons testing at Maralinga. Our report found that health impacts were negligible and that the current restrictions on full time living in the Taranaki restricted area at Maralinga were still appropriate. The full report is available at www.arpansa.gov.au/pubs/technicalreports/tr158.pdf.

Radioactive waste safety

ARPANSA has developed a *Draft Regulatory Guide: Licensing of Radioactive Waste Storage and Near Surface Disposal Facilities* which is currently undergoing a public consultation process due for completion in October 2012. This Guide is intended



Ranger uranium mine, Northern Territory

to supersede an earlier 2006 version and advises potential Commonwealth applicants on how to proceed to apply for a licence for a radioactive storage or disposal facility under the terms of the ARPANS Act, including facilities constructed on land volunteered under the *National Radioactive Waste Management Act 2012*. It describes objectives for protection of human health and of the environment, drawing upon international best practice in relation to radiation protection and radioactive waste safety.

ARPANSA attended the Fourth Review Meeting of the Contracting Parties to the *Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management* at the IAEA's Headquarters in Vienna, Austria between 14 to 23 May 2012. The Australian Delegation was led by ARPANSA's Professor Peter Johnston. At this forum, Australia was commended for hosting an IAEA Integrated Regulatory Review Service mission and follow-up, updating regulatory guidance for storage and disposal incorporating international best practice and having a strong legislative requirement for comprehensive community and stakeholder consultation.

Monitoring exposure to extremely low frequency electromagnetic fields and radiofrequency electromagnetic energy

ARPANSA continued its limited, but important, program to monitor public exposure to radiofrequency electromagnetic energy (RF EME) with measurements to exposure levels from mobile telephone base stations and to publish comparisons with the EME predictions made by industry in accordance with ARPANSA guidelines. We also responded to a continual number of public and media enquiries about health concerns around mobile phones, mobile phone base stations, Wi-Fi, smart meters and other established and emerging technologies.

At the international level, ARPANSA is an international WHO Collaborating Centre on Radiation Protection and a member of the World Health Organization (WHO) International Electro Magnetic (EMF) Project. Dr Lindsay Martin from ARPANSA was the chair of the Annual International Advisory Committee meeting of the WHO International EMF project in Geneva from 5-6 June 2012.

Limit workers' exposure to radiation

ARPANSA continued to promote a high level of protection for Australian workers from radiation and in 2011-12 ARPANSA engaged industries with increased levels of naturally occurring radioactive materials, such as coal-fired power generation and metal extraction industries, to evaluate how radiation protection controls are designed to mitigate potential risks. We undertook screening surveys of New South Wales mines for technological enhancements of naturally occurring radioactive materials.

Noting that uranium mining workers can be exposed to particularly high levels of naturally occurring radiation, ARPANSA continued its management of the Australian National Radiation Dose Register (ANRDR) which collects, stores and audits radiological dose histories for uranium miners. In June 2012, the first ANRDR workshop took place, attended by representatives of the uranium mining industry, contractors, and government organisations and it considered progress made, methodologies used for radiation dose assessments and plans for improvement. From July 2012, the ANRDR began receiving occupational dose records from Ranger uranium mine in the Northern Territory following the passage of new Northern Territory legislation.

ARPANSA also provided guidance and advice to workers exposed to solar ultraviolet radiation, against the backdrop of Australia's high rates of skin cancer, with over 400 000 new cases each year. ARPANSA continued to measure and report daily solar ultraviolet radiation levels in large population centres around Australia as part of our public information efforts to reduce the incidence of this avoidable disease to both workers and members of the public.

Promote the effective use of ionising radiation in medicine

ARPANSA continued to work closely with the medical profession to deliver better patient outcomes in the use of ionising radiation in medicine. The aim was to ensure that diagnostic doses are optimised to provide diagnostic information with the minimum radiation exposure and that in radiotherapy the prescribed dose is delivered to the target area of the patient's body.

Now a year into operation, the Australian Clinical Dosimetry Service (ACDS) has demonstrably contributed to improving safety of radiation oncology throughout Australia over this reporting period. The ACDS has achieved nearly complete signup to its voluntary audit program from centres nationally and has requests for audits extending into 2013.

In 2012, ARPANSA is working towards the introduction of a direct radiotherapy calibration service using the ARPANSA linear accelerator (linac) megavoltage X-ray beams to reduce the uncertainty for clinical treatment for patients across Australia.

This financial year we published the first set of national diagnostic reference levels for adult computed tomography (CT) protocols in collaboration with the Royal Australian and New Zealand College of Radiologists, the Australasian College of Physical Scientists and Engineers in Medicine, the Australian and New Zealand Society of Nuclear Medicine and the Australian Institute of Radiography. The Diagnostic Reference Levels (DRLs) are important tools for driving optimisation of radiation protection of patients, as verified by successful implementation in a number of other countries, and the publication of Australian National DRLs thus represents an important milestone.

Ensure radiological and nuclear security and emergency preparedness

In 2011-12 we started the development of a new Incident Management Plan (IMP) taking into consideration our roles as a regulatory authority, adviser and IAEA-designated National Competent Authority on radiation emergencies both domestic and abroad. We also incorporated lessons learned after the Fukushima Dai-Ichi accident, recognising that the public and the government turned to ARPANSA for our nuclear safety, radiation health and emergency response expertise. ARPANSA continues to work closely with the Department of Health and Ageing National Incident Room and the Emergency Management Australia Crisis Coordination Centre in the further development and harmonisation of the IMP, which will support a seamless whole-of-government response to radiation and nuclear incidents and emergencies.

Develop and implement regulatory systems

ARPANSA was restructured in May 2011 to ensure better and more effective delivery of all its services, including activities related to compliance and enforcement. This includes the formation of a new Safety Analysis Section focusing on promoting safety culture.

ARPANSA has reviewed its compliance and enforcement policy in order to more effectively support a graded, proportionate response to inspections and minor licence non-compliances. ARPANSA is aiming at supporting licence holders to be more holistic and focused on safety outcomes. In November 2011, ARPANSA posted inspection reports on our website for the first time and initial feedback from licensees indicated strong support for this initiative.

ARPANSA introduced a new *Compliance and Enforcement Policy and Regulatory Guide: Graded Response to Non-Compliance*. When non-compliance is identified, the regulatory response will be commensurate with its severity. ARPANSA will use the minimum response necessary to achieve the desired result, which, in most cases will be a return to compliance.

ARPANSA inspector training, including evidence gathering, has been strengthened which may be particularly relevant to investigations of the kind referred to above.

On 13 March 2012, ARPANSA signed a Memorandum of Understanding with Comcare, the Commonwealth agency responsible for workplace safety, rehabilitation and compensation, to support a more integrated approach to the regulatory oversight of many of our licence holders on the basis of both the *Work Health and Safety Act 2011* and the ARPANS Act.

ARPANSA has reviewed its handling of and guidelines for confidential informants which can be viewed on our website at www.arpansa.gov.au/RadiationProtection/ReportingASafetyConcern.cfm.

A condition of the operating licence for ANSTO's OPAL reactor is the requirement for ANSTO to conduct periodic safety reviews which are assessed by ARPANSA. The OPAL reactor was due for periodic safety review in the final quarter of 2011 and ARPANSA commenced this review in December

2011. In February 2012, ARPANSA corresponded with ANSTO providing feedback from its initial review of the OPAL Periodic Safety Review. In addition, ARPANSA requested further information be provided to support this process. ANSTO then provided ARPANSA with a list of corrective actions to be undertaken at OPAL as a result of the this process. ARPANSA is currently reviewing the corrective action list provided.

The Periodic Safety Review will re-examine the safety of the OPAL reactor taking into consideration operating experience since being commissioned and international best practice. Apart from submitting the Periodic Safety Review to ARPANSA, ANSTO is also required to seek international peer review.

In relation to nuclear security, in January 2012, ARPANSA and Australian Safeguards and Non-Proliferation Office jointly created a working group to review the ANSTO Periodic Physical Protection and Security Review submission which will be benchmarked against the IAEA Nuclear Security Series and the ARPANSA Radiation Protection Series No. 11 *Code of Practice for the Security of Radioactive Sources* (2008). This review is continuing.

Licensing activities

During this financial year, ARPANSA approved an application under Regulation 51 of the ARPANS Regulations made by ANSTO to move to a strategy which provides for more efficient and flexible fuel utilisation for the OPAL reactor.

An independent inspection of the ARPANSA Medical Radiation Services laboratories at Yallambie was undertaken by Queensland Health inspectors. No non-compliances with licence conditions were found and a number of recommendations for improved safety and security practices were made. A summary inspection report will be posted on the ARPANSA website when it is finalised.

In 2011, ARPANSA issued a facility licence to ANSTO to operate the 18 MeV cyclotron at Camperdown, New South Wales.

Staff development

In June 2012 ARPANSA's Senior Management Committee commenced an Executive Level Development Program designed to expand



ARPANSA radiochemist placing a food sample into the Germanium Gamma Ray spectrometer to measure radioactivity.

Photo by Joerg Lehmann

opportunities for executive level staff to develop management skills through strategic level work and to develop research, negotiating and communication skills in an environment outside the normal roles. This program will consider our research agenda, our graduate development program, as well as ARPANSA's commercial activities.

Corporate planning

In May 2012, ARPANSA finalised its *Strategic Directions 2012-2016* document which was prepared using an agency-wide collaborative process. Our Strategic Directions document identified community outcomes in ten key areas with a series of strategies to achieve them. This document then became the foundation for the 2012-2013 Corporate Plan which identified all the activities aimed at achieving the outcomes and KPI's and targets to measure performance.

In June 2012, we introduced improved arrangements for performance setting and monitoring. Each quarter we will monitor progress against targets in our Corporate Plan, evaluate our risk control measures and internal audit recommendations, and revise our plans as required.

We will continue to strive for improved openness and transparency with a view to further improving our engagement with stakeholders through a program of key events, and make more of our regulatory decisions and interactions with licensees publicly available. In doing so, we hope to demonstrate that our regulatory decisions are balanced, consistent, transparent, substantiated and evidence-based, and that ARPANSA is operating effectively and efficiently in the interests of the Australian public and the Government.

Financial report on performance

Financially, ARPANSA reported an operating deficit of \$2.39m for the financial year.

We incurred \$3.08m in expenses not requiring appropriation in the budget year. This amount was made up of \$2.54m in depreciation and amortisation expenses with the balance made up of an increase to the revaluation of long service leave provision as a result of the government's change to the bond rate.

The agency continues to review the efficiency and effectiveness by which it delivers its program to the Australian people to ensure that we operate within our financial constraints.

We also invested \$5.34m to complete the renovation of the Yallambie facility along with the purchase of new and replacement scientific and computer equipment.

Our cash holdings continue to be at levels required to support current resourcing requirements to achieve the agency's strategic objectives.

There have been no developments since the end of the financial year that have affected or may significantly affect the agency's operations or financial results in the future.

Outlook for 2012-13

I intend to take every opportunity to work closely with my staff to continue to deliver a professional service based upon our commitment to first class and well managed science, creativity and innovation, ensuring a robust safety culture, cooperation, good management and perceptive leadership with open and transparent processes and a consistent approach to regulation. Significant activities planned for the coming year include the following:

- Further work on good regulatory practice including finalising implementation of the IRRS review recommendations and taking further action to improve our processes for compliance and enforcement.
- Developing and implementing ARPANSA's Incident Management Plan to document and strengthen the operational, technical and communications elements for ARPANSA's response to radiological or nuclear emergencies.
- Continuing to coordinate the international analysis of public health and environmental effects resulting from the Fukushima accident, as part of the larger evaluation of the accident performed by UNSCEAR.
- Finalising the *Draft Regulatory Guide: Licensing of Radioactive Waste Storage and Near-Surface Disposal Facilities* to provide Commonwealth licensee applicants with guidance on the application process for a radioactive waste disposal facility or a radioactive waste storage facility.
- Preparing for a licence application for upcoming interim storage arrangements by ANSTO and later on in relation to the national radioactive waste management facility.
- Further development of the Australian Clinical Dosimetry Service full range of audit capabilities and assisting in the review of the program to determine future directions for clinical dosimetric audit in radiotherapy. This work involves extensive consultation with the Department of Health and Ageing and professional organisations as well as all of the radiotherapy clinics throughout Australia.
- Expanding work on diagnostic reference levels to new modalities which provide a tool for radiological facilities to assist in their cycle of quality improvement and educating all of the participants in radiology in the importance of optimising the procedures.
- Transitioning from indirect Cobalt-60 calibration to direct mega-voltage calibration based on the ARPANSA medical linear accelerator to improve dosimetric accuracy and patient outcomes from radiotherapy.
- Supporting the Therapeutic Goods Administration (TGA) by maintaining facilities for radiopharmaceutical quality control in the event of an incident involving these products and evaluation of new radiopharmaceutical products in support of the TGA.
- Establishing national clearance levels for release of radioactive materials from regulatory control and develop guidance for protection of the environment from the harmful effects of radiation.
- Continuing the Periodic Safety Review as well as the Periodic Physical Protection and Security Review of OPAL.
- Developing a plan for an extension of the national dose register to cover jurisdictions and workers other than those involved in uranium mining and milling.
- Continuing the assessment of scientific literature and guidance on exposure to extremely low frequency electromagnetic radiation, magnetic fields and radiofrequency electromagnetic radiation, revitalising stakeholder consultation in this area and revising standards as necessary.