Part 3: Report on Performance

Protect the Public, Workers and Environment from Radiation Exposure

ARPANSA, on behalf of the Australian Government, undertook a range of activities aimed at improving knowledge about the levels and effects of radiation in the environment, and providing guidance and advice to industry and the public on how best to mitigate these effects. During this financial year, the Agency delivered comprehensive assessments on environmental and health impacts of the Fukushima Dai-ichi nuclear accident on people living in Australia and continued to screen food samples from Japan. Domestically, ARPANSA completed work on environmental and health assessments of inhabitants of the Oak Valley region where residual radiological contamination is left over from British atomic tests conducted in the 1950s. Measurements and advice spanning a range of occupational exposure situations was completed and the Agency continued to fulfil its requirements under the terms of the Comprehensive Test Ban Treaty (CTBT).

Environmental Protection and Health Assessments

The Agency assessed that the health impact of people living in Australia from the Fukushima Dai-ichi nuclear power plant accident to be negligible and these findings were published as Technical Report *Assessment of the impact on Australia from the Fukushima Dai-ichi nuclear power plant accident*.

An assessment was made of the health impact on local peoples living at Oak Valley due to radiological contamination from historical British nuclear weapons testing. Oak Valley is a remote Aboriginal community located on the southern fringe of the Great Victoria Desert on Maralinga Tjarutja Lands in South Australia. ARPANSA published a series of reports on this assessment and reported to the local community that radionuclide contamination from the historical British nuclear weapons testing had a negligible impact on health for Oak Valley village residents and that the current restrictions on full time living in the Taranaki restricted area at Maralinga still remain appropriate. Work was completed on a project which collates existing Australian data holdings on concentration ratios for flora and fauna in uranium mining environments, in collaboration with industry and which was sponsored by the Department of Resources, Energy and Tourism.

The Agency also participates in projects under the auspices of the International Atomic Energy Agency (IAEA). Notably, our experts attended the IAEA Modelling and Data for Radiological Impact Assessments (MODARIA) technical meetings in Vienna, Austria. The aim of this program is to improve capabilities and establish best international practice in environmental radiation dose assessments. These technical meetings established a Working Group 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. ARPANSA'S participation in the MODARIA program will enable the Agency to incorporate international best practice directly into the development of the *Safety Guide for Environmental Radiation Protection in Australia*.

Screening Food Samples

During the year, ARPANSA's Radiochemistry Laboratory delivered a range of commercial services, and provided laboratory services for the screening of food samples from Japan as part of the Department of Agriculture, Fisheries and Forestry's Imported Food Program. Work also commenced on a survey of Australian dietary exposure to radionuclides in collaboration with Food Standards Australia New Zealand (FSANZ) as a part of the 25th Australian Total Diet Study.

Ultraviolet Radiation Protection

Through its solar ultraviolet radiation (UVR) programs ARPANSA continues to monitor public exposure to solar ultraviolet radiation to improve understanding of ways to reduce exposure. Against the backdrop of Australia's high rates of skin cancer, with over 400 000 new cases each year, ARPANSA continues to measure and report daily solar UVR 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.

Research has shown that a reduction in UVR exposure will lead to a reduction in skin cancer incidence and the use of sun protection (clothing, hats, sunscreen, sunglasses and shade) can play an important role in this. ARPANSA's National

Association of Testing Authorities (NATA)-accredited Ultraviolet Protection Factor (UPF) Testing Service tests over two thousand samples of sun protective clothing and hats annually and issues four million labels for sun protective clothing. Since the testing service began, over 67 million UPF rating swing tags have been issued. These UPF tags are designed to raise consumer awareness of sun protection strategies.

The ARPANSA UVR monitoring network continues to provide real-time 'live' ultraviolet (UV) Index and Exposure data for eleven Australian sites and four Antarctic bases via the ARPANSA website. The UV Index data (which is updated every minute) is also delivered to mobile phone users through third-party applications. The ARPANSA website also describes protective strategies for avoiding excessive sun exposure. Research projects measuring the UVR exposures of outdoor workers were carried out in collaboration with Cancer Council Victoria, Queensland Health and with the Australian National University for indoor workers and for different population groups.

ARPANSA continues to work within the UV Alert Group (which includes the Cancer Councils from every state and territory, the Bureau of Meteorology and, more recently, New Zealand Cancer Council and New Zealand Health Sponsorship Council) to improve the delivery of UV Index measurements and information as part of the sun protection message. ARPANSA as a World Health Organization (WHO) Collaborating Center for Radiation Protection continues to participate in the WHO Intersun UVR project. The WHO Intersun Project provides sound scientific information and practical advice on the health impact and environmental effects of ultraviolet radiation exposure encouraging countries to reduce ultraviolet radiation-induced health risks through provision of guidance about effective sun awareness programs. In June 2013, ARPANSA attended the annual international advisory committee Intersun UVR meeting in Paris and reported on ARPANSA's current ultraviolet radiation work programs.

Regulation of the solaria industry is the responsibility of each state or territory. ARPANSA has developed nationally agreed regulatory elements for solaria which are outlined in the *National Directory for Radiation Protection*, and which recommended banning solaria use by

Fitzpatrick Skin Type Scheme - the most commonly used scheme to classify a person's skin type by their response to sun exposure in terms of the degree of burning and tanning.

persons under eighteen years of age and those with very fair skin (skin type 1 according to the Fitzpatrick Skin Type Scheme). While these elements have now been implemented across all jurisdictions, most of the states and territories have indicated that they are now moving towards banning commercial use.

The Fitzpatrick Skin Type Scheme is used to classify a person's skin type by their response to sun exposure in relation to the degree of burning or tanning following exposure.

Occupational Exposure to Ultraviolet Radiation

ARPANSA's Radiation Protection Standard (RPS 12) *Radiation Protection Standard for Occupational Exposure to Ultraviolet Radiation* covers exposure to ultraviolet radiation incurred as part of a worker's occupation and includes both solar and artificial sources of UVR. The Standard protects workers by limiting the occupational exposure to ultraviolet

radiation from artificial sources in the workplace, considered to be a controlled environment; and setting requirements for minimising a person's exposure to uncontrollable sources of ultraviolet radiation, such as the sun. While mandatory application of the limits for solar ultraviolet radiation exposure to outdoor workers is difficult in practice, it is important to limit ultraviolet radiation exposures using engineering and administrative controls as well as personal protection.

Occupational Exposure - Uranium Mining

Occupational exposure to ionising or non-ionising radiation occurs in a variety of work environments. Work environments may contain man-made sources of radiation, elevated levels of natural radiation, or radioactive materials from past activities. ARPANSA strives to promote the identification, characterisation and monitoring of work environments to raise awareness and to reduce exposures.

Promotional poster developed as part of the educational outreach program for the Australian National Radiation Dose Register

Uranium workers are one of the more highly exposed occupational groups requiring protection from the harmful effects of ionising radiation. Radiation protection of workers requires the maintenance of radiation dose records to assess compliance with occupational dose limits and to minimise the radiation health risk to individuals through the continual improvement of work practices.

ARPANSA operates and maintains the Australian National Radiation Dose Register (the Dose Register), for the collection, storage and auditing of radiation dose histories for uranium industry workers in Australia. The Dose Register consolidates and stores radiation dose records to allow for tracking of a worker's dose records throughout their career in the uranium mining industry.

The Dose Register currently holds dose history records for more than 25 200 workers from the uranium mining and milling industry. ARPANSA also manages an educational outreach program for uranium miners to inform them how to retrieve and interpret their dose history records to assist them to safely manage their radiation exposure in the workplace. This program has been delivered to Beverley, Olympic Dam and Ranger uranium mine workers.

ARPANSA is currently seeking to expand the Dose Register beyond uranium mining to cover occupationally exposed workers in other industries. During this financial year, ARPANSA commenced a review of the Australian mineral sands mining and processing industry to inform future decisions for possible expansion of the Dose Register to include these workers. ARPANSA is also investigating options to include occupationally exposed Commonwealth employees in the Dose Register. The key findings and recommendations for expansion of the Dose Register will be published later in 2013.

The information collected through meetings undertaken this financial year with the United Kingdom Health Protection Agency and Health Canada will assist ARPANSA to enhance the functionality of the Register's database and to ensure that operational procedures accord with international best practice, and to identify impediments likely to impact on future expansion of the Register to other industries. In March 2013, ARPANSA was invited to deliver a presentation at the Siemens Low Dose Academy Forum on the role

of the Dose Register for radiation protection of workers. The Forum provided a unique opportunity for ARPANSA to raise awareness for workers in the medical sector about the Australian radiation protection framework and occupational risks of exposure to radiation in the workplace, together with the role of Dose Register as a tool for the optimisation of worker protection.

In relation to the deliverable (set out in the table below) referring to controlling doses to uranium workers, trend data will become more meaningful when all uranium mines are reporting their data to the Dose Register. At the present time ARPANSA is receiving data from 95% of the uranium mining workforce. On 4 July 2012, dose records from workers at the Ranger uranium mine were first submitted to the Dose Register following delays caused by legal issues associated with privacy legislation in the Northern Territory preventing the disclosure of that information and resolved by the passage of the Northern Territory Radiation Protection Amendment Act 2012 which came into effect on 2 July 2012. The final mine, Honeymoon, has been experiencing technical database issues which have prevented their upload of dose data to the Register however, it is expected to be providing data later in 2013. In the interim, we have focused upon reporting trends to key stakeholders as required, or on request, and ARPANSA is confident that this measure has been successfully met. ARPANSA also contributed Dose Register data to an IAEA questionnaire on occupational exposure in the uranium mining industry in Australia. Analysis of the IAEA survey aims to provide a global overview of occupational radiation protection practices in the uranium mining and processing industry, enabling the identification of good practices, existing deficiencies and the need for future action.

Occupational Exposure – NORM

During this financial year, ARPANSA published a survey of naturally occurring radioactive material (NORM) associated with mining, which reported results for samples collected from selected metal mines, collieries and quarries in New South Wales. This survey showed that, for the mines sampled, except in the case of mineral sands mines, the levels of radioactivity were consistent with values commonly obtained for soils, and would therefore pose negligible radiation risks.

Performance Against KPIs - Qualitative Deliverables

Protect the public, workers and environment from radiation exposure	
Devise UV protection strategies for the Australian population and assess their effectiveness	
Measure	Enhanced UV exposure assessment system in place by June 2013
Result	*ARPANSA introduced electronic UV dosimeters measuring UV exposures and the time they occur which have been used in a number of studies of various population groups and outdoor workers*
Enhanced system for response to radiological and nuclear threats and events consistent with international guidance and best practice	
Measure	Documented arrangements for ARPANSA radiation emergency response in place by end of 2012
Result	*Completion of ARPANSA's Incident Management Plan in 2012 and testing of its efficacy conducted in conjunction with partner agencies in January 2013*
Control radiation dose to uranium mining workers	
Measure	Annual reporting of trend in radiation doses received by workers compiled from Australian National Radiation Dose Register provides evidence of optimisation of radiation protection in the uranium mining industry.
Result	*Delivered by providing trend updates at national stakeholder meetings, conferences and Senate Estimates. ARPANSA also contributed trend data to the IAEA for the investigation of occupational radiation protection practices in the uranium mining and processing industry worldwide.*

Personal Radiation Monitoring Service

In 2012–13 the Personal Radiation Monitoring Service (PRMS) continued to provide a high quality, NATA-accredited commercial service for the monitoring the exposures of workers in the medical, dental, chiropractic, industrial and mining fields to ionising radiation. In 2013, ARPANSA committed to a technology upgrade in early 2014 to deliver a lighter pre-assembled monitor with lower detection limits which will increase occupational safety and provide improved convenience and ease of use for clients.

Monitor Population Exposures to Electric and Magnetic Fields and Electromagnetic Radiation (EMR)

ARPANSA continued to provide scientific advice and guidance to the public and the government on exposure to electromagnetic radiation from electrical power infrastructures, mobile telephone handsets and base stations as well as other sources from emerging technologies such as smart meters. The Agency's work included the ongoing analysis of scientific studies on the potential adverse health effects of exposure to electric and magnetic fields and radiofrequency electromagnetic radiation, to ensure that ARPANSA guidance is consistent with international best practice and new scientific developments.

ARPANSA continued its limited, but important, program monitoring public exposure to radiofrequency electromagnetic energy (RF EME), measuring exposure levels from mobile telephone base stations and publishing comparisons with the EME predictions made by industry in accordance with ARPANSA guidelines. The Agency also responded to a variety of public and media enquiries focusing upon health concerns related to human exposure to mobile telephones, base stations, Wi-Fi, smart meters and other established and emerging technologies.

ARPANSA, as a WHO Collaborating Center on Radiation Protection, is also a member of the WHO International Electro Magnetic (EMF) Project. In June 2013, ARPANSA chaired the Annual International Advisory Committee meeting of the WHO International EMF project held in Paris, France. This meeting confirmed ARPANSA's position as a key international authority and the information obtained will assure that Australia retains a sound, best-practice radiation protection framework.

ARPANSA continued its base station survey program to inform the public about actual exposures in close proximity to mobile telephone base stations and validate mathematical predictions. During this financial year, the Agency undertook six mobile telephone base station surveys, publishing the results on the ARPANSA website.

Extremely Low Frequency (ELF) Electric and Magnetic Fields Project

Following the March 2011 decision by the Radiation Health Committee (RHC) to cease development of an ELF Standard and to redraft the document as guidelines, a significant amount of revision work has been undertaken, including substantial harmonisation with international ELF guidelines, in particular, the 2010 International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz to 100 kHz).* A revised draft has been circulated to jurisdictions for comment and to the RHC Working Group responsible for the original draft standard and to the stakeholder Consultative Group. In the light of comments received, the Radiation Health Committee agreed that the document be further streamlined and clarified. Accordingly, a draft based on these recommendations is undergoing final editing. Subject to agreement by the Office of Best Practice Regulation in the Department of Finance regarding the necessary supporting documentation, publication of new ELF guidelines is expected in the 2013–14 financial year.

Comprehensive Nuclear Test-Ban Treaty

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear explosions, whether they are for civilian or military purposes. An International Monitoring System was established to monitor compliance with the CTBT.

As a signatory to the CTBT, Australia is committed to establish, operate and maintain nine air monitoring facilities which form part of the International Monitoring System. During this financial year, ARPANSA continued to operate and maintain radionuclide air monitoring stations at Melbourne, Perth, Townsville, Darwin, the Cocos Islands, and Macquarie Island, Australia, including two noble gas analyser facilities, collocated with the air monitoring stations in Melbourne and Darwin. The

installation of the ninth and final radionuclide air sampling station at Mawson Base (Antarctica) was completed this financial year, including certification of the station by the Comprehensive Nuclear-Test- Ban Treaty Organization (CTBTO). In addition to operating the stations, ARPANSA operates the Australian CTBT Radionuclide Laboratory, which tests samples obtained by other CTBT radionuclide monitoring stations. During this financial year, the CTBTO undertook a triennial on-site surveillance visit, resulting in continued certification of the laboratory. The CTBT Radionuclide Laboratory has obtained A-grade results for its past two CTBTO Proficiency Test Exercises.

Radioactive Waste Safety

In Australia, the greatest volume of radioactive waste consists of materials with a low level of radioactivity or with a shorter half-life. These wastes are potentially able to be disposed of in a 'near-surface' repository. Australia's national inventory of radioactive waste is maintained and published by ARPANSA on the IAEA website for the Net Enabled Waste Management Database (NEWDB)[1], as part of our commitment to the *Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management*.

ARPANSA has continued with progress in the development of regulatory standards to ensure high levels of safety in the way that Australia manages its radioactive waste. ARPANSA provides the Chair of the IAEA Waste Safety Standards Committee which is the prime committee responsible for developing international best practice in radioactive waste safety. In the past year, the IAEA with Australian input, has updated its safety standards in many areas relevant to Australia including *Near Surface Disposal of Radioactive Waste* and *Decommissioning of Nuclear Facilities*.

In August 2012, ARPANSA invited public submissions on its Draft Regulatory Guide: *Licensing of Radioactive Waste Storage and Disposal Facilities* which received mostly positive and supportive public feedback. This document contains requirements and guidance to inform potential applicants seeking regulatory approval to site, construct, operate and decommission a radioactive waste storage or disposal facility.

The Regulatory Guide refers to storage as the placement of radioactive waste in a specific facility, with an intention to retrieve it for actions related to its final management and ultimate disposal, and where appropriate isolation and monitoring are provided and designed to last for decades. The Regulatory Guide addresses both safety and security and is directed towards purpose-built stores with an anticipated operational life of up to 50 to 100 years rather than small-scale laboratory storage of small quantities of waste items. Specific disposal options include near-surface disposal for Low Level Waste and borehole, tunnel, cavern and shaft type disposal facilities for intermediate level waste.

The Regulatory Guide is directed to Commonwealth entities applying for a licence under the ARPANS Act to prepare a site for, construct, operate, and

1 The NEWMDB contains information on national radioactive waste management programs, radioactive waste inventories, radioactive waste disposal, relevant laws and regulations, waste management policies, and plans and activities.

ARPANSA scientists travel to the Comprehensive Nuclear-Test-Ban Treaty stations on the Australian Antarctic Division's Aurora Australis Icebreaker

decommission or close a storage or disposal facility for radioactive waste; and to other stakeholders including the public, to:

- advise of the regulatory issues and to assist in understanding how the application will be assessed by the regulatory body and describing the overarching statutory considerations
- assist in understanding the requirements for the content of an application and addressing the questions 'what is required?' and 'when (at what stage) is it required?' in the application process
- provide guidance based on national and international best practice for meeting the requirements and to assist in achieving high levels of safety.

The new regulatory guidance has been used in ARPANSA's review of ANSTO's licence application to site and construct an interim radioactive waste store. The new regulatory guide will also inform the licensing regime for Australia's National Radioactive Waste Management Facility. The CEO's decision is ultimately based upon the applicant's demonstration of a robust safety case describing organisational and technical arrangements of any potential site. Applicants seeking to carry out conduct related to a storage or disposal facility must demonstrate that the proposed facility will achieve the required level of protection. Applicants are required to present a safety case which draws upon the organisational and technical arrangements put in place, the nature of the waste to be accepted, site characteristics, facility design, including engineered barriers, and arrangements for construction, operation, decommissioning or closure and post-closure stages, as appropriate.

A final version of the Guide, which included consideration of public submissions, was published in March 2013 and is accessible on ARPANSA's website at link: http://www.arpansa.gov.au/Regulation/wasteguide.cfm.

Safe Transport of Radioactive Material

The regulation of the transport of radioactive material throughout the world is based on requirements published by the International Atomic Energy Agency (IAEA). The Australian *Code of Practice for the Safe Transport of Radioactive Material (2008)*, Radiation Protection Series No. 2 (the Transport Code) adopts the *IAEA's Regulations for the Safe Transport of Radioactive Material 2005 Edition* (No. TS-R-1) and establishes requirements for the safe transport of radioactive material in Australia.

The 2012 edition of IAEA *Regulations for Safe Transport of Radioactive Material* (SSR-6) was published in October 2012. ARPANSA is in the process of adopting these Regulations into the national ARPANSA *Code of Practice for Safe Transport of Radioactive Material* and the corresponding safety guides.

Certification of radioactive sources, packages and certain types of transports is an important aspect of the Transport Code and once obtained, the certification needs to be recognisable by radiation regulators around the world. Australia is in the unusual position of having many competent authorities, all of whom can provide certification. This financial year ARPANSA published a *Safety Guide: Approval processes for the safe transport of radioactive materials* (Radiation Protection Series No. 2.2) on its website. This Transport Safety Guide will assist Australian regulators and industry to interpret the detailed provisions in the Transport Code in order to facilitate their compliance with the Code. Both the Transport Safety Guide and the Transport Code describe the administrative and legal requirements for obtaining certification in Australia, outlining what the competent authority does and describing points of contact to achieve certification of packages, radioactive material and the shipment of radioactive material.

During this financial year, ARPANSA approved the shipment of nuclear and radioactive material under special arrangements issuing the following certificates for these shipments:

- AUS/2012-45/B(U)F-96T
- AUS/2013-46/X.

Australian Government Visiting Ships Panel (Nuclear)

ARPANSA chairs the Technical Working Group of the Visiting Ships Panel (Nuclear), an Australian Government Inter-Agency Committee that oversees the arrangements for visits to Australian ports by nuclear powered vessels. As part of the role as the Working Group Chair, ARPANSA (in conjunction with the Australian Defence Force, ANSTO and the Queensland Government) conducted a Nuclear

Powered Warship pre-visit Emergency Response Exercise in order to validate arrangements prior to an embarking visit from a United States warship during exercise Talisman Sabre 2013. A number of lessons learned were identified by ARPANSA and provided to the Visiting Ships Panel (Nuclear) for guidance to the Queensland Government to strengthen future response arrangements.

COAG Report on the Security of Radioactive Sources

ARPANSA has continued to work with state and territory radiation regulatory bodies, the Department of the Prime Minister and Cabinet, State and Federal Police, and ARPANSA licence holders, to address the recommendations contained within the 2006 Council of Australian Governments' *Report on the Security of Radioactive Sources*. Specifically, ARPANSA and a working group of national security experts established from the Chemical, Biological, Radiological and Nuclear Security Sub-Committee of the Australian and New Zealand Counter Terrorism Committee have finalised another recommendation of the 2006 COAG report by delivering the *Report on the Effectiveness of Radiation Detection Equipment at the Border*. This document contained a number of recommendations including enhancing information sharing capabilities between ARPANSA and the Australian Customs and Border Protection Service.

Responding to Radiological and Nuclear Threats

Radioactive material poses potential health risks if released into the environment through accidental or malicious acts. Measures need to be in place to control radioactive materials both within Australia and crossing Australia's borders. Protection of the Australian public and environment requires effective radiation emergency planning.

The Accident Reporting and Guidance Operating System (ARGOS) is ARPANSA's primary atmospheric dispersion modelling and decision support software tool and has been applied to a range of radiological and nuclear release situations, including emergencies and planning. ARGOS can provide an overview of a nuclear or radiological event, create a prognosis of how the event evolves, and calculate its likely consequences. ARPANSA continues to strengthen this tool by participating in the annual ARGOS consortium and user group meetings. Participation in the ARGOS Consortium and User Group meetings and through joint international collaborations has established ARPANSA as a world leader in the application of ARGOS as a decision support tool.

ARPANSA emergency response personnel participated in an IAEA Response and Assistance Network (RANET) exercise within the 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 part of this exercise.

The ARPANSA Incident Management Plan

ARPANSA's draft Incident Management Plan has been developed to guide staff on how to discharge their duties in an emergency, and ways to document and strengthen the strategic, operational, technical and communications elements in our response to radiological or nuclear incidents or accidents.

Nuclear warship USS Ronald Reagan visit to Brisbane

Qualitative Deliverables[1]	2011–12 Revised Budget	2012–13 Budget Target	2013–14 Forward Year 1	2014–15 Forward Year 2	2015–16 Forward Year 3
Protect the public, workers and environment from radiation exposure					
Number of security incidents involving high activity radioactive sources requiring immediate reporting[2]	<5	<2	<2	<2	<2
Result	0	0	N/A	N/A	N/A

[1] In 2012-13, all deliverables and key performance indicators have been reviewed and updated to ensure targeted performance reporting.
[2] The target has been reduced from <5 to <2 because in the last five years the Commonwealth has received notification of only two such incidents and a lower target is now appropriate.

This plan has been prepared to allow ARPANSA to provide a flexible response to radiological and nuclear incidents or emergencies. It provides for combinations of ARPANSA's technical and operational capabilities and communications assets to be activated and deployed when required, depending upon the nature of the emergency. The Incident Management Plan will ensure that ARPANSA is an effective and responsive agency during radiological or nuclear emergencies, and is ready to provide assurance and advice to the public and the Australian Government when required.

In January 2013, ARPANSA joined with its partner agencies including the Attorney-General's Department, Australian Federal Police, the Department of Health and Ageing, and states and territories to test the Incident Management Plan against a challenging scenario, and found that the plan generally achieved all its desired outcomes whilst also identifying a number of improvements which have now been adopted. In June 2013, ARPANSA conducted a Business Continuity Plan test utilising a scenario that would plausibly activate the Incident Management Plan. This scenario demonstrated that both the Incident Management Plan and Business Continuity Plan worked effectively with only minor recommendations made for potential improvement.

International Engagement (selected)

Meeting of the International Atomic Energy Agency (IAEA) Safety and Security Standards Committees Chairs, and of the Commission on Safety Standards, Vienna, 18-21 March 2013

This financial year, various meetings of the five Chairs of IAEA safety and security standards committees were held, including the IAEA

ARPANSA technical specialists participating in an IAEA workshop exercise in the evacuated zone around TEPCO's Fukushima Dai-ichi Nuclear Power Station - 29 May 2013. (Photo Credit: Susanna Lööf/IAEA.)

Qualitative Deliverable	2012–13 Reference Point or Target
Protect the Public, workers and environment from radiation exposure	
Enhanced system for response to radiological and nuclear threats and events consistent with international guidance and best practice	Documented arrangements for ARPANSA radiation emergency response in place by end of 2012
Result	*ARPANSA's Incident Management Plan was completed in 2012 and tested in conjunction with partner agencies in January 2013*

Commission on Safety Standards (with Dr Geoff Williams of ARPANSA chairing the Waste Safety Standards Committee, and the CEO of ARPANSA being a member of the Commission of Safety Standards). The meeting focused on ways for the IAEA committees to work together with a common purpose for better integrating the standards for security and safety, including exploring the possibility of producing documents combining guidance for both safety and security. Updates of current international standards under development were provided by the Chairs to the Commission of Safety Standards, including completion of the safety guide, *Near Surface Disposal of Radioactive Waste* which is of importance for Australia in light of the impending development of the National Radioactive Waste Management Facility. This guide has been endorsed by the Commission for publication.

The Commission for Safety Standards sets out the general directions of the IAEA's work on safety standards in the waste, radiation, transport and nuclear areas. Ongoing considerations relate to the integration of safety and security and the effective implementation of Safety Standards by the IAEA Member States.

IAEA Waste Safety Standards Committee

ARPANSA provides the Chair of the IAEA Waste Safety Standards Committee, which is the prime committee responsible for developing international best practice in radioactive waste safety. ARPANSA participated in both meetings of Waste Safety Standards Committee held in this financial year. In this period, the IAEA with Australian input, has updated its safety standards in many areas relevant to Australia, including *Near Surface Disposal of Radioactive Waste*, *Remediation Processes for Areas with Residual Radioactive Material* and *Decommissioning of Nuclear Facilities*.

Australia is also taking lead roles in the enhancement of international standards for nuclear and radiation safety in light of lessons learned from the Fukushima Dai-ichi nuclear accident, and in working towards the harmonisation of international standards for safety and security in the nuclear industry.

IAEA Transport Safety Standards Committee

The Australian representative from ARPANSA attended the meetings of IAEA Transport Safety Standards held during this year. The meetings discussed the issues to be considered in the review of IAEA Safety Standards in response to the Fukushima Dai-ichi nuclear accident.

Of note to Australia, were publications of the IAEA *Regulations for the Safe Transport of Radioactive Material* (TS-R-1/SSR-6), and finalisation of the Advisory Material for the IAEA *Regulations for the Safe Transport of Radioactive Material* (SSG-26).

The meetings resolved the key issues related to development of Transport Safety documents including *Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material*, (TS-G 1.2), and Schedules of Provisions of the IAEA *Regulations for the Safe Transport of Radioactive Material (2012 Edition)*, TS-G 1.6, and in harmonisation of the requirements of the 2012 edition of *Transport Regulation with UN Model Regulations*.

ARPANSA is in the process of adopting the IAEA *Regulations for the Safe Transport of Radioactive Material*, SSR-6, into its *Code of Practice for Safe Transport of Radioactive Material* and the corresponding safety guides.

Promote the Effective Use of Ionising Radiation in Medicine

ARPANSA continues to promote the safe and effective use of ionising radiation in diagnostic imaging by conducting dose surveys resulting in the establishment of Diagnostic Reference Levels (DRLs). These data provide the baseline for the optimisation of dose management. These data also allow Australian doses to be compared with those of other countries and for the setting of national DRLs. During the year, ARPANSA compared the primary standard of absorbed dose in ARPANSA's medical standards linac against measurements made by the international standards laboratory, the Bureau International des Poids et Mesures. The agreement achieved in the Intercomparison fulfilled the final hurdle before the introduction of a new service for calibration of radiotherapy linac beams against similar beams using ARPANSA's medical standards linac. The Australian Clinical Dosimetry Service (ACDS) also continued to improve radiation oncology safety through implementation of its three level audit program with results published and presented locally and internationally.

Diagnostic Imaging and Nuclear Medicine

Of more than 15 000 000 procedures involving ionising radiation that Australians undergo each year, most are diagnostic imaging procedures. Each of these procedures should provide images obtained with equipment and protocols which have been optimised for the radiation protection of the patient. ARPANSA has a responsibility to estimate the radiation doses to the Australian population from radiological procedures. Evaluation of these doses provides the baseline which is used for optimisation of dose management. The data also allow Australian doses to be compared with those of other countries and for the setting of national diagnostic reference levels (DRLs). The latter are used as indicative benchmarks for comparative radiological practices. Computed tomography (CT) procedures have become the dominant contributor to the radiation dose to the Australian population from diagnostic radiology. This has come about both because of the increasing number of procedures and the increasing complexity and capacity afforded by modern technology.

Optimisation of Radiation Protection of Patients

The Diagnostic Reference Level Survey for computed tomography is continuing. Comparison of data collected in 2011 against 2012 data shows a strong consistency. The National Diagnostic Reference Level Database is gradually being populated with practice data. There are approximately 180 (22%) of national computed tomography practices registered with over 1800 surveys completed since August 2011. New surveys are being developed to cover the areas of interventional radiology and nuclear medicine. A liaison panel has been established for diagnostic reference level surveys in nuclear medicine. The panel has met and initial work is continuing on survey structure and metrics to be used for practice assessment. An expert group of medical physicists has been working on the survey structure and dose metrics for the diagnostic reference level surveys in interventional radiology. The first draft survey has been initiated to test the proposed methodology. Presentations and publications have been delivered to distribute DRL information to the relevant stakeholder and professional groups.

The Primary Standard for Absorbed Dose

The primary standard of absorbed dose was implemented on ARPANSA's medical standards linac. The absorbed dose in the linac beams was compared against measurements made by the international standards laboratory, the Bureau International des Poids et Mesures, with acceptable agreement. Secondary comparisons were made with Canada and Japan with similar results. ARPANSA now offers a calibration service for three megavoltage photon beams allowing calibrations to be performed directly for the beams being used rather than indirectly using ARPANSA's cobalt-60 gamma ray source. The primary standard continues to be used to determine the absorbed dose to water from the cobalt-60 gamma ray source. This source was used to provide traceable calibrations to fifteen radiotherapy facilities in Australia. This number is consistent with the target of calibrating every facility once every three years.

ACDS team developing a Level I - Optically Stimulated Luminescence Detector audit

The Australian Clinical Dosimetry Service

In February 2011, the Australian Government formally launched the Australian Clinical Dosimetry Service (ACDS) as part of a three year trial to determine whether an independent auditing service can provide dosimetric and thus clinical support to radiation therapy patients and staff within Australia. The ACDS has implemented a three level audit program, with each succeeding level having a more complex and challenging geometry. This service is similar to other audit programs internationally, but is unique in its coverage, national participation, audit design and final review process. The ACDS enhancement of radiation oncology safety throughout Australia continued over the 2012–13 financial year. The ACDS has achieved complete signup to its voluntary audit program from centres nationally and has requests for audits extending into the 2013–14 financial year. These two indicators—participation rate and active engagement in the audit program—highlight both the importance that the radiotherapy providers assign to independent auditing, and acknowledge that the ACDS can deliver a valuable program for radiation therapy in Australia.

Oversight of the ACDS is mandated through a Memorandum of Understanding between ARPANSA and the Department of Health. The Memorandum of Understanding requires that ARPANSA report to the Department, the auditing requirements, milestones required for on-going funding, and the formation of a Clinical Advisory Group. The Clinical Advisory Group provides expert opinion to the ACDS and reviews the audit development. The Memorandum of Understanding requires the ACDS to hold Clinical Advisory Group meetings four times a year and this has occurred. The ACDS is currently under review by the Department of Health to determine the need and extent of future audits with the review expected to be completed by September 2013. Since its inception, the ACDS has performed Level I basic reference Dosimetry audits on 119 linacs and 20 higher accuracy level Ib audits on newly installed linacs, level II audits on 33 linacs and level III audits on 37 linacs. All the audits have been performed voluntarily at the request of radiotherapy providers. Counting all the audits performed throughout Australia, 80% of the radiotherapy facilities have had at least one linac audited, equating to more

Quantitative Deliverables[1]	2011–12 Revised Budget	2012–13 Budget Target	2013–14 Forward Year 1
Promote the effective use of ionising radiation in medicine			
Cumulative proportion of centres audited by the Australian Clinical Dosimetry Service for accuracy in dose measurement of radiotherapy[2]	50%	80%	90%
Result	50%	80%	N/A

[1] In 2012-13, all deliverables and key performance indicators have been reviewed and updated to ensure targeted performance reporting.
[2] This program is operating on a trial basis and is funded until June 2014 when it will be reviewed and its future determined.

Quantitative Indicator	2012–13 Reference Point or Target
Promote the effective use of ionising radiation in medicine	
Establish Diagnostic Reference Levels as tools for quality improvement in diagnostic radiology	Improved diagnostic practice using lower dose levels.
Result	*The Diagnostic Reference Level project has successfully raised the profile of radiation exposure of the patient within the radiological community. ARPANSA is seen as an important resource in this area. On-going analysis of CT DRL data indicates that patient doses remain at similar levels. International experience demonstrates that patient dose decreases after implementation of DRLs and recently published Australian DRLS will most likely follow international trends and show decreased doses.*

than three quarters of all the linear accelerators in Australia. Following two years of operation, the philosophy behind the audit design, initial results and future projections have been published and presented internationally resulting in considerable positive feedback and interest.

The mutual engagement between the ACDS and the wider radiation oncology community is further demonstrated by invitations to present on the establishment and progress of the audit program by the Royal Australian & New Zealand College of Radiologists, the Australian Institute of Radiography and the Australasian College of Physical Scientists and Engineers in Medicine. In addition to the formal yearly conferences, the ACDS has also presented to numerous state-based branches of the three colleges, and many hospitals during local audit visits. In total, the ACDS has formally presented eight times at national and international fora over the reporting period.

External auditing for radiotherapy represented in the work of the ACDS is recommended internationally to ensure patient safety and to ensure the accurate delivery of the appropriate dose to the desired identified anatomy. The ACDS delivers a valuable program for radiation therapy in Australia.

The Australian Synchrotron

This financial year, several members of Medical Radiation Services Branch were invited to the Australian Synchrotron in Clayton to assist the Imaging and Medical Beam Line group over a two day period in measuring the dose rate from their intense synchrotron x-ray beam. Credible dosimetry is required for establishing the Imaging and Medical Beam Line for imaging and radiotherapy applications.

ARPANSA maintains significant expertise in this area and will continue the collaboration with the Imaging and Medical Beamline team on further projects.

International Engagement (selected)

In early October 2012, ARPANSA attended an IAEA Technical Meeting: The new dose limit for the lens of the eye – implications and implementation, held in Vienna, Austria which discussed guidance on implementing the requirement for the new dose limit as a basis for future guidance to be provided to Member States. ARPANSA will use guidance from this meeting to incorporate these benchmarks into the appropriate ARPANSA Safety Guides for Radiation Safety in the Medical Uses of Ionising Radiation.

In October 2012, ARPANSA attended the Second Research Coordinators Meeting for the IAEA Coordinated Research *Project E2.10.08 'Development of Advanced Dosimetry Techniques for Diagnostic and Interventional Radiology'*, held in Vienna, Austria. At this meeting, ARPANSA staff lead groups in both CT and skin dose dosimetry and attendance at this type of fora helps ARPANSA develop better dosimetry tools and assessment methods.

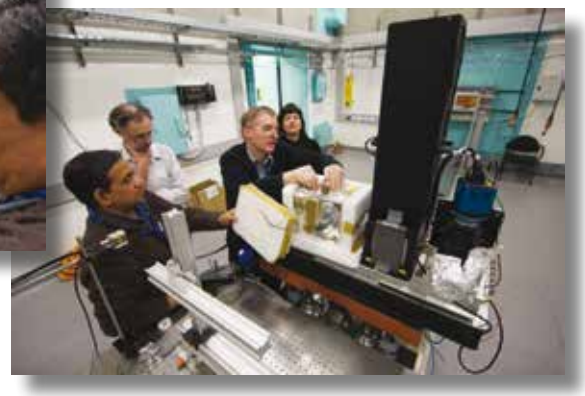
Medical Radiation staff attended the Asia Pacific Metrology Program Technical Committee for Ionizing Radiation which met in Wellington, between 25-30 November 2012 and the

ARPANSA scientist observing delivery of the synchrotron beam to the IMBL measurement room

International Consultative Committee on Ionizing Radiation which met in Paris, between 25-28 March 2013. Both of these were significant international meetings concerning the dosimetry of ionising radiation and the equivalence of dose measurements between countries. At these meetings, ARPANSA presented results from international comparisons of absorbed dose and air kerma, and took part in discussions concerning technical issues in dosimetry and the organisation of future comparisons.

Between 26-28 March 2013, ARPANSA's medical radiation staff attended the Bureau International des Poids et Mesures Comité Consultatif pour les Rayonnements Ionisants Section I (X and gamma rays, charged particles) in Paris, France where representatives of primary standards laboratories from around the world met to discuss strategic and technical issues related to the measurement of ionising radiation. Of primary concern to Australia is the direct measurement of absorbed dose in linear accelerator beams used for radiotherapy. Key outcomes from this trip included preliminary results for the current international comparison of linear accelerator absorbed dose, and the establishment of a reference value for this comparison. The future work program of international comparisons was also decided.

ARPANSA also participated in the initial consultation of the Diagnostic Radiology and Interventional Procedures drafting group on the *Safety Guide (DS399) on Radiation Safety in Medical Uses of Ionizing Radiation* and ARPANSA was selected to lead the editorial group drafting the diagnostic



Staff from ARPANSA's Medical Radiation Services Branch at the Australian Synchrotron in Clayton, Melbourne at work positioning the graphite calorimeter inside a polystyrene box for thermal insulation

imaging module. Members of ARPANSA's medical radiation team have also been appointed as Chair of the UNSCEAR Expert Group on Medical Exposure.

Between 26 February to 1 March 2013, ARPANSA attended the 25th Annual Scientific Meeting of the Trans-Tasman Radiation Oncology Group, held in Wellington, New Zealand which focused on the development of clinical trials and included a technical workshop. The meeting provided an overview and update on the developments in radiation oncology in Australia and New Zealand and an opportunity to discuss the work of ARPANSA's ACDS with colleagues of all three specialities: radiation oncologists, medical physicists and radiation therapists.

Between 15-21 June 2013, the ACDS Director attended the American Association of Physicists in Medicine Summer School (Colorado Springs, United States) 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. This attendance provided ARPANSA with valuable tools to investigate the stability of some of our quality assurance routines and useful information about our techniques and what limit values should be applied to ACDS equipment. During this same visit, ARPANSA attended the MD Anderson Cancer Center Secondary Standards Laboratory and Radiological Physics Centre, in Houston, Texas where a cross-calibration of an ARPANSA ionisation chamber was performed by the Cancer Center's secondary standard dosimetry laboratory (SSDL). 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. ARPANSA also visited the Radiological Physics Centre in Houston which is the US-equivalent to the ACDS and has been operating for more than fifty years. This visit was very useful for the ACDS to help guide its development over the next 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 users.

Ensure Effective Regulation and Enforcement Activities

During this financial year, ARPANSA's licensing and compliance workload has been dominated by the assessment of major licence applications for new ANSTO facilities including the Interim Waste Store facility, an expanded Molybdenum-99 manufacturing facility and waste treatment facility using ANSTO's Synroc technology.

ARPANSA continued to implement a graded approach to compliance with an increased focus on holistic assessment practices of our licence holders. Our Safety Analysis Section has been asked to contribute to IAEA activities in holistic safety.

ARPANSA has increased the amount of guidance information on its website with a view to improving the capability of our licence holders' implementation of radiation safety measures. ARPANSA's licence holders have also responded favourably to our increased transparency in publishing inspection reports on the ARPANSA website.

Emergency Preparedness and Response

ARPANSA strives to achieve international best practice with regard to nuclear and radiological security, and emergency preparedness and response. This financial year, ARPANSA continued its work with the Australian Safeguards and Non-Proliferation Office (ASNO) through the joint Physical Protection and Security Working Group (PPSWG) on a number of activities relating to the improvement of nuclear security for Australia. This work included the development and formulation of the *National Design Basis Threat* issued to ANSTO by ASNO in 2012. Other PPSWG activities included conducting a number of joint security inspections of ANSTO's research reactor, developing guidance for the periodic security review at ANSTO and jointly reviewing risk assessment documentation for the proposed molybdenum-99 production facility.

ARPANSA, in cooperation with the Attorney-General's Protective Security Training College, developed the National Radiation Security Advisor Accreditation Scheme and the supporting Nationally Recognised Training Qualification through Australian Skills Quality Australia. This qualification was designed to ensure that all jurisdictions within Australia have access to a pool of qualified accredited radiation security advisors who may assist in the formulation and endorsement of facility and transport security plans that use security enhanced radioactive sources. ARPANSA is currently working with state and territory radiation regulators to develop the pool of accredited assessors.

ARPANSA's Security and Community Safety team has reviewed a number of radioactive source security plans, including for transport and will continue to engage with Australian Government licence holders to ensure that international best practice is maintained at these facilities.

In conjunction with the Australian Government Crisis Coordination Centre, ARPANSA along with representatives from state and territory law enforcement organisations, emergency first response agencies, Australian Government organisations and radiation regulators, conducted a national radiation emergency response table top exercise designed to strengthen the ARPANSA Incident Management Plan and Australia's national arrangements. ARPANSA, as the IAEA-designated National Competent Authority for radiation incidents, is expected to regularly exercise response plans, and these activities build on the body of expertise and experience gained through our key role in advising the Australian Government and the public during the Fukushima accident.

ARPANSA also participated in the Attorney-General's Exercise Baryon series, part of the National Counter-Terrorism Committee's exercise portfolio, which focused on a security incident occurring at ANSTO's nuclear facilities. This multi-organisational response exercise highlighted the experience and maturity of Australian arrangements when coordinating state and federal resources to resolve a security incident.

A member of the Emergency Response Group at ARPANSA attended the IAEA Workshop on Notification, Reporting and Requesting Assistance held in Singapore. Australia is party to two IAEA conventions, the *Convention on Early Notification of a Nuclear Accident* and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*. ARPANSA is the designated Australian National Competent Authority both domestic and abroad for these conventions. The workshop reinforced ARPANSA's understanding

of the obligations under these two conventions for Australia and informed participants on communication protocols with the IAEA Incident and Emergency Centre.

Major Licensing Activities

Compliance with Commonwealth legislative and regulatory infrastructure is monitored by ARPANSA in a number of ways, including assessment of licence applications, inspections, and surveys. Enforcement actions may be used in situations of non-compliance. The aim is to establish a culture that effectively provides reassurance that activities carried out under a licence from ARPANSA will not be harmful to people or the environment.

The Australian Synchrotron

In December 2012, ARPANSA issued a facility licence to ANSTO to operate the Australian Synchrotron at Clayton in Victoria. The Australian Synchrotron radiation facility is a source of highly intense light ranging from infrared to hard x-rays used for a wide variety of research purposes and is located near the Monash University, Clayton Campus. The Australian Synchrotron uses particle accelerators to produce a beam of high energy electrons which are placed within a storage ring that circulates the electrons to create synchrotron light. The light is directed down separate beamlines at the end of which may be placed a variety of experimental equipment contained within the endstations. Synchrotron light is filtered and adjusted to travel into experimental workstations, where the light reveals intricate detail about the molecular structure of a variety of materials.

A licence condition was imposed on ANSTO to provide a progress report by 30 April 2013 or within such time as determined by the CEO of ARPANSA, on Plans and Arrangements for operating the Synchrotron and production of the Safety Analysis Report with Operating Limits and Conditions. A final report has been requested by 30 September 2013 at the latest or within such time as determined by the CEO of ARPANSA, after which the CEO will reassess the conditions for operations.

ANSTO's Application for the Interim Storage of Returned Radioactive Waste

On 1 May 2012, ANSTO announced its intention to site and construct an interim intermediate level radioactive waste storage facility (Interim Waste Store or IWS Facility) at Lucas Heights Science and Technology Centre, Sydney, New South Wales. On 26 September 2012, ARPANSA received a licence application from ANSTO to site and construct the Interim Waste Store. ARPANSA's CEO is required to assess the application under the ARPANS Act and decide whether or not a licence should be granted.

The purpose of the ANSTO IWS is to safely store intermediate level waste from reprocessing of HIFAR spent fuel which is due to return to Australia from France in December 2015. The waste is intended to be stored at Lucas Heights Science and Technology Centre 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 which may also need to be stored at the ANSTO IWS if the NRWMF is not operational at that time.

In January 2013, ANSTO resubmitted their applications for siting and construction of the IWS Facility following requests from ARPANSA for more information, including details on the full and proposed uses of the facility. Amended siting and construction applications for the IWS were then submitted by ANSTO in mid-April 2013. The proposal for the Interim Waste Store was also referred to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* (EBPC Act). DSWEWPaC determined that no environmental assessment is required for this facility under the EBPC Act.

Details of the DSEWPaC decision can be found on their website at: www.environment.gov.au.

Licence Application for ANSTO Nuclear Medicine Molybdenum-99 Facility (ANM Mo99)

In May 2012, ANSTO submitted an application (Number A0270) to prepare a site for the proposed Australian Nuclear Medicine Molybdenum-99 Facility at the Lucas Heights Science and Technology Centre. The proposed facility will be for the production of Molybdenum-99 to be used in nuclear medicine. The CEO of ARPANSA also intends making a decision on an associated prescribed radiation facility application for the ANSTO SyMo Facility.

In accordance with Regulation 40 of the ARPANS Regulations, the CEO of ARPANSA invited submissions about the applications. The CEO will take all submissions into account before making a decision on whether or not to grant the facility licences. On 16 May 2013, ARPANSA held a community information session to advise on these upcoming licence applications and any likely ramifications for the local community. Public consultations on these licence applications closed on 12 June 2013. Both of these licence applications are currently being considered by ARPANSA and are expected to be finalised before the end of 2013.

Inspections

During this financial year ARPANSA undertook a planned inspection program of sources, prescribed radiation facilities and nuclear installations operated by licence holders in order to monitor compliance with the ARPANS Act and the ARPANS Regulations.

The inspection program was planned on the basis of:

- licence holder risk ranking
- licence holder compliance history
- licence holder incident and accident history
- date of last inspection.

A summary report of these inspections can be found on the ARPANSA website at: www.arpansa.gov.au/Regulation/Inspections/index.cfm.

Other Significant Activities in Relation to Regulatory Oversight

- In August 2012, ARPANSA approved ANSTO's application under Regulation 51 of the ARPANS Regulations to operate the Radiochemical Laboratories at the Camperdown Facility. ANSTO provided an initial report confirming that the design and safety objectives for the Radiochemical Laboratory including the shielding adequacy would be met and that details would be included in ANSTO's Safety Analysis report.
- Approval was granted by ARPANSA and an amended licence was issued to the ANSTO Bragg Institute to operate the SIKA cold triple axis neutron spectrometer up to and including involving opening the instrument to the neutron beam.
- On 19 August 2012, ARPANSA consented to the surrender of the facility licence for the construction of the ANSTO Camperdown facility.
- On 12 September 2012, ARPANSA consented to the surrender of the facility licence for decommissioning of the National Medical Cyclotron at Camperdown.
- On 14 December 2012, ARPANSA assisted the Australian Transport Safety Bureau by recovering and making safe radiological material from its Canberra Offices which were gathered as evidence from an aviation accident investigation in Queensland.
- On 1 March 2013, ARPANSA revised the ANSTO Waste Operations and ANSTO Fuel Operations licences and a revised amalgamated licence for ANSTO Waste Operations (F0260) covering both facilities has been issued.
- During this financial year, ARPANSA continued its periodic review of all source and facility licences which is required at three-yearly intervals under the Regulatory Services Quality Management System.

Breaches

Breaches with safety implications

The Australian Defence Force was in breach of s30(1) of the ARPANS Act for possession of a linear accelerator for industrial radiography at Port Wakefield without the appropriate facility licence. A licence application was subsequently submitted by Defence and approved by ARPANSA. The unauthorised possession was determined to be an administrative error and, no enforcement action was taken.

Quantitative Deliverables	2011–12 Revised Budget	2012–13 Budget Target	2013–14 Forward Year 1	2014–15 Forward Year 2	2015–16 Forward Year 3
Ensure effective regulation and enforcement activities					
Number of inspections of organisations holding a Commonwealth licence	60	60	60	60	60
Result	62	59	N/A	N/A	N/A

The Australian Defence Force was in Breach of s31(2) of the Act by failing to follow licence conditions in the unauthorised disposal of 87 items of controlled apparatus and controlled material. Following advice from ARPANSA, Defence has taken measures to prevent the reoccurrence of such unauthorised disposals. ARPANSA determined that the disposals were of low safety significance and, no enforcement action was taken by ARPANSA.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) - Ecosystem Sciences was found to be in breach of s31(2) of the ARPANS Act in that personal monitoring devices had not been collected and promptly submitted for assessment. Following advice from ARPANSA, the licence holder took appropriate corrective actions and no enforcement action was taken by ARPANSA.

CSIRO Ecosystem Sciences was found to have breached s31(2) of the ARPANS Act by having sealed source assemblies used in portable gauges not locked in the shielded position whilst in storage or during transport. Following advice from ARPANSA, the licence holder took appropriate actions and as no radiological consequences were associated with the breach, no enforcement action was taken by ARPANSA.

ANSTO was found to have breached Licence Condition 6 of Schedule 2 of Licence F0240 for the Gamma Irradiator Suite through its failure to calibrate the area radiation monitor at the required interval. Following advice from ARPANSA, ANSTO recalibrated the area monitor and actions put in place to prevent recurrence. No enforcement action was taken by ARPANSA.

Breaches with no or minor safety implications

During this financial year, breaches with minor or no safety implications were recorded across the following areas:

- late submission of annual report
- failure to keep source inventory workbook updated
- marginally exceeding activity limit for a building
- disposal of a low hazard UV controlled apparatus without prior approval
- disposal of a low hazard x-ray apparatus without prior approval
- failure to implement a radiation management plan
- 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 all 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.

During this financial year, fifty-nine inspections were performed out of a target of sixty.

ARPANSA is committed to carrying out its regulatory functions in a responsive and timely manner. In relation to timeliness of assessing licence applications, we advise that in relation to source licences we achieved an average completion time of 17.3 days against a target of 30 days, in relation to facility licences we achieved an average completion time of 59.5 days against a target of 60 days, and in relation to regulation 51 approvals we achieved an average completion time of 17.6 days against a target of 30 days.

National Uniformity

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

Quantitative Deliverables[1]	2011-12 Revised Budget	2012-13 Budget Target	2013-14 Forward Year 1	2014-15 Forward Year 2	2015-16 Forward Year 3
Ensure effective regulation and enforcement activities					
Number of safety incidents involving Commonwealth users of radiation[2]	<40	<10	<10	<10	<10
Result	5	6	N/A	N/A	N/A

[1] In 2012-13, all deliverables and key performance indicators have been reviewed and updated to ensure targeted performance reporting.
[2] The target has been reduced from <20 to <10 due to recent trends in the number of incidents

ARPANSA and the state and territory radiation regulators through the Radiation Health Committee (RHC). ARPANSA is committed to effectively regulating the use of radiation by Australian Government entities and by promoting the adoption of a uniform framework across all jurisdictions.

The Agency's national uniformity activities have been dominated by resolving long running discussions relating to Extremely Low Frequency (ELF) radiation exposure, commercial solaria and associated UV hazards and creating a uniform approach to disposal of very low level waste material by the user.

During this financial year, the draft NDRP Amendment No. 6 was released for public consultation, further developed and forwarded through the relevant approval processes. This amendment covered various topics including exemptions of krypton-85 lighting products; additional licensing pathways for chiropractors; clarifying incident reporting requirements and other matters.

NDRP Amendment 6 included a restructure of the wording of schedule 13 to clarify the scope of incidents to be reported, provided exemptions for certain lighting products, supplemented the authorisation criteria for chiropractors and updated the reference to the transport code RPS 2. The final version was prepared after detailed consideration by the Radiation Health Committee taking into account public submissions received. 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 Standing Council on Health for out-of-session consideration has been approved. Once the amendment is approved at Ministerial level, a revised NDRP will be published in early 2013–14.

Work has begun on several other proposed NDRP amendments covering a range of topics.

The *Safety Guide for the Approval Processes for the Safe Transport of Radioactive Materials* (RPS 2.2) was published as a supplementary guide to the Transport Code. This document provides practical advice and guidance on approval processes for the transport of radioactive material.

The main achievement of the Radiation Health Committee work program this year has been the advancement of the work on the revision of RPS 1 (*Recommendations for Limiting Exposure to Ionizing Radiation and National Standard for Limiting Occupational Exposure to Ionizing Radiation*) to create two new documents. The *Fundamentals for Protection against Ionising Radiation* will be the top level document replacing the Recommendations part of RPS 1 and the Code *of Practice for Radiation Protection in Planned Exposure Situations For Occupational and Public Exposure* will replace the Standard part of RPS1.

The draft Fundamentals was released for public consultation in June 2013 and drafting of the Code is at an advanced stage, with consultation and regulatory impact assessment due to start in late 2013.

International Engagement (selected)

In February 2013, ARPANSA's Dr Geoff Williams chaired an IAEA Consultancy meeting held in Vienna Austria which explored management of post-accident remediation following a nuclear accident. This work was based on past experience of different approaches: in the Ukraine (Chernobyl); the United States (Hanford) and in Australia (Maralinga rehabilitation). The scope of this consultancy was to draft guidance on the management and disposal of large amounts of waste arising after the ending of an emergency phase of a nuclear/radiological disaster.

Between 20-22 February 2013, ARPANSA attended the IAEA - Regional Workshop on Effective Border Control Coordination in Asia Pacific and Middle East Countries, held in Manila, the Philippines which discussed best practice and lessons learned in implementing effective border control of radioactive materials. The discussions also considered best practice by border control agencies and how to improve information sharing with regulatory bodies to ensure an integrated and harmonised approach to resolve incidents at the border.

Between 13-14 March, senior staff attended the 46th meeting of the Organisation for Economic Cooperation and Development-Nuclear Energy Agency (OECD-NEA) – Radioactive Waste Management Committee and Regulators' Forum, held in Paris, France as well as a Regulator's Forum on 12 March 2013. Of particular interest to Australia was the presentation of the outcomes of a peer review of a licence application for a near surface disposal facility at Dessel in Belgium. In addition, the results of

a peer review of the post-closure radiological safety case for a spent fuel repository in Sweden were presented. In both cases, it was concluded that the international peer review processes added value to licence application assessments.

Between 12-15 March 2013, a senior member of Regulatory Services Branch attended a Consultancy Meeting to Assist in Planning the IAEA International Experts Meeting (IEM-5) on Human and Organisational Consultancy Meeting on Factors in Nuclear Safety in the Light of the Accident at the Fukushima Dai-ichi Nuclear Power Plant, held in Vienna, Austria. Holistic safety is a best practice approach to nuclear safety management that includes technological, human, and organisational aspects and the often complex interaction and interdependence between these three aspects. ARPANSA's invitation to participate in the consultancy group demonstrates the IAEA's recognition of ARPANSA's best practice approach in developing methods to promote and assess safety holistically.

During December 2013, ARPANSA, as an IAEA-designated National Competent Authority, attended the IAEA Workshop on Notification, Reporting and Requesting Assistance held in Singapore. Australia is party to the *Convention on Early Notification of a Nuclear Accident* and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*. This workshop reinforced ARPANSA's obligations under both conventions and informed participants on communication protocols with the IAEA Incident and Emergency Centre.

Discussion and Analysis of Financial Performance

Report on Performance

For the financial year ending 30 June 2013, ARPANSA reported an operating deficit of $2.29m. This deficit is attributed to $2.33m depreciation and amortisation expense not requiring appropriation.

Revenue for the year totalled $25.1m, of which 54% was appropriated by government. The remaining amounts related to regulatory licence fees and charges and from the sale of goods and services.

ARPANSA's expenses totalled $27.4m. Approximately 63% are attributed to employee benefits, 9% relates to depreciation and amortisation expense and the remainder suppliers expense.

The Agency continues to review the efficiency and effectiveness by which it delivers its program, to ensure we operate within our financial constraints.

Performance Against Service Charter

ARPANSA has committed to a service charter that sets out the standards of service that all stakeholders can expect from the Agency. Amongst other things, the charter provides a complaints resolution mechanism and is available in full on the ARPANSA website at: www.arpansa.gov.au/AboutUS/corporate/servicecharter.cfm. ARPANSA's customers are in both the public and private sectors (overseas as well as within Australia) and include:

- people who use radiation in medicine, research and industry (including mining)
- Commonwealth, state and local government agencies
- environment protection agencies
- international organisations
- academia and research organisation
- general public, interest groups and the media.

Services provided by ARPANSA include:

- traceable calibrations of ionising and non-ionising radiation monitoring equipment
- the Personal Radiation Monitoring Service (PRMS)
- the assessment of Ultraviolet Protection Factors (UPF)
- advice, measurements, consultancy, and training on a range of radiation protection issues
- the issue of Customs (Prohibited Imports) permits for the importation of radioactive materials into Australia.

Table 1 ARPANSA Expenses for Outcome 1

Outcome 1: Protection of people and the environment through radiation protection and nuclear safety research, policy, advice, codes, standards, services and regulation	**Budget* 2012–13 $'000 (a)**	**Actual Expenses 2012–13 $'000 (b)**	**Variation $'000 (a)-(b)**
Program 1.1: (Radiation protection and nuclear safety)			
Departmental expenses			
Ordinary annual services (Appropriation Bill No. 1)	13,498	13,498	
Special Accounts	8,613	11,573	(2,960)
Expenses not requiring appropriation in the Budget year	2,171	2,330	(159)
Subtotal for Program 1.1	24,282	27,401	(3,119)
Total for Outcome	24,282	27,401	(3,119)
Average staffing level (FTE)	152	145	

* Full year budget, including any subsequent adjustment made to the 2012-13 Budget.

Client complaints

As part of the quality management system of ARPANSA and services accredited by the National Association of Testing Authorities (NATA), all corrective actions arising from client complaints are recorded. In accordance with the quality system, these actions are reported to the ARPANSA Quality Manager and the relevant Branch Head.

Table 2: ARPANSA Resource Statement – 2012–13

	Actual Available Appropriation for 2012–13 $'000 (a)	Payments Made 2012–13 $'000 (b)	Balance Remaining 2012–13 $'000 (a-b)
Ordinary Annual Services[1]			
Prior year departmental appropriation[2]	580	580	
Departmental appropriation[3]	15 434	13 498	1 936
Total	16 014	14,078	1 936
Total ordinary annual services	16 014	14 078	
Other services[4]			
Departmental non-operating			
Equity injections	-	-	-
Total	-	-	-
Total other services	-	-	-
Special Accounts[5]			
Opening balance	1 656		
Appropriation receipts[6]	14 928		
Non-appropriation receipts to Special Accounts	11 945		
Payments made		27 529	
Total Special Account	28 529	27 529	1 000
Total resourcing and payments	44 543	41 607	
Less departmental appropriations and equity injections drawn from the above and credited to special accounts	(14 928)	(14 078)	
Total net resourcing for ARPANSA	29 615	27 529	

[1] Appropriation Bill (No.1) 2012-13.
[2] Balance carried from previous year for annual appropriations.
[3] Includes an amount of $1.936 million in 2012-13 for the Administered Capital Budget. For accounting purposes this amount has been designated as 'contributions by owners'.
[4] Appropriation Bill (No.2) 2012-13.
[5] Does not include 'Special Public Money' held in accounts like Other Trust Monies accounts (OTM). Services for other Government and Non-agency Bodies accounts (SOG), or Services for Other Entities and Trust Moneys Special accounts (SOETM).
[6] Appropriation receipts from ARPANSA's annual and special appropriations for 2012-13 included above.