



REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended
31 December 2013

TABLE OF CONTENTS

RADIATION SAFETY ACT 1975	3
STATUTORY RESPONSIBILITIES OF THE COUNCIL.....	3
MEMBERSHIP OF THE COUNCIL	3
ADVISORY COMMITTEES	4
ADMINISTRATIVE SUPPORT	4
STATE ELECTORAL ACT	5
STATE RECORDS ACT	5
REGISTRATIONS, LICENCES AND TEMPORARY PERMITS	5
QUALIFICATIONS AND TRAINING OF RADIATION USERS	5
CHANGES TO LEGISLATION	5
RADIATION INCIDENTS.....	6
PROSECUTIONS.....	<u>940</u>
MEDICAL AND RELATED RADIATION MATTERS.....	<u>940</u>
Compliance Testing	<u>940</u>
X-Ray Operator Course	<u>1142</u>
On-Line marketing – Offers for Free Dental Examinations	<u>1142</u>
Electronic Referral Systems.....	<u>1142</u>
Approvals for Exposure to Radiation for Human Subjects in Medical Research	<u>1142</u>
INDUSTRIAL, ENVIRONMENTAL and MINING RADIATION.....	<u>1546</u>
Industrial Compliance Testing.....	<u>1546</u>
Standards for Council Examinations.....	<u>1546</u>
Mining and Milling of Radioactive Ores.....	<u>1546</u>
Memorandum of Understanding with the Department of Mines and Petroleum	<u>1546</u>
MISCELLANEOUS.....	<u>1748</u>
Radiation Health Committee	<u>1748</u>
National Directory for Radiation Protection	<u>1748</u>
Radiological Council Meeting Arrangements	<u>1748</u>
Personal Radiation Monitoring Services	<u>1849</u>

Appendix 1: Registration and Licensing	<u>1920</u>
Appendix 2: Licence Prerequisites	<u>2122</u>
Attachment 1: Radiological Council.....	<u>2223</u>
Attachment 2: Legislation Amendments	<u>2425</u>
Attachment 3: Compliance Testing	<u>2526</u>
Attachment 4: Industrial Radiation Safety Examinations	<u>2627</u>
Attachment 5: List of Australian Radiation Protection and Nuclear Safety Agency publications for 2013	<u>2728</u>
Attachment 6: Registered Irradiating Apparatus, Electronic Products and Radioactive Substances (sealed sources)	<u>2829</u>
Attachment 7: Licences and Registrations	<u>3034</u>
ABBREVIATIONS	<u>3738</u>

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 ten times in 2013.

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 2013.

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 or the Radiation Safety (General) Regulations in 2013. Amendments made to the Radiation Safety (Transport of Radioactive Substances) Regulations 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.

The Council was notified of the following reportable incidents during 2013.

Medical Incidents

- A nuclear medicine practice advised that a ^{99m}Tc radiopharmaceutical scan had been mistakenly administered twice. The first scan had been conducted on receipt of the facsimile request with the original request being placed on the patient's notes. The original scan was later discovered and sent to the department for action and was subsequently performed. In investigating the incident a recommendation was made to the department that the original request must be located prior to acting on any facsimile request and that, booking clerks be reminded to check on the currency of request forms.

Council required that further information was obtained from the practice confirming that the department had acted on the recommendation and also requested information on the practice's standard operating procedures which was subsequently provided and accepted.

- A nuclear medicine practice advised that that a patient had been given a pre-prepared injection intended for another patient. The radiopharmaceutical label on the syringe was not checked against the patient referral details, and instead of the prescribed ^{99m}Tc HDP for a bone scan, a cardiac study injection of ^{99m}Tc tetrofosmin intended for another patient was partially injected. The investigation revealed that the standard procedure of checking the label on the syringe against the patient referral details had not been followed patient.

Council reviewed the remedial actions taken by the practice to reduce the likelihood of a reoccurrence and agreed that they were satisfactory.

- A nuclear medicine practice advised that on three separate occasions a nuclear medicine scan was conducted when it was not required as the medical team had not cancelled the scan with the nuclear medicine practice. In two of these incidents the medical condition of the patient necessitated the cancellation.

Council advised the practice to review their systems, including information technology systems, in order to minimise the likelihood of a reoccurrence.

- A nuclear medicine practice advised that a quality control error had resulted in eight patients being administered with unlabelled ^{99m}Tc Sodium Pertechnetate instead of the prescribed ^{99m}Tc Sestamibi (Cardiolite). An investigation ascertained that a breakdown of the quality control procedures had occurred. This was exacerbated by the technologist performing the administrations being inadequately trained and also presenting to work whilst unwell.

As a result of this incident the practice implemented a number of remedial measures, including modifying the laboratory protocol for improved clarity, retraining the technologist and improving supervision.

- A nuclear medicine practice reported that a scan was performed on receipt of a partially completed but unsigned request form which had not in fact been requested nor was needed. The investigation revealed that an *unsigned* form (which was part of a standard package for a trial) was inadvertently sent by staff to the practice; the clerical staff and a medical registrar also processed the form without recognising that it had not been fully completed or signed.

The process for completing procedures associated with the trial was reviewed and staff were reminded of the correct protocols, in particular that request forms must not be processed unless they are fully completed and signed.

Council requested that the practice be advised that all partially filled request forms must be removed from the system.

- A nuclear medicine practice reported that on three separate occasions within four weeks, unnecessary nuclear medicine scans had been performed due to the failure, on each occasion, by the patient's medical team to notify the nuclear medicine practice that the scan was no longer required. On investigation it was revealed that medical staff were simultaneously ordering several tests that might possibly be needed rather than doing sequential ordering as assessment progresses.

The practice was advised and asked to ensure their medical protocols were reviewed to ensure that a nuclear medicine scan not be ordered until assessment of the patient has determined that it is actually required, since otherwise the patient may be subjected to an unnecessary radiation dose if the scan is found to be not needed when the radiopharmaceutical injection has already proceeded.

- A radiotherapy centre reported to Council that the portable monitoring device for a radiotherapy physicist had received a high dose . The dose relates to an incident where the physicist accidentally dropped the device in the radiotherapy

area during quality assurance work and overlooked retrieving it before completing the radiation exposures.

Council was satisfied that the physicist did not receive the dose and that no further action was required.

- A radiotherapy centre reported to Council that an unplanned radiation exposure incident of external beam therapy to the wrong side of a patient had occurred. Investigations continued throughout 2013 and are expected to be finalised in 2014.

Industrial Incidents

- A personal monitoring service provider advised Council that the portable monitoring devices for three personnel working for a company registered for the use of portable density/moisture gauges had been assessed as exceeding the reportable dose levels for the monitoring period. The investigation revealed that the personal monitoring devices had been incorrectly stored above a portable density/moisture gauge and this had resulted in the dose levels being exceeded.

The company provided the Council with a modified procedure for the use and storage of the personal monitoring devices which was deemed acceptable.

- A personal monitoring service provider advised Council that the portable monitoring device for a person working for a company registered for the use of logging gauges had been assessed as exceeding the reportable dose levels for the monitoring period. The investigation did not reveal any reason for the dose received and it was considered very likely that the dose had resulted from the device being placed in checked baggage during international travel.

Council required that the company review their procedures to minimise non work related doses to monitoring badges during travel.

- During 2013, five 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 55.5 GBq ^3H logging source	Offshore – became stuck at a depth of 5043 m	Abandoned
A 63 GBq ^{137}Cs logging source, and a 55.5 GBq ^3H source.	Offshore – became stuck at depths of 3866 m and 3864 m respectively.	Abandoned
A 63 GBq ^{137}Cs logging source, and a 55.5 GBq ^3H source.	Offshore – became stuck at depths of 4729 m and 4726 m respectively.	Abandoned
A 63 GBq ^{137}Cs logging source, and a 55.5 GBq ^3H source.	Offshore – became stuck at depths of 3762 m and 3759 m respectively.	Abandoned
A ^{60}Co logging source.	North Western Australia	Recovered

PROSECUTIONS

No prosecutions were initiated or finalised in 2013.

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.

The number of compliance tests of diagnostic x-ray equipment received by Council in 2013 was 1302. 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 had been operated and run successfully by Western Australian Country Health Services (WACHS).

During 2013 the running of the x-ray operator course was transitioned from WACHS to Curtin University.

On-Line marketing – Offers for Free Dental Examinations

During 2013 several online offers that included x-ray examinations for free or part of a package were brought to the attention of Council. By offering free x-ray examinations the dental practices involved were not adhering to the requirement that all x-ray examinations must be clinically justified.

The practices were advised that the on-line offers were a breach of the Radiation Safety Act as were the on-line companies associated with the offers. The Western Australian Branch of the Australian Dental Association was informed and assisted the Council in ensuring all of its members were aware of the legal requirements.

Electronic Referral Systems

Council discussed the requirements necessary for electronic referral systems given that more enquiries were being received for electronic systems to replace paper based systems.

Council agreed that it would consider each system as it was introduced but that all systems would need to demonstrate that a secure log in was provided and that the system must include the patient's name, date of birth, examinations requested and clinical indication for the referral.

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 2013.

Research Project Title
FOLFOX6m plus SIR-Spheres v FOLFOX6m alone for liver metastases from primary colorectal carcinoma (FOXFIREGlobal)
Cabozantinib vs Prednisone in Metastatic Castration-Resistant Prostate Cancer Patients who have Received Prior Docetaxel and Prior Abiraterone or MDV3100 Patients who have Received Prior Docetaxel and Prior Abiraterone or MDV3100
A Randomised, Multi-Centre, Placebo-Controlled, Parallel Group Study to Determine the Effects of AMG 145 Treatment on Atherosclerotic Disease Burden As Measured By Intravascular Ultrasound in Subjects Undergoing Coronary Catheterisation'
Safety & Performance Study of the ReZolve2 Sirolimus-Eluting Bioresorbable Coronary Scaffold – RESTORE II Trial'
A Phase 2, Randomised, Double-Blind, Placebo-Controlled, Multi-Centre Study to Access the Efficacy and Safety of GS-6624 in Subjects with Idiopathic Pulmonary Fibrosis (RAINIER)
Neoadjuvant chemotherapy with nab-paclitaxel in women with HER2-negative high-risk breast cancer – ETNA (Evaluating Treatment with Neoadjuvant Abraxane'
A Phase 3, Randomised, Controlled Study Evaluating the Efficacy and Safety of GS-1101 (CAL-101) in Combination with Ofatumumab for Previously Treated Chronic Lymphocytic Leukemia'
Trastuzumab in HER2 + Breast Cancer Patients (Redfern
International Study of Comparative Health Effectiveness with Medical and Invasive Approaches (ISCHEMIA).
A Phase III Randomised Study of BBI608 and Best Supportive Care versus Placebo and Best Supportive Care in Patient with Pretreated Advanced Colorectal Carcinoma'
'A Randomised, Open-label, Phase 3 Trial of A+AVD versus ABVD as Frontline Therapy in Patients with Advanced Classical Hodgkin Lymphoma'

Research Project Title
Multicentre open-label study to evaluate efficacy of gabobutrol-enhanced cardiac magnetic resonance imaging (CMRI) for detection of significant coronary artery disease (CAD) in subject with known or suspected CAD by blind image analysis (GADACAD)
'A Phase III Randomized Study of BBI608 and Best Supportive Care Versus Placebo and Best Supportive Care in Patient with Pretreated Advanced Colorectal Carcinoma', Protocol No: CO23
A Phase 3, Randomised, Double Blind, Placebo Controlled Study Evaluating the Efficacy and Safety of Idelalisibb (GS-1101) in Combination with Bendamustine and Rituximab for Previously Treated Indolent Non-Hodgkin Lymphomas'
A Phase 3, Randomized, Double-blind, Controlled Study of Cabozantinib (XL184) vs Placebo in Subjects with Hepatocellular Carcinoma who have received prior Sorafenib'
A Randomized, Double-blind, Placebo-controlled Study of the Burton's Tyrosine Kinase (BTK) Inhibitor, PCI-32765 (Ibrutinib), in Combination with Rituximab, Cyclophosphamide, Doxorubicin, Vincristine and Prednisone (R-ACHOP) in Subjects with newly diagnosed Non-Germinal Center B-Cell Subtype of Diffuse Large B-Cell Lymphoma'
'A Phase 3, Randomised, Double-blind Study of Tivantinib (ARQ 197) in Subjects with MET Diagnostic-High Inoperable Hepatocellular Carcinoma (HCC) Treated with One Prior Systemic Therapy'
A Phase II/III Randomised, Double-Blind, Placebo-Controlled, Multi-Centre Study of 2 Potential Disease Modifying Therapies in Individuals at Risk for and with Dominantly Inherited Alzheimer's Disease'

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 2013 was 622. A summary of compliance tests assessed in 2013 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 2013, Council officers marked 597 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

The Memorandum of Understanding (MoU) that was being developed with the Department of Mines and Petroleum (DMP) was finalised and in 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.

Four meetings were held in 2013.

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 2013 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 2013 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.

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. In March the Council reviewed the arrangement and agreed to continue with monthly meetings 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 2013 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 2013.

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	Not appointed
<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 Zhongua Sun
Mr G Scott	Medical Radiation Technologist	Mr N Hicks (until June 2013) Mr C Whennan (from June 2013)
Mr C Dillon	Expert in Mining Radiation Hazards	Vacant
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

2013 MEETING ATTENDANCE

	12 FEB	12 MAR	9 APR	14 MAY	11 JUN	9 JUL	10 SEP	15 OCT	12 NOV	10 DEC
Dr A Robertson	✓	✓	✓	A	✓	✓	✓	✓	✓	✓
Dr R Fox	✓	✓	✓	✓	✓	D	✓	✓	✓	✓
Dr G Groom	A	✓	✓	✓	D	✓	✓	✓	✓	✓
Dr C Hewavitharana	✓	✓	✓	✓	A	✓	✓	✓	✓	✓
Mr M Ross	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Prof J McKay	✓	✓	✓	✓	✓	✓	✓	✓	A	✓
Mr C Dillon	A	A	A	A	A	✓	A	A	✓	✓
Mr B Cobb	✓	✓	✓	A	A	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	A	✓	A	✓	A	✓	A	A	✓
Mr G Fee	✓	✓	✓	✓	✓	A	✓	✓	✓	✓
Mr G Scott	A	✓	A	✓	A	✓	A	✓	✓	✓
Dr E Thomas (Deputy)	✓									
Dr R Price (Deputy)	✓									

✓ 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

Radiation Safety (Transport of Radioactive Substances) Amendment Regulations 2013.

Regulations to update and amend the references to the updated Code of Practice Safe Transport of Radioactive Material.

Government Gazette 26 April 2013 pages 1661-3.

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	51	-	3	54
Dental – intraoral	682	-	13	695
Dental – panoramic and/or cephalometric	130	-	1	131
Fluoroscopic – fixed	33	-	10	43
Fluoroscopic – fixed C or U arm	22	-	11	33
Fluoroscopic – mobile	97	-	9	106
Mammography	62	-	1	63
Radiographic – fixed	95	-	22	117
Radiographic – mobile	57	-	3	60
Total	1229	0	73	1302

Industrial – Fixed Gauges

- A** *Compliant*
B *Non-compliant²*

Category	A	B	Total
Density	504	63	567
In-stream analysis	13	4	17
Level	34	4	38
Thickness	-	-	0
Total	551	71	622

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 55 re-tests conducted during 2013, 100% 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 16 re-tests conducted during 2013, 100% resulted in the equipment being granted a compliance certificate.

Attachment 4: Industrial Radiation Safety Examinations*Current at 31 December 2013*

Category	2013	2012	2011	2010	2009
Borehole Logging	16	37	67	78	41
Fixed Gauges	108	118	138	95	64
Gamma Irradiator	0	0	0	3	3
Industrial Radiography	63	67	24	36	88
Industrial Radiography (Advanced)	31	9	0	0	0
Industrial Radiography (Assistant)	194	121	123	86	146
Portable Gauges	92	233	137	65	50
Portable Gauges (WA Requirements)	8	19	28	19	14
Transport	21	31	17	26	20
Service – Cabinet X-ray	2	1	4	1	4
Service – Industrial Radiography (X-ray)	0	0	0	0	0
Service – X-ray Analysis	0	2	0	3	0
X-ray Analysis – Use	5	11	15	6	8
X-ray Analysis – Use and Restricted Service	57	62	69	47	50
Total	597	711	622	465	488

**Attachment 5: List of Australian Radiation Protection and Nuclear Safety
Agency publications for 2013**

No new documents were published in 2013.

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

Current at 31 December 2013

A *Irradiating apparatus and electronic products³*

B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	45	-
Cabinet x-ray equipment	140	-
Calibration	2	477
CT	125	-
CT/SPECT	14	-
Dental – intraoral	1954	-
Dental – panoramic and/or cephalometric	345	-
Education and research	17	1012
Fluoroscopic – fixed	98	-
Fluoroscopic – mobile	125	-
Gauges – density/level	4	2706
Gauges – in stream analysis	-	72
Gauges – logging	26	360
Gauges – neutron moisture/density portable	-	445
Gauges – other	-	245
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	41	-
Laser – industrial	116	-
Laser – medical	247	-
Laser – other medical	175	-
Laser – Podiatry	2	-
Laser – research	151	-
Linear accelerator	15	-
Mammography	88	-
Non-destructive testing	104	102
Non-destructive testing – crawler control	-	18
Portable mineral analyser	-	10
Radiographic – fixed	362	-
Radiographic – mobile	412	-
Sealed Sources – other	-	108

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
Simulator	1	-
Special purpose x-ray	59	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	-	229
Sun Tanning Unit	79 ⁴	-
Superficial radiotherapy	3	-
Test source	4	-
Therapy	2	22
Therapy – HDR brachytherapy	-	2
Transilluminator	117	-
Tracer Studies	-	27
X-ray analysis	461	-
Total	5335	5894

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 2013**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2013	2012	2013	2012	2013	2012
Licences	4711	4558	2218	2161	6929	6719
Registrations	1655	1624	384	369	2039	1993
TOTAL	6366	6182	2602	2530	8968	8712
Change from 2012	+ 3.0%		+ 2.8%		+ 2.9%	

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 2013

B Total current

A	B	Purpose
5	9	Bone Densitometry
3	7	Bone Densitometry (Exemption)
23	64	Cabinet X-ray Equipment
0	1	Cobalt Teletherapy Maintenance
17	51	Compliance Testing - Diagnostic X-ray Equipment
40	105	Compliance Testing - Radioactive Gauges
3	5	Cyclotron Operation
3	5	Cyclotron Servicing
1	3	Education (Apparatus)
8	26	Education (Substances)
123	349	Fluoroscopy - Medical
35	141	Fluoroscopy - Medical (Exemption)
19	36	Fluoroscopy - Medical (Non-Specialist Exemption)
0	1	Fluoroscopy - Research
0	1	Fluoroscopy - Veterinary
1	2	Gamma Irradiator - Use
152	403	Gauges - Industrial
0	8	Gauges - Industrial (Installation)
0	2	Gauges - Level (CO2)
82	357	Gauges - Logging
279	639	Gauges - Moisture and/or Density (Portable)
3	5	Gauges - Other (Apparatus)
16	31	Gauges - Other (Substances)
2	12	Installation of X-ray Equipment
1	7	Installation of X-ray Equipment - Dental
3	7	Lasers - Acupuncture
2	8	Lasers - Chiropractic
50	116	Lasers - Dental
2	7	Lasers - Educational
8	20	Lasers - Entertainment
35	72	Lasers - Industrial
71	242	Lasers - Medical
33	86	Lasers - Physiotherapy
9	10	Lasers - Podiatry (Exemption)

A	B	Purpose
14	37	Lasers - Research
25	58	Lasers - Service
1	2	Lasers - Veterinary
1	2	Manufacture of X-ray Equipment
1	3	Medical Physics
7	15	Medical Physics - Radiotherapy (Apparatus)
3	8	Medical Physics - Radiotherapy (Substances)
36	72	Medical Radiation Technology - Diagnostic Nuclear
599	1 032	Medical Radiation Technology - Medical Imaging
84	177	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
75	231	Medical Radiology
2	3	Non-Medical Irradiation
0	1	Nuclear Medicine - Calibration and QC Sources
14	33	Nuclear Medicine - Diagnostic
14	33	Nuclear Medicine - Therapeutic
0	3	Nuclear Medicine - Veterinary
0	4	Pathology (in vitro) – Sealed Sources
7	12	Pathology Tests
13	32	Portable Mineral Analysers
88	279	Portable Mineral Analysers (X-ray)
3	9	Possession of X-ray Equipment - Diagnostic Medical
1	1	Possession of X-ray Equipment - Diagnostic Medical and Dental
0	3	Quality Assurance Procedures
7	25	Radioactive Ores - Analytical Laboratories
6	9	Radioactive Ores - Exploration
4	17	Radioactive Ores - Mining and/or Processing
3	9	Radioactive Substances - Calibration Sources
1	1	Radioactive Substances - Medical
17	36	Radioactive Substances - Sale
12	29	Radioactive Substances - Service of Devices
1	1	Radioactive Substances - Tracer Studies
8	20	Radioactive Substances - Tracer Studies (Industry)
2	5	Radiography - Chiropractic (Exemption)
18	35	Radiography - Chiropractic (Extended)
58	168	Radiography - Chiropractic (Restricted)
159	394	Radiography - Industrial (Gamma)
159	389	Radiography - Industrial (X-ray)
0	1	Radiography - Medical (Direction and Supervision)
0	1	Radiography - Security
218	609	Radiography - Veterinary
0	2	Radioguidance - Medical (Radioactive Substances)

A	B	Purpose
2	9	Radiology - Veterinary
9	13	Radiopharmaceutical Manufacture and Dispensing
7	19	Radiotherapy - Medical (Apparatus)
7	21	Radiotherapy - Medical (Substances)
2	6	Radiotherapy - Medical Superficial
2	2	Radiotherapy - Veterinary (Apparatus)
2	12	Research
33	69	Research - Unsealed Radioactive Substances
2	3	Research - X-ray
12	37	Sale of Electronic Products
34	90	Sale of X-ray Equipment
4	20	Service of X-ray Equipment - Analytical
10	30	Service of X-ray Equipment - Dental
31	109	Service of X-ray Equipment - Diagnostic
7	11	Service of X-ray Equipment - Diagnostic (Extended)
0	5	Service of X-ray Equipment - Industrial NDT
2	2	Service of X-ray Equipment - Intraoral
8	13	Service of X-ray Equipment - Linear Accelerators
7	30	Service of X-ray Equipment - Other
1	1	Service of X-ray Equipment - Superficial X-ray Therapy
6	14	Special Purpose Enclosed X-ray Equipment
1	1	Static Detection
0	1	Static Electricity Measurement
0	2	Static Elimination
1	1	Storage (Apparatus)
5	11	Storage (Substances)
5	20	Transilluminators
63	125	Transport
0	1	X-ray Analysis
0	1	X-ray Analysis (Research)
19	58	X-ray Analysis - Use
100	263	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 2013

B Total current

A	B	Purpose
7	14	Bone Densitometry
7	22	Bone Densitometry (Exemption)
26	68	Cabinet X-ray Equipment
1	1	Cyclotron Operation
0	1	Disposal of Radioactive Waste – Mt Walton East IWDF
2	4	Education (Apparatus)
4	9	Education (Substances)
2	5	Education - Demonstration Radioactive Sources
1	2	Education - Demonstration Radioactive Sources (Exemption)
3	4	Education - Demonstration Sources
2	3	Fluoroscopy - Medical
1	2	Gamma Irradiator
49	139	Gauges - Industrial
0	4	Gauges - Level (CO2)
10	20	Gauges - Logging
19	44	Gauges - Moisture and/or Density (Portable)
1	7	Gauges - Other (Apparatus)
3	7	Gauges - Other (Substances)
1	6	Lasers - Acupuncture
0	6	Lasers - Chiropractic
31	82	Lasers - Dental
2	2	Lasers - Educational
3	15	Lasers - Entertainment
8	36	Lasers - Industrial
1	1	Lasers - Manufacture
42	96	Lasers - Medical
14	38	Lasers - Physiotherapy
5	5	Lasers - Podiatry
2	5	Lasers - Research
1	6	Lasers - Sale, Service, Maintenance and Testing
0	4	Lasers - Storage
1	2	Lasers - Veterinary
0	2	Manufacture of X-ray Equipment

A	B	Purpose
43	104	Medical Radiology
0	2	Non-Medical Irradiation
7	25	Nuclear Medicine
3	9	Nuclear Medicine - CT (X-ray)/SPECT
0	1	Nuclear Medicine - Veterinary
2	10	Pathology Tests
2	11	Portable Mineral Analysers
44	139	Portable Mineral Analysers (X-ray)
1	11	Radioactive Ores - Analytical Laboratories
4	11	Radioactive Ores - Exploration
11	34	Radioactive Ores - Mining and/or Processing
5	10	Radioactive Substances - Calibration Sources
0	2	Radioactive Substances - Medical
3	7	Radioactive Substances - Sale
0	2	Radioactive Substances - Service of Devices
1	2	Radioactive Substances - Tracer Studies (Industry)
7	14	Radiography - Chest Screening
20	50	Radiography - Chiropractic
0	0	Radiography - Chiropractic (Referrals)
247	643	Radiography - Dental
0	1	Radiography - Forensic
8	22	Radiography - Industrial (Gamma)
8	24	Radiography - Industrial (X-ray)
5	11	Radiography - Mammography Screening
0	0	Radiography - Medical (GP Extended)
26	51	Radiography - Medical (Operator)
11	19	Radiography - Medical (Unrestricted)
30	69	Radiography - Medical Ancillary (Referrals)
1	1	Radiography - Physiotherapy Referrals
0	0	Radiography - Podiatry Referrals
0	1	Radiography - Security
75	211	Radiography - Veterinary
0	1	Radiography - Veterinary (Hospitals)
1	1	Radioguidance - Medical (Radioactive Substances)
0	3	Radiology - Veterinary
0	2	Radiopharmaceutical Manufacture and Dispensing
1	5	Radiotherapy - Medical (Apparatus)
1	9	Radiotherapy - Medical (Substances)
0	1	Radiotherapy - Medical Superficial
0	1	Radiotherapy - Veterinary (Apparatus)
0	2	Regulatory Authority
1	6	Research (Substances)

A	B	Purpose
3	13	Research - Unsealed Radioactive Substances
2	5	Research - X-ray
0	5	Sale of Electronic Products
6	22	Sale of X-ray Equipment
3	5	Secondary Schools - Demonstration Sources
11	28	Secondary Schools - Demonstration Sources (Exemption)
18	44	Security of Radioactive Sources
3	16	Service of X-ray Equipment
1	1	Smoke Detectors - Sale
9	26	Solaria - Possession and Operation
2	6	Special Purpose Enclosed X-ray Equipment
1	1	Static Electricity Measurement
1	3	Static Elimination
6	23	Storage (Apparatus)
9	26	Storage (Substances)
3	14	Transilluminators
6	10	Transport
2	5	X-ray Analysis
34	102	X-ray Analysis - Use
1	1	X-ray Irradiator

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)