URANIUM INDUSTRY FRAMEWORK




REPORT OF THE URANIUM INDUSTRY FRAMEWORK STEERING GROUP

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Preface

This report was prepared by the Uranium Industry Framework (UIF) Steering Group established by the Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane MP, in August 2005. The Steering Group comprised senior representatives of the uranium industry; the Australian, South Australian and Northern Territory governments; and the Northern Land Council.

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In developing the UIF, nine working groups and associated sub-groups were established, comprising representatives with knowledge and expertise in particular areas. More than 150 industry and government experts were involved in the development of the UIF. The Steering Group acknowledges the valuable contribution of working group members and a range of industry, government and other stakeholders in preparing this report.

Secretariat support was provided by the Resources Division of the Department of Industry, Tourism and Resources.

[1] Mr Mann resigned from the Steering Group on 22 August 2006

Executive summary

In considering issues to be addressed under the Uranium Industry Framework (UIF), the Steering Group was guided by the following vision:

> *A sustainable, safe, secure, socially and environmentally responsible uranium industry, making a growing contribution to Australia and the world's energy supply well into the 21st century and assisting in reduced global greenhouse gas emissions.*

The primary objectives of the UIF are to identify opportunities for, and impediments to, the future development of the Australian uranium industry.

Australia has by far the largest identified uranium resources of any country in the world—about 36 per cent of the world's low cost Reasonably Assured Resources (RAR)[2]. There are around 85 known uranium deposits across Australia, including deposits that have been partly or completely mined.

A number of Australian geological provinces have high prospectivity for further discoveries of uranium deposits. Following increased exploration expenditure in recent years, Australia's known resources are expected to grow. In January 2005, Australia's RAR—recoverable at costs of less than US$40 per kilogram—were estimated to be 716 000 tonnes of uranium (t U), or 36 per cent of world resources in this category. At that time, Australia's total Identified Resources (RAR plus Inferred Resources)—recoverable at less than US$40/kg—amounted to 1 094 005 t U.

About 96 per cent of Australia's total RAR classified uranium resources are located within seven deposits (refer to Appendix D: Map of Australia's uranium deposits and resources):

- Olympic Dam in South Australia
- Ranger, Jabiluka and Koongarra in the Alligator Rivers region of the Northern Territory
- Valhalla in Queensland
- Kintyre and Yeelirrie in Western Australia.

There are three uranium mines operating in Australia—the Ranger (Energy Resources of Australia Ltd) mine in the Northern Territory and the Olympic Dam (BHP Billiton Ltd) and Beverley (Heathgate Resources Pty Ltd) mines in South Australia. A fourth mine is expected to commence operation—Honeymoon mine (sxr Uranium One Inc) in South Australia—in the first quarter of 2008.

Australia's uranium exports are subject to the country's uranium export policy, which ensures:

- Australia's uranium may only be used for peaceful purposes
- uranium can only be exported to countries that have signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and its Additional Protocol, and with whom Australia has a bilateral safeguards agreement
- customer countries are responsible for management of waste and other products produced from the use of Australian uranium in their nuclear power reactors (importation of radioactive waste is prohibited in Australia under the *Customs (Prohibited Imports) Regulations 1956* and the *Commonwealth Radioactive Waste Management Act 2005*).

[2] Reasonably Assured Resources (RAR) refers to uranium that occurs in known mineral deposits of delineated size, grade and configuration, such that the quantities which could be recovered within the given production cost ranges with currently proven mining and processing technology can be specified. Estimates of tonnage and grade are based on specific sample data and measurements of the deposits, and on knowledge of deposit characteristics. RAR have a high assurance of existence. Unless otherwise noted, RAR are expressed in terms of quantities of uranium recoverable from mineable ore.

Sustainable development is critical to the establishment of a globally competitive and efficient industry in Australia. The Australian industry already implements initiatives that support economic development, meet social and environmental responsibilities, and establish productive relationships between governments and stakeholders.

Materials stewardship in the mining industry relates to the management of materials, resources, processes and products—throughout their life cycle—to maximise their value and minimise the safety, environmental and social impacts arising from their production, recycling and disposal. Australian uranium mining is the first stage of the global uranium fuel cycle. The further development and adoption of uranium stewardship practices under the UIF will provide a useful means of addressing current impediments to the sustainable development of the industry. Under the UIF, uranium stewardship will require the support and participation of mine operators, new industry participants and relevant government regulatory agencies.

The resources boom has resulted in a strong growth in competition for skilled labour in Australia's mining industry. A wide range of initiatives are underway to address specific skills shortages, such as skilled migration, vocational education and training, and promoting studies in engineering and earth sciences.

The Australian industry's international competitiveness is affected by skills shortages for radiation safety and protection officers and 'competent persons' to report uranium exploration results under the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (known as the JORC Code after the Australasian Joint Ore Reserves Committee).

The efficient, timely and cost-effective transport of products containing uranium is an issue at national and international level. The reluctance by some transport providers and other associated parties to transport uranium products is affecting the cost, scheduling and availability of road, rail and sea transport options. The key factors affecting transport include:

- limited public knowledge and understanding of the product's radioactive properties and negative public perceptions of the industry
- different interpretations of regulations between and within jurisdictions
- over-management of risk assessment and associated activities
- consolidation of international shipping, which limits options for ports and shipping routes
- remoteness of Australia's uranium mines and the need to transport uranium long distances to converters in Europe and North America
- political restrictions placed on uranium mining and the movement of nuclear materials
- limitations arising from concerns about international terrorism.

Different jurisdictions have regulatory responsibilities for uranium mining. The States and Territories are the principal land managers, while the Australian Government regulates uranium mining as an agreed matter of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). While States and Territories continue to have day-to-day responsibility for regulation, arrangements need to be developed that provide a coordinated and transparent role for the Australian Government in discharging its regulatory responsibilities under the EPBC Act in relation to new or expanded uranium mines. This includes transitional arrangements for responsibilities under the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act), which was repealed and replaced by the EPBC Act on 16 July 2000. Respective jurisdictions should ensure that regulatory arrangements applying to uranium mining across Australia are harmonised to the greatest extent possible.

The application of royalty arrangements for uranium development in the Northern Territory on a project-by-project basis is a major source of uncertainty and therefore a deterrent to further investment in the sector. New entrants to the industry are unsure about their potential royalty liabilities, and current arrangements mean that multi-product uranium mines would be subject to the Northern Territory Government's profit-based royalty and the royalty regime imposed by the Australian Government. This leads to administrative complexity and could result in tax-driven investment decisions. These problems could be avoided by the consistent application of a more sustainable uranium royalty regime in the Northern Territory which balances the needs of Indigenous communities, the mining sector and government.

The Australian minerals sector, including the uranium industry, has well-established policies and procedures to develop and manage relationships with Indigenous communities in areas where it seeks to operate. However, there are opportunities to build on policies and develop

a comprehensive approach to Indigenous equity and employment in the industry. Effective participation by Indigenous communities will require support and capacity building by the industry.

Timely access to land for exploration and mining purposes will be important in the further development of the industry. The negotiation of land access with Indigenous groups is most effectively undertaken through relationships built on mutual trust. Current legislative reforms are underway to the native title system, amendments to the *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA) and *Aboriginal and Torres Strait Islander Heritage Protection Act 1984.*

The establishment of a sustainable and successful industry in Australia requires an appropriate and effective communication strategy. This will help the industry to raise public awareness of uranium mining among its stakeholders and the community, leading to community decisions that are based on informed understanding.

Public information about the industry within the nuclear fuel cycle has been generated primarily by opponents of uranium mining. Information sourced from the industry in the past has been perceived as reflecting the self-interest of uranium producers. Information must be factual, accessible and easily understood, addressing community concerns as well as the economic and environmental benefits of expanding sustainable uranium mining.

The UIF Steering Group has developed 20 recommendations:

Recommendations

Uranium stewardship—integral to a sustainable development approach for resource management
Recommendation 1 The Australian uranium industry will establish a uranium stewardship platform as the basis for its engagement with the global uranium stewardship programs currently being developed by the World Nuclear Association.
Competitiveness
Recommendation 2 The Australian Government, State and Territory governments and industry, in consultation with relevant educational institutions, should develop a course on mining-related radiation safety and protection to meet the needs of mining operators and regulators, including accreditation of coursework and related industrial experience and the development of a national certification process for radiation safety officers.
Recommendation 3 Industry in partnership with the Australian Government and relevant State and Territory governments will work with educational institutions to develop strategies aimed at attracting current personnel from industry into relevant established courses, where available.
Recommendation 4 In consultation with the Joint Ore Reserves Committee (JORC), a paper and relevant supporting material on all aspects of the measurement and reporting of uranium resources and reserves under the JORC Code should be developed for dissemination to uranium exploration and mining companies and presentation at suitable industry conferences. The paper should provide information to ensure that the JORC Code is properly understood and applied, and include case studies related to uranium mining, particularly in relation to in situ leach mining.
Recommendation 5 An approach should be made through the Australian Transport Council and/or the Ministerial Council on Mineral and Petroleum Resources (MCMPR) to the Council of Australian Governments proposing the establishment of a single body to oversee a national approach to the domestic transport of uranium. The body would seek agreement between the States and Territories that no regulatory requirements will be imposed on uranium transport over and above the Australian Radiation Protection and Nuclear Safety Agency's (ARPANSA's) Code of Practice for the Safe Transport of Radioactive Material.
Recommendation 6 The domestic uranium transport requirements of existing and potential new mines should be assessed and stakeholders should lobby State and Territory governments for access to ports and transport infrastructure.

Recommendation 7

Government and industry should develop a strategy to address denial of shipping internationally, including representation at multilateral and bilateral forums.

Recommendation 8

A consultative forum should be established with representatives from the Australian Government, State and Territory governments, industry and shipping, air, road and rail transport providers, to discuss the transport of radioactive materials.

Regulation

Recommendation 9

The Australian Government and State and Territory governments will work cooperatively to ensure that, where possible, environmental and other regulatory arrangements across jurisdictions are harmonised. All levels of government, in consultation with the uranium industry and other stakeholders, should also apply guiding principles for the regulation of the uranium industry which:

- provide a coherent and consistent policy framework reflecting the respective policy objectives, roles and responsibilities of the Australian Government and the State and Territory governments in relation to the regulation of the uranium industry
- are high level and strategic and include agreed objectives and outcomes that can be reported on at the State, Territory and national levels
- are supported by appropriate arrangements between the Australian Government and relevant State and Territory governments.

Recommendation 10

The Australian Government, in consultation with relevant State and Territory governments, should consider the most appropriate, effective and efficient arrangements required to discharge its regulatory responsibilities in relation to environmental requirements attached to Australian Government approvals of new uranium mines (and expansions of existing mines) in all jurisdictions under the *Environment Protection and Biodiversity Conservation Act 1999*.

Recommendation 11

The Australian Government, relevant State and Territory governments and the uranium industry work cooperatively to ensure that regulatory arrangements and industry performance are consistent with world's leading practice by:

- maintaining effective and efficient coordination between relevant regulatory agencies to provide, where possible, a single administrative point of contact for industry ('one-stop shop')
- ensuring that community and other stakeholder engagement processes are consistent with MCMPR principles and include all relevant stakeholder interests
- ensuring that industry reporting requirements are effective and efficient and, where possible, appropriately streamlined.

Recommendation 12

The Australian Government should work with relevant State and Territory governments to establish cooperative arrangements with industry to ensure that permanent records of the radiological dose history of uranium industry workers are collected, maintained and retrievable.

Recommendation 13

The Australian Government should establish, in consultation with stakeholders, a royalty framework for the uranium industry in the Northern Territory.

Indigenous engagement and land access

Recommendation 14

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous stakeholders should develop and implement a set of high-level principles for Indigenous engagement, based on existing principles and native title and land rights legislation (where these are relevant and appropriate) and which recognise that the nature of engagement and programs to support Indigenous communities will need to take account of local circumstances.

Recommendation 15

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous communities and organisations, will develop:

- a comprehensive science-based information package specifically for Indigenous audiences, aimed at raising general awareness of the uranium mining sector and addressing key areas of concern, using practical, everyday analogies and presented in a variety of accessible formats
- arrangements to support ongoing dialogue and information exchange between Indigenous communities and organisations, the uranium industry and relevant government agencies, initially between the Northern Territory and South Australia.

Recommendation 16

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous communities and organisations, will seek to improve the coordination and accessibility of relevant government programs and services, in conjunction with third party brokering services (such as those provided by the Northern Land Council), to assist the implementation of land access agreements that provide for sustainable employment and business development opportunities.

Recommendation 17

Building on existing programs, the uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous stakeholders, should:

- examine opportunities for building Indigenous engagement in the uranium industry, including capacity building, investment, joint ventures, partnering with industry and the establishment of economically viable business enterprises providing goods and services to the uranium industry and related industries
- consider surveying and collating information on relevant Indigenous skills, knowledge and experience and provide recognition of such skills, knowledge and experience by facilitating potential commercial application in providing goods and/or services to the uranium industry and associated industries and assessing the needs of the industries for those goods and services
- examine options for ensuring that economic and other benefits flowing to Indigenous communities from uranium exploration and mining are additional to, and are not substituted for, existing benefits and services provided by governments
- examine mechanisms for ensuring that young Indigenous people commencing high school have access to appropriate targeted prevocational advice and opportunities to take up internships, mentoring and work experience placements within the uranium industry and related sectors
- identify measures aimed at increasing the number of Indigenous job readiness, traineeship, apprenticeship and employment opportunities within the uranium and related industries
- promote successes in relation to Indigenous engagement and engage opinion leaders within Indigenous communities and/or representative bodies to champion the positive outcomes of these arrangements.

Recommendation 18

Issues relating to the uranium industry's access to land for exploration, mining and minerals processing will be monitored and addressed, where appropriate, through input to current legislative reform processes.

Communication

Recommendation 19

The uranium industry will collaborate on the development of a multi-faceted communications strategy to ensure the delivery of objective information about the benefits and risks associated with the growth of the industry, through community engagement, the education system and media relations. The strategy will include information products focusing on the social, economic and environmental performance of the uranium industry and the strategies adopted to ensure the safety and security of the industry, as well as information products addressing issues of concern to the community.

Implementation

Recommendation 20

An Implementation Group will be established, in partnership with industry and governments, and will be industry driven, to monitor and guide the Uranium Industry Framework Implementation Plan.

Scope of Uranium Industry Framework

Australia's involvement in the nuclear fuel cycle is currently limited to mining and milling uranium ore to produce uranium concentrates (uranium oxide or yellowcake). The scope of the UIF is limited to matters directly related to the exploration, mining, milling and transport of uranium. The UIF does not focus on issues associated with other aspects of the nuclear fuel cycle, such as conversion, enrichment, nuclear power, and the storage and disposal of nuclear wastes.

The Steering Group was guided by the following terms of reference:

The Uranium Industry Framework will identify opportunities for, and impediments to, the sustainable development of the Australian uranium industry in the short, medium and longer term, and recommend actions aimed at:

- increasing Australia's international competitiveness and facilitating increased exploration, mining and export of Australia's uranium resources
- ensuring a consistent, effective and efficient regulatory regime for uranium mining in Australia
- fostering broader community understanding and acceptance of the economic and social benefits derived from having a safe, secure, efficient and highly productive Australian uranium mining industry.

The Uranium Industry Framework will not consider issues related to nuclear power in Australia.

Within this framework the Steering Group considered key issues under the following five themes:

- uranium stewardship
- competitiveness
- regulation
- Indigenous engagement and land access
- communication.

1 Introduction

1.1 A shared vision for the uranium industry

The UIF Steering Group was guided by the following vision:

> *A sustainable, safe, secure, socially and environmentally responsible uranium industry, making a growing contribution to Australia and the world's energy supply well into the 21st century and assisting in reduced global greenhouse gas emissions.*

1.2 Rationale

The fundamental objectives of reviewing the exploration, mining, milling and transportation of Australian uranium are to support the sustainable development of the Australian uranium industry by:

- further enhancing Australia's international competitiveness and reputation as a reliable, safe and secure global energy supplier by reducing impediments to increased exploration, mining and export of Australia's uranium resources
- seeking a consistent, effective and efficient regulatory regime for uranium mining in Australia
- fostering broader community appreciation of the economic and social benefits derived from having a safe, secure, efficient and highly productive Australian uranium mining industry
- contributing to worldwide efforts to reduce energy-related greenhouse gas emissions.

The Australian Government's Energy White Paper *Securing Australia's Energy Future* (2004) noted that:

- Australia has substantial uranium resources but does not use uranium as an energy source
- Australian uranium is exported under stringent safeguards that recognise that specific arrangements are needed to distinguish between civil and military applications
- Australia's uranium exports reduce global greenhouse gas emissions to the extent that nuclear power replaces higher emission sources in other countries.

1.3 Domestic policy context

In June 2006 the Prime Minister appointed the Uranium Mining, Processing and Nuclear Energy Review (UMPNER) Taskforce to undertake an objective, scientific and comprehensive review into uranium mining and processing, as well as the long-term contribution of nuclear energy in Australia. The terms of reference for the taskforce are provided in Appendix A.

In March 2005, the Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane MP, asked the House of Representatives Standing Committee on Industry and Resources to inquire into and report on the development of the non-fossil fuel energy industry in Australia. The Standing Committee commenced its inquiry with a case study into the strategic importance of Australia's uranium resources. The terms of reference of the Inquiry (commonly referred to as the Prosser Inquiry) are also provided in Appendix A.

1.4 Global policy context

A number of recent international developments are likely to influence development of the Australian uranium industry.

1.4.1 Energy security

World energy demand is forecast to more than double by 2030. Governments around the world are looking at strategies to secure access to reliable, affordable and clean energy to achieve long-term economic growth.

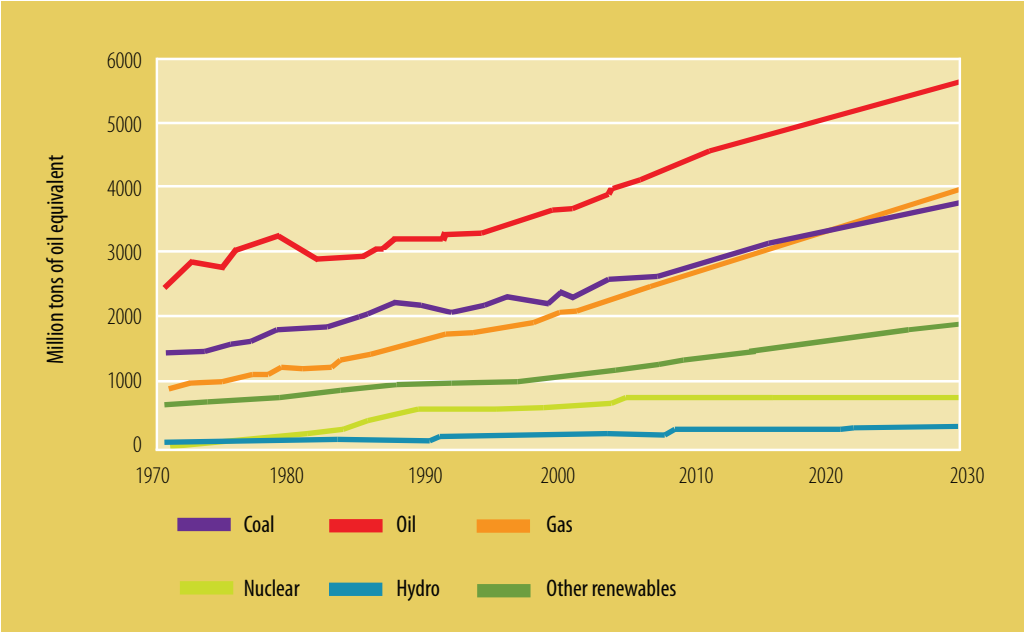
To address physical, geopolitical, security of supply and other risks, many countries are reconsidering the role that nuclear power will play in their energy policies. The broad geographic spread of identified uranium reserves— compared with the regional concentration of the world's remaining oil reserves—favours supply stability in the global uranium market.

1.4.2 Increasing interest in nuclear energy

The rapid growth in demand for electricity over the past 30 years has provided a strong market for the development of nuclear power. World uranium mine production was about 41 870 t U in 2005, and is forecast to rise by at least 50 per cent over the next five to ten years.

The International Energy Agency (IEA) expects world energy demand to grow by 15 per cent from 2003 to 2010, and a further 35 per cent from 2010 to 2030 (Figure 1). Fossil fuels remain the dominant energy source for the foreseeable future, however demand will also continue to grow for non-fossil fuel energy sources to help mitigate greenhouse gas emissions. Energy consumption is projected to expand most strongly in rapidly growing developing countries such as China and India, as a result of relatively high rates of economic growth and increased demand for personal services, such as transport. In comparison, energy consumption is projected to grow more slowly in developed economies.

Figure 1 World primary energy demand by energy source



Source: IEA World Energy Outlook 2005.

Growth in energy demand, sustained high oil prices and concern over greenhouse gas emissions are leading many countries to review their position on nuclear power as an option for meeting future energy needs. To help meet growth in the demand for energy, Russia, China and India have announced large-scale programs for new nuclear power reactors, driven by energy security and supply diversification strategies.

In 2005, nuclear power produced 2626 billion kilowatt hours (kWh), more than 16 per cent of the world's electricity. In July 2006, there were 442 nuclear power reactors in 30 countries and about 28 nuclear power reactors under construction in 11 countries. The International Atomic Energy Agency (IAEA) anticipates that 430 gigawatts of electricity (GWe) generated from nuclear power will be in place by 2020, based on proposals for the construction of nuclear power reactors in a number of countries, including China, India, Russia, Finland and France. This will represent a 17 per cent share of the world's electricity production.

The amount of uranium required to fuel nuclear power reactors in 2006 is estimated at 65 478 t U or 77 218 t uranium oxide (U_3O_8). World mine production of 41 870 t U (49 375 t U_3O_8) in 2005 provided about 63 per cent of these requirements. The remainder was met from secondary sources, including deliveries of low-enriched uranium derived from highly enriched uranium (HEU), re-enrichment of depleted uranium and spent fuel reprocessing. In the longer term, nuclear power reactor technology will change dramatically with the introduction of Generation IV reactors, which are significantly more efficient than existing nuclear power reactors.

China and India use domestic uranium reserves to supply their nuclear power needs. However, reserves are not sufficient to meet the proposed expansion of nuclear power reactors and, in the medium to long-term, both countries will seek to import uranium. The United States and United Kingdom are expected to build a new generation of nuclear power reactors, while other countries are considering nuclear power for the first time.

1.4.3 Global Nuclear Energy Partnership

A number of international proposals are being considered which limit the spread of proliferation-sensitive nuclear technology (enrichment and reprocessing), while respecting the rights of NPT parties to nuclear energy for peaceful purposes.

The United States Global Nuclear Energy Partnership (GNEP) initiative was announced by United States President George W Bush on 6 February 2006. The aim of GNEP is to strengthen the non-proliferation regime by establishing a framework for expanded use of nuclear energy while limiting the spread of enrichment and reprocessing capabilities. GNEP is in the formative stages and complements other multilateral approaches to the nuclear fuel cycle.

GNEP has envisaged a fuel take-back approach where fuel supplier nations which hold enrichment and reprocessing capabilities would provide enriched uranium to conventional nuclear power plants located in user nations. Used fuel would be returned to a fuel supplier nation and recycled using a process that does not result in separated plutonium. The recycled fuel would then be used in fast-neutron reactors in fuel supplier nations.

GNEP proposes nuclear waste management benefits, with nuclear waste requiring storage for 300 to 500 years, rather than the 10 000 years required for current high-level waste. The GNEP proposal does not place an obligation on uranium producers, such as Australia, to take back nuclear waste. Importation of radioactive waste is prohibited by Australian law under the *Customs (Prohibited Imports) Regulations 1956* and the *Commonwealth Radioactive Waste Management Act 2005*.

1.4.4 Fuel leasing

Concern about the need to meet world demand for nuclear power while limiting enrichment capabilities and nuclear proliferation has led to the consideration of fuel leasing. The aim of such an approach would be to strengthen non-proliferation regimes by limiting the spread of proliferation technology while guaranteeing fuel supply for nuclear power programs. Fuel leasing comes within the terms of reference of the Prime Minister's Taskforce on the Review of Uranium Mining, Processing and Nuclear Energy in Australia (Appendix A).

1.5 Safeguards arrangements

1.5.1 Australia's uranium export policy

Australia's uranium resources are considered to be a strategic commodity that must be treated differently from other minerals due to the risk of proliferation. The *Customs (Prohibited Exports) Regulations 1958* require export approval by the Minister for Industry, Tourism and Resources. The *Atomic Energy Act 1953* retains Australian Government ownership of uranium in Australian territories.

In 1975, prior to the development of Ranger mine, the Australian Government established the Ranger Uranium Environmental Inquiry (Fox Inquiry). In 1977, the inquiry found that uranium mining could proceed and led to changes in policy which form the basis of Australia's current policies in relation to the mining and export of uranium.

These policies have ensured that:

- uranium exports may be used only for peaceful, non-explosive purposes
- uranium can be exported only to countries that are a party to the NPT and have a bilateral safeguards agreement with Australia
- countries are responsible for the management of waste produced from the use of Australian uranium.

In announcing these policies the former Prime Minister Malcolm Fraser said:

'The government especially has been conscious that in a world of finite resources there is an obligation on resource-rich nations, such as Australia, to make those resources available to meet the legitimate needs of other nations'.

The uranium export policy has been adhered to by successive Australian governments. It has been strengthened over time to reflect changes in energy demand and policy. The most recent was the Australian Government's announcement on 4 May 2005 that Non-nuclear-weapon States must also be signatories to the IAEA Additional Protocol before exports could occur. The Additional Protocol provides the IAEA with additional information and increased physical access for nuclear safeguards purposes.

Uranium is exported as U_3O_8, which is converted, enriched and fabricated into fuel before it can be used in nuclear power reactors. It is not unusual for each of these activities to be undertaken in different countries; for example, a Japanese utility buying Australian uranium may have uranium converted to uranium hexafluoride in Canada, enriched in France, fabricated into fuel in Japan and reprocessed in the United Kingdom[3].

1.5.2 Tracking Australian uranium

Australia's bilateral agreements require purchasers to identify and precisely account for Australian obligated nuclear material (AONM) as it moves through the nuclear fuel cycle. This ensures that AONM does not materially contribute to, or enhance, any military purpose. Tracking of AONM is the responsibility of the Australian Government's Australian Safeguards and Non-Proliferation Office (ASNO), an agency of the Department of Foreign Affairs and Trade.

ASNO receives notifications and reports on the disposition of AONM, which are cross-checked with a range of information available to ASNO, including information from the IAEA. ASNO reports on its activities, including AONM accounting, in its annual report to the Australian Parliament. There have been no unreconciled differences in accounting for AONM and all Australian uranium exported since 1977 has been accounted for.

1.5.3 Equivalence principle

Due to the impossibility of physically identifying 'Australian atoms', an equivalence principle is used. Where AONM loses its separate identity due to mixing, an equivalent quantity is designated as AONM.

Concerns have been raised that the operation of the equivalence principle means there cannot be assurance that Australian uranium does not enter military programs. The objective of Australia's bilateral agreements is to ensure that AONM does not contribute to, or enhance, any military purpose. Even if AONM were to be used in a processing stream from which nuclear material was subsequently withdrawn for military use, the presence of the AONM would not add to the quantity or quality of the military material.

1.5.4 Nuclear-weapon and Non-nuclear-weapon States

The NPT establishes rules for Non-nuclear-weapon States and Nuclear-weapon States. Nuclear weapon States were defined on 1 January 1967. Five Nuclear-weapon States are recognised under the NPT: the United States, Russia, the United Kingdom, France and China. The Non-nuclear-weapon States undertake to accept IAEA safeguards on existing and future nuclear activities, for example, nuclear facilities in these countries can be inspected by IAEA inspectors to ensure that the country is complying with the NPT.

Australia requires treaty-level assurance that Nuclear weapon States will only use AONM for peaceful purposes and that it will be covered by the country's safeguards agreement with the IAEA. Nuclear weapon States may designate facilities to be subject to IAEA safeguards under a 'voluntary offer'.

Australian uranium may only be used in facilities under voluntary offer, subject to inspection by the IAEA. This ensures that Australian uranium cannot be diverted into military programs.

[3] *Australian Safeguards and Non-Proliferation Office, Annual Report 2004-2005.*

1.5.5 Australia's bilateral safeguards agreements

Australia has 19 bilateral safeguards agreements, covering 36 countries. In order of entry into force, these are with: the Republic of Korea, the United Kingdom, Finland, the United States, Canada, Sweden, France, Euratom (the Atomic Energy Agency of the European Union, covering European Union member States), the Philippines, Japan, Switzerland, Egypt, the Russian Federation, Mexico, New Zealand, the Czech Republic, the United States (covering supply to Taiwan), Hungary and Argentina.

The Australia-China bilateral safeguards agreements signed on 3 April 2006 are subject to ratification by both countries before they come into effect. It is understood that China has ratified both agreements and Australia may ratify the agreements by the end of 2006.

Australia's bilateral safeguards agreements apply specific conditions, additional to IAEA safeguards, for AONM. The agreements require Australia's consent for retransfers, enrichment beyond 20 per cent and reprocessing. Each bilateral agreement is supplemented by its own administrative arrangement which establishes procedures to ensure the smooth implementation of the agreement's provisions.

1.5.6 Actions in case of breaches

If AONM were used for non-peaceful purposes or could not be accounted for, Australia could exercise its right to suspend or cancel further transfers of nuclear material.

2 Industry overview

2.1 Australia's uranium resources

Australia holds 36 per cent of the world's known low-cost recoverable uranium reserves, with about 85 known uranium deposits and prospects across Australia. Until recently there has been limited exploration over the past 20 years. Given Australia's high prospectivity, the number of known deposits is expected to increase.

Australia's uranium resources are reported using:

- Nuclear Energy Agency (NEA) and International Atomic Energy Agency (IAEA) resource classification schemes for national and international resources
- the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) categories for reporting of individual deposits by mining companies.

Under the NEA–IAEA resource classification scheme, resource estimates are divided into two categories that reflect the level of confidence in the quantities reported. These are:

- Reasonable Assured Resources (RAR)—refers to known deposits that could be recovered within given cost ranges
- Inferred Resources—refers to deposits that are inferred, based on direct geological evidence.

Resources are subdivided into categories based on the cost of production:

- less than US$40/kg U (less than US$15/lb U_3O_8)
- less than US$80/kg U (less than US$30/lb U_3O_8) including resources in the above category
- less than US$130/kg U (less than US$50/lb U_3O_8) including resources in both of the above categories.

Australia's RAR recoverable at less than US$40/kg U were estimated to be about 716 000 t U, or 36 per cent of world resources in this category, at January 2005. Australia's total Identified Resources (RAR plus Inferred Resources) recoverable at less than US$40/kg U amounted to 1 094 005 t U as at January 2005[4].

About 96 per cent of Australia's total RAR recoverable at less than $US40/kg U are within seven deposits:

- Olympic Dam, South Australia
- Ranger, Northern Territory
- Jabiluka, Northern Territory
- Koongarra, Northern Territory
- Valhalla, Queensland
- Kintyre, Western Australia
- Yeelirrie, Western Australia.

Table 1 presents uranium resources for the States and the Northern Territory. Resource estimates are reported in tonnes of uranium recoverable from mineable ore (that is, the estimates include allowances for ore dilution, mining and milling losses).

There are no resources reported for New South Wales, Victoria and Tasmania. New South Wales and Victoria have legislation that prohibits the exploration and mining of uranium. Exploration for uranium in Tasmania has been limited to date.

[4] Geoscience Australia, *Australia's Identified Mineral Resources 2006.*

Table 1 Australia's uranium resources for each State and Territory, December 2005

	Reasonably Assured Resources (tU_3O_8)				Inferred Resources (tU_3O_8)				Total Identified Resources[a] (tU_3O_8)			
	<US$40/kg U		<US$80/kg U		<US$40/kg U		<US$80/kg U		<US$40/kg U		<US$80/kg U	
SA	604 733	72%	604 733	70%	347 688	78%	358 879	74%	952 421	74%	963 612	72%
NT	152 178	18%	155 583	18%	80 239	18%	86 538	18%	232 417	18%	242 121	18%
WA	70 277	8%	72 626	8%	8 811	2%	22 930	5%	79 088	6%	95 556	7%
Qld	16 575	2%	30 506	4%	9 600	2%	14 771	3%	26 175	2%	45 277	3%
NSW	0	0	0	0	0	0	0	0	0	0	0	0
Vic.	0	0	0	0	0	0	0	0	0	0	0	0
Tas.	0	0	0	0	0	0	0	0	0	0	0	0
Total	843 763	100%	863 448	100%	446 338	100%	483 118	100%	1 290 101	100%	1 346 566	100%
Total t U	**715 511**		**732 204**		**378 495**		**409 684**		**1 094 005**		**1 141 888**	

a Reasonably Assured Resources plus Inferred Resources.

Source: Geoscience Australia.

Appendix C includes the latest estimates of ore reserves and mineral resources for individual deposits as reported by mining companies. Appendix D shows the locations of uranium deposits, and the relative sizes of ore reserves and mineral resources for each deposit, based on company figures.

2.2 Australia's uranium resources in a global context

Australia has the world's largest resources of uranium in RAR recoverable at less than US$40/kg U, with 36 per cent of world resources in this category (Table 2). Other countries with large uranium resources at less than US$40/kg U include Canada (17 per cent), Kazakhstan (16 per cent) and South Africa (7 per cent).

Table 2 Reasonably Assured Resources (t U), as at January 2005

	<US$40/kg U	<US$80/kg U[a]	<US$130/kg[b] U
Australia	716 000	732 000	747 000
Brazil	139 900	157 700	157 700
Canada	287 200	345 200	345 200
China[c]	25 795	38 019	38 019
Kazakhstan	278 840	378 290	513 897
Mongolia[c]	7 950	46 200	46 200
Namibia	62 186	151 321	182 556
Niger	172 866	180 466	180 466
Russian Federation	57 530	131 750	131 750
South Africa	88 548	177 147	255 593
Ukraine[c]	28 005	58 498	66 706
United States[d]	NR	102 000	34 200
Uzbekistan[c]	59 743	59 743	76 936
Others[e]	37 820	103 009	520 466
Total adjusted for losses[f]	**1 962 383**	**2 661 343**	**3 296 689**

NR = not reported.

a Resources in <US$80/kg category include resources in the <US$40/kg category.

b Resources in <US$130/kg category include resources in the <US$80/kg category.

c In situ resources were adjusted by NEA–IAEA Secretariat to estimate recoverable resources.

d The United States only reports total RAR recoverable at <US$80/kg. The proportion of this total that is in the <US$40/kg category is not reported.

e Algeria, Argentina, Bulgaria, the Central African Republic, Congo, the Czech Republic, Gabon, Greece, Indonesia, Iran, Italy, Malawi, Mexico, Peru, Portugal, Slovenia, Spain and Zimbabwe.

f Totals are higher than the sum of all figures in the table because certain countries do not report resource estimates for reasons of confidentiality.

Sources: Data for Australia compiled by Geoscience Australia. Estimates for all other countries are from OECD–NEA and IAEA (2005), Uranium 2005: Resources, Production and Demand.

2.3 Exploration in Australia

With a strong economic record, political stability, world-class industry capabilities, a culture of innovation, excellent research and development infrastructure, and an open regulatory environment, Australia provides an attractive investment environment.

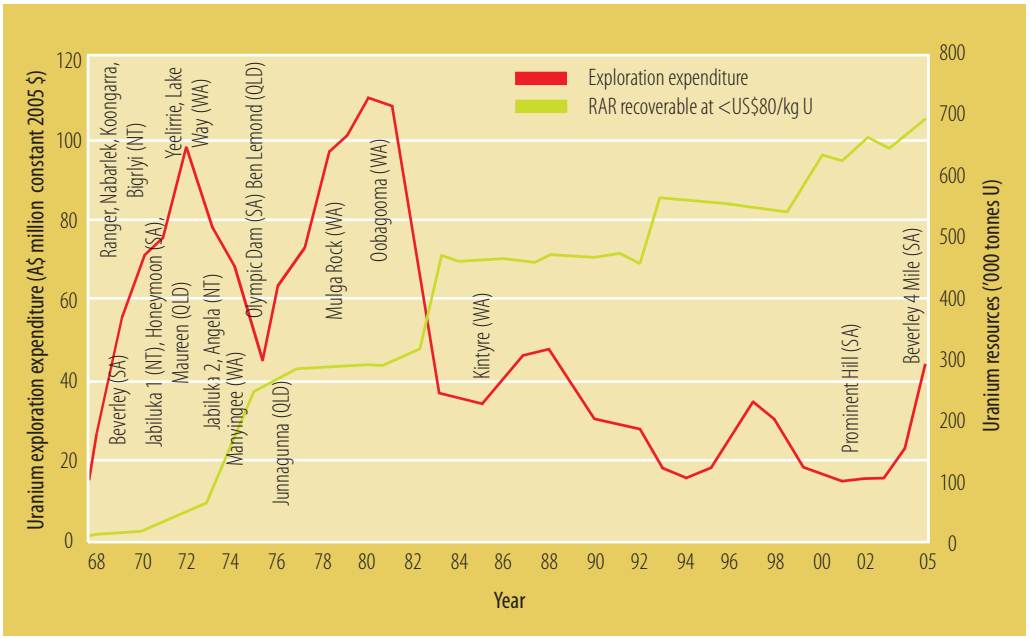
Historically, uranium exploration in Australia has been highly successful. Exploration between 1969 and 1975, revealed about 50 deposits, with several of them in the world-class category. Six deposits were discovered between 1976 to 2005, with only one (Kintyre, Western Australia) having RAR recoverable at less than US$40/kg U (Figure 2).

Annual expenditure on uranium exploration in Australia fell progressively for 20 years from its peak in 1980 (Figure 2). The number of exploration companies actively exploring in the late 1970s and early 1980s declined from around 60 to 5 in 2003. The decline in exploration expenditure resulted from several factors:

- falling uranium prices—over two decades prices fell from an average of US$42.57/lb U_3O_8 in 1979 to an average of US$8.30/lb U_3O_8 in 2002
- increased availability of international supply from secondary sources in many countries, primarily highly enriched uranium (HEU) stocks and stockpiles held by utilities
- restrictions in most States on uranium exploration and/or mining.

Despite limited discoveries since 1975, Australia's economically recoverable uranium resources have continued to increase. This is the result of the delineation of resources at known deposits, particularly at Olympic Dam.

Figure 2 Trends in uranium exploration expenditures,* discovery of deposits and growth in Australia's uranium resources, 1967–2005



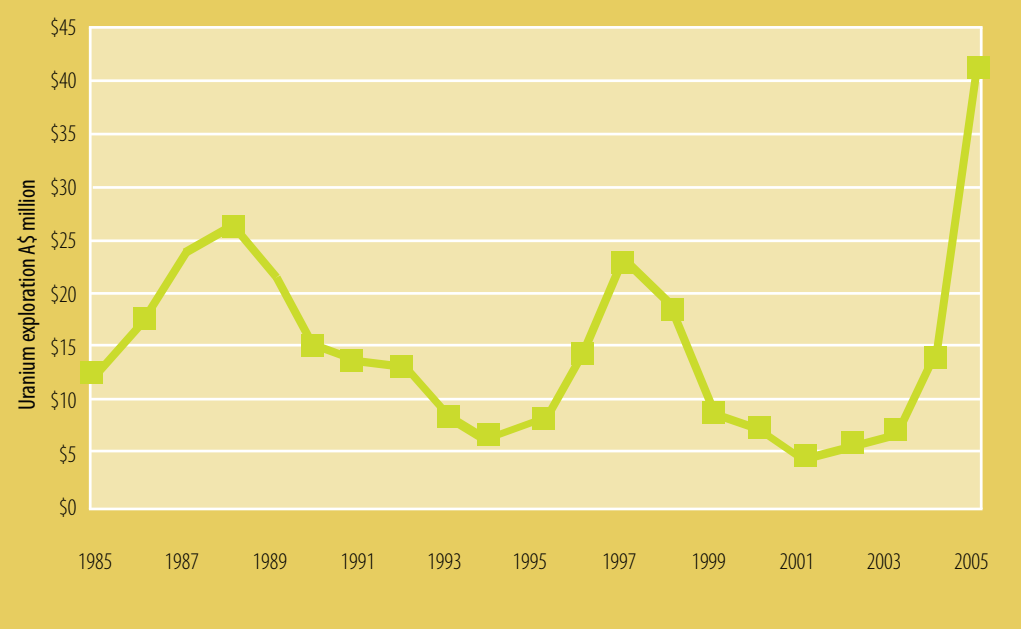
*Expenditures are in constant 2005 Australian dollar (A$) terms.

Source: Geoscience Australia.

2.3.1 Recent exploration activity

Expenditure on uranium exploration in 2005 was A$41.09 million, representing a three-fold increase from A$13.96 million in 2004 (Figure 3). Expenditure in 2005 was the highest annual figure since 1988. There were 70 active exploration projects in 2005, compared with 14 projects in 2004. The number of companies actively exploring for uranium increased from five at the start of 2004 to more than 34 by late 2005.

Figure 3 Uranium exploration expenditure in Australia, 1985–2005*



* Exploration expenditures are in current A$ terms.

Source: Geoscience Australia.

The increase in activity was in response to a resurgence in spot market prices from US$17.98/lb U_3O_8 in June 2003 to more than US$48.50/lb U_3O_8 (about US$118/kg U) in August 2006 (see Figure 7 in Section 2.5).

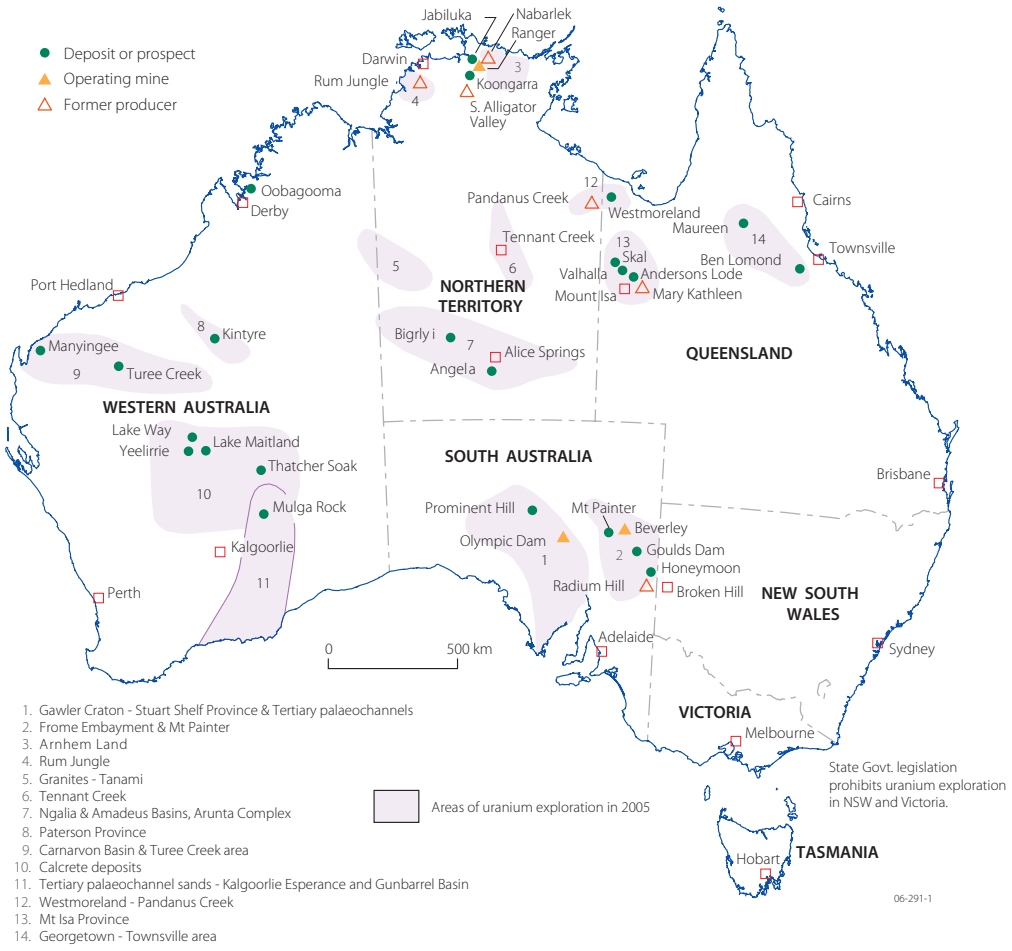
The proportion of total 2005 uranium exploration expenditure in each jurisdiction was South Australia 42 per cent, Northern Territory 37 per cent, Queensland 15 per cent and Western Australia 6 per cent. South Australia and the Northern Territory accounted for almost 80 per cent of the total. The main areas of exploration (Figure 4) were:

- South Australia—Gawler Craton–Stuart Shelf region, Tertiary palaeochannel sediments of the Frome Embayment and palaeochannels overlying the Gawler Craton
- Northern Territory—Alligator Rivers region including the Rum Jungle area and Western Arnhem Land, Ngalia Basin (including Napperby project in Tertiary sediments overlying the Ngalia Basin)
- Queensland—Mount Isa province.

Furthermore in support of the continued growth in exploration, the Australian Government announced additional funding for Geoscience Australia[5] to facilitate the provision of high-quality, pre-competitive geoscience information. This will support Australia's continued attractiveness as a destination for investment in uranium exploration.

[5] The national agency for geoscience research and geospatial information

Figure 4 Areas of uranium exploration, 2005



Source: Geoscience Australia.

2.3.2 World exploration

There was very little international uranium exploration between 1985 and 2004. Exploration has since been stimulated by the rise in the uranium market price. In 2005, Australia, Canada, France and Switzerland were the only countries to report non-domestic exploration expenditures. Expenditure amounted to in excess of US$146 million, more than seven times the total expenditure in 2003.

The bulk of 2004 exploration was reported in only seven countries: Australia, Canada, India, Kazakhstan, Russia, the United States and Uzbekistan. Exploration expenditures are expected to continue increasing to a minimum of US$196 million in 2005.

2.4 Production

2.4.1 World production

In recent years, the majority of uranium mine production has occurred in seven countries: Canada, Australia, Kazakhstan, Niger, the Russian Federation, Namibia and Uzbekistan (see Figure 5). The two largest producers, Canada (28 per cent) and Australia (23 per cent), accounted for more than 50 per cent of world production in 2005. The rising star in world uranium production is Kazakhstan, which is expected to significantly increase its output over the next 10 years, positioning the country on par with Canada and Australia[6].

The recent increase in U_3O_8 prices has encouraged higher mine output and exploration activity. World uranium mine production increased by almost 11 per cent from 42 512 t U_3O_8 in 2002 to 47 480 t U_3O_8 in 2004. Production in 2005 was 41 595 t U_3O_8, 4 per cent higher than in 2004, due to higher production in Australia and Kazakhstan.

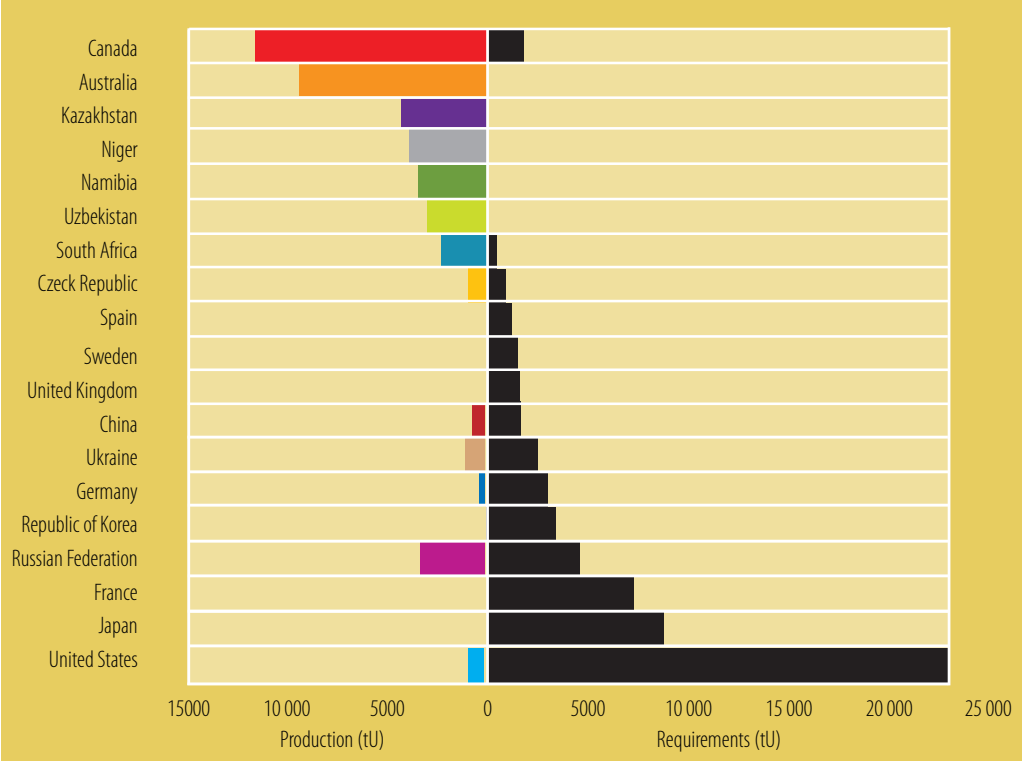
6 Kidd, S, 2005, 'Will there be enough uranium to fuel growth?', *Nuclear Engineering International*, November.

In 2005, the world's largest producer of uranium, Cameco, accounted for 20 per cent of the world's uranium production. Cameco plans to increase production at its Canadian mines by more than four per cent in 2006. The company has applied for an increase in annual licensed capacity for its McArthur River and Key Lake Mill mines. Construction began at Cameco's Cigar Lake mine on 1 January 2005 and was scheduled for completion in late 2007, however construction is now expected to be delayed by at least a year after the mine experienced a significant water inflow following a rock fall in October 2006. Once production begins, there will be a ramp-up period of up to three years before the mine reaches full production[7].

Production from Rio Tinto's Rössing mine in Namibia was 3711 t U_3O_8 in 2005. The Rössing mine produces about eight per cent of the world's uranium. The first production from Paladin Resources' Langer Heinrich deposit (1180 t U_3O_8 per year) in Namibia is expected in late 2006[8].

The major uranium producers in Kazakhstan include Kazatomprom, Kazakhstan JV Betpak Dala and KATCO (Kazakhstan–France joint venture). Kazakhstan's State-owned uranium producer, Kazatomprom, has plans to become one of the leading uranium producers by bringing its output to 15 000 t U per year by 2010[9].

Figure 5 Uranium production and nuclear power reactor-related requirements in 2005 for major producing and consuming countries



Source: Uranium 2005: Resources, Production and Demand, OECD/Nuclear Energy Agency & IAEA.

2.4.2 Australian production

Between 1954 and 1971, Australia produced about 7732 t U from plants at five locations (Table 3)[10]. The mines were developed to satisfy contracts with the United Kingdom Atomic Energy Authority (UKAEA) and the Combined Development Agency (CDA), which was a joint United Kingdom-United States uranium purchasing agency. Capital investment in mining and treatment (in current Australian dollars) amounted to about $50 million and exports earned $164 million.

7 Cameco Corporation, 2006, www.cameco.com.

8 ABARE, *Australian Commodities,* September quarter 2005.

9 *Nuclear Engineering International,* December 2005.

10 Warner, RK, 1976, 'The Australian uranium industry', *Atomic Energy in Australia,* 19(2), 9–31.

The first phase of uranium production in Australia ceased following the closure of the Rum Jungle plant in 1971, however, uranium exploration activities continued.

Table 3 First Australian uranium production phase, 1954–1971

	Rum Jungle (NT)	Radium Hill (SA)	Mary Kathleen (Qld)	South Alligator Valley (NT)	
				United Uranium NL	South Alligator Uranium NL
Production began	1954	1954	1958	1959	1959
Production ended	1971	1962	1963	1964	1962
Mining method	Open-cut	Underground	Open-cut	Open-cut and underground	Underground
Ore treated (t)	863 000	970 000	2 947 000	128 000	13 500
Average grade (% U)	0.24–0.34	0.59–0.76	0.20	0.30–0.58	0.95
Production (t U)	2993	721	3460	441	117
Export contract					
Purchaser	CDA	CDA	UKAEA	UKAEA	UKAEA
Quantity (t U)	1255	721	3460	441	100

CDA = Combined Development Agency, UKAEA = United Kingdom Atomic Energy Authority.

Source: Uranium Information Centre www.uic.com.au

Today there are three operating uranium mines in Australia: Ranger, an open-cut mine in the Northern Territory; Olympic Dam, an underground mine in South Australia; and Beverley, an in situ leach mine also in South Australia. A fourth mine—another in situ leach mine—Honeymoon, in South Australia is expected to commence operation in early 2008.

In 2005, Australia produced a record 11 217 t U_3O_8 (Table 4), accounting for 23 per cent of world production. Australia is the world's second largest producer after Canada, which produced 13 713 t U_3O_8 (28 per cent of world production) in 2005.

Table 4 Australian uranium production, 2000–2005

	2000	2001	2002	2003	2004	2005
Production (tonnes U)	7579	7720	6854	7572	8982	9512
Production (tonnes U_3O_8)	8937	9104	8083	8931	10 592	11 217

Source: Department of Industry, Tourism and Resources, 2005.

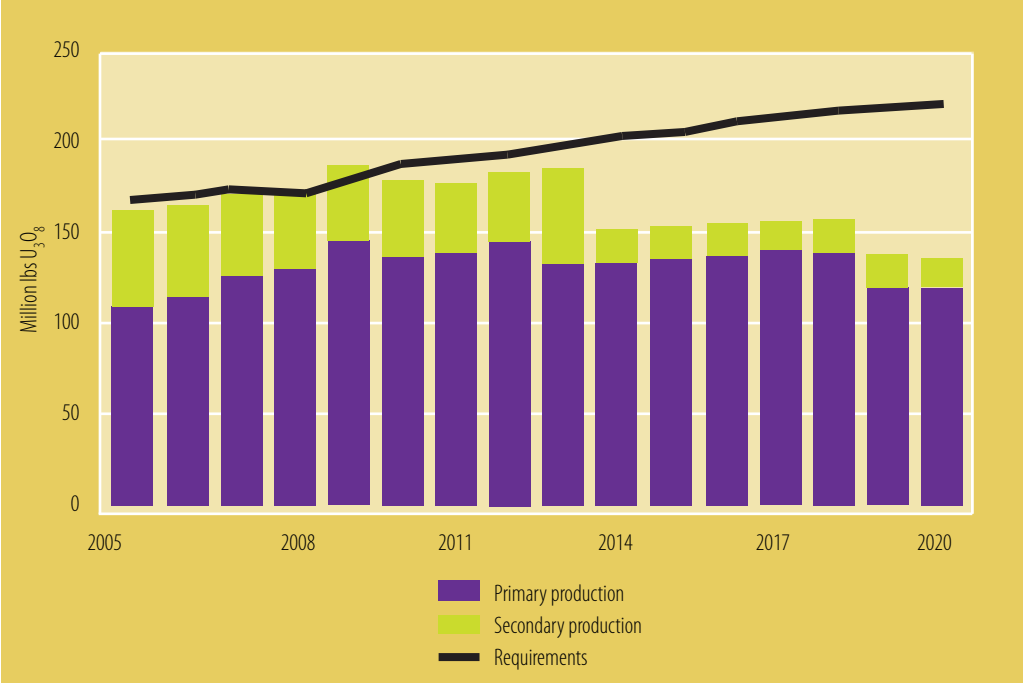
2.5 Secondary supplies of uranium

Uranium is unique among energy fuel resources as a significant portion of international demand is still supplied from secondary sources rather than mine production. Secondary sources include:

- stockpiles of natural and low-enriched uranium held by electricity utilities and conversion plants
- highly enriched uranium (HEU) from ex-military stockpiles in the Russian Federation and the United States that have become available to commercial markets with the dismantling of nuclear weapons
- re-enrichment of depleted uranium 'tails'—residual fissile material recovered from depleted uranium tails at enrichment plants
- recycled uranium and plutonium from spent fuel—mixed oxide (MOX) fuel.

Uranium mine production supplies about 63 per cent of annual world nuclear power reactor demand, with the balance met from secondary sources. Recent forecasts indicate that secondary supplies will decline from 2005 (Figure 6).

Figure 6 Predicted uranium supply–demand balance, 2005–2020



Source: Energy Economist, Issue 297, July 2006.

Uranium from secondary sources has had a significant impact on the market and, although its market share is declining, it is expected to continue to play a major role in supplying commercial markets in the near future. With sustained high uranium prices, the reprocessing of spent nuclear fuel and subsequent recycling of reprocessed uranium and plutonium in MOX fuel now look increasingly economic.

There is uncertainty about the size of available secondary stocks because many countries are unable (due to confidentiality requirements) to provide detailed information on stockpiles held by governments (ex-military stockpiles) and consumers.

Military uranium for weapons is enriched to significantly higher levels than uranium used in the civil fuel cycle. Weapons-grade is more than 90 per cent U-235, which can be diluted about 25:1 with depleted uranium (or 30:1 with enriched depleted uranium) to reduce it to about four per cent U-235, suitable for use in a nuclear power reactor. From 2000, the dilution of 30 t of military HEU per year is displacing about 10 600 t U_3O_8 mine production per year, which represents around 13 per cent of world reactor requirements[11].

The United States–Russia HEU Agreement (commonly referred to as the Megatons to Megawatts Program), was signed in 1993. Spanning 20 years, the program sets out to convert 500 t HEU (about 152 000 t U) from dismantled Russian nuclear warheads into low-enriched uranium suitable for American nuclear power reactors. At the end of June 2006, about 275 t of HEU (the equivalent of around 11 000 warheads) had been converted into 8090 t of low-enriched uranium fuel, for which Tenex in Russia had received US$4.1 billion[12]. Since the program was initiated, around 85 000 t U of mine production has been displaced.

In a significant development over the past few years, mine production in the Russian Federation has been insufficient to meet the country's growing demand for electricity generation. Consequently, supplies of HEU are being retained by the Russian Federation for domestic electricity generation, rather than being sold into the world market.

It is clear that by about 2020 there will be a considerably greater requirement for primary uranium from mine production. Given the long lead times for environmental clearances and permitting of new uranium mines, this means that new discoveries will be required as soon as possible if demand continues to grow.

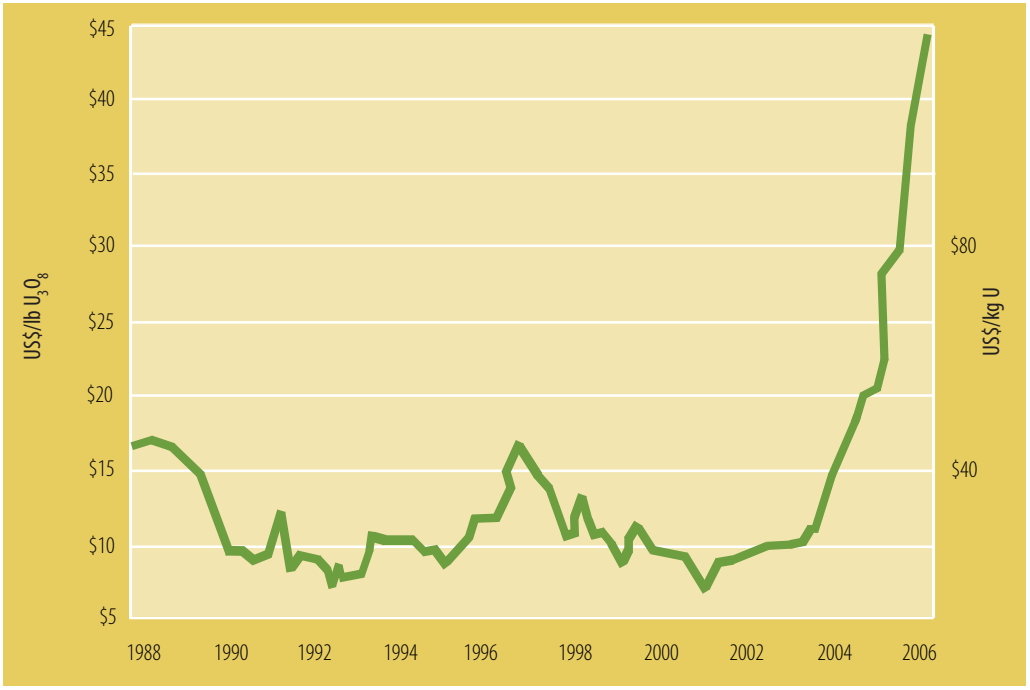
11 Uranium Information Centre, www.uic.com.au/nip04.htm

12 Uranium Information Centre, www.uic.com.au

World U_3O_8 prices are forecast to continue rising in the short term, with the underlying deficit between uranium supply (mine production and secondary sources) and consumption leading to a decline in stocks.

The dwindling supply of uranium stocks—particularly for commercial nuclear power plants—and increased concerns over the future supply of secondary sources of uranium resulted in a strong increase in world spot prices for U_3O_8 from 2003 to mid-2006 (Figure 7)[13].

Figure 7 Spot market prices for uranium, 1987–2006 (current US$ terms)



Source: Ux Consulting Company.

[13] Ux Consulting Company, www.uxc.com

3 Uranium stewardship—integral to a sustainable development approach for resource management

3.1 Sustainable development

The future of the Australian mining industry is inseparable from the global pursuit of sustainable development. Through the integration of economic progress, responsible social development and effective environmental management, the industry is committed to contributing to the sustained growth and prosperity of existing and future generations.

The Australian mining industry's concept of sustainability is founded in the outcomes of the United Nations Commission on Environment and Development (the Brundtland Commission) which describe it as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'. This definition has been confirmed most recently at the World Summit on Sustainable Development. It has gained wide acceptance, leading to broad consistency in the understanding and application of sustainable development among stakeholders.

In the mining and metals sector, sustainable development means that investments in mining projects should be financially profitable, technically appropriate, environmentally sound and socially responsible.

"Enduring Value - The Australian Minerals Industry Framework for Sustainable Development" provides the principal framework for supporting the uptake of policies to ensure that current activities in the minerals sector do not compromise the ability of future generations to meet their own needs.

Companies that embrace sustainable development effectively create value by reducing their risk profile, improving productivity, and sustaining access to land and the ore resource, capital, markets and skilled people. Coupled with regulatory compliance, this constitutes a continuing licence to operate.

There is an emerging consensus among interested parties within the community that delivery on sustainable development goals is dependent upon an integrated, whole-of-life cycle management strategy founded in 'market pull', rather than 'production push'. This evolving concept is referred to as materials stewardship.

3.2 Materials stewardship

Materials stewardship is the management of materials, resources, processes and products throughout their life cycle to maximise value and minimise the safety, environmental and social impacts of their production, use, recycling and disposal.

Stewardship is a management strategy linking all participants in the life cycle of a product. It encourages shared responsibility in the mitigation of negative environmental impacts and the enhancement of social outcomes.

Materials stewardship is the preferred nomenclature for the Australian minerals sector. It best describes the shared responsibility ethos of the sector, the upstream position of the minerals sector in the value chain, and its broad range of principles, policies and commercial applications.

Materials stewardship provides a platform to support continuous improvement in the economic, social and environmental performance of the Australian mining industry, and provides a transparent demonstration of industry performance to external stakeholders.

A key outcome of materials stewardship is transparent and credible demonstration to stakeholders and the general public that the mining industry is an effective and sustainable steward of the materials it handles, and of the community's and environment's health and safety.

Materials stewardship provides an enabling framework for participants in the value chain to demonstrate their environmental and social stewardship on a platform of shared responsibility and interests. This is fundamentally different from mandated product take-back systems, legislated as Extended Producer Responsibility (EPR), which originated from Europe in the early 1990s.

A flaw in EPR is that it places responsibility for managing the environmental and social impacts of a product with the producer and absolves the end-user of any responsibility in the product life cycle. The imposition of a stewardship regime in a punitive and regulatory manner is inappropriate. It does not provide for the effective and shared responsibility of participants through the value chain. It is contrary to the objectives of sustainable development, denies opportunities to change attitudes and behaviours, and limits commercial opportunities through the value chain for the effective management of minerals resources.

3.3 Uranium stewardship

The major potential challenges to sustainable development within the industry arise from the processing, use and disposal of products derived from uranium, which is extensively transformed following its export from Australia.

Ongoing community concerns and associated political restrictions remain key impediments to the sustainable growth of the industry in Australia, to its ability to respond to expected growth in world energy demand, and to maximise its contribution to sustainable development.

There is a need to reassure the community that the flow of uranium throughout its value chain, and the potential risks (both real and perceived) to human health and the environment are both understood and adequately controlled through effective regulation. In particular, the controls currently provided by international safeguards agreements operated by the International Atomic Energy Agency (IAEA) and the Australian Safeguards and Non-Proliferation Office (ASNO) need to be more widely communicated.

Uranium stewardship provides a useful means of addressing impediments to the sustainable development of the industry. Better demonstration of how uranium is managed by operators of each step of the uranium fuel cycle will assist in shaping public perceptions and building community confidence.

As a significant supplier of uranium to the world market, the Australian industry has an interest in the stewardship of uranium throughout its value chain. This includes the various inputs and outputs, physical and management controls created by international and bilateral agreements, and the respective responsibilities of custodians at each stage of the life cycle.

Defining the industry's, and an individual company's, sphere of influence is a key component of stewardship. Those aspects of the value chain for which it has direct responsibility are differentiated from those in which it has shared interests, but no direct responsibility.

While the Australian mining industry's primary focus is on its direct responsibilities for continually improving the environmental and social performance of its mining operations, a uranium stewardship platform provides the industry with the capacity to engage in the global life cycle of uranium use and management by influencing the actions of other stakeholders. Where uranium stewardship is demonstrably effective, this mitigates the need for additional regulatory controls or compliance measures (licence conditions).

With regard to spent fuel management and long-term waste disposal, for example, the Australian industry needs to be confident that these matters are being appropriately managed by the countries that create the spent fuel and waste—in an internationally appropriate manner, consistent with uranium stewardship objectives.

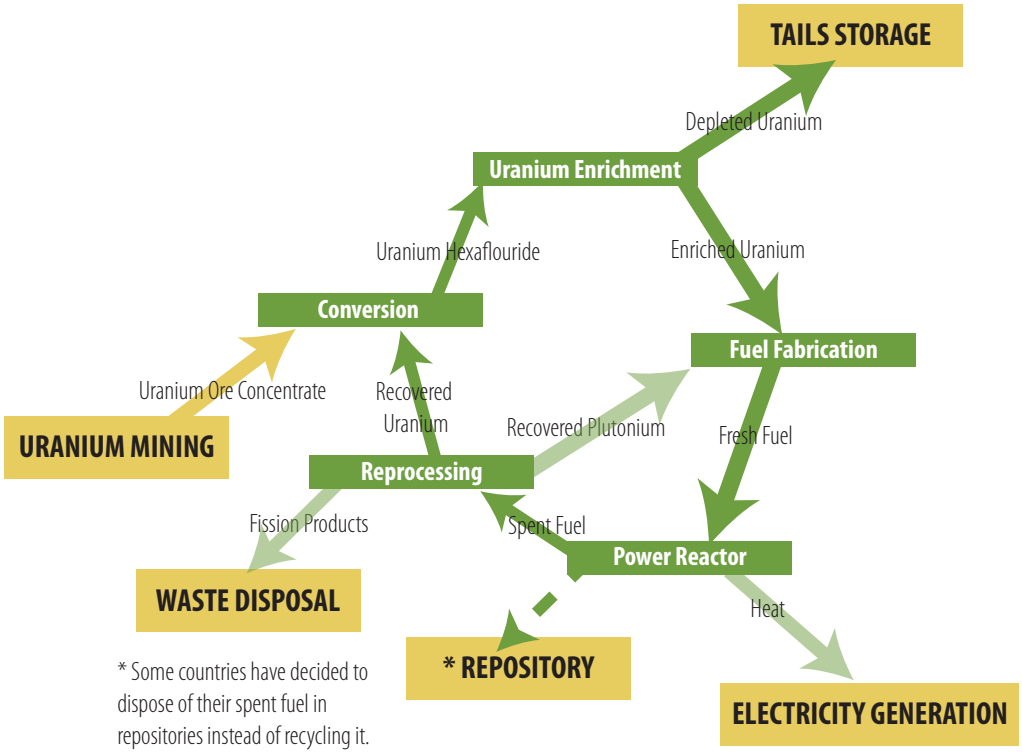
3.4 A global strategy

Australian uranium mining is the first stage of the global nuclear fuel cycle (Figure 8), therefore, uranium stewardship needs to be constructed on a global platform. Australia's direct responsibilities centre on sustainable development of Australia's uranium resources, and ensuring and maintaining a receptive political and community response to this development. A critical adjunct to this is Australia's engagement in a global uranium stewardship dialogue.

A Uranium Stewardship Working Group has been established by the World Nuclear Association (WNA)[14], in which Australian companies are variously engaged. It is critical that stewardship programs developed within the Australian industry are informed by, and do not unnecessarily duplicate, the established principles and practices already being implemented in the global uranium energy industry.

[14] The World Nuclear Association represents the technology, people and organisations of the global nuclear energy industry.

Figure 8 Uranium stewardship covers the global nuclear fuel cycle



Source: *Australian Safeguards and Non-Proliferation Office, Annual Report 2004-2005*.

Complementary to the work of the WNA, Australia has a number of materials stewardship initiatives developed within the overall context of the Australian mining industry's commitment to sustainable development. These include:

- materials stewardship as one of the 10 key platforms to *Enduring Value—the Australian Minerals Industry Framework for Sustainable Development* www.minerals.org.au/enduringvalue
- materials stewardship concepts and tools being developed by the Minerals Council of Australia domestically, and as a member of the International Council on Mining and Metals www.minerals.org.au
- the Australian Government's uranium export and nuclear safeguards controls
- relevant Australian, State and Northern Territory governments' approaches, such as the Ministerial Council on Mineral and Petroleum Resources (MCMPR) Vision for the Australian Minerals and Petroleum Industry in 2025 www.industry.gov.au/mcmpr and the National Environment Protection Measure for Product Stewardship being developed by the Department of the Environment and Heritage
- the Leading Practice Sustainable Development Program for the Mining Industry Handbook on Stewardship developed under the auspices of the Department of Industry, Tourism and Resources, in cooperation with the Department of the Environment and Heritage, industry, State Governments, researchers, non-government organisations and other stakeholders www.industry.gov.au/sdmining
- uranium stewardship initiatives being developed by companies in Australia.

Recommendation 1
The Australian uranium industry will establish a uranium stewardship platform as the basis for its engagement with the global uranium stewardship programs currently being developed by the World Nuclear Association.

4 Competitiveness

Australia's abundant uranium resources, economic strengths, social stability and intellectual capital places the country in a strong position to optimise its contribution to supplying the ever-increasing world market demand for uranium. Current domestic uranium production levels do not reflect the abundance of Australia's uranium resources. While this underperformance partly reflects current political factors, there are some competitiveness issues specifically affecting the uranium industry that need to be addressed to enable Australia to attract additional investment capital and take advantage of emerging market opportunities.

4.1 Issues

The main factors identified by the Competitiveness Working Group affecting the Australian uranium industry's international competitiveness are skills shortages in certain areas and problems in transporting product for export.

4.1.1 Shortage of radiation safety and protection officers

There is a shortage of radiation safety officers (RSOs) available to work in the uranium industry to ensure that uranium operations meet radiation health and safety requirements. This shortage is expected to become a major barrier if there is a significant expansion in uranium production. RSOs will also be required to work in a regulatory role for various government departments. While radiation courses related to medical and occupational hygiene are available, there are currently no existing training courses in the specific skills required by uranium mine operators and regulators. The development of an accredited course would assist in defining standards and skills in this industry.

The 2005 Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (Mining Code), published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), requires the operator and employer to appoint an RSO who has qualifications and experience acceptable to the relevant regulatory authority.

Previous Mining Code guidelines have required RSOs to have tertiary qualifications, preferably in the physical sciences, and at least five years experience in radiation protection in the mining industry. Senior RSOs also require site experience. There are few skilled personnel in Australia who can meet these requirements. A graded approach depending on the scale of the operation is recommended in the Mining Code's safety guide.

A key challenge is to encourage graduates with scientific backgrounds to consider working in mining-related occupations, including radiation safety.

4.1.2 JORC Code skills and training

The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (named the JORC Code after the Australasian Joint Ore Reserves Committee) is part of the Australian Stock Exchange Listing Rules and is therefore mandatory for listed companies. The Australian Securities and Investments Commission uses it when reviewing public reports on exploration results, mineral resources and ore reserves by both listed and unlisted firms. In addition, it is a leading practice industry code.

There is a shortage of 'competent persons' as defined in the JORC Code to report uranium exploration results under the code. While there are no uranium specific requirements in the code, which uses a generic concept of 'competent persons', competent persons are required to have at least five years experience relevant to the activity they undertake and to the style of mineralisation and type of deposit under consideration. They also need to be members of a recognised professional organisation. The JORC Code provides for reciprocal recognition of people who are members of such organisations overseas.

The uranium industry has also highlighted difficulties in measuring and reporting proven and probable uranium ore reserves under the JORC Code for in situ leach operations.

4.1.3 Transport of Uranium Products

The efficient, timely and cost-effective transport of uranium products is an issue of national and international importance. A number of factors affect decisions regarding transport of uranium products:

- Public perceptions of the uranium industry are shaped by a lack of understanding of the diversity of radioactive material. The public and sectors of the transport industry do not differentiate between products with low levels or high levels of radioactivity. The result is that all radioactive material is treated as highly radioactive.
- International standards set by the IAEA on the transport of radioactive material are incorporated in national legislation. Many countries have additional regulations which have not been shown to add to the safe transport of radioactive material. There is considerable inconsistency in regulatory regimes in different countries.
- Over-regulation of transportation of uranium products compared with other dangerous goods. Under State and Territory regulations, for example, State and local governments and emergency response authorities (such as fire brigade and police) must be notified prior to the products being transported by road. Other dangerous goods are not subject to the same stringent transportation requirements.
- Rationalisation and consolidation of the shipping industry. The number of ports at which the parent company calls is often rationalised following a merger or acquisition.
- The remoteness of Australia's uranium mines from ports, and the long distances to conversion facilities in Europe and North America create a competitive disadvantage for Australian uranium producers. Key disadvantages are cost and significant additional time for uranium products to reach their destination.
- Many major international shipping hubs are closed to vessels carrying radioactive material or may not be covered by safeguards arrangements (for example, vessels cannot tranship in the major hub of Malaysia as there is no bilateral safeguards agreement in place to ensure the physical protection of Australian obligated nuclear material). Australian producers are then restricted to using shipping companies that do not call at these ports.
- Higher levels of security in all modes of transport, following the terrorist events in the United States on 11 September 2001 (for example, the International Maritime Organisation developed Chapter XI-2 of the International Convention for the Safety of Life at Sea (SOLAS) and the International Ship and Port Facility Security (ISPS) Code).

These factors contribute to a reluctance of parties to be involved in the transport of uranium, increase scheduling difficulties, lengthen delivery lead times and impose higher operating costs.

Case study: Denial of shipping

Olympic Dam—570 kilometres north-west of Adelaide, and owned and operated by BHP Billiton (BHPB)—began producing and transporting uranium ore concentrate (UOC) to conversion facilities in the United Kingdom, France, the United States (US) and Canada in 1988. BHPB has experienced ongoing denial of shipping constraints in the road, rail and sea transport of UOC. Challenges in road and rail transport in Australia have been met. Access to ports and shipping capability out of Australia, along with the acceptance of radioactive cargos in international ports and associated transport links, are enduring issues.

Due to public sensitivity surrounding radioactive material, the road transport of UOC from Olympic Dam to Port Adelaide began in 1988 with fully escorted convoys accompanied by police, emergency response and clean-up personnel. Convoys were timed to arrive in Port Adelaide in the early hours of the morning, and trained staff oversaw the transfer of the UOC containers directly onto charter vessels. After years of successful road transport with a high safety record, UOC was integrated with normal freight aligned with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Code of Practice for the Safe Transport of Radioactive Material in November 1997.

BHPB continues to encounter difficulty in shipping UOC internationally. The combination of major shipping hubs closed to vessels carrying radioactive cargo and the limitation of route scheduling of major shipping lines cause delays and expense in shipping UOC to conversion facilities in the northern hemisphere. Vessels cannot tranship radioactive material in the major shipping hub of Malaysia, for example, because Australia does not have a bilateral agreement in place to ensure the physical protection of Australian UOC in transhipment. The lack of an agreement reduces the choice of shipping lines and available routes. Vessels departing Port Adelaide and Darwin tranship in Singapore (which has a Physical Protection Agreement with Australia covering the transhipment of UOC). Shipping services from Port Adelaide, the closest port to Olympic Dam, were sporadic and unreliable, and ceased altogether in January 2006. Reopening of shipping through Port Adelaide is being negotiated for late 2006.

Background

Low volumes and the unwillingness of major shipping lines to carry UOC meant that UOC had to be shipped on charter vessels with copper from Olympic Dam for the first 10 years. By early 1999, following the first major expansion of Olympic Dam, volumes of UOC production had increased, coinciding with a greater level of community acceptance of the transport of radioactive material. As a result, BHPB was able to secure carriage of its radioactive material on a regular liner cargo shipping service operating fortnightly from Port Adelaide. A second operator was retained in 1999 providing weekly services to Europe.

UOC containers were discharged in Rotterdam and transported by barge, road and rail to converters in Europe. North American shipments were transhipped to Montreal then carried by rail and road to converters in Canada and the US.

As port and ship security concerns increased following the terrorist events of 11 September 2001, shipping firms have become increasingly reluctant to carry radioactive cargo. The weekly service from Port Adelaide to Europe and North America was withdrawn in 2002, leaving only a fortnightly service which was subsequently downgraded to a monthly service with reduced space for radioactive cargo. A direct service from Port Adelaide to Vancouver operated for only a short time in 2003. It became necessary to charter a vessel in 2004 to clear a backlog of stock.

Uncertainty surrounding shipping services from Port Adelaide created an urgent need to find alternative ports. The New South Wales (NSW) Government refused permission for BHPB to ship UOC through NSW ports, even though other forms of radioactive material, such as mineral sands have been shipped and ANSTO's high flux Australian reactor (HIFAR) spent fuel is routinely shipped from Port Botany. Victoria, Queensland and Western Australia have also refused to allow the export of UOC through their ports.

The only alternative was to ship from Darwin using the Alice Springs–Darwin rail corridor. Following trial transports in early 2005, long-term approval to use the rail corridor was granted by the ASNO and the South Australian and Northern Territory governments. Due to reduced shipping services from Port Adelaide, Darwin became the only Australian port open to the export of UOC.

On-carriage issues after discharge at overseas ports have increased substantially in recent times. Since 11 September 2001, delays at discharge ports in Europe and North America—caused by customs, handling and transfer to on-carriage transports—have eroded the confidence of shipping lines in carrying UOC. The US requires UOC containers (including those x-rayed on discharge in Canada) to be x-rayed at the US border, causing unacceptable delays to trains. Rail companies now refuse to carry UOC, necessitating transport by truck, a less direct, more risky and expensive alternative.

Denial of shipping is a major impediment to uranium producers in Australia which must be addressed, particularly in the context of the current debate on expanding Australia's uranium industry and the Prime Minister's recently announced Review of Uranium Mining, Processing and Nuclear Energy in Australia.

4.2 Options

4.2.1 Radiation safety and protection officers

The Industry Experience for Undergraduates Program established by the Minerals Council of Australia under the Minerals Tertiary Education Council includes online recruitment that matches the work experience needs of students to the needs of employers in the mining industry. This system is one pathway that may be used to recruit tertiary students to undertake work experience in areas related to radiation protection.

Arrangements to establish a training course covering radiation safety skills relevant to the mining industry should be considered and pursued. This should include consideration of a suitable course provider (such as a government agency, a tertiary institution, or one or more consultants), the design of the course, where it would be delivered, and an accredited assessment process.

Such a course should be aligned with the competencies being incorporated into ARPANSA's National Directory for Radiation Protection to allow skills to be recognised nationally through a national certification process. To assist this process, course material should be developed in consultation with Commonwealth, State and Territory regulators, industry and other stakeholders. It is expected that, where appropriate, some parts of the course material could be prepared from training courses, such as the mining and milling of radioactive ores course run by the Australian Radiation Laboratory (ARL—the predecessor of ARPANSA) in the late 1970s and 1980s, and information from the Australian Nuclear Science and Technical Organisation (ANSTO) and consultants. Input from the National Directory Uniformity Implementation Panel (Radiation Control) on course design and assessment should be sought. The Australian Radiation Protection Society may also be consulted on the basic requirements for RSO training.

The design and delivery of a training course would need to take into account the likely demand for training. While there are a limited number of uranium operations, mines need to have back-ups and redundancy in their systems. Knowledge of radiation protection could be linked to opportunities for career advancement where appropriate.

It is expected that participants in the course would have relevant qualifications, industry experience, or both, and that a short course (a few weeks) followed by six to 12 months of on-site training under the guidance of a mentor would be required before a final assessment. The assessment process could also be used to recognise overseas qualifications and previous experience for people already working in the field.

A key factor for attaining enough trained quality radiation safety officers for the industry is a successful marketing and recruitment strategy developed to attract suitable personnel.

Recommendation 2
The Australian Government, State and Territory governments and industry, in consultation with relevant educational institutions, should develop a course on mining-related radiation safety and protection to meet the needs of mining operators and regulators, including accreditation of coursework and related industrial experience and the development of a national certification process for radiation safety officers.
Recommendation 3
Industry in partnership with the Australian Government and relevant State and Territory governments will work with educational institutions to develop strategies aimed at attracting current personnel from industry into relevant established courses, where available.

4.2.2 JORC Code skills

The Australian Institute of Mining and Metallurgy (AusIMM) and the Australian Institute of Geoscientists (AIG) are compiling lists of self-nominations from their members of 'competent persons' with requisite experience to report uranium exploration results under the JORC Code. The lists will be placed on the AusIMM and AIG web sites.

A paper on the reporting of uranium resources and reserves under the JORC Code, prepared under the auspices of the UIF in consultation with the JORC, would benefit both industry and regulators. The paper would need to include relevant case studies to illustrate approaches being adopted by companies, most notably in relation to in situ leaching operations. The paper could also focus on raising industry awareness of the code and its obligations and be presented to industry conferences and made available to the uranium industry. Other supporting information could be prepared, if required.

Recommendation 4

In consultation with the Joint Ore Reserves Committee (JORC), a paper and relevant supporting material on all aspects of the measurement and reporting of uranium resources and reserves under the JORC Code should be developed for dissemination to uranium exploration and mining companies and presentation at suitable industry conferences. The paper should provide information to ensure that the JORC Code is properly understood and applied, and include case studies related to uranium mining, particularly in relation to in situ leach mining.

4.2.3 Transport

Strategies to address transport problems should be devised through a two-tiered domestic and international approach. It is important to deal with these matters early to enable projected expansions in uranium production to be accommodated in the transport chain.

Safety issues concerning the transport of uranium are addressed by ARPANSA's Code of Practice for the Safe Transport of Radioactive Material. Implementation of the code leads to uniformity in regulation of transport of radioactive materials, ensuring the application of international best practice, as the code is based on the IAEA safety regulation. Australian States and Territories (with the exception of Victoria) have adopted the code in legislation or licence conditions.

Work needs to be done to ensure the consistent application of uranium transport standards across State and Territory jurisdictions, removing existing regulations that exceed ARPANSA's code without improving health and safety outcomes.

The approval of transport plans by a single body would reduce the time required to develop plans and provide regulatory consistency between jurisdictions.

Efficient storage on wharves for UOC must be developed. Measures for safe storage of UOC at ports do not depart significantly from the storage requirements for other dangerous goods.

Work is needed to improve the perception of the adequacy of safety standards and training for regulators and operators in order to promote acceptance of uranium transport.

The lack of access to State and Territory ports other than Port Adelaide and Port Darwin is a critical factor limiting uranium transport. Stakeholders should lobby State Governments for access to ports, for example, New South Wales is close to existing mines and Port Botany routinely ships radioactive material such ANSTO's HIFAR spent fuel.

The support of the Council of Australian Governments (COAG) is essential in gaining the cooperation of State and Territory regulators and ports. These issues should be raised at Ministerial Council level such as with the Australian Transport Council and the MCMPR, with a view to submitting a paper to COAG.

Internationally, denial of shipping in uranium products is pursued in a number of forums. The IAEA has established a steering committee to oversee denial of shipping and the World Nuclear Transport Institute (an international industry-funded umbrella organisation) has established a denial of shipping working group. The Australian Government, the uranium industry and stakeholders are actively involved in these forums.

Bilateral discussions should be held to facilitate the trans-boundary movement of uranium and negotiate changes to port access and transport routes. Bilateral agreements should also be negotiated, for example, with Malaysia.

Governments and industry must work together to ensure a consistent approach to the transport of uranium products. The path ahead will be resource intensive and require ongoing effort to ensure results in the long term.

Recommendation 5

An approach should be made through the Australian Transport Council and/or the Ministerial Council on Mineral and Petroleum Resources (MCMPR) to the Council of Australian Governments proposing the establishment of a single body to oversee a national approach to the domestic transport of uranium. The body would seek agreement between the States and Territories that no regulatory requirements will be imposed on uranium transport over and above ARPANSA's Code of Practice for the Safe Transport of Radioactive Material.

Recommendation 6
The domestic uranium transport requirements of existing and potential new mines should be assessed and stakeholders should lobby State and Territory governments for access to ports and transport infrastructure.
Recommendation 7
Government and industry should develop a strategy to address denial of shipping internationally, including representation at multilateral and bilateral forums.
Recommendation 8
A consultative forum should be established with representatives from the Australian Government, State and Territory governments, industry and shipping, air, road and rail transport providers, to discuss the transport of radioactive materials.

4.3 Benchmarking

Benchmarking provides a process to review practices and learn from those achieving world best practice standards. It has been suggested that benchmarking of international royalty regimes, regulation and safety issues against other uranium-producing countries would provide a credible mechanism to demonstrate the industry's commitment to continuous improvement.

4.3.1 Royalty competitiveness

Fiscal competitiveness of the Australian resource sector was the subject of a recent review by the MCMPR. A fiscal working group of the MCMPR examined a range of independent, international studies, which indicated that Australia ranks highly as a destination for investment in the resources sector. This assessment was based on a wide range of factors, including prospectivity, sovereign risk, corporate and resource taxation impacts, infrastructure and labour market conditions. Generally, a jurisdiction with highly attractive features for investors, such as high prospectivity, will use these as leverage to impose a higher tax take. Conversely, low prospectivity or high sovereign risk may lead to a lower fiscal take, reflecting the weaker position of the jurisdiction in relation to the investor. It is therefore inappropriate to consider royalties in isolation from other industry factors.

4.3.2 Regulation and safety regimes

Uranium mining is a highly regulated and monitored industry with existing mines subject to both Australian and relevant State or Territory regulation. Environmental assessment procedures required by both tiers of government before approval of production include a detailed Environmental Impact Statement. During production, regulators visit sites on a regular basis to discuss compliance and other issues, based on extensive monitoring and reporting information provided by the operators. The operators also have their own audit processes, and their customers seek verification of performance, particularly in relation to safety and the environment.

Feedback suggests that attempting to rank Australia against overseas jurisdictions would be difficult due to the unique characteristics of each uranium province and the difficulty of defining objective and verifiable measures. This feedback was provided by a number of Australian Government agencies including the Department of Industry, Tourism and Resources, Australian Nuclear Science and Technology Organisation (ANSTO), the Australian Safeguards and Non-Proliferation Office (ASNO), Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Department of the Environment and Heritage on whether there was merit in funding one or more benchmarking studies.

Transport

Various options are available to Australia to both assess the effectiveness of transport regulation and to advocate improvements where required.

At the request of a country, the IAEA Transport Safety Appraisal Service (TRANSAS) can conduct an appraisal of its transport regulations. Most costs are paid by the applicant, as the IAEA only covers staff salaries. Regional cooperation may be an effective alternative to minimise costs. Relevant transport issues can be raised at the IAEA Transport Safety Standard Committee (TRANSSC) meeting through Australian representatives (ARPANSA).

Environment

Options for benchmarking the environmental performance of the uranium mining industry include comparisons against published leading practice guidelines or environmental requirements attached to current Australian, State and Northern Territory governments' regulations.

The relative level of risk that current existing operations pose in terms of possible environmental harm and non-compliance could also be examined. By measuring the uranium industry's compliance with current regulatory requirements, areas where management principles, systems and operations require improvement may be identified. It is important, however, that this process does not duplicate existing audit and review requirements.

Nuclear safeguards

Safeguards conditions in Australia's bilateral safeguards agreements are similar to those used by the United States and Canada in their safeguards agreements with customer countries. Advice from ASNO, however, is that a benchmarking study on safeguards, while having some value, could be unproductive. The main reason is that publicly available information on safeguards on uranium exports is limited to the agreements each country has with the end user. The details of material accounting procedures under the bilateral safeguards administrative arrangements are confidential between the parties. Therefore, it would be very difficult to gain access to the information necessary to make informed international comparative judgements about the implementation of controls.

Regulatory review

It is noted that ARPANSA has requested the IAEA Department of Nuclear Safety and Security to undertake an international regulatory review of its regulations.

5 Regulation

All sectors of the mining industry in Australia are subject to a range of regulatory arrangements imposed by the Australian, State and Territory governments. However, the uranium industry is subject to more stringent regulation, primarily due mainly to the need:

- to address community concerns about the risks to human health and the environment associated with the mining, milling and transport of uranium
- for strict control over the possession and movement of nuclear materials, arising from national security and nuclear safeguards requirements, and from international obligations arising from the Treaty on the Non-Proliferation of Nuclear Weapons.

Currently, three uranium mines operate in Australia—the Ranger mine in the Northern Territory and the Olympic Dam and Beverley mines in South Australia. The Honeymoon mine in South Australia is expected to commence operations in early 2008. Regulatory arrangements applying to these mines are stringent and complex, and vary across jurisdictions.

Improving the efficiency and effectiveness of current regulatory arrangements at all levels of government, and fostering industry leading-practice, will ensure that Australia's global reputation as a safe, reliable and socially and environmentally responsible supplier of uranium is maintained. A highly effective, efficient and world-class regulatory regime assures the community that all potential risks associated with uranium mining are being effectively controlled and mitigated.

Regulatory certainty and low sovereign risk are both important prerequisites for attracting investment for the expansion of the Australian uranium industry. Enhancing the effectiveness and efficacy of regulatory arrangements will also help to achieve this goal.

Regulatory arrangements applying to the three existing uranium mines in Australia differ across jurisdictions. Reasons for this variance include:

- the Australian Government retains ownership of uranium resources in the Territories but not in the States
- the proximity of the Ranger mine to a World Heritage Area and its location on land owned by Traditional Owners under the Commonwealth *Aboriginal Land (Northern Territory) Act 1976* (ALRA)
- the specific legislative provisions in place for the Olympic Dam mine, which reflect the fact that it has a very long life and is a large-scale operation producing copper, uranium, gold and silver
- the different locations and operations of the mines, for example:
  - the Ranger mine is an open-cut operation in a tropical region where managing surplus water is a key issue
  - Olympic Dam, a large resource that is being considered for open-cut operation, is currently an underground mine in an arid rangeland where water is a limited resource
  - Beverley mine is an in situ leach operation in an arid rangeland where water is a limited resource.

These differences create specific environmental requirements for each mine that are reflected in their respective regulatory regimes. The regulatory regimes for the Australian, South Australian and Northern Territory governments are outlined in Appendix B.

Currently, mining of uranium is permitted only in South Australia and the Northern Territory. New South Wales and Victoria have legislation prohibiting uranium exploration and mining. Western Australia and Queensland have policies that prohibit uranium mining but allow exploration. There are no legislative restrictions on uranium exploration and mining in Tasmania, but no mines operate in that State.

5.1 Issues

While regulatory arrangements for existing uranium mines vary across jurisdictions, relevant State and Northern Territory agencies are responsible for the day-to-day regulation of uranium mining. Furthermore, the commencement of the operation of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) has changed the approvals process and associated regulatory arrangements that would apply for new uranium mines (or the expansion of existing mines) at the Australian Government level. While relatively straightforward, the new

requirements mean that the Australian Government will now be involved in day-to-day regulation, unless agreement can be reached on other arrangements to meet its statutory obligations.

There is no consistent national approach to the regulation of the uranium industry in Australia. This could be considered an impediment to the development of the industry.

A strong and robust regulatory system must be flexible and responsive to changes in economic, environmental and social factors. Regulatory practices also need to be consistent with the 'Principles for Good Regulation' as agreed by the COAG. These provide for, among other things, minimising the impact of regulation on competition and the compliance burden on industry, and for regular review, consistency, flexibility and predictability of outcomes. In addition, regulatory arrangements need to keep pace with developments in mining technology, environmental management systems and international standards.

In a number of industry sectors, regulatory approaches are being changed to outcome-based rather than prescriptive (that is, placing the regulatory focus on the required outcome rather than the means by which the outcome should be achieved). This allows mine operators to use the most efficient means to achieve agreed outcomes which, in turn, fosters innovation.

The uranium industry, like many other industries, has embraced a range of sustainable development measures to improve performance, including environmental management systems, stewardship, third-party certification and triple-bottom-line reporting. In recognition of this, governments are exploring appropriate opportunities for moving to co-regulatory approaches and, in some cases, self-regulatory approaches (often with a safety net). Where practicable, the uranium industry aims to ensure that its performance exceeds what is required by prescriptive regulation.

Given the administrative complexity of regulatory arrangements for the uranium industry, an effective and transparent working relationship between regulatory agencies and mine operators is essential. This could be achieved through regular contact between key personnel and the establishment of a single government administrative point of contact for industry to receive information on and access to government services. Such measures also enable the development of a level of trust and rapport between the regulator and the operator, while maintaining appropriate independence and separation.

5.2 Options

5.2.1 Harmonisation of national regulatory arrangements

Harmonising the regulation of uranium mining and taking account of the different circumstances between jurisdictions (including jurisdictions where uranium mining might be permitted in the future) is important to reduce administrative constraints to the industry. Developing a nationally consistent regulatory regime is not seen as requiring a legally and administratively complex legislative reform process, however some legislative change may be required. A range of other, non-legislative approaches can be developed and implemented to work towards a coherent and nationally consistent policy (examples include memorandums of understanding and codes of practice). Such approaches will need to be outcome focused to encourage the uranium industry to determine the most efficient means of achieving compliance. This is also important in driving and fostering industry innovation. In terms of radiation safety, the Australian, State and Northern Territory governments have made significant progress in the harmonisation of regulations through the development of the National Directory on Radiation Protection and the Mining Code.

Establishment of national guiding principles will provide a framework to identify opportunities for further improvement to the regulatory environment and address any remaining issues. The Olympic Dam expansion provides an example of how the Australian and South Australian governments can achieve outcomes with the existing arrangements through co-operation and collaboration (see the case study on Olympic Dam expansion cooperative assessment process).

Case study: Cooperative assessment processes for the Olympic Dam expansion

BHP Billiton is currently investigating a major expansion of its Olympic Dam copper, uranium, gold and silver mine and associated processing facilities. This expansion has the potential to make Olympic Dam the largest open-cut pit in the world.

In September 2005, the proposal was declared a 'major development' under the South Australian *Development Act 1993* and a controlled action under the Australian Government *Environment Protection and Biodiversity Conservation Act 1999*.

The Australian and South Australian governments have been working together to ensure that for all intents and purposes the separate statutory responsibilities can be met by one joint coordinated assessment process—one set of guidelines and one single Environmental Impact Statement. In addition, public consultation requirements have been aligned to ensure that periods for public comment coincide and are notified in single advertisements and jointly on relevant departmental web sites.

The intent of this cooperative approach is to make the environmental assessment process as streamlined and harmonised as possible. Providing BHP Billiton with one comprehensive and consolidated set of information will assist the company to efficiently manage the assessment process. It will also assist the community to understand and to respond to BHP Billiton's proposed expansion proposal for Olympic Dam, by providing it with one comprehensive and consolidated set of information.

Both the Australian and South Australian governments have, through their relevant departments, actively engaged BHP Billiton in this approach, including agreeing on timelines for meeting the various elements of the environmental assessment process.

5.2.2 Guiding principles for uranium industry regulation

Guiding principles for regulation of the uranium industry would recognise and reflect the respective policy objectives, roles and responsibilities of the Australian, State and Territory governments in relation to the regulation of uranium mining, and position these in an overarching policy framework. Such principles would be high level and supported by a number of agreed objectives and/or outcomes that could be reported on at both levels of government. The principles would aim to provide a basis for ensuring that regulatory arrangements are:

- **Consistent**—Where possible and appropriate, regulatory requirements imposed by government at all levels should be consistent to avoid duplication of effort, redundancies and inefficiencies.
- **Risk based**—Regulatory requirements should be commensurate with the actual level of risk (being a function of the magnitude of impact on human health and the environment of the event, and the probability of the event occurring) involved with the material and/or process.
- **Outcome based**—Regulatory requirements should be outcome based, allowing operators to determine the most efficient and effective means of achieving or exceeding compliance (the principle of 'best practicable technology'). There may be instances, however, where the regulatory outcome requires a specific action, and this should be prescribed.
- **Achieving low sovereign risk**—Australia is recognised globally as a safe, reliable and environmentally responsible supplier of uranium, with a world-class and evolving regulatory regime. It is important that Australia maintains this high standard to continue to attract foreign investment into the industry, support sustainable development and open additional market opportunities.
- **Consistent with world's leading practice**—Regulation should be consistent with world's leading practice standards and, where practicable, should take account of the high level of industry performance in complying with and, in many cases, exceeding regulatory requirements. While the industry will continue to be subject to rigorous regulation due to its nature and the level of public interest, it is important that regulatory arrangements continue to be commensurate with the actual level of risk and that they are effective and efficient, and reflect world's leading practice.
- **Transparent**—While regulatory arrangements should be effective in controlling identified risks, there is also a need to ensure that regulation is seen to be effective by the broader community. Reporting arrangements should be relevant and informative. Community consultative arrangements should be effective and contribute to mutual trust and information exchange between relevant stakeholders. Communication should aim to ensure that all stakeholders are aware of the actual level of risks and the effectiveness of the controls applied to address the risks.

While such principles are already generally consistent with existing regulation for the uranium industry, their articulation should however contribute to its continuous improvement. The issues to be covered by the principles would need to be agreed to by the respective parties, and could include sustainable development, environment protection, stewardship, transport and storage, radiation effects on human health, skills and training, competitiveness, safeguards and fiscal matters (including royalties).

The guiding principles would be developed in consultation with all relevant stakeholders. The principles would be approved and implemented through appropriate agreed arrangements between the Australian Government and relevant State or Territory governments and would reflect the different constitutional responsibilities of the States and Territories in relation to the regulation of uranium mining. The guiding principles would also reflect current world leading practice and would provide useful guidance to new entrants to the uranium industry.

Recommendation 9

The Australian Government and State and Territory governments will work cooperatively to ensure that, where possible, environmental and other regulatory arrangements across jurisdictions are harmonised. All levels of government, in consultation with the uranium industry and other stakeholders, should also apply guiding principles for the regulation of the uranium industry which:

- provide a coherent and consistent policy framework reflecting the respective policy objectives, roles and responsibilities of the Australian Government and the State and Territory governments in relation to the regulation of the uranium industry
- are high level and strategic and include agreed objectives and outcomes that can be reported on at State, Territory and national levels
- are supported by appropriate arrangements between the Australian Government and relevant State and Territory governments.

5.2.3 National arrangements for cooperative regulatory oversight of uranium mining

Under the EPBC Act, protection of the environment from the impacts of uranium mining is defined as a matter of national environmental significance. Proposals for new uranium mines or major expansions to existing uranium mines will therefore be subject to regulation by the Australian Government under the EPBC Act, as well as at the State or Territory level.

As 'the environment' is the matter protected under the EPBC Act in relation to uranium mining, Australian Government regulation covers all aspects of the environment, as broadly defined under the Act. This distinguishes uranium mining from other types of mining, in which Australian Government regulation is generally confined to one or more other matters of national environmental significance, such as threatened species.

It is generally agreed that it is undesirable to have two regulators from different jurisdictions operating on the ground, with the same responsibilities. Nevertheless, different jurisdictions have responsibilities for uranium mining—the States and Territories because they are the principal land managers, and the Australian Government because uranium mining is an agreed matter of national environmental significance. Arrangements need to be developed to ensure continued day-to-day regulation by the States and Territories, but with a coordinated and transparent role for the Australian Government in discharging its responsibilities under the EPBC Act in relation to new or expanded uranium mines in all jurisdictions. Such an approach may also provide an opportunity to streamline current environmental consultation processes between the Australian Government, the South Australian Government and the uranium industry.

The current situation in the Alligator Rivers region of the Northern Territory provides an example of how these arrangements could operate. The Supervising Scientist (a Commonwealth statutory officer who is not a regulator) works with the Northern Territory Government in a cooperative approach to the management of the Ranger uranium mine. Day-to-day regulation is carried out by the Northern Territory Department of Primary Industry, Fisheries and Mines, with the Supervising Scientist having a technical, advisory and supervisory role in relation to environmental requirements issued by the Australian Government Minister for Industry, Tourism and Resources under the *Atomic Energy Act 1953*.

The Ranger uranium mine is, of course, a special case, as it is adjacent to Kakadu National Park one of Australia's most significant World Heritage Areas. While the Supervising Scientist regime may not be entirely applicable to other Australian uranium developments or expansions, it may nevertheless hold some lessons for the development and implementation of cooperative intergovernmental arrangements for uranium mining elsewhere.

Recommendation 10

The Australian Government, in consultation with relevant State and Territory governments, should consider the most appropriate, effective and efficient arrangements required to discharge its regulatory responsibilities in relation to environmental requirements attached to Australian Government approvals of new uranium mines (and expansions of existing mines) in all jurisdictions under the *Environment Protection and Biodiversity Conservation Act 1999*.

5.2.4 Administrative arrangements, community engagement and reporting

A major issue for uranium mine operators is the need to deal day-to-day with a number of different government agencies in each jurisdiction on a range of regulatory and administrative matters related to their business operations. This can involve considerable time and effort, and result in delays and conflicting advice. While each agency has its own legislative and administrative responsibilities, there is scope to improve coordination between agencies to establish a more effective, efficient and streamlined business interface for industry. Such 'one-stop shop' arrangements provide a single point of access through which industry can access and interact with a range of government processes in a seamless and transparent way (see South Australian Government uranium regulation case study).

A 'one-stop shop' at the State or Territory government level could potentially be an administrative access point to relevant Australian Government processes and agencies. Such arrangements are already working effectively in other industry sectors and are supported under the 'Principles for Good Regulation' agreed by COAG. It is therefore proposed that further consideration be given to establishing one-stop shop arrangements where this is appropriate and feasible.

Case study: South Australian government uranium regulation

The South Australian Government is committed to developing a streamlined approach to the environmental regulation of uranium mining. The goal is to simplify resource companies' interaction with government and thereby ensure that they have timely and responsive access to all regulators and advisory services. The South Australian model also provides for increased cooperation and collaboration between State government agencies.

Implementation of the model involves developing agreements between agencies as equal partners. These arrangements can take many forms, but all must clearly:

- outline the framework within which the model is to be implemented
- identify the statutory requirements that are to be satisfied under the arrangements
- define the responsibilities of each agency
- include processes that allow arrangements to be reviewed at regular intervals
- include dispute resolution processes
- result in an overall increase in efficiency of regulation
- minimise regulatory requirements while ensuring adequate regulatory oversight
- include all agencies involved in the environmental regulation of uranium mining
- maintain the ability of any agency to set particular licence conditions, or audit or enforce licence conditions as required under the relevant Acts
- enhance the mechanisms for granting approvals under any Act
- maintain the actual or publicly perceived independence of any agency in fulfilling its roles under the relevant Acts.

The Department of Primary Industries and Resources South Australia and the South Australian Environment Protection Authority are currently discussing how this approach would work for their regulatory responsibilities. The preferred approach is to develop a single document summarising the environmental, social and economic risks of the project to meet the requirements of all relevant agencies, including measurable outcomes to be achieved and a description of the processes involved in meeting and reporting against those outcomes.

This model has benefits for both industry and government. Industry benefits from simpler and clearer dealings with government, while government benefits from reduced duplication and more cooperation and collaboration between agencies.

Given the level of public interest in the safety, environmental and human health impacts of uranium mining, effective stakeholder engagement and public reporting are essential factors in maintaining the industry's social licence to operate. The uranium industry seeks to undertake effective and open engagement and consultation with all relevant stakeholders and recognises the need to ensure that arrangements are transparent, culturally appropriate and timely. While arrangements for stakeholder engagement and consultation will obviously vary from mine to mine, it is important that, where possible, they involve all stakeholders and are linked to reporting arrangements. In addition, where possible, stakeholder engagement and consultative arrangements should be consistent with the MCMPR Principles for Engagement with Communities and Stakeholders.

Existing regulatory arrangements require industry to prepare a significant number of reports for a range of audiences. There may be scope for rationalising this through single multi-part reports that address all statutory reporting obligations, which are circulated to all regulators. This could help raise regulator and community awareness of the range of compliance activities carried out by the operators and lead to a reporting regime that is focused on outcomes. Any change to streamline current reporting arrangements should also look at the effectiveness of current stakeholder consultative arrangements and the potential for better alignment of various reporting timeframes. Changes to current reporting arrangements, however, would need to be resolved between the operator and the regulator in the first instance.

The Australian Government Department of the Environment and Heritage is already moving towards streamlined reporting arrangements and joint assessment and approval processes under the EPBC Act. While the Act outlines the approval process to be implemented, based on those matters defined as being of 'national environmental significance', it also requires the Australian Government to take into account State and Territory regulatory requirements as part of the approval process.

Recommendation 11

The Australian Government, relevant State and Territory governments and the uranium industry work cooperatively to ensure that regulatory arrangements and industry performance are consistent with world's leading practice by:

- maintaining effective and efficient coordination between relevant regulatory agencies to provide, where possible, a single administrative point of contact for industry ('one-stop shop')
- ensuring that community and other stakeholder engagement processes are consistent with MCMPR principles and include all relevant stakeholder interests
- ensuring that industry reporting requirements are effective and efficient and, where possible, appropriately streamlined.

5.2.5 National register of uranium industry workers

Various Australian, State and Territory regulations and standards deal with the management and minimisation of occupational exposure to radioactive materials.

As is the case in most industries involving radioactive materials, uranium industry workers are trained and made aware of the occupational hazards associated with uranium mining. They are required to comply with all occupational health and safety policies and codes of practice while on site. Mine operators also have a range of strategies in place to monitor the level of exposure for each worker, including the use of personal dose meters and other measures.

Records on individual uranium industry worker dosages are currently maintained by the employers and, in some cases, also held by relevant State or Territory government agencies. A single storage area for the health records of uranium industry workers (and workers in other radiation-related industries) would assist in:

- providing greater assurance that records will be checked and maintained, and remain retrievable in the long term, including when companies cease to operate
- preventing situations in which a worker receives a radiation dose that exceeds the annual limit by moving from one operation to another
- providing reliable evidence in cases where a worker suffers an illness that might be related to radiation and
- allowing the production of annual statistics showing industry sector trends and comparisons.

To date, various efforts to establish a national data repository have been hampered by unresolved issues such as privacy concerns, the lack of effective coordination between data custodians, and data incompatibility. There is concern that without some type of national coordination—either in the form of a single data repository or through cooperative working arrangements between the relevant companies and government agencies—little progress will be made. This will increase the risk of records being inadvertently misplaced, damaged or lost.

Recommendation 12

The Australian Government should work with relevant State and Territory governments to establish cooperative arrangements with industry to ensure that permanent records of the radiological dose history of uranium industry workers are collected, maintained and retrievable.

5.2.6 Northern Territory uranium royalty regime

The current application of royalty arrangements for uranium development in the Northern Territory on a project-by-project basis is a major source of uncertainty and therefore could affect investment decisions in the sector.

Ownership of uranium in the Northern Territory is vested in the Australian Government under the *Atomic Energy Act 1953*, but no resource charges generally apply to uranium in the Northern Territory (that is, on both Indigenous and non-Indigenous land). To date, royalty arrangements have been determined for each mine taking into account a range of relevant considerations, including the world market for uranium ore, any previously negotiated non-statutory payments to Indigenous communities, the loss or damage likely to be suffered by Indigenous communities affected by the proposed grant of the mining interest, and the royalty rates set for other mines.

Separate royalty regimes may be inappropriate to a growing uranium mining sector as new entrants to the uranium industry are uncertain about their potential royalty liabilities. Another issue is that current arrangements mean that multi-product uranium mines could be subject both to the Northern Territory Government's profit-based royalty regime and the royalty regime imposed by the Australian Government. This would lead to administrative complexity and tax-driven investment decisions. An administratively simpler uranium royalty regime would apply consistently to all areas of the Northern Territory as a whole. Any new approach should be implemented following a careful review of possible options and would need to balance the needs of Indigenous communities, the uranium mining sector and governments.

For the mining sector, one of the core requirements is fiscal stability for committed investments allocated to mine development and production. The Australian Government would address this concern by not making any new royalty regime retrospective. Existing uranium mines in the Northern Territory would retain their current ad valorem royalty arrangements.

An important issue is the requirement for negotiations with Indigenous groups where a mine is to be developed on Aboriginal land within the meaning of the Commonwealth's *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA). The ALRA includes a payment regime whereby 'royalty equivalents' are paid by the Australian Government into a fund for the benefit of affected Inigenous groups. Any alteration to the manner in which uranium royalties are determined will therefore need to involve close consultation with the Indigenous Land Councils in the Northern Territory. Following some years of stakeholder consultation, the Australian Government has recently made changes to the ALRA that, seek to improve transparency and accountability while retaining the same payment arrangements.

Recommendation 13

The Australian Government should establish, in consultation with stakeholders, a royalty framework for the uranium industry in the Northern Territory.

6 Indigenous engagement and land access

The Australian minerals sector, including the uranium industry, has well-established policies and procedures to develop and manage relationships with Indigenous communities in areas where it seeks to operate. The three current Australian uranium mines are in regional and remote areas where Indigenous groups hold rights and interests in land. Most exploration prospects are similarly located.

The mine operators recognise and respect the importance of the culture and heritage of Indigenous people claiming an interest in their operations. The uranium industry is currently engaging with relevant Indigenous stakeholders through a range of formal and informal processes, including:

- formal agreements dealing with land access issues
- regular consultation about operational and environmental issues
- surveys to identify, record, manage and protect cultural heritage sites
- provision of training and employment opportunities in mines and in allied industries, and support for other community development initiatives
- assistance in providing a range of services to remote Indigenous communities
- sponsorship of community events and assistance with promotions.

Through the Land Access Sub-Committee of the Ministerial Council on Mineral and Petroleum Resources (MCMPR), industry and governments are working cooperatively to identify additional strategies and initiatives that aim to improve land access at a State, Territory and Commonwealth level, while retaining the important Indigenous, environmental and social protection afforded by current legislation. These strategies and initiatives will form the basis of a work-plan for implementation by appropriate State, Territory and Commonwealth bodies.

6.1 Issues

Timely access to land for exploration and mining purposes is important to the continued successful development of the Australian uranium mining industry. Due to the consultative nature of land access negotiations with Indigenous groups, this process is most effective when there is a relationship built on mutual trust.

For a range of legal, social, cultural and political reasons, establishing productive relationships with Indigenous stakeholders can be a complex and difficult process for the industry. While the process of negotiating access to land for exploration and mining activities can pose challenges, particularly for new entrants to the industry, it is essential to the sustainable development of the uranium industry.

Participants striving to develop such relationships need to recognise that the lack of appropriate and adequate information may impede Indigenous groups' understanding of the impact of exploration and development in areas where they hold rights and interests in land. The industry's experience suggests that this is particularly the case in relation to uranium mining.

When considering land access issues, Indigenous groups seek to understand how their communities might benefit from exploration and mining activity in areas where they hold rights and interests in land, and where heritage sites may be affected. They also seek assurance that company employees and contractors will understand, through cross-cultural awareness programs, the fundamental importance of land to their culture and traditions, and the associated Indigenous responsibilities and obligations that flow from this.

Northern Territory Indigenous communities have also identified the need for greater transparency and clarity from explorers regarding their intent when working with Indigenous stakeholders. In addition, increasing the accessibility of technical information would enable Indigenous stakeholders and their representative bodies to better assess and understand the potential environmental, social and economic implications of uranium exploration and mining.

Early consultation with Indigenous groups to establish whether proposed exploration and mining activities are likely to have an impact on cultural heritage values is important to building trust. The preference, wherever possible, should be to avoid disturbance to significant sites and to involve Indigenous groups in the company's continuing management and protection of sites in the vicinity of operations.

Improving the information flow between industry and Indigenous communities will help to ensure a fair and consistent approach to consultation, as well as encourage community engagement and development, reduce tension, and encourage the ongoing development of leading practice. Industry would also benefit from a greater interchange of information between uranium industry companies about practices implemented in developing and managing relationships with Indigenous groups.

The existing uranium mining operations and the prospect of new mines offer further opportunity for capacity building in Indigenous communities. Some company activities already support school and prevocational employment programs. As well as the provision of direct job readiness programs and training and employment in the mining operation, there is also the opportunity to support the establishment of business enterprises by Indigenous groups, which may then secure contracts with companies in mining and allied industries. The development of such enterprises would represent an important contribution by the mining industry to the sustainability of Indigenous communities, while job readiness, training and employment programs would help the industry to address labour and skills shortages.

There is a range of government and non-government organisations involved in delivering programs and services to Indigenous communities. Often exploration and mining companies are not aware of the full range of programs and services available and how they could access and/or contribute to them. The benefits from these programs and services could be improved by:

- identifying agreed objectives and mutual community–industry benefits
- identifying government and non-government participants currently providing programs and services, and their respective interests and objectives
- identifying opportunities to build on existing processes where possible and generate synergies, including linkages to the Memorandum of Understanding on Indigenous Employment and Enterprise Facilitation between the Minerals Council of Australia and the Australian Government, the Working in Partnership Program and existing activities in South Australia and the Northern Territory, within and beyond the mining sector
- assessing the compatibility between existing capacity and skills in Indigenous communities and industry needs, and developing targeted programs to address skill shortages and gaps
- providing career advice to young Indigenous people, who may have an interest in, or an identified aptitude for, working in the uranium mining industry
- better understanding the factors beyond the responsibility or control of the uranium mining industry that are linked to social disadvantage and contribute to impeding Indigenous training, employment and capacity building
- identifying recruitment and employment practices within the minerals sector that could be introduced to facilitate Indigenous access to employment in industry
- identifying measures to increase cross-cultural awareness and capacity within industry.

In considering how sustainable development of the uranium mining industry can further support Indigenous communities, it is important to ensure that it enhances the existing efforts by government and other participants, rather than substitutes for them.

6.2 Options

6.2.1 Shared principles

Current arrangements for uranium industry engagement with local Indigenous communities differ from mine to mine, reflecting the differing corporate objectives, policies and requirements of individual mine operators and the varying interests, concerns and aspirations of the Indigenous communities.

One option that could provide a basis for improving Indigenous engagement and offer guidance to new industry entrants is the development of high-level principles based on the experience of existing operators. These principles could be implemented through a consultative process involving the uranium industry, relevant Indigenous organisations (such as Land Councils and native title representative bodies) and government agencies. Where appropriate, the principles would reflect existing industry actions and principles.

Issues covered by the principles could include prevocational and vocational training, employment, mentoring, business development and other means to build Indigenous capacity and equity. These are often preferable to purely financial payments as they are more likely to provide long-term benefits and are less likely to result in disputes and disruption within communities.

While the principles would be aspirational (they would provide guidance on leading practice and be non-binding), they would be useful in providing an agreed basis for the uranium industry and Indigenous stakeholders to deal with many issues. Operators will continue to determine the most appropriate and effective engagement arrangements based on local circumstances. The principles would highlight the uranium industry's commitment to Indigenous engagement and provide a leading practice framework for Indigenous engagement in the industry.

Recommendation 14

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous stakeholders should develop and implement a set of high-level principles for Indigenous engagement, based on existing principles and native title and land rights legislation (where these are relevant and appropriate) and which recognise that the nature of engagement and programs to support Indigenous communities will need to take account of local circumstances.

6.2.2 Awareness raising and information exchange

Indigenous Australians have the same needs and rights as other Australians to participate actively in the current public debate about the future development of the uranium industry. Equally, they should have the same access to factual information, provided in culturally appropriate terms, and the opportunity to raise their awareness if they wish to do so. This may require the development of specific information materials presented in a variety of accessible formats.

Indigenous communities not directly affected by Australia's current three uranium mines have limited knowledge of uranium operations. An opportunity exists to establish arrangements that support the exchange of information, knowledge and experience between relevant Indigenous communities in the Northern Territory and South Australia. This could be facilitated by government agencies, Indigenous organisations and the current mine operators, and include joint meetings and site visits.

The Working in Partnership Program—administered by the Australian Government through the Department of Industry, Tourism and Resources—could also provide opportunities for bringing Indigenous stakeholders together as part of its regional workshop process. There may also be value in reviewing Indigenous engagement arrangements used by the uranium mining industry elsewhere in the world (such as in Canada) to identify leading practice examples relevant to Australia.

Recommendation 15

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous communities and organisations, will develop:

- a comprehensive science-based information package specifically for Indigenous audiences, aimed at raising general awareness of the uranium mining sector and addressing key areas of concern, using practical, everyday analogies and presented in a variety of accessible formats
- arrangements to support ongoing dialogue and information exchange between Indigenous communities and organisations, the uranium industry and relevant government agencies, initially between the Northern Territory and South Australia.

6.2.3 Improved coordination and access to government programs and services

There is a range of programs on offer that focuses on different facets of Indigenous community development. Improved coordination and access to these programs by Indigenous communities and more appropriate and culturally relevant Indigenous engagement could result in better outcomes.

The Memorandum of Understanding (MoU) between the Minerals Council of Australia and the Australian Government on Indigenous Employment and Enterprise Facilitation is one example of such a program. The initiative is a strategic partnership between the Australian mining industry and government, in which the parties work with Indigenous communities to ensure the coordination of government programs and services to facilitate improved outcomes in Indigenous employment and enterprise development.

The UIF also provides an opportunity to encourage coordination of these programs and their communication to the industry and Indigenous communities.

Recommendation 16

The uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous communities and organisations, will seek to improve the coordination and accessibility of relevant government programs and services, in conjunction with third party brokering services (such as those provided by the Northern Land Council), to assist the implementation of land access agreements that provide for sustainable employment and business development opportunities.

6.2.4 Building Indigenous equity

The industry has the opportunity to assist Indigenous communities to fulfil their aspirations to build capacity and become sustainable. Assistance could be targeted more effectively if existing capacities and skills within Indigenous communities were better understood. The identification and improved coordination of relevant government programs would also help to ensure that industry involvement enhanced such programs, rather than substituted for them.

The extent to which Indigenous people seek to take advantage of such opportunities can be increased by the wide dissemination of information. The uranium industry, for example, could draw on instances where innovative engagement between the mining sector and Indigenous stakeholders has delivered tangible and sustainable outcomes.

Recommendation 17

Building on existing programs, the uranium industry, the Australian Government and State and Territory governments, in partnership with relevant Indigenous stakeholders, should:

- examine opportunities for building Indigenous engagement in the uranium industry, including capacity building, investment, joint ventures, partnering with industry and the establishment of economically viable business enterprises providing goods and services to the uranium industry and related industries
- consider surveying and collating information on relevant Indigenous skills, knowledge and experience and provide recognition of such skills, knowledge and experience by facilitating potential commercial application in providing goods and/or services to the uranium industry and associated industries and assessing the needs of the industries for those goods and services
- examine options for ensuring that economic and other benefits flowing to Indigenous communities from uranium exploration and mining are additional to, and are not substituted for, existing benefits and services provided by governments
- examine mechanisms for ensuring that young Indigenous people commencing high school have access to appropriate targeted prevocational advice and opportunities to take up internships, mentoring and work experience placements within the uranium industry and related sectors
- identify measures aimed at increasing the number of Indigenous job readiness, traineeship, apprenticeship and employment opportunities within the uranium and related industries
- promote successes in relation to Indigenous engagement and engage opinion leaders within Indigenous communities and/or representative bodies to champion the positive outcomes of these arrangements.

6.2.5 Land access legislation

Improvements to the various legislation that covers access to land, particularly those drawing upon shared experiences and learning, can also play an important part in strengthening relationships between Indigenous and industry stakeholders, and facilitating the early resolution of land access agreements.

There are several legislative reform processes underway in relation to land access, which include:

- reform of the native title system, focusing on:
  - native title representative bodies
  - amending the guidelines of the native title respondents financial assistance program
  - technical amendments to the *Native Title Act 1993*
  - an independent review of the claims resolution processes
  - prescribed bodies corporate
  - more transparent practices in the resolution of native title issues
- amendments to the *Aboriginal Land Rights (Northern Territory) Act 1976*, aimed at streamlining and modernising the Act to facilitate better outcomes for Aboriginal people by providing for expedited and more certain processes related to exploration and mining on Aboriginal land
- heritage protection—contributing to a shared understanding by:
  - monitoring the significant number of regional heritage agreements and Indigenous Land Use Agreements (ILUAs) being implemented around the country, so that lessons from individual jurisdictions can be adopted more broadly
  - working to improve the interaction between Commonwealth, State and Territory cultural heritage legislation
  - monitoring proposed amendments to the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* which will provide for accreditation of State and Territory Indigenous heritage legislation where the legislation meets defined criteria, and address the issue of 'last resort intervention' under the Commonwealth Act.

Recommendation 18

Issues relating to the uranium industry's access to land for exploration, mining and minerals processing will be monitored and addressed, where appropriate, through input to current legislative reform processes.

Case Study: Minerals Council of Australia (MCA) Indigenous Relations Strategic Framework

"Enduring Value, the Australian Minerals Industry Framework for Sustainable Development", provides the overarching framework for the MCA's approach to Indigenous relations. More specifically, the MCA has developed an Indigenous Relations Strategic Framework.

The framework is based on the recognition that the future of the Australian minerals sector is inextricably linked to building and enhancing strong relationships with Indigenous communities, and a commitment to carry out operations and activities that are embedded in stated values including:

- acknowledgement, respect and support for the recognition and protection of Indigenous Australians' rights in law, interests and special connections to land and waters in Australia
- recognition, support and facilitation of the capacity of Indigenous Australians to more effectively engage in the broader economy, including through wealth creation and the establishment of vibrant, diversified and sustainable regional economies
- promotion of the negotiation of mutually beneficial and sustainable agreements as an effective mechanism through which to achieve the intended outcomes of sustainable relationships and partnerships between industry and Indigenous communities.

Recent work undertaken pursuant to the framework includes:

Indigenous Leaders Dialogue

In 2004, the MCA Board established the Indigenous Leaders Dialogue (ILD), as a formal opportunity to meet with Indigenous leaders twice a year. The dialogue facilitates engagement between industry and Indigenous leadership, to build common understanding and discuss capacity-building initiatives of mutual interest and benefit. The formation of the ILD has also led to closer engagement with the National Native Title Council (NNTC)), and the formation of a joint industry and Indigenous leaders' working group on the *Aboriginal Land Rights (Northern Territory) Act 1976* and native title system reforms.

Reforms to the Native Title System

In June 2005, the MCA Board approved a policy platform aimed at improving the efficiency and operability of the native title system, without diminishing Indigenous Australians' rights and interests, and providing an enabling framework for mutually beneficial relationships.

In determining specific submissions to government, the MCA consulted broadly within industry and worked through a structured process with Indigenous leaders to establish a common platform for reform. The outcome of these deliberations is a consensus position between the MCA, Indigenous leaders and the NNTC on technical amendments to improve the operability and efficiency of the *Native Title Act 1993*, and in-principle agreement on appropriate resourcing and governance arrangements for native title representative bodies and prescribed bodies corporate.

The opportunity to work collaboratively on reforms to the native title system has also served to strengthen the relationship between the minerals sector and Indigenous leaders, founded on mutual respect and trust.

MCA and Federal Government MoU on Indigenous Employment and Enterprise Facilitation

The MCA and the Australian Government Memorandum of Understanding (MoU), launched in June 2005, establishes a five-year strategic partnership for government and industry to work together with Indigenous communities to increase employment and business development outcomes in mining regions. The MoU aims to provide an appropriate framework to facilitate the development of strong and sustainable communities.

Industry's contribution to community development through employment, training and development opportunities is contingent on government delivering integrated basic social services. In part the MoU aims to enhance government service delivery through improved access to services such as literacy and numeracy, work readiness, drug and alcohol services, and training in literacy and numeracy.

The MoU includes eight pilot projects during the first two years to trial the new working arrangements.

Further information on these initiatives is available from the MCA at www.minerals.org.au.

7 Communication

Australia's uranium industry has not appropriately articulated to the Australian community the benefits of uranium mining and the risk management strategies that are in place. Over the past 30 years uranium mining has been the subject of intermittent but extensive debate, often driven by political interests.

In recent years, the acknowledged shortage of uranium product has increased the level of interest, which has been elevated further by the current nuclear debate. Although research into public attitudes during this period has demonstrated a distinct polarisation of views, with strong advocates for and against the industry, most people's views fall in the middle and tend to be unclear, as they are based on a lack of objective information about the uranium industry and other phases of the nuclear fuel cycle. Research also reveals that people find it hard to separate broader international nuclear issues from the domestic uranium industry.

A review of polling over the past 30 years was undertaken to determine the historical context of current public opinion. Polling by Roy Morgan shows a full range of attitudes to uranium mining in Australia. On average, 60 per cent of the Australian community favours the development and export of uranium for peaceful purposes (Table 5).

Table 5 Australian public opinion on the development and export of uranium for peaceful purposes, percentage of survey respondents, 1977–2006

Response	Sept 1977	July 1978	Apr 1979	July 1982	July 1983	Nov 1983	Apr 1984	June 1991	Mar 1996	Feb 2005	Mar 2005	Oct 2005	Apr 2006
Yes, should	57	59	54	66	66	66	65	62	60	59	61	54	55
No, should not	30	27	32	25	26	23	29	31	34	32	32	38	35
Can't say	13	14	14	9	8	11	6	7	6	9	7	8	10

Note: Respondents were asked: 'Do you think Australia should or should not develop and export uranium for peaceful purposes?'

Source: Roy Morgan, Finding No. 3908, 19 October 2005, and Finding No. 4009, 13 April 2006.

Recent polling indicates a significant increase in support of the expansion of uranium mining (Table 6[15]). Men tended to be more in favour of the current mining and export of uranium than women, and were also more in favour of expanding the industry. Environmental issues as a whole have tended to be of most concern to those in the 18-24 year age bracket[16], although a very recent poll showed that this age group was more likely to be in favour of uranium mining than other groups.

Table 6 Australian public opinion on the operation of additional uranium mines

Response	Oct 2005	June 2006	July 2006
Yes, more uranium mines operating	23	25	38
No, there should not be more uranium mines operating	70	65	51
Can't say	7	10	11

Note: Respondents were asked: 'At present the State Labor Governments have a policy of restricting the number of uranium mines in Australia to three. In your opinion, should there be more uranium mines operating in Australia or not?'

Source: Roy Morgan, Finding No. 4057, 29 July 2006.

While the polling data reveals a number of concerns in the public mind, they are primarily indirectly related to the Australian uranium industry. The most prominent concerns are nuclear weapons proliferation, nuclear power reactor safety, high-level radioactive waste disposal and radiation exposure. It is also important to recognise that when people think about environmental priorities, uranium and nuclear issues are not always 'top of mind'. Nonetheless, these issues are now very much centre stage due to matters relating to climate change. At the same time, there is always potential for public concern about uranium mining or nuclear issues to increase suddenly (for example following an incident at a mine or a nuclear power reactor). Even minor incidents increase public concern unnecessarily.

15 Roy Morgan, *Majority of Australians against more uranium mines,* www.roymorgan.com/news/polls/2005/3908/ , *Majority Of Australians Support Uranium Exports To China* http://www.roymorgan.com/news/polls/2006/4009/ and *Support For Expansion Of Uranium Mining Up 13% Following Beazley's "Three-Mines" Policy Backflip* www.roymorgan.com/news/polls/2006/4057/

16 Australian Bureau of Statistics, *Environmental Issues—People's Views and Practices,* 4602.0, www.abs.gov.au

Media reporting with its emphasis on immediacy and emotive content adds to the communication challenges facing the uranium industry. Emotive opposition to uranium mining, lending itself to short television news grabs and sensational headlines, can be more attractive to viewers than calm explanations of the true risks within the uranium industry and how they are managed. Although particular sections of the media have very recently improved their coverage of the uranium industry by taking a more balanced and objective approach, there is still a tendency (particularly in the electronic media) to focus on the sensational.

A further communication challenge stems from Australian policies, which focus almost solely on uranium mining and not the downstream activities of the nuclear fuel cycle. In countries that depend to some degree on the nuclear industry for electricity, there have been more opportunities to engage the public, and political debate has tended to be broader, more informed and much more objective.

Internationally, there are close associations between public opinion and stewardship, as evidenced by community concerns about the storage of high-level waste (spent fuel) from nuclear power plants. Communication is an important consideration in uranium transport, the perceived over-regulation of the uranium industry, and the relative risks from the operation of existing and future nuclear power plants.

The level of Australian uranium industry regulation may add to the perceived level of risk associated with uranium mining and perhaps hinders the public's understanding of the actual level of risk. This occurs, for example, when uranium producers are required to report publicly incidents that have minimal or no impact on occupational health, public health, public safety or the environment. These incidents are invariably the subject of exaggerated claims by opponents of the uranium industry.

The uranium industry reports extensively on its activities and publicly discloses incidents as is required, however, its attitude to public disclosure has been consistently misrepresented by its opponents as secretive.

7.1 Issues

Until recently, the Australian uranium industry has tended to give communication a low priority. The uranium industry established the Uranium Information Centre to provide information about uranium and nuclear power and to uphold the industry's legitimacy. While this has been effective at some levels, by making a wealth of information about the uranium life cycle accessible, the industry has tended to shy away from coordinated and sustained public advocacy. To address this weakness, on 26 September 2006, the Australian Uranium Association was formed. The Association will further promote the national interest associated with uranium mining and export as well as communicate the industry's position to government and the broader community.

The lack of communication by industry with stakeholders and the broader community has resulted in anti-nuclear organisations and community groups shaping public opinion on the risks of mining and use of uranium. Some 'ethical' investment funds decided to advertise that they would not invest in companies operating uranium mines, putting uranium in the 'unethical' basket. It is worth noting that some major ethical investment funds, however, have recently changed their position to include uranium as an 'ethical' investment due to concerns about climate change. The positive endorsement of uranium mining companies by these major ethical funds represents a significant shift in the attitudes of fund managers and provides further impetus for a factual and balanced debate.

It is considered that the extent of public opposition has shaped regulatory approaches to the uranium industry, adding significantly to the complexity and duration of approval processes for projects and the ongoing regulation of operations. The opposition, however, is mainly due to a significant misalignment between public concern and the objective risk. While risks from uranium are carefully measured and relatively low, the public perception of risk is relatively high.

The prospect of expanding the uranium industry in Australia—and reducing global greenhouse gas emissions even while world energy demand grows rapidly, in developing countries and elsewhere—gives the uranium industry a unique opportunity to demonstrate its benefits to the Australian community.

Community groups, educators, environmentalists, media representatives, politicians, technical professionals and scientists, as well as industry, all have key roles in the debate. The Australian public needs factual information from credible sources, as well as the views of those groups, to make informed decisions about uranium mining. A transparent and robust debate about the uranium industry and related issues will ensure the best outcome for the industry and the community.

While the uranium industry accepts its responsibility to help inform the public, the media also has an important role. The Australian media has an opportunity to contribute to informed public opinion by ensuring balanced coverage of the issue.

Educators in the primary, secondary and tertiary systems are also key sources of knowledge for younger Australians. The industry should work to ensure that curricula contain balanced, factual material that enables students to understand the importance of considering all relevant evidence before making an informed decision.

7.2 Options

The development of the UIF has helped the Australian uranium industry review the need for a more coordinated and collaborative approach to the communications challenge it faces. The uranium industry subsequently has commissioned research into public attitudes and is developing strategies to meet the challenge.

The uranium industry has sought to establish and maintain a dialogue with interested stakeholders. Existing producers, for example, have regular consultation with Indigenous and other community groups in their areas of activity; they try to keep politicians, educators and the media aware of their operations; and have attempted to ensure ongoing dialogue with groups opposed to uranium mining. Consultation about a particular operation will always be shaped by local circumstances, so a rigid, 'one-size-fits-all' approach will not work. The industry will continue to practise strong community engagement.

It is timely for the industry to develop a communications strategy that provides facts and presents them in ways that alleviate concerns. Some suggested approaches include:

- demystifying uranium, the uranium mining process and uranium fuel cycle with factual, accessible and easy-to-understand information that creates a basic level of knowledge to underpin informed discussion
- presenting all aspects of uranium mining using comparisons with natural systems
- emphasising that the true hazards are very well known, and demonstrating that the risks to the general population are immeasurably small and that risks to workers are very low (no more than in the mining industry as a whole)
- describing how exposures to risks are distributed fairly (for example, risks to workers are slightly higher and they are fairly compensated for this)
- demonstrating that the industry's information is factual and inviting corrections and submissions of contrary information
- describing how the approval and regulatory processes are responsive to public input (that is, in areas where the public has input to hazard control standards)
- emphasising voluntary aspects of the industry (for example, people choose to move to Jabiru and Roxby Downs and choose to fly in and out to work at Beverley)
- promoting the level of familiarity of existing projects (Ranger has been in operation for more than 25 years)
- emphasising the significant benefits of Australian uranium mining to the nation
- emphasising Australia's leadership in research and development in several areas in the uranium supply chain.

While the information currently available covers some of these issues, a more consistent and concerted effort to address all issues would help the public to better understand and accept uranium mining.

The uranium industry can also draw on the experiences of other mining sectors. *Enduring Value—the Australian Minerals Industry Framework for Sustainable Development*, released in October 2004, provides guidance for implementing, at an operational level, the 10 principles in the sustainable development framework produced by the International Council on Mining and Metals. One principle is to 'implement effective and transparent engagement, communication and independently verified reporting arrangements . . . . with stakeholders'.

Similarly, the MCMPR vision for the Australian minerals and petroleum industry in 2025 is that 'Australia is recognised as a world-class location for minerals and petroleum exploration and development, with a competitive resources industry valued for its contribution to the sustainable development of the nation and the world'. Key priorities for achieving the vision are valuing the community and contributing to sustainable development.

In 2005, the MCMPR released Principles for Engagement with Communities and Stakeholders, a guide to developing an effective engagement strategy. Developed by the Council, resource industry associations and community participants, the principles address five key themes:

- **Communication**—listen and talk, make information clear, accurate, relevant and timely
- **Transparency**—be clear about, and agree on, feedback and reporting processes
- **Collaboration**—work cooperatively to seek mutually beneficial outcomes
- **Inclusiveness**—recognise, understand and involve communities and stakeholders early and throughout the process
- **Integrity**—engage in a way that fosters mutual respect and trust.

These principles recognise that effective communication requires much more than an assertion of a right to operate a mine and a statement of company intentions. Engagement must be encouraged and maintained throughout the life of a project, from the planning stage, through operation, to closure and post-closure activities. Dialogue must be genuinely two-way. A company's conduct is as important as anything it says. It must be prepared to engage opponents, consider and respond to criticism, and acknowledge mistakes where they have been made.

Journalists and teachers receive information about the uranium industry primarily from government departments, industry, scientists, technical professionals, environmental groups and web sites. Along with the general public and environmental organisations, they are encouraged to visit operating mines. Feedback received by the mining companies shows that all visitors leave more informed and reassured about uranium production.

Australia is a leader in research and development in a number of areas associated with the uranium supply chain, and there are opportunities to consolidate this position. A good example is Synroc, the synthetic material designed to immobilise high-level radioactive waste. Synroc is the result of 25 years of research and development, based on pioneering work at the Australian National University. Another example is SILEX, a Sydney-based company, which has been working on more efficient uranium enrichment processes.

In an energy-constrained future there are clear social and economic benefits for Australia in having a national capability to participate in innovative opportunities across the nuclear supply chain. It is in the interests of the Australian uranium industry to ensure that every Australian knows this.

Recommendation 19

The uranium industry will collaborate on the development of a multi-faceted communications strategy to ensure the delivery of objective information about the benefits and risks associated with the growth of the industry, through community engagement, the education system and media relations. The strategy will include information products focusing on the social, economic and environmental performance of the uranium industry and the strategies adopted to ensure the safety and security of the industry, as well as information products addressing issues of concern to the community.

8. Implementation—where to from here

In announcing the development of the Uranium Industry Framework (UIF) in August 2005, the Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane MP, noted that development of the UIF was expected to take three years. The identification and prioritisation of issues and drafting of the UIF Steering Group Report would occur in the first year, followed by a two-year implementation phase.

The UIF Steering Group Report provides recommendations which address impediments to the sustainable development and growth of Australia's uranium industry.

The Steering Group will develop an Implementation Plan to provide detailed guidance on how the recommendations are to be implemented, with appropriate time frames and performance measures.

The implementation phase is the next crucial stage and mechanisms supporting sound implementation are as important as the development of the UIF Steering Group Report. However, resource constraints and changing economic and world market conditions may affect implementation of some of the recommendations.

Following the development of the Implementation Plan, an industry group will be formed to guide the implementation of recommendations. The role of the Steering Group will then be concluded.

The Implementation Plan will be industry-driven in partnership with the Australian, State and Northern Territory governments.

Recommendation 20
An Implementation Group will be established, in partnership with industry and governments, and will be industry driven, to monitor and guide the Uranium Industry Framework Implementation Plan.

Appendix A Australian uranium mining and nuclear energy reviews

Prime Minister's Taskforce—Review of uranium mining, processing and nuclear energy in Australia

On June 6 2006, the Prime Minister announced the establishment of a Prime Ministerial Taskforce to undertake an objective, scientific and comprehensive review of uranium mining, processing and the contribution of nuclear energy in Australia in the longer term.

The nuclear review will consider the following matters:

Economic issues

- the capacity for Australia to increase uranium mining and exports in response to growing global demand
- the potential for establishing other steps in the nuclear fuel cycle in Australia, such as fuel enrichment, fabrication and reprocessing, along with the costs and benefits associated with each step
- the extent and circumstances in which nuclear energy could, in the longer term, be economically competitive with other existing electricity generation technologies in Australia, including any implications this would have for the national electricity market
- the current state of nuclear energy research and development in Australia and the capacity for Australia to make a significantly greater contribution to international nuclear science.

Environment issues

- the extent to which nuclear energy will make a contribution to the reduction of global greenhouse gas emissions
- the extent to which nuclear energy could contribute to the mix of emerging energy technologies in Australia.

Health, safety and proliferation issues

- the potential of 'next generation' nuclear energy technologies to meet safety, waste and proliferation concerns
- the waste processing and storage issues associated with nuclear energy and current world's best practice
- the security implications relating to nuclear energy
- the health and safety implications relating to nuclear energy.

The review commenced in June 2006 with a draft report to be available for public consultation by November 2006. A final report will be completed by the end of 2006.

Further information is available at http://www.pmc.gov.au/umpner/.

House of Representatives—Development of the non-fossil fuel energy industry in Australia (the Prosser Inquiry)

On Tuesday 15 March 2005, the Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane MP, asked the House of Representatives Standing Committee on Industry and Resources to inquire into and report on the development of the non-fossil fuel energy industry in Australia.

The committee commenced its inquiry with a case study into the strategic importance of Australia's uranium resources. The case study has particular regard to the:

- global demand for Australia's uranium resources and associated supply issues
- strategic importance of Australia's uranium resources and any relevant industry developments
- potential implications for global greenhouse gas emission reductions from the further development and export of Australia's uranium resources
- current structure and regulatory environment of the uranium mining sector (noting the work that has been undertaken by other inquiries and reviews on these issues).

The Prosser Inquiry terms of reference are more constrained than those of the Prime Minister's Taskforce. Its findings will be independent and contribute to the Prime Minister's Taskforce. The report is due to be tabled in the spring 2006 sittings of Parliament.

Further information is available at http://www.aph.gov.au/house/committee/isr/uranium/index.htm.

Appendix B Regulation of uranium mining in Australia

Australian Government

While day-to-day regulation of the Australian uranium industry is primarily a State and Territory government responsibility, the Australian Government has specific interests and responsibilities in relation to the regulation of uranium, including:

- management of nuclear actions and the protection of matters of national environmental significance as defined under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*
- oversight of enforceable environmental requirements attached to export approvals for existing uranium mines issued following recommendations made under the now repealed *Environment Protection (Impact of Proposals) Act 1974 (EPIP Act)*
- environmental assessment and approval of new uranium mines and significant expansions to existing mines under the EPBC Act
- ensuring the physical security of nuclear materials within Australia
- approval of exports of radioactive materials, including uranium
- implementation of safeguards agreements and tracking of Australian obligated nuclear material (AONM) internationally
- ownership of uranium in the Northern Territory, and oversight of uranium mining operations in the Alligator Rivers region in the Northern Territory.

The Australian Government exercises its responsibilities for the regulation of uranium through the following key legislative and administrative arrangements:

Atomic Energy Act

The *Atomic Energy Act 1953* provides for the authorisation of uranium mining on any land in the Ranger Project Area in the Northern Territory. While the Act does not regulate environmental performance directly, any environmental restrictions and obligations placed on the uranium mines in the Ranger Project Area must be consistent with the framework established by the Act. Importantly, under the Act, the Commonwealth retains ownership of all uranium found in all Australian territories.

Environment Protection and Biodiversity Conservation Act

The EPBC Act is the principal legislative means by which the environmental impacts associated with the mining, use and disposal of nuclear material are regulated. The EPBC Act identifies a number of areas of Commonwealth environmental jurisdiction, one of which is 'nuclear actions'. Where a nuclear action has, will have, or is likely to have, a significant impact on the environment, approval must be sought from the Australian Government Minister for the Environment and Heritage before a project can proceed. Approval of such proposals is based on the outcomes of Commonwealth environmental assessment and approval processes, although these can be (and usually are) undertaken jointly with State or Territory governments when required under both Commonwealth and State or Territory law.

Prior to the EPBC Act, proposals were assessed under the now repealed EPIP Act for the purpose of export approvals. Export licences were issued by the Australian Government Minister for Industry, Tourism and Resources taking into account the results of the EPIP Act assessments and remain valid. Any major expansion, intensification or modification to the operation as approved, however, would likely trigger the provisions of, and be subject to assessment under, the EPBC Act. The proposed expansion of the Olympic Dam mine in South Australia is currently being assessed under the EPBC Act.

Environment Protection (Alligator Rivers Region) Act

The *Environment Protection (Alligator Rivers Region) Act 1978* was introduced by the Australian Government in response to the report of the 1997 Ranger Uranium Environmental Inquiry (the Fox Inquiry), which highlighted the need for strong protection measures for the region's environment in relation to uranium mining activities. The Act is concerned with the administrative arrangements for the

Australian Government's oversight of uranium mining operations in the Alligator Rivers region in the Northern Territory. The legislation established the Office of the Supervising Scientist, which operates as a division of the Department of the Environment and Heritage and incorporates the Environmental Research Institute of the Supervising Scientist. The Act also established two consultative bodies: the Alligator Rivers Region Advisory Committee (to facilitate communication between community, government and industry stakeholders on environmental issues associated with uranium mining in the Alligator Rivers region) and the Alligator Rivers Region Technical Committee (to perform reviews of the research and monitoring programs relevant to uranium mines in the region).

Nuclear Non-Proliferation (Safeguards) Act

The *Nuclear Non-Proliferation (Safeguards) Act 1987*, derived from the 1973 Treaty on the Non-Proliferation of Nuclear Weapons, has the objective of ensuring the physical security of nuclear materials within Australia. Under this legislation, possession of nuclear material (including uranium) requires a permit and approval from the Australian Safeguards and Non-Proliferation Office (ASNO).

Australian Radiation Protection and Nuclear Safety Act

The *Australian Radiation Protection and Nuclear Safety Act 1998* provides for the protection of human health and the environment from the harmful effects of radiation. The transportation of uranium and its by-products is regulated through general provisions of the Act, which relate to radiation hazards. A key function of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the development and dissemination of codes of practice for nuclear activities and the protection of the environment and human health from the impacts of radioactive materials. Relevant codes of practice include the Code of Practice for the Safe Transport of Radioactive Material and the Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (Mining Code). Other relevant documents include the proposed second edition of the *National Directory for Radiation Protection*, which will include a protocol for the exemption of material or practices, particularly in relation to mining and mineral processing industries and for bulk amounts of material, and arrangements for the national adoption of new codes of practice and standards (including the Mining Code).

Customs (Prohibited Exports) Regulations

Under Regulation 9 of the *Customs (Prohibited Exports) Regulations 1958* (under the *Customs Act 1901*), an export licence is necessary for the export of radioactive material (including refined uranium, plutonium and thorium). Regulation 9 gives the Minister for Industry, Tourism and Resources the responsibility to approve permits for the export of nuclear material. Amendments to the Regulations were made in 2000 to strengthen Australian Government control over uranium exports by providing the Minister for Industry, Tourism and Resources with a clear and administratively efficient mechanism by which the Minister can place legally binding conditions, including minesite environmental conditions, on the export of uranium.

Export applications are subject to assessment by the Department of Industry, Tourism and Resources (DITR) and the ASNO to ensure that Australian uranium is only being exported for peaceful, non-explosive purposes under Australia's network of bilateral safeguards agreements. Australia retains the right to be selective as to the countries with which it is prepared to conclude safeguards arrangements. The length of the permit is determined on a case-by-case basis. Ten-year permits have been issued to the owners of the three currently operating uranium mines.

Each shipment of uranium leaving Australia must be reported to the DITR and ASNO and have Customs approvals before it can leave the country. At each stage of the process, ASNO and its counterparts in other countries track the AONM. As part of regular reporting requirements, uranium exporters must provide the department with 'converter reconciliation reports' in January and July for the six-month periods ending December and June. These reports state the opening inventory balance and confirm the amount of uranium oxide (U_3O_8) that is delivered to a conversion facility. In the event that there is any breach of the conditions of the export permit, the Minister for Industry, Tourism and Resources may revoke the permit.

Aboriginal Land Rights (Northern Territory) Act

The *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA) provides for the establishment of Land Councils as statutory authorities to represent the interests of Traditional Owners within their jurisdictions. Both the Ranger and Jabiluka mines are located on Aboriginal land within the Northern Land Council's area of jurisdiction, and both are on Mirrar Gundjehmi land traditionally owned by the people. The Act requires a grantee applying for an exploration interest over Aboriginal land in the Northern Territory to make an application to the relevant Land Council for consent to the grant of an exploration interest (the so-called veto). The Australian Government has recently amended the Act to streamline exploration and mining on Aboriginal land including allowing a greater role for the relevant Northern Territory Minister to monitor negotiations.

Native Title Act

Other legislation relating to Indigenous interests in relation to uranium mining includes the *Native Title Act 1993*. The Act established the National Native Title Tribunal, which mediates native title applications referred to it by the Federal Court of Australia, and may assist in negotiations about mining proposals and in the Indigenous land use agreement-making process.

South Australian Government

Uranium mining in South Australia is subject to stricter controls than mining in general. This is due to public concerns about the uses and physical characteristics of the end product and the need to comply with Australian Government requirements and international obligations. Regulation of the industry is through the following key legislation:

Radiation Protection and Control Act

The *Radiation Protection and Control Act 1982* (RPC Act) controls activities that involve radiation and radioactive materials in South Australia. The RPC Act provides for various categories of licence and registration, including a Licence to Mine or Mill Radioactive Ores.

The South Australian Minister for the Environment and Conservation may attach conditions to these licences. The primary condition applied to all such licences is a requirement for compliance with the Australian Government's 2005 Mining Code, which requires, among other things, uranium mines to have an approved 'radiation management program' and an approved 'radioactive waste management program' in place. Results of environmental radiation monitoring conducted under requirements of the radioactive waste management program are analysed and reported annually.

The Mining Code provides for a 'relevant regulatory authority' (RRA) to implement the provisions of the code and to grant approvals or authorisations. In forming the Mining Code, the Australian Government envisioned that each State or Territory would adopt the code via its own legislation or licence conditions, as appropriate. For the purposes of the Mining Code, the RRA in South Australia is the Radiation Protection Division of the South Australian Environment Protection Authority, which administers the provisions of the code in close consultation with the Minerals and Energy Resources Division of Primary Industries and Resources South Australia (PIRSA), and SafeWork SA in the Department for Administrative and Information Services.

The administration of the Mining Code is achieved by an administrative agreement, which ensures that the relevant agencies are involved in the consideration of applications for approvals from the operators and that approvals or authorisations granted under the code do not conflict with other legislative requirements.

Other Australian Government or international standards, codes or guidelines may also be applied to a particular operation, if this is considered necessary.

Incident reporting

In the event of an unplanned release of radioactive process materials within a plant or to the environment, or accidental exposure of a worker, an operator is required to record or report the incident as specified in Criteria and Procedures for Recording and Reporting Incidents at SA Uranium Mines. That document forms part of a radiation management program. Upon being notified of an incident, the regulator ensures that actions taken to contain the spill are appropriate, that all stakeholders have been advised of the incident, that the operator has taken appropriate remedial action, and that information relating to the incident is made publicly available in an open and transparent manner to ensure that public confidence is maintained.

Transport of uranium

The transport of uranium or any other radioactive material is conducted in accordance with the *Radiation Protection and Control (Transport of Radioactive Substances) Regulations 2003*, which essentially adopt the Australian Government's Code of Practice for the Safe Transport of Radioactive Material (2001). Before any shipment of uranium occurs, mine operators are required to obtain all necessary permits and licences from Australian and State government authorities and they must develop a detailed transport plan, which requires approval from Australian and South Australian government authorities. The Security and Emergency Management Office in the Department of the Premier and Cabinet coordinates South Australian input into this plan.

Mining Act and Mines and Works Inspection Act

The *Mining Act 1971* and the *Mines and Works Inspection Act 1920* are the instruments under which the South Australian Minister for Mineral Resources Development regulates all mining activities in South Australia. Under these Acts, PIRSA has broad responsibilities in administering mining operations to achieve South Australian Government objectives and obligations.

Mining leases

The *Mining Act 1971* requires mine operators to obtain a mining lease. The Minister may grant such a mining lease following consideration of the results of an extensive evaluation, including assessment of the likely environmental impacts and satisfactory resolution of native title. Consultation must occur to ensure that a proposed mining lease is in accordance with the *Development Act 1993*, and the outcome of those consultations must be considered when approving the mining lease. The lease must be renewed at regular intervals, generally every seven years. Inspections are conducted to ensure compliance with the conditions of the mining lease.

Mining and rehabilitation programs

In conjunction with obtaining a mining lease, an operator must develop a 'mining and rehabilitation program' to minimise the environmental effects of mining and milling, and ensure adequate rehabilitation of mining sites. Development and approval of a mining and rehabilitation program generally requires an environmental impact assessment of some form. As with a mining lease, the program must be renewed at regular intervals, generally every seven years. Inspections are conducted to ensure that operations are conducted in accordance with the mining and rehabilitation program.

Environmental management and monitoring plans

Uranium mine operators in South Australia are required, as part of mining lease conditions under the *Mining Act 1971*, to submit for approval to the Mining Minister a program for the protection, management and rehabilitation of the environment. This is known as an 'environmental management and monitoring plan' and covers waste management, flora, fauna, groundwater, spills and air emissions. Relevant State agencies are consulted during the process of evaluating and approving environmental management and monitoring plans. Annual reports are required on the progress of the program. Both the plan and the annual report are publicly accessible.

Under recently revised South Australian environment guidelines, the environmental management and monitoring plan has been combined with the mining and rehabilitation program (see above). All future mining and rehabilitation programs will incorporate environmental management and monitoring plans, where appropriate.

Environmental impact assessment processes

The *Development Act 1993* mandates that applications to carry out operations of 'major social, economic or environmental importance' must be referred to the Minister for Urban Development and Planning. Planning SA, a division of PIRSA, undertakes an environmental impact assessment, after which the Minister provides advice to the Minister for Mineral Resources Development to be considered in developing conditions of approval. When an environmental impact assessment is required under the Australian Government's EPBC Act, it is generally undertaken in conjunction with assessments required under the *Mining Act 1971*, the *Development Act 1993*, or both.

Roxby Downs (Indenture Ratification) Act

The Olympic Dam mine is regulated under the *Roxby Downs (Indenture Ratification) Act 1982* (Indenture Act). The *Environmental Protection Act 1993* and the *Mining Act 1971* are subject to the provisions of the Indenture Act. The Indenture Act specifically requires that the operators of the Olympic Dam mine:

- comply with the radiation, transport, waste management and National Health and Medical Research Council codes
- obtain all necessary Commonwealth licences and approvals
- at three-yearly intervals, develop a three-year program for the protection, management and rehabilitation of the environment (an environmental management and monitoring plan), and have that program approved by the Minister
- report annually on the outcomes of each three-year program

- provide a report on the effectiveness of each three-year program at the end of the program.

There is a schedule in the RPC Act that describes how it applies to the Olympic Dam operations.

Other legislative requirements

SafeWork SA, a division of the South Australian Department for Administrative and Information Services, has responsibilities under the *Mines and Works Inspection Act 1920*, the *Occupational Health, Safety and Welfare Act 1986*, and the *Dangerous Substances Act 1979*. The Environment Protection Authority has further responsibilities in relation to 'prescribed activities of environmental significance' under the *Environmental Protection Act 1993* and issues licences for relevant activities under that Act. The Department of Water, Land and Biodiversity Conservation administers the *Water Resources Act 1997*, the *River Murray Act 2003* and the *Natural Resource Management Act 2004*. The Department for Environment and Heritage administers the *Native Vegetation Act 1991*.

Northern Territory Government

The Australian Government has specifically reserved its powers on uranium mining in the Northern Territory by means of the *Atomic Energy Act 1953* and the *Northern Territory (Self Government) Regulations 1978*.

Responsibilities for the regulation of environmental impacts of uranium mining in the Northern Territory have since been shared between the Australian and Northern Territory governments through a series of intergovernmental working arrangements. The working arrangements define the roles and responsibilities of the Commonwealth and Northern Territory, which were agreed by both governments in 1979 and subsequently revised in 1995, 2000 and in 2005. The 2005 Memorandum of Understanding between the Commonwealth of Australia and the Northern Territory of Australia in Relation to Working Arrangements for the Regulation of Uranium Mining in the Northern Territory was signed on 30 May 2005 by the Commonwealth Minister for Industry, Tourism and Resources and Minister for the Environment and Heritage, and the Northern Territory Minister for Mines and Energy.

The Northern Territory *Mining Act 1980*, as in force at 14 December 2005, deals with title approvals, such as those for exploration and mining. Under section 175 of the Northern Territory *Mining Act 1980* and section 34 of the Northern Territory *Mining Management Act 2001*, the Northern Territory Minister for Mines and Energy must consult with the Australian Government Minister for Industry, Tourism and Resources before granting a mining title that relates to uranium, and must act in accordance with any advice that the Australian Government Minister provides. In effect, the Australian Government Minister has a power of veto.

Under section 137 of the *Mining Act 1980*, the Northern Territory Minister may consent to the applicant negotiating with the relevant Land Council for the council's consent to the grant of an exploration licence on Aboriginal freehold land. This applies to land granted under the ALRA, which comprises 50 per cent of the Northern Territory. The consent to negotiate authorises the applicant to enter into negotiations with the relevant Land Council under the ALRA.

Conditions of land access are set out in an agreement approved by the Australian Government's Indigenous Affairs Minister under the ALRA, which sets terms and conditions for operations on Aboriginal land in the Northern Territory.

To carry out mining activities in the Northern Territory, an operator must apply to the Northern Territory Minister for an authorisation, which may be granted subject to the condition that the operator complies with a current mining management plan. Mining operations are regulated by the *Mining Management Act 2001*, which mandates a regime of audits, inspections, investigations, monitoring and reporting to ensure compliance with agreed standards and criteria, and mining officers are appointed to enforce the Act.

The open-cut Ranger mine is authorised under section 41 of the Commonwealth *Atomic Energy Act 1953*. The Jabiluka deposit, north of Ranger, is on a mineral lease authorised under the *Mining Act 1980*, as it was granted after the Northern Territory gained self-government. Both are regulated under the *Mining Management Act 2001* but are subject to additional environmental requirements arising from the Australian Government's environmental approval process. The day-to-day regulatory responsibility rests with the Northern Territory under those arrangements.

The close proximity of the Ranger mine to Kakadu National Park, an environmental protected area of international significance, makes it one of the most stringently regulated and monitored uranium mines in the world. In addition to the working arrangements outlined above, Ranger is subject to oversight arrangements under the *Environment Protection (Alligator Rivers Region) Act 1978* (which establishes the functions of the Office of the Supervising Scientist), the ALRA, the *Northern Territory (Self Government) Regulations 1978*, and the Commonwealth *Atomic Energy Act 1953* (under which the Australian Government retains ownership of uranium).

The operator must have a licence to export uranium (issued by the Australian Government Minister for Industry, Tourism and Resources) under the *Customs (Prohibited Exports) Regulations 1958*.

Other jurisdictions

Currently, mining of uranium is permitted only in South Australia and the Northern Territory. New South Wales and Victoria both have legislation prohibiting uranium exploration and mining. Western Australia and Queensland both have policies that prohibit uranium mining. There is no legislative restriction on uranium exploration and mining in Tasmania, but there are no mines operating in that State.

Appendix C Australia's uranium resources— company reports for individual deposits

The following tables summarise Australia's uranium ore reserves and resources, as reported by mining companies as of December 2005.

Australia's seven largest ore bodies were:

- Ranger No. 3 Orebody, Jabiluka 2 and Koongarra No. 1 Orebody in the Northern Territory
- Olympic Dam in South Australia
- Valhalla in Queensland
- Kintyre and Yeelirrie in Western Australia.

In total, 2 072 334 t U_3O_8 were reported for Australia.

About 97 per cent of all known Australian uranium resources (including low to high cost recoverables) occur in four types of deposits:

- Breccia complex deposits (fragmented rock) account for about 65 per cent of Australia's total uranium resources. Almost all of these resources are at Olympic Dam in South Australia, which is the world's largest uranium deposit.
- Unconformity-related deposits account for about 20 per cent of Australia's total resources, primarily in the Alligator Rivers field (Ranger, Jabiluka and Koongarra) in the Northern Territory, and in the Kintyre deposit in Western Australia.
- Sandstone deposits account for about seven per cent of Australia's total resources, mainly primarily in South Australia (Beverley, Honeymoon, East Kalkaroo and Goulds Dam) and the Westmoreland area in Queensland. Other significant sandstone deposits include Manyingee, Mulga Rock and Oobagooma in Western Australia, and Angela in the Northern Territory.
- Surficial (weathering of rock in situ) deposits account for about five per cent of Australia's resources, predominantly in the world-class Yeelirrie deposit in Western Australia. Other deposits include Lake Way, Lake Maitland and Centipede in Western Australia.

Other types of uranium deposits in Australia include metasomatite deposits (resulting from the influence of pressure, temperature and addition of fluids), such as Valhalla, Skal and Anderson's Lode in Queensland — representing about 1.5 per cent of Australia's total uranium resources. Australia has only small resources hosted by volcanic deposits (Ben Lomond and Maureen, Queensland) and intrusive deposits (Crocker Well, South Australia).

Northern Territory

Deposit	Reserves/resources[a, b]	Grade (% U_3O_8)	Contained U_3O_8 (t)
Alligator Rivers Region			
Ranger No. 3 Orebody	Ore reserves Mineral resources	0.20 0.14	44 457 42 587
Jabiluka 1	Mineral resources	0.25	3400
Jabiluka 2	Ore reserves Mineral resources	0.52 0.46	67 000 96 000
Koongarra No. 1 Orebody	Ore reserves	0.8	14 500
Koongarra No. 2 Orebody	Mineral resources	0.3	2000
Hades Flat	Mineral resources		726
Ranger 4	Mineral resources		200
Ranger 68 (Barote)	Mineral resources	0.357	5500
South Alligator Valley			
Coronation Hill	Mineral resources	0.537	1850
El Sherana West	Mineral resources		80
Allamber Region			
Twin and Dam	Mineral resources	0.13	746
Oenpelli Region			
Caramal	Mineral resources		2500
Rum Jungle Region			
Mt Fitch and Rum Jungle Creek South deposits and Dyson's Dump	Combined resources	0.04	2344
Amadeus Basin			
Angela	Mineral resources	0.1	10 250
Ngalia Basin			
Bigrlyi	Mineral resources	0.343	2774
Walbiri	Mineral resources	0.162	686
Pandanus Creek			
Eva	Mineral resources		363
Arunta Complex			
Nolans Bore	Mineral resources	0.02	3977
Total for Northern Territory			**301 940**

a Mineral resources are in addition to ore reserves (that is, mineral resource figures are exclusive of those resources which have been modified to produce ore reserves).

b Mineral resource figures are the sum of resources in the measured, indicated and inferred categories.

Source: Geoscience Australia.

South Australia

Deposit	Reserves/resources[a, b]	Grade (% U_3O_8)	Contained U_3O_8 (t)
Gawler Craton			
Olympic Dam	Ore reserves[c]	0.05	389 500
	Mineral resources[c]	0.04	1 075 500
Prominent Hill	Mineral resources	0.012	11 780
Frome Embayment			
Beverley	Ore reserves		12 258
Honeymoon	Mineral resources	0.24	2900
East Kalkaroo	Mineral resources	0.074	910
Goulds Dam	Mineral resources	0.045	2500
Billeroo	Mineral resources	0.03	3600
Flinders Ranges			
Radium Ridge	Mineral resources	0.06	2177
Mt Gee	Mineral resources	~0.073	33 200
Armchair, Streitberg Ridge	Mineral resources	0.1	1814
Olary District			
Mt Victoria	Mineral resources	0.16	400
Crocker Well	Mineral resources	0.51	6338
Warrior	Mineral resources	0.034	4000
Total for South Australia			**1 546 877**

a Mineral resources are in addition to ore reserves (that is, mineral resource figures are exclusive of those resources which have been modified to produce ore reserves).

b Mineral resource figures are the sum of resources in the measured, indicated and inferred categories.

c At 30 June 2005.

Source: Geoscience Australia.

Queensland

Deposit	Reserves/resources[a, b]	Grade (% U_3O_8)	Contained U_3O_8(t)
Mount Isa region			
Valhalla	Mineral resources	0.125	25 600
Skal	Mineral resources	0.119	5000
Andersons Lode	Mineral resources	0.143	6500
Mirrioola	Mineral resources	0.112	241
Warwai	Mineral resources	0.12	120
Bikini	Mineral resources	0.139	240
Watta	Mineral resources	0.45	1900
Highlander	Mineral resources		90
Other small deposits	Combined resources		34
Mary Kathleen region			
Mary Kathleen	Mineral resources		1200
Georgetown region			
Maureen	Mineral resources	0.123	2940
Trident	Mineral resources	0.22	495
Twogee	Mineral resources	0.12	755
Fourgeo	Mineral resources	0.077	1171
Oasis, Gecko, Sybnac	Combined resources		171
Westmoreland			
Redtree, Junnagunna Huarabagoo, Sue and Outcamp	Mineral resources	0.13	22 520
Hervey Ranges			
Ben Lomond	Mineral resources	0.246	4758
Total for Queensland			**73 735**

a Mineral resources are in addition to ore reserves (that is, mineral resource figures are exclusive of those resources which have been modified to produce ore reserves).

b Mineral resource figures are the sum of resources in the measured, indicated and inferred categories.

Source: Geoscience Australia.

Western Australia

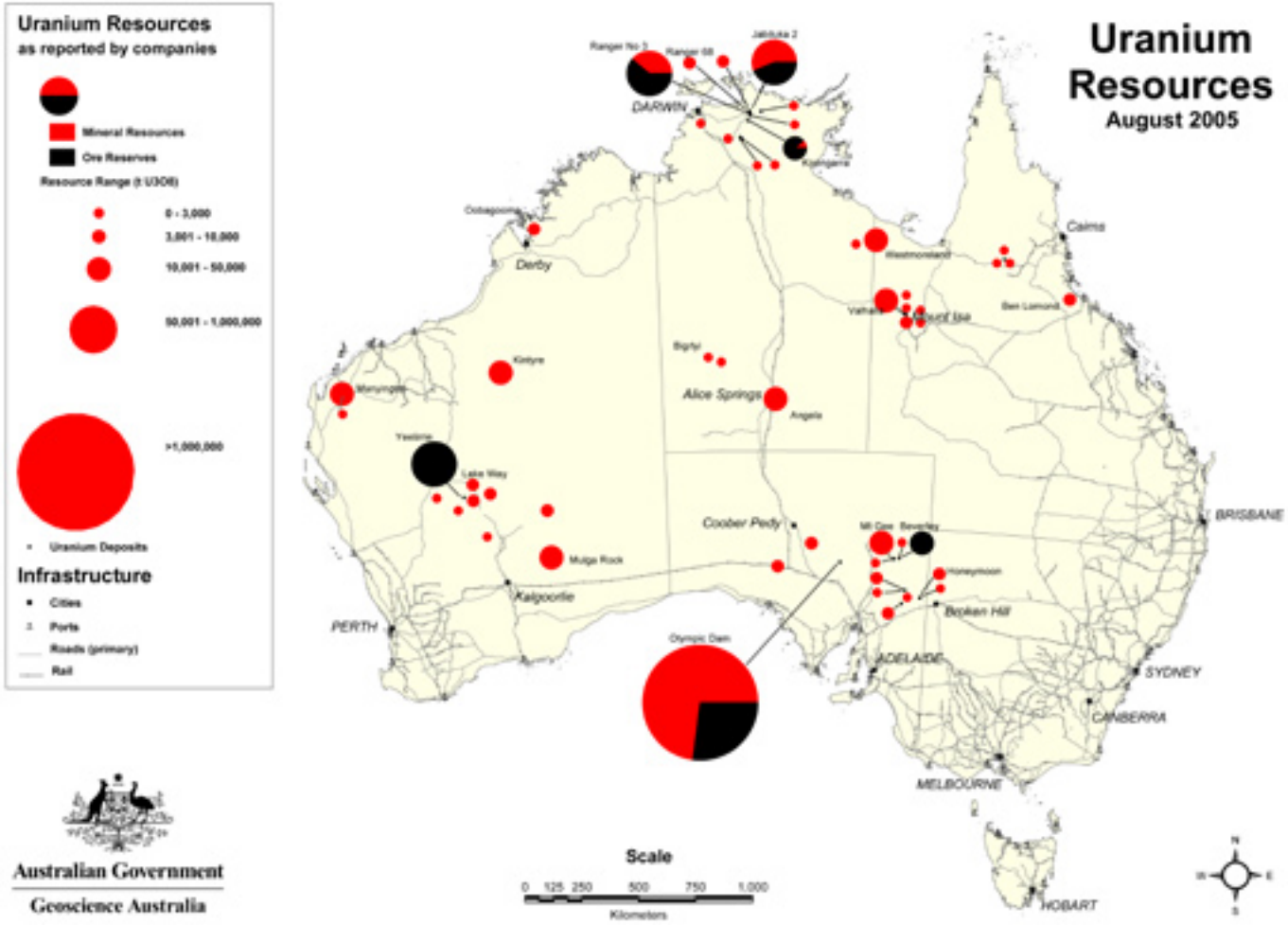
Deposit	Reserves/resources[a, b]	Grade (% U_3O_8)	Contained U_3O_8 (t)
Paterson Province			
Kintyre	Mineral resources	0.15–0.4	36 000
Canning Basin			
Oobagooma	Mineral resources (recoverable)		5000
Yilgarn Craton–Calcrete deposits			
Yeelirrie	Ore reserves	0.15	52 500
Centipede (includes Abercrombie and Millipede)	Mineral resources	0.063	4400
Lake Austin	Mineral resources	0.08	151
Lake Maitland (Mt Joel)	Mineral resources	0.052	7900
Lake Raeside	Mineral resources	0.025	1700
Lake Way	Mineral resources		4000
Nowthana	Mineral resources	0.086	2023
Thatchers Soak	Mineral resources	0.03	4100
Lake Mason	Mineral resources	0.035	2700
Carnarvon Basin			
Manyingee	Mineral resources	0.09	12 078
Bennets Well	Mineral resources	0.16	1500
Eucla Basin			
Mulga Rock	Mineral resources	0.14	15 330
Total for Western Australia			**149 382**

a Mineral resources are in addition to ore reserves (that is, mineral resource figures are exclusive of those resources which have been modified to produce ore reserves).

b Mineral resource figures are the sum of resources in the measured, indicated and inferred categories.

Source: Geoscience Australia

Appendix D Map of Australia's uranium deposits and resources



Appendix E Acronyms and abbreviations

AIG	Australian Institute of Geoscientists
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
ANSTO	Australian Nuclear Science and Technical Organisation
AONM	Australian obligated nuclear material
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASNO	Australian Safeguards and Non-Proliferation Office
AusIMM	Australian Institute of Mining and Metallurgy
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPIP Act	Environment Protection (Impact of Proposals) Act 1974
EPR	Extended Producer Responsibility
COAG	Council of Australian Governments
GNEP	Global Nuclear Energy Partnership
GWe	gigawatts of electricity
HEU	highly enriched uranium
IAEA	International Atomic Energy Agency of the United Nations
IEA	International Energy Agency
ILUAs	Indigenous Land Use Agreements
JORC	Australasian Joint Ore Reserves Committee
JORC Code	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
kWh	kilowatt hours
lb	pounds
MCE	Ministerial Council on Energy
MCMPR	Ministerial Council on Mineral and Petroleum Resources
Mining Code	Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing, 2005
MOX fuel	Mixed oxide fuel
NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
PIRSA	Primary Industries and Resources South Australia
RAR	reasonably assured resources
RPC Act	Radiation Protection and Control Act 1982 (South Australia)
RRA	relevant regulatory authority
RSO	radiation safety officer
t	tonnes
TRANSAS	Transport Safety Appraisal Service of the IAEA
U	uranium
U-235	Isotope 235 of uranium (occurs as 0.711% of natural uranium)
UOC	uranium ore concentrate
U_3O_8	uranium oxide
UIF	Uranium Industry Framework
WNA	World Nuclear Association