



REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended

31 December 2015

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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 eight times in 2015.

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 2015.

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, 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

Amendments made to the Radiation Safety (General) Regulations and the Radiation Safety (Qualifications) Regulations in 2015 are listed in attachment 2.

No amendments were made to the Radiation Safety Act and the Radiation Safety (Transport of Radioactive Substances) Regulations in 2015.

PROSECUTIONS

No prosecutions were initiated or finalised in 2015.

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 34 incidents during 2015 which are presented in the tables below. The majority of incidents were caused by human error and the failure to follow protocol.

Incident	Occurrences	Category
Radiology		
Incorrect patient imaged - failure to correctly identify patient against request form	1	Human error – failure to follow protocol
Incorrect patient imaged due to incorrect patient name being entered on request form	3	Human error – other
Incorrect anatomical site imaged – failure to check request form	3	Human error – failure to follow protocol
Patient found to be pregnant following imaging.	2	Protocol followed – patient identified as not being pregnant
Dose received by staff members	1	Human Error – failure to heed warning signs
Radiotherapy		
An overdose to the site greater than 2% higher than planned.	1	Human error – fault identified after the first 3 of a total of 4 treatments.
Unauthorised diagnostic x-ray procedure of a staff member by another staff member	1	Human error – failure to follow protocol

Industrial		
Borehole logging source stuck in borehole	1	Equipment malfunction/unavoidable – source retrieved
Temporary loss of control of a radioactive source	1	Human error – failure to follow protocol. Source recovered.
Nuclear Medicine		
Incorrect radiopharmaceutical administered	2	Human error – failure to follow protocol
Incorrect activity of radiopharmaceutical administered	3	Human error – failure to follow protocol
Incorrect activity of radiopharmaceutical administered	5	Human error – equipment malfunction
Incorrect activity of radiopharmaceutical administered	1	Human error in setting up equipment calibration.
Radiopharmaceutical administered but scan not performed	1	Protocol followed – patient did not proceed with procedure.
Radiopharmaceutical administered but scan not performed	1	Protocol followed – patient's status changed rapidly and the diagnostic test was no longer required.
Extravasation of radiopharmaceutical	1	Protocol followed – IV administration failed after successful cannulation flush
Delay in intended imaging associated with the need to take the patient to surgery	1	Human error – inadequate communication between teams
Loss of small radioactive source in human tissue	1	Human error – the small source was misidentified
Other		
Excessive discharge of radioactive effluent	1	Equipment malfunction
Dose received by personal monitoring device but not by wearer	2	Failure to adequately secure or appropriately store monitoring device
Transport incident – transport package damaged at warehouse	1	Human error – radioactive source undamaged and able to be used by consignee.

MEDICAL AND RELATED RADIATION MATTERS

Medical Compliance Testing

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

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

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

A summary of the compliance tests assessed in 2015 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.

Laser Regulatory Options

During 2015 Council was requested to consider whether it wishes its officers to conduct a review of the training and qualification prerequisites for the use of lasers for cosmetic purposes. Council asked its officers to conduct the review which was not finalised in 2015

Ban on the Use of Solaria for Commercial Sun tanning

In 2015, the Minister announced that a ban on commercial sun tanning units will take effect on 1 January 2016. Following this announcement, the Council liaised with the Department of Health and progressed the development of an implementation plan for the ban, consideration of compensation options, disposal issues and consideration of a business assistance package.

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 2015.

Research Project Title
68Ga-PSMA PET-CT in biochemical relapse following primary treatment of Prostate Carcinoma (PCa)
A Multicentre Randomized Phase II Trial Comparing NAB Paclitaxel v Paclitaxel in Patients with Advanced Urothelial Cancer Progressing on or after a Platinum Containing Regimen.
A 24-month, Multicentre, Randomized, Double-blind, Placebo-controlled, Parallel group, Efficacy, Safety, Tolerability, Biomarker, and Pharmacokinetic Study of AZD3293 in Early Alzheimer's Disease (AMARANTH Study)
A Phase IA, Open-Label, Multiple-Dose, Dose Escalation Study to investigate the Safety and Pharmacokinetics of the BTK Inhibitor BGB-311 in Subjects with Indolent B-Cell Lymphoid Malignancies
A randomised, multi-centre, open-label, phase III study of adjuvant Lapatanib, Trastuzumab, their sequence and their combination in patients with HER2/ErbB2 positive primary breast cancer.
A phase III, randomised, double-blind, placebo-controlled, parallel-group, multicentre efficacy and safety study of gantenerumab in participants with mild Alzheimer's disease

Research Project Title

A Phase 3 Randomised, Double-blind, Placebo-controlled Study to Assess the Safety and Efficacy of S-888711 (Lusutrombopag) for the Treatment of Thrombocytopenia in Patients with Chronic Liver Disease Undergoing Elective Invasive Procedures.

Randomized, Double-Blind, Placebo-Controlled, Phase 3 Study of Ramucirumab and Best Supportive Care (BSC) Versus Placebo and BSC as Second-Line Treatment in Patients with Hepatocellular Carcinoma and Elevated Baseline Alpha-Fetoprotein (AFP) Following First-Line Therapy with Sorafenib.

Adaptive Radiotherapy for Head and Neck Cancer, Feasibility and Clinical Implications

A Phase 3, Randomized, Efficacy and Safety Study of Enzalutamide Plus Leuprolide, Enzalutamide Monotherapy, and Placebo Plus Leuprolide in Men with High Risk Non-metastatic Prostate Cancer Progressing after Definitive Therapy.

Multi-modality imaging and biomarkers to improve risk stratification for secondary prevention after acute coronary syndrome.

Comparison of HBED and DOTAGA conjugated 68Ga PSMA ligands: diagnostic efficacy and biodistribution in prostate cancer (PCa).

An Open-label, Randomized, Phase 3 Study of Nivolumab or Chemotherapy in Subjects with Relapsed Small-Cell Lung Cancer after Platinum-base First Line Chemotherapy (CheckMate 331).

A Phase 3, Randomised, Open-Label Study of Nivolumab Combined with Ipilimumab versus Sunitinib Monotherapy in Subjects with Previously Untreated, Advanced or Metastatic Renal Cell Carcinoma.

A Phase III Double Blind Placebo Controlled Randomized Study of Adjuvant MED14736in Completely Resected Non-Small Cell Lung Cancer. Protocol Number: BR.31/CTC0154/ALTG14/001

A Clinical Evaluation of the Medtronic Polymer-Free Drug-Eluting Coronary Stent System in De Novo Native Coronary Artery Lesions.

An Open-label, Randomised, Phase 3 Study of Nivolumab or Nivolumab plus Ipilimumab, versus platinum doublet chemotherapy in Subjects with Chemotherapy-Naïve Stage IV or Recurrent Non-Small Cell Lung Cancer (NSCLC) (CheckMate 227).

Research Project Title

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.

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.

A Phase III, randomized, double-blind, controlled, multicentre study of intravenous PI3K inhibitor copanlisib in combination with standard immunochemotherapy versus standard immunochemotherapy in patients with relapsed indolent non-Hodgkin's lymphoma (iNHL).

Multi-modality imaging and biomarkers to improve risk stratification for secondary prevention after acute coronary syndrome.

A double blind randomised placebo controlled 2x2 factorial trial of the effect of Vitamin K and Colchicine on Vascular Calcification Activity in subjects with Diabetes Mellitus: The ViKCoVac Diabetes Study

A Randomised, Multi-centre Phase III Study of Nivolumab versus Sorafenib as First-line Treatment in Patients with Advanced Hepatocellular Carcinoma.

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.

Dose Optimization Study of Idelalisib in Follicular Lymphoma and Small Lymphocytic Lymphoma (Gilead GS-US-313-1580)

The Australian SHAM controlled clinical trial of Renal DeNervation in patients with resistant hypertension (AUSHAM-RDN)

INDUSTRIAL, ENVIRONMENTAL and MINING RADIATION

Industrial Compliance Testing

The Council's compliance testing program for fixed radiation gauges commenced in 1999. Gauges are not approved for use without a current certificate of compliance. . A summary of compliance tests assessed in 2015 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 2015, Council officers marked 459 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 2015.

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 2015 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 2015 through the national Radiation Health Committee.

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

Personal Radiation Monitoring Services

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

- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Commonwealth Government's radiation safety agency in Victoria.
- New Zealand National Radiation Laboratory, the New Zealand national radiation safety organisation
(Australian agent: Australian Radiation Services Pty Ltd, Victoria).
- Australian Radiation Services Pty Ltd, a company based in Victoria.
- Landauer Inc (USA) for the Luxel based system.
- 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 2015 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. 53 Temporary Permits were current as at 31 December 2015.

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 2015.¹

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.

¹ A list of the purposes for both licences and registrations (and exemptions) are normally included in this attachment but could not be generated due to a technical error.

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	Medical Radiation Technologist	Mr C Whennan
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

**Radiological Council
2015 MEETING ATTENDANCE**

2015 Annual Report

	10 FEB	17 MAR	12 MAY	9 JUN	18 AUG	20 OCT	10 NOV	8 DEC
Dr A Robertson	✓	✓	✓	A	✓	✓	✓	✓
Dr R Fox	✓	✓	✓	✓	✓	✓	✓	✓
Dr G Groom	✓	✓	✓	✓	✓	✓	✓	A
Dr C Hewavitharana	✓	✓	A	A	A	✓	✓	✓
Mr M Ross	✓	✓	✓	✓	✓	✓	✓	✓
Prof J McKay	✓	✓	✓	A	✓	✓	A	✓
Mr B Cobb	A	✓	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	A	✓	✓	A	✓	✓	✓
Mr G Fee	✓	✓	✓	✓	✓	A	A	✓
Mr G Scott	✓	✓	✓	✓	✓	✓	✓	A
Dr E Thomas (deputy for Dr Groom)								✓

✓ attended A apology NA not appointed at the time

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

None

RADIATION SAFETY (GENERAL) REGULATIONS

Radiation Safety (General) Amendment Regulations 2015

Amendment to fees (Schedule XV).

Government Gazette 19 May 2015 pages 1754-7.

Radiation Safety (General) Amendment Regulations (No. 2) 2015

Delete definitions and regulations associated with the commercial use of solariums.

Government Gazette 9 October 2015 pages 3982.

RADIATION SAFETY (QUALIFICATIONS) REGULATIONS

Radiation Safety (Qualifications) Amendment Regulations 2015

Amendment to fees (Schedule 2).

Government Gazette 19 May 2015 pages 1753-4.

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

Attachment 3: Compliance Testing**Medical**

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

Category	A	B	C	Total
CT	68	-	2	70
Dental – intraoral	639	-	5	644
Dental – panoramic and/or cephalometric	148	-	-	148
Dental – cone beam CT	5	-	-	5
Fluoroscopic – fixed	31	-	7	38
Fluoroscopic – fixed C or U arm	23	-	1	24
Fluoroscopic – mobile	104	-	5	109
Radiographic – fixed	103	-	23	126
Radiographic – mobile	68	-	3	71
Mammography	44	-	1	45
Total	1233	0	47	1280

Industrial – Fixed Gauges

- A** *Compliant*
B *Non-compliant³*

Category	A	B	Total
Density	502	40	542
In-stream analysis	4	-	4
Level	51	12	63
Total	557	52	609

² Equipment deemed to be non-compliant may continue to be used for a further three months while the problem is being addressed provided that the reason for non-compliance does not significantly increase the radiation dose to the patient. A re-test is then required. Of the 40 re-tests conducted during 2015, 98% resulted in the equipment being granted either a compliance or conditional compliance certificate.

³ Equipment that has been assessed as non-compliant cannot be used until it has been re-tested and issued with a certificate of compliance. Of the 2 re-tests conducted during 2015, 100% resulted in the equipment being granted a compliance certificate.

Attachment 4: Industrial Radiation Safety Examinations*Current at 31 December 2015*

Category	2015	2014	2013	2012	2011
Borehole Logging	13	29	16	37	67
Fixed Gauges	125	153	108	118	138
Industrial Radiography	63	73	63	67	24
Industrial Radiography (Advanced)	19	16	31	9	0
Industrial Radiography (Assistant)	129	237	194	121	123
Portable Gauges	23	46	92	233	137
Portable Gauges (WA Requirements)	1	14	8	19	28
Transport	32	17	21	31	17
Service – Cabinet X-ray	4	5	2	1	4
Service – Industrial Radiography (X-ray)	0	0	0	0	0
Service – X-ray Analysis	3	0	0	2	0
X-ray Analysis – Use	0	0	5	11	15
X-ray Analysis – Use and Restricted Service	47	42	57	62	69
Total	459	632	597	711	622

Attachment 5: List of Australian Radiation Protection and Nuclear Safety Agency publications for 2015

Title
RPS G-1 Guide for Radiation Protection of the Environment (2015)

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

Current at 31 December 2015

A *Irradiating apparatus and electronic products⁴*

B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	55	-
Cabinet x-ray equipment	162	-
Calibration	2	550
CT	132	-
CT/SPECT	15	-
Dental – cone beam CT	10	-
Dental – intraoral	2133	-
Dental – panoramic and/or cephalometric	412	-
Education and research	19	1053
Fluoroscopic – fixed	93	-
Fluoroscopic – mobile	142	-
Gauges – density/level	4	3196
Gauges – in stream analysis	-	81
Gauges – logging	31	432
Gauges – neutron moisture/density portable	-	469
Gauges – other	-	273
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	132	-
Laser – industrial	128	-
Laser – medical	273	-
Laser – other medical	201	-
Laser – Podiatry	9	-
Laser – research	171	-
Linear accelerator	20	-
Mammography	81	-
Non-destructive testing	164	123
Non-destructive testing – crawler control	-	18
Portable mineral analyser	-	10
Radiographic – fixed	352	-
Radiographic – mobile	409	-

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

Category	A	B
Sealed Sources – other	-	114
Simulator	3	-
Special purpose x-ray	46	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	-	273
Sun Tanning Unit	0	-
Superficial radiotherapy	3	-
Test source	4	-
Therapy	2	25
Therapy – HDR brachytherapy	-	1
Transilluminator	119	-
Tracer Studies	-	27
X-ray analysis	535	-
Total	5863	6704

Attachment 7: Licences and Registrations*Current at 31 December 2015**Including individual exemptions granted under Section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2015	2014	2015	2014	2015	2014
Licences	5219	5000	2316	2315	7535	7315
Registrations	1800	1753	403	404	2203	2157
TOTAL	7019	6753	2719	2719	9738	9472
Change from 2014	+ 3.9%		-		+ 2.8%	

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
MoU	Memorandum of Understanding
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)