



Australian Government
**Australian Radiation Protection
and Nuclear Safety Agency**



Quarterly Report

of the

Chief Executive Officer of ARPANSA

Oct to Dec 2021

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Acknowledgement of Country

ARPANSA respectfully acknowledges Australia's Aboriginal and Torres Strait Islander communities and their rich culture and pays respect to their Elders past and present. We acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely.

We recognise and value the ongoing contribution of Aboriginal and Torres Strait Islander peoples and communities to Australian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

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Letter of transmittal

6 April 2022

The Hon Dr David Gillespie MP
Minister Assisting the Minister for Trade and Investment
Minister for Regional Health
PO Box 6022
House of Representatives
Parliament House
Canberra ACT 2600

Dear Minister

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

- the operations during the quarter of the CEO, ARPANSA, the Radiation Health and Safety Advisory Council (the Council), the Nuclear Safety Committee (the NSC) and the Radiation Health Committee
- details of directions given by the Minister to the CEO under section 16 of the Act
- details of directions given by the CEO under section 41 of the Act
- details of improvement notices given by inspectors under section 80A of the Act
- details of any breach of licence conditions by a licensee, of which the CEO is aware
- details of all reports received by the CEO from the Council and the NSC under Part 4, paragraphs 20(f) or 26(1)(d) of the Act, and
- A list of all 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 October to December 2021.

Please note that subsection 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



Dr Gillian Hirth
CEO of ARPANSA

The operations of the CEO and ARPANSA

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection and nuclear safety. Our purpose is to protect the Australian people and the environment from the harmful effects of radiation, through understanding risks, best practice regulation, research, policy, services, partnerships and engaging with the community.

ARPANSA sits within the Department of Health portfolio and has a single outcome, as set out in the 2021-22 Portfolio Budget Statements (PBS):

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

The Radiation Protection and Nuclear Safety Program, contained within the 2021-22 PBS, describes four performance measures, against which ARPANSA seeks to achieve its outcome. These measures are:

- Provide high quality advice to government and the community on health, safety and environmental risks from radiation.
- Provide emergency preparedness and response systems for a radiological or nuclear incident.
- Promote patient safety in radiotherapy and diagnostic radiology.
- Ensure protection of people and the environment through efficient and effective regulation.

The report on the operations of the CEO and ARPANSA focuses on these.

Provide high quality advice to government and the community on health, safety and environmental risks from radiation

Enhanced Electromagnetic Energy (EME) Program

In December 2021, ARPANSA in collaboration with Swinburne University of Technology, published a systematic map protocol on the impact of radiofrequency (RF) electromagnetic fields on animals and plants in the environment. The systematic map will identify gaps in knowledge, recommend future research and inform environmental and radiation protection authorities. This will support the promotion of health and safety and address misinformation about EME emissions. The systematic map protocol is available at: <https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-021-00252-w>.

On 20 October 2021, ARPANSA presented on the new RF exposure standard to Engineers Australia. The standard sets the exposure limits and includes requirements for protection of the general public and the management of risk to workers, as well as information about verifying compliance. Providing information on the new ARPANSA RF standard to different stakeholders is important in promoting health and safety from RF exposure.

Australian Radiation Incidents Register

In December 2021, ARPANSA published a summary of reported radiation incidents that occurred in 2020. ARPANSA analyses all incidents reported to the Australian Radiation Incident Register (ARIR), Australia's national database of incidents involving the use of radiation or radioactivity with reports provided by Commonwealth, state and territory radiation protection authorities. A total of 803 incidents were reported across multiple industries with human error being the primary cause in the majority of incidents. The information from the analysis raises awareness about where, how and why incidents occur and how they can be best prevented to improve radiation safety. The summary report is available on the ARPANSA website:

https://www.arpansa.gov.au/sites/default/files/arir_-_annual_summary_report_2020.pdf

Jurisdictional surveys of capability and capacity

In December 2021, ARPANSA presented the initial findings from the Radiological and Nuclear National Capability Survey (the survey), at an Australasian Radiation Protection Society (ARPS) webinar. First responder entities across all jurisdictions were invited to participate in the survey via the National Health Emergency Management Subcommittee (NHEMS). The information from the surveys will be used to establish a central knowledge base of radiological and nuclear emergency preparedness and response capabilities. This will guide the strategies to be implemented for maintaining and building national capability and capacity. The information will also be used for updating Australia's registration to the IAEA's Response and Assistance Network (RANET).

Safety in radiotherapy and diagnostic radiology

Medical Imaging (MI)

In October 2021, ARPANSA distributed a survey to review administered activity levels of radiopharmaceuticals in nuclear medicine and positron emission tomography (PET) procedures, including dose metrics for associated computed tomography (CT) scans. The survey will provide data to review and revise the national diagnostic reference levels (DRLs) for nuclear medicine and PET by July 2022.

Preparation for the survey involved consultation with key stakeholders through a liaison panel comprising representatives from the Australian and New Zealand Society for Nuclear Medicine (ANZSNM), the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM), the Australasian Association of Nuclear Medicine Specialists (AANMS), the Australian Diagnostic Imaging Association (ADIA), and the advisory committee to the Diagnostic Imaging Accreditation Scheme (DIAS). The liaison panel provided guidance on the design of the survey and facilitated the conduct of a pilot survey. DRLs provide a point of comparison so a given imaging facility can compare their practice with that of their peers. The aim of DRL comparisons is to encourage imaging facilities to review their practice and thereby ensure an appropriate balance of benefit and risk for patients. This helps to avoid excessive radiation dose to patients from medical imaging. The current Australian diagnostic reference levels for nuclear medicine can be found on the ARPANSA website: <https://www.arpansa.gov.au/research-and-expertise/surveys/national-diagnostic-reference-level-service/current-australian-drls/mdct>

Primary Standards Dosimetry Laboratory (PSDL)

In November 2021, the results of ARPANSA's "Key Comparison" of kilovoltage x-rays were published. The Key Comparison is a scientific exercise to establish the equivalence of radiation measurements in Australia with those overseas and maintain ARPANSA's internationally recognised, Primary Standard status. This is a requirement of the authorisation from the National Measurement Institute (NMI) to maintain and disseminate the standard. The ARPANSA results for Cobalt-60 gamma rays and kilovoltage x-rays are now publicly available on the Key Comparison Database (KCDB) maintained by the International Bureau of Weights and Measures. These comparisons are one of the primary methods by which ARPANSA ensures that measurements of radiation dose in Australia can be trusted.

ARPANSA's dosimetry calibration services continued on schedule, with 17 ionisation chambers calibrated for 10 radiotherapy facilities. Several on-site calibrations for commercial laboratories who provide their own calibration services for radiation survey meters have been deferred until 2022, as a result of travel restrictions.

Australian Clinical Dosimetry Service (ACDS)

ARPANSA's Australian Clinical Dosimetry Service (ACDS) resumed full-service delivery this quarter, completing the quarterly on-site and remote mail-out audit schedule plus 13 on-site audits delayed from previous quarters. On-site audits supported the clinical introduction of 11 new linear accelerators, 5 in new radiation oncology treatment facilities. The ACDS audit program measures and evaluates the radiation dose delivered by radiation oncology treatment machines, giving confidence to the facility and their patients that accurate radiation doses are delivered.

This quarter, ARPANSA published the ACDS 2020–21 Year in Review report, along with the Clinical Advisory Group (CAG) report and an updated audit program brochure. The report details audit outcomes, recommendations to facilities and our research and development with the aim to increase stakeholder engagement. The publication is available on the ARPANSA website:
<https://www.arpansa.gov.au/sites/default/files/acds-year-review-2020-21.pdf>

ARPANSA staff were key authors for a published international journal article regarding characterisation of a synthetic diamond detector. The detector is used in audits for treatment techniques, often close to critical organs, that require a high level of accuracy due to the high dose per fraction that is delivered. The article contributes to refining measurements when verifying high dose treatment delivery techniques. The article is available at: <https://doi.org/10.1016/j.phro.2021.10.002>

Ensure protection of people and the environment through efficient and effective regulation

Significant regulatory activities

ARPANSA routinely assesses licence applications and requests for approval to make changes to facilities and associated activities which may have significant implications for safety.

ARPANSA approved the following changes with significant implications for safety:

- Australian Nuclear Science and Technology Organisation (ANSTO) Open Pool Australian Lightwater (OPAL) reactor – the second stage of a design modification to rectify an error identified in March 2021 affecting the first reactor protection system, to provide better performance under unusual operating and accident conditions.
- ANSTO waste operations - for the use of a new laser for decontamination activities. The laser will provide an improved and safer process to remove surface contamination of waste.
- ANSTO Nuclear Medicine (ANM) facility - recovery activities in a dissolution hot cell following a system failure last year. The approval allowed ANSTO to safely return the cell to use, providing increased operational redundancy for radiopharmaceutical production.
- ANSTO Camperdown facility - Safety Analysis Report and safety assessments were updated.

ARPANSA hosted a virtual public forum on 13 October to seek further public comments on the new licence application for ANSTO to prepare a site for an intermediate Level Solid Waste Store. If the application is approved through all the required licensing stages, a new purpose made storage facility will be constructed at the site.

Defence's Port Wakefield accelerator facility has improved the Safety Analysis Report and other safety documentation and met the licence condition imposed on them by ARPANSA.

Inspections

The ARPANSA inspection program was impacted by COVID travel restrictions during the quarter. ARPANSA conducted three inspections and two site visits during the quarter. ARPANSA undertakes a program of scheduled inspections of licence holders to monitor compliance with the Act and the ARPANS Regulations. The scope and frequency of inspections is risk-informed, accounting for a range of factors including licence

holder safety performance. Inspections play an important part in ARPANSA's compliance and performance monitoring program providing assurance that licence holders are operating safely. The inspection reports can be found at: www.arpansa.gov.au/regulation/inspections/reports.

Stakeholder engagement

ARPANSA held a series of meetings with ANSTO and other stakeholders including NSW Police and the Port Authority to discuss the transport of intermediate level waste from a NSW port to the ANSTO site at Lucas Heights. This waste is from the reprocessing of spent fuel from the High Flux Australian Reactor (HIFAR) reactor which is being returned from the UK this year, under an intergovernmental agreement between the UK and Australian governments.

ANSTO OPAL Reactor Operations group and ARPANSA discussed the Periodic Safety and Security Review (PSSR) submission prior to its finalisation. The meeting was virtually attended by international experts that carried out an independent peer review of the licence holder assessment. The PSSR is a major safety review that is conducted every 10 years to ensure that the safety case remains valid.

Radioactive material import and export permits

The import and export of radioactive material to and from Australia requires permission under Regulation 4R of the Customs (Prohibited Imports) Regulations 1956 and Regulation 9AD of the Customs (Prohibited Exports) Regulations 1958. Under these regulations, ARPANSA officers are authorised to issue import and export permits. Permits ensure that radioactive material entering and exiting the country is subject to appropriate regulatory control. This includes a requirement that the end user is authorised to deal with the material, and that it is subject to appropriate safety and security provisions en route and at its final destination. This material is used for a wide range of medical, industrial, and scientific purposes.

Permits issued this quarter:

Type of permits	Urgent (single shipment)	Standard (single shipment)	12 months
Import of non-medical radioisotope	41	49	2
Import of medical radioisotope	0	117	6
Export of high activity source	-	5	-

Transport of radioactive material

Non-Australian Type B(U) package design requires validation by the Australian competent authority for use in Australia. This is to enable assessment of compliance with local regulatory requirements and to ensure that, should an incident or accident occur involving such material and package, relevant information will be readily available for an appropriate regulatory and emergency response. In the quarter, ARPANSA validated a Canadian package design, OPTIMUS-H (Optimal Modular Universal Shipping Cask for High activity contents). The package will be used to transport various legacy equipment or items containing high activity sources. A validation certificate has been issued to ANSTO.

International engagement

ARPANSA's international engagement provides the agency with the means of influencing the international radiation protection and nuclear safety and security framework, and for taking stock of international developments to ensure ARPANSA's regulatory framework and radiation protection standards are based on international best practice. The following is a summary of key international engagement activities undertaken in this quarter, both in-person and virtually.

Convention on Nuclear Safety (CNS) Organisational Meeting (and Meetings with the President and Secretariat of CNS) for the 8th/9th CNS Review Meeting, 20-22 October 2021, Vienna, Austria

ARPANSA's CEO attended organisational meetings, to prepare for the joint 8th/9th CNS Review meeting, as the elected Vice-President of the Eighth Review Meeting of the CNS. The CNS commits countries that operate land-based nuclear installations to maintain a high level of safety, based on international benchmarks. The combining of the eighth and ninth meetings, has required considerable preparation from the CNS officers in order to consider six years' worth of nuclear data. ARPANSA administers the obligations imposed under the Convention on behalf of the Australian Government. This travel was funded by ARPANSA.

The International Atomic Energy Agency (IAEA) International Conference on Radioactive Waste Management: Solutions for a Sustainable Future, 1-5 November 2021, Vienna, Austria

The CEO and the Deputy CEO of ARPANSA attended this Conference to foster information exchange on current progress and solutions in the area of radioactive waste management. ARPANSA has a strong interest in monitoring international best practice in radioactive waste management as an Australian regulator, including for the proposed National Radioactive Waste Management Facility to be built in Kimba, South Australia. This travel was funded by ARPANSA.

IAEA International Conference on a Decade of Progress after Fukushima-Daiichi: Building on the Lessons Learned to Further Strengthen Nuclear Safety, 8-12 November 2021, Vienna, Austria

The IAEA invited key ARPANSA staff, including the CEO and Deputy CEO, to chair or present during various sessions of this conference. It focused on looking back on the lessons learned, experiences shared, results, and achievements from actions undertaken by national, regional, and international communities following the accident on 11 March 2011 and identifying ways to further strengthen nuclear safety. The IAEA part-funded this travel.

International Commission on Radiological Protection (ICRP) Main Commission, 15-17 November 2021, Frankfurt, Germany

ARPANSA's Deputy CEO as a member of the ICRP Main Commission (MC) attended this first meeting for the new 2021-2025 term. Two ICRP reports were approved for publication on *Cancer Risk from Exposure to Plutonium and Uranium*, and *Radiation Detriment Calculation Methodology*, and a draft report on *Radiological Protection in Veterinary Practice* was approved for public consultation. The ICRP MC discussed the review and revision of the System of Radiological Protection and prioritised establishing Task Groups on several topics including, biomedical research, cancer risk models, ecosystem services approach for protection of the environment, effective dose in medicine, justification, and non-radiation factors in detriment. The review of the ICRP's recommendations is a major undertaking of significant interest to

ARPANSA. It commenced in October 2021 with the ICRP's first Workshop on the Future of Radiological Protection and is expected to be completed over the course of about 8 years to inform future updates to the system of radiological protection that underpins international regulatory frameworks for ionising radiation. This travel was funded by ARPANSA.

Global System for Mobile Communications (GSMA) Electromagnetic fields (EMF) Forum, Maximising 5G for Safety and Performance, 14 October 2021, Virtual

ARPANSA virtually attended this forum, which reviewed scientific developments regarding radiofrequency 'millimetre waves', the results of 5G network assessments, and how these developments can contribute to policy and communication responses to EME concerns. ARPANSA also presented on its reviews of research on 5G millimetre waves and health. ARPANSA's participation in this event enhanced engagement with key national and international stakeholders and provided a platform for ARPANSA to continue to communicate on the health and safety of EME exposure.

Nordic Nuclear Safety Research CRESCENT: Credible release scenarios for nuclear-powered vessels operating in Nordic waters, 5-6 October 2021, Virtual

ARPANSA presented at the virtual NKS-CRESCENT conference which addressed Emergency Preparedness and Response (EPR) arrangements, as well as past and potential incidents, relating to visiting nuclear powered vessel (NPV)s. ARPANSA has for several years collaborated with Nordic authorities, particularly the Norwegian Radiation and Nuclear Safety Authority (DSA), regarding planning for NPV visits, which led to the invitation to present at the NKS-CRESCENT meeting. This collaboration includes a jointly funded project between DSA and ARPANSA to review the current '2000 Reference Accident' scenario presently used in Australia as part of NPV visit planning, with a range of work underway to address the recommendations of this review. This engagement ensures ARPANSA remains at the forefront of research and international discussion on credible release scenarios and reference-accident planning for NPVs.

Details of directions given by the Minister

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

Details of directions given by the CEO

No directions were given by the CEO under section 41 of the Act.

Details of improvement notices given by inspectors

No improvement notices were issued by ARPANSA under section 80A of the Act.

Details of any breach of licence conditions by a licensee

ARPANSA categorises breaches of licence conditions based on whether the implications for safety (the potential risks to safety) were either significant or minor. Breaches with significant safety implications

typically occur where there is a high risk of potential radiation exposure or actual radiation exposure to people or the environment. Breaches with minor safety implications or administrative failures can occur for a variety of reasons including failing to label equipment properly, submit documentation on time, complete scheduled training, keep up-to-date inventories, or conduct scheduled reviews of plans and arrangements. ARPANSA publishes performance histories of licence holders on the ARPANSA website: www.arpansa.gov.au/regulation-and-licensing/regulation/our-regulatory-services/who-we-regulate/licence-holder-performance.

There was one breach with significant safety implications this quarter:

ARPANSA self-reported that they did not obtain the prior approval of the CEO of ARPANSA to make a change that had significant implications for safety. An alteration of the interlocks on the Elekta Synergy Linear Accelerator had been made by a contractor. Changes to interlocks are safety significant as these ensure that people are not present in higher radiation areas. ARPANSA's regulatory team must be informed of changes beforehand so that it is able to ensure that the change meets any required safety standards and, where necessary, intervene to ensure those standards are met. Once a modification is implemented any such changes may be costly and disruptive.

There were two breaches in the quarter with minor safety implications or administrative failures to meet regulatory requirements:

- Department of Home Affairs self-reported procurement and subsequent possession of a CT scanner in 2015 when not authorised to deal with this kind of controlled apparatus. The apparatus was procured in order to gift it to a foreign government.
- ANSTO had not conducted a self-assessment against each applicable code and standard at the Australian Synchrotron within the 3 years as prescribed in the licence condition. These reviews are part of the licence holder's oversight and help to ensure that any changes that have occurred are appropriately assessed so that, where appropriate, practices evolve to keep up with improving safety standards.

Facilities licensed under Part 5 of the ARPANS Act

No facility licences were issued in the period.

The operations of the Council and Committees

Radiation Health and Safety Advisory Council

The Radiation Health and Safety Advisory Council (RHSAC) met virtually on the 16 and 17 December 2021.

The Council received updates from ARPANSA on the overseas conferences and meetings attended this quarter following a hiatus of almost two years due to the ongoing Covid 19 pandemic. They were also updated on ARPANSA's work related to skin cancer caused by solar ultra-violet radiation.

The Council were updated on ARPANSA's involvement in the 'AUKUS' nuclear submarine program and the related impact on resourcing. It was noted that any of the possible options for the regulation of a nuclear submarine program would require growth in ARPANSA's workforce. The member representing the interests of the public raised questions relating to visits from nuclear-powered warships and the Visiting Ships Panel (Nuclear).

A representative from the Australian Radioactive Waste Agency provided the Council with an introductory presentation. The Council continued their discussions around lasers and the lack of related regulation through an explanation of the dangers of multi-spectral lasers. Following the closure of the Council's working groups on lasers and medical imaging they agreed to form two new working groups, to provide guidance and advice related to ARPANSA's involvement in the nuclear submarine program and ARPANSA's input to the International Commission on Radiological Protection (ICRP)'s review of the current system of radiological protection.

The minutes of past meetings are on ARPANSA's website at www.arpansa.gov.au/rhsac. The next meeting is scheduled for 3 and 4 March 2022.

Reports to the CEO from the RHSAC under paragraph 20(f) of the Act

The RHSAC did not provide any reports to the CEO during this quarter.

Radiation Health Committee

The Radiation Health Committee (RHC) met virtually on 11 October 2021 and 10 December 2021.

The RHC discussed its forward program of work including policy issues to bring to the awareness of the Environmental Health Standing Committee (enHealth), a standing committee of the Australian Health Protection Principal Committee (AHPPC).

The RHC discussed a draft standard that would help move towards a consistent approach to equipment compliance testing across jurisdictions. It also discussed three advisory notes on updated occupational dose coefficients (one component of the calculations used to provide radiation dose estimates) based on new data; on explanation of health and well-being as referred to in RPS C-3: Code for Disposal Facilities for Solid Radioactive Waste (ARPANSA 2018); and on an explanation of 'incident' as referred to in RPS C-1: Code for Radiation Protection in Planned Exposure Situations (Rev. 1) (ARPANSA 2020).

The RHC issued a statement advising that radiation workers should be permitted to carry their personal radiation monitoring devices through airport hand luggage security screening (to be checked by alternative

screening processes) to avoid recording false high doses from x-ray security scanners. The RHC also discussed the role of oral health therapists in performing certain imaging procedures, under the Code of Practice and Safety Guide for Radiation Protection in Dentistry, as well as plans to review that code.

Further information can be found in the meeting minutes which are provided online at www.arpansa.gov.au/rhc. The next RHC meeting will take place virtually on 11 March 2022.

Nuclear Safety Committee

The Nuclear Safety Committee (NSC) met virtually on 26 November 2021.

The NSC was provided with a brief overview of the Australian government intention to acquire nuclear-powered submarine technology. Several updates were also provided on major controlled facilities and inspections including the ANSTO Intermediate Level Waste Capacity Increase (ILWCI) licence request that was currently under review by ARPANSA and the ongoing work to address defects in the OPAL reactor riser.

The minutes of the meeting are provided online at www.arpansa.gov.au/nsc. The next meeting of the NSC is scheduled for 25 February 2022.

Reports to the CEO from the NSC under paragraph 26(1)(d) of the Act

The NSC did not provide any reports to the CEO during this quarter.