



REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended
31 December 2022



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RADIATION SAFETY ACT 1975

An Act to regulate the keeping and use of radioactive substances, irradiating apparatus and certain electronic products, and for matters incidental thereto.

STATUTORY RESPONSIBILITIES OF THE COUNCIL

The Radiological Council is appointed under Section 13 of the Radiation Safety Act to assist the Minister to protect public health and to maintain safe practices in the use of radiation.

In its position as an independent regulatory authority, the Council is required to administer the Act and to —

- implement the scheme of licensing and registration;
- conduct inquiries into alleged contraventions of the Act and, where necessary, to suspend or cancel licences and registrations;
- advise the Minister and make recommendations with respect to the technical aspects of radiation safety requirements, the methods that may be used to prevent or minimise the dangers arising from the use of radioactive substances, irradiating apparatus and electronic products, including the preparation of regulations;
- investigate and prosecute offences.

The Council is also required to keep under review manufactured or assembled devices which emit radiation to determine if control of these devices is necessary under the Act.

Section 10 of the Act requires the Minister at all times to have regard to the expressed views of the Council.

MEMBERSHIP OF THE COUNCIL

The Council comprises —

- a medical practitioner appointed by the Governor on the recommendation of the Executive Director Public Health;
- a medical practitioner who is a specialist in radiology or radiotherapy;
- a physician specialising in nuclear medicine;
- a person who possesses relevant qualifications or experience as a physicist;
- a person who possesses relevant qualifications or experience as a radiation engineer or electronic engineer;
- a representative of the interests of tertiary educational institutions;
- two other persons with special expertise in radiation protection may be nominated by the Minister on the advice of the other members of the Council;
- a medical radiation technologist.

The present members, approved by the Governor, are listed in attachment 1.

The Council officially met 11 times in 2022, either in person or by video-conference.

ADVISORY COMMITTEES

The Council may appoint committees under Section 19 of the Act to investigate and advise on any aspect of its functions, or to carry out any function other than those relating to licences and registrations. The present policy is to create, when necessary, short-term working parties which address a specific issue and report back to the Council.

No advisory committees are currently appointed.

ADMINISTRATIVE SUPPORT

Section 10(4) of the Act provides for the administration of the Act to be paid out of monies appropriated by Parliament for the purpose. However, the Council is not funded directly and relies on the Department of Health's Radiation Health Unit for administrative and scientific support. While the greater part of the Unit's duties is directly concerned with supporting the Council's needs, and many of the staff are appointed authorised officers under Section 4(1) of the Act for this purpose, the Unit also provides separate advice to the Department on a range of radiation issues.

The Radiation Health Unit also provides the Secretary of the Council. The position has been held by Ms H Upton (Managing Health Physicist) since February 2002, with Mr D Surin (Principal Health Physicist) performing these duties in Ms Upton's absence.

A restructure for the Radiation Health Unit to a new directorate within the Department of Health was announced in December 2022 and is expected to be finalised in January 2023. The Unit will move from the Environmental Health Directorate to the Public Health Regulation Directorate.

STATE RECORDS ACT

The Radiological Council's record keeping systems are managed by the Radiation Health Unit of the Department of Health, and thus the Council's compliance with the State Records Commission Standard 2, Principle 6 is linked to compliance by the Department of Health.

STATE ELECTORAL ACT

For the purposes of Section 175ZE of the State Electoral Act, the Radiological Council has no expenditure to report. Council's functions are supported from within the budget assigned by the Department of Health to the Radiation Health Unit. The Council does not have a budget in its own right.

REGISTRATIONS, LICENCES AND TEMPORARY PERMITS

Registration and licensing are the principal means by which the use of radiation is regulated. A summary of the legislative system for registration and licensing in Western Australia is included in appendix 1.

QUALIFICATIONS AND TRAINING OF RADIATION USERS

Before a licence may be granted, the Council has an obligation to ensure that an applicant has appropriate qualifications, competence and experience (Section 33).

Protocols have been developed which prescribe the prerequisite qualifications and experience necessary for a wide range of radiation uses. Some qualifications are recognised by the Council because an appropriate degree of radiation safety training is inherent in gaining

those qualifications. However, other applicants may be required to attend a recognised radiation safety course and pass an examination. The Council has authority to impose examinations under the Radiation Safety (Qualifications) Regulations.

Persons who are not required to hold a licence themselves but who must work under the direction and supervision of a licensee may also be required to hold certain qualifications or to have undergone additional radiation safety training. These requirements may be imposed by regulation or through conditions, restrictions and limitations imposed under Section 36. The registrant for the premises where the individual works is primarily responsible for ensuring compliance with these criteria.

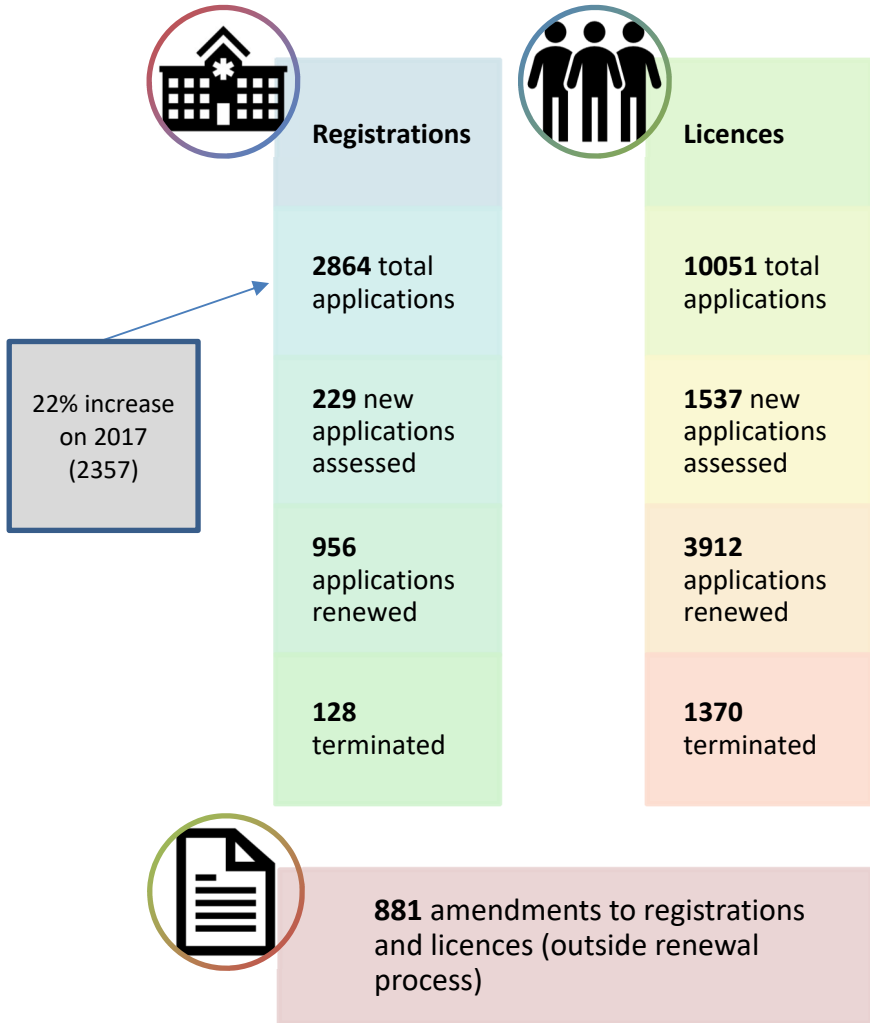
Courses in various aspects of radiation safety are offered by both the government and private sectors.

CHANGES TO LEGISLATION

No amendments were made to the Radiation Safety Act or Radiation Safety (Transport of Radioactive Substances) Regulations in 2022.

Amendments made to the Radiation Safety (General) Regulations and the Radiation Safety (Qualifications) Regulations are listed in attachment 2.

2022 IN REVIEW



9 officers from the Radiation Health Unit authorised under the Radiation Safety Act to carry out the services of the Radiological Council

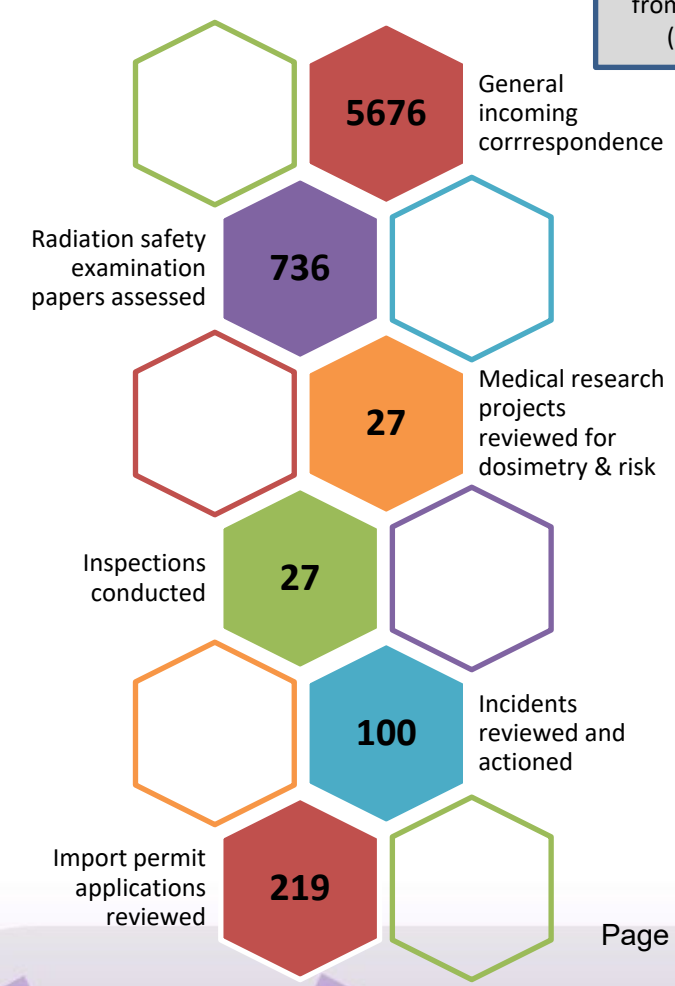
3 clerical officers from the Environmental Health Directorate provide administrative support

No difference to 2017
36% reduction from 2016 (14)

33% increase on 2017 (7545)

168% increase on 2017 (329)

Indication of 5-year difference



PROSECUTIONS

No prosecutions were initiated or finalised in 2022.

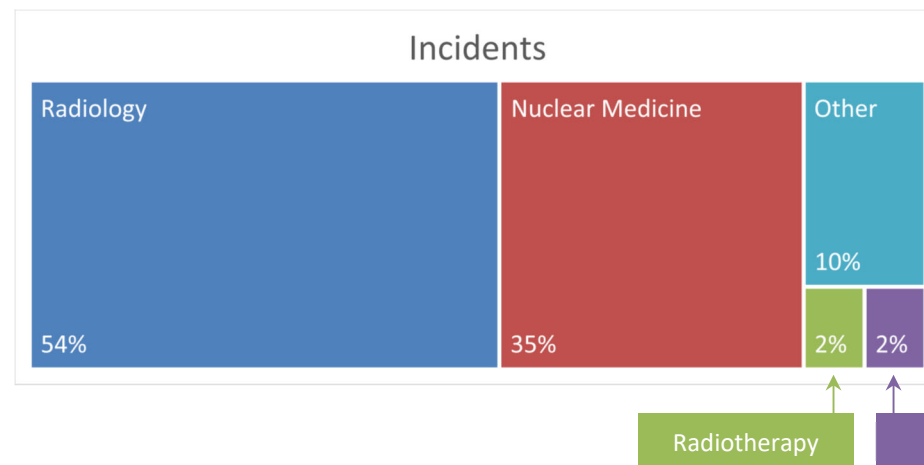
RADIATION INCIDENTS

Reported incidents involving radiation rarely pose a major health risk to the individuals exposed. Regulation 19A of the Radiation Safety (General) Regulations requires registrants to notify the Council in writing as soon as practicable should any of the abnormal or unplanned radiation exposures specified in that regulation occur. In addition to Regulation 19A, the medical incident reporting condition requires specified medical incidents to be reported to Council as soon as practicable and within 30 days from the date of the incident.

Although there is no certainty that all incidents are reported, Council encourages reporting and rigorous investigation of the cause as this provides a forum for improving work practices and minimising the risk of recurrence of such incidents.

The Council was notified of 100 incidents during 2022 which are presented in the table below. The majority of incidents relate to human error and a failure to follow protocols. All reported incidents are followed up by Council and its officers and attention is given to analysing the root cause and ensuring procedures and protocols are amended where necessary in order to minimise the chance of reoccurrence.

In addition, an incident occurred in December 2022 and January 2023 concerning the failure of a gauge at a mine site and the subsequent temporary loss of the source capsule during transport. This will be reported to the Radiological Council formally at its first meeting in 2023 and will be included in the 2023 Annual Report.



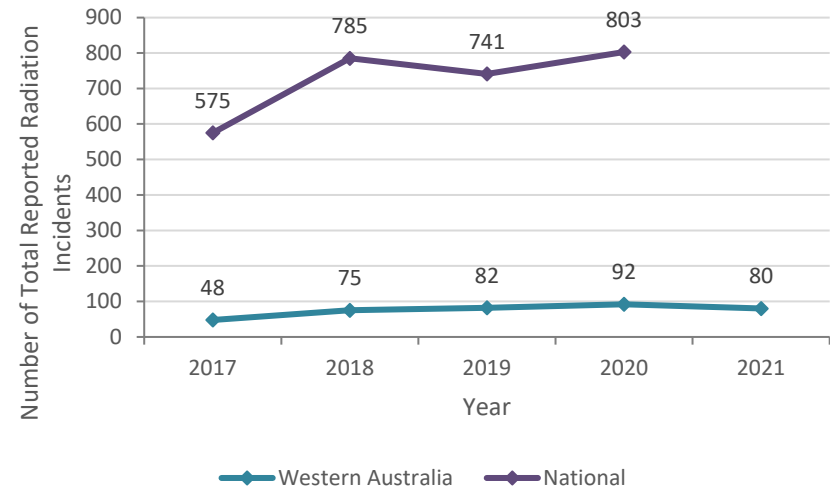
Incident type	Area	Occurrences
Human Error		
Wrong patient - failure to follow patient ID protocol	Radiology	20
Wrong patient – incorrect patient ID sticker placed on referral	Radiology	6
Incorrect procedure – incorrect information included on request form	Radiology	1
Incorrect procedure – failure to follow request form	Radiology	12
Incorrect modality – failure to follow request form	Radiology	3

Incident type	Area	Occurrences
Duplication of procedure – due to contrast not being injected	Radiology	2
Duplicate of procedure – imaging under QLD coal miner scheme needed to be repeated at an accredited facility	Radiology	1
Incorrect radiopharmaceutical activity administered – failure to follow protocol	Nuclear Medicine	4
Unintended release of radioactive substances – spill and contamination in controlled area due to failure to follow cannulation protocol	Nuclear Medicine	1
Provision of incorrect radiopharmaceutical	Other	1
Unnecessary exposure due to failure of operator to remain out of exposure area or utilise appropriate personal protective equipment	Radiotherapy (CT)	2
	Radiology	1
Equipment Malfunction		
Duplicate imaging required	Radiology	2
Radiopharmaceutical administered and scan not able to be performed or top-up dose required	Nuclear Medicine	3

Incident type	Area	Occurrences
Unintended release of radioactive substances - spill and contamination in controlled area	Nuclear Medicine	2
Unintended x-ray exposure of operator	Industrial	1
Logging source stuck in hole – source abandoned following failed recovery attempts, protocol followed	Industrial	1
Unintended release of radioactive substances - gaseous release to atmosphere	Other	1
Patient Factors Outside of Operator Control		
Extravasation of radiopharmaceutical – following successful cannulation flush	Nuclear Medicine	7
Radiopharmaceutical administered and scan not performed – patient choice not to proceed	Nuclear Medicine	7
Radiopharmaceutical administered and scan not performed – patient's clinical status changed	Nuclear Medicine	11
Unintended exposure of fetus – patient advised not pregnant	Radiology	4
Duplication of procedure – due to duplicate referral form	Radiology	1

Incident type	Area	Occurrences
Other		
Release of radioactive substances to sewer above regulatory discharge limits due to I-131 waste holding tank excess water issue	Other	1
Unauthorised release of medical radioactive waste to general waste stream	Other	1
Loss of I-125 ROLLIS seed following removal from patient	Other	1
Breach of I-125 ROLLIS seed casing due to pathology sampling technique	Other	1
Unauthorised use of potential class 4 laser for tattoo removal purposes	Other	1
Unauthorised use of fluoroscopic equipment in theatre	Radiology	1

The graph below illustrates the number of incidents in Western Australia compared to data available from the Australian Radiation Incident Register¹.



¹ www.arpana.gov.au/regulation-and-licensing/safety-security-transport/australian-radiation-incidents-register

MEDICAL AND RELATED RADIATION MATTERS

Medical Compliance Testing

Council's compliance testing program, which commenced in 1997, applies to diagnostic x-ray equipment used on living humans for medical radiography, fluoroscopy, chiropractic radiography, dental radiography and computed tomography.

No such x-ray equipment may be used for human diagnostic purposes unless it has a current certificate of compliance, a certificate of conditional compliance or an exemption from compliance.

Through conditions imposed on registrations under Section 36 of the Act, registrants are legally responsible for satisfying the requirements of the compliance testing program.

A summary of the compliance tests assessed in 2022 is included in attachment 3.

In 2022, the Council sought additional nominations for its *Diagnostic X-ray Equipment Compliance Testing Working Group*, an advisory body consisting of qualified experts and experienced compliance testers. Membership of the group was endorsed at Council's April meeting.

Whilst Western Australia has for many decades had an established and well-regarded diagnostic x-ray equipment compliance testing program, this is not the case across all Australian jurisdictions. In 2022 the Council was represented on a national compliance testing working group, which was formed to compile a reference document of compliance testing requirements that should be mandated by radiation regulators. The group met numerous times during 2022 and work on the document continues.

Approvals for Exposure to Radiation for Human Subjects in Medical Research

In Western Australia, all research projects involving exposure of human participants to ionising radiation must be evaluated by the Radiation Safety Officer. When the estimated radiation dose exceeds prescribed levels, Council approval must be obtained in addition to the approval by an Ethics Committee.

In keeping with the Australian *Code of Practice for the Exposure of Humans to Ionizing Radiation for Research Purposes* (Radiation Protection Series 8), the Council assesses research projects which involve exposing humans to ionising radiation without proven benefits to the irradiated subjects and where the dose to any individual exceeds Council's dose threshold.

In 2022, Council assessed and approved the radiation component of the research applications listed in attachment 4.

Feline I-131 Therapy for Hyperthyroidism

Several veterinary facilities had expressed interest in undertaking therapy with Iodine-131 (I-131) to treat feline hyperthyroidism, which was not currently undertaken in Western Australia. The Council considered the facility design, radiation safety and personnel training requirements it would apply through licensing and registration of such facilities under the Radiation Safety Act.

Council continued to liaise with the proponents and review documentation associated with the proposals for two different veterinary facilities. Both facilities have now been provided with approval to commence I-131 therapy for feline hyperthyroidism.

New Cyclotron Radiopharmaceutical Production Facility

Previously, only one cyclotron radiopharmaceutical manufacture and dispensing facility has existed in Western Australia.

A private company commenced discussions with the Council in 2020 regarding their intent to build and operate a privately owned cyclotron radiopharmaceutical manufacture and dispensing facility in Perth. Over 2021 and 2022 the Council continued to liaise with the proponent and review documentation associated with the proposal. The Council has now provided approvals under the Radiation Safety Act for the facility design (radiation shielding and other design safety features), operator training, cyclotron and hot cell installation and associated commissioning activities.

The assessment process for operational aspects of the facility is continuing and is expected to be completed in 2023.

Review of I-131 Discharge to Sewer

In 2020 the Council received a request from two Western Australian nuclear medicine physicians to amend the patient administration and discharge requirements relating to inpatient I-131 therapies. To adequately address this request, the Council needed to undertake a review relating to I-131 requirements, and particularly the discharge of I-131 contaminated effluent to sewer and associated implications for the Western Australian community.

The commencement of the review was delayed at the time due to the Council needing to complete pre-existing reviews. The review commenced in 2021 and was further prioritised in 2022 with the Council reconsidering its operational resources and contracting a physicist to assist with the project.

The review is expected to be finalised and considered by the Council in early 2023.

INDUSTRIAL, ENVIRONMENTAL AND MINING RADIATION

Industrial Compliance Testing

The Council's compliance testing program for fixed radiation gauges commenced in 1999. Gauges are not approved for use without a current certificate of compliance. A summary of the compliance tests assessed in 2022 is included in attachment 3.

Standards for Council Examinations

In 2002, the Council agreed that greater control should be exercised over industrial radiation safety examinations and decided that while course providers may continue to invigilate examinations, all industrial papers would be returned to Council's officers for marking. In 2022, Council officers marked 641 industrial examination papers. The number of examinations marked in each category is listed in attachment 5.

Mining and Milling of Radioactive Ores

The mining, milling, processing, certain exploration activities and the transport of radioactive ores are subject to the Radiation Safety Act and subsidiary legislation.

The Council has an independent role to ensure the appropriate oversight of the radiation safety aspects of the mining and milling of radioactive ores and this includes –

- the review of radiation management plans.
- approvals of Radiation Safety Officers.
- the review of occupational and environmental reports.

- conducting independent monitoring and surveillance.
- conducting inspections and audits.

The mining and milling of radioactive ores are also subject to regulation administered by the Mines Safety Directorate of the Department of Mines, Industry Regulation and Safety (DMIRS).

The Work Health and Safety (WHS) Act 2020 and accompanying regulations came into effect in March 2022, replacing the Mines Safety and Inspection Act and Regulations.

Memorandum of Understanding

Following the WHS Act 2020 coming into effect in March 2022, DMIRS and Council agreed to progress and reinstitute a Memorandum of Understanding (MoU) for radiation on mining operations.

Drafting of the MoU has commenced and it is expected that it will be finalised in 2023.

Occupational dose assessment for mine workers

The purpose of occupational dose assessment is to estimate the effective dose received by an employee during a defined period of time from all pathways that may deliver a dose to a worker.

The Council and DMIRS have been consulted on national revisions to *dose coefficients* which are used to calculate the dose contributions from the occupational inhalation and ingestion of radionuclides for mine workers. The intention has been to bring these dose coefficients in line with updates to that presented in publications of the International Commission on Radiological Protection, taking

Australia-specific factors into account.

Occupational dose assessment procedures for mine workers in Western Australia are provided in publications from DMIRS. Reports on the doses to mine workers are regularly provided to the Council by DMIRS.

Mineral Sands and Rare Earths Projects

The assessment of major projects in Western Australia involves multi-agency consideration and response from the State Government.

During 2022 the Council was consulted as part of the State assessment of a number of rare earths and mineral sands projects that are in their initial stages. It is expected that at least one of these projects will be operational in 2023.

One further assessment has involved a major extension to existing approvals from DMIRS and the Council. This has been addressed with assessment of a revised Radiation Management Plan.



MISCELLANEOUS

COVID-19

The Radiological Council has been cognisant of the difficulties individuals and operations have faced during the COVID-19 pandemic. However, as the situation evolved in Western Australia, the Council undertook initiatives to ensure that radiation safety was not compromised. The initiatives were both industry-wide and as needed on a case-by-case basis. Individuals and organisations regulated under the Radiation Safety Act were recommended to consider business continuity planning, noting that radiation safety and the security and oversight of radioactive sources, irradiating apparatus and electronic products was to remain paramount.

In November 2022, the Council agreed to retire COVID-19 arrangements as a standing item at its meetings.

Radiation Health Expert Reference Panel

The Radiation Health Expert Reference Panel (RHERP) is comprised of representatives from each Australian jurisdiction's radiation safety regulator and is established under the Environmental Health Standing Committee (enHealth) to provide expert advice on radiation specific issues.

EnHealth is a standing committee of the Australian Health Protection Principal Committee and is responsible for providing agreed environmental health policy advice, implementation of the *National Environmental Health Strategy*, consultation with key stakeholders, and the development and coordination of research, information and practical resources on environmental health matters at a national level.

Radiation Health Committee

The Radiation Health Committee (RHC) is a body established to advise the Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and its Radiation Health & Safety Advisory Council on matters relating to radiation protection, formulating draft national policies, codes and standards for consideration by the Commonwealth, States and Territories.

Western Australia has representation on the RHC through the Secretary of the Radiological Council who attends the committee meetings tri-monthly.

National Strategy for Radiation Safety

In 2018 Australia hosted the International Atomic Energy Agency Integrated Regulatory Review Service (IRRS) mission. The principal recommendation of the IRRS was that the Commonwealth Government, in conjunction with State and Territory Governments, ensure a consistent level of protection of people and the environment through effective coordination and harmonized implementation of codes and guides by the Commonwealth, States and Territory regulatory bodies.

After the review, the Australian governments committed that a National Strategy for Radiation Safety (NSRS) would be developed to formalise a framework for safety into a national policy and strategy for safety, providing an implementation mechanism for addressing issues identified in the IRRS review. The NSRS would also assist with:

- reviewing the current regulatory framework in Australia to ensure a comprehensive and adequate coverage of radiation risks with facilities and activities
- developing competency requirements for ensuring safety of

- facilities and regulatory activities
- a national framework for managing radiation incidents of national significance

The draft NSRS was provided for public consultation in late 2021 and further work on the draft was undertaken in 2022.

Automatic Mutual Recognition

The Automatic Mutual Recognition (AMR) scheme commenced in Western Australia on 1 July 2022.

The AMR scheme applies to persons who hold a radiation licence (use authorisation) in their participating Australian home state or territory and who wish to temporarily perform the same work in Western Australia. Those eligible are not required to apply and pay for a second licence in Western Australia; a Western Australian radiation licence is only required to be obtained if the person's home state or territory becomes Western Australia. As at December 2022, all Australian jurisdictions except Queensland are participating in the scheme.

Those intending to work in Western Australia under the AMR scheme must provide the required notification to the Radiological Council of their intent to work in Western Australia. From July to December 2022, 36 notifications were received by the Council.

Where a person is not eligible to work in Western Australia under the AMR scheme, they may still be eligible to work under existing mutual recognition arrangements. These are outlined on the Radiological Council website.

Security of Radioactive Sources

The Council requires compliance with the Australian *Code of Practice for the Security of Radioactive Sources* (Radiation Protection Series 11). The Code specifies security requirements to be implemented by persons responsible for sealed radioactive sources in order to decrease the likelihood of unauthorised access to a radioactive source.

The Code imposes additional obligations on registrants of security enhanced sources (Categories 1, 2 and 3). Persons responsible for security enhanced sources must ensure a source security plan is developed which demonstrates how they will satisfy the requirements of the Code by implementing risk-based security measures appropriate to the category of the source. Persons responsible for security enhanced sources must ensure that the source security plan is assessed and endorsed by an accredited assessor.

During 2022 the Council conducted a review of security plan endorsements for Western Australian facilities with category 1, 2 and 3 sources. The program of review is ongoing with facilities undertaking remediation as required by the Council.

Low Level Radioactive Waste Facilities

The existing State owned and operated low level Intractable Waste Disposal Facility has remained in contact with Council with regards to proposals for a disposal operation. The planned disposal campaign for low-level radioactive waste did not occur in 2022.

In 2022, the Council continued to liaise with the proponent and review of documentation associated with a proposal for a privately owned and commercially operated low-level radioactive waste facility in Western Australia. Council approved the operational Radiological

Safety Case (April 2022) which allows the proponent to dispose of low-level radioactive waste at their facility under the Radiation Safety Act.

The Safety Case is required under the Australian *Code for Disposal Facilities for Solid Radioactive Waste* (Radiation Protection Series C-3) published by ARPANSA. The Code sets out the radiation protection principles and regulatory requirements for the safety and security of disposal of solid radioactive waste with the aim to ensure that the protection against radiation risks for people and the environment is optimised.

Council's approval for the facility is provided under the Radiation Safety Act only but takes into consideration the processes and approvals from other departments for this project. Council was advised that the proponent had also subsequently sought approval to operate from the Department of Water and Environmental Regulation.

Radiological Council Website

The transition of the Radiological Council website to a new platform under a content management system commenced late in 2021. The website architecture is now based on that used for other entities within the Department of Health, and so already meets the website standards set by the Office of Digital Government, Department of Premier and Cabinet.

Authorised officers under the Radiation Safety Act were trained in the use of the new content management system. The new website was launched in March 2022.

X-ray Screening

In April 2021, Council was advised that a tender was in progress for x-ray equipment to be used in Western Australia for the purpose of security screening of individuals.

Council has been continuing to liaise with representatives of the agency that is managing the tender. The agency engaged a consultant to assist with the justification, submission and application to utilise the radiation technology.

In April 2022, Council provided in-principle approval for x-ray equipment to be used in Western Australia for screening of prisoners in custodial facilities for contraband detection. Final approval of the first Western Australian installation for this purpose is expected to be issued in 2023.

APPENDIX 1: REGISTRATION AND LICENSING

Registrations

Section 28 of the Act requires prescribed radioactive substances, x-ray equipment and electronic products, together with the associated premises, to be registered. Registrants may include individuals, companies, organisations or institutions.

All x-ray equipment is prescribed while prescribed electronic products include lasers and transilluminators.

Radioactive substances that exceed the exempt quantities prescribed in the regulations are subject to registration. A small number of devices containing radioactive substances in excess of the exempt limits, but which pose a minimal hazard to users, have been exempted by regulation from control under the Act.

The numbers of devices and sealed radiation sources registered as at 31 December 2022 are included in attachment 6.

Licences

Section 25 of the Act requires persons who manufacture, store, transport, sell, possess, install, service, maintain, repair, use, operate or otherwise deal with prescribed radioactive substances, x-ray equipment or electronic products to be licensed or, where permitted, work under the direction and supervision of a licensee.

Section 29 of the Act also creates an offence for a person to sell any prescribed substances or devices unless they require the

purchaser to produce evidence that they hold a relevant licence or are otherwise exempted by the Act or regulations. Sales also must be notified in writing to the Council, without delay, identifying the purchaser and the particulars of the relevant licence or exemption.

Exemptions from Licence

A licence is not required where a general exemption is provided by the regulations or where a person has been granted an individual exemption from licence. The regulations nevertheless specify the minimum qualifications or training required for these radiation workers.

Temporary Permits

The shortest period for which a licence or registration can be granted is 12 months. However, for shorter periods an application may be made for a Temporary Permit. Permits cannot exceed a duration of 3 months. 96 Temporary Permits were current as at 31 December 2022.

Conditions, Restrictions and Limitations

A range of performance and safety requirements for radioactive substances, x-ray equipment and the prescribed electronic products are specified in the regulations. However, additional safety measures may be applied by the Council under Section 36

of the Act through conditions, restrictions and limitations applied to registrations, licences, temporary permits and exemptions.

Failure to comply with a condition is an offence.

Attachment 7 shows the types and numbers of licences and registrations (or individual exemptions) granted or renewed in 2022.

Automatic Mutual Recognition

Automatic Mutual Recognition may apply if a person is entering Western Australia from a participating jurisdiction to undertake

temporary work.

From July to December 2022, 36 notifications were received by the Council.

Commonwealth Government Agencies and Contractors

The Radiation Safety Act does not apply to Commonwealth agencies or to their employees (or contractors) who might use radiation in Western Australia. Those agencies are regulated by ARPANSA under the Commonwealth Government's Australian Radiation Protection and Nuclear Safety Act 1999.

ATTACHMENT 1: RADIOLOGICAL COUNCIL**MEMBERS OF THE RADIOLOGICAL COUNCIL**

Members	Qualification or Designation	Deputy	
<i>Appointment under Sections 13(2)(a) and 13(3) of the Act</i>			
Dr A Robertson (Chairman)	Medical Practitioner	Dr R Bangor-Jones	
<i>Appointment under Sections 13(2)(b), 15(1) and 17 (1) of the Act</i>			
Dr C Hewavitharana	Radiologist	Dr D Dissanayake	until 18 February 2022
Dr M Morris	Radiologist	Dr V Vaidya	until 19 February 2025
Dr E Thomas	Nuclear Medicine Physician	Dr R Troedson	until 13 June 2025
Dr R Price	Physicist	Mr C Storm	until 19 September 2022
Mr C Storm	Physicist	Ms M McGibbons	until 18 October 2025
Mr D Kwiatkowski	Electronic Engineer	Vacant	until 18 February 2022
Mr J Pereira	Electronic Engineer	Dr W Green	until 19 February 2025
A/Prof R Francis	Tertiary Institutions representative	Prof P Parizel	until 30 April 2024
Vacant	Medical Radiation Technologist	Ms H Parry	until 19 September 2022
A/Prof S Maresse	Medical Radiation Technologist	Dr C Ng	until 18 October 2025
Mr N Tsurikov	Expert in Mining Radiation Hazards	N/a	
Mr F Harris	Expert in Mining Radiation Hazards	N/a	

2022 MEETING ATTENDANCE

	8 FEB	8 MAR	12 APR	10 MAY	14 JUN	12 JUL	9 AUG	13 SEP	11 OCT	8 NOV	13 DEC
Dr A Robertson	A	✓	✓	✓	A	✓	✓	A	✓	✓	✓
Dr R Bangor-Jones	A	✓	✓	A	✓D	✓	✓	✓D	✓	A	✓
Dr C Hewavitharana	✓	R	R	R	R	R	R	R	R	R	R
Dr M Morris	NA	✓	✓	A	A	✓	✓	✓	A	A	✓
Dr V Vaidya				✓D	✓D	A	✓	✓O	✓D	✓D	✓O
Dr E Thomas	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓
Dr R Price	✓	✓	✓	✓	✓	✓	A	✓	✓O	R	R
Mr C Storm	A	✓O	✓O	✓O	✓O	A	✓O	✓O	✓O	✓	✓
Ms M McGibbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	✓O
Mr D Kwiatkowski	A	R	R	R	R	R	R	R	R	R	R
Mr J Pereira	NA	✓	✓	✓	✓	A	✓	✓	A	✓	✓
A/Prof R Francis	✓	✓	✓	A	✓	✓	✓	✓	✓	✓	✓
Ms H Parry	✓	✓	✓	✓	✓	✓	✓	✓	✓O	R	✓
A/Prof S Maresse	NA	NA	NA	NA	NA	NA	NA	NA	NA	A	✓
Dr C Ng	NA	NA	NA	NA	NA	NA	NA	NA	NA	✓D	-
Mr N Tsurikov	✓	✓	✓	A	✓	✓	A	✓	✓	✓	✓
Mr F Harris	✓	A	A	A	✓	A	✓	✓	A	A	✓

✓ attended D deputy A apology O observer R retired NA not appointed at the time

ATTACHMENT 2: LEGISLATION AMENDMENTS**RADIATION SAFETY ACT**

None

RADIATION SAFETY (GENERAL) REGULATIONS

Health Regulations Amendment (Veterinary Practice) Regulations 2022 Pt.3

Amendment to definitions (Regulation 3).

Government Gazette 17 June 2022 SL 2022/93

Health Regulations Amendment (Fees and Charges) Regulations 2022 Pt.3

Amendment to fees (Regulation 58 and Schedule 15).

Government Gazette 15 July 2022 SL 2022/136

RADIATION SAFETY (QUALIFICATIONS) REGULATIONS

Health Regulations Amendment (Fees and Charges) Regulations 2022 Pt.3

Amendment to fees for examinations (Schedule 2).

Government Gazette 15 July 2022 SL 2022/136

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

ATTACHMENT 3: COMPLIANCE TESTING**Medical**

- A** *Compliant*
- B** *Conditionally compliant*
- C** *Non-compliant²*

Category	A	B	C	Total
CT	63	-	1	64
Dental – cone beam CT	53	-	1	54
Dental – intraoral	649	1	3	653
Dental – panoramic and/or cephalometric	146	-	-	146
Fluoroscopic – fixed	29	-	2	31
Fluoroscopic – fixed C or U arm	19	-	1	20
Fluoroscopic – mobile	110	-	2	112
Mammography	54	-	1	55
Radiographic – fixed	91	-	6	97
Radiographic – mobile	62	-	2	64
Total	1276	1	19	1296

² Equipment deemed to be non-compliant may continue to be used for a further three months while the problem is being addressed provided that the reason for non-compliance does not significantly increase the radiation dose to the patient. A re-test is then required. Of the 5 re-tests conducted during 2022, 100% resulted in the equipment being granted either a compliance or conditional compliance certificate.

Industrial – Fixed Gauges

- A** *Compliant*
B *Non-compliant*³

Category	A	B	Total
Density	545	17	562
In-stream analysis	8	-	8
Level	81	-	81
Other	19	1	20
Total	653	18	871

³ Equipment that has been assessed as non-compliant cannot be used until it has been re-tested and issued with a certificate of compliance. Of the 30 re-tests conducted during 2022, 100% resulted in the equipment being granted a compliance certificate.

ATTACHMENT 4: RESEARCH PROJECT APPLICATIONS ASSESSED

Research Project Title
Randomized. Double-blind, phase 3 study of tucatinib or placebo in combination with trastuzumab and pertuzumab as maintenance therapy for metastatic (HERCLIMB+ - 05).
A multicentre, parallel arm, open-label trial of frontline R-CHOP/Pola-RCHP and glofitamab in younger, higher risk patients with diffuse large B cell lymphoma (DLBCL).
Phase 1, multicentre, open-label study to assess safety, tolerability, pharmacokinetics and preliminary efficacy of BAT7104 in patients with advanced solid tumours.
An ALLG open label phase II study of Pembrolizumab And Chemo-Immunotherapy as First-line therapy for primary mediastinal B-Cell lymphoma (ALLG-PACIFIC).
A Phase 1b Open-label Study Evaluating the Safety and Pharmacokinetics of Subcutaneous AMG 701 for the Treatment of Relapsed or Refractory Multiple Myeloma (ProxiMMItty-1).
A Dose Escalation and Expansion Study of ABBV-383 in Combination with Anti-Cancer Regimens for the Treatment of Patients with Relapsed/Refractory Multiple Myeloma (R/R MM).
Multi-center, international, prospective, randomized. Subjects will be randomized on 1:1 basis to Transcatheter Aortic Valve Replacement (TAVR) using the Medtronic Evolut PRO+ TAVR system + guideline-directed management and therapy (GDMT) or GDMT alone.

Research Project Title
Amendment - A Global, Phase 2 Study of ARX788 in HER2-Positive Metastatic Breast Cancer Patients Whose Disease is Resistant or Refractory to T-DM1, and/or T-DXd, and/or Tucatinib-Containing Regimens ACE-Breast-03.
Imaging Biomarkers of Response to Immunotherapy in Malignant Mesothelioma.
A Phase III, Multicenter, Randomized, Parallel-Group, Double-Blind, Placebo-Controlled Study to Evaluate the Efficacy and Safety of Gantenerumab in Participants at Risk for or at the Earliest Stages of Alzheimer’s Disease.
A phase 2 study of erdafitinib in subjects with advanced solid tumors and FGFR gene alterations.
A randomized, open-label, phase 3 study of Sacituzumab govitecan and pembrolizumab versus treatment of physician’s choice and pembrolizumab in patients with previously untreated, locally advanced, inoperable, or metastatic triple-negative breast cancer, whose tumors express PD-L1(ASCENT-04).
A randomized, open-label, phase 3 study of Sacituzumab Govitecan versus treatment of physician’s choice in patients with previously untreated, locally advanced, inoperable or metastatic triple-negative breast cancer whose tumors do not express PD-L1 or in patients previously treated with anti-PD-(L)1 agents in the early setting whose tumors do express PD-L1. (ASCENT-03)



Research Project Title

A phase 1/2, safety confirmation and double-blind, placebo-controlled, randomized study of relatlimab in combination with nivolumab and bevacizumab in treatment-naïve advanced/metastatic hepatocellular carcinoma (RELATIVITY-106).

A Phase 1/2 Study of [225Ac]-FPI-1966, [111In]-FPI-1967, and Vofatamab in Participants with FGFR3-expressing Advanced, Inoperable, Metastatic and/or Recurrent Solid Tumours.

A Randomised, Double-Blind, Placebo-Controlled Study to Evaluate the Treatment Effects and Safety of SLS-005 (trealose injection, 90.5 mg/mL for intravenous infusion) in Participants with Alzheimer's Disease (AD).

A Phase 1, Multi-Centre, Open-Label, Dose Escalation, First-in-Human Study to Assess the Safety, Tolerability and Pharmacokinetics of JSKN003 in Subjects with Advanced or Metastatic Solid Malignant Tumors.

An Open-label, Multicentre, Phase 2 Study of Sacituzumab Govitecan Combinations in First-line Treatment of Patients with Advanced or Metastatic Non-Small-Cell Lung Cancer Without Actionable Genomic Alterations.

A Phase 3, Open-Label Study to Evaluate Safety and Efficacy of Epcoritamab in Combination with Rituximab and Lenalidomide (R2) compared to R2 in Subjects with Relapsed or Refractory Follicular Lymphoma (EPCORE™ FL-1).

A Phase 3 Open-Label, Randomized Study of Pirtobrutinib (LOXO-305) versus Brutinib in Patients with Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma (BRUIN-CLL-314).

Research Project Title

A Substudy of CD8 Positron Emission Tomography (PET/CT) Imaging With [89Zr]Zr-Df-crefmirlimab In Patients with Inclusion Body Myositis Administered ABC008.

A Phase 1b, Open Label, Global, Multicenter, Dose Determination, Randomized Dose Expansion Study to Determine the Maximum Tolerated Dose, Assess the Safety and Tolerability, Pharmacokinetics and Preliminary Efficacy of Iberdomide (CC-220) in Combination with R-CHOP-21 and CC-99282 in Combination with R-CHOP-21 for Subjects with Previously Untreated, Aggressive B-Cell Lymphoma.

A Phase 3, Randomized, Open-Label Study to Evaluate Safety and Efficacy of Epcoritamab in Combination with R-CHOP Compared to R-CHOP in Subjects with Newly Diagnosed Diffuse Large B-Cell Lymphoma (DLBCL).

A Phase III Prospective, Multicenter, Randomized, Open-Label Trial of Acalabrutinib plus Venetoclax versus Venetoclax plus Obinutuzumab in Previously Untreated Chronic Lymphocytic Leukemia or Small Lymphocytic Lymphoma.

An ALLG phase II study of pembrolizumab checkpoint blockade following chemoimmunotherapy (CIT) for primary central nervous system lymphoma (PCNSL) NHL32.

A Modular, Phase II, Open-Label, Multicentre Study to Assess the Preliminary Efficacy and Safety of RXC004, in Patients with Advanced Solid Tumours that have Progressed following Therapy with Current Standard of Care – PORCUPINE 2.

A Phase 3 Randomized, Open-Label, Multicenter Study of Zanubrutinib (BGB-3111) Plus Anti-CD20 Antibodies Versus Lenalidomide Plus Rituximab in Patients with Relapsed/Refractory Follicular or Marginal Zone Lymphoma.

ATTACHMENT 5: INDUSTRIAL RADIATION SAFETY EXAMINATIONS*Current at 31 December 2022*

Category	2022	2021	2020	2019	2018	2017
Borehole Logging	80	115	87	46	24	29
Fixed Gauges	137	134	85	119	83	109
Industrial Radiography	22	22	15	33	30	49
Industrial Radiography (Assistant)	104	86	83	97	109	57
Portable Gauges	70	102	78	80	61	50
Transport	28	25	22	54	25	42
Service – Cabinet X-ray	1	2	3	16	2	5
Service – Industrial Radiography (X-ray)	0	0	0	1	0	0
Service – X-ray Analysis	2	0	0	2	0	0
X-ray Analysis – Use	0	0	1	0	0	0
X-ray Analysis – Use and Restricted Service	91	68	44	47	111	48
Total	641	554	421	510	453	392

ATTACHMENT 6: REGISTERED IRRADIATING APPARATUS, ELECTRONIC PRODUCTS AND SEALED RADIOACTIVE SUBSTANCES

Current at 31 December 2022

- A** *Irradiating apparatus and electronic products⁴*
- B** *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	72	-
Cabinet x-ray equipment	217	-
Calibration	1	692
CT	142	-
SPECT-CT and PET-CT	39	-
Dental – cone beam CT	104	-
Dental – intraoral	2659	-
Dental – panoramic and/or cephalometric	535	-
Education and research	26	791
Fluoroscopic – fixed	77	-
Fluoroscopic – mobile	147	-
Gauges – density/level	10	3731
Gauges – in stream analysis	2	89
Gauges – logging	55	437
Gauges – neutron moisture/density portable	-	529
Gauges – other	-	347
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	156	-

⁴ This data column specifically excludes x-ray equipment that is no longer operable but for which compliance testing data is held.

Category	A	B
Laser – industrial	225	-
Laser – medical	420	-
Laser – other medical	452	-
Laser – podiatry	18	-
Laser – research	219	-
Linear accelerator	28	-
Mammography	71	-
Non-destructive testing	235	154
Non-destructive testing – crawler control	-	17
Portable mineral analyser	-	7
Radiographic – fixed	375	-
Radiographic – mobile	407	-
Sealed Sources – other	-	223
Simulator	8	-
Special purpose x-ray	39	-
Static detection/measurement	-	2
Static elimination	-	18
Storage	-	262
Superficial radiotherapy	2	-
Test source	3	-
Therapy	3	27
Therapy – HDR brachytherapy	-	2
Transilluminator	127	-
Tracer Studies	-	131
X-ray analysis	837	-
Total	7710	7509

ATTACHMENT 7: LICENCES AND REGISTRATIONS*Current at 31 December 2022**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2022	2021	2022	2021	2022	2021
Licences	7612	7153	2439	2424	10051	9577
Registrations	2423	2334	441	429	2864	2763
TOTAL	10035	9487	2880	2853	12915	12340
Change from 2022	+ 5.8%		+ 0.9%		+ 4.7%	

Attachment 7 (cont)

Purposes for Licences and Exemptions from Licence – total current as at 31 December 2022

Note: A single licence may be granted for one or more purposes.

Total	Purpose
15	Bone Densitometry
3	Bone Densitometry (Exemption)
107	Cabinet X-ray Equipment
56	Compliance Testing - Diagnostic X-ray Equipment
576	Compliance Testing - Radioactive Gauges
18	Cyclotron Operation
3	Cyclotron Servicing
3	Education (Apparatus)
28	Education (Substances)
534	Fluoroscopy - Medical
69	Fluoroscopy - Medical (Exemption)
34	Fluoroscopy - Medical (Non-Specialist Exemption)
16	Fluoroscopy - Podiatry (Exemption)
5	Fluoroscopy - Veterinary
6	Gamma Irradiator - Use
569	Gauges - Industrial
7	Gauges - Industrial (Installation)
1	Gauges - Level (CO2)
360	Gauges - Logging
562	Gauges - Moisture and/or Density (Portable)
10	Gauges - Other (Apparatus)

Total	Purpose
104	Gauges - Other (Substances)
2	Installation of X-ray Equipment
2	Installation of X-ray Equipment - Dental
3	Lasers - Acupuncture
145	Lasers - Allied Health ⁵
52	Lasers - Allied Health (Exemption) ⁵
1	Lasers - Astronomy
188	Lasers - Dental
6	Lasers - Educational
36	Lasers - Entertainment
575	Lasers - Hair Removal (Exemption)
97	Lasers - Industrial
360	Lasers - Medical
60	Lasers - Medical (Exemption)
10	Lasers - Other
69	Lasers - Research
92	Lasers - Service
117	Lasers - Superficial Cosmetic (Exemption)
26	Lasers - Tattoo Removal (Exemption)
25	Lasers - Veterinary
1	Manufacture of X-ray Equipment

⁵ Lasers – allied health includes licences previously issued for chiropractic, osteopathy, physiotherapy and podiatry.

Total	Purpose
2	Medical Physics
34	Medical Physics - Radiotherapy (Apparatus)
23	Medical Physics - Radiotherapy (Substances)
105	Medical Radiation Technology - Diagnostic Nuclear
1392	Medical Radiation Technology - Medical Imaging
40	Medical Radiation Technology - Nuclear Medicine - Diagnostic CT
244	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
330	Medical Radiology
7	Nuclear Medicine - Calibration and QC Sources
43	Nuclear Medicine - Diagnostic
39	Nuclear Medicine - Therapeutic
6	Nuclear Medicine - Veterinary
2	Pathology (In Vitro) - Sealed Sources
5	Pathology Tests
14	Portable Mineral Analysers
600	Portable Mineral Analysers (X-ray)
2	Possession of X-ray Equipment - Diagnostic Medical
1	Possession of X-ray Equipment - Diagnostic Medical and Dental
3	Quality Assurance Procedures
34	Radioactive Ores - Analytical Laboratories
14	Radioactive Ores - Exploration
21	Radioactive Ores - Mining and/or Processing
14	Radioactive Substances - Calibration Sources
1	Radioactive Substances - Medical
37	Radioactive Substances - Sale
38	Radioactive Substances - Service of Devices

Total	Purpose
13	Radioactive Substances - Tracer Studies (Industry)
20	Radiography - Chiropractic (Extended)
180	Radiography - Chiropractic (Restricted)
1	Radiography - Forensic
416	Radiography - Industrial (Gamma)
428	Radiography - Industrial (X-ray)
3	Radiography - Mammography Screening (Exemption)
-	Radiography - Medical (Direction and Supervision)
4	Radiography - Security
1009	Radiography - Veterinary
1	Radioguidance - Medical (Radioactive Substances)
168	Radiology - Dental
13	Radiology - Veterinary
27	Radiopharmaceutical Manufacture and Dispensing
29	Radiotherapy - Medical (Apparatus)
19	Radiotherapy - Medical (Substances)
10	Research
35	Research - Unsealed Radioactive Substances
17	Research - X-ray
35	Sale of Electronic Products
90	Sale of X-ray Equipment
34	Service of X-ray Equipment - Analytical
38	Service of X-ray Equipment - Cabinet
33	Service of X-ray Equipment - Dental
149	Service of X-ray Equipment - Diagnostic
4	Service of X-ray Equipment - Diagnostic (Extended)
3	Service of X-ray Equipment - Industrial NDT
48	Service of X-ray Equipment - Linear Accelerators
6	Service of X-ray Equipment - Other

Total	Purpose
4	Service of X-ray Equipment - Superficial X-ray Therapy
19	Special Purpose Enclosed X-ray Equipment
1	Static Detection
1	Static Electricity Measurement
1	Static Elimination
3	Storage (Apparatus)
16	Storage (Substances)

Total	Purpose
23	Transilluminators
152	Transport
152	X-ray Analysis - Use
334	X-ray Analysis - Use and Service (Restricted)
3	X-ray Irradiator
6	X-ray - Industrial

Attachment 7 (cont)

Purposes for Registrations and Exemptions from Registration – total current as at 31 December 2022

Note: A single registration may be granted for one or more purposes.

Total	Purpose
26	Bone Densitometry
12	Bone Densitometry (Exemption)
92	Cabinet X-ray Equipment
4	Cyclotron Operation
3	Disposal of Radioactive Waste
9	Education (Apparatus)
15	Education (Substances)
28	Education – Demonstration Radioactive Sources (Exemption)
5	Fluoroscopy – Medical
1	Fluoroscopy – Podiatry
3	Gamma Irradiator
142	Gauges – Industrial
3	Gauges – Level (CO2)
19	Gauges – Logging
46	Gauges – Moisture and/or Density (Portable)
15	Gauges – Other (Apparatus)
6	Gauges – Other (Substances)
1	Lasers – Acupuncture
3	Lasers – Analyser
1	Lasers – Astronomy
9	Lasers – Chiropractic
144	Lasers – Dental
2	Lasers – Educational

Total	Purpose
18	Lasers – Entertainment
73	Lasers – Hair Removal
44	Lasers – Industrial
2	Lasers – Manufacture
188	Lasers – Medical
1	Lasers – Osteopathy
3	Lasers – Other
53	Lasers – Physiotherapy
20	Lasers – Podiatry
8	Lasers – Research
9	Lasers – Sale, Service, Maintenance and Testing
29	Lasers – Storage
37	Lasers – Superficial Cosmetic
6	Lasers – Tattoo Removal
15	Lasers – Veterinary
2	Manufacture of X-ray Equipment
151	Medical Radiology
21	Nuclear Medicine – Computed Tomography
25	Nuclear Medicine – Diagnostic
11	Nuclear Medicine – Therapeutic
5	Nuclear Medicine – Veterinary
6	Pathology Tests
4	Portable Mineral Analysers

Total	Purpose
294	Portable Mineral Analysers (X-ray)
13	Radioactive Ores – Analytical Laboratories
11	Radioactive Ores – Exploration
39	Radioactive Ores – Mining and/or Processing
16	Radioactive Substances – Calibration Sources
1	Radioactive Substances – Medical
7	Radioactive Substances – Sale
3	Radioactive Substances – Service of Devices
2	Radioactive Substances – Tracer Studies (Industry)
14	Radiography – Chest Screening
45	Radiography – Chiropractic
830	Radiography – Dental
1	Radiography – Forensic
25	Radiography – Industrial (Gamma)
35	Radiography – Industrial (X-ray)
15	Radiography – Mammography Screening
42	Radiography – Medical (Operator)
10	Radiography – Medical (Unrestricted)
1	Radiography – Security
282	Radiography – Veterinary
4	Radioguidance – Medical (Radioactive Substances)
82	Radiology – Dental
6	Radiology – Veterinary

Total	Purpose
3	Radiopharmaceutical Manufacture and Dispensing
14	Radiotherapy – Medical (Apparatus)
6	Radiotherapy – Medical (Substances)
1	Radiotherapy – Veterinary (Apparatus)
1	Radiotherapy – Veterinary (Substances)
2	Regulatory Authority
5	Research (Substances)
11	Research – Unsealed Radioactive Substances
8	Research – X-ray
9	Sale of Electronic Products
23	Sale of X-ray Equipment
54	Security of Radioactive Sources
15	Service of X-ray Equipment
15	Special Purpose Enclosed X-ray Equipment
1	Static Electricity Measurement
2	Static Elimination
68	Storage (Apparatus)
57	Storage (Substances)
13	Transilluminators
18	Transport
147	X-ray Analysis
2	X-ray Irradiator
3	X-ray - Industrial

ABBREVIATIONS**General Terminology**

AMR	Automatic Mutual Recognition
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CT	Computed Tomography
CT/SPECT	Computed Tomography/Single-Photon Emission Computed Tomography
DMIRS	Western Australian Department of Mines, Industry Regulation and Safety
enHealth	Environmental Health Standing Committee
HDR	High Dose Rate
NDT	Non-Destructive Testing
PET	Positron Emission Tomography
RHC	Radiation Health Committee
RHERP	Radiation Health Expert Reference Panel
ROLLIS	Radio-guided Occult Lesion Localisation using Iodine-125 Seeds

Units of Activity

Bq	becquerel (1 disintegration per second)
MBq	megabecquerel (1,000,000 becquerels)
GBq	gigabecquerel (1,000,000,000 becquerels)

Units of Effective Dose

Sv	sievert (1 joule per kilogram multiplied by a modifying factor for the type of radiation and the radiological sensitivities of the organs and tissues being irradiated)
mSv	millisievert (one thousandth of a sievert)
μSv	microsievert (one millionth of a sievert)

The Government of Western Australia acknowledges the traditional custodians throughout Western Australia and their continuing connection to the land, waters and community. We pay our respects to all members of the Aboriginal communities and their cultures; and to Elders both past and present.

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