Report of the

Radiological Council of Western Australia

for the year ended

31 December 2006

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REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended

31 December 2006

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CHAIRMAN'S REVIEW

I have great pleasure in presenting the Annual Report of the Radiological Council for the year 2006. The year saw a diverse range of issues requiring Council's attention, a number of which are more fully described in the body of the Report.

An emerging challenge for the Council and its officers is the incorporation into the regulatory framework new nationally agreed security measures for protection against the malicious use of radioactive sources. When finalised, these requirements will need to be implemented by Council's officers in addition to their existing responsibilities for enforcing the provisions of the Radiation Safety Act and, independently of the Council, providing services within the Radiation Health Branch to the Department of Health.

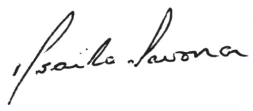
The Council has reiterated to the Department of Health and the Nurses Board its concern that Nurse Practitioners have not yet acquired an acceptable level of training in radiation safety commensurate with the authority they now hold under the Nurses Amendment Act 2003 to refer patients for radiological investigations and radiation therapy. Although required to practise in compliance with evidence-based clinical protocols in areas designated by the Director General of Health, the assistance of the Council and its officers was not sought in the preparation of these protocols, although assurances were given that this would be the case. The Council remains firmly of the view that Nurse Practitioners should not be permitted to refer patients for radiation therapy and that referrals for radiological investigations should be restricted to a small range of plain radiographic examinations with all examinations interpreted by a Radiologist.

Towards the end of the year the Council was notified by a Company providing geophysical measurement services to industry that one of its radioactive sources was missing in transit. Extensive investigations were conducted which involved various government agencies, including the

Department of Health, the W A Police Department and the Fire and Emergency Services. The source was recovered intact in January 2007 but the Council has requested a review of the circumstances of the loss and the preparation of recommendations to further minimise the likelihood of such losses in future. The Council wishes to thank all agencies for their cooperation and assistance in the source recovery.

Day to day support for Council's operations is the responsibility of officers of the Radiation Health Branch of the Department of Health. These dedicated officers continue to provide valued administrative and scientific support. From time to time, the loss of key personnel within the Branch to other organisations becomes a cause for concern to the Council as this adds considerable pressure on the remaining officers, particularly at times when emerging issues impose new demands on their services.

As always, I would like to express my appreciation to all the members of Council who have tirelessly given of their expertise. The year also saw the end of the 3 year term of the 10th Radiological Council and the beginning of the 11th Council. I would also like to express my appreciation to its officers (the staff of the Radiation Health Branch) who have diligently upheld the radiation safety standards in the State throughout the year.



Dr P Psaila-Savona
CHAIRMAN

16 March 2007

RADIATION SAFETY ACT 1975 – 2004
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.

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

The Council met six times in 2006.

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 2006.

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) and 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. There were no amendments made to the website during 2006.

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

Consequential amendments were made to the Radiation Safety Act in 2006 as a result of the Medical Radiation Technologists Act 2006. The consequential amendments, which do not take affect until proclaimed, are provided 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 recurrence of such incidents

The Council was notified of the following 14 incidents during 2006:

Medical Incidents

- Council investigated a radiation dose of 11 mSv recorded on a personal radiation monitoring device (film badge) which had been assigned to an x-ray equipment service engineer for a 2 month monitoring period. The pro-rata occupational dose limit for this period is 3.33 mSv. Following receipt of the dose assessment the service engineer stated that the film had fallen out of its holder on a number of occasions during the period in question but he was unable to provide dates or the circumstances when the film may have been exposed while not in its holder. He did not report the incident

to his employer's Radiation Safety Officer at the time nor was the allegedly faulty film badge holder replaced.

Reports from the engineer and the Radiation Safety Officer suggest it was unlikely that the dose had actually been received by the service engineer. However, the Council agreed that the dose should remain on the wearer's personal dose record.

- A report was received from the Radiation Safety Officer for a diagnostic imaging practice in March 2006 concerning a dose of 6.38 mSv received on the personal monitoring device assigned for a 2 month period to a medical imaging technologist. This dose is almost double the pro-rata occupational dose limit for the period.

  An investigation determined that during fluoroscopic imaging procedures, the medical imaging technologist had been wearing the dosimeter on his shirt collar rather than under the lead protective apron as required by the regulations.

  Council agreed that the dose of 6.38 mSv should remain on the worker's personal dose record.

- Council received a report from a hospital's Radiation Safety Officer advising of an occasion where ^{90}Y for liver cancer therapy was administered to a patient without an approved physicist being present as required by the hospital's registration conditions.

  Council considered the report and noted that in view of the urgent nature of the particular case, the licensed medical practitioner had acted in the best interests of the patient when he proceeded with the therapy. However, Council reminded the hospital that it must ensure an approved physicist is present during these procedures.

- A dose of 18 mSv was assessed for the personal monitoring device (film badge) worn by an engineer in the radiology department of a hospital for a 3 month period. This dose is more than 3½ times the pro-rata occupational dose limit for that period.

  The Radiation Safety Officer reported that the high assessment was caused by a faulty film badge holder which was found to have two filters missing. The badge also had been kept on a shelf in a room

where mobile x-ray units were tested. The Radiation Safety Officer counselled the engineer regarding proper use and storage of his film badge but also advised the Council that the next dose report also may show a high dose as the faulty badge holder had not then been replaced.

Council agreed that the dose of 18 mSv should not be retained on the engineer's personal dose record. The radiation worker and the Radiation Safety Officer were reminded of their obligations under the regulations in relation to the use of personal dosimeters.

Industrial

- A personal radiation monitoring service provider advised the Council of reportable doses that had been received by 3 personnel at an industrial radiography company over a 1 month period. A dose of 8.62 mSv had been recorded on the device assigned to an industrial radiography assistant while doses of 2.99 mSv and 1.89 mSv respectively had been recorded on the devices assigned to two industrial radiography licensees - all above the pro-rata occupational dose limit of 1.66 mSv for the 1 month period.

  The company was asked to investigate the cause and reported that in each case the devices had been lost and were later found near items that had been radiographed. Council agreed that the doses should remain on each individual's personal record.

- A personal radiation monitoring service provider notified the Council in July 2006 that a personal radiation monitoring device assigned to a well logging licensee using radioactive substances had received a reportable dose over a 3 month monitoring period of 5 mSv.

  The company's Radiation Safety Officer reported that the dose was not received from work conducted with radiation sources. Dose calculations based on the period the licensee had used radioactive sources as recorded in the company's log book (the licensee had only used calibration sources) indicated a maximum possible dose of less than 1.7 mSv.

  The report suggested that the dose may be attributed to the licensee's checked-in baggage having been scanned while travelling

interstate and in the United States of America. Some airport security cabinet x-ray scanners (for checked-in baggage) may be capable of giving doses in the order of 20 – 30 mSv.

The Radiation Safety Officer estimated a more likely dose for the licensee over the monitoring period to be 75 µSv and based this estimate on average doses received over six monitoring periods by the licensee and two co-workers.

Council agreed that the dose was uncharacteristic of the work undertaken by the licensee and that the dose should not remain on the licensee's personal record.

- A well logging company performing reservoir evaluation offshore in March 2006 advised Council that logging tools containing radioactive sources became stuck at depths of 3541m and 3535m (for ^{137}Cs and $^{241}Am/Be$ sources respectively). Source fishing operations were unsuccessful and, as the tools were deemed unrecoverable, the sources were cemented in-situ in accordance with agreed protocols.

  The conditions of the company's 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. In compliance with the conditions of registration, the registrant took the specified actions to cement the source in place.

- A mining and mineral processing company advised the Council that approximately 300 tonnes of material containing slightly elevated concentrations of naturally occurring radioactive material had been disposed of mistakenly at a landfill facility in June 2006. Some tailings material had been inadvertently removed together with the top soil from the company's registered site. The radiation levels (gamma dose rates) of the material were approximately ten times the natural background for the area (2-4 µGy/h compared to 0.2-0.3 µGy/h natural background).

  The material had been sign-posted and it is unlikely that any person had been exposed to a measurable dose due to the remote location

and low radiation levels.

The company undertook remedial action by returning the material to the company's registered site. Follow-up surveys of the landfill facility showed radiation levels at natural background levels for the area.

- Notification was received from a well logging company that in September 2006 while performing reservoir evaluation offshore in the North West of the State logging tools with ^{137}Cs and $^{241}Am/Be$ radioactive sources became stuck at a depth of 2105 m. Source recovery operations were unsuccessful and the tools were cemented in-situ and abandoned in accordance with agreed protocols.

  The conditions of the company's 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. In compliance with the conditions of registration, the registrant took the specified actions to cement the source in place.

- A personal radiation monitoring service provider advised that a monitoring device assigned to a *portable moisture/density gauges* user had received a dose over a 3 month monitoring period of 8.11 mSv. This dose is some 60% greater than the pro-rata occupational dose limit for the period

  Council required the company's Radiation Safety Officer to investigate the circumstances leading to the dose and report the matter to the Council in accordance with Regulation 15.

  The Radiation Safety Officer reported that the dose was not received from work conducted with radiation sources as the radiation worker concerned had been overseas during the dose monitoring period and had not been working with radioactive materials. The report suggested that the dose may be attributed to the monitoring device in the licensee's baggage having been scanned by x-ray equipment during an overseas trip. Council requested further information but this was not forthcoming during 2006.

- A personal radiation monitoring service provider advised that a monitoring device assigned to an *industrial radiography* licensee had received a reportable dose over a 1 month monitoring period of 1.77 mSv. This dose is slightly greater than the pro-rata occupational dose limit for the period.

  The radiography company's Radiation Safety Officer was asked to investigate the reported dose in accordance with Regulation 15.

  The report suggested that the dose may have been received when the licensee left the monitoring device in his vehicle while it was parked in a co-tenant's premises. The co-tenant (and another company) is said to have made a number of industrial radiography exposures on the premises in close proximity to the vehicle

  Council agreed the dose should remain on the licensee's personnel record as there was insufficient evidence to conclude that the dose had not been received.

- In October 2006 the Radiation Safety Officer for a well logging company advised Council of an incident with one of their radioactive logging tools. A 1.6 GBq ^{60}Co source had become detached from the source holder inside the tool. The source holder was removed from the tool but the radioactive source remained behind and was loaded into the passenger section of the work truck. The necessary routine safety checks with a radiation survey instrument were not performed. Two workers were exposed to a dose rate of approximately 600 µSv/h for 8 hours with doses of 2.71 mSv and 1.27 mSv being recorded on their respective personal monitoring devices.

  The source holder and tool were sent to a service company to determine how the source became detached from the holder. It was concluded that a grub screw used to hold 2 sections of the source holder together had unfastened due to the thread in the drill hole not being tapped deep enough and that an adhesive compound had not been used to further secure the grub screw. Further investigations are being carried out in relation to this incident

- In December 2006 Council was notified by a well logging company that a 592 GBq ^{241}Am/Be radioactive source used during oil and gas exploration was missing.

The source had been ordered from the United States of America and while records traced its movements to Australia and within the State, the owner did not realise the source was missing until it failed to arrive at its intended location in the North West.

Council's officers led the search and successful recovery operation in conjunction with WA Police, the Fire and Emergency Services, the owner of the source and the company responsible for transportation of the source. [*Note: the source was recovered intact in January 2007*].

Non-Ionising Radiation

- A university reported an incident to the Council involving ultra-violet radiation (UVR) exposure from a transilluminator to an honours student at the university which resulted in facial erythema.

  Transilluminators which use UVR for back-illumination of transparent fluorescent materials in laboratory or industrial applications are prescribed electronic products under the Act.

  When the cover of a non-enclosed operating transilluminator is open the face of the operator, in less than 1 minute, can be exposed to UVR levels in excess of the exposure limit. Council's registration and licence conditions require warning notices to be placed beside the transilluminator, UVR protective clothing (including a full face UVR shield and appropriate gloves) to be provided and users to be given suitable safety instruction.

  Although the student was wearing safety glasses, gloves and a laboratory coat, he neglected to wear a full face shield even though one was available. The student also inadvertently left the polycarbonate shield forward so that it was not providing adequate protection.

  A permanent polycarbonate shield has since been fitted to the transilluminator concerned.

  Council subsequently wrote to all transilluminator registrants and licensees informing them of the incident and reminding them of their responsibilities under the Act and regulations.

PROSECUTIONS

The following matters were dealt with in 2006.

- In 2005 Council agreed to prosecute a mining company following the exposure of one of its employees to the direct radiation beam from a level gauge containing a radioactive substance.

  At the Perth Magistrates Court on 8 February 2006 the mining company pleaded guilty to the charge under Regulation 19(2)(cb), under which the registrant is required to ensure that each radiation worker is licensed; or is supervised by and working under the direction of a licensee; or exempt from the requirement to be licensed.

  The company was fined $1500 and required to pay costs of $545.70.

- A company was prosecuted for being in possession of an unregistered radioactive CO_2 level detection device which contained 3.65 MBq ^{60}Co. This amount of ^{60}Co is more than 90 times the exempt quantity specified in the regulations.

  On 13 September 2006 the company pleaded guilty to charges under Sections 25, 28 and 38 of the Act with respect to the requirements for licensing and registration. The company was fined $500 and required to pay costs of $475.70.

  The company alleged it had been incorrectly informed by the New South Wales supplier that the radioactive source was exempt from registration. Council advised the New South Wales radiation regulator of the outcome of the prosecution.

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 humans. 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. The number of compliance tests of diagnostic x-ray equipment assessed by Council in 2006 increased by 36% from 2005 to a total of 1069. A summary of the statistics for the compliance program per type of diagnostic medical imaging equipment is included in attachment 3.

Compliance Testing Working Group

A review of the 1996 version of compliance testing workbooks, which formed the basis of the Council's Diagnostic Medical Compliance Testing program, began in 2005. The revised workbooks were approved by the Council and issued during 2006.

Regulation of Medical Radiation Technologists

The Medical Radiation Technologists Act was passed by Parliament in 2006. The Act provides for the Medical Radiation Technologists Registration Board of Western Australia to be established and for the registration of medical radiation technologists (MRTs). It also amends the Radiation Safety Act 1975 to provide for the licensing of medical radiation technologists. The Medical Radiation Technologists Act and the consequential amendments to the Radiation Safety Act do not take effect until proclaimed.

Registration of MRTs under a separate registration Act with a general exemption from licensing under the Radiation Safety Act was the Council's preferred option, subject to continuing the existing requirement for direction and general supervision by a licensee. However, Council agreed that a satisfactory alternative would be to individually license registered medical imaging technologists. This compromise satisfied both Council's concerns as well as those of MRTs.

Nurse Practitioners

The Nurses Amendment Act 2003 has, as a result of amendments to the Radiation Safety Act, given authority to Nurse Practitioners to request a licensee to undertake any diagnosis or therapy using radiation sources prescribed under the Act. Council raised concerns at the time and subsequently, regarding the training and expertise of the nurse practitioners. Medical and other relevant practitioners are presently exempt from licensing under the Act for the purpose of requesting diagnosis or therapy but it is implicit that those practitioners refer patients for procedures that are within their professional competence and that they have the knowledge, competence and ability to respond appropriately to the outcomes of the diagnostic or therapeutic procedures.

During 2006, the Council again raised with the Department of Health its concerns that patients might be referred for procedures without appropriate consideration of risk versus benefit and strongly advised against referrals of patients by Nurse Practitioners other than for the most basic, plain radiographic procedures.

Council was assured that the scope of practice of Nurse Practitioners would be outlined in clinical protocols to be given legal standing via the Nurses Rules and that the Council would be consulted in the preparation of these clinical protocols in 2005. Despite these assurances, Council was not invited to participate in the development of the approval process and remains concerned at the potential health risk to patients from inappropriately trained Nurse Practitioners referring patients for diagnosis or therapy using radiation.

Delegation of Authority for Christmas Island

A request was accepted by the Council from the Commonwealth Department of Transport and Regional Services for an interim delegation from the Australian Government Minister for Local Government, territories and Roads.

The delegation permits the Council (and the Minister) to carry out their respective functions of the Radiation Safety Act and the regulations in the Commonwealth Territory of Christmas Island. The delegation facilitated

the Indian Ocean Territories Health Service (IOTHS) in the provision of a mammography screening services for its residents which commenced in August 2006. The delegation is necessary because, although Christmas Island is a Commonwealth territory, services on the island are provided under Western Australian law in accordance with subsection 8(a)(i) of the Christmas Island Act 1958.

Approvals for Exposure to Radiation for Human Subjects in Medical Research

In keeping with the NHMRC Code for the *Administration of Ionizing Radiation to Human Subjects in Medical Research (1984),* 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 following six research applications in 2006.

Research Project Title	Institution
A Phase II Study of PI-88 with Dacarbazine in Patients with Metastatic Melanoma	Sir Charles Gairdner Hospital
Congestive heart failure: a longitudinal study of its impact on brain function and structure in later life	Royal Perth Hospital
Multicentre, Phase 1b safety study of anti-fibrin humanised monoclonal antibody (DI-DD3B6/22-80B3) Fab' protein fragment (ThromboView) conjugated with technetium-99m in the detection of pulmonary emboli	Royal Perth Hospital
A Phase II study of Sutent (SU11248) as second line treatment in pleural mesothelioma after first line treatment with platinum and antimetabolite	Royal Perth Hospital

An investigation of the causes of persistent CD4+ T-cell deficiency in HIV patients receiving effective anti-retroviral therapy	Sir Charles Gairdner Hospital
A Randomised, Open-Label, Multicenter, Phase 2 Study to evaluate the safety and efficacy of Lumiliximab in combination with Fludarabine, Cyclophosphamide, and Rituximab Versu Fludarabine, Cyclophosphmide, and Rituximab alone in subjects with relapsed Chronic Lymphocytic Leukaemia	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 2006 was 519. A summary of compliance tests assessed in 2006 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 2006, Council officers marked 352 industrial examination papers. The number of exams marked in each category is listed in attachment 4.

Contaminated Sites Legislation

The Contaminated Sites Act 2003 and the Contaminated Sites Regulations 2006, administered by the Department of Environment and Conservation (DEC), came into effect on 1 December 2006.

Under the Contaminated Sites Act, the site owner, occupier and person who caused contamination have a duty to report known or suspected contaminated sites to the DEC. The DEC will classify all sites reported to it based on risk to human health or the environment (there are 7 possible classifications set out in the Contaminated Sites Act).

The Council and the DEC agreed to establish a Memorandum of Understanding in relation to the classification, investigation and reporting of radioactively contaminated sites.

The classification of radioactively contaminated sites must consider the natural variability of background radiation present in soil throughout Western Australia that arise from naturally occurring radioactive materials

(NORM). NORM is present in our environment in rocks, minerals, soils and water and arises primarily from primordial radionuclides.

In developing a classification scheme, Council will be guided by the exempt activity concentration levels stipulated in the International Atomic Energy Agency's *Basic Safety Standards* and the ARPANSA *National Directory for Radiation Protection*, as well as consideration of the potential dose pathways and the public dose limits stipulated in the Regulations.

MISCELLANEOUS

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. The Ministers also agreed that the first edition of the Directory would not be applied to the mining and mineral processing industries until further work regarding exemption criteria has been undertaken.

Further development of the National Directory continued in 2006 through the national Radiation Health Committee, a body established to advise the Chief Executive Officer of ARPANSA and its Radiation Health & Safety Advisory Council on matters relating to radiation protection, including formulating draft national policies, codes and standards for consideration by the Commonwealth, States and Territories.

Council has participated in the development of the National Directory and provided comment to the Radiation Health Committee.

It was anticipated that Edition 2 of the National Directory, which would expand on the range of radiation matters and practises considered for the purpose of national uniformity, would become available for public comment and Council's final consideration in 2007.

Personal Radiation Monitoring Services

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

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

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

- Australia 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.

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 2006 are included in attachment 5.

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. Seven Temporary Permits were current as at 31 December 2006.

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 6 shows the types and numbers of licences and registrations (or individual exemptions) granted or renewed in 2006.

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 10TH RADIOLOGICAL COUNCIL

Members	Qualification or Designation	Deputy
Appointment under sections 13(2)(a) and 13(3) of the Act		
Dr P Psaila-Savona (Chairman)	Medical Practitioner	Dr G Groom
Appointment under sections 13(2)(b), 15(1) and 17 (1) of the Act		
Dr S Song	Radiologist	Dr A Kumar
Dr G Groom	Nuclear Medicine Physician	Dr M McCarthy
Dr R Fox	Physicist	Dr R Price
Mr J Hunter	Electronic Engineer	
Mr N Tsurikov	Expert in Mining Radiation Hazards	
Vacant	Tertiary Institutions representative	
Mr N Hicks	Radiographer	
Dr N Costa	Co-opted member	
Mr B Cobb	Co-opted member	

MEMBERS OF THE 11TH RADIOLOGICAL COUNCIL

Members	Qualification or Designation	Deputy
Appointment under sections 13(2)(a) and 13(3) of the Act		
Dr P Psaila-Savona (Chairman)	Medical Practitioner	Dr G Groom
Appointment under sections 13(2)(b), 15(1) and 17 (1) of the Act		
Dr E Wylie	Radiologist	Dr M Bynevelt
Dr G Groom	Nuclear Medicine Physician	Dr G Bower
Dr R Fox	Physicist	Dr R Price
Mr J Hunter	Electronic Engineer	Vacant
Vacant	Tertiary Institutions representative	
Mr N Tsurikov	Expert in Mining Radiation Hazards	Mr G Fee
Mr N Hicks	Expert in Medical Imaging	Mr B Stock
Mr B Cobb	Co-opted member	Vacant

2006 MEETING ATTENDANCE

Transition from the 10th to 11th Council.

	9 Feb	13 Apr	8 Jun	11 Aug	12 Oct	14 Dec
Dr P Psaila-Savona	✓	✓	✓	✓	✓	✓
Dr N Costa	✓	A	A	NA	NA	NA
Dr R Fox	✓	✓	✓	D	✓	✓
Dr G Groom	✓	✓	✓	✓	✓	D
Mr N Hicks	✓	✓	✓	✓	✓	✓
Mr J Hunter	✓	✓	✓	✓	✓	✓
Dr S Song	✓	✓	A	NA	NA	NA
Dr E Wylie	NA	NA	NA	A	D	D
Mr B Cobb	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	A	✓	✓	✓	A	✓

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

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

Consequential amendments[1] to the Act as provided in Schedule 3 of the Medical Imaging Technologists Act 2006 are as follows:-

*(1) The amendments in this clause are to the Radiation Safety Act 1975**

(2) Section 4(1) is amended as follows:

(a) by inserting the following definition in the appropriate alphabetical position — " "medical radiation technologist" has the meaning given to that term in section 3 of the Medical Radiation Technologists Act 2006; ";

(b) by deleting the definition of "section".

(3) Section 4(2) is repealed.

(4) Section 4 is amended by deleting the subsection designation "(1)".

(5) Section 5 is repealed.

(6) Section 13(2) is amended as follows:

(a) in paragraph (b) by deleting "5" and inserting instead — " 6 ";

(b) in paragraph (b) by deleting "7" and inserting instead — " 8 ";

(c) after paragraph (b)(v) by deleting "and";

(d) after paragraph (b)(vi) by deleting the full stop and inserting instead — "; and (vii) one shall be a medical radiation technologist.".

(7) After section 24 the following section is inserted in Part II —

[1] These consequential amendments do not take effect until Schedule 3 of the Medical Imaging Technologists Act is proclaimed.

"24A. Disclosure of information to the Medical Radiation Technologists Board of Western Australia

(1) The Council shall furnish to the Board as defined in section 3 of the Medical Radiation Technologists Act 2006 written advice if —

(a) a licence held by a medical radiation technologist under the Radiation Safety Act 1975 is revoked, surrendered, not renewed or its operation is suspended;

(b) a condition, restriction or limitation in relation to such a licence is imposed or varied; or

(c) proceedings are commenced against a medical radiation technologist for an offence under section 52.

(2) The advice referred to in subsection (1) must be given no later than 30 days after the revocation, surrender, refusal to renew, suspension, imposition, variation or commencement of proceedings. ".

(8) Section 27(2) is amended as follows:

(a) in paragraph (b) by inserting before "he was lawfully" — "if the person is not practising in an area of medical radiation technology as defined in section 3 of the Medical Radiation Technologists Act 2006, ";

(b) after paragraph (b) by deleting "or" and inserting —

"(ba) he was —

(i) a medical radiation technologist engaged in professional practice;

(ii) the holder of a relevant licence under this Act authorising him so to do; and

(iii) acting in accordance with a written request referred to in section 26(2) or (2a);

(bb) he was —

(i) a medical radiation technologist whose registration was subject to a condition that his practice in an area of medical radiation technology be subject to direction and supervision by a person to whom paragraph (a) or (ba) applies (a "supervisor"); and

(ii) lawfully acting under the direction and supervision of a supervisor; or ".

(9) Section 49 is amended as follows:

(a) after paragraph (a) by deleting "or";

(b) after paragraph (a) by inserting the following paragraph —

"(aa) under section 24A; or"

RADIATION SAFETY (GENERAL) REGULATIONS

None

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

RADIATION SAFETY (QUALIFICATIONS) AMENDMENT REGULATIONS

None

Attachment 3: Compliance Testing

Medical

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

Category	A	B	C	Total
CT	27	-	-	27
Dental – intraoral	448	2	22	472
Dental – panoramic and/or cephalometric	60	-	4	64
Fluoroscopic – fixed	26	1	26	53
Fluoroscopic – fixed C or U arm	29	1	8	38
Fluoroscopic – mobile	77	4	16	97
Mammography	56	-	10	66
Radiographic – fixed	123	1	49	173
Radiographic – mobile	72	-	7	79
Total	918	9	142	1069

Industrial – Fixed Gauges

A *Compliant*
B *Non-compliant*[3]

Category	A	B	Total
Density	462	14	476
In-stream analysis	68	1	69
Level	80	-	80
Thickness	1	-	1
Total	611	15	626

[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 140 re-tests conducted during 2006, 92% 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.

Attachment 4: Industrial Radiation Safety Examinations

Current at 31 December 2006

Category	2006	2005	2004
Borehole Logging	23	28	45
Fixed Gauges	82	57	105
Industrial Radiography	35	26	22
Industrial Radiography (Advanced)	0	0	2
Industrial Radiography (Assistant)	85	64	33
Portable Gauges	61	61	45
Portable Gauges (WA Requirements)	2	0	9
Transport	11	13	16
Service – Cabinet X-ray	5	2	1
Service – Linear Accelerators (Industrial)	0	0	1
Service – X-ray Analysis	0	0	3
X-ray Analysis – Use	5	9	8
X-ray Analysis – Use and Restricted Service	43	27	42
Total	352	287	332

Attachment 5: Registered Irradiating Apparatus, Electronic Products and Radioactive Substances (sealed sources)

Current at 31 December 2006

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

Category	A	B
Bone densitometry	38	-
Cabinet x-ray equipment	99	-
Calibration	2	346
CT	123	-
CT/SPECT	5	-
Dental – intraoral	1790	-
Dental – panoramic and/or cephalometric	226	-
Education and research	16	869
Fluoroscopic – fixed4	149	-
Fluoroscopic – mobile	117	-
Gauges – density/level	7	1721
Gauges – in stream analysis	-	101
Gauges – logging	10	165
Gauges – neutron moisture/density portable	-	256
Gauges – other	-	86
Irradiator	-	4
Isotope Production	1	-
Laser – entertainment	30	-
Laser – industrial	52	-
Laser – medical	149	-
Laser – other medical	116	-
Laser – research	68	-
Linear accelerator	11	-
Mammography	100	-
Non-destructive testing	67	63
Non-destructive testing – crawler control	-	2
Portable mineral analyser	-	23

[4] Includes equipment used in DSA/Cardiac Cath Lab

Category	A	B
Radiographic – fixed	423	-
Radiographic – mobile	505	-
Sealed Sources – other	-	61
Simulator	2	-
Special purpose x-ray	60	-
Static detection/measurement	-	3
Static elimination	-	4
Storage	-	174
Superficial radiotherapy	5	-
Test source	4	-
Therapy	1	45
Therapy – HDR brachytherapy	-	2
Transilluminator	98	-
X-ray analysis	175	-
Total	4449	3925

Attachment 6: Licences and Registrations

Current at 31 December 2006

Including individual exemptions granted under section 6 of the Act.

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2006	2005	2006	2005	2006	2005
Licences	2281	2118	1216	1151	3497	3269
Registrations	1326	1301	306	313	1632	1615
TOTAL	3607	3419	1522	1465	5129	4884
Change from 2005	5.5%		3.9%		5.0%	

Attachment 6 (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 2006*
B *Total current*

A	B	Purpose
0	3	Bone Densitometry
0	3	Bone Densitometry (Exemption)
36	68	Cabinet X-ray Equipment
0	2	Cobalt Teletherapy Maintenance
17	49	Compliance Testing - Diagnostic X-ray Equipment
23	86	Compliance Testing - Radioactive Gauges
0	3	Cyclotron Operation
0	6	Cyclotron Servicing
2	4	Education (Apparatus)
10	46	Education (Substances)
39	146	Fluoroscopy - Medical
40	177	Fluoroscopy - Medical (Exemption)
0	2	Fluoroscopy - Medical (Non-Specialist Exemption)
0	2	Fluoroscopy - Research
1	1	Fluoroscopy - Veterinary
0	2	Gamma Irradiator - Use
73	227	Gauges - Industrial
7	15	Gauges - Industrial (Installation)
1	1	Gauges - Level (CO2)
64	166	Gauges - Logging
123	325	Gauges - Moisture and/or Density (Portable)
1	6	Gauges - Other (Apparatus)
1	23	Gauges - Other (Substances)
0	1	Installation of X-ray Equipment
4	5	Installation of X-ray Equipment - Dental
4	15	Lasers - Acupuncture
5	7	Lasers - Chiropractic
16	40	Lasers - Dental
3	9	Lasers - Educational

A	B	Purpose
4	10	Lasers - Entertainment
12	42	Lasers - Industrial
70	201	Lasers - Medical
25	65	Lasers - Physiotherapy
12	31	Lasers - Research
16	43	Lasers - Service
0	0	Lasers - Veterinary
0	0	Manufacture of Lasers and Laser Products
1	5	Manufacture of X-ray Equipment
0	1	Medical Physics
49	171	Medical Radiology
1	3	Non-Medical Irradiation
13	24	Nuclear Medicine - Diagnostic
13	23	Nuclear Medicine - Therapeutic
0	2	Nuclear Medicine - Veterinary
4	17	Pathology Tests
8	30	Portable Mineral Analysers
12	25	Portable Mineral Analysers (X-ray)
3	7	Possession of X-ray Equipment – Diagnostic Medical
0	1	Quality Assurance Procedures
3	14	Radioactive Ores - Mining and/or Processing
3	5	Radioactive Substances - Calibration Sources
1	2	Radioactive Substances - Medical
17	46	Radioactive Substances - Sale
12	19	Radioactive Substances - Service of Devices
0	1	Radioactive Substances - Tracer Studies
8	19	Radioactive Substances - Tracer Studies (Industry)
0	1	Radiography - Chiropractic (Exemption)
18	44	Radiography - Chiropractic (Extended)
31	94	Radiography - Chiropractic (Restricted)
89	225	Radiography - Industrial (Gamma)
89	227	Radiography - Industrial (X-ray)
1	4	Radiography - Medical (Direction and Supervision)
1	1	Radiography - Security
187	530	Radiography - Veterinary
0	3	Radiology - Veterinary
3	16	Radiopharmaceutical Manufacture and Dispensing

A	B	Purpose
6	15	Radiotherapy - Medical (Apparatus)
6	22	Radiotherapy - Medical (Substances)
4	9	Radiotherapy - Medical Superficial
1	3	Radiotherapy - Veterinary
4	21	Research
21	95	Research - Unsealed Radioactive Substances
4	8	Research - X-ray
6	18	Sale of Electronic Products
22	54	Sale of X-ray Equipment
6	17	Service of X-ray Equipment - Analytical
7	12	Service of X-ray Equipment - Dental
18	57	Service of X-ray Equipment - Diagnostic
5	23	Service of X-ray Equipment - Diagnostic (Extended)
0	2	Service of X-ray Equipment - High Energy Therapeutic
2	7	Service of X-ray Equipment - Industrial NDT
0	2	Service of X-ray Equipment - Intraoral
3	12	Service of X-ray Equipment - Linear Accelerators
8	20	Service of X-ray Equipment - Other
6	11	Special Purpose Enclosed X-ray Equipment
1	1	Static Detection
0	1	Static Electricity Measurement
0	1	Static Elimination
2	4	Storage
3	23	Transilluminators
30	64	Transport
0	1	X-ray Analysis
1	2	X-ray Analysis (Research)
17	55	X-ray Analysis - Use
58	127	X-ray Analysis - Use and Service (Restricted)

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
NHMRC	National Health and Medical Research Council

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)

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