REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended

31 December 2010

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RADIATION SAFETY ACT 1975 – 2010

STATUTORY RESPONSIBILITIES OF THE COUNCIL

The Radiological Council is appointed under Section 13 of the Radiation Safety Act to assist the Minister to protect public health and to maintain safe practices in the use of radiation.

In its position as an independent regulatory authority, the Council is required to administer the Act and to —

- implement the scheme of licensing and registration;
- conduct inquiries into alleged contraventions of the Act and, where necessary, to suspend or cancel licences and registrations;
- advise the Minister and make recommendations with respect to the technical aspects of radiation safety requirements, the methods that may be used to prevent or minimise the dangers arising from the use of radioactive substances, irradiating apparatus and electronic products, including the preparation of regulations;
- investigate and prosecute offences.

The Council is also required to keep under review manufactured or assembled devices which emit radiation to determine if control of these devices is necessary under the Act.

Section 10 requires the Minister at all times to have regard to the expressed views of the Council.

MEMBERSHIP OF THE COUNCIL

The Council comprises —

- a medical practitioner appointed by the Governor on the recommendation of the Executive Director Public Health;
- a medical practitioner who is a specialist in radiology or radiotherapy;
- a physician specialising in nuclear medicine;
- a person who possesses relevant qualifications or experience as a physicist;
- a person who possesses relevant qualifications or experience as a radiation engineer or electronic engineer;

- a representative of the interests of tertiary educational institutions;
- two other persons with special expertise in radiation protection may be nominated by the Minister on the advice of the other members of the Council;
- a medical radiation technologist.

The present members, approved by the Governor, are listed in attachment 1.

The Council met six times in 2010.

ADVISORY COMMITTEES

The Council may appoint committees under Section 19 of the Act to investigate and advise on any aspect of its functions, or to carry out any function other than those relating to licences and registrations. The present policy is to create, when necessary, short-term working parties which address a specific issue and report back to the Council.

The only exception is Council's Chiropractic Advisory Committee which is appointed to supervise the radiation safety examination for chiropractors who wish to apply for licences to operate diagnostic x-ray equipment. The committee, which also advises Council on other chiropractic matters, met twice in 2010.

ADMINISTRATIVE SUPPORT

Section 10(4) of the Act provides for the administration of the Act to be paid out of moneys appropriated by Parliament for the purpose. However, the Council is not funded directly and relies on the Department of Health's Radiation Health Branch for administrative and scientific support. While the greater part of the Branch's duties are directly concerned with supporting the Council's needs, and many of the staff are appointed authorised officers under Section 4(1) of the Act for this purpose, the Branch also provides separate advice to the Department on a range of radiation issues.

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

STATE ELECTORAL ACT

For the purposes of Section 175ZE of the State Electoral Act, the Radiological Council has no expenditure to report. Council's functions are supported from within the budget assigned by the Department of Health to the Radiation Health Branch. The Council does not have a budget in its own right.

STATE RECORDS ACT

The Radiological Council's record keeping systems are managed by the Radiation Health Branch of the Department of Health, and thus the Council's compliance with the State Records Commission Standard 2, Principle 6 is linked to compliance by the Department of Health.

THE RADIOLOGICAL COUNCIL WEBSITE

In 2004 the first version of the Radiological Council website was finalised and was made available for access by the public at the address www.radiologicalcouncil.wa.gov.au. The Website was updated during 2010 to satisfy the greater depth of information being sought by the public concerning the requirements of the Act. The website will continue to be updated to ensure its continued relevance and usefulness.

REGISTRATIONS, LICENCES AND TEMPORARY PERMITS

Registration and licensing are the principal means by which the use of radiation is regulated. A summary of the legislative system for registration and licensing in Western Australia is included in appendix 1.

QUALIFICATIONS AND TRAINING OF RADIATION USERS

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

CHANGES TO LEGISLATION

Amendments made to the Act and Regulations in 2010 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 **11** incidents during 2010.

Medical Incidents

- Council was advised by the Radiation Safety Officer of a hospital that a reportable dose had been recorded on the two personal radiation monitoring badges worn by a cardiology registrar. The TLD assigned to the trunk had recorded a dose of 5.4 mSv and the TLD assigned to the collar had recorded a dose of 0.15 mSv. In accordance with the Radiation Safety (General) Regulations, the Radiation Safety Officer informed the Radiological Council of the matter and the response taken.

  The Radiation Safety Officer advised that investigations had concluded that it was likely the registrar had mixed up the trunk and collar badges and placed them on his person incorrectly. The trunk TLD is normally worn under a lead apron.

  Council noted that the Radiation Safety Officer also advised that the registrar had been counselled on the importance of the correct positioning of monitoring devices to prevent a reoccurrence of the incident.

- A misadministration incident of a diagnostic radiopharmaceutical (incorrect radiopharmaceutical agent) to a child under 12 months occurred in the Nuclear Medicine Department of a hospital.

  In accordance with the Radiation Safety (General) Regulations, the Radiation Safety Officer of the hospital informed the Radiological Council of the matter and of the response and the future preventative measures.

  The error occurred because the licensed nuclear medicine technologist drew up the wrong pre-dispensed radiopharmaceutical from the supplier. The syringe was then incorrectly labelled with the name of the prescribed radiopharmaceutical. When inappropriate imaging data acquisition was noted

by the nuclear medicine technologist, the senior technologist investigated and noted that the incorrect radiopharmaceutical agent (which was still in its sealed packaging) had been drawn up.

The nuclear medicine specialist informed the parents and the referring clinical team and the incident was also reported to the Head of Department and to the Radiation Safety Officer. The additional effective radiation to the patient has been estimated by the Radiation Safety Officer as 1.85 mSv.

The Radiation Safety Officer advised the Radiological Council that the investigation of the incident indicated that the colour coding of the shielded containers, to distinguish between different radiopharmaceutical agents, had not been applied to those agents that were received from outside suppliers. The Radiation Safety Officer advised that this had now been rectified and that protocols and procedures had been modified.

Council was satisfied with the investigation and the review of procedures and protocols that had been implemented.

- An incident of inadvertent radiation exposure of a non-radiation staff member occurred in a CT scan room of a hospital.

A medical imaging technologist (MIT) commenced the warm up sequence of the CT scanner at the hospital. As is the department's policy, the MIT locked the door between the CT room and the corridor and placed an "In Use" sign on the door. The door between the CT room and the console room was closed but the console room door was left ajar. The warning lights are active during exposures in the warm up sequence. As no other persons were present in the department, the MIT left the CT scanner running and went to turn on the other x-ray equipment in the department and carry out tube warm up exposures.

Sometime later, the department's nurse entered the console room and found the non-radiation worker in the CT scan room. The officer advised that he had heard the scanner audible exposure alarm as scanning took place and believed that they were warning noises. He entered the CT room to try and identify any problems.

The worker was counselled by the Radiation Safety Officer and the MIT and was advised that the dose received was estimated to be much less than 0.05 mSv.

A review of procedures and protocols was undertaken and all medical imaging staff members were advised that they must remain in the console room whenever the equipment was producing x-rays. Additionally, training of staff within the hospital was reviewed.

Council was satisfied that the investigation and review of polices, procedures and training was sufficient to minimise the likelihood of a reoccurrence of the incident.

- Council was advised that a reportable dose had been recorded on the personal radiation dosimeter worn by a radiation therapist employed by an oncology department.

  An investigation had found that the personal dosimeter had fallen from its holder and had remained in the radiotherapy treatment room during a patient treatment. The incident had been reported at the time to the radiotherapy physicist who organised the processing of the dosimeter and arranged for a new dosimeter to be issued. The original dosimeter returned an assessed dose of 95 mSv.

  The Radiological Council reviewed the investigation and requested that the hospital department amend its protocols to require that the date and details of such incidents are recorded in writing and forwarded to the Radiation Safety Officer at the time of the incident.

- Council was advised, under the Radiation Safety (General) Regulations that a spill of a radiopharmaceutical had occurred in the nuclear medicine department of a hospital.

  The investigation of the incident found that the spill occurred from an inadvertently uncapped lumen attached to the patient cannula during administration of the radiopharmaceutical. Thorough decontamination of the patient and surrounds was performed immediately along with appropriate disposal of waste. The patient would have received only a minor radiation dose.

  Council noted that the nuclear medicine technologists of the hospital were informed of the incident and advised to take extra care with unfamiliar devices with particular attention given to multi-port devices and closure of relevant ports.

  Council was satisfied with the investigation and the remedial action taken to minimise the likelihood of reoccurrence.

- Council was advised that an incident involving the misadministration of a ^{99m}Tc radiopharmaceutical occurred in the nuclear medicine department of a hospital.

  The error occurred when the patient received a dose of 900 MBq of the radiopharmaceutical for an exercise myocardial perfusion scan but was not exercised and the investigation could not be performed. The correct isotope

and activity had been administered, but too early (i.e. before the stress test). The misadministration occurred as the patient had already had a rest study and the dose injected was meant to be for the stress study and should not have been given until the patient was undergoing the treadmill stress test. The additional effective radiation dose received by the patient was estimated at 8.1 mSv.

The incident was reported immediately upon discovery and the patient counselled by the Senior Nuclear Medicine Technologist and the rostered Nuclear Medicine Consultant.

The Radiation Safety Officer reported that the investigation found that there were two major contributing factors to the incident;

- the patient should have been taken into the cardiac stress room for cannulation, not the injection room, and
- one of the nurses should have been watching and waiting for the patient to be cannulated in the injection room, as part of their preparation, before moving to the cardiac stress room.

The incident was discussed at the next team meeting and protocols and procedures were amended.

Council was satisfied that the action during the incident and investigation and the amendments to existing protocols was acceptable.

Industrial Incidents

- Council was advised of a high dose that had been recorded on a personal monitoring device worn by an industrial radiographer. The dose recorded on the device was 2.6 mSv.

  The investigation by the Radiation Safety Officer found that the personal dosimeter had become dislodged from its holder and had fallen into the exposure area and remained there during the radiation exposure.

  Council reviewed the investigation and was satisfied with the explanation provided.

- Notification was received from a well logging company that two logging tools had been abandoned in the north west of the state in two separate incidents.

  The first incident occurred when the logging tool, with installed radioactive sources (63 GBq of ^{137}Cs and 444 GBq of ^{241}Am) became stuck at a depth of

4538 metres. Source fishing operations were unsuccessful, and the tool was deemed unrecoverable

The second incident occurred a month later when the logging tool with installed radioactive sources (63 GBq of ^{137}Cs and 444 GBq of ^{241}Am) became stuck at a depth of 3355 metres. Source fishing operations were unsuccessful and the tool was deemed unrecoverable.

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

Notifications of the abandonment were provided to the National Offshore Petroleum Safety Authority and the Petroleum Division of the Department of Mines and Petroleum.

- Notification was received from the Radiation Safety Officer of a mining company that non-radiation workers had been exposed to radiation from a gauge containing 5.55 GBq of ^{137}Cs attached to a pipe that had not been isolated.

  The incident occurred during maintenance that was being performed on a primary crusher, vault/apron feeder. A work permit had been issued that covered the works to be completed in the level above the gauge. Investigations had found that it had been assumed that the isolations in place for the vault access would allow safe access to the apron feeder feed chute, however, this was not the case.

  Estimates of doses received by personnel range from 0.009 mSv to 0.02 mSv.

  Council was satisfied that the investigation and remedial action undertaken by the company was satisfactory.

- Notification was received from a well logging company of two logging tools that had become detached from their wirelines in two separate incidents.

  The first incident occurred when the logging tool, with installed ^{60}Co radioactive source, had become detached during logging operations. Operations to retrieve the source were successful and the source was undamaged.

  The second incident occurred when the logging tool, with installed ^{60}Co radioactive source, became stuck down a bore hole during logging operations.

Operations to retrieve the source were successful and the source was undamaged.

- Notification was received from a well logging company that a logging source had been abandoned in a well in the north west.

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

PROSECUTIONS

No prosecutions were initiated in 2010.

MEDICAL AND RELATED RADIATION MATTERS

Compliance Testing

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

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

Through conditions imposed on the registration under Section 36 of the Act, the registrant (the owner) is legally responsible for satisfying the requirements of the compliance testing program.

Over the last few years the compliance testing program has been challenged by the rapid rollout of new technologies, the increasing workload and reduced resources. The number of staff assigned to the program has been reduced significantly in order to cope with additional regulatory demands imposed by changes in government policy and the rapid rise in the number of licences and registrations issued in Western Australia. Suitable staff, with the expertise and time to assess the new technologies, have not been able to be made available to the program. With the continuing pressure on the staff resources of the Branch, Council is concerned that the compliance testing program will not be properly monitored to fulfil its function of improving radiation safety to staff and patients.

The number of compliance tests of diagnostic x-ray equipment received by Council in 2010 was 1248. A summary of the statistics for the compliance program per type of diagnostic medical imaging equipment is included in attachment 3.

Approvals for Exposure to Radiation for Human Subjects in Medical Research

In Western Australia, all research projects involving exposure of human participants to ionising radiation must be evaluated by the Radiation Safety Officer. When the level of radiation dose involved exceeds certain levels, Radiological Council approval must be obtained.

In keeping with the Australian Radiation Protection and Nuclear Safety Agency Radiation Protection Series # 8 (2005) *Exposure of Humans to Ionizing Radiation for Research Purposes*, the Council assesses research projects which involve exposing humans to ionising radiation without proven benefits to the irradiated subjects and where the dose to any individual adult subject exceeds 5 mSv in any year.

Council assessed and approved the radiation component of the following research applications in 2010.

Research Project Title	Institution
Revised Protocol for Human research project using radiation: Prospective Feasibility Study of the Apnex Medical Hypoglossal Nerve Stimulation (HNS) System to Treat Obstructive Sleep Apnea	Sir Charles Gairdner Hospital
Revised C-11 Methionine and F-18 Fluorothymidine PET imaging in suspected residual or recurrent glioma	Sir Charles Gairdner Hospital
A Double-blind, Placebo-Controlled Randomised Trial of PF-804 in Patients with Incurable Stage IIIB/IV Non-small Cell Lung Cancer after Failure of Standard Therapy for Advanced or Metastatic Disease	Sir Charles Gairdner Hospital
Characterisation of Global and Regional Hypoxia in Mesothelioma using 18F-FMISO PET Imaging: Extension of project duration	Sir Charles Gairdner Hospital
CD-40 activating antibody (CP-870,893) in combination with cisplatin and pemetrexed in unresectable malignant mesothelioma: a phase Ib study	Sir Charles Gairdner Hospital
A Phase 3, Randomised, Double Blind, Multicenter Trial Comparing Orteronel (TAK-700) plus Prednisone with Placebo plus Prednisone in Patients with Chemotherapy-Naïve Metastatic Castration-Resistant Prostate Cancer (Millennium Pharmaceuticals Inc: Protocol C21004)	Sir Charles Gairdner Hospital
A Phase 3, Randomised, Double Blind, Multicenter Trial Comparing Orteronel (TAK-700) plus Prednisone with Placebo plus Prednisone in Patients with Metastatic Castration-Resistant Prostate Cancer that has Progressed during or following Docetaxel-based Therapy (Millennium Pharmaceuticals Inc: Protocol C21005)	Sir Charles Gairdner Hospital
Phase 1 Multiple Ascending Dose Study of BMS-754807 in Subjects with Advanced or Metastatic Solid Tumours (Bristol-Myers Squibb, Protocol No: CA191-002)	Sir Charles Gairdner Hospital
An Open-Label, 2-Cohort, Multicenter, Phase 2 Study of E7080 in Previously Treated Subjects with Unresectable Stage III or Stage IV Melanoma (Eisai Protocol: E7080-G000-206)	Sir Charles Gairdner Hospital
Coherex Left Atrial Appendage Occlusion Study: A multi-center study to evaluate the safety and efficacy of the Coherent Left Atrial Appendage Occlusion System	Sir Charles Gairdner Hospital
Apoptosis Imaging in Malignant Pleural Mesothelioma	Sir Charles Gairdner Hospital

INDUSTRIAL, ENVIRONMENTAL and MINING RADIATION

Industrial Compliance Testing

The Council's compliance testing program for fixed radiation gauges commenced in 1999. The program requires that gauges are not used unless they have a current certificate of compliance. The number of compliance tests received by the Council in 2010 was 375. A summary of compliance tests assessed in 2010 is included in attachment 3.

Standards for Council Examinations

Council had previously agreed that improved control over industrial radiation safety examination standards was necessary and had decided that while course providers may continue to invigilate examinations, all industrial papers would be returned to Council's officers for marking. The program commenced during the last quarter of 2002. In 2010, Council officers marked 465 industrial examination papers. The number of exams marked in each category is listed in attachment 4.

Uranium Mining

On 17 November 2008, the State Government officially overturned a ban on uranium mining in Western Australia. Uranium mining and processing, certain exploration activities and the transport of uranium ore are subject to the Radiation Safety Act and any subsidiary legislation.

The Council has an independent role to ensure the appropriate oversight of the radiation safety aspects of uranium mining and this includes –

- the review of radiation management plans.
- approvals of Radiation Safety Officers.
- the review of occupational and environmental reports.
- conducting independent monitoring and surveillance.
- conducting inspections and audits.

MISCELLANEOUS

Radiation Health Committee

The Radiation Health Committee is a body established to advise the Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Agency and its Radiation Health & Safety Advisory Council on matters relating to radiation

protection, formulating draft national policies, codes and standards for consideration by the Commonwealth, States and Territories.

Western Australia has representation on the Radiation Health Committee through the Secretary of the Radiological Council who attends the committee meetings tri-monthly.

A list of publications for 2010 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 2010 through the national Radiation Health Committee.

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

Personal Radiation Monitoring Services

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

- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the Commonwealth Government's radiation safety agency in Victoria.

- New Zealand National Radiation Laboratory, the New Zealand national radiation safety organisation
  (Australian agent: Australian Radiation Services Pty Ltd, Victoria).

- Australian Radiation Services Pty Ltd, a company based in Victoria.

- Landauer Inc (USA) for the Luxel based system.
  (Agent: Landauer Australasia Pty Ltd)

- Global Dosimetry Solutions, a company based in USA.

- Global Medical Solutions Australia, a company based in NSW.

Appendix 1: Registration and Licensing

Registrations

Section 28 of the Act requires prescribed radioactive substances, x-ray equipment and electronic products, together with the associated premises, to be registered. Registrants may include individuals, companies, organisations or institutions.

All x-ray equipment is prescribed while prescribed electronic products include lasers, transilluminators and microwave ovens.

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 2010 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. Nine Temporary Permits were current as at 31 December 2010.

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 2010.

Commonwealth Government Agencies and Contractors

The Radiation Safety Act does not apply to Commonwealth agencies or to their employees (or contractors) who might use radiation in Western Australia. Those agencies are regulated by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) under the Commonwealth Government's Australian Radiation Protection and Nuclear Safety Act 1999.

Appendix 2: Licence Prerequisites

Before a licence may be granted, the Council has an obligation to ensure that an applicant has appropriate qualifications, competence and experience (Section 33).

Protocols have been developed which prescribe the prerequisite qualifications and experience necessary for a wide range of radiation uses. Some qualifications are recognised by the Council because an appropriate degree of radiation safety training is inherent in gaining those qualifications. However, other applicants may be required to attend a recognised radiation safety course and pass an examination. The Council has authority to impose examinations under the Radiation Safety (Qualifications) Regulations.

Persons who are not required to hold a licence themselves but who must work under the direction and supervision of a licensee may also be required to hold certain qualifications or to have undergone additional radiation safety training. These requirements may be imposed by regulation or through conditions, restrictions and limitations imposed under Section 36. The registrant for the premises where the individual works is primarily responsible for ensuring compliance with these criteria.

Courses in various aspects of radiation safety are offered by both the government and private sectors, for example:

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

Attachment 1: Radiological Council

MEMBERS OF THE 12TH RADIOLOGICAL COUNCIL

Members	Qualification or Designation	Deputy
Appointment under Sections 13(2)(a) and 13(3) of the Act		
Dr A Robertson (Chairman)	Medical Practitioner	Dr G Groom
Appointment under Sections 13(2)(b), 15(1) and 17 (1) of the Act		
Dr M Bennett	Radiologist	Dr D Dissanayake
Dr G Groom	Nuclear Medicine Physician	Dr G Bower
Dr R Fox	Physicist	Dr R Price
Mr M Ross	Electronic Engineer	Mr J O'Donnell
Prof J McKay	Tertiary Institutions representative	Dr S Hinckley
Mr G Scott	Medical Radiation Technologist	Mr N Hicks
Mr N Tsurikov	Expert in Mining Radiation Hazards	Dr L Toussaint
Mr F Harris	Expert in Mining Radiation Hazards	
Mr B Cobb	Co-opted member	not applicable

2010 MEETING ATTENDANCE

	11 FEB	15 APR	10 JUN	10 AUG	14 OCT	10 DEC
Dr A Robertson	✓	✓	✓	✓	✓	✓
Dr R Fox	✓	✓	✓	✓	✓	✓
Dr G Groom	✓	✓	✓	✓	D	✓
Mr M Ross	✓	A	✓	✓	✓	✓
Prof J McKay	✓	A	✓	✓	✓	✓
Dr M Bennett	✓	A	D	D	A	✓
Mr B Cobb	✓	✓	A	✓	✓	✓
Mr N Tsurikov	A	✓	✓	A	A	A
Mr F Harris	✓	✓	✓	✓	A	✓
Mr G Scott	NA	NA	NA	NA	✓	A

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

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

Consequential amendments were made via the following Acts as follows;

- Health Practitioner Regulation National Law (WA) Act 2010.
- Public Sector Reform Act 2010.

RADIATION SAFETY (GENERAL) REGULATIONS

Radiation Safety (General) Amendment Regulations 2010.
Regulations to update references to Standards Australia and Australian Radiation Protection and Nuclear Safety Agency Codes and Standards.

Government Gazette 17 August 2010 pages 4045-8.

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

RADIATION SAFETY (QUALIFICATIONS) AMENDMENT REGULATIONS

None

Attachment 3: Compliance Testing

Medical

A *Compliant*
B *Conditionally compliant*
C *Non-compliant*[1]

Category	A	B	C	Total
CT	38	-	2	40
Dental – intraoral	588	-	21	609
Dental – panoramic and/or cephalometric	107	-	3	110
Fluoroscopic – fixed	32	1	17	50
Fluoroscopic – fixed C or U arm	21	-	4	25
Fluoroscopic – mobile	95	-	9	104
Mammography	53	2	7	62
Radiographic – fixed	124	1	39	164
Radiographic – mobile	83	-	1	84
Total	1141	4	103	1248

Industrial – Fixed Gauges

A *Compliant*
B *Non-compliant*[2]

Category	A	B	Total
Density	321	7	328
In-stream analysis	17	1	18
Level	59	-	59
Thickness	2	-	2
Total	399	8	407

[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 124 re-tests conducted during 2010, 98% resulted in the equipment being granted either a compliance or conditional compliance certificate.
[2] Equipment that has been assessed as non-compliant cannot be used until it has been re-tested and issued with a certificate of compliance. Of the 12 re-tests conducted during 2010, 100% resulted in the equipment being granted a compliance certificate.

Attachment 4: Industrial Radiation Safety Examinations

Current at 31 December 2010

Category	2010	2009	2008	2007	2006
Borehole Logging	78	41	78	46	23
Fixed Gauges	95	64	141	78	82
Gamma Irradiator	3	3			
Industrial Radiography	36	88	56	40	35
Industrial Radiography (Assistant)	86	146	92	65	85
Portable Gauges	65	50	73	96	61
Portable Gauges (WA Requirements)	19	14	8	4	2
Transport	26	20	27	28	11
Service – Cabinet X-ray	1	4	10	1	5
Service – Industrial Radiography (X-ray)	0	0	0	1	0
Service – X-ray Analysis	3	0	4	0	0
X-ray Analysis – Use	6	8	4	0	5
X-ray Analysis – Use and Restricted Service	47	50	69	50	43
Total	465	488	562	409	352

Attachment 5: List of Australian Radiation Protection and Nuclear Safety Agency publications for 2010

Title
RPS No. 6 National Directory for Radiation Protection, December 2010.
RPS No.20 Safety Guide for Classification of Radioactive Waste 2010

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

Current at 31 December 2010

A *Irradiating apparatus and electronic products*[3]
B *Radioactive substances (sealed sources only)*

Category	A	B
Bone densitometry	41	-
Cabinet x-ray equipment	115	-
Calibration	2	384
CT	94	-
CT/SPECT	5	-
Dental – intraoral	1726	-
Dental – panoramic and/or cephalometric	273	-
Education and research	15	896
Fluoroscopic – fixed	86	-
Fluoroscopic – mobile	108	-
Gauges – density/level	6	2329
Gauges – in stream analysis	-	89
Gauges – logging	11	353
Gauges – neutron moisture/density portable	-	338
Gauges – other	-	231
Irradiator	-	48
Isotope Production	1	-
Laser – entertainment	6	-
Laser – industrial	61	-
Laser – medical	217	-
Laser – other medical	120	-
Laser – research	82	-
Linear accelerator	11	-
Mammography	71	-
Non-destructive testing	87	94
Non-destructive testing – crawler control	-	11
Portable mineral analyser	-	18

[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
Radiographic – fixed	352	-
Radiographic – mobile	418	-
Sealed Sources – other	-	104
Simulator	1	-
Special purpose x-ray	62	-
Static detection/measurement	-	3
Static elimination	-	8
Storage	-	149
Sun Tanning Unit	56	-
Superficial radiotherapy	4	-
Test source	2	-
Therapy	1	40
Therapy – HDR brachytherapy	-	3
Transilluminator	102	-
Tracer Studies	-	27
X-ray analysis	294	-
Total	4430	5125

Attachment 7: Licences and Registrations

Current at 31 December 2010

Including individual exemptions granted under Section 6 of the Act.

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2010	2009	2010	2009	2010	2009
Licences	3946	3636	1813	1708	5759	5344
Registrations	1495	1460	344	334	1839	1794
TOTAL	5441	5096	2157	2042	7598	7138
Change from 2009	+ 6.8%		+ 5.6%		+ 6.4%	

Attachment 7 (cont)

Purposes for Licences and Exemptions from Licence

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

A *Granted or renewed in 2010*
B *Total current*

A	B	Purpose
2	7	Bone Densitometry
5	7	Bone Densitometry (Exemption)
21	57	Cabinet X-ray Equipment
0	1	Cobalt Teletherapy Maintenance
17	47	Compliance Testing - Diagnostic X-ray Equipment
36	94	Compliance Testing - Radioactive Gauges
2	3	Cyclotron Operation
5	6	Cyclotron Servicing
1	5	Education (Apparatus)
10	35	Education (Substances)
112	241	Fluoroscopy - Medical
39	155	Fluoroscopy - Medical (Exemption)
27	29	Fluoroscopy - Medical (Non-Specialist Exemption)
0	1	Fluoroscopy - Research
0	1	Fluoroscopy - Veterinary
1	2	Gamma Irradiator - Use
116	323	Gauges - Industrial
0	9	Gauges - Industrial (Installation)
1	3	Gauges - Level (CO2)
141	348	Gauges - Logging
187	407	Gauges - Moisture and/or Density (Portable)
2	6	Gauges - Other (Apparatus)
6	26	Gauges - Other (Substances)
2	3	Installation of X-ray Equipment
2	5	Installation of X-ray Equipment - Dental
0	0	Installation of X-ray Equipment - Linear Accelerator
3	11	Lasers - Acupuncture
1	7	Lasers - Chiropractic
27	61	Lasers - Dental
6	10	Lasers - Educational

A	B	Purpose
8	20	Lasers - Entertainment
31	66	Lasers - Industrial
61	215	Lasers - Medical
21	63	Lasers - Physiotherapy
7	29	Lasers - Research
24	51	Lasers - Service
1	1	Lasers - Veterinary
0	0	Manufacture of Lasers and Laser Products
1	3	Manufacture of X-ray Equipment
1	2	Medical Physics
1	4	Medical Physics - Radiotherapy (Apparatus)
1	4	Medical Physics - Radiotherapy (Substances)
41	72	Medical Radiation Technology - Diagnostic Nuclear
659	959	Medical Radiation Technology - Medical Imaging
93	162	Medical Radiation Technology - Radiation Therapy Irradiating Apparatus
89	212	Medical Radiology
1	5	Non-Medical Irradiation
7	28	Nuclear Medicine - Diagnostic
7	28	Nuclear Medicine - Therapeutic
0	1	Nuclear Medicine - Veterinary
6	11	Pathology Tests
13	35	Portable Mineral Analysers
86	149	Portable Mineral Analysers (X-ray)
3	8	Possession of X-ray Equipment - Diagnostic Medical
0	1	Quality Assurance Procedures
19	58	Radioactive Ores - Mining and/or Processing
3	7	Radioactive Substances - Calibration Sources
2	2	Radioactive Substances - Medical
14	36	Radioactive Substances - Sale
10	26	Radioactive Substances - Service of Devices
0	4	Radioactive Substances - Tracer Studies
5	17	Radioactive Substances - Tracer Studies (Industry)
0	0	Radiography - Chiropractic (Exemption)
14	39	Radiography - Chiropractic (Extended)
58	147	Radiography - Chiropractic (Restricted)
110	327	Radiography - Industrial (Gamma)
112	324	Radiography - Industrial (X-ray)

A	B	Purpose
0	2	Radiography - Medical (Direction and Supervision)
0	1	Radiography - Security
192	551	Radiography - Veterinary
0	3	Radiology - Veterinary
8	14	Radiopharmaceutical Manufacture and Dispensing
6	15	Radiotherapy - Medical (Apparatus)
7	20	Radiotherapy - Medical (Substances)
1	8	Radiotherapy - Medical Superficial
2	2	Radiotherapy - Veterinary (Apparatus)
1	2	Radiotherapy - Veterinary (Substances)
3	17	Research
32	77	Research - Unsealed Radioactive Substances
3	5	Research - X-ray
7	22	Sale of Electronic Products
23	73	Sale of X-ray Equipment
3	17	Service of X-ray Equipment - Analytical
4	25	Service of X-ray Equipment - Dental
26	80	Service of X-ray Equipment - Diagnostic
6	14	Service of X-ray Equipment - Diagnostic (Extended)
0	0	Service of X-ray Equipment - High Energy Therapeutic
0	5	Service of X-ray Equipment - Industrial NDT
2	2	Service of X-ray Equipment - Intraoral
7	12	Service of X-ray Equipment - Linear Accelerators
9	28	Service of X-ray Equipment - Other
0	0	Smoke Detectors - Sale
3	9	Special Purpose Enclosed X-ray Equipment
1	1	Static Detection
0	1	Static Electricity Measurement
0	2	Static Elimination
1	5	Storage
8	21	Transilluminators
40	106	Transport
1	2	X-ray Analysis
0	1	X-ray Analysis (Research)
18	50	X-ray Analysis - Use
66	199	X-ray Analysis - Use and Service (Restricted)

Attachment 7 (cont)

Purposes for Registrations and Exemptions from Registration

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

A *Granted or renewed in 2010*
B *Total current*

A	B	Purpose
5	10	Bone Densitometry
11	24	Bone Densitometry (Exemption)
19	63	Cabinet X-ray Equipment
1	1	Cyclotron Operation
0	1	Disposal of Radioactive Waste – Mt Walton East IWDF
3	4	Education (Apparatus)
3	9	Education (Substances)
2	5	Education - Demonstration Radioactive Sources
1	3	Education - Demonstration Radioactive Sources (Exemption)
2	4	Education - Demonstration Sources
0	1	Fluoroscopy - Medical
0	0	Fluoroscopy - Medical (Image Intensifiers)
0	1	Fluoroscopy - Veterinary
0	2	Gamma Irradiator
41	115	Gauges - Industrial
2	4	Gauges - Level (CO2)
13	21	Gauges - Logging
13	40	Gauges - Moisture and/or Density (Portable)
0	6	Gauges - Other (Apparatus)
2	7	Gauges - Other (Substances)
4	11	Lasers - Acupuncture
0	4	Lasers - Chiropractic
14	41	Lasers - Dental
2	2	Lasers - Educational
5	8	Lasers - Entertainment
6	26	Lasers - Industrial
0	1	Lasers - Manufacture
33	86	Lasers - Medical
15	35	Lasers - Physiotherapy
1	5	Lasers - Research

A	B	Purpose
1	6	Lasers - Sale, Service, Maintenance and Testing
2	4	Lasers - Storage
1	1	Lasers - Veterinary
0	2	Manufacture of X-ray Equipment
46	105	Medical Radiology
0	2	Non-Medical Irradiation
8	23	Nuclear Medicine
2	6	Nuclear Medicine - CT (X-ray)/SPECT
0	1	Nuclear Medicine - Veterinary
1	10	Pathology Tests
2	14	Portable Mineral Analysers
31	75	Portable Mineral Analysers (X-ray)
15	48	Radioactive Ores - Mining and/or Processing
4	5	Radioactive Substances - Calibration Sources
0	2	Radioactive Substances - Medical
2	7	Radioactive Substances - Sale
0	2	Radioactive Substances - Service of Devices
0	0	Radioactive Substances - Tracer Studies
1	2	Radioactive Substances - Tracer Studies (Industry)
0	1	Radiography - Chest Screening
18	54	Radiography - Chiropractic
2	7	Radiography - Chiropractic (Referrals)
237	598	Radiography - Dental
1	1	Radiography - Forensic
7	19	Radiography - Industrial (Gamma)
6	17	Radiography - Industrial (X-ray)
4	9	Radiography - Mammography Screening
0	2	Radiography - Medical (GP Extended)
27	52	Radiography - Medical (Operator)
10	18	Radiography - Medical (Unrestricted)
29	66	Radiography - Medical Ancillary (Referrals)
3	7	Radiography - Physiotherapy Referrals
2	5	Radiography - Podiatry Referrals
0	1	Radiography - Security
75	202	Radiography - Veterinary
0	1	Radiography - Veterinary (Hospitals)
0	2	Radiology - Veterinary

A	B	Purpose
0	2	Radiopharmaceutical Manufacture and Dispensing
1	3	Radiotherapy - Medical (Apparatus)
3	10	Radiotherapy - Medical (Substances)
1	2	Radiotherapy - Medical Superficial
0	1	Radiotherapy - Veterinary (Apparatus)
0	1	Radiotherapy - Veterinary (Substances)
0	2	Regulatory Authority
1	6	Research (Substances)
2	14	Research - Unsealed Radioactive Substances
2	5	Research - X-ray
0	4	Sale of Electronic Products
4	24	Sale of X-ray Equipment
1	2	Secondary Schools - Demonstration Sources
11	29	Secondary Schools - Demonstration Sources (Exemption)
17	43	Security of Radioactive Sources
3	16	Service of X-ray Equipment
2	2	Smoke Detectors - Sale
10	44	Solaria - Possession and Operation
2	5	Special Purpose Enclosed X-ray Equipment
1	1	Static Electricity Measurement
1	3	Static Elimination
7	17	Storage (Apparatus)
4	15	Storage (Substances)
4	14	Transilluminators
5	13	Transport
3	5	X-ray Analysis
35	86	X-ray Analysis - Use

ABBREVIATIONS

General Terminology

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

Units of Activity

Bq	Becquerel (1 disintegration per second)
MBq	megabecquerel (1,000,000 Becquerels)
GBq	gigabecquerel (1,000,000,000 Becquerels)

Units of Effective Dose

Sv	Sievert (1 joule per kilogram multiplied by a modifying factor for the type of radiation and the radiological sensitivities of the organs and tissues being irradiated)
mSv	millisievert (one thousandth of a Sievert)
µSv	microsievert (one millionth of a Sievert)