



**Australian Government**

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**Australian Radiation Protection  
and Nuclear Safety Agency**

**QUARTERLY REPORT**

**OF THE**

**CHIEF EXECUTIVE OFFICER**

**OF ARPANSA**

**FOR THE PERIOD 1 APRIL 2013 TO 30 JUNE 2013**





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## Letter of Transmittal

29 October 2013

Senator the Hon Fiona Nash MP  
Assistant Minister for Health  
House of Representatives  
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 paragraph 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 April 2013 to 30 June 2013.

Please note that Section 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



**Carl-Magnus Larsson**  
CEO of ARPANSA

## **Report on the Operations of the CEO and ARPANSA**

The report on the operations of the CEO and ARPANSA is based on the key strategic directions:

- apply best practice regulation through the promotion of national uniformity and regulation
- promote the most effective use of radiation in therapeutic treatments and in diagnostic medicine
- improve radiation protection of workers, the public and the environment from natural sources including uranium mining and radioactive waste disposal
- assure the security of radioactive sources in Australia and strengthen Australia's capability to respond to radiation emergencies, and
- monitor and advise on population exposures to ultraviolet radiation, extremely low frequency electric and magnetic fields and electromagnetic radiation.

### ***Regulate the Use of Radiation***

#### ***National Uniformity and Regulation***

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

During this quarter, the draft NDRP Amendment No. 6 was finalised covering a number of topics including: exemption of lighting products containing krypton-85 from authorisation requirements; update of the licensing requirements for chiropractors; clarification of the incident reporting requirements, and other editorial matters. A preliminary regulatory assessment report relating to this draft amendment was approved by the Office of Best Practice Regulation and submission of the amendment to the Australian Health Ministers' Advisory Council for out-of-session consideration has been approved.

#### ***Significant Licensing Activities***

On 16 April 2013, ARPANSA received two separate licence applications from ANSTO to site and construct an Interim Waste Store (IWS) at Lucas Heights Science and Technology Centre (LHSTC).

The purpose of the ANSTO IWS is to safely store intermediate level waste (ILW) from reprocessing of HIFAR spent fuel which is due to return to Australia from France in December 2015 until the National Radioactive Waste Management Facility (NRWMF) becomes available.

Intermediate level waste from reprocessing of HIFAR spent fuel is also due to return to Australia from the United Kingdom in approximately 2020 and this may also need to be stored at the ANSTO IWS if the NRWFM is not available at that time.

On 16 May 2013 ARPANSA held a community information session at Engadine Community Centre on ANSTO licence applications for the proposed IWS at Lucas Heights Science and Technology Centre, the ANSTO Nuclear Medicine Molybdenum-99 Facility, and the ANSTO SyMo Facility. A copy of the transcript of the proceedings is posted on the ARPANSA website at [www.arpansa.gov.au/pubs/comment/transcript\\_160513.pdf](http://www.arpansa.gov.au/pubs/comment/transcript_160513.pdf)

The community information session was attended by approximately 45 people. In accordance with Regulation 40 of the *Australian Radiation Protection and Nuclear Safety Regulations 1999*, the CEO of ARPANSA invited public submissions on the applications and this process closed on 12 June 2013. Regulatory assessment of these licence applications, including consideration of issues raised in public submissions, will be largely completed during the next quarter. Prior to the issuing of a licence, the CEO of ARPANSA must advise of his intention to do so and make public his Statement of Reasons which summarises the considerations that have been taken into account.

### ***Inspections***

ARPANSA continued its licensee inspection program and undertook 13 inspections and site visits during the quarter.

Three licence breaches were found during the period. One with potential safety significance related to the calibration of an area radiation monitor in a facility operated by ANSTO. Two were considered of lesser potential safety consequence, being largely administrative in nature.

These inspections and site visits were undertaken to monitor compliance with licence conditions, investigate operational incidents, and to gather information to progress current licence applications.

Inspections conducted in this quarter included discussions with representatives of each licence-holder, review of training and dosimetry records, review of source inventories and detailed physical inspections of laboratories and working areas. The remaining inspections all concluded that good radiation safety practices were in place and there was no evidence of non-compliance.

Detailed inspection reports are regularly posted on ARPANSA's website at [www.arpansa.gov.au/regulation/inspections/index.cfm](http://www.arpansa.gov.au/regulation/inspections/index.cfm)

## ***Promote the Effective Use of Radiation in Medicine***

### ***Radiotherapy Calibration Service***

The radiotherapy calibration service supports the accuracy of radiation dose delivery in treatment centres. It is currently based upon the ARPANSA cobalt-60 gamma-ray source facility. During this quarter, five dosimeter calibrations were completed. The output of one kilovoltage radiotherapy unit in a skin cancer clinic was measured. ARPANSA also calibrated 13 survey meters for external clients. These meters are used to assess the compliance of radiation levels against standards for radiation exposure in industrial settings. ARPANSA also measured the output of a set of cesium-137 sources which are used by a private company to provide survey meter calibrations as a commercial service.

### ***Australian Clinical Dosimetry Service (ACDS)***

The ACDS commenced auditing radiotherapy centres in 2011. The ACDS audits the accuracy of radiation dose delivery from linacs in treatment centres to assure correct delivery of radiation dose to patients. The audits are conducted at a range of levels including: basic output audits of operational linacs (Level I); pre-operational audits of new linacs (Level Ib); audits of the whole radiation field using a two-dimensional detector array (Level II); and audits involving the pseudo-treatment of a simulated human torso made from tissue-equivalent plastic which allows end-to-end audit of the treatment planning and delivery process (Level III).

The ACDS auditing requirements are mandated by a Memorandum of Understanding with the Department of Health and Ageing. To date, the ACDS has achieved the audit requirements for the Level I and III audits, and is expected to achieve the Level II requirement before the end of 2013. This quarter, the ACDS completed 33 Level I audits, 33 Level II audits, 15 Level III audits and 1 Level Ib audit.

### ***Australian Diagnostic Reference Levels (DRL) for Medical Imaging***

Collection of relevant data for national diagnostic reference levels for adult and paediatric CT is ongoing. Liaison panels have been established to develop survey methods for interventional radiology and nuclear medicine. A draft survey for interventional radiology has been successfully completed and a draft nuclear medicine survey is being developed.

## ***Protect People from Natural Sources of Radiation***

### ***Exposures in Uranium Mining and Naturally Occurring Radioactive Materials (NORM) Industries***

ARPANSA maintains the Australian National Radiation Dose Register (ANRDR) which involves the collection, storage and auditing of radiological dose histories for uranium industry workers in Australia. The ANRDR currently holds dose history records for approximately 25,200 workers from the uranium mining and milling industry.

To ensure the ANRDR is consistent with international best practice of the more established national dose registers around the world, ARPANSA is seeking to expand the ANRDR beyond uranium mining to cover occupationally exposed workers in other industries. ARPANSA has commenced a review of the Australian mineral sands mining and processing industry to inform future decisions for possible expansion of the ANRDR to cover workers in the mineral sands industry. ARPANSA is also investigating options to include occupationally exposed Commonwealth employees in the ANRDR.

During this quarter the International Atomic Energy Agency (IAEA) circulated an information survey to uranium-producing countries on occupational exposure in the uranium mining and processing industry. The ANRDR proved a useful resource for ARPANSA in providing the dosimetric information requested by the IAEA on occupational exposure in the uranium mining industry in Australia. Analysis of the data aims to provide a worldwide overview of occupational radiation protection practices in the uranium mining and processing industry, allowing for the identification of good practices and of deficiencies and the need for action when required.

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

#### ***Public Information - ARPANSA base station survey program***

The ARPANSA base station survey program informs the public about actual exposures in close proximity to mobile phone base stations and validates mathematical predictions provided in the ARPANSA designed Environmental EME Reports prepared by industry. Four mobile base station surveys (Skennars Head, Lennox Head and Merewether in New South Wales and Shepparton in Victoria) were conducted in the last quarter and the results are available on the ARPANSA website at link: [www.arpansa.gov.au/RadiationProtection/BaseStationSurvey/index.cfm](http://www.arpansa.gov.au/RadiationProtection/BaseStationSurvey/index.cfm)

#### ***Electromagnetic Energy Reference Group***

A meeting of the ARPANSA Electromagnetic Energy Reference Group (EMERG) was held on 28 June 2013. EMERG was established to provide stakeholder and community input into electromagnetic energy (EME) issues. The group includes representatives from consumer organisations, the telecommunications industry, the health sector, academic organisations, other government organisations and community groups. Much of the meeting focused upon ARPANSA's radiofrequency literature review, including presentations by an expert panel on their findings.

#### ***Standards and Guides***

In November 2012 ARPANSA provided a submission to Standards Australia on the need to have the *Sun Protective Clothing Standard AS/NZS 4399 (1996)* updated and revised. This

proposal was accepted by Standards Australia. In June 2013 an initial teleconference was held between ARPANSA, Standards Australia, and others to finalise the composition of the Standards committee and to organise the first meeting of the full committee.

In June 2013 Standards Australia also approved the ARPANSA proposal to reopen the *Shade Cloth Standard AS 4174* to allow the introduction of ultraviolet radiation protection testing in the revised and updated Standard. This will provide better protection to the Australian population as the current standard is based on horticultural uses.

## ***Oversee Security of Radioactive Sources, and Ensure Emergency Preparedness***

### ***Emergency Preparedness and Response Capability***

ARPANSA maintained specialised radiation emergency capabilities in line with Australian emergency planning arrangements. In this quarter, ARPANSA emergency response personnel participated in an International Atomic Energy Agency (IAEA) Response and Assistance Network (RANET) exercise within the contaminated areas in Fukushima Prefecture, Japan. The exercise involved the organisation and deployment of Field Assistance Teams from several countries. ARPANSA personnel performed radiological monitoring and environmental sampling and analysis within agreed regions as a part of the exercise.

Work was completed on the development of an in-situ sampling device for the pre-concentration of cesium-137 from seawater, including final testing. This device will be deployed at ports visited by nuclear powered warships, where it will initially be used to determine the baseline levels of cesium-137 in the seawater and eventually for regular monitoring of these sites.

### ***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, and Macquarie Island, plus two noble gas analyser facilities, collocated with the air particulate monitoring stations in Melbourne and Darwin. A new station at Mawson, Antarctica was officially certified by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in this quarter. This completes the installation and certification of all seven Australian particulate stations as part of the International Monitoring System (IMS)<sup>1</sup>.

In addition to operating the stations, ARPANSA operates the Australian CTBT Radionuclide Laboratory (CRL), which has the role of testing samples obtained by other CTBT

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<sup>1</sup> The IMS consists of 321 monitoring facilities and 16 radionuclide laboratories around the world that monitor for evidence of nuclear explosions in underground, underwater and atmospheric environments using a variety of methods - seismic, hydro-acoustic and infrasound stations. Radionuclide stations and laboratories conduct atmospheric sampling to detect radioactive debris from atmospheric explosions or vented by underground or underwater nuclear explosions.

radionuclide monitoring stations. In this quarter the CTBTO undertook a triennial on-site surveillance visit, resulting in continued certification of the CRL.

### ***Joint Standing Committee on Treaties (JSCOT) Hearings – May and June 2013 – on Australia-UAE Cooperation Agreements***

On 13 May 2013 and 17 June 2013, senior staff from ARPANSA, alongside staff from other Agencies and Departments, appeared at the JSCOT hearings to consider a list of bilateral agreements between Australia and the United Arab Emirates. During the 13 May hearing, the Committee asked ARPANSA to respond formally to questions on notice relating to the Agreement between the Government of Australia and the Government of the United Arab Emirates on Cooperation in the Peaceful Uses of Nuclear Energy. At the second round of JSCOT hearings on 17 June, public submissions on the Agreement between the Government of Australia and the Government of the United Arab Emirates on Cooperation in the Peaceful Uses of Nuclear Energy were considered. ARPANSA did not give evidence at that second hearing and did not take any questions on notice.

### ***International Engagement***

#### ***Third International Conference on Effective Nuclear Regulatory Systems – Ottawa - Canada 8-12 April 2013***

ARPANSA attended the third international conference on Effective Nuclear Regulatory Systems held in Ottawa, Canada from 8-12 April 2013. The conference was hosted by the Canadian Nuclear Safety Commission. It was the first conference since the Fukushima nuclear accident to focus on the work of nuclear regulators. The conference found that spent fuel pond safety should be reviewed to establish weaknesses of Defence in Depth with a view to introducing new mechanisms to avoid serious accidents.

It was observed that there has been an increased emphasis on safety of spent fuel ponds, and ARPANSA should review the post-Fukushima response by ANSTO to safety of its spent fuel ponds.

In addition, it was recommended that nuclear regulators such as ARPANSA should participate more actively in emergency management exercises with its licence-holders, and play an active emergency management role in these exercises.

Following attendance at this conference, ARPANSA will audit the post-Fukushima response by ANSTO to safety of its spent fuel ponds. In particular, ARPANSA intends to engage and participate more actively in the emergency exercises undertaken by its licence-holders, in particular, ANSTO.

***Technical Meeting for the International Reporting System for Research Reactors (IRSRR) Vienna, 15-19 April 2013***

ARPANSA participated in the biennial Technical Meeting of the IRSRR which has been organised by the IAEA since 2003. The meeting was held for representatives of countries operating and regulating research reactors. Participants exchanged information on safety issues relating to research reactors, discussed event investigations, the methodology employed and future actions for effective use of the IRSRR. Refresher training on event root cause analysis was provided.

The meeting emphasised the importance of maintaining an event database and sharing the operational experience and investigation outcomes. ARPANSA considers this engagement to be a good example of the application of international best practices in event reporting for its licence-holders.

***International Atomic Energy Agency (IAEA) Integrated Regulatory Review Service (IRRS) Mission to Czech Republic – Preparatory Meeting 29 to 30 April 2013***

ARPANSA's Chief Medical Radiation Scientist, Professor Johnston, was invited by the IAEA to be Deputy Team Leader for an Integrated Regulatory Review Service (IRRS) Mission to the Czech Republic.

ARPANSA's involvement in IAEA Missions supports the global nuclear safety regime by promoting international discussion about best practices and solutions to problems that other countries have experienced. This is consistent with ARPANSA's strategic direction in international and regional collaboration which has an outcome: Australian expertise contributing effectively to the development of the international safety and security frameworks. In addition, Australia strongly supports review missions that strengthen the global nuclear safety regime.

***IAEA Regional workshop for Pacific Island States – 29 April to 2 May 2013***

ARPANSA presented on nuclear security at an IAEA Regional workshop for Pacific Island states between 29 April 2013 and 2 May 2013. The workshop was attended by 12 Pacific Island countries (Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu). Topics discussed included: the international legal framework for nuclear security (binding and non-binding international instruments); the role of the IAEA in supporting nuclear security initiatives and capacity building, including the IAEA Nuclear Security Plan; IAEA Nuclear Security Series documents; information exchange mechanisms such as the IAEA Incident and Trafficking Database (ITDB); IAEA Advisory Services available to Member States; the State's responsibility for nuclear security; national nuclear security infrastructure; border detection; nuclear security risk context, threat, sources and materials of security concern; potential targets; and the value of regional cooperation.

### ***Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management – May 2013***

This quarter, ARPANSA prepared the Country Waste Profile Report for Australia (Reporting Year: 2010), which was published by the International Atomic Energy Agency (IAEA) in May 2013. The report contains a general inventory of radioactive waste in Australia that is available on an international database in order to maintain long-term records and to assist with the reporting requirements of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

### ***Visit to Public Health England – May 2013***

ARPANSA is currently investigating better approaches in undertaking health impact assessments and communicating radiation risk to the public. In May 2013, an ARPANSA representative visited the newly formed Public Health England (PHE). PHE was established in April 2013 and took over the role of the Health Protection Agency (HPA) and a number of other health bodies. The visit enabled ARPANSA to engage with international experts and to learn first-hand from their experience in regards to the development, implementation and ongoing management of health physics applications. The knowledge acquired will greatly assist ARPANSA to enhance approaches and to further facilitate international collaborations.

### ***IAEA's MODARIA Programme – May 2013***

An ARPANSA representative attended the Interim IAEA MODARIA (Modelling and Data for Radiological Impact Assessments) Working Group meeting in Vienna during May. The Working Group was established to assess radio-ecological data in IAEA Technical Reports Series publications to identify key radionuclides and associated parameter values for human and wildlife exposure assessment. An ARPANSA presentation provided an overview of radio-ecological data currently available in Australia and the challenges faced in interpretation of the datasets. Participation in the MODARIA programme will enable ARPANSA to incorporate international best practices directly into the development of the Safety Guide for Environmental Radiation Protection in Australia.

### ***Accident Reporting and Guidance Operating System (ARGOS) User Group Meeting – Videoconference – May 2013***

In May, ARPANSA representatives attended (via video conference) the ARGOS User Group Meeting, held in Warsaw, Poland. Discussions focused on current developments, the RIMPUFF<sup>2</sup> dispersion model and the ARGOS food-chain and dose model with an emphasis on quantifying and displaying uncertainties. ARPANSA discussed approaches on the preparation of data for decision makers and the effect of applying land use information within ARGOS. Participation in the ARPANSA User Group continues to strengthen ARPANSA as

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<sup>2</sup> RIMPUFF is an emergency response model used to deal with chemical, nuclear, biological and radiological releases to the atmosphere.

a world leader in the application of ARGOS as a decision support tool for decision makers during nuclear and radiological emergency response situations.

***International Conference on the Use of Computers in Radiation Therapy (ICCR 2013), Melbourne, 6-9 May 2013***

ICCR takes place every three years and is a key meeting for those involved in Monte Carlo and Treatment Planning for radiotherapy. Two ARPANSA staff were on the conference organising committee and helped bring this international conference to Melbourne. Eight ARPANSA staff attended and presented three posters and one oral paper. Key presentations included one by the Radiological Physics Centre (which performs similar functions to the ACDS, but for the whole of North America). The presentation by the Radiological Physics Centre noted that around 10% of radiotherapy centres still fail the basic linac output check. There were also presentations on the accuracy of Monte Carlo modelling in radiotherapy. Three invited speakers visited ARPANSA's Yallambie campus after the conference and made further presentations on topics in Radiation Therapy.

***OECD Nuclear Energy Agency (NEA) Committee on Radiation Protection and Public Health (CRPPH) – OECD, Paris, 14-16 May 2013***

ARPANSA attended the Annual Business Meeting of the Organisation for Economic Cooperation and Development's Nuclear Energy Agency (OECD-NEA)'s Committee on Radiation Protection and Public Health (CRPPH) held in Paris between 14 to 16 May 2013.

The Annual Business Meeting of CRPPH was combined with a joint meeting of CRPPH and the Working Party on Nuclear Emergency Matters (WPNEM) and Half-day Topical Session on the INEX-4 Exercise. All meetings had a strong emphasis on emergency and recovery management. As the meetings focused on Fukushima-related work, other business was kept to a minimum. Topical areas covered included:

- Decision-making on protection strategies: – optimisation; implementation and termination of countermeasures; communication and coordination;
- Public health, including issues surrounding information and communication;
- Monitoring and assessment, including capability assessment;
- Safety and security of populations and infrastructure; and
- Planning for recovery, including: clean-up/waste management; stakeholder involvement.

All participating countries stated that they found that the INEX-4 materials provided were realistic and useful tools to apply in their own jurisdictions. A series of table-top exercises was undertaken addressing issues in consequence management and the transition to recovery arising from a radiological dispersion device in an urban area. However, the emergency phase was deemed too problematic for international definition because command structures for emergencies vary so greatly between countries.

The INEX-4 exercise demonstrated good collaboration between multiple authorities and neighbouring states. Problems of public mistrust and the imperative to undertake testing of emergency planning were also emphasised. Recovery planning has been notoriously neglected in many countries, but pre-planning of optimisation strategies, communication plans and messaging, waste handling and decommissioning methodology, public health registry and pre-planned criteria for de-escalating were considered important areas of further work.

Attendance at this forum was extremely useful for ARPANSA in the refining of its Incident Management Plan and emergency response processes. This forum was also useful in demonstrating that lack of planning for radiological emergencies can significantly hinder recovery and effective decontamination. In particular, the implications of the lack of planning for a malicious event in an urban area are obvious but this has received little attention in the past. This conference addressed many of these concerns.

***IAEA International Experts Meeting on Human and Organisational Factors in Nuclear Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, Vienna, 21-24 May 2013***

ARPANSA presented at the fifth international experts meeting (IEM5) on human and organisational factors in nuclear safety focusing upon the Fukushima nuclear accident and the IAEA Action Plan on Nuclear Safety. This meeting, held in Vienna, Austria, was attended by more than 150 participants from 40 Member States and provides support for the preparation of the IAEA Fukushima Comprehensive Report expected to be published by the end of 2014. This meeting was a forum to share information on human and organisational aspects of nuclear safety focusing upon the interactions between individuals, technology and organisations and to identify lessons learned and best practices.

ARPANSA's representative was an invited keynote speaker at the meeting who provided an explanation of ARPANSA's development and promotion of a holistic approach to safety by Australian operators. ARPANSA's holistic approach integrates human, technological and organisational components of safety and represents a best practice in high hazard industries.

This IEM supported the IAEA Action Plan on Nuclear Safety and its conclusions will assist in the preparation of the IAEA Fukushima Comprehensive Report due to be published by the end of 2014. The meeting provided a forum to share knowledge and experience concerning human and organisational aspects of nuclear safety - in particular the interactions between individuals, technology and organisations – as well as to identify lessons learned and best practices.

An observation from the meeting is that ARPANSA's work on holistic safety and strategic directions is extremely relevant to a leading group of counterpart countries working in this area. ARPANSA's work is closely aligned to the direction that the IAEA is taking in developing systemic safety practices in member states. There was also a good deal of useful information shared during the meeting which will further inform ARPANSA's approach to holistic safety management and regulation.

**60th Session of the United Nations Scientific Committee on the Effects of Atomic Radiation, UNSCEAR. 27 – 31 May 2013, Vienna, Austria**

ARPANSA's CEO, Dr Larsson, chaired the 60th Session of UNSCEAR from 27 to 31 May 2013. The Commonwealth Chief Medical Officer, Prof Baggoley, attended as the alternate representative of Australia. Two senior ARPANSA scientists participated in the Australian Delegation as advisors. This session of UNSCEAR focused on the yearly report to the UN General Assembly and on two Scientific Annexes to the GA Report:

- Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami; and
- Effects of radiation exposure in children.

Both Scientific Annexes will be delivered in final quarter of 2013. Progress reports were received on a number of other Scientific Annexes currently under development as follows:

- Methodology for estimating human exposures due to radioactive discharges
- Radiation exposures from electricity generation
- Biological effects of selected internal emitters (tritium and uranium)
- Epidemiology of low-dose-rate exposures of the public to natural and artificial environmental sources of radiation
- Evaluation of medical exposures

An 'out of session' meeting was held to discuss the finalisation of the Scientific Annex on attribution of health effects to radiation and inference of risks, which was agreed in principle at the 59th Session.

Work on "Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami", involves contributions of 80 scientists from 18 countries, plus – approximately – an additional 200 scientists working closely with those nominated to the project. The UNSCEAR assessment project includes a Coordination Expert Group, four expert groups and a task group. Group A is responsible for the data compilation, screening, quality assurance and documentation, Group B for the assessment of radionuclide releases and dispersion, Group C for the dose and risk assessment to humans and biota and Group D for the assessment of worker doses. The Health Implications Task Group (HIT) was established during 2012 to report on the health implications of the nuclear accident. The final report is due for publication in October of 2013. Preliminarily it will be first presented in Japan, possibly in Fukushima. All of the sessions on the Fukushima report were chaired by Larsson (Australia). These commenced with technical discussions of the Main text and General Assembly (GA) Report, followed by a session on each of the detailed scientific appendices.

ARPANSA's, Acting Chief Radiation Health Scientist, Dr Solomon, was the Leader of Group C and presented a summary on appendix C – Assessment of Doses to the Public. This appendix provided details about methodology employed to estimate doses to the public in Japan, and elsewhere in the world. The pathways considered in the assessment included

external, inhalation and ingestion pathways and estimates of doses were reported for typical groups (1-year olds; 10-year olds; and adults) for the first year following the accident, 10 years following; and lifetime exposure to the age of 80 years.

The Scientific Annex “Effects of radiation exposure in children” was first reviewed by UNSCEAR at the 59th session. The Annex specifically addresses radiation effects in children (or, more precisely, the immediate and late effects of radiation exposure during childhood) and has been prepared mainly by three expert consultants and the US representative. The report reviews data on physiology of children from infant to post-adolescence, and data on a number of malignancies. The report qualifies the notion of children being “3-5 times more radiosensitive than adults” as this is greatly dependent on what cancer is being studied. There is clear evidence for children being more at risk of developing, for example, leukaemia and thyroid cancer than adults. For some cancers, such as lung cancer, it appears children are less at risk. For other cancers there seem to be little if any difference between children and adults, and for a final group of cancers, such as prostate cancer, there is no clear relationship to radiation exposure for either age group. The report also considered deterministic effects (or tissue reactions) at high doses. The draft report is now in the process of being finalised for publication by the end of 2013. The recently published Australian epidemiological study (John Mathews et al. 2013) of cancer among people subjected to CT imaging during childhood was discussed at some length.

Dr Larsson will continue to Chair UNSCEAR until the end of 2014. UNSCEAR is a key priority engagement and constitutes an important knowledge source for ARPANSA. Whilst ARPANSA will now wind down its work on Fukushima, it should be noted that ARPANSA Chairs the UNSCEAR’s Expert Group on Medical Exposures (EGME). This group, with international representation, will collate and evaluate international data on medical exposures, to update and hopefully expand the information on medical exposures last presented in the 2008 Report. Among other things, this will provide input to trend analyses in this important and expanding field, which will help in developing optimisation strategies for medical exposures.

### ***5th ASEAN Regional Forum Inter-Sessional Forum on Nuclear Disarmament - Manila 4-6 June 2013***

ARPANSA joined with the Australian Safeguards and Non-Proliferation Office (ASNO) and ANSTO to form the Australian Delegation to the 5th ASEAN Regional Forum Inter-Sessional Forum on Nuclear Disarmament. Representing Australia, ASNO was a co-Chair of the Forum along with the Philippines.

The Forum was well attended and emphasised the three pillars of the Nuclear Non-Proliferation Treaty with this meeting focusing upon the benefits of peaceful uses of nuclear technology in this fast growing region to improve medical services, agriculture and energy supplies, to keep pace with economic development.

Attending countries expressed continued commitment to international safeguards, security and safety obligations. These statements are being matched with international and regional support for joint exercises and capacity building to improve the implementation.

### ***World Health Organisation (WHO) International EMF Project***

The WHO launched the International Electromagnetic Fields Project (the EMF Project) in 1996 in response to growing public concern in several Member States over possible health effects from exposure to EMF sources including new wireless technologies. The EMF Project is a WHO extra-budgetary program and is funded entirely by voluntary contributions from participating countries. The EMF Project aims to review, and identify gaps in, the scientific research literature, and to encourage a focused agenda for future research. The EMF Project also aims to encourage harmonised standards, provide information on risk perception, management and communication and to advise national programs and non-governmental institutions on suitable EMF policies.

### ***WHO International EMF Project – EHC International Stakeholder Seminar – Paris 5 June 2013***

ARPANSA presented at the WHO International Stakeholder Seminar, convened to bring stakeholder views and information to the WHO's Environmental Health Criteria (EHC) monograph being developed on RF fields. ARPANSA provided an update on current projects, including ARPANSA's RF Standard, noting that ARPANSA is currently assessing RF literature published since its RPS3 RF Standard was finalised in 2002 to determine whether a formal review is needed.

### ***18th International Advisory Committee Meeting - WHO International EMF Project – Paris 6 – 7 June 2013***

The two-day meeting was attended by representatives from more than 40 Member States and international organisations and chaired by ARPANSA. The three WHO Collaborating Centres with programs in EMR/EMF, ARPANSA, BfS (Germany) and Public Health England (UK) attended and provided reports on their work programs. Reports on EMR activities with health and safety implications were received from the WHO, International Telecommunications Union, International Commission for Non Ionizing Radiation Protection, International Committee for Electromagnetic Safety, International Union of Radio Science and the European Commission.

Expert summaries were presented of recent research activities in laboratory studies and epidemiological research. Outcomes were generally in line with existing knowledge but some recent advances in the therapeutic use of RF fields were noted.

A description was presented of the process for development of the Environmental Health Criteria monograph on RF fields, including the preparation by a core expert group of a draft for consultation and the final evaluation and completion by a larger, and broadly representative, task group. Publication of the monograph is expected during 2014.

Other progress reports on International EMF Project activities were presented, and members' views sought, on current activities of the EMF Project, including the planned database of national EMF standards and policies, on a brochure being developed to assist local planning authorities in dealing with EMF issues and on the ongoing revision of the WHO EMF website and published documents and factsheets.

### ***Meeting with Medical Physicists – United States – 10-13 June 2013***

A member of ARPANSA's medical radiation team attended a series of meetings with medical physicists in the United States on 10-13 June 2013 which focused on the status of clinical radiation oncology in the United States. The meetings discussed the ongoing use of advanced radiotherapy techniques using high doses in small volumes which allow treatment in a small number of visits. Clinical trial outcomes discussed at the meeting suggest that prostate cancer radiation therapy with these advanced techniques appears practical and safe at this point, and the techniques will be further expanded to other clinical sites. Tomotherapy, a technique using a rotating treatment source, is continuing to be upgraded and clinical trials in this space should be watched with interest. The meeting validated the ACDS' approach to continue with developing small field audits, and the requirement for the Primary Standards work at ARPANSA to develop a rigorous dosimetric approach for small field dosimetry.

### ***OECD Nuclear Energy Agency (OECD-NEA) – Nuclear Law Committee – 12-13 June 2013***

ARPANSA's Corporate Counsel attended the OECD-NEA Nuclear Law Committee as Australia's Representative between 12 to 13 June 2013 in Paris. The June meeting of the Nuclear Law Committee focused on issues of third party liability for accidents at nuclear installations. Experts from Russia and India discussed developments in their respective countries in adopting and implementing national legislation on nuclear liability. A special session was also held on the legal aspects of the Fukushima Dai-ichi nuclear accident which included a comprehensive presentation by Japanese delegates on the nuclear liability regime in Japan and progress made in providing relief to victims of the accident. This Committee continues to follow developments in Japan and other jurisdictions in order to enhance the scheme for third party liability in the nuclear field. ARPANSA's representation and participation in the Nuclear Law Committee is significant as this is a key strategic international forum for consideration of the interpretation, harmonisation and modernisation of the international nuclear liability regime.

### ***26th Meeting of the IAEA Transport Safety Standard Committee (TRANSSEC), 17-19 June 2013***

The Australian representative from ARPANSA attended this meeting which discussed the resolution of comments received from the Member States on the recently published 'Regulations for the Safe Transport of Radioactive Material - 2012 Specific Safety Requirements-6 (SSR-6), and the issues related to TSG-1.6 (Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material). Representatives from

Australia, the USA, Belgium, Germany, France and Japan formed a working group to develop an Internal Guide for Applicants for design and approval of transport packages.

ARPANSA presented an overview of Australian approval processes for the safe transport of radioactive material in the light of ARPANSA Safety Guide on Approval Processes for the Safe Transport of radioactive Material, Radiation Protection Series No. 2 (2012), which will be one of the references for the proposed international guide.

***Attendance at American Association of Physicists in Medicine (AAPM) Summer School (Colorado Springs, United States); Visits to MD Anderson Cancer Centre, Secondary Standards Laboratory and Radiological Physics Centre, Houston – 15-21 June 2013***

Between 15 June and 21 June, 2013, the Director of the ACDS attended the AAPM Summer School which presented on a number of different approaches to both quality control and fault finding in the clinical environment and also engineering-based process control techniques. ARPANSA also attended the MD Anderson Cancer Center where a cross-calibration of an ARPANSA ionisation chamber was performed by the Cancer Center's secondary standard dosimetry laboratory (SSDL). ARPANSA also visited the Radiological Physics Centre (RPC) in Houston which is the US-equivalent to the ACDS and has been operating for more than fifty years.

Attendance at the AAPM Summer School has given the ACDS a number of tools to investigate the stability of some of our quality assurance routines and should provide useful information about our techniques and what limit values should be applied to ACDS equipment. These tools are particularly valuable as they enable ACDS staff to define the quality parameters which its dosimetry equipment should meet prior to audits. They also enable ARPANSA to track the dosimeter behaviour over time with a realistic metric. The cross-calibration performed by the SSDL was particularly important for ARPANSA's Radiotherapy Section as it assists with resolving an identified difference between measurements performed in North America and Australasia.

The visit to the RPC was very useful for the ACDS to help guide its development over the new few years and in particular in the logistics of large audits as the complexity and technologies of the ACDS evolves to meet the needs of its clientele.

## Details of any Breach of Licence Conditions by a Licensee

### *Breaches with Safety Implications*

Licensee	Number	Nature of breach	Action
ANSTO	F0240	Breach of Licence Condition 6 of Schedule 2 of Licence F0240 for the Gamma Irradiator Suite – failure to calibrate area radiation monitor at the required interval	Area monitor recalibrated and actions put in place to prevent recurrence

### *Breaches with No or Minor Safety Implications*

There were two breaches with minor or no safety implications recorded during the quarter as follows:

- Lack of facility specific emergency procedures, relying on site emergency procedures.
- Failure to notify ARPANSA of a source transfer within a given time period.

In each of the above cases, the breach was assessed to have minor safety implications, corrective actions were implemented by the licence-holder and no enforcement action was considered necessary.

## Facilities Licensed Under Part 5 of the ARPANS Act

Licensee	Number	Type	Comment
Australian Nuclear Science and Technology Organisation (ANSTO)	F0272	Facility	Licence to construct the Centre for Accelerator Science at Lucas Heights Science and Technology Centre

## Transport of Radioactive Material

ARPANSA approved the shipment of radioactive material from Victoria to ANSTO Lucas Heights under special arrangement and issued the following certificate to ANSTO:

- AUS/2013-46/X

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

### ***Radiation Health and Safety Advisory Council***

The Council met on 18 to 19 April 2013 at the offices of Queensland Health, Brisbane. A full summary of the meeting is available at:

<http://www.arpansa.gov.au/AboutUs/Committees/rhsacmt.cfm>.

The Council was briefed on radiation regulatory issues in Queensland and noted the wide range of activities undertaken by the Radiation Health Unit and the challenges faced in such a large jurisdiction.

Council was also briefed on the Queensland Government's plans for resuming uranium mining in the state and discussed the implications for transport and the need for local consultation as well as appropriate coordination and communication between government agencies involved.

At the meeting, the Council also:

- Discussed the recent follow up of outcomes of radiation accidents at Epinal, France and noted the importance of tools such as the Australian Clinical Dosimetry Service to ensure that similar accidents do not happen in this country.
- Discussed the current activities of ARPANSA's Compliance and Enforcement section particularly in relation to the assessment of recent ANSTO applications.

### ***Reports to the CEO from the RHSAC (s.20(f) of the Act)***

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

### ***Radiation Health Committee***

The Committee did not meet during the quarter. The next meeting is scheduled for 23-24 July 2013.

### ***Nuclear Safety Committee***

The Committee met on 21 June 2013 at ARPANSA's Miranda offices in Sydney. A summary of the meeting is available at [www.arpansa.gov.au/AboutUS/Committees/nscmt.cfm](http://www.arpansa.gov.au/AboutUS/Committees/nscmt.cfm)

At this meeting, the Committee:

- Discussed the process being made towards satisfying and removing special licence conditions of the OPAL Reactor licence. These conditions placed on the licence following the 2007 fuel fault event cumulated in a modification of the reactor fuel design.

- Discussed ARPANSA's internal methods for the risk informed allocation of regulatory resources to particular licences.
- Discussed the processes and practices for holistic assessment of licence-holders which are currently being trialled by ARPANSA. The Committee provided advice in the practices used by other high reliability organisations in this regard.
- ARPANSA updated the Committee on a number of ongoing applications and activities on which the CEO may ask for future advice. This included an Australian report to the Convention of Nuclear Safety which is currently being prepared.

## **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 294 permits for medical radioisotopes including three urgent permits, six 12-month permits, and 285 single shipment permits.

ARPANSA authorised officers also issued the total of 229 permits for customs release of non-medical radioisotopes, comprising of: 102 urgent permits; 120 standard permits; and seven 12-month permits.