RAC

RADIATION ADVISORY COUNCIL

ANNUAL REPORT 2009–10

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The Honourable Frank Sartor MP
Minister for Climate Change and the Environment

Dear Minister

It is my pleasure to forward to you for presentation to the Parliament of New South Wales the Annual Report of the Radiation Advisory Council for the period 1 July 2009 to 30 June 2010. This report has been prepared in accordance with the provisions of the *Radiation Control Act 1990*.

Yours sincerely

CRAIG LAMBERTON
Chairperson
Radiation Advisory Council
November 2010

Contents

Chairperson's review

The Radiation Advisory Council (the Council) is established under the Radiation Control Act 1990 (the Act). The Act and the Radiation Control Regulation 2003 (the Regulation) are administered by the Minister for Climate Change and the Environment.

The Council held six meetings during the year and provided policy and regulatory advice to the Department of Environment, Climate Change and Water (DECCW) on the administration of the Act and a wide range of radiation matters.

During 2009–10 the Council's work and activities that were of particular significance included:

- input into the National Directory for Radiation Protection, and the national codes and standards arising from the national uniformity process

- the review and endorsement of the work of the Council's Naturally Occurring Radioactive Material (NORM) Committee and, in particular, the identification of operations, materials, and industry sectors that may be of risk to human health and the environment from NORM in NSW; the identification of industry priority issues in NSW; and the development of a consultation strategy for priority NORM industries

- the review of the work of the Council's Shielding Assessment and Verification Committee and, in particular, the endorsement of draft guideline 7: *Radiation Shielding Design Assessment and Verification Requirements* as an applicable requirement for registration of new premises where radiation apparatus, sealed source devices or radioactive substances are kept or used; and the endorsement of the committee's recommendations on the accreditation of consulting radiation experts (CREs) who assess radiation shielding in premises

- the participation of several Council members in a multi-agency radiological training exercise held in November 2009. The aim of the multi-agency exercise was to develop emergency response capabilities relating to the dispersal of a radioactive substance

During the reporting period the Council also endorsed its 2009–2012 strategic direction for the next three years and will continue to focus its attention on:

- reviewing radiation legislation to ensure that an efficient and effective regime for controlling the risks to human health and the environment is in place and, in particular, streamlining the Act and Regulation by reducing red tape and duplication, considering a more outcomes-based legislation while accommodating national uniformity requirements

- developing uniform regulatory initiatives through the National Directory for Radiation Protection by reviewing national codes and standards and identifying regulatory gaps that may need to be addressed

- identifying and addressing emerging issues in radiation protection such as NORM

- identifying procedures and requirements to prevent or minimise dangers arising from the misuse of radiation materials.

During the year the Council continued to provide advice to DECCW on routine radiation matters in relation to:

- radiation licensing, registration and accreditation of CREs
- the review of radiation accidents and incidents; and the assessment of radiation safety courses.

The primary focus of the Council in the year ahead will be on:

- commencing work on the review of the Regulation
- continuing input into the National Directory for Radiation Protection
- continuing the review and input into national codes and standards arising from the national uniformity process.

I would like to sincerely thank all the members of the Council for their contribution and commitment to radiation safety in NSW. I would also like to acknowledge the excellent work of DECCW staff in supporting the Council and its committees.

CRAIG LAMBERTON
Chairperson
November 2010

From 1 July 2009 the Department of Environment and Climate Change NSW (DECC) was renamed the Department of Environment, Climate Change and Water NSW, with additional responsibilities for water.

Responsibilities of the Council

The Radiation Advisory Council (the Council) is constituted under section 29 of the *Radiation Control Act 1990* (the Act).

The object of this Act is to:

> … secure the protection of persons and the environment from exposure to harmful ionising and non-ionising radiation to the maximum extent that is reasonably practicable, taking into account social and economic factors and recognising the need for the use of radiation for beneficial purposes.

Section 33(1) of the Act requires that 'as soon as practicable after 30 June (on or before 31 December) in each year, the Council is to prepare and forward to the Minister a report of its work and activities for the 12 months ending on 30 June in that year'.

Constitution of the Council

The Council consists of 16 members appointed by the Minister. Membership of the Council consists of:

(a) the Director General or a member of staff of the Authority, who is to be the Chairperson

(b) a medical practitioner who is a specialist in radiology

(c) a radiographer with expertise in the field of human diagnostic radiography

(d) a person with expertise in the industrial uses of radiation

(e) a person with expertise in health physics

(f) a medical practitioner who specialises in nuclear medicine

(g) a person with expertise in non-ionising radiation

(h) a person with expertise in occupational health and safety

(i) a person who is a legal practitioner of at least 7 years' standing

(j) a person who represents community interests

(k) an officer of the Department of Health

(l) a radiation oncologist

(m) a medical physicist

(n) an officer of the WorkCover Authority

(o) a person with expertise in naturally occurring radioactivity

(p) a person chosen by the Minister.

Functions of the Council

Section 30 of the Act prescribes the functions of the Council, namely:

(1) The Council is to advise the Minister on:

(a) proposed amendments to this Act and the making, amendment or repeal of regulations under this Act, and

(b) the administration of this Act and the regulations, and

(c) measures to prevent or minimise the dangers arising from radiation, and

(d) the granting of exemptions authorised by the regulations for periods exceeding 60 days, and

(e) such other matters relating to radiation safety as the Minister considers appropriate.

(2) Any such advice may be given either at the request of the Minister or without any such request.

(2A) The Council may at any time, and must on the request of the Authority, provide advice to the Authority about licences, registrations and accreditations under Part 2.

(2B) The advice provided to the Authority may be general or specific, as the circumstances require.

(3) The Council has such other functions as are conferred or imposed on it by or under this or any other Act.

The Department of Environment, Climate Change and Water NSW (DECCW) exercises responsibilities and powers in the name of the Environment Protection Authority (EPA). DECCW officers of the Hazardous Materials and Radiation Section support the work of the Council. The term EPA and DECCW will therefore be used interchangeably throughout this document.

Meetings of the Council

During the reporting period ending 30 June 2010, the Council met on six occasions. The attendance of members at meetings during this period is shown in Table 1.

The Memorandum of Understanding (MoU) between the Council and the EPA is provided in Appendix 1. The Council reviewed the MoU at its February 2010 meeting and endorsed minor changes to the document. The document was endorsed with minor changes and was signed by both parties on 25 March 2010.

TABLE 1

Members of the Radiation Advisory Council and meeting attendance 2009–10

Member	Appointed position	Total meetings attended
Mr Craig Lamberton	Chairperson	6
Mr Simon Smith	Deputy chairperson	
Dr Philip Pasfield	Radiologist	4
Dr Andrew Scott	Deputy radiologist	
Mr John Robinson	Diagnostic Radiographer	6
Mr Glen Burt	Deputy diagnostic radiographer	
Mr Frank Galea	Expert in industrial uses of radiation	6
Mr Troy Jones	Deputy expert in industrial uses of radiation	
Mr Brian Holland (resigned 7/5/2010)	Health physicist	5
Mr Roger Alsop	Deputy health physicist	
Dr Eva Wegner	Physician in nuclear medicine	5
Dr Hugh Dixson	Deputy physician in nuclear medicine	
Ms Kathy Meleady	Officer of the Department of Health	3
Mr Wayne Smith	Deputy officer of the Department of Health	
Dr Richard Smart	Medical physicist	6
Mr Paul Cardew	Deputy medical physicist	
Mr Mark Moskvitch	An officer of WorkCover Authority of NSW	2
Ms Margaret Conley	Minister's nominee	6
Dr Brad Cassels	Expert in naturally occurring radioactivity	6
Mr Michael Carter	Deputy expert in naturally occurring radioactivity	
Assoc. Prof. Lee Collins, AM	Expert in non-ionising radiation	6
Mr Howard Ackland	Deputy expert in non-ionising radiation	
Mr Jon D'Astoli	Occupational health and safety expert	5
Ms Karen Wolfe	Deputy occupational health and safety expert	
Dr Ludmilla Robinson	Legal practitioner	6
Mr Geoff Bartels	Deputy legal practitioner	
Dr Cameron Hazlehurst	Community representative	6
Mr James Prior	Deputy community representative	
Dr Mary Dwyer	Radiation oncologist	6
Dr Roland Yeghiaian-Alvandi	Deputy radiation oncologist	

The Council granted leave to members who were unable to attend meetings. In many instances absent members tendered written advice on agenda items. These submissions were considered by the Council and its committees.

Council's strategic direction

During the reporting period, the Council considered and endorsed its strategic direction for 2009 to 2012. The objectives of the Council over the next three years will continue to focus on:

- developing uniform regulatory initiatives through the National Directory for Radiation Protection by reviewing national codes and standards and identifying regulatory gaps that may need to be addressed
- reviewing the regulatory model for radiation control in NSW to ensure that an efficient and effective regime for controlling the risks to human health and the environment is in place and, in particular, streamlining the Act and Radiation Control Regulation 2003, by reducing red tape and duplication, and considering a more outcomes-based legislation while accommodating national uniformity requirements
- identifying and addressing emerging issues in radiation protection such as Naturally Occurring Radioactive Material (NORM), the security of radioactive material and the use of solaria
- identifying procedures and requirements to prevent or minimise dangers arising from the misuse of radiation materials. The Council will continue to focus on emergency response capabilities through participation in multi-agency emergency management exercises and through participation in national programs.

Council's work

During the reporting period the Council focused its attention on:

- the progress of the review of radiation legislation
- the review of, and input into, national codes and standards arising from the national uniformity process
- priorities and strategies relating to radiation safety issues arising from NORM

  Council members and DECCW staff attended a presentation by international speaker Mr Charles Simmons on NORM. Mr Simmons provided insights into strategies on how to approach NORM and his experience in implementing NORM legislation in the USA, particularly legislation that addressed radiation risks to human health and the environment from NORM
- finalising draft guideline 7: *Radiation Shielding Design Assessment and Verification Requirements* for premises, and endorsing an accreditation system for consulting radiation experts (CREs) who assess radiation shielding in premises
- the progress on the implementation of the regulation of solaria in NSW – at its April meeting the Council considered an audit and inspection report on the regulation of solaria in NSW that was undertaken by DECCW
- the progress on the implementation of the *Code of Practice on the Security of Radioactive Sources*.

A considerable amount of the work of the Council is undertaken by the Council's committees. Details on the work of each of the Council's committees are provided in the next section.

During the reporting period the Council also provided advice to DECCW in relation to routine radiation matters such as:

- non-standard licensing applications
- radiation safety courses for the purposes of licensing
- non-standard registration applications
- non-standard accreditation applications
- the review of radiation accidents.

During the reporting period the Council, in addition to the work of the Council's committees and the routine radiation matters undertaken by the Council:

- endorsed the Council's Annual Report 2008–09
- reviewed the Memorandum of Understanding between EPA and the Council
- developed and endorsed its strategic direction for 2009 to 2012
- considered and endorsed its work plan for July 2010 to June 2011
- reviewed its corporate governance arrangements
- was invited to participate and briefed on the third multi-agency radiological training exercise that was held in November 2009 in which several Council members participated
- raised the issue of whole body imaging security scanners, which are proposed to be used at major airports around Australia, and the potential radiation dose to commuters. The Council requested that the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) provide the Council with a presentation on the latest screening technologies and the Commonwealth's assessment and regulatory approach
- raised the issue of the accuracy of radiation personal monitors with regard to high dose readings and requested that DECCW provide a paper on the matter – the Council considered and noted the information contained in the paper
- considered and provided advice on the following documents:
  - the NSW Medical Board Professional Standards Committee Statement of the decision regarding a complaint to the Health Care Complaints Commission (HCCC) – Council initially recommended that the matter be referred to the HCCC.
  - Australian Institute of Radiography discussion paper: *A Model of Advanced Practice in Diagnostic Imaging and Radiation Therapy in Australia*
  - NSW Health Policy Directive: *Radiation Safety Guidelines – Speech Pathologists/Other Staff – Modified Barium Swallows/Fluoroscopy*
  - NSW Health Policy Directive: *Exposure of Sonographers to Ionising Radiation*
  - The Royal Australian and New Zealand College of Radiologists (RANZCR) *Standards of Practice for Diagnostic and Interventional Radiology*
- received an overview of the remediation program of the former uranium smelter site at Hunters Hill
- considered reports of DECCW's radiation compliance activities
- considered a report on the implementation of the solaria program
- kept itself informed on radiation matters occurring nationally and internationally.

Committees of the Council

Section 31 of the Act enables the Council to establish committees to help it carry out its functions. During the reporting period the Council had four committees as listed below. However, by the end of the reporting period, the Council had only three active standing committees:

- Regulatory Review and Reform Committee
- National Directory Committee
- Naturally Occurring Radioactive Committee (NORM).
- Shielding Assessment and Verification Committee – the Council at its June 2010 meeting endorsed the recommendations of this committee and dissolved the committee as it had completed its terms of reference.

During 2009–10 the Council considered progress reports on the work undertaken by each of its committees. The role and the work of each of the Council's committees are outlined below.

Regulatory Review and Reform Committee

The Council established the Regulatory Review and Reform Committee to ensure that the regulation of radiation in NSW is both efficient and effective in controlling the risks to human health and the environment.

The committee's role is to review the basis of the current NSW regulatory regime and provide advice to the Council and DECCW on potential reform.

The committee is to carry out this work by:

- providing views from various stakeholders on the current regulatory framework
- comparing the NSW framework with those in other jurisdictions and overseas
- advising whether the framework is optimal to the needs of NSW
- providing advice on options for the development of a new model if required
- providing advice on any possible options to improve the existing framework, its effectiveness and administrative efficiency.

During the previous reporting period the committee provided significant advice to the Council and DECCW on the review of the Act. During the reporting period the committee did not meet, but was provided with progress reports on the drafting of the Radiation Control Bill.

National Directory Committee

The National Directory Committee was established by the Council to assist the Radiation Health Committee (RHC) in the development and implementation of the National Directory for Radiation Protection (the Directory) and to ensure that RHC's proposals were practicable and effective in controlling radiation risks to human health and the environment.

The role of the committee is to provide advice to the Council and DECCW on the priorities and suitability of material within the Directory, and its legislative, financial and operational impact on DECCW, other NSW Government agencies and NSW as a whole. The committee reviews documents of RHC.

During the reporting period the committee met on three occasions and considered and provided advice to the Council and DECCW on the following items:

- RHC's *First Responder Radiation Exposure*
- ARPANSA's draft *Recommendations for the Classification of Radioactive Waste*
- RHC's *National Radiation Protection Qualifications and Accreditation and Training Standards*
- RHC's *Statement on the Radiation Risk from Handling Deceased Persons Recently Treated with Radioactive Materials*
- Australian non-radiation approaches to stakeholder consultation
- The Directory amendments.

During the reporting period the committee was provided with advice by DECCW on:

- near finalisation by RHC of the *Code of Practice in the Use of Ionizing Radiation by Chiropractors*
- endorsement by RHC of the *Code of Practice and Safety Guide: Radiation Protection in Veterinary Medicine*
- items for discussion and decision to be made at the RHC meetings.

Naturally Occurring Radioactive Materials Committee

The Council established the Naturally Occurring Radioactive Materials (NORM) Committee to identify, and where necessary, address radiation risks to human health and the environment associated with NORM.

The committee's work included:

- identifying operations, environments and/or materials involving NORM in NSW
- identifying potential industry sectors in NSW that might cause people to be exposed to elevated risks due to NORM
- prioritising NORM industries/issues needing attention in NSW and encouraging ARPANSA to bring these matters onto the priority list
- assisting DECCW in its work with the NSW industry on NORM-related issues to educate and encourage the adoption of working practices that minimise radiation exposure of employees, the public and the environment
- developing materials/strategies for priority NORM issues in NSW with the view of supplementing initiatives being undertaken at the national level
- assessing the implications of draft annexes of the ARPANSA *Safety Guide Management of Naturally Occurring Radioactive Material* on the NSW-regulated community and practice in general
- assisting in the development of further industry specific annexes for the *National Directory for Radiation Protection: Safety Guide for the Management of NORM*
- identifying what is necessary to put into the public domain and how that might be achieved.

During the reporting period, the NORM Committee met on five occasions to discuss its work and outcomes. The committee provided advice to the Council on its priorities, strategies and work relating to radiation safety pertaining to NORM and, in particular, the committee:

- agreed to a strategy for the development of industry specific guidance material for NORM industries which are not presently covered by the ARPANSA safety guides
- scoped the NORM issues in NSW, identifying operations, materials, and industry sectors that should be assessed for possible NORM issues
- identified industry priority sectors in NSW such as coal mining and coal fired electricity generation; extraction industries; mineral sands; water treatment; iron and steel production; and scrap metal recycling
- developed a consultation strategy for the priority NORM industries
- reviewed ARPANSA's *Draft Safety Guide on Methods for Monitoring, Assessing and Recording Occupational Radiation Doses in Mining and Mineral Processing*
- provided the Council and DECCW with an extract from Raymond H Johnson's *Radioactivity in Tobacco Products,* and recommended that NSW Health be provided with the information for consideration
- recommended that DECCW nominate Mr Rob McLaughlin, of the Council's NORM committee, to the National NORM safety guide working group.

The Council considered the findings of the committee at its June 2010 meeting and agreed that the committee's recommendations be provided to DECCW for consideration. Council members thanked Dr Cassels, the Chairperson of the committee, and committee members for their contribution to the work of the committee.

Shielding Assessment and Verification Committee

The Council established the Shielding Assessment and Verification Committee to address issues relating to premises shielding and for the accreditation of CREs for assessing and certifying all premises in NSW where radioactive substances are kept or used and where radiation apparatus is used.

The committee's work included determining:

- the technical criteria necessary for the proper safe shielding of premises for certification by CREs – the committee established this through the development of a guideline and by referring to technical documents published by professional and government organisations
- a classification system of CREs to be accredited, and the criteria to be used by DECCW for the accreditation of these CREs – the accreditation criteria will depend on the level of the hazard of the practices/premises that the CREs are to assess and certify as being compliant with the requirements of the Regulation
- an administrative mechanism whereby DECCW, in collaboration with the Council, can issue these CREs with a Certificate of Accreditation.

During 2009–10 the committee met on three occasions and finalised the draft radiation guideline 7: *Radiation Shielding Design Assessment and Verification Requirements* for premises, and the accreditation of CREs to assess premises shielding. In August 2009 the draft guideline was submitted to the Council to endorse as an applicable requirement for registration of new premises where radiation apparatus, sealed source devices or radioactive

substances are kept or used. The Council endorsed the draft guideline at this meeting and the guideline was published by DECCW in December 2009.

DECCW envisages that the guideline will be prescribed as an applicable requirement in the Regulation for the registration of new premises where radiation apparatus, sealed source devices or radioactive substances are kept or used. In the interim period the Council expects that the guideline will be used, by owners of radiation apparatus or sealed source devices and occupiers of premises, to assess shielding requirements for new premises. The committee also recommended that RHC be notified of the completion of the guideline.

During the reporting period the committee provided advice and focused on the development of the accreditation criteria for CREs assessing shielding requirements as set out in the guideline and, in particular:

- informed the Council that the competencies, assessment and course outline for CREs assessing medical premises previously endorsed by the Council had progressed and that DECCW was in the process of liaising with the Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) to develop a course and assessment program for CREs assessing shielding in medical premises
- developed competencies and an assessment criteria for CRE accreditation of shielding for non-medical premises
- developed a course outline for assessing radiation shielding plans and verifying radiation shielding for non-medical premises
- proposed the establishment and membership of an expert panel to assess CRE applicants seeking accreditation to assess and certify shielding in non-medical premises for registration under the Act; and also proposed the terms of reference and standing operating procedures of the panel
- recommended that the committee be dissolved upon the Council's endorsement of its recommendations.

The Council at its June 2010 meeting endorsed the recommendations of the committee and officially dissolved the committee as a standing committee of Council as it had completed its terms of reference. Mr Lamberton and Council members thanked Dr Smart, the Chairperson of the committee, and committee members for their contribution.

Membership of all the Council's committees is shown at Appendix 2.

National uniformity

The Australian Health Ministers' Conference (AHMAC), held in August 1999, agreed that the approach to national uniformity would be through the development of the Directory, which would allow all jurisdictions, including the Commonwealth, to achieve national uniformity in their radiation protection frameworks. The Directory is being developed by RHC and facilitated by ARPANSA.

In May 2005 the first edition of the Directory was endorsed by the AHMAC as the uniform national framework for radiation protection in Australia. In 2007 RHC agreed that further progression of the Directory would be by individual amendments to be submitted to AHMAC for endorsement.

During 2009–10 the Council was provided with three amendments to the Directory. These were agreed to by RHC during 2008, considered by the Council during 2007 and 2008, and adopted by AHMAC in December 2009. A summary of these amendments are shown below.

Amendment No. 1, 2008

- 1.3 Scope – the Scope was replaced to include the application of the Directory to mining and mineral processing
- Schedule 11 – National adoption of referenced codes of practice and standards was amended to add eight publications to the list of referenced codes and standards, as shown in the table below.

RPS 2 Code of Practice	Safe Transport of Radioactive Material, ARPANSA, January 2008 (the 2001 edition is deleted)
RPS 5 Code of Practice	Portable Density/Moisture Gauges containing Radioactive Sources, ARPANSA, May 2004
RPS 8 Code of Practice	Exposure of Humans to Ionizing Radiation for Research Purposes, ARPANSA, May 2005
RPS 9 Code of Practice	Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing, ARPANSA, August 2005
RPS 10 Code of Practice	Radiation Protection in Dentistry, ARPANSA, December 2005
RPS 11 Code of Practice	Security of Radioactive Sources, ARPANSA, January 2007
RPS 12 Radiation Protection Standard	Occupational Exposure to Ultraviolet Radiation, ARPANSA, December 2006
RPS 13 Code of Practice	Safe Use of Fixed Radiation Gauges, ARPANSA, January 2007

Amendment No. 2, 2008

- Exclusions and Exemptions 2008 – This amendment clarified the scope of the Directory in terms of exclusion and exemptions of radiation from legislation.

Amendment No. 3, 2008

- Codes of practice and radiation protection standards – Schedule 11 was amended to add RPS 14 *Code of Practice Radiation Protection in the Medical Applications of Ionizing Radiation* (2008) to the referenced codes and standards.

Documents referenced in Schedule 11 of the Directory are to be specifically adopted under the terms of the National Competition Policy (NCP) agreements, by each jurisdiction within their regulatory frameworks. NSW amended the Act in 2001 to provide an easy mechanism for the adoption of the documents. The Council at its April 2010 meeting was informed by DECCW that a notice to adopt nine documents (contained in amendments 1 and 3 above) was placed in the NSW Government Gazette on 9 April 2010.

During 2009–10, the Council:

- considered and provided advice to DECCW on ARPANSA's draft *Recommendations for the Classification of Radioactive Waste*
- considered and provided advice to DECCW on the draft consultation report by the International Commission on Radiological Protection (ICRP) on *Radiological Protection Education and Training for Healthcare Staff and Students*
- considered reports and was briefed on the major issues arising from RHC meetings held in July and November 2009 and March 2010
- recommended that DECCW raise with RHC the need to nationally train nuclear medicine technologists (NMTs) to use computed tomography for coronary angiography (CTCA) as this technology is rapidly becoming an alternative to fluoroscopy. RHC considered the matter at its March 2010 meeting and agreed that a national training approach be considered for the training of NMTs in the use of CTCA and extended an invitation to the Australian Institute of Radiography and Australian and New Zealand Society of Nuclear Medicine Technologists to develop a national training package for NMTs using CTCA in consultation with the relevant course providers in each State/Territory
- expressed concerns to DECCW regarding the effectiveness of the consultation processes associated with the development of the Directory in terms of insufficient time to comment on publications during their development – DECCW, on the recommendation of the Council, wrote to RHC about these concerns
- received feedback from DECCW on the outcomes of the Radiation Regulators Forum on the issue of a national disqualification system for radiation licences – the forum agreed that each jurisdiction needed to investigate whether a national system would be compatible with its legislative structure
- was provided with advice that the Australian Health Practitioner Regulation Agency (AHPRA), the national agency responsible for the registration and accreditation of ten health professions in Australia, will commence registration of professions on 1 July 2012. AHPRA is bound by the *Health Practitioner Regulation National Law Act 2009* – the Council was advised that this will mean that all state professional bodies will be phased out and only national professional bodies will be responsible for determining registration and accreditation of individuals in their respective professions
- considered reports from DECCW on the implementation of the ARPANSA *Code of Practice for the Security of Radioactive Sources*
- was provided with the published ARPANSA *Statement on Safe Handling of Deceased Persons Recently Treated with Radioactive Material*
- was informed of the National Forum on the revision of the International Atomic Energy Agency Safety Standards.

Review of radiation control legislation

Review of the NSW Radiation Control Act 1990

During the previous period the Council considered a summary of the key issues for the review of the Act that were derived from the consultation process including deliberations of the Council's Regulatory Review and Reform Committee, consultation with the Council and

DECCW. Several of the key issues will have an impact on the achievement of Priority P3 (Cutting red tape) of the NSW Government's State Plan

During 2009–10 the key issues, examined in the review of the Act, were used by DECCW to guide the Minister in the drafting of the Radiation Control Bill. The key issues included:

- the original intended objectives of the legislation and whether these are being met
- an examination of the role of the Council in achieving these radiation protection objectives
- ensuring that the review aligned with the national uniformity process and the Directory as it is being developed through codes of practice, safety guides, and national standards for adoption by the states and territories
- the recommendations of the final report of the NCP review of radiation protection legislation and the NCP agreement
- the Council of Australian Governments (COAG) *Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies* (the COAG Guidelines)
- parallels with other outcomes-based legislation (OH&S legislation, and Commonwealth, Queensland, Victorian, and United Kingdom radiation protection legislation)
- the implementation of security initiatives endorsed by COAG
- costs of administration of the Act, Regulation and legislative instruments (particularly the system of licensing and registration)
- examination of possible ways to reduce the burden of red tape on business and the regulated community, without compromising radiation safety
- an examination of potential ways to streamline the system of authorisations without compromising radiation safety.

During the reporting period the Council was kept informed of the progress of the drafting of the Radiation Control Bill.

Licensing, registration and accreditation

The EPA is the authority responsible for dealing with applications and variations for items listed under Part 2, Regulatory Controls, of the Act. The EPA is empowered to seek, or take into consideration, the advice of the Council on licensing, registration and accreditation matters. Section 30 of the Act, provides that the Council can give generic or specific advice to DECCW on applications under Part 2 of the Act.

The Council and the EPA have agreed on effective processes in determining applications, which is set out in the MoU between the Council and the EPA. The MoU is provided at Appendix 1.

During the reporting period the Council provided advice in relation to licensing, registration and accreditation. Council’s advice for each of these areas is provided below.

Licences to use, possess and sell radioactive substances and radiation apparatus

Section 6 of the Act regulates the use and sale of radioactive substances and radiation apparatus. Section 6(2) prohibits a person from using, selling or possessing radioactive substances or radiation apparatus unless they hold a current licence and comply with its conditions. Clause 8 of the Regulation provides an exemption from section 6 of the Act for specified categories of persons.

During the reporting period, the Council:

- recommended the granting of 28 non-standard licence conditions:
  - 11 to use radioactive substances for scientific or research purposes
  - 3 to use radiation apparatus for scientific or research purposes
  - 4 to use radioactive substances for radiopharmacy
  - 2 to use radiation apparatus for the production of radionuclides
  - 2 to use radioactive substances for tracer studies (excluding studies on humans)
  - 1 to use radiation apparatus for quality assurance purposes
  - 1 to use radioactive substances for quality assurance purposes
  - 1 to use radioactive substances for installing and/or servicing radiation apparatus
  - 1 to use radioactive substances for veterinary purposes
  - 1 to use radiation apparatus for fluoroscopy (specialists other than radiologists)
  - 1 to use radioactive substances for maintaining a radioactive substance store
- considered a licence application to use radioactive substances and apparatus for radiation oncology physics (tier 1 without supervision) and recommended that this licence condition be granted subject to the applicant providing evidence that they are included on the ACPSEM medical physics register, a register for qualified medical physics specialists
- did not support:
  - a licence variation to allow a radiation therapist to provide the role of radiographer in a cardiac catheter laboratory (CCL) until the applicant could show that they have the necessary skills to the satisfaction of the Council. The applicant was assessed against a list of skills and knowledge required to safely operate a CCL developed by the Council in 2005
  - a licence application to sell/possess radiation apparatus and radioactive substances on the basis that the Council deemed it not appropriate, however the Council did endorse the issue of a restricted licence to use radioactive substance for the purposes of installing and/or servicing devices containing a radioactive substance (S10)
  - licensing a cardiologist to inject radiopharmaceuticals into patients undergoing cardiac stress tests on the basis of the information provided recommending further information be sought from the applicant; that the Radiation Safety Officer be provided with the details of the request; and that the matter be reconsidered by the Council once the additional information is provided. At the time of writing this report the Council had not discussed this matter further
- considered a new licence condition for borehole logging (IA35) recommending that:
  - the Reservoir Performance Monitor be approved for use in borehole logging

  - the new conditions of licence (IA35) for the apparatus be endorsed
  - that applicants completing one of the training courses currently approved for the S35 licence 'Use radioactive substances for borehole logging' be eligible to be granted the IA35 licence without further referral to the Council
  - that RHC be informed of the Council's recommendation and that DECCW request RHC to consider licensing such apparatus uniformly across Australia due to the potential security issues that may be associated with the use of this apparatus
- provided advice on the suspension of a radiation licence and recommended that the matter be referred to RHC to consider the development of a nationally consistent system for disqualification of licensees
- endorsed the criteria to use radiation apparatus for quality assurance purposes (IA12) and radioactive substances for quality assurance (S12) for the purpose of licensing, and that the criteria be considered as the standing advice of the Council, thus where an applicant meets the criteria for these licence conditions the licence may be issued without further referral to the Council
- considered the need to train NMTs in the use of CTCA, as this technology is rapidly becoming an alternative to fluoroscopy – the Council was informed that these examinations can be done using conventional computed tomography (CT) or by using a hybrid CT. The hybrid SPECT/CT technology brings new capabilities beyond those offered by conventional scanners, and procedural possibilities in non-invasive cardiac imaging. The Council recommended that the matter be referred to RHC suggesting that a national approach be considered for training NMTs in the use of CTCA.
- considered the issue of X-ray equipment being sold online and requested DECCW to investigate the licensing of persons who sell or buy radiation apparatus online – the Council considered the paper on the matter at its April 2010 meeting noting the advice
- recommended the endorsement of the following radiation safety courses/training programs for the purposes of licensing:
  - Portable and Hand-held XRF Radiation Safety and Operator Training Course provided by Analytical Solution Pty Ltd – applicants completing this unit of study are eligible to be granted a licence condition to use portable X-ray fluorescence (XRF) radiation apparatus for analysis (IA19) and a licence condition to use radioactive substances in a portable X-ray fluorescence (XRF) analyser (S19)
  - MRTY3116 CT for Nuclear Medicine Technologists, part of the Bachelor of Applied Science (Medical Radiation Sciences) Nuclear Medicine, provided by the University of Sydney – applicants completing this unit of study are eligible to be granted a licence condition to use CT for Nuclear Medicine Technology (IA16)
  - Certificate III dental assistants/nurses (HLT31807) and Certificate IV dental assistants/nurses (HLT43007) provided by Pacific Smiles Staffing Solutions Pty Ltd – applicants completing this unit of study are eligible to be granted a licence condition to use radiation apparatus for general dental radiography (IA20)
- considered statistics of routine licences issued during the year ending 30 June.

For the reporting period ending 30 June 2010, the Council was advised that DECCW issued 1202 new licences, including 73 licences for sale/possession and 1129 licences to use radiation apparatus and/or radioactive substances. The total number of licences (1202) is the number of actual individual new applications that resulted in a licence being issued.

Table 2 lists the licence conditions issued by occupational category. As a licence may contain more than one condition the total number of licence conditions issued for radioactive substances and ionising radiation apparatus in Table 2 is greater than the number of actual licences issued.

During 2009–10 DECCW renewed 4213 licences. At the end of the reporting period there were 12,742 active licences.

TABLE 2

Number of new licence conditions issued in 2009–10 listed by licence category

Occupational category	**To use radioactive substances**	**To use ionising radiation apparatus**
Analytical work	0	5
Auditing and quality assurance work	4	1
Bone mineral analysis and body composition analysis work	n/a	41
Chiropractic work	n/a	46
Dental	n/a	193
Educational and demonstration work	0	0
Industrial and other related work	177	34
Installation and servicing work	23	48
Medical – Nuclear medicine work	49	48
Medical – Physics work	14	14
Medical – Radiation therapy work	81	79
Medical – Radiography radiology/fluoroscopy work	n/a	455
Medical diagnosis work	0	n/a
Radiopharmacy work	5	n/a
Scientific and research work	55	10
Sell or possess	37	74
Veterinary work	1	139
Other	1	8
Total	**447**	**1195**

The introduction of the option of a three-year licence in September 2007 has resulted in the reduction of the number of new and renewed radiation licences in this period.

Table 3 summarises the number of new licence conditions issued by DECCW during the period 2005–06 to 2009–10.

TABLE 3

Number of new licence conditions issued from 2005–06 to 2009–10

Period	Radioactive substances	Radiation apparatus	Total
July 2005–June 2006	873	1870	2743
July 2006–June 2007	742	1876	2618
July 2007–June 2008	683	1592	2275
July 2008–June 2009	1006	2800	3806
July 2009–June 2010	447	1195	1642

Registration of radiation apparatus, sealed source devices and premises

Section 7 of the Act requires the registration of sealed source devices (SSDs) and certain prescribed radiation apparatus. Section 8 of the Act requires premises to be registered where radioactive substances, which are not contained in an SSD, are kept or used.

The purpose of registration is to:

- enable the regulatory authority to place best practice requirements on the operation and maintenance of radiation apparatus, SSDs and radioactive substances, including the design and construction of premises where radiation apparatus, SSDs and radioactive substances are kept or used
- enable up-to-date records to be kept on all SSDs, certain radiation apparatus, and premises where radioactive substances are kept or used
- allow the regulatory authority to restrict the use of apparatus, SSDs and radioactive substances to pre-agreed practices or activities, which ensure that the protection of individuals and the environment is optimised.

During the reporting period the Council:

- considered and endorsed an application for the registration of a cyclotron at Macquarie University Hospital. DECCW staff and Council members reviewed the application followed by a visit to the facility. DECCW issued the applicant with a registration for the cyclotron only for the purpose of commissioning the cyclotron. DECCW is to provide Council with a progress report regarding the full registration once the cyclotron has been commissioned.
- provided advice on an application from Inline Systems seeking a review of registration conditions to use NOMAD portable X-ray systems. The Council, provided advice on what requirements must be complied with in order for the registration conditions to be accepted.
- endorsed the registration of the Reservoir Performance Monitor for borehole logging; that the apparatus be registered as an SSD; and that the conditions of registration must state that it must comply with the *Code of Practice for the Security of Radioactive Sources*

- received a presentation from DECCW on its enforcement campaign specifically, spot inspections, of diagnostic imaging premises, designed to identify unregistered apparatus and devices; unlicensed persons; and to increase DECCW profile as a credible regulator of regional NSW
- considered statistics for routine registrations issued during the year ending 30 June 2010.

Table 4 provides a list of items that are required to be registered with DECCW and their registration commencement dates.

TABLE 4

Registration categories and registration commencement dates

Registration category	Commencement date
Diagnostic imaging apparatus	11 August 2000
Cyclotrons	1 December 2001
Therapy apparatus	1 February 2004
Sealed source devices	1 July 2004
Premises where radioactive substances are kept or used	1 July 2004

A summary of each registration category and the number of registrations in each category is provided below.

Registration of diagnostic imaging apparatus

The registration period for diagnostic imaging apparatus is valid for 2 or 5 years, depending on the type of apparatus as shown in Table 5.

TABLE 5

Duration of registration for diagnostic imaging apparatus

Category	Duration of registration
Dental radiography (fixed and mobile)	5 years
Radiography (fixed and mobile)	5 years
Fluoroscopy (fixed and mobile)	2 years
Radiography/fluoroscopy (fixed and mobile)	2 years
Mammography (fixed and mobile)	2 years
Computed tomography (includes dental apparatus classified as computed tomography)	2 years
Panoramic radiography (with/without cephalometry)	5 years
Bone mineral densitometry	5 years

During the year ending 30 June 2010, DECCW issued 812 new registrations for diagnostic imaging apparatus as shown in Table 6. Table 6 also summarises the number of new diagnostic imaging apparatus registered with DECCW between 2005–06 and 2009–10.

As at 30 June 2010 the total number of diagnostic imaging apparatus registered with DECCW was 7475.

TABLE 6

Number of new diagnostic imaging apparatus registered between 2005–06 and 2009–10

Equipment type	**2005–06**	**2006–07**	**2007–08**	**2008–09**	**2009–10**
Fixed dental radiography	422	374	197	363	344
Fixed radiography	119	92	73	117	88
Fixed fluoroscopy	16	10	8	14	14
Fixed radiography/fluoroscopy	19	22	14	25	14
Fixed mammography	26	16	31	68	26
Computed tomography	65	56	53	93	68
Dental computed tomography	3	2	4	1	7
Bone mineral densitometry	27	16	18	24	20
Mobile dental radiography	10	6	11	15	15
Mobile radiography	101	61	51	60	57
Mobile fluoroscopy	38	21	26	54	34
Mobile radiography/fluoroscopy	7	7	3	14	4
Mobile mammography	4	0	2	10	2
Panoramic radiography	39	51	68	116	119
Total	**896**	**734**	**559**	**974**	**812**

Registration of cyclotrons

The Regulation prescribes cyclotrons as radiation apparatus and are required to be registered under the Act. Cyclotrons are required to be registered every two years.

During the reporting period the Council considered and endorsed the registration of a cyclotron at Macquarie University Hospital.

As at 30 June 2010, there were two cyclotrons registered in NSW.

Registration of therapy apparatus

The Regulation requires that radiation apparatus used or intended to be used for radiotherapy or radiotherapy planning purposes must be registered. Radiotherapy apparatus is required to be registered every 2 years.

During the year ending 30 June 2010, DECCW issued six new registrations for therapy apparatus as shown in Table 7. Table7 also summarises the number of registrations for each type of therapy apparatus issued by DECCW between 2005–06 and 2009–10.

As at the 30 June 2010 the total number of therapy apparatus registered with DECCW was 70.

TABLE 7

Number of therapy apparatus registrations between 2005–06 and 2009–10

Equipment type	2005–06		2006–07		2007–08		*2008–09	*2009–10
	New	Renewed	New	Renewed	New	Renewed	New	New
Kilovoltage therapy X-ray (superficial and/or orthovoltage)	3	25	0	0	2	16	3	0
Linear accelerator	3	9	12	4	2	23	7	6
Simulator	0	14	2	0	1	5	2	0
Total	**6**	**48**	**14**	**4**	**5**	**44**	**12**	**6**

*Due to system limitations individual statistics for the number of renewed registrations in each category are not provided.

Registration of SSDs

The Regulation requires that SSDs must be registered. The registration period for SSDs is every 2 years.

During the reporting period, DECCW registered 85 new SSDs as shown in Table 8. Table 8 also summarises the number of registrations of SSDs issued by DECCW between 2005–06 and 2009–10.

At the end of the reporting period there were a total of 1052 SSDs registered with DECCW.

TABLE 8

Number of sealed source devices registered between 2005–06 and 2009–10

Equipment type	2005–06	2006–07		2007–08		*2008–09	*2009–10
		New	Renewed	New	Renewed	New	New
Borehole logging	8	5	11	0	7	3	2
Soil moisture density & moisture determination	30	18	208	39	26	103	29
Density gauge	22	5	5	7	19	1	3
Neutron probe	1	7	36	2	1	31	2
Industrial radiography	14	6	20	3	6	25	9
XRF analyser	3	2	17	2	2	3	2
Portable gauge	1	0	8	0	1	2	0
Beta backscatter thickness testing	0	1	0	0	1	1	0
Self-shielded irradiator	2	4	12	2	2	4	0
Therapy device	3	1	8	2	3	6	0
Analyser	0	0	2	0	0	1	0
Nuclear medicine gamma camera	0	0	10	2	0	1	0
Fixed radiation gauges	63	58	249	70	319	109	38
Total	**147**	**107**	**586**	**129**	**387**	**290**	**85**

*Due to system limitations individual statistics for the number of renewed registrations in each category are not provided.

Registration of premises where radioactive substances are kept or used

Section 8 of the Act requires that premises on which a radioactive substance, that is not contained in an SSD, is kept or used must be registered with DECCW. The registration period for premises where radioactive substances are kept or used is 2 years.

At the end of the reporting period, DECCW registered 19 new premises as shown in Table 9. Table 9 also summarises the number and category of new premises registered with DECCW between 2005–06 and 2009–10.

At the end of the reporting period, there were 275 premises registered with DECCW where radioactive substances are kept or used.

TABLE 9

Number and category of new premises registered where radioactive substances are kept or used between 2005–06 and 2009–10

Premises category	2005–06	2006–07	2007–08	2008–09	2009–10
Low	29	20	12	33	10
Medium	13	7	12	8	8
High	2	0	2	0	1
Total	**44**	**27**	**26**	**41**	**19**

Accreditation of CREs

The EPA is responsible for accrediting CREs under the Act and, through section 9A of the Act, may seek the Council's advice on accreditation matters. The Regulation sets out the following activities of a CRE:

(a) advising on the design of premises to be registered under section 8 of the Act in relation to radiation safety requirements

(b) assessing plans for premises to be registered under section 8 of the Act in relation to radiation safety requirements for the purpose of certifying compliance with the requirements necessary for registration

(c) measuring and assessing radiation doses from ionising radiation apparatus used for medical therapy

(d) measuring and assessing radiation doses from ionising radiation apparatus used for diagnostic purposes

(e) advising on the design of premises, in relation to radiation safety requirements, in which SSDs or radiation apparatus prescribed under section 7(1) of the Act are kept or used

(f) assessing plans for premises in which SSDs or radiation apparatus prescribed under section 7(1) of the Act are kept or used, for the purpose of certifying compliance with any requirements for registration under section 7(5) of the Act

(g) assessing radiation apparatus, SSDs, and premises that are required to be registered under section 7 or 8 of the Act for the purpose of certifying compliance with the requirements for registration

(h) assessing the integrity of any shielding of premises in which SSDs or radiation apparatus prescribed under section 7(1) of the Act are kept or used for purposes of certifying compliance with the requirements for registration.

During the reporting period the Council:

- considered an application from an individual seeking to be accredited as a CRE for general diagnostic imaging apparatus (DIA) excluding dental apparatus. Due to the lack of adequate information provided for assessment the Council requested that the applicant provide examples of his past work. The applicants past work was assessed and accreditation was not recommended.
- requested that DECCW investigate re-certification of CREs to ensure they have had relevant training in new ionising radiation apparatus that is being sold and used in the market place
- was informed that DECCW in conjunction with Mr Galea, a member of the Council, revised its assessment program for individuals wishing to become CREs in the industrial category
- endorsed the accreditation of two individuals in the CRE industrial category on the basis that both applicants had passed the DECCW CRE (Industrial) theory and practical assessment
- considered an application for accreditation of an overseas trained medical physicist as a CRE to assess mammography, general diagnostic imaging and dental apparatus. The Council recommended that the applicant be assessed:
  - using a competency based assessment (i.e. Guideline 6: *Registration requirements & industry best practice for ionising radiation apparatus used in diagnostic imaging protocols*)
  - by an independent CRE as a means of assessing the applicant's suitability for gaining accreditation in mammography, general diagnostic imaging and dental apparatus
- was provided with advice on statistics of routine accreditation issued by DECCW during the year.

During the reporting year ending 30 June 2010, DECCW issued 4 new CRE accreditations. The number of new accreditations is the number of actual individual applications resulting in a new accreditation being issued.

Table 10 lists the number of accreditation conditions issued for each category, which includes new applications and variations to existing accreditations. These figures represent the number of accreditation conditions issued, not the actual number of accredited CREs. A CRE may have more than one condition therefore the total number of accreditation conditions issued will be greater than the number of accredited CREs.

Table 10 shows that at the end of the reporting period there were 160 active accreditation conditions. The total number of accredited CREs was 103.

From 1 July 2003 CREs were required to renew their accreditation annually.

TABLE 10

Number of accreditation conditions issued during 2009–10 and the total number of accreditation conditions as at 30 June 2010

Category	Equipment	2009–10	Total as at 30 June 2010
Diagnostic imaging	Mammography	1	25
	Dental (intra-oral, OPG and cephalometry)	2	45
	Dental (intra-oral, OPG and cephalometry) Radiography Fluoroscopy Computed tomography Bone mineral densitometry (including veterinary and chiropractic)	1	69
	Radiography Fluoroscopy Computed tomography Bone mineral densitometry (including veterinary and chiropractic)	0	6
Industrial	Fixed radiation gauges	2	15
Total		**6**	**160**

Radiation accidents

Clauses 27 and 28 of the Regulation outline the mandatory requirements imposed on an employer in regard to the reporting and recording of radiation accidents. Clause 26 of the Regulation specifies the types of incidents that are classified as radiation accidents for the purposes of the Act.

Accidents are normally caused by either deficiency in the relevant management systems, or failures on the part of individuals to implement those systems correctly. The Council normally recommends that new procedures be developed and implemented in cases where investigations reveal that accidents were caused by a deficiency in the management system. The Council usually recommends counselling or further training where an individual is at fault, where this has not been undertaken by the organisation to prevent the type of incident from recurring. In specific circumstances, enforcement action may be warranted.

Serious health (medical) related accidents may be referred to the Health Care Complaints Commission (HCCC) on the recommendation of the Council. DECCW has standing advice to refer all matters to the HCCC that are considered significant by the Council.

The Council each year emphasises that it is vital that accidents are consistently reported, even if the dose received was negligible, not just because of a legal requirement, but because the knowledge gained can help to develop processes and procedures that reduce the risk of similar accidents occurring in the future.

Council is also aware that a national incidents register (the Australian Radiation Incidents Register) has been developed by ARPANSA as part of the national uniformity initiatives. Under these initiatives all jurisdictions are required to provide incidents data to this register. Council supports the establishment of this incident database which will provide useful data and guidance to aid in preventing or limiting radiation incidents and accidents.

During the reporting period ending 30 June 2010, DECCW was informed of 24 instances where radiation accidents may have occurred involving 26 people. The Council considered each case and, where appropriate, made recommendations that, in its opinion, would reduce the risk of a recurrence.

A summary of all the accidents reported to the Council and subsequent recommendations of the Council are provided below. The summary is grouped by categories of accidents: nuclear medicine, therapy, and radiology.

Nuclear medicine

The Council reviewed the following accidents and the controls that the facilities had instigated to correct deficiencies in their standard operating procedures, and was satisfied with the steps the organisations had taken to prevent the type of incident from recurring.

- A patient received 1000 MBq Tc99m intended for a liver study instead of 1000 MBq Tc99m–HDP for a bone scan. The patient received an effective dose of 12 mSv.
- A patient received a routine PET/CT scan however after the completion of the CT component of the study the scanner software failed and the computer had to be rebooted resulting in the patient receiving a second CT scan prior to the PET scan. The patient received an estimated effective dose of 10 mSv.
- A patient scheduled for a bone scan was injected with 400MBq of Tc-99m pertechnetate instead of Tc99m MDP due to the label on the dose not being read correctly. The patient received an effective dose of 5.2 mSv.
- Two patients scheduled to have nuclear medicine scans received the wrong radiopharmaceutical. The errors occurred when the radiopharmaceutical doses were unpacked and placed in incorrect containers. The estimated effective dose to the first patient was 4.2 mSv. The estimated effective dose to the second patient was 3.4 mSv.
- Two patients were prescribed Tc-99m sestamibi as part of their cardiac perfusion study. The doses were dispensed from a vial that did not pass the QC test, recording only 50% labelling instead of >90%, and the incorrect information ‘vial passed QA’ was placed in the hot lab computer system in error. This resulted in the patients receiving 1020 MBq and 1047 MBq 99mTc sestamibi doses respectively, which were not adequate for the study and the images obtained were deemed non-diagnostic thus requiring the stress study to be repeated. The total effective dose to each patient was estimated to be 10.8 mSv.
- A patient presented for a lung scan and was required to breathe in 40 MBq of Technegas as part of the procedure. When placed under the gamma camera for imaging it was discovered that the patient had inhaled three times the required activity. The accident occurred as a result of the patient inhaling more of the Technegas than would normally be

expected, and due to the activity concentration of the Technegas being prepared for two patients. The patient received an estimated effective dose of 1.5 mSv.

- A patient was injected with 946 MBq Tc-99m MIBI as part of a stress test however the prescribed drug adenosine was not administered to the patient so the stress test could not be performed and required repeating. The accident occurred due to a faulty injection pump. The effective dose to the patient was estimated be 8.5 mSv.
- An elderly patient received 850 MBq Tc-99m pertechnetate instead of 850 MBq Tc99m MDP for a bone scan. It was reported that the patient received a whole body dose of 3.5 mGy. The Council noted a discrepancy of the dose suggesting that the patient would have received an effective dose of approximately 11 mSv. Council members were satisfied with the actions taken by the facility to prevent recurrence of this type of accident however requested DECCW to write to the facility requesting clarification regarding the dose calculations.
- A patient received 615 MBq I-131 for a therapeutic treatment for hyperthyroidism instead of 400 MBq I-131, the result of an incorrectly calibrated and labelled dose that was meant for another patient. The label and the discrepancy on the requisition form was not checked prior to administration of the radiopharmaceutical. The patient received an estimated effective dose of 5.16 mSv.

Therapy

Correction to a radiation accident reported in the RAC Annual Report 2008–09: A patient undergoing radiation treatment was prescribed three doses of 4, 8 and 4 Gy. The first site was given 8 Gy instead of 4 Gy as prescribed. The patient received an additional radiation dose to the area of approximately 4.34 Gy. The effective dose in the accident reported was in fact 5.34 Gy not 4.34 Gy as indicated in the report.

The Council reviewed the following accidents and the controls that the facilities had instigated to correct deficiencies in their standard operating procedures, and was satisfied with the steps the organisations had taken to prevent the type of incident from recurring.

- A patient was prescribed with 48 Gy in 20 fractions to be delivered via anterior and posterior beams to the left axilla. The first fraction of a treatment plan was delivered to the wrong anatomical site. The absorbed excess dose to the patient was 2.4 Gy. The Council noted that the cause of the accident was due to the patient not being consulted or being asked key questions immediately prior to the treatment, and that that the treatment staff had not properly read all the documentation.
- A patient was prescribed 45 Gy in 25 fractions for a radiation oncology treatment. The patient was administered the first two of five doses at 16.5 Gy instead of the prescribed 10 Gy in these two fractions. The treatment was halted so that the remainder of the prescribed dose was not delivered. The accident occurred due to the LINAC not being set up correctly (manual transcription of incorrect units into the system), lack of subsequent checks, and the differences in models of LINAC used at the facility.
- A patient received a CT scan as part of their preparation for a radiotherapy treatment. The patient received a CT scan to the lumbar spine instead of thoracic spine. The error occurred due to the wrong scan site being written on the planning form and patient consent form. The patient received an estimated total effective dose of 33 mSv. The Council was provided with an overview of the Root Cause Analysis (RCA).
- A patient received a single treatment of radiotherapy in error, being 2 Gy to the bladder by a linear accelerator for bladder cancer. The patient was originally booked in for the treatment however it was later determined that the procedure was no longer necessary.

The error occurred as the patient was not informed of the cancellation of the treatment and presented themself to the oncology department where the treatment was carried out again. The patient received an effective dose of 80 mSv.

The Council suggested that DECCW write to all CEO Area Health Services informing them of the requirements of the *Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation* (2008) and safety guides for radiation protection in diagnostic and interventional radiology; nuclear medicine and radiotherapy drawing particular attention to the requirements of the responsible person.

- A patient received a radiotherapy treatment where the correct single fraction dose of 8 Gy was delivered 2 cm from the intended treatment location. The intended treatment location was thoracic vertebrae T5-6-7 however the actual treatment location included T4-5-6. The error occurred due to the incorrect interpretation of the pre-treatment image of the area to be irradiated. The patient received an unintended effective dose to the T4 vertebrae of 8 Gy.

Radiology

During 2009–10 the Council reviewed the following accidents and the controls that the facilities had instigated to correct deficiencies in their standard operating procedures, and was satisfied with the steps the organisations had taken to prevent the type of incident from recurring.

A patient received an abdominal X-ray instead of a chest X-ray. The accident occurred as a result the exam and the request not being confirmed. The patient received an effective dose of 0.7 mSv.

- A patient received an abdominal X-ray instead of a chest x-ray. The error occurred because the request form was not checked. The patient received an effective dose of 0.1 mSv.
- A patient received a CT examination of the spine instead of plain X-ray of the spine because the request form was not read correctly. The patient received an estimated effective dose of 10 mSv.
- A patient received a CT fluoroscopy guided L4/L5 nerve root block to the right side instead of on the left because the request form was not read correctly. The patient received an estimated effective dose of 6.3 mSv. The Council members were satisfied with the measures taken by the facility to prevent recurrence of this type of incident however suggested that a letter be written to the facility outlining the following two-step approach that should be considered: 1 take the patient into a dedicated interview room and see if the referral is appropriate, and 2. where necessary phone an interpreter.
- The wrong patient was taken from the emergency department and received a CT of the brain. The error occurred due to patient misidentification. The patient had no identifying arm band and no escort to verify their name. The estimated effective dose to the patient was 3.5 mSv.
- A child received two X-rays of the hips instead of an ultrasound of the hips. The error occurred as a result of a booking process error which differed from the request form. The Council noted that it is common for both an ultrasound and X-ray examination to take place for neonates suspected of having hip dysplasia. The patient received an effective dose of 1.53 mSv.
- A patient in the intensive care unit was booked for a CT brain scan. After the scan was performed it was discovered that it was not required. The estimated effective dose to the patient was 3.5 mSv.

- A patient was mistakenly referred to the radiology department for a CT scan of the head due to patient misidentification. The patient received an effective dose of 2 mSv.
- An accident and emergency patient received a number of X-rays in error. The error occurred as the wrong patient was taken from the Accident and Emergency Department. The incorrect patient notes and identification label were used to label the request form. The patient received an effective dose of 1 mSv.
- A patient received a repeat CT angiogram of the brain. The error occurred as the referring doctor was not aware the first examination had been carried out and ordered a second CT cerebral angiogram. The patient received an effective estimated dose of 1.35 mSv.

Follow-up actions from accidents reported in the last period

Therapy

The Council had an outstanding action arising from an accident considered in the period 2007–08 where the Council recommended that the facility provide the Council with the outcomes of the RCA when it became available. The accident involved a patient who was treated with one fraction from a total of 25 prescribed fractions of 18 MV radiation to treat pelvis and para-aortics. The patient received 1.8 Gy to an area 10 cm x 16 cm x 14.5 cm inferior to the treatment field as a result of incorrect settings. Council was advised that the RCA had not been undertaken however that a review of treatment protocols and staff education was undertaken by the facility.

Radiology

In the previous reporting period the Council reviewed an accident whereby an elderly patient incorrectly received 17 fractions (34 Gy) to the right mandible for a retromolar squamous cell carcinoma instead of to the left mandible. The patient was prescribed to receive 60 Gy in 30 fractions for the complete treatment. The initial report indicated that the error occurred due to the CT scan being marked on the wrong side (i.e. right side instead of the left side). The Council recommended that the facility provide the Council with the outcomes of the RCA when it became available.

During the reporting period the Council received and considered the RCA and recommended that due to the severity of the accident that the accident be referred to the HCCC. Subsequently the Council received and considered the HCCC's response to the complaint. The Council having considered the advice provided by the HCCC recommended that DECCW write to the professional body, RANZCR, suggesting that the college may find it beneficial to provide its members through its newsletter with the accident details (removing all personal information) including the HCCC outcomes.

Categories of radiation accidents reported between 2005 and 2010

Table 11 provides a summary of accidents reported to DECCW in specific categories between 2005–06 and 2009–10.

TABLE 11

Categories of accidents reported between 2005 and 2010

Accident category	**2005–06**	**2006–07**	**2007–08**	**2008–09**	**2009–10**
Nuclear medicine	25	9	10	14	9
Therapy	3	7	1	5	5
Radiology	4	12	13	6	10
Other	2	0	1	1	0
Total	**34**	**28**	**25**	**26**	**24**

Appendix 1: Memorandum of Understanding between the EPA and the Radiation Advisory Council

Statement of Common Intent

This Memorandum of Understanding has been agreed between the Environment Protection Authority (EPA) and the Radiation Advisory Council (the Council) to document the practical aspects of the way that each will work with the other to advance radiation safety in New South Wales.

The EPA is part of the Department of Environment, Climate Change and Water (DECCW) and remains a statutory body with specific powers under environment protection legislation. Staff of DECCW exercises regulatory activities for and on behalf of the EPA. Staff of DECCW also provide administrative support to the Radiation Advisory Council on behalf of the EPA.

Both the Council and the EPA are committed to a cooperative and collaborative partnership with the aim of advancing the objectives of the Act. This Memorandum of Understanding shall be reviewed annually and remain in force until such time as both parties agree otherwise.

The roles and responsibilities for each body are set out in the Radiation Control Act 1990 (the Act). Fundamentally, the Council provides expert advice to the EPA and the Minister for Climate Change and the Environment across all radiation safety matters, while the EPA has responsibility for administering the regulatory functions provided by the Act. This Memorandum of Understanding includes an agreement on how advice from the Council will be utilised by the EPA in the details of issuing licences, registrations and accreditations.

The Council also has a key role in helping the EPA develop radiation safety policy for New South Wales. The EPA has responsibility for formally adopting and giving effect to such policies. The EPA must also take into account New South Wales Government policy, any direction from the Minister for Climate Change and the Environment and other advice it receives in developing and implementing policy. In recognition of the Council's special expertise, the EPA will engage openly, early and in detail with the Council in the development of radiation safety policy matters.

Agreed details of how the Council and EPA collaborate

1. Development of Regulatory Guidelines and Policies

The EPA will provide the Council with drafts of any new or amended guidelines, policies or standards that are developed or reviewed by the EPA or other external bodies.

The EPA will seek the formal advice of the Council at each stage in the process of the development of these guidelines, policies and standards. This consultation will include the results of any feedback obtained in community consultation processes. The Council will also be formally asked to consider endorsing the final products of the development of guidelines, policies and standards.

2. Provision of Advice from the Council to the Minister

Section 30 of the Act gives the functions of the Council in relation to provision of advice to the Minister.

1. The Council is to advise the Minister on:

   (a) proposed amendments to this Act and the making, amendment or repeal of regulations under this Act,

   (b) administration of this Act and the regulations,

   (c) measures to prevent or minimise the dangers arising from radiation,

   (d) the granting of exemptions authorised by the regulations for periods exceeding 60 days,

   (e) such other matters relating to radiation safety as the Minister considers appropriate.

2. Any such advice may be given either at the request of the Minister or without any such request.

The Council may also provide advice to the EPA from time to time, as it sees fit and on issues that it considers to be of relevance, at the request of the EPA or of its own accord.

3. Correspondence

When requested by the Council to prepare correspondence on its behalf, the EPA will present a draft of the correspondence for comment. After amendments to the draft have been prepared in light of the comments offered by the Council, the EPA will submit a final version for endorsement prior to signing by the Chair of the EPA Board.

The timeframes for the preparation of drafts and presentation of final versions of correspondence for endorsement by the Council, will be managed by the EPA to accommodate the workload of Hazardous Materials and Radiation Section at the time.

Finalised correspondence which has been mailed out, and correspondence received, will be tabled by the EPA at the next Council meeting subject to the deadlines for submission of business papers for that meeting.

4. Storage of Documents

Records of meetings, including agendas, minutes, and all documents associated with the meetings of the Council are kept by the EPA. These records will, as far as is possible, be kept in electronic format and will be made available to the members of the Council upon request to the EPA, in a timely manner.

5. Provision of Secretariat Support

The EPA will provide secretariat support to the Council and all its committees. This support will include the:

- preparation and distribution to the Council members of the agendas for meetings of the Council and committees
- the taking of minutes and their distribution to members
- the preparation of any correspondence requested by the Council.

6. Development of Procedures

The EPA and the Council will further develop the system of generic advice for applications to the EPA for licences, registrations and accreditations and the EPA will continue to refer applications not covered by the generic advice to the Council. The EPA will also seek the advice of the Council in regard to radiation accidents and incidents and their investigation, and in regard to the assessment of radiation safety courses.

The EPA will seek active input from the Council on strategic and policy matters. These will include substantive input on any review or development of legislation, and emphasis on the development of standards, codes of practice and guidelines. There will be substantial activity during the development of the National Directory for Radiation Protection.

While recognising that the RAC performs an advisory function, and the EPA is the decision maker, the parties agree to work through disagreement as follows:

- That there will be an opportunity for discussion, including consideration of the decision-making process of both the RAC and the EPA.
- The EPA will advise the Council if it has formed a view that it intends to make a decision which is inconsistent with RAC advice, and will provide an opportunity for discussion about the differences.
- The Council may request the EPA to provide an independent facilitator, and the EPA agrees to consider each such request in good faith.
- If the EPA decides to proceed in a manner inconsistent with RAC advice, it will provide the RAC with a written explanation of why it has decided to do so.

7. Determinations for Licensing, Registration and Accreditation

The EPA is the determining authority for applications for licences, registrations, accreditations and variations to licences and accreditations, made under Part 2 of the Radiation Control Act 1990. The EPA is empowered by section 9A of the Act to seek and take into consideration the advice of the Council on such matters.

Section 30 (2A and 2B) of the Act empowers the Council to provide advice to the EPA on Part 2 applications at any time and requires the Council to do so when so requested by the EPA. The advice provided by the Council may be generic or specific, as the circumstances require.

The Council has provided the EPA with generic advice on Part 2 applications and this advice, known as ‘standing advice’ is recorded at Schedule 2 of the Council’s Corporate Governance and Operating Procedures manual. It is the duty of the EPA to maintain the standing advice in

Schedule 2. Part 2 applications that are fully covered by the standing advice at Schedule 2 are known as ‘routine applications’. Part 2 applications that are not covered, or are only partly covered, by the standing advice are known as ‘non-routine applications’.

Before an officer with the delegated authority to do so determines a Part 2 application, s/he must have regard to relevant requirements of Part 2 of the Act, the Radiation Control Regulation 2003, and the standing advice of the Council.

Unless the Director General has agreed in writing to the following procedure being varied, the officer:

- may approve any routine application without first seeking the specific advice of the Council on the application, but
- before approving any non-routine application must seek and take into consideration the advice of the Council on the application, and
- before refusing any application must seek and take into consideration the advice of the Council on the application.

Normally the Director-General will only approve a variation in this procedure in an emergency, in which case the concurrence of the Council to the determination is to be sought retrospectively as soon as practicable.

LISA CORBYN
Director General
Department of Environment, Climate Change and Water

CRAIG LAMBERTON
Chairperson
Radiation Advisory Council

Appendix 2: Membership of committees of the Council during 2009–10

Regulatory Review and Reform Committee	
Member	**Membership category**
Dr Ludmilla Robinson	Legal practitioner (Chairperson)
Mr John Robinson	Diagnostic radiographer
Dr Cameron Hazlehurst	Community representative
Mr Mark Moskvitch	An officer of WorkCover Authority NSW
Ms Margaret Conley	Minister's nominee
Dr Henry Forester	DECCW (Hazardous Materials & Radiation Section)

National Directory Committee	
Member	**Membership category**
Dr Cameron Hazlehurst	Community representative (Chairperson)
Dr Ludmilla Robinson	Legal practitioner
Mr John Robinson	Diagnostic radiographer
Dr Richard Smart	Medical physicist
Ms Kathy Meleady	An officer of the Department of Health
Mr Jon D'Astoli	Occupational health and safety
Dr Philip Pasfield	Radiologist
Dr Eva Wegner	Physician in nuclear medicine
Dr Mary Dwyer	Radiation oncologist
Mr Lee Collins	Expert in non-ionising radiation
Mr Frank Galea	Expert in industrial uses of radiation
Mr Mike Carter	Deputy expert in NORM
Ms Sue Macalpine	DECCW (Hazardous Materials & Radiation Section)

The Shielding Assessment and Verification Committee	
Member	**Membership category**
Dr Richard Smart	Medical physicist (Chairperson)
Mr Jeremy Pigott	Health physicist
Mr Paul Cardew	Deputy medical physicist
Mr Lee Collins	Expert in non-ionising radiation
Mr Howard Ackland	Deputy expert in non-ionising radiation
Mr Kevin Fitzsimmons	Industry representative (Radiation Services Australia)
Mr Frank Galea	Expert in industrial uses of radiation
Ms Daniela Freschi	DECCW (Hazardous Materials & Radiation Section)

NORM Committee	
Member	**Membership category**
Dr Brad Cassels	Expert in NORM (Chairperson)
Mr Mike Carter	Deputy expert in NORM
Dr Cameron Hazlehurst	Community representative
Mr Mark Moskvitch	An officer of WorkCover Authority of NSW
Ms Margaret Conley	Minister’s representative
Mr Roger Alsop	Health physicist
Ms Sue Macalpine	DECCW (Hazardous Materials & Radiation Section)
Dr Tony Hodgson	DECCW (Hazardous Materials & Radiation Section)
Mr Rob McLaughlin	Department of Industry and Investment NSW

Abbreviations

ACPSEM	Australasian College of Physical Scientists and Engineers in Medicine
AHMAC	The Australian Health Ministers'
AHPRA	Australian Health Practitioner Regulation Agency
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CCL	Cardiac catheter laboratory
COAG	Council of Australian Governments
CRE	Consulting radiation expert
CT	Computed tomography
CTCA	Computed tomography for coronary angiography
DECCW	Department of Environment, Climate Change and Water NSW
DIA	Diagnostic imaging apparatus
EPA	Environment Protection Authority
GBq	Gigabecquerel
Gy	Gray
HCCC	Health Care Complaints Commission
ICRP	The International Commission on Radiological Protection
MBq	Megabecquerel
MoU	Memorandum of Understanding
mSv	milliSievert
NCP	National Competition Policy
NDRP	National Directory for Radiation Protection
NMTs	Nuclear medicine technologists
NORM	Naturally Occurring Radioactivity
OH&S	Occupational health and safety
RAC	Radiation Advisory Council
RANZCR	The Royal Australian and New Zealand College of Radiologists
RCA	Root Cause Analysis
RHC	Radiation Health Committee (National)
SSD	Sealed source device