

# Chapter 3

## Regulatory Framework

Australia's radioactive waste is managed in accordance with national regulatory requirements and, where applicable, internationally accepted procedures and practices. A broad description of the legislative regime and approvals requirements relevant to the repository, and codes of practice, relevant to the repository is provided in this chapter.

### 3.1 International Organisations and Conventions

Australia is an active member of the following international organisations, which encourage the safe use and management of radioactive materials:

- The International Atomic Energy Agency (IAEA) is an autonomous intergovernmental organisation founded in 1957 in accordance with the General Assembly of the United Nations. It is the world's central intergovernmental forum for scientific and technical cooperation in nuclear matters, including the management of radioactive waste.
- The Nuclear Energy Agency is a specialised agency of the Organisation for Economic Co-operation and Development, an intergovernmental organisation of industrialised countries.
- The International Commission on Radiological Protection (ICRP) is an independent advisory body, founded in 1928 that provides recommendations that form the basis of the international system of radiological protection. Australian scientists have served and continue to serve on ICRP committees and Australia follows ICRP standards.

The IAEA has developed a series of Radiation and Waste Safety Standards based on recommendations made by a number of international bodies, principally the ICRP, and estimates of radiation risk made by the United Nations Scientific Committee on the Effects of Atomic Radiation. These standards, which are followed by most countries including Australia, identify the basic principles for the regulatory, safety and technical requirements for radioactive waste repositories, in:

- protecting human health
- protecting the environment
- protecting beyond national borders
- protecting future generations
- reducing burdens on future generations
- establishing a national legal framework
- controlling radioactive waste generation
- correlating radioactive waste generation and management
- ensuring facilities are safe.

In 1996, the IAEA Secretariat introduced a hierarchical structure for IAEA Safety Standards Series publications: Safety Fundamentals, Safety Requirements and Safety Guides are supplemented by Safety Reports.

The key ICRP radiation protection recommendations are provided in ICRP Publication 60 (International Commission on Radiological Protection 1991) and also in a number of subsequent publications (e.g. International Commission on Radiological Protection 1997), which give guidance on the application of the recommendations. These recommendations have been formally adopted in Australia as the *National standard for limiting occupational exposure to ionizing radiation* which is accompanied by recommendations (NHMRC 1995a).

The ICRP framework of radiation protection contains three basic principles (International Commission on Radiological Protection 1991):

- (a) No practice involving exposures to radiation should be adopted unless it produces sufficient benefit to the exposed individuals or to society to offset the radiation detriment it causes. (This is called the justification of a practice.)
- (b) In relation to any particular source within a practice, the magnitude of individual doses, the number of people exposed, and the likelihood of incurring exposures where these are not certain to be received, should all be kept as low as is reasonably achievable, with economic and social factors being taken into account (the ALARA principle). This procedure should be constrained by restrictions on the doses to individuals (dose constraints) or the risks to individuals in the case of potential exposures (risk constraints), so as to limit the inequity likely to result from the inherent economic and social judgments. (This is called the optimisation of protection.)
- (c) The exposure of individuals resulting from the combination of all the relevant practices should be subject to dose limits or to some control of risk in the case of potential exposures. These are aimed at ensuring that no individual is exposed to radiation risks that are judged to be unacceptable from these practices in any normal circumstances. Not all sources are susceptible to control by action at the source and it is necessary to specify the sources to be included before selecting a dose limit. (This is called individual dose and risk limitation.)

There are various international conventions that deal with the management of radioactive waste. Australia is either a signatory to, or has ratified the following:

- *Joint convention on the safety of spent fuel management and on the safety of radioactive waste management*
- *Convention on the prevention of marine pollution by dumping of wastes and other matter* (London dumping convention)
- *Convention for the protection of natural resources and environment of the South Pacific Region* (SPREP Convention)
- *Convention to ban the importation into Forum Island countries of hazardous and radioactive waste and to control the transboundary movement and management of hazardous waste within the South Pacific Region* (Waigani convention)
- *Code of conduct on the safety and security of radioactive sources.*

Australia signed the *Joint convention on the safety of spent fuel management and safety of radioactive waste management* on 13 November 1998, having actively participated in developing the text. The aims of the joint convention are to:

- promote a high level of safety in spent fuel management and safety in radioactive waste management, through enhancement of national measures and international cooperation
- ensure effective defences against potential hazards so that individuals, society and the environment are protected from the harmful effects of radiation
- prevent accidents with radiological consequences and mitigate their consequences should they occur.

The treatment, transboundary movement, storage and disposal of spent fuel and radioactive waste were also covered. The joint convention states that each contracting party should:

- take the appropriate steps to ensure that at all stages of radioactive waste management, individuals, society and the environment are adequately protected against radiological and other hazards in so doing, each contracting party should take appropriate steps to aim to avoid imposing undue burdens on future generations
- in the framework of its national law, take the appropriate steps to ensure that the possession, re-manufacturing or disposal of disused sealed sources takes place in a safe manner

- ensure that all reasonably practicable improvements are made to upgrade the safety of radioactive waste management facilities.

The establishment of a national, radioactive waste repository would ensure that radioactive waste, including sources, is managed in the safest, most appropriate manner possible.

Contracting parties to the joint convention must report on radioactive waste management facilities and the inventory of radioactive waste. Australia is working towards ratification of the joint convention. When Australia becomes a contracting party, the national radioactive waste repository, as well as other waste management facilities, must be reported on under guidelines set out by the contracting parties to the convention.

The London Dumping and SPREP Conventions prohibit the dumping of radioactive waste at sea. The Waigani Convention, which Australia has ratified but which has not yet entered into force, seeks to ban the export of radioactive waste to all Pacific Island developing countries that are members of the South Pacific Forum.

The IAEA *Code of conduct on the safety and security of radioactive sources* was finalised in 2000. It states that to protect human health and the environment, every jurisdiction should take the appropriate steps necessary to ensure that the radioactive sources within its territory, or under its jurisdictional control, are safely managed during their useful lives and at the end of their useful lives; and are not stored for extended periods of time in facilities not designed for the purpose of such storage. The General Conference of the IAEA has called on member states to implement the code. Australia's policy of establishing a purpose-built facility for the disposal of disused sources is in keeping with the code.

## 3.2 Australia's Regulatory Framework

Each of the states and territories has its own legislation to regulate the use of radioactive materials.

In the case of the Commonwealth in 1999, the *Australian Radiation Protection and Nuclear Safety Act 1999* (Cwlth) established the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which regulates the Commonwealth's use of radioactive materials and provides advice on the use and management of radioactive substances. Before ARPANSA was established, the following organisations undertook this role:

- The Australian Radiation Laboratory provided advice to Government and the community on the health effects of radiation, and undertook research and provided services in this area.
- The Nuclear Safety Bureau regulated the High Flux Australian and Moata research reactors at Lucas Heights in Sydney.

The organisations were combined to form ARPANSA, which is specifically responsible for:

- promoting uniformity of radiation protection and nuclear safety policy and practices across jurisdictions of the Commonwealth, the states and the territories
- providing advice to government and the community on radiation protection and nuclear safety
- undertaking research and providing services on radiation protection, nuclear safety and medical exposures to radiation
- regulating all Commonwealth entities (including departments, agencies and bodies corporate, and contractors to these organisations) involved in radiation or nuclear activities or dealings.

Before ARPANSA was formed, the Commonwealth provided national advice and recommendations on radiation protection, through the Australian Radiation Laboratory, and through the Radiation Health Committee of the National Health and Medical Research

Council (NHMRC) which has published several codes of practice on radioactive waste management in Australia, covering user disposal, uranium mining and milling, and near-surface disposal.

The national repository would be owned by the Commonwealth and regulated by ARPANSA. States and territories would be involved as suppliers of waste to the facility and have the responsibility for waste management until the Commonwealth accepts control of the waste.

An ARPANSA licence would control how the repository was operated.

### 3.2.1 Relevant Acts and Regulations

The importation of radioactive waste into Australia is prohibited under Regulation 4R of the *Customs (Prohibited Imports) Regulations*.

The use, transport and disposal of radioactive material and waste in Australia is bound by Commonwealth and State legislation, through licensing requirements, and by codes of practice and standards. The following key Commonwealth elements are most relevant:

By specific exclusion in Commonwealth legislation:

- *Nuclear Non-Proliferation (Safeguards) Act 1987*

By Commonwealth legislation:

- *Australian Radiation Protection and Nuclear Safety Act 1998* (ARPANS Act)
- *Australian Radiation Protection and Nuclear Safety (Consequential Amendments) Act 1998*
- *Australian Radiation Protection and Nuclear Safety (Licence Charges) Act 1998*
- *Australian Radiation Protection and Nuclear Safety Amendment Regulations 1999*
- *Australian Radiation Protection and Nuclear Safety Amendment Regulations 2000*
- *Australian Radiation Protection and Nuclear Safety (Licence Charges) Regulations 2000*

By reference in commonwealth codes and standards:

- *Recommendations for limiting exposure to ionizing radiation 1995* (National Health and Medical Research Council and National Occupational Health and Safety Commission 1995a)
- *National standard for limiting occupational exposure to ionizing radiation 1995*
- *Code of practice for the disposal of radioactive waste by the user 1985* (NHMRC 1985)
- *Code of practice for the near-surface disposal of radioactive waste in Australia 1992* (NHRMC 1992 Code)
- *Code of practice for the safe transport of radioactive material 2001* (Australian Radiation Protection and Nuclear Safety Agency 2001)
- *Code of practice on the management of radioactive wastes from the mining and milling of radioactive ores 1982* (Department of Home Affairs and Environment 1982)
- *Code of practice on radiation protection in the mining and milling of radioactive ores 1987* (Department of the Arts, Sport, the Environment, Tourism and Territories 1987)

The ARPANS Act applies within and outside Australia and prohibits certain nuclear activities. The ARPANS (*Consequential Amendments*) Act amended and revoked parts of the *Australian Nuclear Science and Technology Organisation Act 1987*, and revoked the whole *Environment Protection (Nuclear Codes) Act 1978* with transfers of assets and transitional arrangements. The ARPANS (Licence Charges) Act sets the framework for imposing license fees and, as such, will be directly relevant to the repository proposal.

The NHMRC 1992 Code is the guide for the management of radioactive waste in Australia. Although pre-dating the more recent IAEA Waste Safety publications (e.g. *Near surface disposal of radioactive waste*, WS-R-1 (1999), *Siting of near surface disposal facilities* 111-G-3.1 (1994), and *Safety assessment for near surface disposal*, WS-G-1.1 (1998)), the 1992 Code is entirely consistent with current IAEA philosophy and recommendations on the safety requirements for radioactive waste management. It focuses on the importance of natural site characteristics in providing a barrier to the dispersal of any radioactivity from the waste. The code is of primary importance to the repository proposal. Reference to subsequent IAEA codes will also be observed in the construction and operation of the repository.

The Nuclear Non-Proliferation (Safeguards) Act incorporates the treaty on the Non-Proliferation of Nuclear Weapons and covers licensing, control, monitoring and auditing of materials and equipment of strategic importance in the development of nuclear reactors, nuclear fuel processing and nuclear weapons. Non-proliferation of nuclear weapons has been an objective of the highest priority. Most states have joined the treaty as non-nuclear-weapon states and have accepted comprehensive IAEA safeguards. As the national repository will solely be for the storage of low level and short-lived intermediate level radioactive waste, the Nuclear Non-Proliferation (Safeguards) Act is not of direct relevance.

As a Commonwealth facility, the national radioactive waste repository will also be subject to the *Occupational Health and Safety (Commonwealth Employment) Act 1991*. The Act prescribes the use, management and storage of hazardous material at the workplace. The preferred and two alternative sites for the national radioactive waste repository are located in central-north South Australia between Woomera and Roxby Downs (see Figure 1.1). The preferred site, Evetts Field West (52a), is located inside the Woomera Prohibited Area (WPA). Commonwealth legislation, under part VII of the *Defence Force Regulations (No. 35) 1952*, has declared the WPA as a prohibited area for the purposes of 'the testing of war material'.

The regulations of the *Defence Act 1903* (part XI) prohibit entering into and the use of a prohibited area without permission. The Defence Force Regulations confer on the Minister for Defence the right to control all access and activities within the WPA. The regulations also stipulate that standards on issues such as range safety, hazardous materials handling and environmental management are established and must be met by users of the WPA. The Department of Defence is committed to managing the WPA in an exemplary manner. The WPA and its activities are described in detail in Chapter 10.

### 3.2.2 Radiation Protection Limits

On the basis of recommendations from the International Commission for Radiation Protection, the NHMRC, in conjunction with the National Occupational Health and Safety Commission (NOHSC) has published Radiation Health Series No. 39 comprising *Recommendations for limiting exposure to ionizing radiation (1995b)* and *National standard for limiting occupational exposure to ionizing radiation (1995a)*.

This document sets limits on dose which, if not exceeded, will prevent deterministic effects from occurring. The system of radiation protection described is designed to keep the probability that stochastic effects will occur from exceeding a level that is regarded as unacceptable. The document notes that while the system of radiation protection described does not specifically refer to other species or the environment, it is generally believed that the standard of environmental control required for protection of people will ensure that other species are not put at risk.

The recommendations provide for a radiation dose limit, for people employed in occupations involving exposure to radiation, of 100 mSv in any five-year period with no more than 50 mSv in any one year. This corresponds to an annual effective dose of 20 mSv, averaged over five years. Doses to workers must be as low as reasonably achievable.

For members of the public, the recommendations provide for an annual radiation dose limit of 1 mSv and apply to exposure from all sources excluding those arising from natural background and the medical use of radiation. In certain circumstances a higher value of effective dose could be allowed in a single year, provided that the average over five years remains at 1 mSv per year.

### 3.2.3 Transport Regulations

Regulatory authorities in the Commonwealth, states and territories are responsible for the regulation of the transport of radioactive materials by road, rail or waterways within their respective jurisdictions. Regulation in states and territories is provided by the department responsible for either health or the environment. ARPANSA is the Commonwealth regulator.

Radioactive materials in Australia must be transported in accordance with the relevant code of practice, and state and territory regulations, to protect persons, property and the environment from the effects of radiation during transport.

*The Code of practice for the safe transport of radioactive substances (1990)* published by the former Department of the Arts, Sport, the Environment, Tourism and Territories under the *Environment Protection (Nuclear Codes) Act 1978*, was based on 1985 IAEA regulations adapted for Australia. The Commonwealth followed this code of practice until its revision in 2001. It also formed the basis of relevant state and territory legislation and regulations.

While the *Code of practice for the safe transport of radioactive substances (1990)* provides a high degree of safety, some of its aspects became dated with the publication in 1996 of new IAEA regulations. These regulations were in turn revised by the agency in 2001. In the light of the current knowledge of the risk of exposure to radiation some packaging controls needed to be tightened and others relaxed (Australian Radiation Protection and Nuclear Safety Agency 2001).

A working group of the Radiation Health Committee of ARPANSA has revised the 1990 code of practice. The new code, the *Code of practice for the safe transport of radioactive material (2001)* (ARPANSA 2001 Code) has now been adopted by the Commonwealth, and is referred to in the relevant parts of the ARPANS Act. Adoption of the new code by jurisdictions will ensure that the requirements for transport of radioactive materials in Australia are in keeping with current international practice.

The new code is in the process of being adopted by states and territories and, until it is, the 1990 Code of Practice and relevant existing state and territory regulations continue to apply. Persons are free to transport radioactive materials by road, provided that:

- they have obtained any necessary approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (the EPBC Act)
- they have obtained any necessary source (or other) licence under the ARPANS Act or, if that Act is not applicable, the relevant state or territory radiation protection laws
- they comply with the ARPANSA 2001 Code or, in some cases where the ARPANS Act is not applicable, the *Code of practice for the safe transport of radioactive substances 1990* (the previous code)
- they comply with the other requirements of any applicable radiation protection legislation and the conditions of any relevant licence
- they comply with generally applicable road transport laws.

The 1985 and 1996 IAEA regulations (International Atomic Energy Agency 1985, 1996), on which the 1990 and 2001 codes of practice are based respectively, establish standards of safety with the purpose of providing an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment associated with the transport of radioactive material. This is achieved by requiring:

- containment of the radioactive materials

- control of external radiation levels
- prevention of criticality
- prevention of damage caused by heat and impact.

In the 2001 code as in the 1990 code, packaging, labelling and licensing requirements are structured around a series of packaging levels, which are defined by the radionuclides present and their level of activity.

Differences between the two codes include changes to some packaging types, exemption levels and radiation protection program requirements. The essence of the codes is that the package design is commensurate with the potential hazard of the contents being transported.

## **Packaging**

Packaging is defined as the assembly of components necessary to enclose the radioactive contents completely. It may consist of one or more receptacles, absorbent materials, spacing structures, radiation shielding and service equipment for filling, emptying, venting and pressure relief; devices for cooling absorbing mechanical shocks handling and tie-down and thermal insulation; and service devices integral to the package. The packaging may be a box, drum or similar receptacle, or a freight container tank or intermediate bulk container.

The following broad categories are defined in the 2001 Code of Practice:

- Excepted package
- Industrial package Type 1 (TypeIP-1)
- Industrial package Type 2 (TypeIP-2)
- Industrial package Type 3 (TypeIP-3)
- Type A package
- Type B(U) package
- Type B(M) package
- Type C package.

Type C is the most stringent of the packaging types. Freight containers can be used for industrial package classes. The code defines, for each packaging type where appropriate:

- requirements before first shipment
- requirements before each shipment
- appropriate transport documentation for each shipment
- segregation from other goods
- requirements for packaging materials and packages (including geometry and temperature requirements)
- requirements and controls for contamination and leaking packages
- specific additional requirements for each packaging type
- labelling requirements
- responsibilities of the consigner
- requirements for transport documentation to be provided by the consigner, including relevant actions to be taken by the carrier (instructions for loading, stowage, carriage, handling and unloading, and emergency arrangements appropriate to the consignment)
- general provisions regarding considerations for emergency response
- additional specific requirements for different transport methods (e.g. road, rail, air, ship)
- procedures for testing and sampling contents of packages and potential for leaching/leaking
- approval and administrative requirements (e.g. notification to the competent/regulatory authority on shipment information, including date of shipment and arrival and proposed route, required for Type B and C packages).

### **Radiation Dose Limits**

Radiation dose limits are specified for transport containment. The dose limits apply at the surface and at a defined distance from the transport package. The dose limits for occupational and public exposure are defined in the *national standard for limiting occupational exposure to ionizing radiation* [NOHSC: 3022] and *Recommendations for limiting exposure to ionizing radiation* (Guidance note [NOHSC: 1013 (1995)]), together known as Radiation Health Series No. 39 (National Health and Medical Research Council and National Occupational health and Safety Commission 1995a,b).

### **Prior Notification**

If the radioactive material (waste or other) is packaged in accordance with the relevant code of practice, there is no requirement that any authority be notified about the shipment, including the 'competent government authority' (regulator). Given that radioactive material is transported throughout Australia on a routine basis it would not be practicable to notify the competent government authority of every occurrence of transport of these substances.

### **Emergency Response**

In the unlikely event of a radiation-related accident or incident, emergency response is a matter for the relevant state or territory emergency services and is covered by existing emergency planning arrangements in accordance with the transport code. In most emergency situations, the police, ambulance, fire services and state emergency services are the first responders. The fire services maintain specialised Hazmet teams trained to deal with chemical, biological and radiological incidents.

In addition the Commonwealth can provide assistance on request from the states. This assistance is provided through requests from the state emergency services to Emergency Management Australia. ARPANSA and the Australian Nuclear Science and Technology Organisation also maintain trained radiation emergency response teams that can provide assistance on requests from the state authorities. Further details on emergency response can be found in Section 7.6.4.

### **Regulatory Regime and the National Repository**

Waste being transported by the Commonwealth would be regulated by ARPANSA, and would need to comply with the ARPANSA 2001 Code. The type of containment required for transport of waste to the repository would depend on the form and level of activity of the waste to be transported. In addition, conditioning requirements for acceptance of the waste at the repository will also be relevant to the packaging for transport. It is expected that a variety of packaging types will be required, as various types of low level and short-lived intermediate level waste will be transported for disposal in the facility.

Smoke detectors, for example, only require clear identification of the package contents. Depending on the activity, low level waste will generally require industrial packaging, which meets specified temperature and pressure specifications, drop tests, and water spray and penetration requirements. Type B packages may be used for some disused sources. These packages must withstand the effects of severe accidents and are tested for resistance to impact, penetration, and fire and water immersion.

Environmental impact or damage is very unlikely during the transportation of radioactive waste, given the solid and treated form of the wastes and the appropriate packaging requirements.

Transport of waste to the repository would also be considered in the context of the licensing of the facility by ARPANSA.



## 3.3 Approvals and Licences

The entire disposal process would be subject to regulatory requirements, including the characterisation and conditioning of waste to an acceptable form, transport of waste to the repository and the disposal operations. ARPANSA is the relevant regulatory authority and the regulatory framework would conform to the IAEA and ICRP standards and guidelines, together with Australian guidelines and legislation.

The environmental approval for the repository, including siting, design, construction, and operational and post-closure management is subject to the requirements of the EPBC Act, which is discussed separately in Section 1.2.

### 3.3.1 Approvals

The Commonwealth would own the low level and short-lived intermediate level radioactive waste repository, with regulatory oversight by ARPANSA, as the Commonwealth's independent regulator.

The repository site would be acquired by the Commonwealth and therefore would not require any state planning approvals. The Commonwealth acquisition would be undertaken under the *Lands Acquisition Act 1989*, and would formally commence once the Minister for the Environment and Heritage has reached a decision on the repository proposal. The Lands Acquisition Act allows land acquisition by agreement, or by compulsory process, following a well-defined series of steps.

### 3.3.2 Relevant Licences

Approval is required under the ARPANSA licence for each stage of the repository process including siting, construction, operation and decommissioning. The assessment of the licence approval would be subject to the evaluation of detailed plans and arrangements for protection and safety, including:

- the safety management plan
- the radiation protection plan
- the radioactive waste management plan
- strategies for the decommissioning, disposal or abandoning of the facility and/or the site
- the security plan
- the emergency plan for the controlled facility.

The regulatory branch of ARPANSA would review the monitoring results from the repository regularly to ensure its safety and compliance with licence conditions.

Public consultation is an important part of the licensing process. Public comment is invited on licence applications. The actual licence application fees are prescribed in the ARPANS Amendment Regulations 2000 and ARPANS (Licence Charges) Regulations 2000.

