



REPORT OF THE
RADIOLOGICAL COUNCIL

for the year ended
31 December 2016

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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 nine times in 2016.

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 once in 2016.

ADMINISTRATIVE SUPPORT

Section 10(4) of the Act provides for the administration of the Act to be paid out of monies appropriated by Parliament for the purpose. However, the Council is not funded directly and relies on the Department of Health's Radiation Health Unit for administrative and scientific support. While the greater part of the Unit's duties 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. Mr L Dahlskog (Senior Health Physicist) and Mrs M Aerts (Health Physicist) performed these duties in Ms Upton's absence until their resignation on 30 June 2016.

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

Amendments made to the Radiation Safety Act, the Radiation Safety (General) Regulations and the Radiation Safety (Qualifications) Regulations in 2016 are listed in attachment 2.

No amendments were made to the Radiation Safety (Transport of Radioactive Substances) Regulations in 2016.

RADIATION INCIDENTS

Reported incidents involving radiation rarely pose a major health risk to the individuals exposed. Regulation 19A of the Radiation Safety (General) Regulations requires registrants to notify the Council in writing as soon as practicable should any of the abnormal or unplanned radiation exposures specified in that regulation occur. In addition to Regulation 19A, the medical incident reporting condition requires medical incidents specified in that condition to be reported to Council within 7 days. This has resulted in a significant increase in the number of reported incidents.

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 47 incidents during 2016 which are presented in the tables below. The majority of incidents were in medical imaging due to a failure to follow protocol. A more detailed description of three of the more significant incidents of 2016 is provided below.

Incident	Occurrences	Category
Radiology		
Error in CT equipment or CT data analysis software requiring repeat imaging	2	Equipment Malfunction
Wrong patient imaged - failure to correctly identify patient against request form	7	Human error - failure to follow protocol
Wrong patient imaged due to incorrect patient name being entered on request form	2	Human error - other
Wrong patient imaged due to error in electronic request system and subsequent failure to check identity of patient	1	Equipment Malfunction & human error - failure to follow protocol
Wrong anatomical site imaged – failure to check request form	5	Human error - failure to follow protocol
Failure to confirm pregnancy status	2	Human error - failure to follow protocol
Wrong modality - failure to check request form	4	Human error - failure to follow protocol
Incorrect positioning of patient requiring repeat imaging	1	Human error - failure to follow protocol
Unauthorised operation of fluoroscopic x-ray equipment by nurse	1	Unauthorised use of equipment
Duplication of imaging due to operator administrative error	1	Human error - failure to follow protocol

Incident	Occurrences	Category
Triplication of imaging due to 3 different request forms being completed	1	Human error - failure to follow protocol
Failure to cancel imaging associated with cancelled surgery	1	Human error - other
Unauthorised operation of fluoroscopic x-ray equipment by surgeon	1	Unauthorised use of equipment
Radiotherapy		
Systemic error introduced in modelling electron beam of linear accelerator & not detected by quality assurance process. Affected 37 patients treatment plans over a period of ten years	1	Human error - failure to follow protocol & near miss
Failure to communicate temporary halt of treatment	1	Human error - failure to follow protocol
Use of new model of high dose rate brachytherapy unit resulted in delivery of radiation partially to wrong anatomical site	1	Human error - failure to follow protocol
Lasers		
Surgeon misjudged laser positioning and directed it on own finger	1	User injury
Activation of medical laser without others wearing personal protective equipment	1	Human error - failure to follow protocol
Industrial		
Industrial Radiographer failed to clear controlled area before exposure was performed	1	Human error - failure to follow protocol
Abandonment of logging source which was stuck in borehole	1	Equipment malfunction/unavoidable
Nuclear Medicine		
Wrong radiopharmaceutical administered	1	Human error - failure to follow protocol
Patient discharged before scan completed	2	Human error - failure to follow protocol
Out of date request form actioned – failure to notice date by administrative and imaging staff	1	Human error - failure to follow protocol
Failure of radiopharmaceutical dose dispenser infusion sets requiring repeat imaging	2	Equipment malfunction
Failure of laboratory to perform complete testing of sample resulting in patient dose for no benefit	1	Human error - failure to follow protocol

Incident	Occurrences	Category
Radiolabelling error by Radiochemist	3	Human error - failure to follow protocol
Other		
Abnormal and unplanned exposure – dose rate in excess of dose constraint	1	-

PROSECUTIONS

No prosecutions were initiated or finalised in 2016.

MEDICAL AND RELATED RADIATION MATTERS

Medical Compliance Testing

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

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

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

The number of compliance tests of diagnostic x-ray equipment received by Council in 2016 was 1337. 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

X-ray operators are approved by the Radiological Council to perform basic radiography of the chest and extremities in remote and rural areas where radiology services are otherwise not available. A Radiological Council approved training course suitable as a prerequisite for approval of an x-ray operator has been run successfully by Curtin University of Technology since 2013.

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 2016.

Research Project Title

A Phase 3, Randomised, Open-Label Study Evaluating the Efficacy and Safety of Idelalisib in Combination with Obinutuzumab Compared to Chlorambucil in Combination with Obinutuzumab for Previously Untreated Chronic Lymphocytic Leukaemia.

A Phase II, Study of Ibrutinib, Rituximab and mini-CHOP therapy in very elderly patients with newly diagnosed Diffuse Large B-Cell Lymphoma (DLBCL) – NHL29.

A Phase III open-label, multicentre trial of avelumab (MSB0010718C) as a third line treatment of unresectable, recurrent, or metastatic gastric or gastroesophageal junction adenocarcinoma.

A Phase III, Multicenter, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Efficacy and Safety Study of Crenezumab in Patients with Prodromal to Mild Alzheimer's Disease.

Protocol 54861911 ALZ2003: A phase 2b/3 Randomised, Double-blind, Placebo-Controlled, Parallel group, Multicenter Study Investigation the Efficacy and Safety of JNJ-54861911 in Subjects who are Asymptomatic at Risk for Developing Alzheimer's Dementia.

A Non-Randomised Study to Evaluate the Safety and Performance of the ARIATM Emphysema Treatment System in Patients with Severe Emphysema with Hyperinflation of the Lung.

Research Project Title

A Phase 1b, Open Label, Multiple Dose, Dose Escalation and Expansion Study to Assess Safety, Tolerability and Antitumor Activities of the Combination of BGB-3111 with BGB-A317 in Subjects with B-Cell Lymphoid Malignancies.

A Phase III open-label, multicentre trial of avelumab (MSB0010718C) versus continuation of first line treatment of unresectable, recurrent, or metastatic gastric or gastro-esophageal junction adenocarcinoma.

A Phase 3, Multicenter, Randomised, Double Blind Study of Bortezomib and Dexamthasone in combination with either Venetoclax or Placebo in subjects with Relapsed or Refractory Multiple Myeloma who are sensitive or naïve to Proteasome Inhibitors.

A Phase III open-label, multicentre trial of avelumab (MSB0010718C) versus platinum-base doublet as a first-line treatment of recurrent or Stage IV PD-L1+ non-small cell lung cancer.

A Phase 3 Open-Label, Randomised, Parallel, 2-Arm, Multi Centre Study of Talazoparib (BMN 673) versus Physician's Choice in Germline BRCA Mutation Subjects with Locally Advanced and/or Metastatic Breast Cancer, Who Have Received Prior Chemotherapy Regimens for Metastatic Disease.

A Phase I, open-label, multiple-ascending dose trial to investigate the safety, tolerability, pharmacokinetics, biological and clinical activity of MSB0011359C in subjects with metastatic or locally advanced solid tumors and expansion to selected indications.

A Phase 3, multinational, Randomized, Open-label, Parallel-Arm Study of Avelumab (MSB0010718C) in Combination with Axitinib (Inlyta®) versus Sunitinib (Sutent®) Monotherapy in the First-Line Treatment of Patients with Advanced Renal Cell Carcinoma.

Augmented CeRebral Oximetry and Near-Infrared Spectroscopy Measurements in subarachnoid haemorrhage – ACRONYM.

A Two-arm, Open-label, Randomized Phase II Study of Pembrolizumab (MK-3475) Monotherapy versus Standard Chemotherapy in platinum Pre-treated, Recurrent or Metastatic Nasopharyngeal Cancer.

A Randomized, Multicenter, Open-Label Phase 3 Study of Acalabrutinib (ACP-196) Versus Investigator's Choice of Either Idelalisib Plus Rituximab or Bendamustine Plus Rituximab in Subjects with Relapsed or Refractory Chronic Lymphocytic Leukemia.

Research Project Title

Randomized blinded phase 3 assessment of second- or third-line chemotherapy with docetaxel + plinabulin compared to docetaxel + placebo in patients with advanced non-small cell lung cancer and with at least one measurable lung lesion.

A Phase 3 Randomized, Open-Label Study Comparing Pexa-Vec (Vaccinia GM-CSF/Thymidine Kinase – Deactivated Virus) Followed by Sorafenib Versus Sorafenib in Patients with Advanced Hepatocellular Carcinoma (HCC) Without Prior Systemic Therapy.

A Phase 3, Multicentre, Multinational, Randomised, Open-Label, Parallel-Arm Study of Avelumab (MSB0010718C) Plus Best Supportive Care Versus Best Supportive Care Alone as a Maintenance Treatment in Patients with Locally Advanced or Metastatic Urothelial Cancer whose Disease did not progress after completion of First-Line Platinum-Containing Chemotherapy.

A Phase 3 Multicenter, Randomised, Double Blind, Placebo Controlled, Parallel Group Study to Evaluate the Efficacy and Safety of Aducanumab (BIIB037) in subjects with Early Alzheimer's Disease.

Effect of LY3202626 on Alzheimer's Disease Progression as Measured by Cerebral 18F-AV-1451 Tau-PET in Mild Alzheimer's Disease Dementia.

A Randomised Phase II Study of nab-paclitaxel Combination with Carboplatin as First Line Treatment of Gastrointestinal Neuroendocrine Carcinomas.

A randomised, multicentre, double-blind, placebo-controlled phase II study of the efficacy and safety of trastuzumab emtansine in combination with atezolizumab or atezolizumab-placebo in patients with HER2-positive locally advanced or metastatic breast cancer who have received prior trastuzumab and taxane based therapy.

A prospective randomised multi-centre study of the impact of Ga-68 PSMA-PET/CT imaging for staging high risk prostate cancer prior to curative-intent surgery or radiotherapy.

A Phase3 Placebo-Controlled Study of Carboplatin/ Paclitaxel With or Without Concurrent and Continuation Maintenance Veliparib (PARP inhibitor) in Subjects with Previously Untreated Stages III or IV High-Grade Serous Epithelial Ovarian, Fallopian Tube, or Primary Peritoneal Cancer.

A Phase 3, Randomized, Open-Label, Multicentre Study Comparing the Efficacy and Safety of the Bruton's Tyrosine (BTK) Inhibitors BGB-3111 and Ibrutinib in Subjects with Waldenstrom's Macroglobulinemia (WM).

Research Project Title

Outcomes and predictors of efficacy of palliative radiotherapy in patients with malignant pleural mesothelioma.

A Phase III, Double-Blinded, Randomized, Placebo-Controlled Study of Atezolizumab Plus Cobimetinib and Vemurafenib Versus Placebo Plus Cobimetinib and Vemurafenib in Previously Untreated BRAFV600 Mutation-Positive Patients with Unresectable Locally Advanced or Metastatic Melanoma.

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 2016 was 685. A summary of compliance tests assessed in 2016 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 2016, Council officers marked 290 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).

Memorandum of Understanding with the Department of Mines and Petroleum

A Memorandum of Understanding (MoU) has existed with the Department of Mines and Petroleum (DMP) since 2013.

One of the agreements in the MoU was that a Radiation Liaison Committee (RLC) be established to provide a framework for liaison between DMP and the Radiological Council.

The decisions and outcomes of the RLC do not limit the statutory obligations and decision making of each agency. At least two representatives of the Radiological Council and the Department of Mines and Petroleum need to be present at each meeting. DMP advised that it would like to amend the functions and composition of the RLC in order to streamline its functionality.

Two meetings were held in 2016.

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 2016 is in attachment 5.

National Directory for Radiation Protection

At the Australian Health Ministers' Conference 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 2016 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.

Reduction in Administrative Support – Voluntary Severance Scheme

Major staff redundancies imposed by the Department of Health in 2016 have left the Council's support arm, the Radiation Health Unit of the Environmental Health Directorate, inadequately resourced.

Staff reductions of almost 30% (the majority of voluntary severances occurred at the senior level – senior positions were reduced by 60%) are already impacting applications for registration and licences by delaying the approvals process. The need to allocate the limited resources to major projects in mining and medicine, where significant investigation and research is essential to identify any potential radiation risks and to ensure the proper protection of the public, occupationally exposed workers and the environment, has resulted in significant delays which is affecting small business and individuals.

The Radiological Council alerted the Minister for Health that it might be unable to maintain the high standards of radiation safety to the people of Western Australia required of both the Council and the Minister by the Radiation Safety Act.

Regulation Amendments for Lasers

The Council was advised that amendments were made to the Radiation Safety (General) Regulations, which deleted Schedule XIV(10) of the regulations. Schedule XIV imposes requirements for all Class 4 lasers and requires that surfaces within the controlled area are rendered non-reflective to reduce the possibility of hazardous diffuse reflections.

The Council had not been consulted and had therefore not approved the amendments. Schedule XIV applies to all medical and industrial facilities that use Class 4 lasers, and the Council considered clause 10 to be essential. The deletion also created a disparity between the requirements for Class 3B lasers which were still required to meet the same requirement.

Council liaised with the Department of Health for the reinstatement of the clause.

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)
- Global Dosimetry Solutions
- Global Medical Solutions Australia
- Landauer Australasia.
- National Radiation Laboratory, New Zealand
- SGS Radiation Services Pty Ltd

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 2016 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. 44 Temporary Permits were current as at 31 December 2016.

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 2016.

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
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 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 C Hewavitharana	Radiologist	Dr D Dissanayake
Dr G Groom	Nuclear Medicine Physician	Dr E Thomas
Dr R Fox	Physicist	Dr R Price
Mr M Ross	Electronic Engineer	Mr J O'Donnell
Prof J McKay	Tertiary Institutions representative	A/Prof Z Sun
Mr G Scott (until June 2016)	Medical Radiation Technologist	
Mr C Whennan (from August 2016)	Medical Radiation Technologist	Mr R Hart
Mr G Fee	Expert in Mining Radiation Hazards	Vacant
Mr B Cobb	Co-opted member	not applicable
Mr N Tsurikov	Co-opted member	not applicable
Vacant	Expert in Mining Radiation Hazards	Vacant

2016 MEETING ATTENDANCE

	9 FEB	8 MAR	12 APR	10 MAY	14 JUN	9 AUG	13 SEP	8 NOV	20 DEC
Dr A Robertson	✓	✓	A	A	✓	A	✓	A	✓
Dr R Fox	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dr G Groom	✓	A	✓	✓	A	✓	✓	✓	✓
Dr C Hewavitharana	A	✓	✓	✓	✓	✓	✓	✓	A
Mr M Ross	✓	✓	A	✓	✓	A	✓	✓	✓
Prof J McKay	✓	✓	✓	✓	✓	✓	✓	✓	A
Mr B Cobb	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	✓	✓	✓	A	A	✓	✓	A
Mr G Fee	A	A	R	R	R	R	R	R	R
Mr G Scott	✓	✓	✓	A	✓	R	R	R	R
Mr C Whennan	NA	NA	NA	NA	NA	NA	✓	A	A

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

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

Public Health (Consequential Provisions) Act 2016 s.102

Consequential amendments to replace references to Executive Director with Chief Health Officer.

Date of assent 25 July 2016. Government Gazette 10 January 2017 page 165 with commencement on 24 January 2017.

RADIATION SAFETY (GENERAL) REGULATIONS

Health Regulations Amendment (Fees and Charges) Regulations 2016 Pt.6

Amendment to fees (Schedule XV).

Government Gazette 17 June 2016 pages 2101-5.

Radiation Safety (General) Amendment Regulations 2016

Regulations to update references to the Mines Safety and Inspection Act 1994, Planning and Developments Act 2005 and Health Act 1911, and to update the definition to the National Health and Medical Research Council. Schedule XIV item 10 of the requirements to be complied with in respect of premises in which class 4 lasers are operated or used was also deleted.

Government Gazette 20 September 2016 pages 3967-8.

RADIATION SAFETY (QUALIFICATIONS) AMENDMENT REGULATIONS

Health Regulations Amendment (Fees and Charges) Regulations 2016 Pt.7

Amendment to fees (Schedule 2).

Government Gazette 17 June 2016 pages 2101-5.

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

Attachment 3: Compliance Testing**Medical**

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

Category	A	B	C	Total
CT	54	-	-	57
Dental – intraoral	714	-	13	727
Dental – panoramic and/or cephalometric	134	-	1	135
Dental – cone beam CT	6	-	-	6
Fluoroscopic – fixed	30	-	1	31
Fluoroscopic – fixed C or U arm	29	-	5	34
Fluoroscopic – mobile	108	-	6	114
Radiographic – fixed	115	-	20	135
Radiographic – mobile	47	-	1	48
Mammography	50	-	3	53
Total	1287	0	50	1337

Industrial – Fixed Gauges

- A** *Compliant*
B *Non-compliant²*

Category	A	B	Total
Density	468	114	582
In-stream analysis	7	-	7
Level	69	27	96
Total	544	141	685

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 40 re-tests conducted during 2016, 90% 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. Of the 2 re-tests conducted during 2016, 100% resulted in the equipment being granted a compliance certificate.

Attachment 4: Industrial Radiation Safety Examinations*Current at 31 December 2016*

Category	2016	2015	2014	2013	2012
Borehole Logging	20	13	29	16	37
Fixed Gauges	68	125	153	108	118
Industrial Radiography	46	63	73	63	67
Industrial Radiography (Advanced)	4	19	16	31	9
Industrial Radiography (Assistant)	78	129	237	194	121
Portable Gauges	18	23	46	92	233
Portable Gauges (WA Requirements)	2	1	14	8	19
Transport	22	32	17	21	31
Service – Cabinet X-ray	1	4	5	2	1
Service – Industrial Radiography (X-ray)	0	0	0	0	0
Service – X-ray Analysis	1	3	0	0	2
X-ray Analysis – Use	0	0	0	5	11
X-ray Analysis – Use and Restricted Service	30	47	42	57	62
Total	290	459	632	597	711

Attachment 5: List of Australian Radiation Protection and Nuclear Safety Agency publications for 2016

Title
RPS C-1 Code for Radiation Protection in Planned Exposure Situations (2016)

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

Current at 31 December 2016

A *Irradiating apparatus and electronic products³*

B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	57	-
Cabinet x-ray equipment	168	-
Calibration	2	573
CT	137	-
CT/SPECT	20	-
Dental – cone beam CT	10	-
Dental – intraoral	2202	-
Dental – panoramic and/or cephalometric	435	-
Education and research	20	1080
Fluoroscopic – fixed	90	-
Fluoroscopic – mobile	145	-
Gauges – density/level	4	3472
Gauges – in stream analysis	-	86
Gauges – logging	32	425
Gauges – neutron moisture/density portable	-	457
Gauges – other	-	279
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	149	-
Laser – industrial	164	-
Laser – medical	312	-
Laser – other medical	235	-
Laser – Podiatry	9	-
Laser – research	193	-
Linear accelerator	20	-
Mammography	80	-
Non-destructive testing	179	125
Non-destructive testing – crawler control	-	15
Portable mineral analyser	-	10
Radiographic – fixed	353	-
Radiographic – mobile	415	-

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
Sealed Sources – other	-	121
Simulator	4	-
Special purpose x-ray	47	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	-	296
Sun Tanning Unit	-	-
Superficial radiotherapy	3	-
Test source	2	-
Therapy	4	24
Therapy – HDR brachytherapy	-	1
Transilluminator	121	-
Tracer Studies	-	27
X-ray analysis	565	-
Total	6178	7052

Attachment 7: Licences and Registrations*Current at 31 December 2016**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2016	2015	2016	2015	2016	2015
Licences	5287	5219	2230	2316	7517	7535
Registrations	1859	1800	413	403	2272	2203
TOTAL	7146	7019	2643	2719	9789	9738
Change from 2015	+ 1.8%		- 2.8%		+ 0.5%	

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 2016

B Total current

A	B	Purpose
8	27	Bone Densitometry
2	4	Bone Densitometry (Exemption)
29	92	Cabinet X-ray Equipment
0	1	Cobalt Teletherapy Maintenance
20	57	Compliance Testing - Diagnostic X-ray Equipment
127	224	Compliance Testing - Radioactive Gauges
8	10	Cyclotron Operation
3	4	Cyclotron Servicing
1	3	Education (Apparatus)
12	31	Education (Substances)
135	414	Fluoroscopy - Medical
31	115	Fluoroscopy - Medical (Exemption)
11	21	Fluoroscopy - Medical (Non-Specialist Exemption)
0	1	Fluoroscopy - Research
0	1	Fluoroscopy - Veterinary
1	3	Gamma Irradiator - Use
165	510	Gauges - Industrial
1	9	Gauges - Industrial (Installation)
0	1	Gauges - Level (CO2)
82	315	Gauges - Logging
171	436	Gauges - Moisture and/or Density (Portable)
2	4	Gauges - Other (Apparatus)
17	40	Gauges - Other (Substances)
3	3	Installation of X-ray Equipment
1	4	Installation of X-ray Equipment - Dental
2	5	Lasers - Acupuncture
1	11	Lasers - Chiropractic
65	174	Lasers - Dental
3	7	Lasers - Educational
9	30	Lasers - Entertainment
32	65	Lasers - Industrial
93	292	Lasers - Medical
31	97	Lasers - Physiotherapy
13	28	Lasers - Podiatry (Exemption)

A	B	Purpose
13	49	Lasers - Research
27	71	Lasers - Service
4	10	Lasers - Veterinary
1	2	Manufacture of X-ray Equipment
1	3	Medical Physics
4	14	Medical Physics - Radiotherapy (Apparatus)
4	12	Medical Physics - Radiotherapy (Substances)
35	70	Medical Radiation Technology - Diagnostic Nuclear
575	1134	Medical Radiation Technology - Medical Imaging
7	12	Medical Radiation Technology - Nuclear Medicine - Diagnostic CT
79	179	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
92	179	Medical Radiology
3	5	Non-Medical Irradiation
0	2	Nuclear Medicine - Calibration and QC Sources
15	38	Nuclear Medicine - Diagnostic
12	32	Nuclear Medicine - Therapeutic
1	3	Nuclear Medicine - Veterinary
0	3	Pathology (in vitro) – Sealed Sources
3	6	Pathology Tests
16	30	Portable Mineral Analysers
83	268	Portable Mineral Analysers (X-ray)
1	8	Possession of X-ray Equipment - Diagnostic Medical
1	6	Possession of X-ray Equipment - Diagnostic Medical and Dental
0	3	Quality Assurance Procedures
5	30	Radioactive Ores - Analytical Laboratories
3	11	Radioactive Ores - Exploration
4	17	Radioactive Ores - Mining and/or Processing
5	11	Radioactive Substances - Calibration Sources
1	1	Radioactive Substances - Medical
18	40	Radioactive Substances - Sale
13	39	Radioactive Substances - Service of Devices
6	18	Radioactive Substances - Tracer Studies (Industry)
0	1	Radiography - Chiropractic (Exemption)
12	27	Radiography - Chiropractic (Extended)
56	186	Radiography - Chiropractic (Restricted)
138	462	Radiography - Industrial (Gamma)
139	467	Radiography - Industrial (X-ray)
0	1	Radiography - Medical (Direction and Supervision)
0	3	Radiography - Security
244	729	Radiography - Veterinary

A	B	Purpose
0	2	Radioguidance - Medical (Radioactive Substances)
1	4	Radiology - Dental
2	11	Radiology - Veterinary
8	13	Radiopharmaceutical Manufacture and Dispensing
6	20	Radiotherapy - Medical (Apparatus)
6	20	Radiotherapy - Medical (Substances)
1	2	Radiotherapy - Medical Superficial
0	1	Radiotherapy - Veterinary (Apparatus)
4	11	Research
17	48	Research - Unsealed Radioactive Substances
3	7	Research - X-ray
14	38	Sale of Electronic Products
31	85	Sale of X-ray Equipment
5	22	Service of X-ray Equipment - Analytical
4	28	Service of X-ray Equipment - Cabinet
8	29	Service of X-ray Equipment - Dental
47	126	Service of X-ray Equipment - Diagnostic
1	4	Service of X-ray Equipment - Diagnostic (Extended)
0	4	Service of X-ray Equipment - Industrial NDT
8	15	Service of X-ray Equipment - Linear Accelerators
2	8	Service of X-ray Equipment - Other
4	6	Service of X-ray Equipment - Superficial X-ray Therapy
6	15	Special Purpose Enclosed X-ray Equipment
1	1	Static Detection
0	1	Static Electricity Measurement
1	2	Static Elimination
4	7	Storage (Substances)
2	19	Transilluminators
51	140	Transport
0	1	X-ray Analysis (Research)
20	85	X-ray Analysis - Use
82	276	X-ray Analysis - Use and Service (Restricted)
0	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 2016

B Total current

A	B	Purpose
5	21	Bone Densitometry
7	18	Bone Densitometry (Exemption)
24	76	Cabinet X-ray Equipment
0	2	Cyclotron Operation
0	1	Disposal of Radioactive Waste – Mt Walton East IWDF
1	10	Education (Apparatus)
6	18	Education (Substances)
9	28	Education - Demonstration Radioactive Sources (Exemption)
2	5	Fluoroscopy - Medical
1	2	Gamma Irradiator
41	150	Gauges - Industrial
0	4	Gauges - Level (CO2)
5	23	Gauges - Logging
15	54	Gauges - Moisture and/or Density (Portable)
3	14	Gauges - Other (Apparatus)
3	7	Gauges - Other (Substances)
2	4	Lasers - Acupuncture
2	9	Lasers - Chiropractic
47	113	Lasers - Dental
1	2	Lasers - Educational
8	30	Lasers - Entertainment
11	37	Lasers - Industrial
1	1	Lasers - Manufacture
49	124	Lasers - Medical
16	46	Lasers - Physiotherapy
6	10	Lasers - Podiatry
3	6	Lasers - Research
0	6	Lasers - Sale, Service, Maintenance and Testing
2	7	Lasers - Storage
2	7	Lasers - Veterinary
0	2	Manufacture of X-ray Equipment
41	115	Medical Radiology
1	2	Non-Medical Irradiation

A	B	Purpose
5	22	Nuclear Medicine
5	15	Nuclear Medicine - CT (X-ray)/SPECT
1	10	Nuclear Medicine - Therapeutic
0	2	Nuclear Medicine - Veterinary
2	7	Pathology Tests
1	9	Portable Mineral Analysers
41	166	Portable Mineral Analysers (X-ray)
1	11	Radioactive Ores - Analytical Laboratories
3	12	Radioactive Ores - Exploration
12	35	Radioactive Ores - Mining and/or Processing
3	7	Radioactive Substances - Calibration Sources
0	1	Radioactive Substances - Medical
4	9	Radioactive Substances - Sale
1	3	Radioactive Substances - Service of Devices
1	2	Radioactive Substances - Tracer Studies (Industry)
5	14	Radiography - Chest Screening
13	43	Radiography - Chiropractic
254	737	Radiography - Dental
1	1	Radiography - Forensic
8	25	Radiography - Industrial (Gamma)
8	31	Radiography - Industrial (X-ray)
6	13	Radiography - Mammography Screening
25	45	Radiography - Medical (Operator)
7	18	Radiography - Medical (Unrestricted)
31	82	Radiography - Medical Ancillary (Referrals)
0	1	Radiography - Physiotherapy Referrals
0	1	Radiography - Security
78	247	Radiography - Veterinary
0	3	Radioguidance - Medical (Radioactive Substances)
1	3	Radiology - Veterinary
0	2	Radiopharmaceutical Manufacture and Dispensing
0	7	Radiotherapy - Medical (Apparatus)
0	8	Radiotherapy - Medical (Substances)
0	1	Radiotherapy - Veterinary (Apparatus)
0	2	Regulatory Authority
1	5	Research
0	5	Research (Substances)
4	12	Research - Unsealed Radioactive Substances
3	7	Research - X-ray
0	5	Sale of Electronic Products
7	22	Sale of X-ray Equipment
14	47	Security of Radioactive Sources

A	B	Purpose
2	16	Service of X-ray Equipment
2	8	Special Purpose Enclosed X-ray Equipment
1	1	Static Electricity Measurement
0	2	Static Elimination
7	35	Storage (Apparatus)
11	39	Storage (Substances)
3	14	Transilluminators
5	12	Transport
0	6	X-ray Analysis
23	115	X-ray Analysis - Use
1	1	X-ray Irradiator

ABBREVIATIONS

General Terminology

ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CT	Computed Tomography
CT/SPECT	Computed Tomography/Single-Photon Emission Computed Tomography
DMP	Western Australian Department of Mines and Petroleum
HDR	High Dose Rate
MIT	Medical Imaging Technologist
MoU	Memorandum of Understanding
MRT	Medical Radiation Technologist
NDT	Non-Destructive Testing
PET	Positron Emission Tomography
RHC	Radiation Health Committee

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)