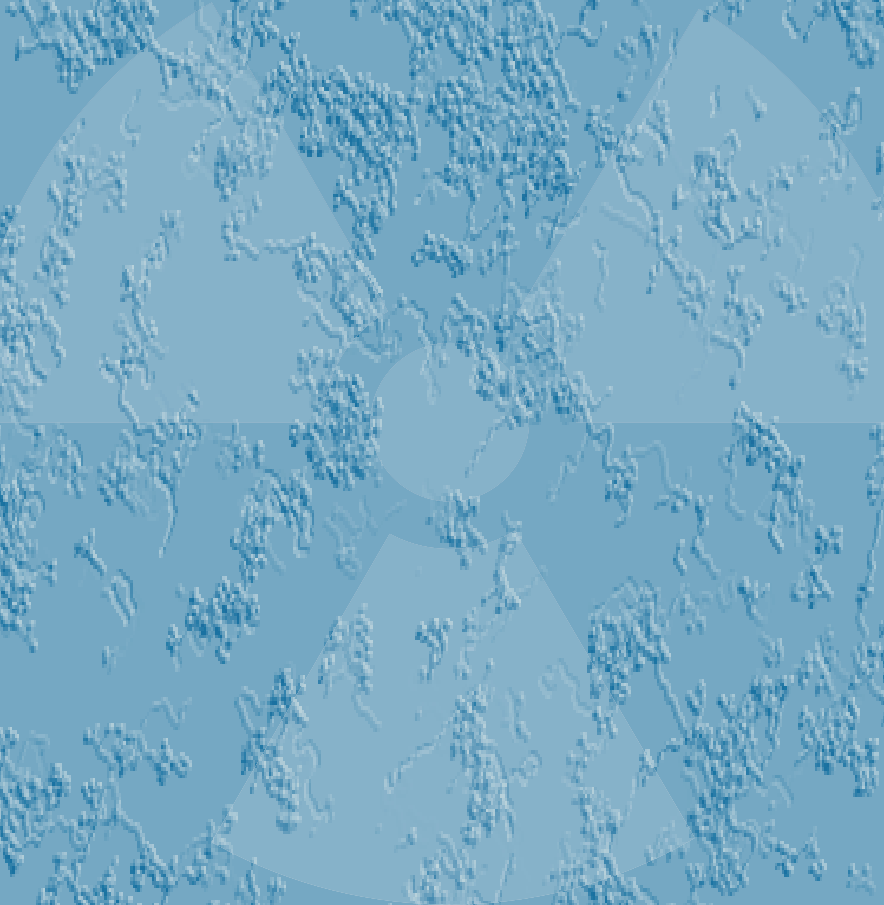


Report of the
**Radiological Council
of Western Australia**

for the year ended
31 December 2004





REPORT OF THE

RADIOLOGICAL COUNCIL

for the year ended
31 December 2004

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CHAIRMAN'S REVIEW



During 2004 the long awaited National Directory for Radiation Protection (NDRP) was published by the Australian Radiation Protection and Nuclear Safety Agency. The Australian Health Ministers' Conference (AHMC) in August 1999 endorsed the development of the NDRP as a means of achieving uniformity across all Australian jurisdictions. AHMC also agreed that on the completion of the first edition of the NDRP the regulatory elements of the Directory would be adopted in each jurisdiction as soon as possible. The Radiological Council has now commenced a review of its regulatory regimes to ensure consistency with the regulatory requirements contained in the NDRP.

One of the notable aspects of this year's report is the number of misadventures that have been reported to Council by medical practices. The total number reported is however minuscule having regard to the number of radiological procedures that are carried out on a daily basis throughout the State. This is indicative of the diligence and professional standing of all concerned. However, each misadventure, whenever it happens, is always of great concern to both the patient and the Council. Council requires that these incidents are reported and investigated thoroughly and advice is given on how such incidents can be prevented. The continued reporting of these incidents is vital and hence prosecution for these incidents is generally not in the best interest of the community since such action could lead to under reporting.

This year the Council also spent time considering the issues associated with the amendments to the Nurses Act and the introduction of Nurse Practitioners. The Nurses Amendment Act 2003 amended a range of legislation but its impact on the Radiation Safety Act was to give authority to Nurse Practitioners to request a licensee to undertake any radiological diagnostic procedure or therapy. The Council has ongoing concerns that such Practitioners may not have the appropriate training and expertise to consider adequately the risk versus benefit of such procedures and treatment. It has, therefore, strongly advised against referrals of patients by Nurse Practitioners for procedures other than basic, plain radiography and believes that all radiographic examinations must be interpreted by a Radiologist.

Council was also asked to comment on a discussion paper that was prepared by the Department of Health as part of the process of reviewing the regulation of medical radiation technologists (MRTs) and which included a proposal for a MRT registration board.

Council considered the matter at length and advised the Department that it had no objections to their registration via a board because it was unlikely that patient, operator and public radiation doses would be adversely impacted. However, Council is of the opinion that MRTs should not conduct procedures autonomously and agreed that registered MRTs should either be individually licensed under the Radiation Safety Act or continue to work under a degree of direction and supervision by an appropriately licensed medical practitioner.

The year also saw continuing staff shortages that brought increased pressure on the personnel of the Radiation Health Branch who provide the administrative and scientific support to the Council. As Chairman, I maintain close contact with Council's officers and rely on them to keep me fully informed on the relevant issues and to provide advice to both myself and to Council. I am again pleased to record my appreciation of their continued efforts in this regard and in providing a first class service to Council and the people of Western Australia.

Finally, I would like to express my appreciation to all the members of Council who have tirelessly given of their expertise during 2004.

A handwritten signature in cursive script, reading 'Psaila Savona'.

Dr P Psaila-Savona
CHAIRMAN

4 March 2005

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 2004.

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 2004 for the annual examination.

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. The Council's operations are fully supported by the Department of Health. It does not have a separate budget.

THE RADIOLOGICAL COUNCIL WEBSITE

During 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. As use of the site increases and feedback is received, the site will 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 to the regulations made in 2004 are listed in attachment 2.

NUCLEAR WASTE STORAGE AND TRANSPORTATION (PROHIBITION) ACT

The Nuclear Waste Storage (Prohibition) Act imposed restrictions on the disposal of “nuclear waste” (as defined in that Act). Concurrently, section 41A of the Radiation Safety Act requires the Council to refer any authorisation for the disposal of “nuclear waste” to Parliament for consideration. The agreement of both houses of Parliament is required before the authorisation may be granted.

During 2003 the Council was asked to provide independent advice to the Government with regard to the proposed amendments to the Act with specific regard to advising on the change of definition of ‘nuclear waste’ under the Act.

In March 2004, Parliament passed the Nuclear Waste Storage (Prohibition) Amendment Act 2004 which updates the definition of “nuclear waste” and includes a restriction on the transport of such waste. The definition of “nuclear waste” now states:-”

Nuclear waste means material —

(a) that is or contains a radioactive substance; and

(b) that —

(i) is waste of a nuclear plant; or

(ii) results from the testing, use or decommissioning of nuclear weapons,

whether or not that material has been conditioned or reprocessed;

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 19 incidents during 2004:

Medical

Misadministrations

- A nuclear medicine practice informed Council that a patient was injected with an incorrect ^{99m}Tc radiopharmaceutical. The error resulted in the patient receiving an unnecessary radiation dose of approximately 4.9 mSv.

The practice determined that the error was due to a technologist failing to check the patient's name on the syringe prior to administration. The practice's protocols have been reviewed and all personnel re-instructed in the importance of fully complying with the rules.

- A hospital reported that a patient was accidentally injected with a ^{99m}Tc radiopharmaceutical intended for a heart study instead of that for a bone scan. It was estimated that the patient received an unnecessary radiation dose of approximately 8.3 mSv.

The hospital determined that the error occurred when, in breach of established protocols, a technologist failed to properly cross-check the pharmaceutical identification information prior to dispensing. The hospital modified the protocols and re-trained all relevant personnel.

- A hospital reported that a patient was accidentally injected with a ^{99m}Tc radiopharmaceutical intended for a bone study instead of that required for a heart scan. It was estimated that the patient received an unnecessary radiation dose of approximately 5.1 mSv.

The hospital determined that there was a dispensing error, modified its protocols and re-trained all relevant personnel.

- A hospital reported that a person under 18 years of age had been accidentally injected with the wrong ^{99m}Tc radiopharmaceutical. The error was only discovered when the radiopharmaceutical failed to be taken up in bone as expected. The patient received an unnecessary effective radiation dose of approximately 8.6 mSv, consisting of approximately 37 mGy and 18.3 mGy to the intestine and to the thyroid respectively.

The cause of the error was the failure of a technologist to check either the label on the syringe or its shielded container until after the injection had commenced. The hospital had revised its protocols to the Council's satisfaction.

- A nuclear medicine practice reported that a patient had been injected with a ^{99m}Tc radiopharmaceutical intended for a bone scan instead of the prescribed heart agent. The patient received an unnecessary effective radiation dose of approximately 4.7 mSv.

The practice determined that the cause of the error was failure by a nuclear medicine practitioner to check the radiopharmaceutical prior to injection. Protocols for the procedure have been revised to Council's satisfaction.

- A nuclear medicine practice reported that a patient was accidentally injected with a ^{99m}Tc radiopharmaceutical intended for a bone study instead of that required for a heart scan. It was estimated that the patient received an unnecessary effective dose of radiation of 4.7 mSv.

The incident investigation report showed that the incident was due to the incorrect dose having been delivered to the exercise test room with the correct patient request form, and the dose not having been correctly checked by the nuclear medicine specialist prior to injecting the patient.

Protocols for the procedure have been revised to Council's satisfaction.

Other Medical Incidents

- In compliance with the regulations, a hospital informed the Council that it had accidentally discharged approximately 1.7 GBq ^{131}I to the sewer. The incident was the result of a patient undergoing ablative thyroid treatment but who also required renal dialysis. The first volume of urine from the dialysis should have been collected for storage pending radioactive decay to a level that permitted disposal to the sewer but instead was accidentally discharged. The activity discharged was less than 50% of the activity permitted for discharge in a 12 month period.

The hospital's report outlined the remedial actions taken and the procedures put in place to minimise a recurrence.

- A breast-feeding patient at a hospital had not been advised to cease breast-feeding for a 12 hour period after the administration of $^{99\text{m}}\text{Tc}$ for a lung scan. Personnel were not aware that the patient was breast-feeding until some hours after the administration of the radiopharmaceutical by which time the patient had fed her infant twice. The baby was estimated to have received an effective dose between 1 and 2 mSv.

The Council was satisfied with the hospital's revised protocols and the measures undertaken by the hospital to minimise a similar recurrence.

- A hospital reported the spill of approximately 800 MBq $^{99\text{m}}\text{Tc}$ in its nuclear medicine department.

The cause of the spill was a faulty cannula connection that had not been tested immediately prior to administration of the radiopharmaceutical in accordance with established procedures. The Council was satisfied with the hospital's intention to provide improved training for relevant personnel.

- As prescribed by the regulations, Council received a report of an occupational radiation dose of approximately 3.9 mSv received by a radiation therapist.

The institution's Radiation Safety Officer investigated the circumstances and advised that the therapist's personal radiation monitoring device had fallen from their clothing and had been in a linear accelerator room during the treatment of a patient. The Council was satisfied with the report and the revised procedures implemented by the institution.

Industrial

- Council received a report from an industrial radiography company regarding a radiation dose recorded on the personal radiation monitoring device assigned to an industrial radiography assistant. A dose of 2.76 mSv had been recorded over the one-month monitoring period.

The incident was investigated and it appears that the dose may have been received whilst setting up a particular type of gamma radiography equipment (Sentinel SCAR 959). Council asked its officers to request additional information from the company regarding their preparation, planning and use of working rules for this equipment. The information was provided by the company and accepted by Council after being reviewed by Council's officers.

- In compliance with the regulations, a company using portable moisture/density meters informed the Council of a radiation dose recorded on the personal radiation monitoring device assigned to one of its personnel. A dose of 6.36 mSv had been recorded over the three-month monitoring period.

The company's Radiation Safety Officer investigated the matter but was not able to provide an explanation for the dose. Information was obtained from the monitoring service provider which suggested that the dose was from a static exposure (ie, there was no movement between the radiation source and the monitoring device during the exposure). The radiation worker had been unable to recall any incident that may explain the dose.

Council was satisfied that the dose was unlikely to have been received by the worker but required the company to ensure its personnel were properly instructed on the use and care of personal monitoring devices in compliance with the regulations.

- Council was contacted by the Radiation Safety Officer of an industrial radiography company regarding an incident involving industrial radiography equipment.

The licensed radiographer and his approved radiography assistant were performing radiography at their company's premises when the item being radiographed fell over and damaged the delivery tube while the radioactive source was in the exposed position.

Operations to return the source to a shielded position resulted in a dose to three personnel, the highest of which was calculated to be a maximum of 125 µSv to the whole body and 250 µSv to the fingers.

Council discussed and reviewed the reports of the incident and noted that it appeared that the company had performed the source recovery operations well.

- An industrial radiography company reported the loss of x-ray equipment that had been sent from a branch of the company in another State and, through the local branch, to a Western Australian repairer. When the WA branch of the company requested the return of the equipment from the service agent, they were informed that it had already been delivered to their premises. The service company said there were no personnel at the premises at the time and the equipment was left by the door to the workshop. The equipment had not been fixed and was non-functional.

The owner of the x-ray equipment submitted a report with details of the steps taken to locate the missing device, including reporting it to the Police.

Council reviewed the report and was satisfied that all reasonable efforts had been made and as the equipment was not capable of generating x-rays would not pose a risk to public health.

- Council was contacted by the Fire and Emergency Services Authority (FESA) and an employee of a bore hole logging company regarding a traffic accident in the Mid West which involved two radioactive logging sources. The company's Radiation Safety Officer (RSO) drove to the location to take control of the radioactive source containers and in the intervening period, Council's officers provided advice to FESA and the police on the immediate safety procedures to be implemented. The source container was not compromised by the traffic accident.

Council reviewed a report by its officer and the company and was satisfied that the incident had been handled appropriately.

- A mining company reported to the Council that in the previous week an employee might have been exposed to radiation from a radioactive level gauge. An employee had performed routine maintenance on a vessel on which the level gauge was installed and on completion of this work noticed that the gauge shutter indicator was half way between ON and OFF. The employee pointed this out to the shift supervisor who isolated the gauge.

Calculations performed on a worst case scenario suggest that if exposed to the useful radiation beam, the employee might have received a radiation dose of approximately 1 mSv.

However, further investigations by Council's officers also found that the company did not have either a Radiation Safety Officer or a responsible licensee and allegedly was in breach of the Act and regulations. The matter has now been referred to the State Solicitor for advice on prosecution.

- A personal monitoring service provider informed the Council that a personal radiation monitoring device assigned to an employee of an industrial radiography company had received a dose of 6140 μ Sv for a one-month period. Council's officers contacted the company's Radiation Safety Officer requesting that the cause be investigated and a report submitted in compliance with the regulations.

The Radiation Safety Officer's report stated that the employee recalled an occasion when he had left his personal monitoring device in his toolbox in his office and had later found the toolbox in the radiographic exposure bay. The employee believed that this was the likely cause of the reported dose. The employee had not reported the incident to his employer at the time as he was unsure if the exposure bay had been used while the tool box was in the bay.

The company viewed the matter seriously and issued a written reprimand to the employee for failing to immediately report the incident. The company also advised all staff of their responsibilities in reporting incidents and in ensuring the safe storage of their personal monitoring devices.

The Council reviewed the reports and was satisfied that adequate measures had been taken to minimise a recurrence of this type of incident.

- An employee of a mining company informed the Council of an incident in which contractors had entered a vessel without first having isolated a radioactive level gauge. The company's licensee estimated that the contractors would not have received more than 10 μ Sv.

The incident is still under investigation.

Non-Ionising Radiation

- Council received an incident report concerning ultra-violet radiation (UVR) exposure from a transilluminator at a hospital. Transilluminators are devices that use UVR for back-illumination of transparent fluorescent materials in laboratory or industrial applications and are prescribed items under the Act. It is possible to exceed the prescribed UVR exposure limits in less than a minute at the level of the face of the operator when the cover of a non-enclosed transilluminator is open, which then has the potential to cause either temporary or permanent skin or eye damage. Registration and licence conditions require warning notices to be placed beside the transilluminator, the provision of UVR protective clothing (including a full face UVR shield and appropriate gloves), that all unprotected skin is covered and that radiation safety instruction is provided to all users.

Council decided that it was timely to remind all transilluminator registrants and licensees of the registration and licence conditions and their responsibilities for providing appropriate safety equipment, training and direction and supervision.

PROSECUTIONS

In the 2003 report, Council advised that one incident had been referred to the State Solicitor's Office for advice on prosecution and one case against a licensed industrial radiographer was still proceeding. These matters were dealt with in 2004.

- In 2003 an industrial radiography company was prosecuted for alleged breaches of Section 36(3) of the Radiation Safety Act which occurred during November 2002. The case against the licensed radiographer was postponed until March 2004, with two charges pending for failure to comply with Section 36(3) of the Act by contravening the licence conditions: i.e.
 - using a radioactive substance for the purpose of industrial radiography with an activity exceeding 1200 GBq ^{192}Ir ; and
 - failure to ensure that radiography was performed in accordance with the Code of Practice.

However, shortly before the scheduled hearing, the State Solicitor's Office advised that the charges should not proceed because the evidence was not strong enough to ensure a successful outcome. The complaint was withdrawn.

- In 2003 a logging company reported the loss of a 37 MBq ^{241}Am -Be neutron calibration source. The company first identified the source as missing in May 2002 but its loss was not reported to the Council until 14 April 2003. A thorough search was conducted by both the company and Council's officers.

The source would not be a health hazard should it be found by the public but the Council was nevertheless concerned at the company's alleged failure to promptly report the loss. The matter was referred to the State Solicitor's Office for prosecution advice and scheduled for mention only before the Court of Petty Sessions in June 2004.

However, the action was dismissed because the complaint was sworn and witnessed by a Justice of the Peace one-day outside the limitation period of twelve months. The twelve month period begins at the time the complaint is first brought to Council's attention.

- During the year, the Council investigated an issue concerning a licensed compliance tester who is also an approved Qualified Expert¹ for the purpose of the diagnostic x-ray equipment Compliance Testing Program. The Qualified Expert had provided Council with compliance test reports and notification that compliance certificates had been issued in respect of two dental x-ray machines. However, Council's records showed that one of the machines had been decommissioned in 2000. This raised serious concerns about the integrity and reliability of the Program as well as the accuracy of the submitted test data.

Following a review of the information prepared by its officers, the Council agreed that the Qualified Expert should be prosecuted. However, the State Solicitor's Office advised that in its opinion there were difficulties in relation to the approval process for Qualified Experts and that a prosecution should not be implemented. Changes to the way in which Qualified Experts are approved were recommended and will be pursued by the Council.

MEDICAL AND RELATED RADIATION MATTERS

Compliance Testing

The Council's compliance testing program applies to all diagnostic x-ray equipment used on humans and commenced in 1997. 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 received by Council in 2004 was 1122. 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

The 1996 version of compliance testing workbooks currently forms the basis of the Council's Diagnostic Medical Compliance Testing program. A working group has been convened to revise the workbooks and the group met ten times during 2004.

¹ Persons approved as qualified experts by the Radiological Council must have proven competencies in compliance testing and quality assurance procedures relevant to diagnostic medical imaging and are responsible for the accuracy of any certified compliance test and accountable for any failure or inadequacy of the test.

Nurse Practitioners

The Chief Nursing Officer of the Department of Health wrote to the Chairman of the Council in January 2004 in relation to amendments to the Nurses Act and the introduction of Nurse Practitioners. The Nurses Amendment Act 2003 amended a range of legislation but its impact on the Radiation Safety Act was to give authority to Nurse Practitioners to request a licensee to undertake any diagnosis or therapy. A range of medical and other 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 both the knowledge and experience to respond appropriately to the outcomes of the diagnostic or therapeutic procedures.

The Council has ongoing concerns that patients might be referred for procedures without appropriate consideration of risk versus benefit and has strongly advised against referrals of patients by Nurse Practitioners for procedures other than basic, plain radiography and believes that all radiographic examinations must be interpreted by a Radiologist.

Plain radiography excludes examinations by computed tomography (CT), fluoroscopy and all nuclear medicine procedures where the radiation dose received by patients can be significant. However, where a Nurse Practitioner believes that one of these more involved procedures is necessary, the Council is firmly of the opinion that prior consultation with a medical practitioner is essential.

The Council also cannot envisage any situation where Nurse Practitioners should refer patients for therapeutic procedures as the radiation doses involved carry risks of acute radiation injury to patients. Referrals of therapeutic procedures should remain solely the province of specialist medical practitioners.

The Council's concerns regarding the competency of Nurse Practitioners to undertake the range of radiological procedures implied by the 2003 amendment to the Radiation Safety Act were discussed with the Chief Nursing Officer. The Council was assured that the scope of practice of Nurse Practitioners will be outlined in clinical protocols to be given legal standing via the Nurses Rules, and that the Council will be consulted in the preparation of these clinical protocols in 2005.

Proposed dental x-ray machine dose limit

In January 2004, all dentists registered under the Radiation Safety Act were informed that the Council intended to stipulate a maximum radiation dose for specified dental radiographic exposures. Practitioners were provided with supporting information and invited to make submissions on the proposal.

There was a good overall response to the survey, however only ten submissions were received concerning the limit. None of the submissions, including one from the WA Branch of the Australian Dental Association, objected to the proposal. With this largely positive response, Council approved amendments of the conditions of registration to direct registrants to ensure that the radiation dose to each patient is kept as low as reasonably achievable, commensurate with the required diagnostic outcome, and that in all cases the patient entrance surface dose in air for a bitewing intra-oral radiograph does not exceed 7 mGy.

Medical Radiation Technologists

Council was asked to comment on a discussion paper that was prepared by the Legal and Legislation Branch of the Department of Health for distribution to key stakeholders and interested parties as part of the process of reviewing the regulation of medical radiation technologists (MRTs). In particular, Council was asked for its view on whether medical radiation technologists should be licensed under the Radiation Safety Act, registered with a Board or both.

Council considered the matter at length and advised the Department that it had no objections to registration because it was unlikely that patient, operator and public radiation doses would be adversely impacted. However, Council is of the opinion that MRTs should not conduct procedures autonomously and agreed that registered MRTs either should be individually licensed under the Radiation Safety Act or continue to work under a degree of direction and supervision by an appropriately licensed medical practitioner.

The Department is continuing to liaise with the Council on this matter.

Approvals for Exposure to Radiation for Human Subjects in Medical Research

In line with the recommendations of the NHMRC Code *Administration of Ionizing Radiation to Human Subjects in Medical Research (1984)*, the Radiological Council assesses those research projects which involve exposing humans to ionising radiation without proven benefits to the irradiated individual subjects and where the dose to any individual adult subject exceeds 5 mSv in any year.

Council assessed and approved the following five research applications in 2004.

Research Project Title	Institution
Comparison of thyroxine withdrawal and rTSH stimulation in the detection of thyroid carcinoma, in radio-iodine negative thyroglobulin positive patients having FDG PET imaging.	Royal Perth Hospital
PET in Palliative Care Patients.	Sir Charles Gairdner Hospital
¹⁸ F-fluoromethlycholine (FCH) imaging in patients with known prostate carcinoma, who are PSA positive without disease localised on standard imaging.	Royal Perth Hospital
Disruption of awareness in patients with cerebro-vascular lesions.	Fremantle Hospital
A pilot study of the accuracy of multidetector computed tomography in the detection of coronary artery stenoses.	Royal Perth Hospital

INDUSTRIAL, ENVIRONMENTAL and MINING RADIATION

Industrial Compliance Testing

The Council's compliance testing program for static radioactive 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 2004 was 431. A summary of compliance 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 2004, Council officers marked 298 examination papers from external course providers. The number of exams marked in each industrial category is listed in attachment 4.

MISCELLANEOUS

National Directory for Radiation Protection

The Australian Health Minister's Council decided that the principles and guidelines adopted by the National Directory for Radiation Protection are to be implemented by all Australian jurisdictions. The Radiological Council has long been a supporter of uniform radiation safety practice, frequently giving the lead to other jurisdictions. Council has already agreed that it would possibly recommend against the adoption of some practices if they were not considered appropriate for Western Australia and if in the Council's view they might result in the downgrading of safety standards. The Minister will be advised on these issues if and when they arise.

At the Australian Health Ministers' Conference (AHMC) held on the 29 July 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.

With the release of Edition 1 of the National Directory the Council is now obliged to review the Radiation Safety Act and Regulations to ensure consistency with the Directory.

Personal Radiation Monitoring Services

Council currently recognises four 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., a US based company
(Australian agent: Radiation-Wise, Perth, Western Australia)

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 December 31 2004 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.

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 2004.

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:

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

Attachment 1: Radiological Council

MEMBERS OF THE 10TH RADIOLOGICAL COUNCIL

Members	Qualification or Designation	Deputy
<i>Appointment under sections 13(2)(a) and 13(3) of the Act</i>		
Dr P Psaila-Savona (Chairman)	Medical Practitioner	Dr G Groom
<i>Appointment under sections 13(2)(b), 15(1) and 17 (1) of the Act</i>		
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	
Mr N Hicks	Radiographer	
Dr N Costa	Co-opted member	
Mr B Cobb	Co-opted member	

2004 MEETING ATTENDANCE

	12 Feb	8 Apr	10 Jun	12 Aug	14 Oct	11 Dec
Dr P Psaila-Savona	✓	✓	✓	✓	✓	✓
Dr N Costa	A	A	A	✓	A	✓
Dr R Fox	✓	✓	✓	✓	✓	✓
Dr G Groom	✓	✓	✓	✓	✓	A
Mr N Hicks	A	A	✓	✓	✓	A
Mr J Hunter	✓	✓	A	✓	✓	✓
Dr S Song	✓	✓	✓	✓	✓	✓
Mr B Cobb	✓	✓	✓	✓	✓	✓
Mr N Tsurikov	✓	✓	✓	✓	✓	✓

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

Attachment 2: Legislation Amendments

RADIATION SAFETY ACT

Section 12 and 54 amended to now refer appeal to the State Administrative Tribunal.

Government Gazette Edition 55 pages 994 and 995.

RADIATION SAFETY (GENERAL) REGULATIONS

Radiation Safety (General) Amendment Regulations 2004

Regulation 9 amended to allow mention of a licence in advertising material.

Government Gazette Edition 1 page 3

RADIATION SAFETY (TRANSPORT OF RADIOACTIVE SUBSTANCES) REGULATIONS

None

RADIATION SAFETY (QUALIFICATIONS) AMENDMENT REGULATIONS

None

NUCLEAR WASTE STORAGE AND TRANSPORTATION (PROHIBITION) ACT

Section 41A amended the definition of nuclear waste.

Government Gazette Edition 2 page 14.

Attachment 3: Compliance Testing

Medical

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

Category	A	B	C	Total
CT	37	-	-	37
Dental – intraoral	534	8	69	611
Dental – panoramic and/or cephalometric	65	-	9	74
Fluoroscopic – fixed	4	1	29	34
Fluoroscopic – fixed C or U arm	8	5	9	22
Fluoroscopic – mobile	37	4	23	64
Mammography	51	-	9	60
Radiographic – fixed	79	1	61	141
Radiographic – mobile	65	-	14	79
Total	880	19	223	1122

Industrial – Fixed Gauges

- A *Compliant*
 B *Non-compliant*³

Category	A	B	Total
Density	468	30	498
In-stream analysis	9	1	10
Level	27	2	29
Thickness	1	-	1
Total	505	33	538

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 214 re-tests conducted during 2004, 96% 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 2004*

Category	2004	2003
Borehole Logging	45	18
Fixed Gauges	105	39
Industrial Radiography	22	41
Industrial Radiography (Advanced)	2	1
Industrial Radiography (Assistant)	33	82
Portable Gauges	45	34
Portable Gauges (WA Requirements)	9	2
Transport	16	9
Service – Cabinet X-ray	1	1
Service – Linear Accelerators	1	0
Service – X-ray Analysis	3	0
X-ray Analysis – Use	8	16
X-ray Analysis – Use and Restricted Service	42	16
Total	332	259

Attachment 5: Equipment and Sealed Solid Sources Registered

Current at 31 December 2004

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

Category	A	B
Bone densitometry	30	-
Cabinet x-ray equipment	73	-
Calibration	2	254
CT	94	-
CT/SPECT	4	-
Dental – intraoral	1612	-
Dental – panoramic and/or cephalometric	205	-
Education and research	7	909
Fluoroscopic – fixed ⁴	134	-
Fluoroscopic – mobile	98	-
Gauge – density/level	7	1539
Gauge – in stream analysis	-	110
Gauges – logging	7	115
Gauge – neutron moisture/density portable	-	237
Gauge – other	-	31
Irradiator – non-industrial	-	3
Isotope Production	1	-
Laser – entertainment	14	-
Laser – industrial	40	-
Laser – medical	129	-
Laser – other medical	88	-
Laser – research	69	-
Linear accelerator	8	-
Mammography	89	-
Non-destructive testing	49	54
Non-destructive testing – crawler control	-	5
Portable mineral analyser	-	24
Radiographic – fixed	372	-
Radiographic – mobile	450	-
Sealed Sources – other	-	70
Simulator	2	-
Special purpose x-ray	51	-

⁴ Includes equipment used in DSA/Cardiac Cath Lab

Category	A	B
Static detection/measurement	-	3
Static elimination	-	2
Storage	-	136
Superficial radiotherapy	5	-
Test source	6	-
Therapy	1	38
Therapy – HDR brachytherapy	-	2
Transilluminator	76	-
X-ray analysis	144	-
Total	3867	3532

Attachment 6: Licences and Registrations*Current at 31 December 2004**Including individual exemptions granted under section 6 of the Act.*

	X-ray and/or Electronic Products		Radioactive Substances		TOTAL	
	2004	2003	2004	2003	2004	2003
Licences	1993	1963	1087	1027	3080	2990
Registrations	1264	1259	313	300	1577	1559
TOTAL	3257	3222	1400	1327	4657	4549
Change from 2003	1.1%		5.5%		2.4%	

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 2004*

B *Total current*

A	B	Purpose
3	3	Bone Densitometry
3	3	Bone Densitometry (Exemption)
18	35	Cabinet X-ray Equipment
0	7	Cobalt Teletherapy Maintenance
15	39	Compliance Testing - Diagnostic X-ray Equipment
33	82	Compliance Testing - Radioactive Gauges
2	2	Cyclotron Operation
4	5	Cyclotron Servicing
0	4	Education (Apparatus)
19	48	Education (Substances)
59	114	Fluoroscopy - Medical
46	197	Fluoroscopy - Medical (Exemption)
0	2	Fluoroscopy - Medical (Non-Specialist Exemption)
2	2	Fluoroscopy - Research
1	4	Fluoroscopy - Veterinary
1	2	Gamma Irradiator - Use
92	197	Gauges - Industrial
5	15	Gauges - Industrial (Installation)
0	1	Gauges - Level (CO ₂)
64	142	Gauges - Logging
131	273	Gauges - Moisture and/or Density (Portable)
3	7	Gauges - Other (Apparatus)
10	16	Gauges - Other (Substances)
1	3	Installation of X-ray Equipment - Dental
3	18	Lasers - Acupuncture
0	6	Lasers - Chiropractic
11	28	Lasers - Dental
4	9	Lasers - Educational
6	8	Lasers - Entertainment
16	34	Lasers - Industrial
61	191	Lasers - Medical

A	B	Purpose
27	61	Lasers - Physiotherapy
7	29	Lasers - Research
15	30	Lasers - Service
0	3	Lasers - Veterinary
0	1	Manufacture of Lasers and Laser Products
3	5	Manufacture of X-ray Equipment
0	1	Medical Physics
70	141	Medical Radiology
1	1	Non-Medical Irradiation
5	24	Nuclear Medicine - Diagnostic
4	23	Nuclear Medicine - Therapeutic
0	2	Nuclear Medicine - Veterinary
7	13	Pathology Tests
17	22	Portable Mineral Analysers
1	2	Portable Mineral Analysers (X-ray)
1	6	Possession of X-ray Equipment – Diagnostic Medical
0	1	Quality Assurance Procedures
3	9	Radioactive Ores - Mining and/or Processing
2	5	Radioactive Substances - Calibration Sources
1	2	Radioactive Substances - Medical
22	43	Radioactive Substances - Sale
3	13	Radioactive Substances - Service of Devices
7	11	Radioactive Substances - Tracer Studies (Industry)
1	1	Radiography - Chiropractic (Exemption)
22	41	Radiography - Chiropractic (Extended)
43	90	Radiography - Chiropractic (Restricted)
77	197	Radiography - Industrial (Gamma)
82	199	Radiography - Industrial (X-ray)
1	5	Radiography - Medical (Direction and Supervision)
209	493	Radiography - Veterinary
9	15	Radiopharmaceutical Manufacture and Dispensing
6	13	Radiotherapy - Medical (Apparatus)
8	26	Radiotherapy - Medical (Substances)
3	11	Radiotherapy - Medical Superficial
1	4	Radiotherapy - Veterinary
7	23	Research
38	95	Research - Unsealed Radioactive Substances
4	4	Research - X-ray
6	19	Sale of Electronic Products
16	43	Sale of X-ray Equipment
7	14	Service of X-ray Equipment - Analytical

A	B	Purpose
4	10	Service of X-ray Equipment - Dental
17	46	Service of X-ray Equipment - Diagnostic
15	24	Service of X-ray Equipment - Diagnostic (Extended)
1	3	Service of X-ray Equipment - High Energy Therapeutic
4	8	Service of X-ray Equipment - Industrial NDT
2	2	Service of X-ray Equipment - Intraoral
10	15	Service of X-ray Equipment - Linear Accelerators
4	13	Service of X-ray Equipment - Other
2	12	Special Purpose Enclosed X-ray Equipment
0	1	Static Detection
0	1	Static Electricity Measurement
0	1	Static Elimination
2	5	Storage
12	26	Transilluminators
19	58	Transport
0	1	X-ray Analysis
0	2	X-ray Analysis (Research)
24	58	X-ray Analysis - Use
39	89	X-ray Analysis - Use and Service (Restricted)

ABBREVIATIONS

General Terminology

ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARPANS Act	Australian Radiation Protection and Nuclear Safety Act
CT	Computed Tomography
CT/SPECT	Computed Tomography/Single-Photon Emission Computed Tomography
DSA	Digital Subtraction Angiography
NORM	Naturally Occurring Radioactive Material
PET	Positron Emission Tomography
RHSAC	Radiation Health and Safety Advisory Council
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material

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)

