

GLOSSARY

Words in italics are also listed in the glossary.

accelerator: device that accelerates charged atomic particles to very high speeds.

accident: any unintended event, including operator errors, equipment failures or other mishaps, the consequences or potential consequences of which are not negligible from the point of view of protection of safety.

activity: number of nuclear disintegrations per unit time in a *radioactive* material. The standard international unit of activity is the *becquerel* (Bq) which is one disintegration per second. A historic unit of activity is the *curie*, which is 3.7×10^{10} becquerels.

ALARA: as low as reasonably achievable, economic and social factors being taken into account.

ALARP: as low as reasonably practicable.

alpha emitter: a *radioactive* material that emits *alpha particles*.

alpha particle: a positively charged particle emitted from the *nucleus* of an *atom* during *radioactive decay*. It contains two *protons* and two *neutrons*. Alpha particles are normally highly energetic but travel only a few centimetres in air and are stopped by a sheet of paper or the outer layer of dead skin.

annual limit on intake by ingestion: that quantity of a radioactive material which, taken into the body during one year, would to a committed effective dose equal to the occupational annual limit on effective dose.

atom: the smallest piece of matter that cannot be broken up by chemical reactions. Atoms have a *nucleus* consisting of positively charged *protons* and uncharged *neutrons*, and a number of negatively charged *electrons* in orbit around the nucleus.

background radiation: *ionising radiation* in the environment to which every person is exposed. It comes from many sources such as outer space, the sun, rocks and soil, buildings, air, food and radioactive materials within our bodies. In Australia the average radiation *dose* from background radiation is about 1-2 *millisieverts* per year.

becquerel: unit of measurement of *radioactivity*: one nuclear disintegration per second.

beta emitter: a *radioactive* material which emits *beta particles*.

beta particle particles emitted from a *nucleus* during radioactive *decay*, which may be either negatively charged *electrons* or positively charged *positrons*. High energy beta particles can travel metres in air and several millimetres into the human body; low energy beta particles are unable to penetrate the skin. Most beta particles can be stopped by a small thickness of light material, such as aluminium or plastic sheeting. Beta particles have more penetrating power but are less damaging to tissues than *alpha particles*.

cation: negatively charged *ion*.

cell: the simplest unit of living things and the site of the chemical processes associated with life.

concentration: concentration of a radioactive substance in a material expressed in terms of the *activity* in becquerels (Bq) per kilogram of the material.

conditioning: treatments which convert radioactive *waste* into an acceptable condition for packaging, transport, storage and disposal. May involve solidification of the waste, enclosure of the waste in containers and/or encapsulation in a stable matrix such as concrete.

criticality: a *nuclear reactor* has reached criticality when the rate of *neutrons* produced is equal to the rate of neutron loss and a self-sustaining chain reaction can occur.

curie: a historic unit of *radioactivity*: 3.7×10^9 nuclear disintegrations per second. Also, an amount of *radioactive* material which has one curie of radioactivity.

cyclotron: machine which *accelerates* charged atomic particles to high energies using electromagnetic forces. These particles can be used to produce *radioisotopes*.

decay, radioactive: disintegration of an *atom's nucleus* resulting in the release of *alpha* or *beta* particles or *gamma* radiation.

dispersal: the effect of processes such as transport, diffusion and mixing of wastes or effluents in water or air, ultimately leading to dilution.

disposal: disposal of radioactive *waste* without the possibility or intention of ever retrieving it, either by *dispersing* it into the environment or by permanently isolating it from the environment.

dose: an amount of radiation energy received by an object such as the human body. Often used to mean *dose equivalent*.

dose equivalent: *dose*, weighted to take account of the different biological effects of the different types of radiation on different tissues; a measure the impact of a radiation dose on living tissue. The unit of dose equivalent is the *sievert* (1 joule per kilo), usually expressed as the *millisievert* (one thousandth of a sievert).

dose limit: in radiation protection standards, the maximum *dose* of radiation that a person is allowed to receive over a stated period of time.

electron: a negatively charged subatomic particle.

element: substance that cannot be divided into simpler substances by chemical reactions.

equivalent dose: *dose equivalent*.

exempt waste: *waste* that is released from regulatory control in accordance with clearance levels, because the associated radiological hazards are considered negligible.

fission: splitting of a heavy *nucleus* into two smaller parts. It is accompanied by release of energy and usually two or three *neutrons*.

fuel rods: rods of fissionable material, which are the fuel of a *nuclear reactor*.

gamma radiation: high energy electromagnetic radiation emitted after nuclear *fission* or by *radioactive* materials. *Gamma* rays are highly penetrating (more so than X-rays) and, depending on their energy, can require a considerable thickness of lead or concrete to absorb them. Because gamma radiation causes ionisation, it constitutes a biological hazard.

gangue: part of the ore that is not the objective in working the ore deposit.

geological disposal: isolation of radioactive *waste* using a system of engineered and natural barriers at depths up to several hundred metres in a geologically stable formation. Typical plans call for disposal of *long lived* and *high level* wastes in geological formations.

half life: the time required for the activity of a *radioactive* material to decrease by half. Half-lives of different radioactive materials vary from less than a millionth of a second to more than one billion years.

high level waste: radioactive *waste* that emits sufficiently large and penetrating amounts of *ionising radiation* to require the maximum standards of radiation protection when it is handled, transported or stored. It requires substantial shielding and cooling.

incident: a technical event or anomaly which, although not directly or immediately affecting safety, is liable to lead to subsequent re-evaluation of safety provisions.

intermediate level waste: waste of a lower activity and heat output than *high level waste*, but which still requires shielding during handling and transport. Includes materials such as spent radiotherapy sources, level and moisture gauges, smoke detectors, liquids from *radiopharmaceutical* production and spent ion exchange resins from ANSTO or an unusually large proportion of radium²²⁶ which has a half life of 1600 years. Radium is present in older luminous paint and watches, contaminated articles etc.

ion: an atom that has gained or lost one or more *electrons*, thus becoming electrically charged.

ionising radiation: *radiation* which removes *electrons* from *atoms* that it encounters, creating electrically charged variants called *ions*.

irradiation: exposure to *neutrons*, charged particles or *ionising radiation*.

isotopes: variants of an *element* which have the same number of *protons* but a different number of *neutrons*. Different isotopes of an element have the same chemical properties, but somewhat different physical properties.

kilobecquerel: 1,000 *becquerels*.

long lived waste: radioactive waste containing long lived materials having sufficient radiotoxicity in quantities and/or *concentrations* requiring long term isolation from the biosphere. 'Long lived' refers to *half-lives* usually over 30 years.

long term: in relation to *disposal* of radioactive *waste*, refers to periods of time which exceed the time during which active institutional control can be expected to last.

low level waste: radioactive *waste* requiring minimum standards of protection for personnel when it is handled, transported or stored. It mainly consists of material of low *activity* and short *half life* (up to 30 years) which does not have to be specially shielded and which contains little or no long lived *alpha emitters*. These wastes can consist of contaminated clothing, packaging, equipment, soil, some mining wastes etc. Very low level waste has such low activity and short half life that disposal by controlled release into the environment is permissible.

microcurie: a millionth of a *curie*.

microsievert: a millionth of a *sievert*.

millisievert: a thousandth of a *sievert*.

monazite: mineral containing phosphate of rare earth metals.

near surface disposal: disposal of radioactive *waste*, with or without engineered barriers, on or below the ground surface where the final protective covering is of the order of a few metres thick, or in caverns a few tens of metres below the earth's surface. Typically *short lived low level* and *intermediate level wastes* are disposed of in this manner.

neutron: uncharged particle found in the *nucleus* of *atoms*.

noble gases: a group of gases which do not react chemically with other elements. They include *radon*, and some have *radioactive isotopes*. Also known as inert gases.

nuclear energy: energy released by atomic *fission* or fusion or by radioactive *decay*.

nuclear fuel cycle: all operations associated with production of *nuclear energy*, including mining, refining and enriching uranium; fabrication of fuel elements and their use in a *nuclear reactor*; reprocessing spent fuel; re-enrichment of the fuel material and its refabrication into more fuel elements; and waste management, including *spent fuel* disposal.

nuclear medicine: medical speciality that uses radioactive materials.

nuclear reactor: a structure in which *fission* reactions release controlled energy.

nucleus: the core of an *atom*; consists of positively charged *protons* and uncharged *neutrons*.

nuclide: *isotope*.

positron: a positively charged subatomic particle.

proton: a positively charged subatomic particle located in the *nucleus* of an *atom*.

radiation: term that embraces all the ways in which energy may be given off by an *atom*: electromagnetic waves (including x-rays and *gamma rays*) as well as streams of fast-moving charged particles (*electrons*, *protons*, etc.) and *neutrons*.

radioactive, radioactivity: property of certain materials of spontaneously emitting subatomic particles or *radiation*, or of emitting radiation following orbital electron capture, or of undergoing spontaneous fission.

radioisotope: an *isotope* that is *radioactive*.

radionuclide: *radioisotope*.

radiopharmaceuticals: pharmaceuticals containing a radioactive materials.

radon: a *radioactive element*, the heaviest of the *noble gases*, which gives rise to the major part of the radiation *dose* from natural *background radiation*.

repository: facility where radioactive *waste* is emplaced where future retrieval is not intended.

reprocessing: treatment of spent nuclear fuel to separate unused uranium and plutonium from fission products and other transuranic elements. The recovered uranium and plutonium can then be recycled into new fuel elements.

short-lived waste: regarded as that with a *half life* of up to 30 years.

sievert: unit of *dose equivalent*: one joule per kilogram.

spallation: nuclear reaction in which bombardment by high energy particles produces a large number of disintegration products.

specific activity: the *activity* of a radioactive material per unit mass. Expressed as becquerels per gram.

spent fuel: nuclear fuel elements in which *fission* products have built up and the fissile material depleted to a level where a chain reaction does not operate efficiently. Also referred to as irradiated fuel.

storage: placing radioactive *waste* in a facility designed so that the waste may be retrieved later.

Synroc: synthetic rock based on titanate minerals that can immobilise the elements in high level wastes within its crystal structures. This is a synthetic mineral produced through chemical bonding of waste *radioactive atoms* to stable material.

tailings: Material left over after minining and milling of ores. Tailings from milling uranium ore contain *radioactive* radium and thorium and will remain radioactive for hundreds of thousands of years.

tritium: a *radioactive isotope* of hydrogen, with a half life of 12.5 years.

uranium: *radioactive* element with two fissile *isotopes* (uranium²³⁵ and uranium²³³) and two that are fertile (uranium²³⁸ and uranium²³⁴). Uranium is the basic raw material of nuclear power generation.

vitrification: formation of a glassy solid containing radioactive *waste* products.

waste: material for which no further use is foreseen.

yellowcake: mixture of uranium oxides produced from uranium ore. Uranium is exported from Australia in this form.

APPENDIX 1

LIST OF SUBMISSIONS

1	Sir Ben Dickinson, SA
2	Dr Kristin Shrader-Frechette, USA
3	Mr F Schroeder, NSW
4	City of Port Augusta, SA
5	Mr M Hanlon, NSW
6	District Council of Paringa, SA
7	Sutherland Shire Environment Centre, NSW
8	Mr P Jones, TAS
9	Mr A W Fleischmann, NSW
10	Mr B Pitt, SA
11	Messrs A, R & M Starkey & R Thomas, NT
12	The Country Women's Association of WA (Inc), WA
13	Professor A Samarin, NSW
13a	Professor A Samarin, NSW
14	Northern Territory Government, NT
15	The Queensland Greens, QLD
16	Australian Nuclear Association Inc, NSW
16a	Australian Nuclear Association, Inc, NSW
17	Co-Tech Management Pty Ltd, NSW
18	Dr K B Fenton, TAS
18a	Dr K B Fenton, TAS
19	ACT Government, ACT
20	Sutherland Shire Council, NSW
21	Australian Radiation Laboratory, VIC
21a	Australian Radiation Laboratory, VIC
21b	Australian Radiation Laboratory, VIC
22	Radiation Safety Committee, University of Western Australia, WA
23	South Australian Government, SA
23a	South Australian Government, SA
24	Dr B M Hartley, WA
25	Commonwealth Scientific and Industrial Research Organisation, ACT
26	Department of Foreign Affairs & Trade, ACT
27	University of South Australia, SA
28	Department of Primary Industries and Energy, ACT
29	Ms K J Lannstrom, SA

- 30 Government of Queensland, QLD
- 31 Nuclear Safety Bureau, NSW
- 32 Australian Nuclear Science and Technology Organisation, NSW
- 32a Australian Nuclear Science and Technology Organisation, NSW
- 32b Australian Nuclear Science and Technology Organisation, NSW
- 32c Australian Nuclear Science and Technology Organisation, NSW
- 33 Department of Defence, ACT
- 33a Department of Defence, ACT
- 34 The Chamber of Mines and Energy, WA
- 34a The Chamber of Mines and Energy, WA
- 34b The Chamber of Mines and Energy, WA
- 35 The Environment Centre NT Inc, NT
- 36 Department of Minerals and Energy, WA
- 36a Department of Minerals and Energy, WA
- 37 Government of Victoria, VIC
- 38 Confidential submission
- 39 Women Opposing Uranium Mining, VIC
- 40 Department of Transport, ACT
- 41 Government of Tasmania, TAS
- 42 Conservation Council of Australia and Friends of the Earth, SA
- 43 Ms S Peebles, WA
- 44 Conservation Council of Western Australia Inc, WA
- 45 New South Wales Environment Protection Authority, NSW
- 45a New South Wales Environment Protection Authority, NSW
- 46 Environment Protection Authority, ACT
- 46a Environment Protection Authority, ACT
- 47 Friends of the Earth, NSW
- 48 Greenpeace, NSW
- 49 Government of Western Australia, WA
- 49a Government of Western Australia, WA
- 50 Statewide Network of Action Groups, WA
- 51 Medical Association for Prevention of War, WA
- 52 Dr A Bhattacharrya, NSW
- 53 Mr J Elbourne, NSW

54	Dr N D M Harvey, SA
55	Penrice Soda Products Pty Ltd, SA
56	Coca-Cola Amatil (SA) Ltd, SA
57	Goldfields Against Serious Pollution, WA
58	Long Products Division, BHP Steel, SA
59	St Vincents Hospital, NSW
60	Adelaide Brighton Cement Ltd, SA
61	North West Institute of TAFE, TAS
62	Townsville General Hospital, QLD
63	Women's and Children's Hospital, SA
64	Royal Brisbane Hospital, QLD
65	Mr L Collins, NSW
66	St George Hospital, NSW
67	The Alfred Healthcare Group, VIC
68	Australian & New Zealand Society of Nuclear Medicine, NSW branch, NSW
69	Royal Perth Hospital, WA
70	Confidential submission
71	Rhone-Poulenc Chimie (Aust) Pty Ltd, VIC
72	Edith Cowan University, WA
73	Mater Misericordiae Public Hospitals, QLD
74	Department of Industry, Science and Technology, ACT
75	The University of New South Wales, NSW
76	Fire Protection Industry Association of Australia, VIC
77	Dr G F Egan, VIC
78	Mr P Wong, NSW

APPENDIX 2

INDIVIDUALS WHO APPEARED BEFORE THE COMMITTEE AT PUBLIC HEARINGS

Friday, 23 June 1995, Canberra

Department of Primary Industries and Energy -

Mr P J Davoren, Manager, Rehabilitation and Radioactive Waste Policy

Mr M N Rawson, Assistant Secretary, Uranium and Nuclear Policy
Branch

Mr S M Veitch, Manager, National Datasets, National Resource
Information Centre

Australian Nuclear Science and Technology Organisation -

Mr P S Bull, Head, Nuclear Services

Dr G Durance, Principal Research Scientist

Dr A Jostons, Director, Advanced Materials Program

Mr J M Rolland, Director, Information Services

Department of Industry Science and Technology

Mr D Dewar, Assistant Director, Science and Technology Policy
Coordination

Mr S Hollway, Secretary

Commonwealth Scientific and Industrial Research Organisation

Mr A W Blewitt, Director, Corporate Services

Mr G Harley, General Manager, Corporate Property Branch, Corporate
Services

Dr D E Smiles, Chief Research Scientist

Nuclear Safety Bureau

Mr M R Allen, Director

Mr D I MacNab, Leader, Technical Assessment

Australian Radiation Laboratory

Mr P A Burns, Acting Section Head, Radiation Health Section

Dr K H Lokan, Director

Department of Defence

Mr M J Curtis, Business Enterprises Munitions and Aerospace, Industry Programs and Operations Branch

Commodore (RAN) M H Dowsett, Director-General, Corporate Health Services and Programs

Mr A Mamalis, Director, Environment and Heritage, Facilities and Property Division

Mr E J B O'Dovovan, Senior Professional Officer, Defence Science and Technology Organisation

Mr J R Popham, Acting Assistant Secretary, Industry Programs and Operations Branch, Industry Involvement and Contracting Division

Squadron Leader B Wood, Staff Officer, Environmental Health, Office of the Surgeon-General

Wednesday, 5 July 1995, Adelaide

University of South Australia

Dr M B M Hochman, Manager, Research Office

Mr D Paix, Radiation Safety Officer and Senior Lecturer in Applied Physics

Mr S Baker, National Spokesperson for FOE Australia on Nuclear Issues, Nuclear Issues Action Group, Conservation Council of South Australia and Friends of the Earth Australia

Mr G E F Botten, Acting City Manager, Corporation of the City of Port Augusta

Sir Ben Dickinson

Miss M Hine, Volunteer Member, Nuclear Issues Action Group, Conservation Council of South Australia

Ms K J Lannstrom

Mr B Pitt

Thursday, 27 July 1995, Perth

Chamber of Mines and Energy

Mr P H Dench, Titanium Minerals

Mr J Nayton, Consultant (Public Affairs)

Mr P T O'Shaughnessy, Titanium Minerals Committee Member

Mr A E Petersen, Member, Occupational Health and Safety Committee
and Conservation Environment and Land Management Committee

Mr I S Schache, Chairman, Titanium Minerals Committee

Department of Environmental Protection

Mr N J Davies, Assistant Director, Waste Disposal

Mr C J Schuster, Acting Director, Waste Management Division

Country Women's Association of Western Australia

Mrs M T Gosling, Member of Social Issues Fact Finding Team and
Member of Metropolitan Branch

Mrs M R Nilsson, Vice-President, Eastern Division, International Officer,
Southern Cross Branch

University of Western Australia

Mr L Munslow-Davies, Senior Physicist, Radiation Protection Office

Mr M Rafferty, Radiation Safety, Radiation Protection Office

Dr H Cohen, President, Conservation Council of WA and National President,
Medical Association for the Prevention of War

Mr G D Fee, Environmental Superintendent, Cable Sands (WA) Pty Ltd

Dr B M Hartley

Mr G S Hewson, Acting Assistant Director, Research and Technical Services,
Mining Operations Division, Department of Minerals and Energy

Mr D E Hutchinson, Secretary, Radiological Council of WA

Ms J Lowe, Western Australian Coordinator, Medical Association for
Prevention of War

Ms R M Siewert, Coordinator, Conservation Council of Western Australia

Mr L F Toussaint, Physicist, Radiological Council of Western Australia

Wednesday, 2 August 1995, Sydney

NSW Environment Protection Authority

Mr P J Colgan, Manager, Radiation Control Section

Mr E Samuel, Director, Hazardous Substances

Greenpeace Australia Limited

Mr S A Moreland, Assistant Nuclear Campaigner

Mr B Pearson, Nuclear Campaigner

Dr W M Burch

Mr A W Fleischmann

Mr J R Hallam, Nuclear Campaigner, Friends of the Earth

Mr M G Hanlon, Radiation Safety Officer, Royal Alexandra Hospital for Children

Professor A Samarin, Member, Sustainable Development Committee,
Australian Academy of Technological Sciences and Engineering

Mrs J E Towson, Radiation Safety Officer, Royal Prince Alfred Hospital

Thursday, 3 August 1995, Sutherland

Sutherland Shire Council

Councillor G Rankin, Mayor

Councillor D R Carter, Member

Councillor D Emerson, Member

Mr T F Robertson, Legal Counsel

Dr G J Smith, Principal Environmental Scientist

Australian Nuclear Association

Dr P L Airey, President

Dr C J Hardy, Secretary

Dr D J Higson, Committee Member

Sutherland Shire Environment Centre

Mr M G Priceman, Convenor, Nuclear Issues Committee

Mr R D Walshe, Chairman

Mrs L Ward, Secretary and Education Officer

Friday, 4 August 1995, Brisbane

Queensland Greens Inc

Mr M Lewis, Media Coordinator and Party Agent

Ms D S Mahoney, State Spokesperson

Monday, 16 October 1995, Canberra

Department of Foreign Affairs and Trade

Ms C M Adams, Executive Officer, Legal Office

Mrs M Grant-Thomson, Legal Officer, Environmental Law Unit

Mr L R Luck, Assistant Secretary, Nuclear Policy Branch, International Security Division

Mr A J McCarthy, Acting Unit Leader, Defence, Outer Space and Nuclear Law Unit

Mr P G Scott, Defence, Outer Space and Nuclear Law Unit

Mr R R Smith, Acting Director, Nuclear Affairs Section, Nuclear Policy Branch

Department of Transport

Ms J A Scott, Senior Officer, Airport Regulation Branch, Aviation Operations Division

Mr P Anyon, Director, Regulation Policy and Projects, Federal Office of Road Safety

Ms D A Campbell, Director, International Relations Section, Maritime Policy Division

Mr P M Makeham, First Assistant Secretary, Federal Office of Road Safety

Mr D A Zaal, Senior Officer, Regulation Policy and Projects Section, Federal Office of Road Safety

Qantas Airways Limited

Mr M P Montuori, Training Manager, Freight Division

Mr M Quinn, Manager, Air Safety Investigation

Mr P A Burns, Head, Scientific Services Section, Australian Radiation Laboratory

Mr J A Carlson, Director of Safeguards, Australian Safeguards Office

Mr E L Clements, Principal Marine Surveyor, Ship and Personnel Safety Services, Australian Maritime Safety Authority

Mr A D Johnston, Environment Radiation Officer, Office of the Supervising Scientist, Commonwealth Environment Protection Agency

Mr C Roberts, Superintendent, Rescue and Fire Fighting Service, Airservices Australia

Mr P Steele, Dangerous Goods Coordinator, South East Region, Civil Aviation Safety Authority

Monday, 23 October 1995, Canberra

Rhone-Poulenc Chimie (Australia) Pty Ltd

Dr B M Hartley, Consultant

Mr D H Newton, Chief Executive

Department of Health, Queensland

Mr R I Kleinschmidt, Senior Physicist, Radiation Health Unit

Mr J D Wallace, Principal Physicist, Radiation Health Unit

Dr K B Fenton

Monday, 13 November 1995, Canberra

Mr P D Wong, Managing Director, Contaminated Waste Disposal Service Pty Ltd

Monday, 11 December 1995, Sydney

Mr L T Collins, Chair, Division of Allied Health, Principal Physicist, Radiation Safety Officer, Westmead Hospital

Mr R A Balsillie, Executive Director, Australian Fire Protection Association

Dr A K Bhattacharyya, Visiting Fellow, Department of Mining Engineering,
University of New South Wales

Mr M W Carter, Principal Consultant, Radiation Safety Consultants

Mrs C M Coate, National Executive Director, Fire Protection Industry
Association of Australia

Dr G F Egan, Principal Scientist, Centre for Positron Emission Tomography,
North Eastern Healthcare Network

Mr J Elbourne

Mr F Fairclough

Mr M R Griffiths, Scientific Officer, Department of Nuclear Medicine, Acting
Radiation Safety Officer, St Vincent's Hospital

Mr M G Hanlon, Radiation Safety Officer, Senior Hospital Scientist,
Immunology, Royal Alexandra Hospital for Children

Mr C C Orr, National Councillor, Fire Protection Industry Association of
Australia

Dr R Rosen, Chairman, University Radiation Safety Committee, Senior
Lecturer, Department of Safety Science, University of New South Wales

Dr R C Smart, Radiation Safety Officer, Principal Medical Physicist, St George
Hospital

Mrs J E Towson, Radiation Safety Officer, Royal Prince Alfred Hospital

Wednesday, 13 December 1995, Kalgoorlie

Goldfields Against Serious Pollution

Mrs D Botica, Secretary

Mrs L Powlesland, Member

Mrs S H Peebles

Mr I F Taylor, MLA

Mr L B Wright

Mr R S Yuryevich, Mayor, City of Kalgoorlie-Boulder

APPENDIX 3

COMMONWEALTH DEPARTMENTS AND AUTHORITIES INVOLVED IN RADIATION POLICY AND MANAGING RADIOACTIVE WASTE

This list follows the administrative arrangements gazetted in the Commonwealth Gazette, 11 March 1996. Submissions to the Inquiry were made under former names.

Department of Primary Industries and Energy

The Department has overall responsibility for Commonwealth policy on radioactive waste. It has a Uranium and Nuclear Policy Section within the Coal and Minerals Division. The Minister administers the *Atomic Energy Act 1953*, which deals mainly with the Ranger uranium mine, Northern Territory.

Department of Industry, Science and Tourism

The Department oversees the Australian Nuclear Science and Technology Organisation, the Safety Review Committee, CSIRO and the Australian Customs Service. The Minister administers the *Australian Nuclear Science and Technology Act 1987* except the parts of it that relate to the Nuclear Safety Bureau, which are administered by the Minister for Health and Family Services.

Australian Nuclear Science and Technology Organisation (ANSTO)

ANSTO is a statutory authority with activities including operating a nuclear reactor, scientific research, producing radioactive materials and other irradiation services for medical use on a commercial basis, providing advice to Government, and assisting industry develop new or improved products and processes. ANSTO supplies about 85 per cent of the demand for radioisotopes and radiopharmaceuticals in Australia.

Safety Review Committee

The *Australian Nuclear Science and Technology Act 1987* (section 26) establishes a Safety Review Committee to oversee the safety of ANSTO's activities. The Safety Review Committee may advise the Minister or ANSTO, but has no powers of enforcement.

Commonwealth Scientific & Industrial Research Organisation (CSIRO)

CSIRO is a statutory authority which holds and produces a variety of radioactive wastes. CSIRO's Fishermens Bend radioactive soil, now in store at Rangehead, Woomera, represents about 60 per cent of Australia's Commonwealth/State owned radioactive waste by volume.

Australian Customs Service

The *Customs Act 1901* prohibits the import of radioactive substances without a permit.¹ The Australian Radiation Laboratory advises Customs on applications for permits, after consulting State authorities.

Department of Health and Family Services

The Department oversees the National Health and Medical Research Council, the Nuclear Safety Bureau, the Australian Radiation Laboratory and the Australian Ionising Radiation Advisory Committee. The Minister administers the *Environment Protection (Nuclear Codes) Act 1978*, and the parts of the *Australian Nuclear Science and Technology Act 1987* which relate to the Nuclear Safety Bureau.

National Health and Medical Research Council

This is a statutory authority which, among other things, recommended standards on all aspects of handling ionising radiation, through its Radiation Health Standing Committee. This Committee is now renamed the Radiation Health Committee and its secretariat is located in the Australian Radiation Laboratory.

Nuclear Safety Bureau

The *Australian Nuclear Science and Technology Act 1987* (section 37) establishes the Nuclear Safety Bureau to monitor the safety of ANSTO's nuclear reactor. The Bureau has power to impose conditions on the operation of the reactor and provides technical advice to the Commonwealth on other nuclear matters.

¹

Customs (Prohibited Import) Regulations (Amendment) (Statutory Rules 1989 No 60).

Australian Radiation Laboratory

The Australian Radiation Laboratory is part of the Department.² Its functions are to provide research, advice and national standards on the health effects of radiation. It participates in international collaboration on radiation health and (by delegation under regulations of the *Customs Act 1901*) decides applications to import radioactive materials.

Australian Ionising Radiation Advisory Council

The Council is a non-statutory body established to advise the Commonwealth Government on radiation matters. It has fallen into disuse and it is proposed to abolish it and absorb its functions within the proposed Australian Institute of Radiation Protection.

Department of Industrial Relations

The Department oversees the National Occupational Health and Safety Commission (which has collaborated with the National Health and Medical Research Council in producing new standards for occupational exposure to radiation³) and Comcare, which is responsible for the occupational health and safety of Commonwealth-employed radiation workers.

Department of Environment, Sport and Territories

The Department oversees the operation of the *Environment Protection (Impact of Proposals) Act 1974*, which is generally relevant to control of the Commonwealth's environmentally significant actions. The Minister also administers the *Environment Protection (Alligator Rivers Region) Act 1978*, the main purpose of which is to protect the Alligator Rivers region (Kakadu National Park, Northern Territory) from the effects of uranium mining.

Department of Transport and Regional Development

The Department controls transport of radioactive material by air (regulations under the *Civil Aviation Act 1988*, administered by the Civil Aviation Safety

² The Australian Radiation Laboratory is established by Order in Council; *Commonwealth Gazette*, 7 October 1987, p. 1360

³ *Recommendations for limiting exposure to ionising radiation and National standard for limiting occupational exposure to ionising radiation* (1995).

Authority) and by sea (regulations under the *Navigation Act 1901*, administered by the Australian Maritime Safety Authority).

Department of Defence

The Department regulates and monitors visits by nuclear warships. It produces small amounts of radioactive waste, and has some waste in store, most of which dates from the 1950s and 60s.

Department of Foreign Affairs and Trade

The Department co-ordinates Australia's position on international treaties to do with radioactivity and (through the Australian Safeguards Office) oversees Australia's adherence to the international Nuclear Safeguards Agreement. The Minister administers the *Nuclear Non-Proliferation (Safeguards) Act 1987*.

APPENDIX 4

RADIATION PUBLICATIONS BY THE NATIONAL HEALTH AND MEDICAL RESEARCH COMMITTEE'S RADIATION HEALTH STANDING COMMITTEE

Radiation publications are available from State and Territory health authorities, not direct from the NHMRC.

In 1994 the Radiation Health Standing Committee was renamed the Radiation Health Committee, and its secretariat was transferred to the Australian Radiation Laboratory, a branch of the Department of Health and Family Services.

Notes on Medical Procedure for Radiation Accidents and Radioactive Contamination (1960)

Code of Practice for the Safe Use of Radioactive Luminous Compounds (1971)

Recommendations for Exemptions from Licensing of Gaseous Tritium Light Devices (1975)

RADIATION HEALTH SERIES

- RH 1** Recommended Radiation Protection Standards for Individuals Exposed to Ionising Radiation (1980) **Superseded by RH39**
- RH 2** Code of Practice for the Design of Laboratories Using Radioactive Substances for Medical Purposes (1980)
- RH 3** Code of Practice for the Safe Use of Ionizing Radiation in Veterinary Radiology: Part 1 and 2 (1982)
- RH 4** Code of Practice for the Safe Use of Radiation Gauges (1982)
- RH 5** Recommendations Relating to the Discharge of Patients Undergoing Treatment with Radioactive Substances (1983)
- RH 6** Code of Practice for the Safe Use of Lasers in Secondary Schools (1983) **Superseded by RH36**
- RH 7** Guidelines for the Safe Use of Lasers in the Entertainment Industry (1983) **Superseded by RN37**
- RH 8** Code of Nursing Practice for Staff Exposed to Ionizing Radiation (1984)

- RH 9** Code of Practice for Protection Against Ionizing Radiation Emitted from X-Ray Analysis Equipment (1984)
- RH10** Code of Practice for the Safe Use of Ionizing Radiation in Veterinary Radiology: Part 3 - Radiotherapy (1984)
- RH11** Code of Practice for the Safe Use of Soil Density and Moisture Gauges Containing Radioactive Sources (1984)
- RH12** Administration of Ionizing Radiation to Human Subjects in Medical Research (1984)
- RH13** Code of Practice for the Disposal of Radioactive Wastes by the User (1985)
- RH14** Recommendations for Minimizing Radiological Hazards to Patients (1985)
- RH15** Code of Practice for the Safe Use of Microwave Diathermy Units (1985)
- RH 16** Code of Practice for the Safe Use of Shortwave (Radiofrequency) Diathermy Units (1985)
- RH17** Procedure for Testing Microwave Leakage from Microwave Ovens (1985)
- RH18** Code of Practice for the Safe Handling of Corpses Containing Radioactive Materials (1986)
- RH19** Code of Practice for the Safe Use of Ionizing Radiations in Secondary Schools (1986)
- RH20** Code of Practice for Radiation Protection in Dentistry (1987)
- RH21** Statement on Cabinet X-Ray Equipment for Examination of Letters, Packages, Baggage, Freight and Other Articles for Security, Quality Control and Other Purposes (1987)
- RH22** Statement on Enclosed X-Ray Equipment for Special Applications (1987)
- RH23** Code of Practice for the Control and Safe Handling of Radioactive Sources Used for Therapeutic Purposes (1988)
- RH24** Code of Practice for the Design and Safe Operation of Non-Medical Irradiation Facilities (1988)
- RH25** Recommendations for Ionization Chamber Smoke Detectors for Commercial and Industrial Fire Protection Systems (1988)
- RH26** Policy on Stable Iodine Prophylaxis Following Nuclear Reactor Accidents (1989)
- RH27** Australia's Radiation Protection Standards (1989) **Superseded by RH39**
- RH28** Code of Practice for the Safe Use of Sealed Radioactive Sources in Borehole Logging (1989)

- RH29** Occupational Standard for Exposure to Ultraviolet Radiation (1989)
- RH30** Interim Guidelines on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields (1989)
- RH31** Code of Practice for the Safe Use of Industrial Radiography Equipment (1989)
- RH32** Intervention in Emergency Situations involving Radiation Exposure (1990)
- RH33** Interim Statement on Australian Radiation Practice Standards (1991) **Superseded by RH39**
- RH34** Safety Guidelines for Magnetic Resonance Diagnostic Facilities (1991)
- RH35** Code of practice for the Near-surface Disposal of Radioactive Waste in Australia (1992)
- RH36** Code of practice for the safe use of lasers in schools (1995)
- RH37** Code of practice for the safe use of lasers in the entertainment industry (1995)
- RH38** Recommended limits on radioactive contamination on surfaces in laboratories (1995)
- RH39** Recommendations for limiting exposure to ionising radiation (1995) and National standard for limiting occupational exposure to ionising radiation

APPENDIX 5

STATE/ TERRITORY RADIATION CONTROL LEGISLATION

Under the Constitution control of radioactive materials generally lies with States and Territories. All States and Territories have laws controlling possession and use of radioactive materials. These are listed here. Others laws relating to public health, environment protection, nuclear non-proliferation, occupational health and safety, dangerous goods and mining control may also be relevant.

Australian Capital Territory

Radiation Act 1983

New South Wales

Radiation Control Act 1990

Radiation Control Regulation 1993

Northern Territory

Radiation (Safety Control) Act

Queensland

Radioactive Substances Act 1958-1978

Radioactive Substances Regulations 1961

South Australia

Radiation Protection & Control Act 1982

Ionising Radiation Regulations 1985

Tasmania

Radiation Control Act 1977

Radiation Control Regulations 1994

Victoria

Health Act 1958

Health (Radiation Safety) Regulations 1994

Western Australia

Radiation Safety Act 1975-1984

Radiation Safety (General) Regulations 1983