



**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 TO 30 JUNE 2007**





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## Letter of Transmittal

20 December 2007

Senator the Hon Jan McLucas  
Parliamentary Secretary to the Minister  
for Health and Ageing  
Parliament House  
Canberra ACT 2600

Dear Parliamentary Secretary

The *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act) requires the Chief Executive Officer 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
- a list of 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 to 30 June 2007.

As you would be aware, 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



**John Loy**  
CEO of ARPANSA

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

Following are the highlights of ARPANSA's operations over the past quarter based on the Agency's three output groups:

1. knowledge, information and services;
2. national leadership in radiation protection and nuclear safety; and
3. regulation.

### **Knowledge, information and services**

#### ***Non-ionizing radiation***

Data from the UPF Testing Service at ARPANSA, which tests the UVR protection provided by clothing, has been used to publish a paper in a scientific journal (Textile Research Journal). The publication deals with the effect of colour on the amount of UVR protection provided by clothing. A further publication, an invited paper over-viewing the subject of Clothing and UVR protection was accepted for publication in Photodermatology, Photoimmunology and Photomedicine.

The study on measurements of the effectiveness of various species of trees in Australia in providing protection against solar UVR, done in collaboration with the Waite Institute of the University of Adelaide and the Cancer Council South Australia, has been accepted for publication in overseas scientific journal (Photochemistry and Photobiology).

Initial drafts analysing the large amount of data collected in the collaborative international project examining the UVR exposures of parents, children and lifeguards while at swimming pools in the United States in the summer of 2006 has begun. The project, with the University of Hawaii and Emory University in the United States, is looking at validation of diary entries made by the subjects against independent measures such as UVR dose measured using UVR sensitive polysulphone film dosimeters and sunscreen swabs of the subjects skin to measure the presence of sunscreen. The drafts, covering various aspects of behaviour, such as sun protection practices and awareness and their inter-relation with UVR exposure and sunscreen use are planned to be submitted to journals for publication before the end of 2007.

A seminar on solar UVR was presented by ARPANSA staff at the Cancer Council Victoria in June 2007 and another in July 2007 to the National Skin Cancer Committee of the Australian Cancer Society. Measurements were made of the UVR emissions from two UVC lamps for the University of SA Radiation Safety Officer. ARPANSA staff participated in the newly formed Cancer Council Victoria Advisory Group on Outdoor Workers and Solar UVR. Enquiries regarding solar UVR levels, hand held UV meters, the effects of ozone depletion and requests for UV data were received from a number of state Cancer Councils. Numerous other information requests concerning UVR were received from State and Territory Cancer Councils as well as other Australian and overseas universities, industries and the general public. Appropriate information was provided in all cases.

ARPANSA UV measurement data is now provided in real time on the internet for Melbourne, Sydney, Darwin, Adelaide, Brisbane and Townsville. It is planned to add Newcastle, Perth and Alice Springs before next summer.

## ELECTROMAGNETIC RADIATION (EMR)

EMR section staff provided information to State and Australian government agencies and to the public and media regarding EMR and health. Occupational exposure to radiofrequency electromagnetic fields remains of interest but the majority of enquires were in regard to possible health effects of magnetic fields from electricity distribution, particularly high-voltage transmission lines. Calls concerning mobile phones and mobile phone base stations and other wireless devices and household appliances were in the minority.

The measurements of 50 Hz magnetic fields in Melbourne homes have continued as part of a survey of approximately 300 homes. Measurements in 295 homes have been completed. There have been difficulties in making arrangements to measure the final 3 homes in the survey. Measurements outside almost 550 non-participating homes have been taken to estimate selection biases. Analysis of the results has commenced.

NIR Branch staff have continued their involvement in the drafting of an ARPANSA Standard for human exposure to extremely low frequency electric and magnetic fields. Following the receipt and analysis of submissions regarding the draft, a two day meeting was held on 29<sup>th</sup> and 30<sup>th</sup> May to consider appropriate changes to the draft. Further meetings are planned.

A field measurement exercise for the development of the Standards Australia revised radiofrequency measurement standard AS 2772.2 was hosted by ARPANSA at the Yallambie premises on 26<sup>th</sup> April. A staff member participated in a meeting of the Standards Australia meeting TE7 committee and the TE7/2 working group to develop the revised standard (Sydney 22 - 23 May).

ARPANSA scientific officers carried out inspections and measurements of RF EMR levels in the vicinity of mobile phone base stations in order to assist in planning for the survey of a small, selected, number of base stations throughout Australia. Measurements will be carried out by NATA registered consultants. A contract has been signed and measurements at the first base station (Sandringham, Victoria) were made in April.

## PUBLIC EDUCATION

The website is averaging more than 52 000 visitors per month. The topics of most interest are radiation and health information sheets and educational pages dealing with the basics of radiation science. Visitors downloaded 41,104 documents predominantly from the ARPANSA Radiation Protection series which can be found at: <http://www.arpansa.gov.au/Publications/codes/rps.cfm> .

EMR Section Staff convened a meeting of the Electromagnetic Energy Reference Group (EMERG) on 24th May 2007 in Sydney to discuss ARPANSA activities and community concerns regarding EMR in the environment. This information is used to guide the preparation of public information on the issues and to help plan measurement programs.

## PUBLICATIONS

Colin R. Roy and Lindsay J. Martin. A comparison of important international and national standards for limiting exposure to EMF including the scientific rationale. *Health Physics* **92**: 635-641, 2007.

Colin R. Roy. Rapporteur Report: ICNIRP International Workshop on EMF dosimetry and Biophysical Aspects Relevant to Setting Exposure Guidelines. *Health Physics* **92**: 658-667, 2007.

Peter Gies. Photoprotection by Clothing. *Photodermatology, Photoimmunology & Photomedicine*, **23**: (in press) 2007.

Peter Gies, Robin Elix(deceased), David Lawry, Jennifer Gardner, Trevor Hancock, Sarah Cockerell, Colin Roy, John Javorniczky and Stuart Henderson. Assessment of the UVR Protection Provided by Different Tree Species. *Photochem. Photobiol.*, **83**: (in press) 2007.

C.A. Wilson, P. H. Gies, B. E. Niven, A. McLennan and N. K. Bevin. The relationship between UV transmittance and color — visual description and instrumental measurement. *Textile Res. J.* (in press) 2007.

## **Medical radiation**

### RADIATION IN HEALTH CARE – SAFER AND BETTER USE

The 2007 Budget measure Radiation in Health Care – Safer and Better Use emphasised the importance of the use of ionizing radiation as a core element in medical diagnosis (diagnostic imaging by x-ray and CT scans, nuclear medicine) and in the treatment of cancer and other diseases (radiotherapy, therapeutic nuclear medicine) and has provided ARPANSA with \$9.1 million funding over the four years 2007-2011 (and then ongoing funding). ARPANSA will work with the medical professions to optimise the use of radiation in medicine so as to ensure that the best outcomes are achieved for patients. This will be achieved by:

1. The purchase and operation by ARPANSA of a state-of-the-art medical linear accelerator (linac) with the capability to perform the accurate calibration of radiation doses delivered to cancer patients by clinically applicable megavoltage radiation beams, both for current and emerging radiotherapy technologies.
2. ARPANSA working to improve the safe and effective use of ionizing radiation in medical diagnosis and therapy by actively engaging with the medical professions, providing training and access to research facilities for persons working in the medical radiation field and by providing radiation dose information, and information on techniques to reduce radiation doses to patients and occupationally exposed persons.

The advertising for staff positions is in progress.

## PERSONAL RADIATION MONITORING SERVICE (PRMS)

The ARPANSA PRMS has continued to offer a comprehensive radiation monitoring service for persons who may be exposed to ionizing radiation as a consequence of their occupation. A service is also provided for the measurement of radon and natural background radiation levels.

The PRMS Application Development Project has been completed. The cut-over to the new system took place on 29 May 2007. The warranty period extends from that date until 26 August 2007. Four unresolved issues from acceptance testing and a number of problems identified since the cut-over to the new system are being addressed.

A redesigned prototype of the new monitor holder to be used in the PRMS has been developed. Tests on samples of the new holder indicate that it does not meet the specifications. The supplier has given assurances that another set of samples will be delivered that will address the issues raised.

## IONIZING RADIATION STANDARDS (IRS) – CALIBRATION SERVICES

The work on the ARPANSA and IAEA graphite calorimeters was completed and a paper was presented at the workshop on “Absorbed Dose and Air Kerma Primary Standards” held in Paris, on 9-11 May, 2007. A technical report is being prepared with more detail on the implementation of the calorimeters. A poster on the potential heat defect in graphite was also displayed at the workshop. Dr Ramanathan left ARPANSA in late April and has moved to a similar position at the NIST in the US.

The 18<sup>th</sup> biennial meeting of the Consultative Committee for Ionizing Radiation (Section I) at the International Bureau of Weights and Measures (BIPM) in Paris over May 14-16 was attended by the ARPANSA delegate and another staff member. The status of the graphite calorimeter and the Australian standard of absorbed dose were presented.

Two centres have been sent TLD material to participate in the next round of the national therapy dosimetry audit program with two more to follow. Exposures are scheduled for July/August. Further radiotherapy centres have indicated their intention to participate later this year.

The response to the report from NATA for the accreditation of the extended scope of IRS calibration services has been sent to NATA. All corrective actions were dealt with.

Progress has been made towards refurbishing the ARPANSA therapy level cobalt-60 source. A meeting with ANSTO is planned to resolve issues of shipment of a third party source to Melbourne and the transfer process.

## MEDICAL PHYSICS

A survey of radiation doses from Computed Tomography (CT) is in progress. The computation tools and methodologies necessary to estimate effective doses from all types of CT equipment and a database to organise the information have been

developed. A major aim of the survey is to measure the impact of new technologies and procedures on patient doses in CT.

#### RADIOPHARMACEUTICAL

The ARPANSA Technical Report “Results of the Quality Assurance Testing Program for Radiopharmaceuticals (2006)”, Technical Report Series No. 146, has been posted on the ARPANSA internet site.

### ***Environmental Radiation***

The analysis of samples as part of a quality management program for gross alpha/beta, radium and uranium in water was completed. All results were found to be acceptable and within appropriate international limits. The next samples as part of the same quality management program for tritium and gamma emitting radionuclides will arrive in July.

### ***Services***

Statistics on the outputs of ARPANSA services are at Annex B.

## **National leadership in radiation protection and nuclear safety**

### ***Comprehensive Test Ban Treaty – air sampling monitoring stations***

As part of Australia’s commitment to the Comprehensive Nuclear-Test-Ban Treaty, ARPANSA continued to operate and maintain radionuclide air monitoring stations at Melbourne, Perth, Townsville, Darwin, and the Cocos Islands, Australia. The two remaining stations to be installed will be located at Macquarie Island and Mawson, Antarctica.

ARPANSA had responded to a Request for Proposal from CTBTO for the installation of a radionuclide air monitoring stations on Macquarie Island. Several key issues are still to be resolved, and negotiations between ARPANSA and CTBTO are continuing.

Due to the uncertainty surrounding the long term future of Mawson base, Davis station is being considered as a possible alternative location. Consequently, in collaboration with Geoscience Australia (GA), ARPANSA and GA have responded to a request from the CTBTO for a contractor to carry out an infrastructure review and radiological measurements in Davis, Antarctica. An MOU has been negotiated with GA for the collection of soil samples, and limited dose rate measurements on Davis. The collected soil samples have been returned to ARPANSA, and analysed by high resolution gamma ray analysis.

In November 2006, the SAUNA II Noble Gas analysing system was installed in Darwin by Gammadat Instruments AB, which forms part of the CTBT International Monitoring System. In December 2006, the system entered into the Tuning and Initial Testing Phase. ARPANSA has submitted to CTBTO a Budget for the testing and evaluation of Phase III of the Noble Gas experiment, ARPANSA has been

informed by CTBTO, that the Noble Gas facility had entered the Testing and Evaluation Phase on 1 April 2007; a contract for this activity is expected in the near future. Up to this date, ARPANSA had provided limited technical support.

In addition to operating the stations, ARPANSA also operates the Australian Radionuclide Laboratory, which has the role of testing samples obtained by other monitoring stations. The Laboratory was formally certified by the CTBTO in December 2006. A contract for the provision of ongoing RN Laboratory services has been negotiated.

ARPANSA continues to maintain a National Data Centre that provides advice to the Australian Safeguards and Non-Proliferation Office (ASNO) on any event detected by the CTBT radionuclide network that may be indicative of a nuclear weapon test explosion. ARPANSA is in the process of negotiating an MOU with ASNO with regard to the provision of limited NDC services that are both timely and effective.

### ***National Uniformity***

The draft Regulatory Impact Statement on the 2<sup>nd</sup> edition of the National Directory was forwarded to the Office of Best Practice Regulation at the end of the quarter. It is expected that, after clearance from the OBPR, the public comment period will commence in August.

### ***International Activities***

ARPANSA officers attended the following international meetings:

- The 23<sup>rd</sup> meeting of the Waste Standards Safety Committee (WASSC) at the IAEA in Vienna in 10-13 April. Part of the meeting involved a joint session between WASSC and RASSC, where the overall structure of the Basic Safety Standards (BSS) was discussed, a summary was presented of current thinking regarding revision of the BSS, and a progress report was presented on the International Commission on Radiological Protection's new recommendations on radiation protection. A joint session with the Nuclear Standards Safety Committee was also held.

Several publications were progressed.

Overviews were presented of recent developments in safety of radioactive waste, including the current status of the draft Safety Guide DS390 Classification of Radioactive Waste. Following an international workshop held in Cape Town in July 2007, it is proposed to present a further draft of DS390 to WASSC in October 2007.

- the IAEA Radiation Safety Standards Committee (RASSC) meeting from 10-13 April in Vienna, Austria. The meeting discussed the revision of the IAEA Basic Safety Standards (BSS) and the overall structure of the safety standards series of publications. A range of draft publications were also reviewed and progressed.
- the 4<sup>th</sup> plenary meeting of the IAEA Safety Assessment Driving Radioactive Waste Management Solutions (SADRWMS) during the week of 23-27 April 2007. The working group was chaired by ARPANSA. The SADRWMS project

has developed a software tool called SAFRAN to assist with the performance and review of safety assessments in pre-disposal waste management.

- the 55<sup>th</sup> meeting of the United National Scientific Committee on the Effects of Atomic Radiation. The Committee reviewed drafts on public, occupational and medical exposures to ionizing radiation. It also reviewed drafts on the effects of exposures to ionizing radiation resulting from the Chernobyl accident and the effects of radiation accidents as well as effects on the environment of radiation exposures.
- the *International EMF Conference 2007 & Short Course on EMF Safety Management* in Kuala Lumpur, Malaysia, 3<sup>rd</sup> – 8<sup>th</sup> June as an invited speaker and gave a presentation “**Radiofrequency Measurements of Mobile Phone Base Stations for Addressing Public Concern**”, L.J. Martin and S.I. Henderson.

An officer was recalled to duty in Europe during June to attend meetings at the Health Protection Agency, UK on the development of the ARPANSA ELF standard, the revision of the ICNIRP ELF Guidelines and the handling of MRI issues in Europe. At WHO (Geneva, Switzerland) the officer participated in the Meeting of the International Advisory Committee of the International EMF Project and in a 2-day workshop on ‘Developing and Implementing Protective Measures for ELF’. In Rome the officer met with staff of the National Institute of Health (NIH) to discuss ICNIRP issues, including the review of the ELF and RF guidelines and to explore the possibility of collaborative studies in the area of UVR personal dosimetry

An ARPANSA officer presented several lectures on radiation safety at a 5-day IAEA Regional Training Course on Radiation Safety for the Control of Public Exposure, Including Management of Radioactive Waste from 11-15 June 2007 in Dhaka, Bangladesh.

An ARPANSA officer visited the Centre de l’Aube in France which is a waste disposal facility for short-lived, low- and intermediate-level radioactive waste. The very low-level radioactive waste disposal facility at Morvilliers was also visited. Both are good examples of operating facilities.

### ***Source security and emergency response***

At the end of April 2007, ARPANSA participated in the “In-Situ Intercomparison Scenario” organised by the ARC - Seibersdorf research GmbH (ARC-sr) in cooperation with the International Atomic Energy Agency (IAEA) and the Austrian NBC Defence School.

The Australian Government has provided funding to ARPANSA for a program to *Strengthening Regional Radiological Emergency Response*. The objective of the program is to strengthen plans and technical capabilities of countries within the Asian region; and establish a regional network of technical expert assistance, in order to respond to a radiological or nuclear incident. As part of this program, the ARPANSA Radiation Emergency Operations Unit conducted joint exercise training with the Malaysian Atomic Energy Licensing Board Emergency teams in Kuala Lumpur in April.

ARGOS is a Decision Support System originally developed in Denmark to deal with nuclear emergencies, but the system has been extended to cover CBRN emergencies. In April 2007, Australia joined the ARGOS consortium. ARPANSA is coordinating an Australian ARGOS Evaluation Project which aims to assess the suitability of ARGOS for Australian CBRN response. As part of this project ARPANSA and Emergency Management Australia organised technical seminars in Melbourne and Canberra.

In May ARPANSA participated in a CTBTO on-Site Inspection Directed Exercise 2007 in the Chernobyl Exclusion Zone, Ukraine.

ARPANSA continues to provide radiation experts for the Australian Crisis Advisory Panel of Experts and an on-call duty officer to provide 24 hour access to ARPANSA resources and expertise.

## **Regulation**

### ***IAEA Integrated Regulatory Review Service Mission to Australia***

At the request of the CEO of ARPANSA, an international team of eleven experts in radiation and nuclear safety visited the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) from 25 June to 6 July 2007 to conduct an Integrated Regulatory Review Service (IRRS) mission.

The purpose of the IRRS mission was to conduct a review of the regulatory framework established by the *Australian Radiation Protection and Nuclear Safety Act 1998* and the Australian Radiation Protection and Nuclear Safety Regulations and to consider the effectiveness of the implementation of that framework. The mission was also designed to ensure the exchange of information and experience between the members of the mission and their counterparts within ARPANSA

The IAEA had conducted a 'full scope' IRRS Mission in France in 2006 and an abbreviated mission in the UK. An IRRS Mission was taking place in Japan at the time of the Australian Mission and future missions are being prepared for Pakistan, Spain and other countries.

The IRRS Review Team consisted of senior regulatory experts from Canada, Denmark, Finland, France, South Africa, Spain, the US; and staff of the IAEA .

The areas of review considered by the team are based on the IAEA Safety Standards and included consideration of:

- legislative and governmental responsibilities, including the authority of the regulatory body
- organization of the regulatory body
- activities of the regulatory body, including the authorization (licensing) process, review and assessment, inspection and enforcement, the development of regulations and guides

- each area of activity was examined in relation to research reactors, sources and industrial practices, decommissioning, remediation, and radioactive waste management
- safety and security of radioactive sources
- national infrastructure for radioactive waste, decommissioning and remediation
- emergency preparedness
- the regulatory body's management system
- public information and communication.

Prior to the commencement of the Mission a comprehensive self assessment was undertaken by ARPANSA taken from the requirements of IAEA Safety Standards. The ARPANSA self assessment formed the basis for counterpart discussions between the IAEA Team and ARPANSA staff. In addition the IAEA team observed ARPANSA inspections and interactions with licence holders.

During the course of the Mission the IAEA team met with the Parliamentary Secretary to the Minister on Health and Ageing, representatives from the Department of Prime Minister and Cabinet and the Chair of each of the Radiation Health and Safety Advisory Council, the Radiation Health Committee, the Nuclear Safety Committee and the Regulators' Forum.

In its draft report discussed with ARPANSA at the exit meeting on 6 July, the IRRS Review Team identified a number of Good Practices and made Recommendations and Suggestions that indicate where improvements are necessary or desirable to further continue improving effectiveness of regulatory controls.

The Review Team found that the ARPANSA legislative and statutory framework was consistent with the IAEA Safety Requirements GS-R-1: *Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety*. The Team found the requirement in the ARPANS Act for the CEO to take into account international best practice in radiation protection and nuclear safety to be a Good Practice. It was suggested that when the ARPANS Act is reviewed, consideration be given to stating licence holder responsibility for safety and to more clearly establish ARPANSA's role in regulating the transport of radioactive material. The Act might also be reviewed to provide a better basis for the regulatory oversight of existing exposure situations.

With respect to the responsibilities and functions of ARPANSA, the Review Team found that ARPANSA was provided with appropriate effective independence. The Team supports the approach being taken to deal with the conflict of interest in ARPANSA regulating itself (using the services of the Victorian Regulator). The Team identified the development of the National Directory for Radiation Protection as the instrument for promoting national uniformity as a Good Practice. Indeed, they record that the progress made so far in promoting national uniformity is 'remarkable'.

With regard to the organization of the regulatory body, the Review Team identified ARPANSA's use of peer reviews and services from the IAEA; the plans for Graduate Recruitment; and ARPANSA's involvement in the framework of international cooperation for radiation protection and nuclear safety all as being Good Practices.

The Team recommended that ARPANSA establish a more comprehensive training program for regulatory staff and made some suggestions about corporate planning, interaction between the regulatory and scientific areas and workforce planning and development.

Turning to the activities of the regulatory body, the Review Team identified ARPANSA's seeking of feedback at the close of inspections; and its decommissioning guidelines as Good Practices. It recommended that ARPANSA prepare guidance for the forthcoming periodic safety review of the OPAL reactor; should prepare guidelines for the end-point of decommissioning; and in relation to the decommissioning of HIFAR. The Team also recommends that ARPANSA include unannounced inspections in its inspection program. The Team made suggestions with regard to guidance relating to relevant changes with significant implications for safety and a range of other matters affecting regulatory guidance and enforcement.

The Review Team was supportive of ARPANSA's work with regard to the safety and security of radioactive sources. They saw the development of ARPANSA's Code of Practice on the Security of Radioactive Sources and the implementation of the recommendations in the COAG report on radiological materials as serving to meet Australia's commitment to follow the IAEA Code of Conduct on the Safety and Security of Radioactive Sources. The Team made a small number of suggestions aimed at supporting and improving further ARPANSA efforts in this area.

The Team commented on national infrastructure for radioactive waste management, decommissioning and remediation. It suggested that ARPANSA strongly promote a national system for classification of radioactive waste and develop guidance for the clearance of materials from decommissioning.

On emergency preparedness, the Team commended ARPANSA's health physics arm and emergency operations unit as being Good Practice. The Team recommended that ARPANSA address in-house procedures and policies for managing its role in emergencies arising with licence holders and in the provision of public and governmental information during and after events and accidents.

The Review Team was supportive of ARPANSA's management system commending its 'systematic and professional manner to improve and develop the management system' as being Good Practice, as were ARPANSA's strategic planning framework, the introduction of the Regulatory Management Information System and the role of internal audit. The Team recommends further work on the completeness and consistency of the QA procedures and that ARPANSA should expand its management system to include, promote and support strong safety culture. The Team also makes suggestions about planning, risk management and further development of costing information.

With regard to the transport of radioactive materials, the Review Team recommends that ARPANSA review transport compliance assurance. It also suggests that there might be a review of the current arrangements, whereby there are 11 different 'competent authorities' for transport of radioactive material in Australia.

The Review Team is supportive of ARPANSA's public information activities and suggests that these be developed further and documented.

The Review Team also undertook discussions on a number of policy issues. These discussions will be included in the report but they do not lead to specific recommendations or suggestions. The policy issues covered were:

- enhancing regulatory effectiveness and compliance
- risk-informed and performance-based approach to regulation
- openness and transparency
- human resources and knowledge management
- the promotion of national uniformity in radiation protection
- emergency response
- implementation of measures to improve security of sources
- stakeholder consultation.

ARPANSA believes that the Mission was very effective and successful. The Review Team were very capable and experienced individuals. One of the principal outcomes was the value of the interaction between the Review Team members and ARPANSA counterparts.

ARPANSA will take up the recommendations and suggestions made by the Review Team as part of its ongoing planning of its regulatory program.

The report of the Review will be completed in the next financial year. A final report is expected by mid-late August 2007. It would be expected that ARPANSA would make the final report public through its website. This will be reported in the September 2007 Quarterly Report.

The results of the Australian mission will be discussed at the senior regulators' meeting at the IAEA General Conference in September 2007. This will be the subject of a report in the December 2007 Quarterly Report.

### ***Regulation of the Commonwealth's uses of radioactive material, apparatus and facilities***

The CEO of ARPANSA is responsible for regulating all radiation and nuclear activities undertaken by Australian Government entities and contractors who undertake such activities for or on behalf of Australian Government entities (Commonwealth contractors).

ARPANSA staff assist the CEO to implement the regulatory scheme set out in the ARPANS legislation in particular by providing assessments and advice in connection with applications for source and facility licences under the ARPANS Act, including whether or not a licence should be issued, authorising dealings with radiation sources and conduct undertaken in relation to facilities, both prescribed radiation facilities and nuclear installations.

Monitoring compliance with the ARPANS legislative scheme for regulation, including by undertaking inspections and providing advice to the CEO on findings of breach of the Act and any subsequent recommendation as to enforcement action, is a

major output of ARPANSA. Compliance monitoring includes the review of compliance reports submitted by licence holders.

### ***Inspections for compliance monitoring***

ARPANSA continues an active program of inspections to determine compliance with licences issued under the *ARPANS Act 1998*. The following radiation safety inspections were undertaken in the quarter:

- Australian Customs Service – Brisbane Neutron Scanner (S0092)
- Australian Defence Force – Gallipoli Barracks Enogerra (S0042)
- Australian Antarctic Division Polar Medicine Unit (S0008)
- Australian Crime Commission (S0034)
- Bureau of Meterology, Cape Grim Baseline Air Pollution Station (S0005)

Inspections of nuclear safety focused on:

- OPAL research reactor (FO 0157)
- HIFAR (Hi-flux Australian Reactor)
- ANSTO Radiopharmaceutical Industries, Radiopharmaceutical Manufacturing Facility (Building 23A)
- MOATA research reactor (FO 0044-6A)

### ***Details of Regulatory Activities***

Further details of regulatory activities including a list of all licensed facilities, installations and sources are at Annex A.

# **Report on the 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 27 April 2007. A summary of the meeting is available at [http://www.arpansa.gov.au/rhsac\\_mt.htm](http://www.arpansa.gov.au/rhsac_mt.htm).

The main issues discussed at the meeting were:

- Consideration of Council's future workplan. Council agreed to undertake a high level review of the international position on safety issues in the operation of nuclear power plants and safe management of high level waste. A proposal for the project would be prepared for the next meeting.
- Council also agreed that after three years of operation it should undertake a review of the effectiveness and efficiency of the National Directory for Radiation Protection, edition 1, for the Radiation Health Committee. A framework for the review will be prepared for next meeting.
- Council agreed that it should keep medical radiation on its forward plan and place any new issues on the agenda for discussion.

Council discussed a range of international developments, including the adoption of new ICRP recommendations, the development of IAEA Safety Standards, information from two international conferences on naturally occurring radioactive material, and information from an international conference on the public health issues arising from the London polonium-210 poisoning.

Other matters considered were:

- A briefing on the IAEA Integrated Regulatory Review Service review of ARPANSA's regulatory functions.
- A report on the increase medical radiation exposure in the USA over the past 20 years.
- Media reports concerning an incident at Department of Defence, in which staff were exposed to tritium. ARPANSA had previously investigated the incident, which occurred four years ago.

## **Radiation Health Committee**

The Committee did not meet during the quarter. The next Committee meeting is scheduled for 18-19 July 2007.

## **Nuclear Safety Committee**

The NSC met on 22 June 2007. A summary of the meeting is available at [http://www.arpansa.gov.au/nsc\\_mt.htm](http://www.arpansa.gov.au/nsc_mt.htm).

The Committee received a briefing on the application by the Australian Nuclear Science and Technology Organisation (ANSTO) for a facility licence authorising it to possess or control the HIFAR including aspects relating to the expected timeline for a licence decision, the options relating to a possible public forum and possible NSC involvement in the assessment process.

The Committee also received a briefing on the progress of commissioning of the OPAL Reactor. Members were advised of several issues that had arisen during the commissioning process.

Other matters considered at the meeting included updates on:

- The progress of the organisation of the Research Reactor Conference to be held in Sydney in November;
- The two week IAEA Integrated Regulatory Review Service mission that was due to commence the week following the meeting.
- Progress on the proposed Radioactive Waste Management Facility and disposal of Australian long-lived intermediate level waste.

## **Reports required by subsections 60 (2)-(5) of the Act**

### **Details of directions given by the Minister under Section 16**

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

### **Details of any breach of licence conditions by a licensee during the quarter, of which the CEO is aware**

#### ***Breaches determined by the CEO***

The CEO determined the following breaches of licence conditions during the quarter:

- Australian Defence Force/Department of Defence – breach of regulation 53. Failure to obtain prior approval for disposal of sources

In each case, the CEO considered whether or not to take enforcement action and he determined that enforcement action was not necessary, as the licence holder took corrective action to rectify the breach upon notification of the breach by ARPANSA.

#### ***Exemptions***

The CEO has the power pursuant to both 30(1)(b) and 31(1)(b) of the ARPANS Act to exempt a controlled person from the requirement for licensing in relation to both source and facility licences. During the quarter the CEO made 2 exemption decisions:

- Exemption under regulation 38(5) of the ARPANS Regulations in relation to tritium firearm night sites used by the Australian Federal Police
- Exemption under regulation 38(5) of the ARPANS Regulations in relation to TR cell containing tritium and klystron amplifier devices (components of weather radars) used by the Bureau of Meteorology

## **Reports to the CEO from the Council and NSC (paragraphs 20(f) and 26(1)(d) of the Act)**

The CEO did not receive any reports from the Radiation Health and Safety Advisory Council or the Nuclear Safety Committee

## **A list of all facilities licensed under Part 5 of the *ARPANS Act during the quarter***

There were no facility licences issued during the quarter. A list of all licence applications received during the quarter as well as all licence issued, amended or surrendered during the quarter is included in Annex A.

## **Annex A – Regulatory Operations**

### **Nuclear Installations**

#### ***OPAL Research Reactor – Operating Licence (F0157)***

The reactor remains in a commissioning phase due to a number of matters that need to be resolved prior to the onset of normal operation. ANSTO issued a final version of the Stage C Commissioning Report on 23 May 2007 and requested that the ARPANSA Hold Point No.3 was cleared. This request is currently under review and consideration by ARPANSA officers.

During the second quarter of 2007, three fuel cycles were implemented and the reactor operated for the equivalent of 61 full power days. At the end of the period the reactor was in operating in cycle 005.

#### **MATTERS ARISING DURING COMMISSIONING**

##### ***Matters carried over from previous quarters***

As reported in the previous quarter, in January ANSTO identified a fault in the First Reactor Protection System (FRPS) logic. ANSTO subsequently submitted a submission for a regulation 51 change to the FRPS logic. ARPANSA are currently waiting for resolution of a number of matters before this request can be approved.

During this quarter ANSTO have continued to monitor a reduction in purity of heavy water within the reflector vessel due to movement of light water from the reactor pool. The rate of change has remained constant even though the differential pressures between the reflector vessel and reactor pool has been reduced. A briefing on the investigation and the preferred solution to the problem has been provided to ARPANSA officers during the quarter. It is likely that this solution will be implemented in the third quarter of 2007.

In February ANSTO reported increased activity in the primary coolant. ANSTO consequently submitted a change request to alter the previously proposed fuel management strategy so that a suspect fuel assembly could be removed. This was approved by ARPANSA and implemented by ANSTO. Activity levels in the pool have since reduced.

In December 2006, ANSTO observed that radiation levels in the Reactor Auxiliary Building were higher than anticipated. The increase required redesignation of the building from “white” to “red” radiation area during reactor operation. During the June quarter confirmation was obtained that repairs to the Cold Neutron Source undertaken during the March quarter had successfully reduced these levels. The Auxiliary building has now reverted to “white” designation during reactor operation.

##### ***Matters identified during this quarter***

ANSTO’s quarterly report for the period identifies that there have been 19 trips of the reactor protection systems as indicated in the table below. This is an increase from the

previous quarter but is largely associated with testing of the cold neutron source. ARPANSA officers will continue to monitor activation of the reactor protection systems, especially the first reactor protection system for which there are limited life issues. It is anticipated that the number of trips will reduce significantly once the reactor is under normal operation.

Period	Trip of First Reactor Protection System (Control Rod Drops)	Trips of Second Reactor Protection System (Reflector Vessel Dump)	Total for Period
July 2006 to March 2007	87	26	112
April 2007 to June 2007	14	5	19
Total*	101	31	132
* Disparity in totals accounted by trips of both first and second shutdown systems			

ANSTO have reported a total of 34 events during the quarter, many of which are not associated with nuclear or radiation safety. The following events are notable;

In April routine inspection found a discrepancy between the set point of a pressure switch associated with the containment energy removal system (CERS) and its value as stated in the Operational Limits and Conditions (OLCs). ANSTO determined that the OLC value was incorrect and a recommendation was made to review all OLC values. In the short term a Regulation 51 change was submitted to and approved by ARPANSA to change the OLC value. ANSTO also checked other set points against OLC values to confirm that they were within specified limits. No other discrepancies were found.

In May, whilst the reactor was operating at power, a failure occurred in the secondary cooling system. Both cooling pumps stopped which resulted in an increase in primary cooling system temperature. The first reactor protection system (FRPS) (insertion of control rods) was tripped automatically when a high core inlet temperature set point was reached. At the end of this quarter ARPANSA are continuing to oversee the internal investigation into this Event.

## REGULATORY INSPECTIONS

### *Matters from inspections undertaken in previous quarters*

In October/November 2006 inspections of OPAL maintenance arrangements and the provision of documents and materiel were undertaken by ARPANSA. During this quarter, ANSTO have advised that a number of specific matters raised during these inspections have been subject to improvement and rectification or are planned to be rectified.

### *Inspections undertaken during this quarter*

Two formal inspections were undertaken during the quarter. These covered ANSTO's compliance with OPAL Plans and Arrangements as required under Regulation 49 and covered the same areas as the inspections of October/November 2006 discussed above.

The first inspection concentrated on the provision of up-to-date hardcopy documentation in the main control room and OPAL emergency control centre. This inspection also looked at log keeping practice and shift manager accreditation procedures. The inspection confirmed that improvements have been achieved since the previous inspection. New matters were raised during this inspection principally concerning provision of information, staff accreditation and log keeping. These matters have been subject of ongoing communication between ANSTO and ARPANSA and progress will be reported in subsequent reports.

The second inspection looked at maintenance arrangements. Improvements in many areas have been achieved since the previous inspection in November 2006. A number of matters remain of regulatory interest and will be the subject of further discussion and oversight. Progress will be reported in subsequent reports. This inspection coincided with an International Atomic Energy Agency (IAEA) International Regulatory Review Service (IRRS) mission of ARPANSA. Two IRRS mission reviewers accompanied ARPANSA inspectors and expressed satisfaction with the conduct of the inspection.

#### ANSTO QUARTERLY REPORT

In accordance with the Special Licence Condition 4 of the OPAL Operating Licence ANSTO provided their quarterly report covering OPAL operation on 27 July 2007. The covered the three months to 30 June 2007. Topics covered in the report include:

- Operating History
- Events
- Staffing
- Safety Performance
- Modifications and Operating Document Status
- Plant Surveillance and Maintenance
- Discharges

Staffing levels for operational staff are highlighted in the table below. ARPANSA officers regard the current staffing levels to be adequate to sustain safe operation.

Period	Accredited Shift Managers	Accredited Reactor Operators	Authorised Plant Operators
End of December 2006	7 (1)	10 (3)	7 (4)
End of March 2007	8 (1)*	9 (0)	7 (0)
End of June 2007	8 (0)*	9 (0)	7 (0)
Figures in Brackets indicate accreditations and authorisations in the corresponding quarter  * As a result of an inspection on 5 June, the method of appointment from Reactor Operator to Shift Manager has been the subject of regulatory discussion during the June Quarter. As a consequence a shift manager appointed in the March quarter was subject to re-assessment on 18 July 2007.			

Plant Maintenance activities have been listed in the quarterly reports. It is apparent that commissioning continues to be a demanding period for the reactor maintenance personnel. A number of matters arising from an inspection of maintenance arrangements in June 2007 were identified and will be subject of discussion between ARPANSA and ANSTO.

Airborne discharges from the OPAL reactor during the quarter were higher than the previous quarter which reflected the increased period over which the reactor was at power. Even so, emissions remained low. Argon 41 and Tritium were the only emissions at measurable quantities at 0.22% and 3.4% of the quarterly notification levels. Liquid discharges from the whole of the ANSTO site (including OPAL) were also well within ANSTO's discharge limits.

#### REGULATION 51 CHANGES

There have been five new submissions under ARPANS Regulation 51. Three of these arose from a change in fuel management strategy caused by the replacement of a leaking fuel assembly in the first quarter (see above). The other submissions addressed modifications to be implemented to resolve technical matters encountered during commissioning activities. The current status of Reg 51 changes is shown below:

Period	Reg 51 Submissions	Reg 51 Approvals	Reg 51 Approvals Pending
July to September 2006	1	0	1
October to December 2006	5	3 (1)	3
January to March 2007	5	3 (1)	5
April to June 2007	5	5 (1)	5

Figures in Brackets indicate approval of a submission from a previous period. ARPANSA require that the all Reg 51 submissions provide a robust demonstration of safety prior to regulatory approval.

#### REGULATION 52 CHANGES

ANSTO initiated two Reg 52 Changes during this quarterly Report as shown in the table below.

Period	Reg 52 Changes Initiated	ANSTO Approval	Final Completion	Reg 52 Changes Outstanding
January to March 2007	8	7	2	9
April to June 2007	2	2	2	11

Prior regulatory approval is not required for Reg 52 changes. However ARPANSA officers will audit a sample of changes for compliance with the ARPANS Regulations.

### ***OPAL Research Reactor – Construction Licence (F0118)***

In March 2007, ANSTO requested to surrender Facility Licence FO 0118. During this quarter ARPANSA officers conducted a review of the request. The CEO of ARPANSA consented to the surrender of this licence in accordance with Section 39 of the ARPANS Act in June 2007.

There was no other activity on this licence during the quarter.

### ***HIFAR Research Reactor (FO0044-4A)***

#### *Operating Licence*

During this period the majority of HIFAR Final Closure activities were completed, including the removal of all nuclear fuel from the facility and the draining of the heavy water. The HIFAR Shift Operations ceased on 4 June following ARPANSA Approval.

Initial closure activities continued to be undertaken using procedures and processes used during the past major shutdowns using the HIFAR Operational Limits and Conditions. ARPANSA have been kept informed of the activities being undertaken

#### *Application for a facility licence authorising possession or control of HIFAR*

On 8 January 2007 ANSTO wrote to ARPANSA advising the CEO of ARPANSA that ANSTO intended to commence the HIFAR Closure Project which would commence with the final shutdown of the HIFAR on 30 January 2007. The letter indicated the steps that ANSTO then wished to take in order to prepare the HIFAR for eventual decommissioning. The reactor was permanently shutdown by the Minister for Education Science and Training, the Honourable Julie Bishop, on 30 January 2007.

On 4 April 2007 the CEO of ARPANSA wrote to ANSTO setting out his expectations in relation to any application for a facility licence authorising ANSTO to possess or control HIFAR. In particular he noted the activity to be authorised under this licence was necessarily limited to preparation for decommissioning not the activity of decommissioning itself. Further the CEO stated:

Whilst I accept that the definition of ‘decommissioning’ used in international guidance often encompasses the preparatory stages, I would see it as being consistent with the ARPANS Act for ‘having possession and control’ to incorporate the later transition stages from operation, and the preparation for and then management of a state similar to the state of ***safe enclosure***. The IAEA Safety Requirements *Decommissioning of Facilities Using Radioactive Material* (Safety Standards No WS-R-5, IAEA 2006) defines a strategy of deferred dismantling (also known as safe storage, safe store or safe enclosure) as being:

*the strategy in which parts of a facility containing radioactive contaminants are either processed or placed in such a condition that they can be safely stored and maintained until they can subsequently be decontaminated and/or dismantled to levels that permit the facility to be released for unrestricted use or with restrictions imposed by the regulatory body.*

The underlined section of this definition would seem to me to be consistent with 'having possession or control' for the purpose of preparation for decommissioning. Decommissioning itself is defined in the latter part of the definition.

Thus I would regard activities that are needed to bring HIFAR within a state of safe enclosure and to maintain it safely in that state on an extended basis as legitimately falling within 'having possession or control'. I would take the position that any dismantling of an item important to safety with the intention of never reassembling or replacing it as decommissioning. This cannot be carried out until ANSTO has been issued with a facility licence authorising decommissioning.

'Dismantling' as used here means the planned disassembly and/or removal of an item with the intention of not replacing it. ANSTO would need to identify non-safety related structures, systems and components it proposed to retire or replace during the possession or control phase.

On 18 May 2007, an application for a facility licence to "Possess or Control" that would replace the HIFAR Facility Operating Licence No. FO0044-4A, was submitted by ANSTO to ARPANSA. The Application was divided into five parts as follows:

Part A: General information on the purpose and location of the Facility.

Part B: The plans and arrangements for managing safety for the Facility.

Part C: The Safety Analysis Report (SAR) for the Facility.

Part D: The Limits and Conditions (LCs) for the Facility.

Part E: The Planned Activities to be undertaken under the Licence.

Part B contained eight plans to satisfy Regulation 39(2) and requests from ARPANSA. These plans are:

1. arrangements for maintaining effective control of the facility;
2. safety management plan for the controlled facility;
3. radiation protection plan for the controlled facility;
4. radioactive waste management plan for the controlled facility;
5. security plan for the controlled facility;
6. emergency plan for the controlled facility;
7. environmental management plan; and
8. arrangements for safe storage of controlled material and maintaining the controlled facility.

Part E Contains eleven refurbishment projects and twenty four preliminary dismantling projects. These refurbishing and dismantling projects are proposed to be handled using the existing HIFAR project management procedures and instructions, which were not listed.

*ANSTO - Radiopharmaceuticals and Industrials (Facility Licence F0044-5A, 5B, 5C)*

A matter of significance during the quarter under the ARI facility licence were a number of incidents or abnormal events that were reported to the CEO of ARPANSA during this quarter.

*Radiation exposure/contamination*

An incident in April resulted in the extremity dose to a worker exceeding the statutory annual dose limit for extremity dose limits. The worker was relieved from all radiation work pending further investigation. ARPANSA conducted an inspection to follow up this incident.

There was also a spillage of radioactive Molybdenum-99 solution due to the failure of the in-cell capper. The contamination was contained. Corrective action including the replacement of the capper was taken to prevent recurrence of such incident.

Another incident involved external contamination to a staff member. Corrective action including decontamination of the skin and health physics survey of the area were taken.

An incident involving spillage of heated sodium hydroxide onto the in-cell equipment occurred during cold commissioning of the Mo-99 process plant. A complete HAZOP study was undertaken and the results of this study are being considered by both ANSTO and ARPANSA.

In all cases ANSTO complied with its notification obligations and identified corrective actions that were acceptable to ARPANSA in every case.

*Other Nuclear Installations*

There were no matters of significance to report for the following nuclear installations during this quarter:

- MOATA
- Waste Operations
- Fuel Operations

*Approval of the Transport of Radioactive Materials*

The CEO of ARPANSA approved the transport of a hot spot facility from Port Melbourne to the ANSTO site at Lucas Heights as a Special Arrangement under the Code of Practice for the Safe Transport of Radioactive Material.

### Licence applications received during the quarter:

Type of application	From
Source Licence (S0179)	Department of Foreign Affairs and Trade
Source Licence (S0181)	Department of Transport and Regional Services
Source Licence (S0182)	CSIRO – Food Science Australia

### Licences issued during the quarter:

Type of licence and authorisation	To
Source Licence (S0092)	Australian Customs Services
Source Licence (S0182)	CSIRO – Food Science Australia

### Licences surrendered during the quarter:

Type of licence and authorisation	To
Facility Licence authorising the construction of the OPAL reactor (FO 0118)	Australian Nuclear Science and Technology Organisation

## Annex B – Service Operations

### B.1 The Radiofrequency Calibration Laboratory

Calibration requests	Jobs completed as NATA accredited reports	Job composition
57	48	38 monitors (with 42 probes) 15 personal monitors

### B.2 Ultraviolet Protection Factor Testing, Licensing and Labelling

Job requests	Fabric samples tested	UPF trademark licenses completed	UPF swing tags issued	Pairs of sunglasses tested
153	545	34	2,296,000	none

Note: Following a tender process the ARPANSA UPF Testing Service has a new printer for UPF swing tags. These finally became available during the April-June Quarter and the UPF statistics shown in the above Table reflect this.

### B.3 Radioanalytical Service

Water	Food	Soil/Sediment	Filter	Wipe test	Maypacks	Other
302	22	6	83	132		23

### B.4 Dosimetry Calibration Services

Therapy reference dosimeters	Electrometers	Standard ionization chambers	Gamma/Beta survey meters	Neutron survey meters	Personal dosimeters	Reference beams from sources or generators
7	7	1	5	2	-	4

### B.5 Import Permits issued under Customs (Prohibited Import) Regulations 1956 – Medical Radioisotopes

Total permits issued	Single-shipment permits issued	12-monthly permits issued	Permits issued urgently
121	102	13	6

### **B.6 Import Permits issued under Customs (Prohibited Import) Regulations 1956 – Non- Medical Radioisotopes**

<b>Total permits issued</b>	<b>Single-shipment permits issued</b>	<b>12-monthly permits issued</b>	<b>Permits issued urgently</b>
113	36	4	73

### **B.7 Export Permits under Customs (Prohibited Export) Regulations 1958**

<b>Total Permits Issued</b>	2
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