



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

A photograph of a female doctor with dark hair tied back, smiling warmly at the camera. She is wearing a white lab coat over a light blue button-down shirt. A blue stethoscope is draped around her neck. The background is a blurred hospital corridor with large windows.

ANRDR in Review 2017

Welcome to the 2017 edition of the Australian National Radiation Dose Register (ANRDR) annual newsletter, ***ANRDR in Review***.

The past 12 months have seen significant progress, such as the commencement of engagement with the medical sector, the development of privacy resources for stakeholders and simplification of the onboarding process.

We thank our partner organisations who participated in the pilot phase of our expansion into new industries. We extend our thanks to all our partner organisations for your continued support. We aim to achieve national uniformity and international best practice for recording and maintaining occupational dose records.

In this issue of *ANRDR in Review*, you'll find information about ANRDR activities over the past year. This includes analysis of data, expansion activities and onboarding process changes.

We hope that you find this newsletter of interest and, as always, we encourage your suggestions for future editions of *ANRDR in Review*.



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Significant events



ANRDR expansion activities

Onboarding process changes

To date, the ANRDR has focused on working with organisations to make their disclosure of dose records a legal requirement in order to ensure that privacy legislation is adhered to. On review of the Commonwealth and relevant state and territory privacy legislations, a service agreement model has been developed to simplify the onboarding process for organisations wishing to join the ANRDR.

The service agreement model has been developed to allow for the disclosure of personal information in the same manner as it is disclosed to dosimetry service providers. Under the agreement, the ANRDR agrees to provide the service for long-term storage and maintenance of dose records in accordance with the *Privacy Act 1988* (the Privacy Act), while the organisation agrees to disclose the records to the ANRDR. The establishment of this model allows employers to disclose dose records to the ANRDR without the need for implementing amendments to licence conditions or radiation management plans which may require regulatory approval. More information on privacy can be found in the [Privacy Work section](#) of the newsletter.

Regulators

At the first Radiation Health Committee meeting of 2017, the ANRDR requested that regulators who monitor their own employees for radiation exposure submit their records to the ANRDR. The aim of this request is to improve understanding of the ANRDR and the record submission process by regulators. This, in turn, would encourage support for and participation in the ANRDR in those jurisdictions.

Due to their well-established framework for the uranium industry and familiarity with ANRDR processes, the South Australian Environmental Protection Authority commenced submitting dose records into the register for their employees. The ANRDR continues to work with the other regulators for the submission of their dose records.



ANRDR expansion activities

Medical sector

In preparation for expansion to the medical sector, the ANRDR team undertook a review of the industry via a survey circulated to medical stakeholders. The purpose of the survey was to gather information on how occupational radiation dose records are managed across different organisations and jurisdictions. The results were analysed and presented in a report published on the [ARPANSA website](#). Based on the results, several recommendations were presented in the report to improve record keeping practices and facilitate implementation of the ANRDR within the industry.

The survey has revealed inconsistencies in the management of radiation exposure records, for example:



Full names of the employees was the only common identifier recorded and stored with dose records across all organisations.



Dates of birth and **genders** were recorded and stored with dose records by three out of four organisations.



Unique employee numbers were recorded and stored with dose records by one out of three organisations.



Paper records or a combination of paper and digital records are still being used by one in two organisations.

The ANRDR requires personal identifiers to be submitted with dose records in order to enhance identification of individuals when issuing personal dose history reports. ARPANSA recommends that all organisations currently maintaining dose records using only paper-based systems work towards the development of digital record management systems. This would ensure that dose record management practices are in line with international best practice and would facilitate national uniformity in record keeping practices through the implementation of the ANRDR.

Dose records are classified by employers as personal information or sensitive information (health information). Owing to the ANRDR being established as part of the primary purpose for which this information is collected by the employer, the disclosure of dose records to the ANRDR is permitted regardless of the classification type.

Alfred Health has offered to take part in the ANRDR as the pilot organisation for the medical sector. The purpose of the pilot phase is to establish and evaluate the technical features and legal framework (in relation to meeting privacy requirements) before we expand coverage to all organisations.

Commonwealth Licence Holders (CLHs)

After the success of the pilot phase with CSIRO, the ANRDR team has begun engagement with all remaining CLHs that have been identified as suitable for taking part in the ANRDR. Progress has been made with ANSTO (now including the Australian Synchrotron) and the Australian Federal Police.

From July 2017, amendments to the ARPANS Regulations will come into effect, which include the provision that the requirements of ARPANSA's newly-published *Code for Radiation Protection in Planned Exposure Situations* (RPS C-1) (see [publications of interest](#)) are mandatory for all CLHs. Implementation of RPS C-1 will ensure that the conditions of the Australian privacy legislation are met with the establishment of a legal requirement for the submission of dose records from CLHs to the ANRDR.

Clause 3.1.24 (c) of RPS C-1 states that the Responsible Person must:

“provide details of the doses estimated to have been received by an occupationally exposed person to the relevant regulatory authority or its approved central record keeping agency.”

The ANRDR is defined by ARPANSA as the central record keeping agency for dose records retained by CLHs. ARPANSA will continue to work with all relevant CLHs to ensure that they can submit records to the ANRDR within appropriate time frames from the implementation of the amended Regulations. More information can be found in the [stakeholder engagement](#) section.

Analysis of data

The ANRDR collects information on quarterly-assessed radiation doses for the following dose types and exposures (where applicable):

- external gamma
- external neutron
- inhalation of radioactive particulates
- inhalation of radon and radon progeny
- ingestion, eye, skin, wound and extremity doses.

Employer and personal information are also collected to assist with matching doses with the correct workers. The data collected is used to monitor individual radiological doses and generate annual statistics related to exposure trends to facilitate the optimisation of radiation protection practices.

The ANRDR currently holds dose records for over 36 000 individuals. Although the ANRDR now collects data from the mineral sands mining and processing industry, as only one operation is currently submitting dose records, no analysis is possible at this time.

Addressing variations in personal information

The ANRDR uses personal information to link new dose records with existing records for individuals. This information is also used to confirm an individual's identity when a personal dose history report is requested. For this reason it is important that accurate personal information is provided to the ANRDR and any changes to workers' personal details are communicated to the ANRDR as soon as practicable.

An internal review of the quality of personal information provided to the ANRDR was undertaken over the past year. The review identified a number of individuals with incorrectly recorded dates of birth (<16 or >80 years old at time of registration) and unspecified genders. Where such inconsistencies were identified, the affected employers were requested to review and provide updated information on these individuals. The ANRDR no longer accepts dose records with an empty gender field. In line with the Australian Government's new guidelines on gender classification, the three options that are now accepted are M (male), F (female) or X (intersex, indeterminate, unspecified).

Separate records may be created for an individual when some aspects of personal information contained in dose records do not match that of existing records in the database. This can occur for a variety of reasons, including:

- errors arising during data entry when submission files are compiled manually
- change of names
- cases where workers are employed by more than one employer.

To address this issue, ARPANSA has purchased record-matching software. The software works by identifying common features in personal details across all individuals in the database and making suggestions for 'possible matches' by providing a percentage match. The ANRDR team evaluate the results and may then approach the relevant employer(s) to seek clarification on whether the individuals identified as a possible match are indeed the same person. This will help improve dose record management within the dose register and will assist workers by ensuring their dose records are fully consolidated and available to them on request.

The results from the first review using this software identified a significant number of individuals with variations in names, dates of birth and genders where errors have been present in data submitted to the ANRDR. The majority of errors were due to manual data entry inconsistencies in names and dates of birth, unspecified genders and the inclusion of nicknames in place of first names.

The review of personal information highlights the need to ensure that the dose records submitted to the ANRDR are of high quality and that organisations should have systems in place to ensure the accuracy of information provided. Processes have also been put in place for the ANRDR team to perform annual record-matching reviews to ensure the integrity of the dose register.

Analysis of data

ARPANSA review

ARPANSA continues to use the ANRDR as its dose record keeping repository which contains dose records from 1987, when records were first digitised. Average ARPANSA staff doses are well below 1 mSv/y, with an average of less than 0.2 mSv/y over the 30 year period. Average exposures over the last 5 years are less than 0.05 mSv/y.

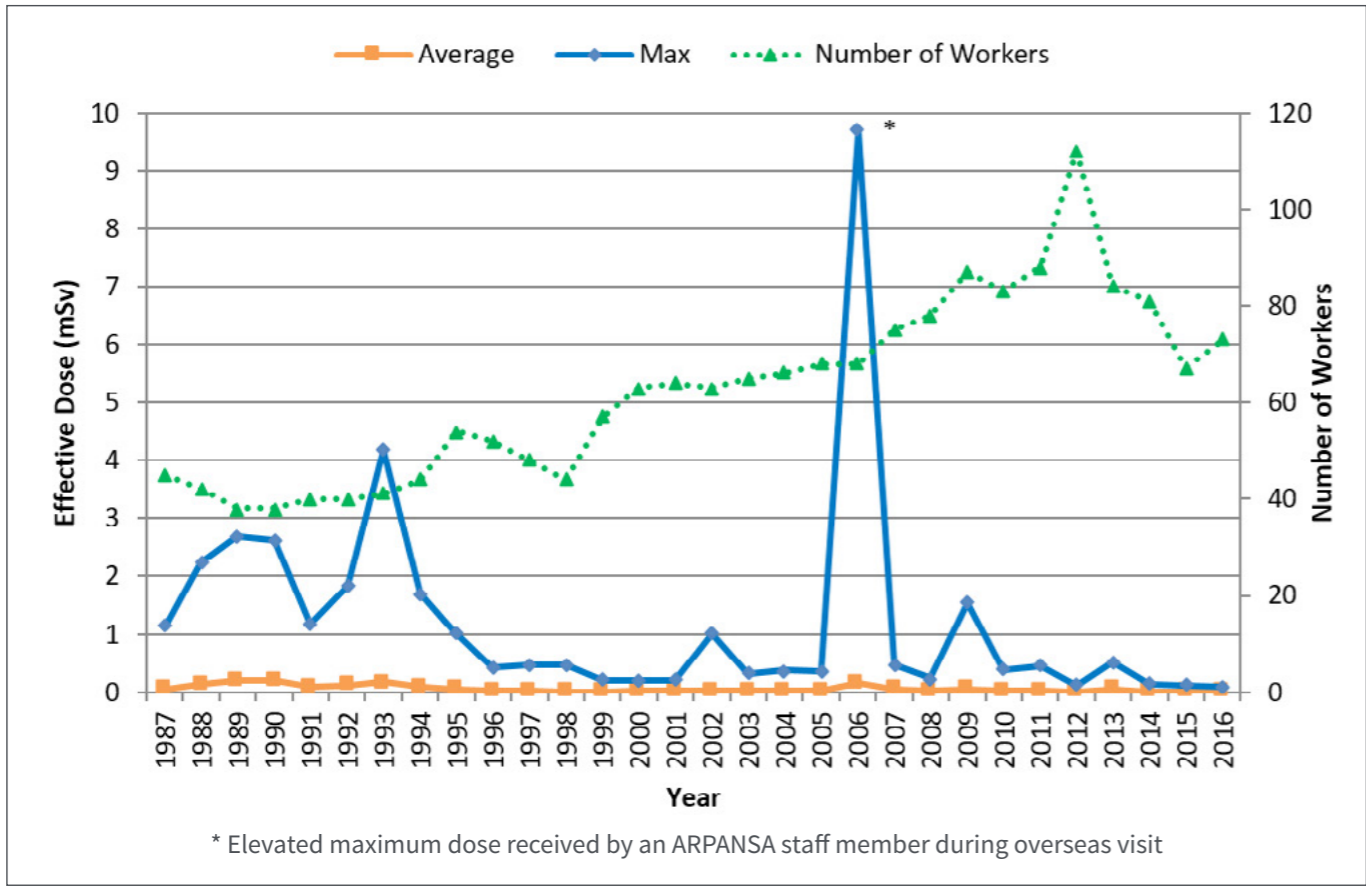


Figure 1: Average and maximum effective doses with staff numbers for ARPANSA staff (1987–2016)

Collective effective dose

The collective effective dose can be used as a comparative tool for the optimisation of radiation protection practices. It has been used by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) for reporting and comparing exposures from different practices around the world (UNSCEAR 2008).

The collective effective dose is simply the sum of the individual doses incurred by a group, and is expressed as ‘man sieverts’ (man Sv) to distinguish the collective dose from the individual doses (IAEA 2007).

The establishment of the ANRDR, which has complete coverage of the uranium mining and milling industry in Australia, allows for the calculation of the collective effective dose from this industry. The ANRDR does not currently have sufficient coverage to report on other industries. This data may be used in future UNSCEAR or International Atomic Energy Agency (IAEA) reports for comparative studies. The collective effective doses from the uranium mining and milling industry are shown in Figure 2.

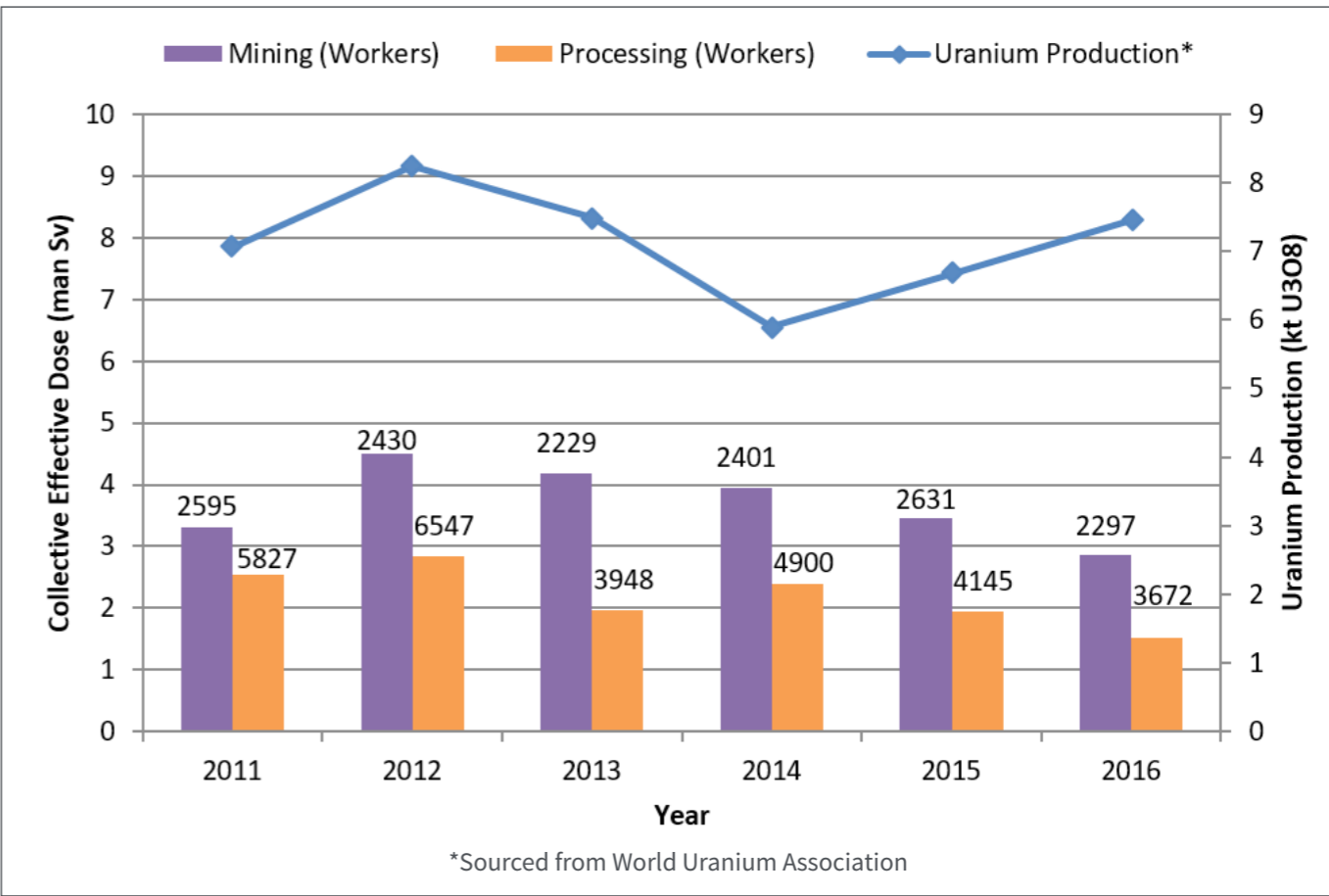


Figure 2: Australian uranium industry collective effective doses and uranium production with worker numbers (2011–2016)

Analysis of data

Figure 2 demonstrates that over the period 2014–2016 the collective effective doses have decreased while uranium production has increased. The decrease in the collective effective dose is due to a decrease in uranium industry worker numbers as well as a decrease in average effective doses over that period, as shown in Figure 3 and Figure 4.

Uranium industry data

The ANRDR has coverage of all licensed Australian uranium operators with exposure records that cover all operations from 2011.

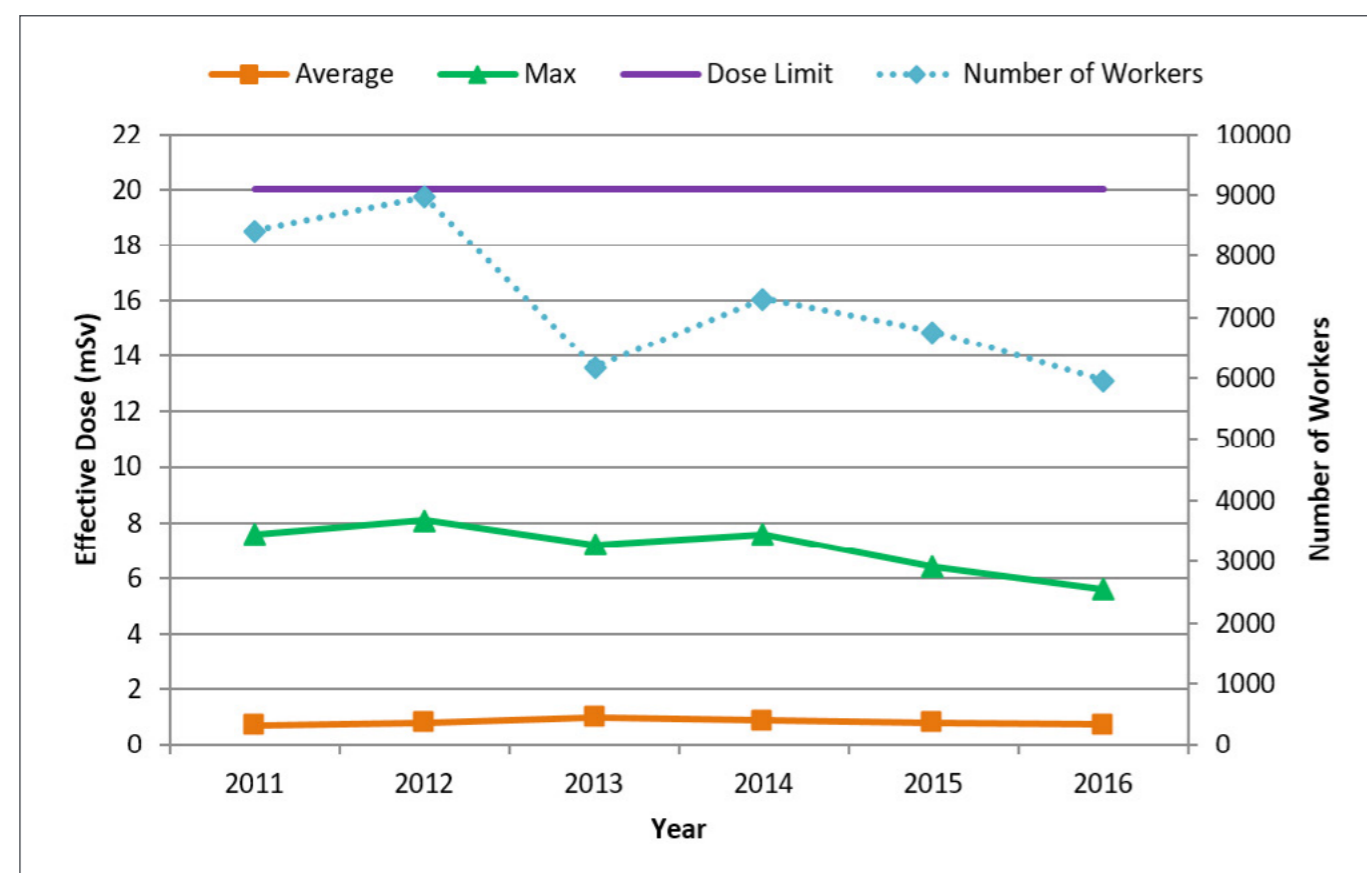


Figure 3: Uranium industry average and maximum effective doses with workforce numbers (2011–2016)

Figure 3 demonstrates that average and maximum effective doses for uranium industry workers continue to proceed in a downward trend from 2014 with average and maximum effective doses in 2016 of 0.75 mSv and 5.6 mSv, respectively. The number of workers in the industry has also been declining since 2014 as a result of reduced market conditions.

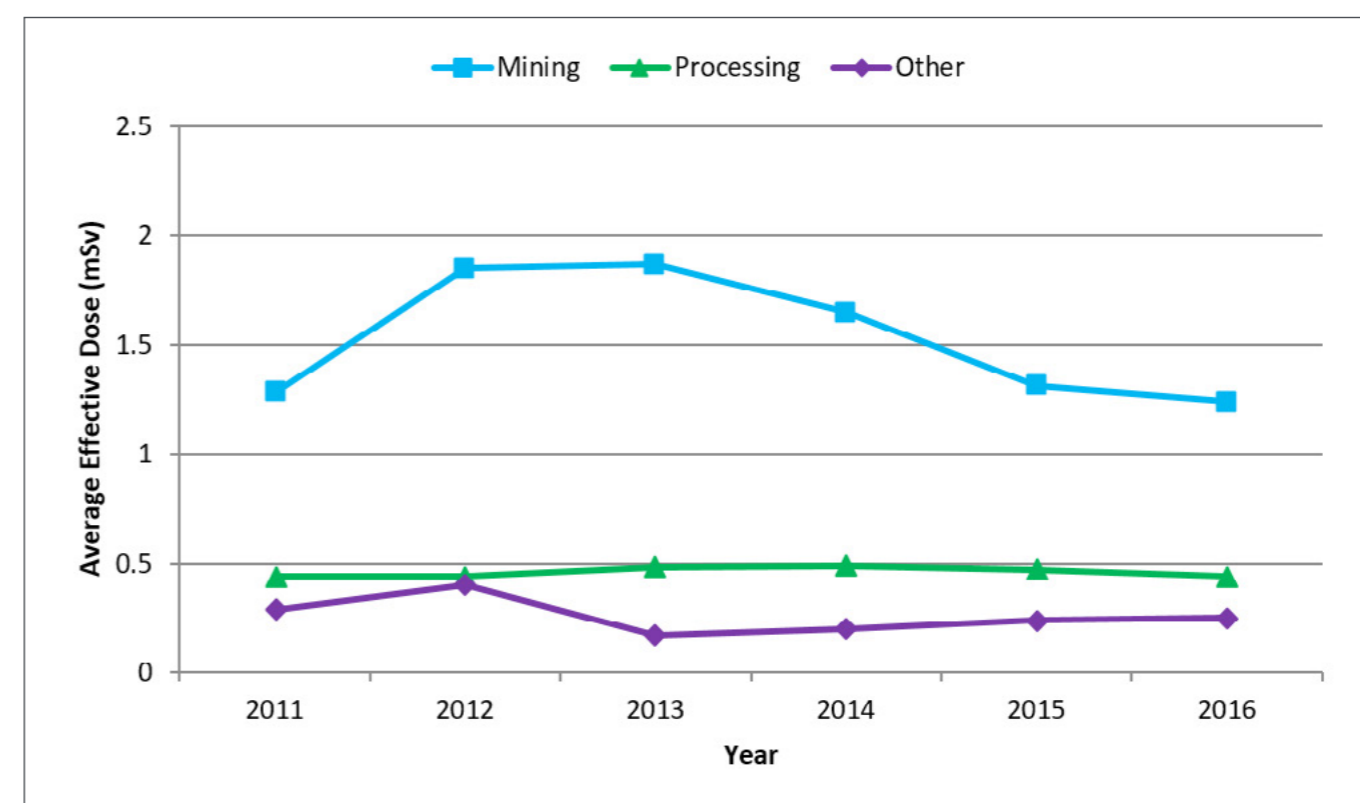


Figure 4: Uranium industry average effective doses by worker categories (2011–2016)

The mining category continues to be the highest exposed worker group in the Australian uranium industry. This can be attributed to the fact that due to its large workforce, the mining category is heavily skewed towards underground operations. However, the industry shows a continued downward trend in occupational exposures for this work category with an average effective dose in 2016 of 1.24 mSv. In the same year, average exposures to processing and other workers remain low at 0.44 mSv and 0.25 mSv, respectively.

Stakeholder engagement

MCA Uranium Forum – ARPANSA dialogue

Each year, ARPANSA and the Minerals Council of Australia (MCA) Uranium Forum meet to exchange information, views and ideas on radiation safety and radiation protection related issues associated with the exploration, extraction, processing and transport of minerals that contain radioactive material. The annual dialogue was held at ARPANSA's Melbourne offices in March 2017.

A key topic of discussion centred around the implications of the new International Commission on Radiation Protection (ICRP) radon progeny dose coefficient (DC). ARPANSA provided background information on ICRP's new DC for radon progeny which will increase the assessed radon progeny doses by around a factor of two. The ANRDR newsletter, *ANRDR in Review*, will be used as a tool for communicating these changes when they come into effect. No retrospective changes will be made to the existing reported doses in the ANRDR. ARPANSA and MCA noted the need to develop a consistent approach for implementing ICRP changes to DCs for all radionuclides.

ARPANSA will develop and update guidance for industry, regulators and workers on the ICRP changes. ARPANSA will work collaboratively with all stakeholders to develop a communication strategy for dissemination of consistent information.

Another item discussed was the lack of consistency in reporting of personal protective equipment (PPE) factors. An improvement opportunity has been identified for the ANRDR to record and maintain this information to allow direct comparison of radon progeny doses across different organisations. The [full meeting minutes](#) can be found on ARPANSA's website.



Stakeholder engagement

Medical sector engagement

With the ANRDR engagement into the Medical Sector, team members attended major industry conferences, including the Australasian Radiation Protection Society (ARPS) Conference in August 2016, Engineering and Physical Sciences in Medicine Conference in November 2016, the Annual Scientific Meeting of Medical Imaging and Radiation Therapy in March 2017 and the Annual Scientific Meeting of the Australian and New Zealand Society of Nuclear Medicine in April 2017.

The presentations focused on a review of the ANRDR with a particular focus on the benefits for workers, industry and regulators. Presentations at each conference were followed with an article submitted to each of the organisations' newsletters to further raise awareness and provide additional information on the ANRDR to their members. The feedback received from stakeholders indicates strong support for the introduction of the ANRDR into the medical sector.

Uranium Council

In June 2017, ARPANSA took part in the 11th meeting of the Uranium Council at the Science Exchange in Adelaide, attended by industry and government representatives.

As part of the Department of Industry, Innovation and Science's resources portfolio, the Uranium Council promotes the progressive and sustainable development of the Australian uranium exploration, mining, milling and exporting industry in line with world's best practice standards. Membership of the Council comprises representatives of the Commonwealth and state and territory government agencies, industry associations and uranium mining companies.

ARPANSA provided an update on the uranium related activities and initiatives undertaken at the agency over the previous year. These include the recent publication of the **Code for Radiation Protection in Planned Exposure Situations (2016)** which includes guidance on radiation protection in uranium mining and milling operations, ARPANSA's participation in a range of IAEA and ICRP workshops, an overview of ANRDR activities and an update on the proposed National Radioactive Waste Management Facility.



“The feedback received from stakeholders indicates strong support for the **introduction of the ANRDR into the medical sector.**”

Stakeholder engagement

Licence Holder Forum

On 28 June 2017, ARPANSA held its annual Licence Holder Forum at the Australian National University (ANU) in Canberra. The Forum was an opportunity for participants to share and discuss new initiatives and good practices being used throughout the Commonwealth to improve radiation protection and nuclear safety.

The **Code for Radiation Protection in Planned Exposure Situations (2016)** was the feature topic this year. The Code sets out the Australian requirements for the protection of occupationally exposed persons, the public and the environment in planned exposure situations. In conjunction with the **Fundamentals for Protection against Ionising Radiation (2014)**, these documents form part of the framework of radiation protection as it applies to many licence holders, and replaces the earlier RPS 1 publication. Some of the major changes introduced in the Code include:

- provision of dose records to a central record keeping agency (ANRDR)
- reduction of the annual equivalent dose limit to the lens of the eye from 150 mSv to 20 mSv
- implementation of a Radiation Management Plan for all licence holders.

The morning session consisted of a brief overview of the changes and how these changes could affect the licence holders. This was followed by a panel discussion comprised of representatives from ANSTO, ARPANSA, CSIRO, Defence and the Australian War Memorial, who shared their experiences and perspectives on the Code's implementation within their respective organisations.

The afternoon session consisted of a series of interactive 'coffee corners' on topics including:

- the ANRDR
- the Australian Radiation Incident Register
- the National Radioactive Waste Management Facility
- a tour of ANU's world class particle accelerator facility used for a wide range of applications including nuclear research and analysis of materials.



A panel of Commonwealth licence holders from (left to right) the Australian War Memorial, ARPANSA, Defence, CSIRO and ANSTO taking questions from the audience at the licence holders' forum.

Privacy work

The disclosure of dose records to the ANRDR must occur in accordance with the relevant privacy legislation. For most commercial entities and Commonwealth departments, the Privacy Act and the 13 Australian Privacy Principles (APPs) that govern the conditions under which personal information can be disclosed are applicable. For some non-Commonwealth organisations (i.e. hospitals, regulatory bodies), a state or territory privacy act may be in place. In most cases, the requirements of the state or territory-based legislation will be consistent with the Commonwealth legislation.

In response to feedback received from a number of stakeholders regarding privacy concerns, the ANRDR team has developed a **Privacy Impact Assessment** (PIA) template that can be used as a self-assessment tool to assist with demonstrating compliance with the APPs during the onboarding process.

The ANRDR team has reviewed the operation of the dose register against the APPs using the PIA template and makes this available to stakeholders. The purpose of the ANRDR PIA is to provide evidence of the ANRDR's compliance with all privacy requirements and it can also be used as a guide for stakeholders completing their own PIA. The ANRDR takes the position that the disclosure of dose records to the dose register can be established as part of the primary purpose for which the records were collected. As such, through the establishment of an appropriate legal mechanism, such as a service agreement (see **Onboarding process changes**), and appropriate communication to employees, an organisation may submit dose records to the ANRDR without the need for individual consent.

The ANRDR encourages all organisations wanting to submit dose records to the dose register to complete their own PIA to ensure that the method of disclosure aligns with the relevant privacy legislation by which they must abide. The template produced by the ANRDR is developed based on the APPs and the Privacy Act. Our review of privacy legislation in jurisdictions where it exists indicates that the requirements for disclosure are similar to that in the Commonwealth legislation.

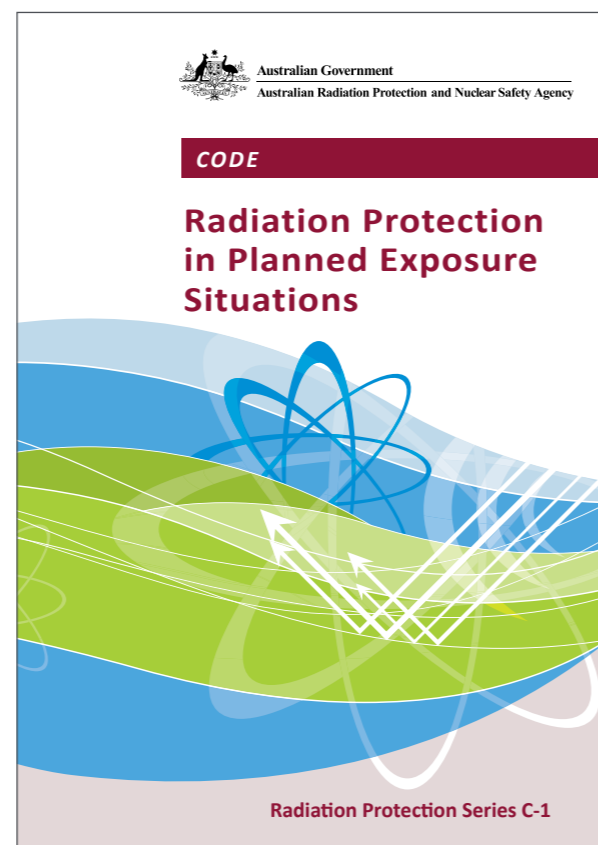


“ In most cases, the requirements of the state or territory-based legislation **will be consistent** with the Commonwealth legislation. ”

Publications of interest & references

Code for Radiation Protection in Planned Exposure Situations

The **Planned Exposure Code** (RPS C-1), together with **Fundamentals for Protection Against Ionising Radiation** (RPS F-1), supersede the *Recommendations for Limiting Exposure to Ionizing Radiation* (1995) and *National Standard for Limiting Occupational Exposure to Ionizing Radiation* (republished 2002) (RPS 1). The recommended action levels for radon-222 concentration in air (Annex C of RPS 1) will be superseded by the Existing Exposure Guide when published (currently in preparation by the Radiation Health Committee). RPS 1 will be withdrawn when the Existing Exposure Guide is published.



References

IAEA Safety Glossary 2007

UNSCEAR 2008

Team & events

Upcoming events

RANZCR Annual Scientific Meeting

The ANRDR team will continue its engagement with the medical sector with a presentation at the Royal Australian and New Zealand College of Radiologists 2017 68th Annual Scientific Meeting to be held at the Crown Towers in Perth from the 19–22 October 2017. This meeting will finalise the first round engagement with the medical sector to introduce the ANRDR to professional organisations and will be followed by a newsletter article in RANZCR's *Inside News* publication.

ARPS Conference

With the theme “Science and the Art of Radiation Protection: Broadening the Horizon”, the Australasian Radiation Protection Society Conference aims to enrich understanding of non-ionising and ionising radiation, highlight the importance of effective communication and stakeholder involvement, showcase new technologies, and generate discussion across a broad range of radiation protection aspects.

The conference will be held in Wollongong from 6–9 August 2017. The ANRDR will present on the current data analysis from the ANRDR as well as recent activities, including a review of the medical sector survey.

The ANRDR team

Cameron Lawrence, ANRDR Manager



Cameron joined ARPANSA as the ANRDR Manager in early 2016 and brings his extensive experience in health, hygiene and radiation safety from the uranium mining and aluminium industries to the team. Cameron is responsible for the continued expansion of the ANRDR into other sectors and the overall management of the Dose Register.

Ben Paritsky, Science Officer



Since joining the ANRDR in 2012, Ben has managed the operation, ongoing maintenance and development of the ANRDR. Most recently, Ben has driven the activities related to the expansion of the dose register to all relevant industries.