

Report of the
**Radiological Council
of Western Australia**

for the year ended
31 December 2012





REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended
31 December 2012

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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 seven times in 2012.

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 twice in 2012.

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 Unit for administrative and scientific support. While the greater part of the Unit'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 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 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 Unit. 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 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.

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

No amendments were made to the Act and Regulations in 2012 (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.

The Council was notified of seven incidents during 2012.

Medical Incidents

- A nuclear medicine practice advised that the wrong ^{99m}Tc radiopharmaceutical had been administered to a 10 month old infant. The intended ^{99m}Tc radiopharmaceutical for a renal scan was then rescheduled for the following week. An investigation found that two prepared injections had been taken into the scanning room (against clinic policy, but because of a delay in readiness of the originally intended prior patient) and the wrong dose for injection was accidentally selected.

Council agreed that the report provided by the practice was satisfactory and that the incident had been managed well.

- A radiology practice reported an incident when the wrong patient underwent a plain film lumbar spine and pelvis x-ray examination due to an error in patient identification. An investigation found that the patient transported to the x-ray department was not wearing a wrist identification band and their identity was not clarified by the Medical Imaging Technologist prior to the examination.

Council wrote to the practice regarding its concerns that incidents of this type persist despite recommendations that rigorous patient identification procedures be implemented and asked the practice for their plans to minimise the likelihood of further occurrences. In addition, a circular to all nuclear medicine and radiology practices on patient identification procedures was prepared and issued to all relevant registrants.

- Council received a report from a hospital Radiation Safety Officer alleging a breach of licence conditions by a medical specialist. Following a report by its officers, Council agreed that the specialist would be required to attend a radiation safety training course. Compliance with his licence conditions would subsequently be monitored for six months. Council also wrote to all similarly licensed medical specialists reminding them of their obligations under the Act and the requirement for compliance with their licence conditions.

Industrial Incidents

- A Radiation Safety Officer from an industrial company reported to Council that a company vehicle transporting a portable moisture/density gauge was involved in a road accident in the far north of Western Australia. The gauge was removed from the accident scene by another licensee and transported to a registered location. It was subsequently confirmed that the gauge had not been damaged and that radiation levels were within expected bounds. No breaches of the Radiation Safety (Transport of Radioactive Substances) Regulations had occurred.
- During 2012, three notifications were received regarding logging tools containing radioactive sources becoming stuck down boreholes. In all cases, operations to recover the sources were conducted. When source recovery operations are unsuccessful the sources are classified as abandoned.

The conditions of registration require that where a source is irretrievably lost in a borehole, written notification is given to the owner and/or operator of the borehole 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 which risks intersecting with its location.

Notification of the abandonment is also provided to the National Offshore Petroleum Safety and Environmental Management Authority and the Petroleum Division of the WA Department of Mines and Petroleum.

A table summarising the notifications is below.

Source Information	Location	Recovered or Abandoned
A 2.2GBq ⁶⁰ Co logging source	North Western Australia	Recovered
A 1.13 GBq ⁶⁰ Co logging source	North Western Australia	Recovered
A 63 GBq ¹³⁷ Cs logging source and a 278 GBq ²⁴¹ Am logging source	Offshore – became stuck at a depth of 4570 m	Abandoned

PROSECUTIONS

In 2011, a company advised of the theft of a nuclear moisture density gauge. On investigation it was alleged that three breaches of the conditions placed on their registration under the Radiation Safety Act had occurred. The alleged breaches were as follows;

- The company failed to ensure that the gauge was only used by a licensed person or by an assistant under the direction and immediate personal supervision of a licensed person;
- The company failed to ensure that the storage of the gauge complied with both Regulation 30 of the Radiation Safety (General) Regulations and section 5.1 of the ARPANSA Code of Practice for Portable Density/Moisture Gauges Containing Radioactive Sources (the Code); and
- The company failed to comply with section 5.2 of the Code that stipulated that the gauge must only be transported with the source assembly fully retracted and key locked in the shielded position.

A prosecution was initiated in December 2011 and a hearing date was set for 31 January 2012. The company pleaded guilty to all charges and a fine of \$5000 plus \$74.70 court costs was imposed.

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

As has been previously reported, 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 continue and the limited progress in developing and revising test procedures and compliance criteria continues to be of concern.

The number of compliance tests of diagnostic x-ray equipment received by Council in 2012 was 1032. A summary of the statistics for the compliance program per type of diagnostic medical imaging equipment is included in attachment 3.

X-ray Operator Course

In 2012 the Council received notification from the Department of Health's Western Australian Country Health Services (WACHS) that following the completion of the November 2012 course WACHS would no longer be a provider of x-ray operator training. The regulations require x-ray operators to have attended an approved course of training and pass an examination in radiation safety and radiographic techniques for plain radiography of the chest and extremities. So that remote and rural areas would not be disadvantaged by a hiatus in training, Council sought other potential course providers and welcomed an approach from the Department of Medical Imaging at Curtin University. Council accepted Curtin's proposal and noted that the first x-ray operator course at the University would be held in May 2013.

Council wishes to record its appreciation to all those who have contributed to the course over the years and in particular the staff of the Department of Health's WACHS, Biomedical Engineering and Radiation Health Unit.

Cone Beam Volumetric Tomography

During 2012, submissions were received on the Western Australian dental use requirements for Cone Beam Volumetric Tomography (CBVT). One of these submissions was received from a dentist, and the remaining submissions were from equipment manufacturing and supplier organisations.

As CBVT equipment has the potential to increase patient dose, Council sought the advice of specialist dentists, dental radiologists, and relevant WA professional bodies on the appropriate qualifications and training required for the use of the CBVT equipment. The advice received recommended to Council that the only suitable qualification for dentists to attain in Australia, where they would receive sufficient training to use CBVT equipment and to correctly interpret the images, is the Masters Degree in Oral and/or Maxillofacial Radiology offered by the University of Queensland and the University of Adelaide.

Council reviewed the qualification requirements in 2012 and based on the advice received decided to retain the current WA requirements.

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 Radiation Protection and Nuclear Safety Agency (ARPANSA) 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 or amendments in 2012.

Research Project Title
<p>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).</p> <p><i>(Amendment to previously approved application)</i></p>
<p>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).</p> <p><i>(Amendment to previously approved application)</i></p>
<p>A Phase III, Multicenter, 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).</p>
<p>A Multicentre, Phase III, open-label, randomized 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 Rituximab maintenance therapy in responders.</p>

Research Project Title
A phase III study of the impact of a physical activity program on disease-free survival in patients with high risk stage II or stage III colon cancer: a randomised controlled trial (CHALLENGE).
PTO-001 – Transthoracic Pneumonostomy for Severe Emphysema. <i>(Amendment to previously approved application)</i>
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.
Randomised crossover trial and physiology of dorsal versus caudal zona incerta deep brain stimulation in Parkinson's disease of tremor.
A Placebo-Controlled, Multicenter Randomized, Double Blind Trial to Evaluate the Safety and Effectiveness of Ik-5001 for the Prevention of Remodelling of the Ventricle and Congestive Heart Failure after Acute Myocardial Infarction ("Preservation I Trial").
A phase III study of the impact of a physical activity program on disease-free survival in patients with high risk stage II or stage III colon cancer: a randomised trial (CHALLENGE). <i>(Amendment to previously approved application)</i>
Phase 2 Study of LY2784544 in patients with Myeloproliferative Neoplasms.
A Phase III Prospective, Two-Cohort Non-Randomised, Multicenter, Multinational, Open Label Study to Assess the Safety of Assisted – and Self-Administered Subcutaneous Trastuzumab as Adjuvant Therapy in Patients with Operable HER2-Positive Early Breast Cancer ("SafeHer").
A Multi-center, Randomized, Phase 3 Study of Sequential Pralatrexate Versus Observation in Patients with Previously Undiagnosed Peripheral T-cell Lymphoma Who Have Achieved an Objective Response Following Initial Treatment with CHOP-based Chemotherapy Protocol PDX-017
A Multicentre, Randomised, Open-Label Phase 2b Study to investigate the Preliminary Efficacy and Safety of INNO-206 (Doxorubicin-EMCH) Compared to Doxorubicin in Subjects with Metastatic, Locally Advanced, or Unresectable Soft Tissue Sarcoma'

Research Project Title
Renal Denervation in Patients with Chronic Heart Failure and Renal Impairment (SYMPPLICITY – HF).
A Prospective, Double Blind, Randomized, Placebo-Controlled Clinical Trial of Intracoronary Infusion of Immunoselected, Bone Marrow-Derived Stro3 Mesenchymal Precursor Cells (MPC) in the Treatment of Patients with ST-Elevation Myocardial Infarction (The AMICI Trial).
A prospective, double blind, randomized, placebo-controlled clinical trial of intracoronary infusion of immunoselected, bone marrow-derived Stro3 mesenchymal precursor cells (MPC) in the treatment of patients with ST-elevation myocardial infarction.
Clinical valuation of the ‘Therapeutic IntraVascular Ultrasound (TIVUSTM) System’. A system for renal denervation in patients with resistant hypertension.
Optimising Anterior Pallidal Deep Brain Stimulation (DBS) for Tourette’s Syndrome.
A Phase I study to evaluate Mesenchymal Stromal Cells (MSC) for treating Chronic Obstructive Pulmonary Disease (COPD).
A Randomised Phase 3 Study Comparing Cabazitaxel/Prednisone in combination with Custirsen(OGX-011) to Cabazitaxel/Prednisone for Second-line Chemotherapy in Men with Metastatic Castrate-Resistant Prostate Cancer. Protocol OGX-011-12
INNO-206 (Doxorubicin-EMCH) compared to Doxorubicin in subjects with Metastatic, Locally Advanced, or Unresectable Soft Tissue Sarcoma. Protocol INNO-206-P2-STS-01
A pilot study of the utility of combination F18-fluorodeoxyglucose and F18-fluorocholine positron emission tomography imaging in hepatocellular carcinoma.
A Phase 2, Randomised Dose-ranging Study to evaluate the Efficacy of Tralokinumab in Adults with Idiopathic Pulmonary Fibrosis
Compare and Assess the use of the BodyFIX system (Elekta Medical Intelligence) with and without the vacuum wrap against the current immobilisation device for Thoracic and Abdominal Cancers, to determine which is most suitable for use with Stereotactic Body Radiotherapy (SBRT) patients.

Research Project Title

Assessment of Overall Survival of FOLFOX6m plus SIR-Sphere microspheres versus FOLFOX6m alone as first-line treatment in patients with non-resectable liver metastases from primary colorectal carcinoma in a randomised clinical study (FOXFIREGlobal) – Protocol STX0112.

A Phase III, Double-Blind, Placebo-Controlled Study of Vemurfenib versus Vemurfenib Plus GDC-0973 in previously untreated BRAF^{V600}-Mutation Positive Patients with Unresective Locally Advanced or Metastatic Melanoma (Study GO28141).

A Randomised Phase II Study of Cetuximab Alone or in Combination with Irinotecan in patients with metastatic CRC with either KRAS WT or G13D mutation.

A Multicentre, Non-Randomised, Controlled Study of the Safety, Performance, Quality of Life and Cost Effective Outcomes of the Edwards SAPIEN XTTM Transcatheter Heart Valve in an Australian Population.

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. The number of compliance tests received by the Council in 2012 was 228. A summary of compliance tests assessed in 2012 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 2012, Council officers marked 711 industrial examination papers. The number of examinations marked in each category is listed in attachment 4.

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 Part 16 of the Mines Safety and Inspection Regulations under the Mines Safety and Inspection Act. These regulations are administered through the Department of Mines and Petroleum (DMP).

In 2012, the Radiological Council and DMP commenced development of a Memorandum of Understanding (MoU). The purpose of the MoU is to clarify administrative arrangements, roles and responsibilities, formalise communication and coordinate approvals. The MoU will be finalised in early 2013.

National Mine Safety Framework

The National Mine Safety Framework (NMSF) is an initiative of the Standing Council on Energy and Resources (SCER). The SCER is responsible for pursuing priority issues of national significance in the energy and resources sectors.

Under the NMSF a number of “principal mining hazards” had been identified with radiation being initially one of these. A Code of Practice on Naturally Occurring Radioactive Material was then drafted however none of the radiation regulators in any of the Australian States or Territories were consulted during its preparation.

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

On 9 February 2012, radiation regulators, ARPANSA and the NMSF secretariat met and drafted a statement which was submitted to the NMSF Steering Group meeting the next day. The Committee had accepted the advice from radiation regulators and ARPANSA that ionising radiation did not meet the definition of a “principal mining hazard” and that it would not be included in the NMSF.

MISCELLANEOUS***Radiation Health Committee***

The Radiation Health Committee (RHC) is a body established to advise the Chief Executive Officer of 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.

A list of publications approved by the RHC and published by ARPANSA in 2012 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 2012 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.

Suspected Contaminated Goods

In 2012 Council was advised that Customs had detected radiation from a sea container, originating from overseas, in Fremantle Port. The Customs area is regulated by the Federal Government and all Custom's radiation matters are regulated by ARPANSA.

Council officers inspected the site and verified that radiation levels were low and had not been a hazard to port personnel. Council officers also verified that the material was not released into Western Australia. ARPANSA later advised that the material had been returned to the point of origin.

Radiological Council Meeting Arrangements

During 2012 Council considered the frequency and format of meetings. Council agreed that due to the increased number of items requiring consideration and the often tight time frames required that it would trial meeting every month instead of every two months. The Council will review this arrangement in 2013 to decide whether the monthly meetings will continue on a permanent basis.

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.
- 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 2012 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. 51 Temporary Permits were current as at 31 December 2012.

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 2012.

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.

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 13TH 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 (resigned during 2012)	Radiologist	Dr D Dissanayake
Dr C Hewavitharana	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	A/Prof Zhongua Sun
Mr G Scott	Medical Radiation Technologist	Mr N Hicks
Mr N Tsurikov	Expert in Mining Radiation Hazards	
Mr F Harris (resigned during 2012)	Expert in Mining Radiation Hazards	
Mr B Cobb	Co-opted member	not applicable

2012 MEETING ATTENDANCE

	23 FEB	5 APR	3 JUL	11 SEP	9 OCT	13 NOV	11 DEC
Dr A Robertson	✓	✓	✓	✓	✓	✓	✓
Dr R Fox	✓	✓	✓	✓	✓	✓	A
Dr G Groom	✓	✓	✓	A	✓	✓	A
Dr C Hewavitharana	NA	NA	✓	✓	✓	✓	✓
Mr M Ross	✓	✓	✓	✓	✓	A	✓
Prof J McKay	✓	✓	✓	✓	✓	✓	✓
Dr M Bennett	✓	R	R	R	R	R	✓
Mr B Cobb	✓	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	A	✓	A	✓	A	A
Mr F Harris	A	A	R	R	R	R	R
Mr G Scott	✓	✓	A	A	A	✓	✓

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

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

None.

RADIATION SAFETY (GENERAL) REGULATIONS

None

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	56	1	2	59
Dental – intraoral	608	-	14	622
Dental – panoramic and/or cephalometric	119	-	1	120
Fluoroscopic – fixed	39	-	9	48
Fluoroscopic – fixed C or U arm	16	-	5	21
Fluoroscopic – mobile	106	-	7	113
Mammography	65	-	2	67
Radiographic – fixed	128	-	44	172
Radiographic – mobile	78	1	9	88
Total	1215	2	93	1310

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 69 re-tests conducted during 2012, 97% 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 2012.

Attachment 4: Industrial Radiation Safety Examinations*Current at 31 December 2012*

Category	2012	2011	2010	2009	2008
Borehole Logging	37	67	78	41	78
Fixed Gauges	118	138	95	64	141
Gamma Irradiator	0	0	3	3	0
Industrial Radiography	67	24	36	88	56
Industrial Radiography (Advanced)	9	0	0	0	0
Industrial Radiography (Assistant)	121	123	86	146	92
Portable Gauges	233	137	65	50	73
Portable Gauges (WA Requirements)	19	28	19	14	8
Transport	31	17	26	20	27
Service – Cabinet X-ray	1	4	1	4	10
Service – Industrial Radiography (X-ray)	0	0	0	0	0
Service – X-ray Analysis	2	0	3	0	4
X-ray Analysis – Use	11	15	6	8	4
X-ray Analysis – Use and Restricted Service	62	69	47	50	69
Total	711	622	465	488	562

Attachment 5: List of Australian Radiation Protection and Nuclear Safety Agency publications for 2012

Title
RPS No. 2.2 Safety Guide for the Approval Processes for the Safe Transport of Radioactive Materials (2012)
RPS No.18 Safety Guide for the Use of Radiation in Schools (2012)

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

Current at 31 December 2012

A *Irradiating apparatus and electronic products³*

B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	43	-
Cabinet x-ray equipment	124	-
Calibration	2	462
CT	112	-
CT/SPECT	10	-
Dental – intraoral	1850	-
Dental – panoramic and/or cephalometric	307	-
Education and research	14	960
Fluoroscopic – fixed	85	-
Fluoroscopic – mobile	120	-
Gauges – density/level	4	2619
Gauges – in stream analysis	-	69
Gauges – logging	27	364
Gauges – neutron moisture/density portable	-	411
Gauges – other	-	237
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	35	-
Laser – industrial	89	-
Laser – medical	228	-
Laser – other medical	148	-
Laser – research	142	-
Linear accelerator	15	-
Mammography	81	-
Non-destructive testing	94	98
Non-destructive testing – crawler control	-	13
Portable mineral analyser	-	12
Radiographic – fixed	352	-
Radiographic – mobile	393	-
Sealed Sources – other	-	91
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	58	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	3	236
Sun Tanning Unit	89 ⁴	-
Superficial radiotherapy	3	-
Test source	4	-
Therapy	2	22
Therapy – HDR brachytherapy	-	2
Transilluminator	110	-
Tracer Studies	-	27
X-ray analysis	420	-
Total	4966	5682

⁴ The number reported in previous years was incorrectly calculated and there has not been an increase in the number of sun-tanning units since regulation of these units was commenced.

Attachment 7: Licences and Registrations*Current at 31 December 2012**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2012	2011	2012	2011	2012	2011
Licences	4558	4245	2161	1905	6719	6150
Registrations	1624	1541	369	346	1993	1887
TOTAL	6182	5786	2530	2251	8712	8037
Change from 2011	+ 6.8%		+ 12.4%		+ 8.4%	

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 2012*

B *Total current*

A	B	Purpose
1	6	Bone Densitometry
3	8	Bone Densitometry (Exemption)
23	59	Cabinet X-ray Equipment
0	1	Cobalt Teletherapy Maintenance
14	50	Compliance Testing - Diagnostic X-ray Equipment
39	95	Compliance Testing - Radioactive Gauges
0	3	Cyclotron Operation
0	6	Cyclotron Servicing
1	2	Education (Apparatus)
8	28	Education (Substances)
128	339	Fluoroscopy - Medical
39	144	Fluoroscopy - Medical (Exemption)
7	45	Fluoroscopy - Medical (Non-Specialist Exemption)
0	1	Fluoroscopy - Research
1	1	Fluoroscopy - Veterinary
0	2	Gamma Irradiator - Use
134	370	Gauges - Industrial
5	8	Gauges - Industrial (Installation)
1	3	Gauges - Level (CO2)
145	379	Gauges - Logging
334	625	Gauges - Moisture and/or Density (Portable)
1	4	Gauges - Other (Apparatus)
3	24	Gauges - Other (Substances)
5	11	Installation of X-ray Equipment
0	5	Installation of X-ray Equipment - Dental
1	8	Lasers - Acupuncture
6	7	Lasers - Chiropractic
40	93	Lasers - Dental
3	10	Lasers - Educational
9	20	Lasers - Entertainment
24	73	Lasers - Industrial
84	228	Lasers - Medical
45	83	Lasers - Physiotherapy
8	27	Lasers - Research

A	B	Purpose
21	58	Lasers - Service
0	3	Lasers - Veterinary
0	2	Manufacture of X-ray Equipment
0	2	Medical Physics
4	11	Medical Physics - Radiotherapy (Apparatus)
4	8	Medical Physics - Radiotherapy (Substances)
19	73	Medical Radiation Technology - Diagnostic Nuclear
270	1 045	Medical Radiation Technology - Medical Imaging
49	169	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
92	238	Medical Radiology
1	4	Non-Medical Irradiation
1	1	Nuclear Medicine - Calibration and QC Sources
12	29	Nuclear Medicine - Diagnostic
12	29	Nuclear Medicine - Therapeutic
2	3	Nuclear Medicine - Veterinary
4	4	Pathology (in vitro) – Sealed Sources
3	11	Pathology Tests
10	33	Portable Mineral Analysers
115	283	Portable Mineral Analysers (X-ray)
4	8	Possession of X-ray Equipment - Diagnostic Medical
5	6	Quality Assurance Procedures
13	31	Radioactive Ores - Analytical Laboratories
4	10	Radioactive Ores - Exploration
6	17	Radioactive Ores - Mining and/or Processing
3	9	Radioactive Substances - Calibration Sources
0	2	Radioactive Substances - Medical
9	36	Radioactive Substances - Sale
11	30	Radioactive Substances - Service of Devices
0	0	Radioactive Substances - Tracer Studies
1	19	Radioactive Substances - Tracer Studies (Industry)
3	5	Radiography - Chiropractic (Exemption)
13	35	Radiography - Chiropractic (Extended)
55	167	Radiography - Chiropractic (Restricted)
143	349	Radiography - Industrial (Gamma)
141	345	Radiography - Industrial (X-ray)
1	1	Radiography - Medical (Direction and Supervision)
0	1	Radiography - Security
217	571	Radiography - Veterinary
2	2	Radioguidance - Medical (Radioactive Substances)
4	6	Radiology - Veterinary
0	15	Radiopharmaceutical Manufacture and Dispensing
7	20	Radiotherapy - Medical (Apparatus)

A	B	Purpose
8	21	Radiotherapy - Medical (Substances)
3	6	Radiotherapy - Medical Superficial
1	2	Radiotherapy - Veterinary (Apparatus)
4	11	Research
13	70	Research - Unsealed Radioactive Substances
0	4	Research - X-ray
14	27	Sale of Electronic Products
33	83	Sale of X-ray Equipment
6	20	Service of X-ray Equipment - Analytical
13	28	Service of X-ray Equipment - Dental
29	101	Service of X-ray Equipment - Diagnostic
3	11	Service of X-ray Equipment - Diagnostic (Extended)
2	4	Service of X-ray Equipment - Industrial NDT
0	2	Service of X-ray Equipment - Intraoral
1	13	Service of X-ray Equipment - Linear Accelerators
12	34	Service of X-ray Equipment - Other
3	8	Special Purpose Enclosed X-ray Equipment
0	1	Static Detection
0	1	Static Electricity Measurement
1	2	Static Elimination
0	1	Storage (Apparatus)
7	10	Storage (Substances)
4	20	Transilluminators
33	104	Transport
1	2	X-ray Analysis
0	1	X-ray Analysis (Research)
25	69	X-ray Analysis - Use
85	226	X-ray Analysis - Use and Service (Restricted)
1	1	X-ray Irradiator

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 2012*

B *Total current*

A	B	Purpose
6	10	Bone Densitometry
7	23	Bone Densitometry (Exemption)
23	65	Cabinet X-ray Equipment
1	1	Cyclotron Operation
0	1	Disposal of Radioactive Waste – Mt Walton East IWDF
0	4	Education (Apparatus)
4	9	Education (Substances)
1	5	Education - Demonstration Radioactive Sources
1	2	Education - Demonstration Radioactive Sources (Exemption)
0	4	Education - Demonstration Sources
1	2	Fluoroscopy - Medical
0	2	Gamma Irradiator
40	125	Gauges - Industrial
1	4	Gauges - Level (CO ₂)
4	22	Gauges - Logging
19	46	Gauges - Moisture and/or Density (Portable)
5	7	Gauges - Other (Apparatus)
2	7	Gauges - Other (Substances)
2	9	Lasers - Acupuncture
4	6	Lasers - Chiropractic
25	52	Lasers - Dental
0	2	Lasers - Educational
7	17	Lasers - Entertainment
14	32	Lasers - Industrial
1	1	Lasers - Manufacture
24	91	Lasers - Medical
12	39	Lasers - Physiotherapy
4	5	Lasers - Research
2	6	Lasers - Sale, Service, Maintenance and Testing
4	7	Lasers - Storage
0	2	Lasers - Veterinary
1	2	Manufacture of X-ray Equipment
28	103	Medical Radiology

A	B	Purpose
1	2	Non-Medical Irradiation
9	23	Nuclear Medicine
3	7	Nuclear Medicine - CT (X-ray)/SPECT
0	1	Nuclear Medicine - Veterinary
2	10	Pathology Tests
4	11	Portable Mineral Analysers
41	124	Portable Mineral Analysers (X-ray)
6	11	Radioactive Ores - Analytical Laboratories
4	9	Radioactive Ores - Exploration
7	33	Radioactive Ores - Mining and/or Processing
0	8	Radioactive Substances - Calibration Sources
2	2	Radioactive Substances - Medical
3	7	Radioactive Substances - Sale
2	2	Radioactive Substances - Service of Devices
1	2	Radioactive Substances - Tracer Studies (Industry)
5	15	Radiography - Chest Screening
19	51	Radiography - Chiropractic
0	0	Radiography - Chiropractic (Referrals)
233	626	Radiography - Dental
1	1	Radiography - Forensic
7	19	Radiography - Industrial (Gamma)
4	20	Radiography - Industrial (X-ray)
3	11	Radiography - Mammography Screening
0	1	Radiography - Medical (GP Extended)
7	50	Radiography - Medical (Operator)
3	17	Radiography - Medical (Unrestricted)
15	68	Radiography - Medical Ancillary (Referrals)
0	1	Radiography - Physiotherapy Referrals
0	0	Radiography - Podiatry Referrals
1	1	Radiography - Security
82	211	Radiography - Veterinary
0	1	Radiography - Veterinary (Hospitals)
1	2	Radiology - Veterinary
1	2	Radiopharmaceutical Manufacture and Dispensing
1	5	Radiotherapy - Medical (Apparatus)
5	10	Radiotherapy - Medical (Substances)
0	1	Radiotherapy - Medical Superficial
1	1	Radiotherapy - Veterinary (Apparatus)
0	2	Regulatory Authority
3	6	Research (Substances)
5	15	Research - Unsealed Radioactive Substances
2	4	Research - X-ray

A	B	Purpose
3	5	Sale of Electronic Products
8	22	Sale of X-ray Equipment
2	3	Secondary Schools - Demonstration Sources
10	29	Secondary Schools - Demonstration Sources (Exemption)
12	43	Security of Radioactive Sources
5	16	Service of X-ray Equipment
0	1	Smoke Detectors - Sale
9	37	Solaria - Possession and Operation
4	5	Special Purpose Enclosed X-ray Equipment
0	1	Static Electricity Measurement
0	3	Static Elimination
11	24	Storage (Apparatus)
5	20	Storage (Substances)
6	14	Transilluminators
2	12	Transport
1	6	X-ray Analysis
37	102	X-ray Analysis - Use

ABBREVIATIONS

General Terminology

AHMC	Australian Health Ministers' Conference
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CBVT	Cone Beam Volumetric Tomography
CT	Computed Tomography
CT/SPECT	Computed Tomography/Single-Photon Emission Computed Tomography
DMP	Western Australian Department of Mines and Petroleum
DSA	Digital Subtraction Angiography
HDR	High Dose Rate
MIT	Medical Imaging Technologist
MoU	Memorandum of Understanding
NDT	Non-Destructive Testing
NMSF	National Mines Safety Framework
PET	Positron Emission Tomography
RHC	Radiation Health Committee
SCER	Standing Council on Energy and Resources
TLD	Thermo-Luminescent Dosimeter
WACHS	Western Australian Country Health Services

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)

