



REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended
31 December 2011

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RADIATION SAFETY ACT 1975

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 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 met six times in 2011.

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.

The only exception is Council's Chiropractic Advisory Committee which is appointed to supervise the radiation safety examination for chiropractors who wish to apply for licences to operate diagnostic x-ray equipment. The committee, which also advises Council on other chiropractic matters, met three times in 2011.

ADMINISTRATIVE SUPPORT

Section 10(4) of the Act provides for the administration of the Act to be paid out of moneys appropriated by Parliament for the purpose. However, the Council is not funded directly and relies on the Department of Health's Radiation Health Branch for administrative and scientific support. While the greater part of the Branch's duties are 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 Branch also provides separate advice to the Department on a range of radiation issues.

The Radiation Health Branch also provides the Secretary of the Council. The position has been held by Ms H Upton (Managing Health Physicist) since February 2002, with Mr L Dahlskog (Senior Health Physicist) or Mrs M Aerts (Health Physicist) performing these duties in Ms Upton's absence.

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 Branch. The Council does not have a budget in its own right.

STATE RECORDS ACT

The Radiological Council's record keeping systems are managed by the Radiation Health Branch 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.

THE RADIOLOGICAL COUNCIL WEBSITE

In 2004 the first version of the Radiological Council website was finalised and was made available for access by the public at the address www.radiologicalcouncil.wa.gov.au. The Website was updated during 2011 to satisfy the greater depth of information being sought by the public concerning the requirements of the Act. The website will continue to be updated to ensure its continued relevance and usefulness.

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

A summary of the legislative scheme for ensuring the appropriate qualifications and competence of persons applying for licences is included in appendix 2.

CHANGES TO LEGISLATION

Amendments made to the Act and Regulations in 2011 are listed in attachment 2.

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 and as soon as practicable should any of the abnormal or unplanned radiation exposures specified in that regulation occur.

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.

During this calendar year the Radiological Council discussed the apparent under reporting of radiology incidents and asked its officers to review current reporting requirements and report back to Council with their findings.

The Council was notified of 17 incidents during 2011.

Medical Incidents

- A hospital reported a misadministration had occurred within its nuclear medicine department when 920 MBq of ^{99m}Tc MDP for a whole body bone scan had been administered.

A registrar, who meant to request a CT scan, had written "Whole Body Scan" on the request form without identifying the procedure as an x-ray examination. The patient attended the Nuclear Medicine Department as an outpatient and was administered ^{99m}Tc MDP for a whole body bone scan. Shortly after the radiopharmaceutical had been administered, the requesting registrar telephoned to cancel the test. No nuclear medicine imaging was performed as the registrar advised that a bone scan would be of no use in the patient's clinical setting. The Radiation Safety Officer estimated the effective dose from the administered activity as 5.2 mSv.

The hospital provided a report which the Council agreed was satisfactory.

- A hospital radiology department reported an incident where an orthopaedic registrar undertook a fluoroscopic procedure in theatre while wearing only a lead rubber pelvis and thyroid protector.

On completing the procedure, the registrar removed his theatre greens and it became apparent that the protective clothing being worn was inadequate. The Medical Imaging Technologist (MIT) advised the registrar that the protection was inappropriate and reported the matter to the Radiation Safety Officer. The Radiation Safety Officer wrote to the registrar outlining the personal protective equipment requirements for fluoroscopy.

Council wrote to both the registrar and the responsible licensed surgeon regarding its concerns at the incident and the apparent lack of supervision of the registrar by the licensee.

- A hospital Radiation Safety Officer advised Council of an incident where an unlicensed medical practitioner had used fluoroscopy for the purpose of fracture reduction. The MIT who was present during the procedure was unaware that the medical practitioner was not authorised for the use of this equipment until the procedure was completed.

The hospital provided a satisfactory response to Council's request for information on how they intended to minimise the possibility of a reoccurrence. Council also agreed that a publicly accessible database of licensees may be useful to assist in the prevention of these types of incidents.

- A hospital reported that higher than typical finger doses had been received by a staff member during radiopharmaceutical dispensing. The doses were 57.19 mSv (right finger) and 34.86 mSv (left finger). These may be compared with the pro-rata monthly finger limit of 41.7 mSv. The staff member's whole body dose for the period was 0.24 mSv which can be compared to a pro-rata monthly whole body limit of 1.67 mSv.

The staff member performs tasks of quality assurance and dispensing as well as post-graduate research work. The routine dispensing procedures were identified as the cause of the higher-than-typical finger doses and further training and supervision of handling techniques was provided. Council was also advised that the laboratory was also testing an automatic dispensing unit which had the potential to reduce hand doses to all dispensing staff, noting that even those with an experienced technique typically receive around 25% (occasionally up to around 50 or 60%) of the pro-rata extremity dose limit.

- Council received a report from a hospital Registrant in regard to an unplanned exposure. A patient had undergone a CT scan of the brain which they did not require. The Registrant advised that the wrong patient was brought from the ward and that the MIT conducting the scan had not followed correct patient identification procedures.

Council wrote to the MIT informing them of the seriousness of the incident and reminding them of their obligations.

- A practice reported an incident of an unplanned exposure when the wrong patient underwent a CT head scan owing to an incorrect identification label being attached to the referral form. The practice was alerted by the patient's doctor that the clinical history on the form was incorrect for the patient. The estimated effective dose for the scan was 2.52 mSv.

Council agreed that the incident could not have been avoided once the incorrect patient sticker had been placed on the referral form and wrote to the practice reminding them of the importance of matching patient details and information.

- A hospital Radiation Safety Officer advised of the incorrect disposal of three low activity calibration sources (one ^{241}Am source and two ^{57}Co sources). The two ^{57}Co sources, at the time of their disposal, were below the exempt limit specified in Schedule V of the Radiation Safety (General) Regulations.

The Council accepted the Radiation Safety Officer's report on the hospital's plans to minimise a reoccurrence of this type of incident.

- A nuclear medicine practice advised that a $^{99\text{m}}\text{Tc}$ thyroid dose was administered to a patient by a nuclear medicine technologist when the pregnancy status (although very early) of the patient was uncertain. The patient and her partner were subsequently counselled by the nuclear medicine physician and informed that the radiation risk to the patient and the baby was negligible. The practice also intended reviewing its practices.

The Council noted that the technologist had also been counselled and that the practice's procedures had been reviewed.

- A radiology practice reported an incident to Council whereby a CT scan of the elbow was carried out on a patient who had been referred for bilateral shoulder x-ray and ultrasound examinations, plus steroid injection if indicated.

An investigation by Council's officers found that while there was an error in patient identification resulting in the patient receiving an unjustified CT elbow scan, the error did not involve the MIT changing the referral as initially alleged. However, the investigation revealed a number of issues which contributed to the unnecessary scan being performed. These included a lack of adherence to patient identification procedures; signatures and dates being omitted from some request forms; and clerical errors involving the incorrect placement of labels over vital information on request forms.

Council wrote to the practice regarding the outcome of the investigation drawing its attention to the weaknesses in the administrative processes for patient identification.

- A nuclear medicine practice reported that a radioactive calibration source had inadvertently been dispatched with old equipment to a scrap metal dealer.

The equipment had been decommissioned in 2008 but a 9.3 MBq ^{137}Cs check source had not been removed before storing the equipment in the nuclear medicine department pending disposal. In preparation for the renovation of the room, the equipment, together with the check source, was sent to a scrap metal dealer. The source was detected by the scrap metal company as part of its routine radiation monitoring procedures and taken to a registered storage facility for proper disposal.

Council agreed to inform other nuclear medicine practices of the incident.

- A hospital Radiation Safety Officer reported the misadministration of a radiopharmaceutical in a nuclear medicine department.

During a combined rest/stress examination, the radiopharmaceutical for the stress component was mistakenly administered during the resting phase of the test, necessitating a repeat of the stress dose component the following day resulting in the patient receiving an additional 1,060 MBq of $^{99\text{m}}\text{Tc}$ MIBI. The additional radiation dose was estimated as 9.0 mSv.

A review of the incident indicated that the cause was a breakdown in staff communication. The nuclear medicine department initiated a review and protocols were amended to have all MIBI dose labels clearly marked with REST or STRESS as a visual prompt for the technologist administering the doses.

- A hospital Radiation Safety Officer reported that a nuclear medicine diagnostic scan had been cancelled after the administration of 17.3 MBq of ^{111}In when the medical team responsible for the patient required immediate surgery to be undertaken due to a biopsy having confirmed infection. The estimated radiation dose to the patient was 10 mSv.

In this particular case, it appears that the course of action in taking the patient for surgery without completing the scan was appropriate.

Industrial Incidents

- A member of the public reported that they had found 5 radioactive items in a skip bin and had taken two of the items home. From the description provided it appeared that the items were the old style exit signs containing tritium.

The two exit signs were provided to the Radiation Health Branch and investigations concluded that the remaining three exit signs had been disposed of to a municipal landfill site.

Council noted the inadvertent disposal and that it was not deemed practical to try and retrieve the signs already buried at the landfill site. The risk to workers and the public at the landfill site was deemed to be negligible from these items.

- A Radiation Safety Officer from an industrial company reported to Council that a Troxler Model 3430 portable moisture density gauge containing 300 MBq of ^{137}Cs and 1.48 GBq of $^{241}\text{Am/Be}$ had been stolen.

The company was instructed to conduct searches of the nearby parklands in the surrounding areas. The local Councils were notified of the missing gauge and its appearance, and fliers were distributed in the neighbourhood, shops and also attached to poles in the area. The search also took into account known areas for dumping refuse and waste. The WA police and State and Territory regulators were also notified.

Council officers conducted interviews of appropriate personnel within the company and forwarded the information to the State Solicitor's office for advice on prosecution. Advice was received in December of 2011 that a case could be brought against the company and the Council authorised the prosecution to proceed.

- A transport incident occurred during September 2011 on the Great Northern Highway, Muchea. A truck, belonging to a licensed carrier, was carrying a logging gauge with a 7.4 GBq of ^{137}Cs source, when it was involved in an accident with another truck.

Council officers attended the scene of the incident and confirmed that the container was not damaged and that no one would have been exposed to the radioactive source. No breaches of the Radiation Safety (Transport of Radioactive Substances) Regulations had occurred.

- Notification was received from the Radiation Safety Officer of a well logging company that a logging tool had been abandoned in the north west of the State.

The logging tool, containing 63 GBq ^{137}Cs and 370 GBq ^{241}Am , had become stuck at a depth of 4245 m. Source fishing operations were unsuccessful and the tool was deemed unrecoverable.

The conditions of registration require that where a source is irretrievably lost in a bore hole, written notification is given to the owner and/or operator of the bore hole that the source is to be cemented in situ; the location of the source is documented for the owner's records; and that no further drilling is permitted in the immediate vicinity of the source that risks intersecting with the source.

Notification of the abandonment was provided to the National Offshore Petroleum Safety Authority and the Petroleum Division of the Department of Industry and Resources.

- Notification was received from the Radiation Safety Officer of a well logging company that a logging tool had been abandoned offshore in the north west of the State.

The logging tool, containing 63 GBq ^{137}Cs and 555 GBq ^{241}Am , had become stuck at a depth of approximately 4000 m. Source fishing operations were unsuccessful and the tool was deemed unrecoverable.

The conditions of registration require that where a source is irretrievably lost in a bore hole, written notification is given to the owner and/or operator of the bore hole that the source is to be cemented in situ; the location of the source is to be documented for the owner's records; and that no further drilling is permitted in the immediate vicinity of the source that risks intersecting with the source.

Notification of the abandonment was provided to the National Offshore Petroleum Safety Authority and the Petroleum Division of the Department of Industry and Resources.

PROSECUTIONS

Prosecution of the company which had advised the theft of a nuclear moisture density gauge was initiated in December 2011 with a hearing date set for January 2012.

MEDICAL AND RELATED RADIATION MATTERS

Compliance Testing

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

No 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 the registration under Section 36 of the Act, the registrant (the owner) is legally responsible for satisfying the requirements of the compliance testing program.

Over the last few years the compliance testing program has been challenged by the rapid rollout of new technologies, the increasing workload and the reduced resources. These challenges have continued in 2011 and although additional resources have not been provided to the Branch some changes in staff allocations has resulted in some progress in this area.

The number of compliance tests of diagnostic x-ray equipment received by Council in 2011 was 1248. A summary of the statistics for the compliance program per type of diagnostic medical imaging equipment is included in attachment 3.

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 pre-determined levels, Radiological Council approval must be obtained.

In keeping with the Australian Radiation Protection and Nuclear Safety Agency Radiation Protection Series # 8 (2005) *Exposure of Humans to Ionizing Radiation for Research Purposes*, 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 adult subject exceeds 5 mSv in any year.

Council assessed and approved the radiation component of the following research applications in 2011.

Research Project Title	Institution
Dose and image quality in computed tomography pulmonary angiography (CTPA): An assessment of the effects of reduced peak kilo-voltage (kVp) and the alternative reconstruction method: adaptive statistical iterative reconstruction (ASIR)	Private Practice
Double blind randomized phase III study of lenalidomide (revlimid) maintenance versus placebo in responding elderly patients with DLBCL and treated with R-CHOP in first line	Public Hospital
A Phase II, Open-Label, Multi-Dose Study of the Monoclonal Antibody, MDX-1097 in Previously Treated Kappa Light Chain Restricted Multiple Myeloma Subjects with Stable Measurable Disease (Immune System Therapeutics, Protocol No: MDX1097-02).	Public Hospital
A Phase III, multicentre, Open-Label, Randomised Trial Comparing the Efficacy of GA101 (RO507259) in Combination with CHOP (G-CHOP) versus Rituximab and CHOP (R-CHOP) in Previously Untreated Patients with CD20- Positive Diffuse Large B-Cell Lymphoma (DLBCL)	Public Hospital
A Multicentre, Phase III, open-label, randomised study in previously untreated patients with advanced indolent Non-Hodgkin's lymphoma evaluating the benefit of GA101 (RO5072759) plus chemotherapy compared with Rituximab plus chemotherapy followed by GA101 or Rituximab maintenance therapy in responders	Public Hospital

Research Project Title	Institution
A Single Arm Phase II Study of the Efficacy of Tamoxifen in Triple Negative (Oestrogen Receptor Alpha Negative Progesterone Receptor Negative, HER-2 Negative) but Oestrogen Receptor Beta Positive Metastatic Breast Cancer	Public Hospital
A Phase 3, Randomised, Double Blind, Multicenter Trial Comparing Orteronel (TAK-700) plus Prednisone with Placebo plus Prednisone in Patients with Chemotherapy-Naïve Metastatic Castration-Resistant Prostate Cancer (Millennium Pharmaceuticals Inc: Protocol C21004) - Revision of previously approved protocol.	Public Hospital
A Phase 3, Randomised, Double Blind, Multicenter Trial Comparing Orteronel (TAK-700) plus Prednisone with Placebo plus Prednisone in Patients with Metastatic Castration-Resistant Prostate Cancer that has Progressed during or following Docetaxel-based Therapy (Millennium Pharmaceuticals Inc: Protocol C21005) – Revision of previously approved protocol.	Public Hospital

INDUSTRIAL, ENVIRONMENTAL and MINING RADIATION

Industrial Compliance Testing

The Council's compliance testing program for fixed radiation gauges commenced in 1999. The program requires that gauges are not used unless they have a current certificate of compliance. The number of compliance tests received by the Council in 2011 was 209. A summary of compliance tests assessed in 2011 is included in attachment 3.

Standards for Council Examinations

Council had previously agreed that improved control over industrial radiation safety examination standards was necessary and had decided that while course providers may continue to invigilate examinations, all industrial papers would be returned to Council's officers for marking. The program commenced during the last quarter of 2002. In 2011, Council officers marked 622 industrial examination papers. The number of exams marked in each category is listed in attachment 4.

Uranium Mining

In September 2008, the State Government officially overturned a ban on uranium mining in Western Australia. Uranium mining and processing, certain exploration activities and the transport of uranium ore are subject to the Radiation Safety Act and any subsidiary legislation.

The Council has an independent role to ensure the appropriate oversight of the radiation safety aspects of uranium mining 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.

In 2011 the *Independent Review of Uranium Mining Regulation* report prepared by the *Uranium Advisory Group* for the Department of Mines and Petroleum was provided to Council. Council provided formal comments on the draft report.

ARPANSA – Dose Register

The Australian National Radiation Dose Register (ANRDR) was officially launched in June 2011.

The ANRDR was established in 2010 to collect, store, manage and disseminate records of radiation doses received by workers in the course of their employment in a centralised database. The ANRDR is maintained and managed by ARPANSA and has been initially set up to accept dose reports from operating uranium mines, but it is anticipated that this database may be extended to include other occupations at a later stage.

National Mine Safety Framework

The National Mine Safety Framework (NMSF) aims to establish a nationally consistent occupational health and safety (OHS) regime in the mining industry. In May 2009, the Workplace Relations Ministers' Council directed Safe Work Australia to develop a Model OHS Act and supporting regulations.

The NMSF had identified a number of *principal mining hazards* with radiation being one of these. A Code of Practice on Naturally Occurring Radioactive Material was drafted which, according to its author, drew on RPS 9 *Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)* and on WA guidance. None of the radiation regulators in any of the Australian States or Territories were consulted during the preparation of this document.

When the regulators became aware of the document in June 2011, a process of engagement with Safe Work Australia and the NMSF commenced, led by the ARPANSA Radiation Health Committee Chair and representatives of the radiation regulators from the various jurisdictions.

At the end of 2011 discussions on this issue were continuing.

MISCELLANEOUS***Relocation of Radioactive Transit Store and Radiation Health Branch Offices***

During 2011 the existing radioactive transit store was planned for demolition and a new store rebuilt at a different location on the same premises.

An independent health physics consultant was engaged to prepare the plans and proposals which were examined and endorsed by the Council.

Also during 2011 the staff of the Radiation Health Branch were relocated to refurbished premises at Grace Vaughan House in Shenton Park. The previous offices on the Queen Elizabeth II Medical Centre site had been occupied by the Branch since 1961.

Radiation Health Committee

The Radiation Health Committee is a body established to advise the Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Agency 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 Radiation Health Committee through the Secretary of the Radiological Council who attends the committee meetings trimonthly.

A list of publications for 2011 is in attachment 5.

National Directory for Radiation Protection

At the Australian Health Ministers' Conference (AHMC) held in June 2004, the Ministers endorsed the adoption of the National Directory for Radiation Protection, Edition 1, as the Framework for National Uniformity in Radiation Protection.

Further development of the National Directory continued in 2011 through the national Radiation Health Committee.

Council continued its participation in the development of the National Directory and provided comment to the Radiation Health Committee.

Personal Radiation Monitoring Services

Council currently recognises six organisations for the provision of a personal radiation monitoring service in accordance with the Regulations –

- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Commonwealth Government's radiation safety agency in Victoria.
- New Zealand National Radiation Laboratory, the New Zealand national radiation safety organisation
(Australian agent: Australian Radiation Services Pty Ltd, Victoria).
- Australian Radiation Services Pty Ltd, a company based in Victoria.
- Landauer Inc (USA) for the Luxel based system.
(Agent: Landauer Australasia Pty Ltd)
- Global Dosimetry Solutions, a company based in USA.
- Global Medical Solutions Australia, a company based in NSW.

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, transilluminators and sun tanning units used for commercial purposes.

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 2011 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. Although exempt from licensing, 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. Twenty Temporary Permits were current as at 31 December 2011.

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 2011.

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 the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) under the Commonwealth Government's Australian Radiation Protection and Nuclear Safety Act 1999.

Appendix 2: Licence Prerequisites

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, for example –

- Bone Densitometry*
- Compliance Testing of Diagnostic X-ray Equipment*
- Fluoroscopy – Medical*
- Fixed Radioactive Gauges*
- Industrial Radiography*
- Lasers – Medical and Industrial*
- Portable Radioactive Gauges*
- Transport of Radioactive Substances*
- Unsealed Radioisotope Handling*
- Well (Borehole) Logging*
- X-ray Operator*

Attachment 1: Radiological Council

MEMBERS OF THE 12TH 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 G Groom
<i>Appointment under Sections 13(2)(b), 15(1) and 17 (1) of the Act</i>		
Dr M Bennett	Radiologist	Dr D Dissanayake
Dr G Groom	Nuclear Medicine Physician	Dr G Bower
Dr R Fox	Physicist	Dr R Price
Mr M Ross	Electronic Engineer	Mr J O'Donnell
Prof J McKay	Tertiary Institutions representative	Dr S Hinckley
Mr G Scott	Medical Radiation Technologist	Mr N Hicks
Mr N Tsurikov	Expert in Mining Radiation Hazards	
Mr F Harris	Expert in Mining Radiation Hazards	
Mr B Cobb	Co-opted member	not applicable

2011 MEETING ATTENDANCE

	10 FEB	21 APR	9 JUN	11 AUG	6 OCT	14 DEC
Dr A Robertson	✓	✓	✓	✓	✓	✓
Dr R Fox	✓	✓	✓	✓	✓	✓
Dr G Groom	✓	✓	✓	✓	✓	D
Mr M Ross	✓	✓	✓	✓	A	✓
Prof J McKay	A	✓	✓	A	✓	✓
Dr M Bennett	A	✓	✓	✓	✓	✓
Mr B Cobb	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	A	A	A	✓	A
Mr F Harris	A	A	A	A	A	A
Mr G Scott	✓	✓	✓	✓	✓	✓

✓ attended A apology D deputy NA not appointed at the time

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

None.

RADIATION SAFETY (GENERAL) REGULATIONS

Radiation Safety (General) Amendment Regulations 2011.

Regulations to update the definitions of chiropractor, dentist, medical practitioner, physiotherapist and podiatrist to those contained in the Health Practitioner National Law (Western Australia).

Government Gazette 1 April 2011 pages 1183-4.

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

RADIATION SAFETY (QUALIFICATIONS) AMENDMENT REGULATIONS

None

Attachment 3: Compliance Testing

Medical

- A** *Compliant*
B *Conditionally compliant*
C *Non-compliant¹*

Category	A	B	C	Total
CT	53	-	3	56
Dental – intraoral	494	-	10	504
Dental – panoramic and/or cephalometric	64	-	1	65
Fluoroscopic – fixed	37	-	9	46
Fluoroscopic – fixed C or U arm	18	1	5	24
Fluoroscopic – mobile	80	-	10	90
Mammography	67	-	3	70
Radiographic – fixed	93	1	22	116
Radiographic – mobile	59	-	2	61
Total	965	2	65	1032

Industrial – Fixed Gauges

- A** *Compliant*
B *Non-compliant²*

Category	A	B	Total
Density	158	12	170
In-stream analysis	6	-	6
Level	45	7	52
Thickness	-	-	0
Total			228

¹ 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 59 re-tests conducted during 2011, 98% resulted in the equipment being granted either a compliance or conditional compliance certificate.

² Equipment that has been assessed as non-compliant cannot be used until it has been re-tested and issued with a certificate of compliance. No retests were conducted during 2011.

Attachment 4: Industrial Radiation Safety Examinations*Current at 31 December 2011*

Category	2011	2010	2009	2008	2007
Borehole Logging	67	78	41	78	46
Fixed Gauges	138	95	64	141	78
Gamma Irradiator	0	3	3	0	0
Industrial Radiography	24	36	88	56	40
Industrial Radiography (Assistant)	123	86	146	92	65
Portable Gauges	137	65	50	73	96
Portable Gauges (WA Requirements)	28	19	14	8	4
Transport	17	26	20	27	28
Service – Cabinet X-ray	4	1	4	10	1
Service – Industrial Radiography (X-ray)	0	0	0	0	1
Service – X-ray Analysis	0	3	0	4	0
X-ray Analysis – Use	15	6	8	4	0
X-ray Analysis – Use and Restricted Service	69	47	50	69	50
Total	622	465	488	562	409

**Attachment 5: List of Australian Radiation Protection and Nuclear Safety
Agency publications for 2011**

Title
RPS No. 6 National Directory for Radiation Protection, Amendment No 5. June 2011.
RPS No.9.1 Safety Guide for monitoring and recording Occupational Doses in Mining and Mineral Processing (2011)

Attachment 6: Registered Irradiating Apparatus, Electronic Products and Radioactive Substances (sealed sources)

Current at 31 December 2011

A *Irradiating apparatus and electronic products³*

B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	44	-
Cabinet x-ray equipment	114	-
Calibration	2	425
CT	104	-
CT/SPECT	5	-
Dental – intraoral	1767	-
Dental – panoramic and/or cephalometric	288	-
Education and research	15	902
Fluoroscopic – fixed	85	-
Fluoroscopic – mobile	107	-
Gauges – density/level	6	2383
Gauges – in stream analysis	-	88
Gauges – logging	14	321
Gauges – neutron moisture/density portable	-	355
Gauges – other	-	234
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	18	-
Laser – industrial	82	-
Laser – medical	212	-
Laser – other medical	126	-
Laser – research	91	-
Linear accelerator	12	-
Mammography	82	-
Non-destructive testing	91	93
Non-destructive testing – crawler control	-	12
Portable mineral analyser	-	18
Radiographic – fixed	361	-
Radiographic – mobile	417	-
Sealed Sources – other	-	106
Simulator	1	-

³ This data column specifically excludes x-ray equipment that is no longer operable but for which compliance testing data is held.

Category	A	B
Special purpose x-ray	62	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	-	158
Sun Tanning Unit	53	-
Superficial radiotherapy	4	-
Test source	2	-
Therapy	1	37
Therapy – HDR brachytherapy	-	3
Transilluminator	102	-
Tracer Studies	-	27
X-ray analysis	367	-
Total	4636	5221

Attachment 7: Licences and Registrations*Current at 31 December 2011**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2011	2010	2011	2010	2011	2010
Licences	4245	3946	1905	1813	6150	5759
Registrations	1541	1495	346	344	1887	1839
TOTAL	5786	5441	2251	2157	8037	7598
Change from 2010	+ 6.3%		+ 4.4%		+ 5.8%	

Attachment 7 (cont)

Purposes for Licences and Exemptions from Licence

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

A Granted or renewed in 2011

B Total current

A	B	Purpose
2	6	Bone Densitometry
0	6	Bone Densitometry (Exemption)
26	57	Cabinet X-ray Equipment
1	1	Cobalt Teletherapy Maintenance
20	51	Compliance Testing - Diagnostic X-ray Equipment
27	88	Compliance Testing - Radioactive Gauges
1	3	Cyclotron Operation
2	6	Cyclotron Servicing
0	4	Education (Apparatus)
9	30	Education (Substances)
118	289	Fluoroscopy - Medical
66	144	Fluoroscopy - Medical (Exemption)
15	39	Fluoroscopy - Medical (Non-Specialist Exemption)
1	1	Fluoroscopy - Research
0	1	Fluoroscopy - Veterinary
1	2	Gamma Irradiator - Use
141	349	Gauges - Industrial
3	8	Gauges - Industrial (Installation)
1	3	Gauges - Level (CO2)
162	365	Gauges - Logging
233	459	Gauges - Moisture and/or Density (Portable)
1	4	Gauges - Other (Apparatus)
17	26	Gauges - Other (Substances)
1	2	Installation of X-ray Equipment
4	5	Installation of X-ray Equipment - Dental
6	10	Lasers - Acupuncture
0	7	Lasers - Chiropractic
32	66	Lasers - Dental
1	10	Lasers - Educational
6	20	Lasers - Entertainment
23	69	Lasers - Industrial
84	222	Lasers - Medical
35	74	Lasers - Physiotherapy
11	28	Lasers - Research

A	B	Purpose
19	57	Lasers - Service
1	3	Lasers - Veterinary
1	3	Manufacture of X-ray Equipment
2	2	Medical Physics
4	8	Medical Physics - Radiotherapy (Apparatus)
2	3	Medical Physics - Radiotherapy (Substances)
23	67	Medical Radiation Technology - Diagnostic Nuclear
325	1 010	Medical Radiation Technology - Medical Imaging
63	169	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
78	218	Medical Radiology
1	5	Non-Medical Irradiation
8	29	Nuclear Medicine - Diagnostic
8	29	Nuclear Medicine - Therapeutic
1	1	Nuclear Medicine - Veterinary
3	11	Pathology Tests
10	36	Portable Mineral Analysers
110	223	Portable Mineral Analysers (X-ray)
3	8	Possession of X-ray Equipment - Diagnostic Medical
1	1	Quality Assurance Procedures
7	31	Radioactive Ores - Analytical Laboratories
1	9	Radioactive Ores - Exploration
8	16	Radioactive Ores - Mining and/or Processing
3	9	Radioactive Substances - Calibration Sources
0	2	Radioactive Substances - Medical
12	39	Radioactive Substances - Sale
7	28	Radioactive Substances - Service of Devices
0	1	Radioactive Substances - Tracer Studies
13	19	Radioactive Substances - Tracer Studies (Industry)
3	3	Radiography - Chiropractic (Exemption)
6	36	Radiography - Chiropractic (Extended)
55	156	Radiography - Chiropractic (Restricted)
112	335	Radiography - Industrial (Gamma)
108	330	Radiography - Industrial (X-ray)
0	1	Radiography - Medical (Direction and Supervision)
1	1	Radiography - Security
201	260	Radiography - Veterinary
2	3	Radiology - Veterinary
4	16	Radiopharmaceutical Manufacture and Dispensing
5	16	Radiotherapy - Medical (Apparatus)
6	21	Radiotherapy - Medical (Substances)
2	7	Radiotherapy - Medical Superficial
0	4	Radiotherapy - Veterinary (Apparatus)

A	B	Purpose
4	12	Research
25	70	Research - Unsealed Radioactive Substances
1	5	Research - X-ray
13	23	Sale of Electronic Products
32	80	Sale of X-ray Equipment
10	22	Service of X-ray Equipment - Analytical
11	28	Service of X-ray Equipment - Dental
43	100	Service of X-ray Equipment - Diagnostic
2	13	Service of X-ray Equipment - Diagnostic (Extended)
3	5	Service of X-ray Equipment - Industrial NDT
0	2	Service of X-ray Equipment - Intraoral
6	12	Service of X-ray Equipment - Linear Accelerators
13	31	Service of X-ray Equipment - Other
4	10	Special Purpose Enclosed X-ray Equipment
0	1	Static Detection
1	1	Static Electricity Measurement
1	2	Static Elimination
0	2	Storage (Apparatus)
0	5	Storage (Substances)
8	21	Transilluminators
34	103	Transport
0	1	X-ray Analysis
1	1	X-ray Analysis (Research)
15	50	X-ray Analysis - Use
82	214	X-ray Analysis - Use and Service (Restricted)

Attachment 7 (cont)

Purposes for Registrations and Exemptions from Registration

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

A Granted or renewed in 2011

B Total current

A	B	Purpose
6	11	Bone Densitometry
9	23	Bone Densitometry (Exemption)
28	64	Cabinet X-ray Equipment
0	1	Cyclotron Operation
1	1	Disposal of Radioactive Waste – Mt Walton East IWDF
1	4	Education (Apparatus)
2	9	Education (Substances)
1	5	Education - Demonstration Radioactive Sources
0	3	Education - Demonstration Radioactive Sources (Exemption)
1	4	Education - Demonstration Sources
1	1	Fluoroscopy - Medical
0	2	Fluoroscopy - Medical (Image Intensifiers)
0	1	Fluoroscopy - Veterinary
2	2	Gamma Irradiator
39	117	Gauges - Industrial
0	4	Gauges - Level (CO2)
9	21	Gauges - Logging
9	41	Gauges - Moisture and/or Density (Portable)
1	6	Gauges - Other (Apparatus)
4	7	Gauges - Other (Substances)
5	10	Lasers - Acupuncture
2	5	Lasers - Chiropractic
14	44	Lasers - Dental
0	2	Lasers - Educational
4	8	Lasers - Entertainment
10	28	Lasers - Industrial
0	1	Lasers - Manufacture
31	89	Lasers - Medical
12	36	Lasers - Physiotherapy
0	5	Lasers - Research
3	6	Lasers - Sale, Service, Maintenance and Testing
1	4	Lasers - Storage
1	2	Lasers - Veterinary

A	B	Purpose
1	2	Manufacture of X-ray Equipment
43	107	Medical Radiology
1	2	Non-Medical Irradiation
9	22	Nuclear Medicine
2	6	Nuclear Medicine - CT (X-ray)/SPECT
1	1	Nuclear Medicine - Veterinary
7	10	Pathology Tests
3	13	Portable Mineral Analysers
47	102	Portable Mineral Analysers (X-ray)
3	10	Radioactive Ores - Analytical Laboratories
1	5	Radioactive Ores - Exploration
6	33	Radioactive Ores - Mining and/or Processing
5	8	Radioactive Substances - Calibration Sources
0	2	Radioactive Substances - Medical
3	7	Radioactive Substances - Sale
0	2	Radioactive Substances - Service of Devices
0	2	Radioactive Substances - Tracer Studies (Industry)
6	14	Radiography - Chest Screening
21	53	Radiography - Chiropractic
4	6	Radiography - Chiropractic (Referrals)
214	604	Radiography - Dental
0	1	Radiography - Forensic
7	18	Radiography - Industrial (Gamma)
8	18	Radiography - Industrial (X-ray)
3	9	Radiography - Mammography Screening
0	1	Radiography - Medical (GP Extended)
18	51	Radiography - Medical (Operator)
5	16	Radiography - Medical (Unrestricted)
27	67	Radiography - Medical Ancillary (Referrals)
3	6	Radiography - Physiotherapy Referrals
3	4	Radiography - Podiatry Referrals
0	1	Radiography - Security
74	203	Radiography - Veterinary
1	1	Radiography - Veterinary (Hospitals)
1	2	Radiology - Veterinary
1	2	Radiopharmaceutical Manufacture and Dispensing
3	4	Radiotherapy - Medical (Apparatus)
4	10	Radiotherapy - Medical (Substances)
1	1	Radiotherapy - Medical Superficial
0	2	Radiotherapy - Veterinary (Apparatus)
1	2	Regulatory Authority
2	6	Research (Substances)

A	B	Purpose
5	15	Research - Unsealed Radioactive Substances
0	5	Research - X-ray
2	4	Sale of Electronic Products
9	24	Sale of X-ray Equipment
0	2	Secondary Schools - Demonstration Sources
5	29	Secondary Schools - Demonstration Sources (Exemption)
20	42	Security of Radioactive Sources
9	16	Service of X-ray Equipment
0	2	Smoke Detectors - Sale
17	40	Solaria - Possession and Operation
0	5	Special Purpose Enclosed X-ray Equipment
0	1	Static Electricity Measurement
2	3	Static Elimination
9	20	Storage (Apparatus)
4	15	Storage (Substances)
5	14	Transilluminators
5	12	Transport
1	5	X-ray Analysis
29	95	X-ray Analysis - Use

ABBREVIATIONS

General Terminology

ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CT	Computed Tomography
CT/SPECT	Computed Tomography/Single-Photon Emission Computed Tomography
DSA	Digital Subtraction Angiography
HDR	High Dose Rate
MIT	Medical Imaging Technologist
NDT	Non-Destructive Testing
NHMRC	National Health and Medical Research Council
PET	Positron Emission Tomography
TLD	Thermo-Luminescent Dosimeter

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)