

**Submission by the Australian Government
Department of the Environment and Heritage to:**

**Standing Committee on Industry and Resources
Inquiry Into Developing Australia's Non-Fossil Fuel
Energy Industry**

**Case Study – STRATEGIC IMPORTANCE
OF AUSTRALIA'S URANIUM RESOURCES**

1. Introduction

This submission to the Standing Committee on Industry and Resources Inquiry Into Developing Australia's Non-Fossil Fuel Energy Industry (Case Study – Strategic Importance of Australia's Uranium Resources) from the Australian Government Department of the Environment and Heritage incorporates information provided from the Supervising Scientist, the Director of National Parks and the Director of Meteorology as relevant statutory office holders within the portfolio. The submission addresses aspects of the case study terms of reference as they relate to the Department's responsibilities.

In addition to the attached submission, your attention is drawn to the 2003/04 Annual Reports of the Department of the Environment and Heritage, Supervising Scientist, Director of National Parks, and the Australian Greenhouse Office, which contain substantial information on matters relevant to this inquiry. Also of relevance is the submissions of the Department and of the Supervising Scientist to the Senate Environment, Communications, Information Technology and the Arts References Committee Inquiry into the Environmental Regulation of Uranium Mining (September 2002).

The Australian Government Department of the Environment and Heritage and its predecessors have had a role in the environment assessment and monitoring of the extraction of uranium in Australia since the 1970s. This submission provides an overview of the key aspects of that role and the Department's current responsibilities.

Key issues addressed in the submission include:

- portfolio responsibilities that are relevant to the Case Study terms of reference;
- the relationship between greenhouse gas emissions and the export of Australia's uranium resources;
- environmental aspects of the regulation of the uranium mining sector;
- waste management in the uranium mining industry;
- social impact assessment and consultation with traditional owners
- uranium mine health issues in the Alligator Rivers Region; and
- the adequacy of regulation of uranium mining.

1.1 Overview of Uranium Mining in Australia

Since the 1970s, uranium has been extracted for energy use. The uranium from Australia's mines is exported for use in electricity generation overseas. Small quantities may be used to fuel research reactors. Exports are only to countries with which there is a bilateral nuclear cooperation agreement on the peaceful use of Australian uranium.

Uranium has been mined in Australia since the 1930s, initially to extract radium for medical purposes, and later (in the 1950s and 1960s) for military use by the United Kingdom and the United States.

Uranium mining first occurred in Australia at the Radium Hill mine in South Australia during the 1930s when ore was milled in order to extract radium for medical purposes. Uranium was also recovered from the ore, and was used to decoratively

colour glass and ceramics. Smaller amounts of material were extracted at Mount Painter in South Australia in the pre-war years.

Following the Second World War and the onset of the Cold War, uranium came to be regarded as a strategic mineral because of its importance in nuclear weapon production. During the 1950s and 1960s a number of uranium mines and mills were operating with the uranium concentrates exported to the United Kingdom and United States of America. These mines were at Mary Kathleen in Queensland, Rum Jungle and the South Alligator River valley in the Northern Territory, and Radium Hill and Myponga in South Australia.

The development of viable nuclear powered electricity generation in the 1960s led to a civilian demand for uranium, and this demand resulted in significant uranium exploration during the late 1960s and throughout the 1970s. Several new mining operations also commenced. Queensland's Mary Kathleen mine was reactivated and operated between 1975-1982. In the Northern Territory, the Nabarlek mine operated between 1979-1988, and the Ranger mine commenced production in 1981. In South Australia, the Olympic Dam mine started producing uranium concentrates in 1988, followed by the Beverley mine in 2001.

Today production is continuing at the Ranger open pit mine in the Northern Territory, Olympic Dam underground mine in South Australia and the Beverley in-situ leach operation, also in SA (see Table 1). Significant potential economic uranium deposits have also been identified in various areas of South Australia (including Honeymoon), Queensland (including Westmoreland, Valhalla and Ben Lomond), Western Australia (including Kintyre, Yeelirrie and Manyingee) and the Northern Territory (including Jabiluka and Koongarra).

Table 1 – Overview of current and potential Uranium Mine Sites in Australia that have been subject to Environment Assessment

MINE	MINE TYPE	KEY LEGISLATION	WASTE DISPOSAL
Ranger NT	Uranium – two open pits	Ranger Uranium Environmental Inquiry under <i>Environment Protection (Impact of Proposals) Act 1974</i> (EPIP). Ranger Project Area established under <i>Atomic Energy Act 1953</i> . NT regulation under <i>Mining Management Act 2001</i> and supervision by the Supervising Scientist under <i>Environment Protection (Alligator Rivers Region) Act 1978</i> .	Includes a tailings dam, although all tailings are now sent directly to the pits and tailings in the dam as well as mineralised waste rock are also to be returned to the pits during rehabilitation of the site. Site also includes waste rock stockpiles and stockpiles of various grades of ore.
Jabiluka NT Not Operational	Uranium – Underground. (Currently under long term care and maintenance)	Commonwealth environment assessments under EPIP. NT regulation under <i>Mining Management Act 2001</i> and supervision by the Supervising Scientist under <i>Environment Protection (Alligator Rivers Region) Act 1978</i> .	Jabiluka Mill Alternative - all tailings to be returned underground. Remaining unmineralised waste rock stockpiles to be rehabilitated as a landform. Ranger Mill Alternative – Tailings to be disposed at Ranger pits, waste rock to be returned underground as backfill.
Olympic Dam SA	Underground copper, uranium and gold	Commonwealth environment assessments under the EPIP Act (last in 1997). SA regulation under <i>Roxby Downs (Indenture Ratification) Act 1982</i> .	Tailings permanently stored in tailings dam. Coarse fraction of waste rock mixed with cement and returned underground to previously mined stopes. Fine fraction sent to tailings dam.
Beverley SA	In-situ leach uranium	Commonwealth environment assessments under the EPIP Act. SA regulation under <i>Mining Act 1971</i> .	No tailings or waste rock produced. Liquid waste is returned to same underground aquifer.
Honeymoon SA Not Operational	In-situ leach uranium (approved but not active)	Commonwealth environment assessments under the EPIP Act. SA regulation under <i>Mining Act 1971</i> .	No tailings or waste rock produced. Liquid waste is returned to same underground aquifer.

1.2 Key Responsibilities of the Environment and Heritage Portfolio Relevant to the Case Study

The Environment and Heritage portfolio has four key responsibilities that are relevant to the Case Study terms of reference.

The Department of the Environment and Heritage (DEH) is responsible for the administration of the environment assessment and approvals provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under the environmental assessment provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance are subject to a rigorous assessment and approval process. An action includes a project, development, undertaking, activity, or series of activities. Nuclear actions (including uranium mining) are one of the seven matters of National Environmental Significance the EPBC Act identifies. The other matters of National Environmental Significance include World Heritage properties and wetlands of international significance under the Ramsar Convention, which are both of particular relevance to uranium mining in the Alligator Rivers Region of the Northern Territory. Kakadu National Park within the Region is a World Heritage property and includes extensive Ramsar wetlands.

The Supervising Scientist, established under the *Environment Protection (Alligator Rivers Region) Act 1978*, has a monitoring, research and supervisory role with respect to uranium mining activities in the Alligator Rivers Region of the Northern Territory.

The Director of National Parks (an authority within the Environment and Heritage portfolio) is responsible for the management of Commonwealth reserves established under the EPBC Act, including Kakadu National Park which surrounds the Ranger and Jabiluka mine sites. The Park is jointly managed by the Director and its traditional Aboriginal owners.

The Australian Greenhouse Office, within the Department of Environment and Heritage delivers the Australian Government's climate change strategy as announced in the 2004-05 Federal Budget and in the Energy White Paper, *Securing Australia's Energy Future*.

Each of these roles is relevant to matters discussed later in this submission

2. Potential implications for global greenhouse gas emission reductions from the further development and export of Australia's uranium resources.

The Australian Government's policy on energy was outlined in June 2004 through the Energy White Paper, *Securing Australia's Energy Future*. The White Paper highlighted that developing Australia's abundant low-cost energy resources is a key to our future prosperity.

The Energy White Paper indicated the use of uranium reserves raises cost, safety and waste disposal issues in power generation and that Australia is not contemplating the domestic use of nuclear power. Coal and oil will continue to be by far the most important primary energy sources (Australian Government 2004).

While uranium is not used as an energy source in Australia it is exported under stringent safeguard arrangements to ensure it is used for exclusively peaceful purposes and is fully accounted for throughout the nuclear fuel cycle (Australian Government 2004).

Uranium is Australia's second largest energy export in terms of energy content and plays a role in decreasing the greenhouse intensity of other nations to the extent that it displaces higher-emission energy sources (Australian Government 2004).

Australia's reasonably assured resources of uranium recoverable at less than US\$40/kg are 689,000 tonnes (OECD NEA/IAEA 2004). Australia's estimated additional uranium resources recoverable at less than US\$40/kg are 276,000 tonnes (OECD NEA/IAEA 2004), bringing the total inferred and assured low cost resource to 965,000 tonnes.

Australian uranium plays a role in reducing global emissions. The conversion of uranium to electricity in power stations emits virtually no greenhouse gases (OECD 2005). Under current international arrangements, the emissions from producing uranium would be attributed to Australia, but the emissions savings from its consumption would accrue to the country that uses it (Australian Government 2004).

Australia exported 9,593 tonnes of Uranium Oxide (U_3O_8) in 2002-03 (ABARE 2004). This could produce approximately 413,640 GWh of electricity.¹ While it is not possible to determine precisely the greenhouse emissions savings to other countries from this export, a number of comparable scenarios may be examined. For instance, if the same amount of electricity was to be produced from average black coal generation, more than 395 Mt CO₂e/yr would be emitted.² This represents around 70% of Australia's total greenhouse gas emissions for 2003 which is reported to have been 550.0 Mt CO₂e (AGO 2005). On this basis, and assuming that Australia's uranium does not displace uranium sourced from other countries, Australia's total inferred, low cost, uranium reserves could displace nearly 40,000 Mt CO₂e³ if it replaced black coal electricity generation. This represents almost 5 years of emissions from world public electricity and heat production at 2002 levels (8,512 Mt CO₂e/yr) as reported by the International Energy Agency (IEA 2004).

Estimation of the net greenhouse gas abatement contribution through use of Australia's uranium to produce nuclear power would need to include analysis of emissions throughout the lifecycle of uranium fuel from extraction through to long term disposal of wastes. This paper does not estimate these emissions.

¹ 1t U_3O_8 = 43 119 MWh – based on 0.47 petajoules per tonne (ABARE 2004), 1 petajoule = 278 GWh (EECA and NZ Ministry for Environment 2002) and 33% thermal conversion efficiency (http://www.eia.doe.gov/cneaf/nuclear/page/uran_enrich_fuel/convert.html)

² 954kgCO₂e/MWh – Energy White Paper p135, National Greenhouse Gas Inventory Analysis of Recent Trends and Greenhouse Indicators 1990-2002. (413, 640 GWh x 0.954 x 1,000 = 395 Mt)

³ 965, 000 t U_3O_8 * 43, 119 MWh/t U_3O_8 * .954 tCO₂e/MWh

Assessing the contribution of nuclear energy to global greenhouse abatement will also involve analysis of the costs of generating nuclear power. International sources of information on costs of nuclear electricity production vary. It is difficult to ascertain a precise cost estimate as the range of studies on this issue are based on different assumptions and information. For example, many of the life cycle costs associated with plant decommissioning, long term waste disposal and catastrophic event insurance are not included or are discounted in most analyses. Costs of electricity from nuclear energy compared to, say, coal will vary according to a number of factors including the generation plant's proximity to its fuel source, the quality of fuel and the age of competing infrastructure. The results of two recent reports provide some idea of the uncertainties associated with the estimation of the costs of nuclear electricity.

One report, *'Projected Costs of Generating Electricity - 2005 Update'* produced by the OECD in conjunction with the International Energy Agency (IEA) and the Nuclear Energy Agency (NEA) estimates that at a 5% discount rate, the levelised costs of nuclear generated electricity range between US\$21/MWh and US\$31/MWh. By comparison, the report estimates that coal would cost between US\$25–\$50/MWh and gas between \$37–\$60/MWh. At a 10% discount rate, the levelised costs of nuclear generated electricity are estimated to be in the range of US\$30/MWh to US\$50/MWh. This compares with a cost of US\$35 – 60/MWh for coal and US\$40 – \$62/MWh for gas.

The report qualifies its levelised cost approach, noting that it does not reflect investors' perceptions of financial risk in liberalised markets. It also includes data provided from non-market economies including North Korea and Romania. The report also notes that the approach adopted does not substitute for the economic analysis that needs to be carried out at the national level.

Further, the cost estimates for nuclear energy fail to specify the level of finance allocated to decommissioning. The figures also fail to include complete insurance risk and the unknown cost of permanent waste storage. Including these costs may raise the levelised cost considerably.

An independent academic report by the Massachusetts Institute of Technology (MIT 2003) estimated the relative costs of one megawatt hour (MWh) of electricity from various fuel sources over a 40-year project period. They found nuclear power to be more expensive at US\$67/MWh compared to coal (US\$42/MWh) and gas (US\$41/MWh). The MIT report estimated it would require a carbon tax in the order of US\$30/tCO_{2e} for nuclear to compete with coal and a carbon tax of US\$50/tCO_{2e} for nuclear to compete with gas under most scenarios. The higher carbon tax required for nuclear to compete with gas reflects the lower greenhouse emission intensity of gas compared to coal

It is unclear if the MIT calculations account for the costs of decommissioning which may raise the levelised cost considerably. Also, the calculations do not appear to include complete insurance risk or the costs of permanent nuclear waste storage.

3. Current Structure and regulatory environment of the uranium mining sector

3.1 Overview

Uranium mining in Australia is subject to regulation by both the Australian Government and State/Territory Governments.

The roles and responsibilities of the Australian Government in relation to uranium mining have evolved significantly since the 1970s. Prior to the 1970s uranium was regarded as a strategic mineral and Commonwealth regulation was focussed on the protection of uranium as a strategic military asset. The actual mining process was regulated by States and Territories in a similar fashion to the regulation of other minerals.

During the 1970s, the Australian Government developed a significant role in relation to environmental protection, an area that had previously been the preserve of the States and Territories. The first significant piece of legislation in this area was the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act). The Australian Government's environmental protection role as it relates to uranium mining developed in the late 1970s in response to the outcomes of the Ranger Uranium Environmental Inquiry (RUEI) which was carried out under the EPIP Act. Through this process the Australian Government gave itself a specific role in the protection of the Alligator Rivers Region through a range of mechanisms including the Supervising Scientist.

3.2 Commonwealth Regulation of Existing Uranium Mines

The Australian Government's regulatory role is the responsibility of three portfolios – Environment and Heritage, Industry, Tourism and Resources, and Foreign Affairs and Trade. Regulation of uranium exports and safeguards are the responsibility of the Department of Industry, Tourism and Resources and The Australian Safeguards and Non-Proliferation Office (ASNO).

The Australian Government exercises control over the export of uranium under the *Customs (Prohibited Exports) Regulations 1958*. Amendments to those regulations in 2000 strengthened Australian Government control over uranium exports by enabling export permissions (or licences) for uranium to be granted subject to conditions. That amendment provides the Minister for Industry, Tourism and Resources with a clear and administratively efficient mechanism by which he can place legally binding conditions, including mine-site environmental conditions, on the export of uranium.

The Australian Government administers the *Nuclear Non-Proliferation (Safeguards) Act 1987* which has the objective of ensuring the safeguards and physical security of nuclear materials within Australia. Thus, in respect of the physical security and export of uranium, the Australian Government regulates all Australian uranium mines. Under this Act, ASNO accounts for all uranium as it moves through the international fuel cycle, including in Australia.

The Australian Government also administers the *Atomic Energy Act 1953* which vests ownership of uranium in all Australian Territories with the Commonwealth. In practice this gives the Minister for Industry, Tourism and Resources greater powers in the Northern Territory in relation to uranium mining. For instance, the Northern Territory Minister must consult with the Minister for Industry, Tourism and Resources for major approvals for uranium mines in the Northern Territory (see also section 3.2.2.2).

The Department of the Environment and Heritage is not strictly the day to day regulator of any uranium mines, although it has carried out environmental impact assessments of all operational uranium mines and contributes to the regulatory process in the Alligator Rivers Region of the Northern Territory through the involvement of the Supervising Scientist.

The day-to-day regulation of mining activities is a matter for States and Territories. However the *Heads of Agreement on Commonwealth/State Roles and Responsibilities for the Environment* signed by the Australian Government, States and Territories in 1997, recognises that the Australian Government has a specific role in relation to nuclear issues.

Attachment 1 to the *Heads of Agreement* notes matters of *National Environmental Significance*, one of which is “nuclear activities”:

6. Nuclear activities

“The Commonwealth has responsibility and an interest in relation to the assessment and approval of mining, milling, storage and transport of uranium and the development and implementation, in consultation with the States, of codes of practice as provided under the Environment Protection (Nuclear Codes) Act 1978 for protecting the health and safety of the people of Australia, and the environment, from possible harmful effects associated with nuclear activities”.

The *Environment Protection (Nuclear Codes) Act 1978* was repealed as part of the process of establishing the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The nuclear codes are now part of an ARPANSA publications series, and remain non-binding unless formally adopted by a State or Territory.

3.2.1 Environment Assessment and Approval of Uranium Mines

3.2.1.1 Environment Protection (Impact of Proposals) Act 1974

All existing uranium mines in Australia were subject to environmental impact assessment under the now repealed EPIP Act (as these proposals predated the EPBC Act). After assessment, the Minister for the Environment and Heritage made recommendations which the action Minister (the Minister with responsibility for Resources) was then required to take into account in matters to which the recommendations related. Recommendations made under the EPIP Act were generally agreed and issued as conditions by the action Minister to the proponent. In the case of the three operating uranium mines, recommendations made under the EPIP Act continue to be enforced in Environmental Requirements through the export permissions (administered by the Department of Industry, Tourism and Resources

(DITR)) and mining authorisations, and regularly reported against by operators. The ongoing implementation of the recommendations were therefore not the responsibility of the Environment and Heritage Portfolio.

DEH does retain an ongoing consultative role in current uranium mines (and implementation of recommendations) through the Beverley Environmental Consultative Committee, Olympic Dam Environmental Consultative Committee, and (through OSS) Alligator Rivers Region Advisory Committee (see Sections 3.2.2.1 and 3.2.3)

3.2.1.2 The Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which replaced the EPIP Act in 1999, provides a vehicle for the Minister for the Environment and Heritage to directly issue approval conditions to a proponent.

If a nuclear action, such as the construction and operation of a uranium mine has, will have, or is likely to have a significant impact on the environment, then a referral must be made to the Minister for the Environment and Heritage under the EPBC Act. Under the EPBC Act, any proposal referred and determined to be a controlled action would require assessment at a level determined by the Minister for the Environment and Heritage. Being a nuclear action, the assessment would be of the whole of the environment and not restricted to matters of national environmental significance (NES). One of the four approaches may be used for assessment of relevant impacts of an action: preliminary documentation; Public Environment Report (PER); Environmental Impact Statement (EIS); or a public inquiry.

At the completion of that assessment process, the Minister would determine, first, whether the proposal could go ahead or not, and, if it were to, what conditions would be required. Such conditions would be legally enforceable with both civil and criminal penalties being potentially applicable for non-compliance.

While much of the decision-making process affecting the environment rests largely in local or State hands, such as the day to day operation of mines, there is a legitimate national dimension to environmental policy in relation to uranium mining. The best way of ensuring national and Australian Government interests are served, is for new proposals to be assessed under the EPBC Act. Environment impact assessment by the Australian Government provides for a degree of reassurance and certainty in the public's perception that environmental protection measures for all proposals are rigorous, fully transparent, open and consistent.

Given that nuclear actions are matters of national environmental significance under the EPBC Act, it is likely that any approvals under the Act for new uranium mines, or the substantial expansion of an existing mine, will require a continuing Australian Government role in any regulatory regime established to ensure compliance with approval conditions. It will be important that consideration be given to how such a regulatory regime should best operate to incorporate the interests of both the Australian Government and State/Territory Governments. It is the view of DEH that with the recent interest in an expanded uranium export industry in Australia, there is a need to ensure that a strict regulatory regime keeps pace with expansion to ensure that

the environment and human health are protected and that reasonable expectations of stakeholders both nationally and internationally are met.

3.2.2 Australian Government involvement in regulation of uranium mining in the Alligator Rivers Region of the Northern Territory

Uranium mining in the Alligator Rivers Region of the Northern Territory is subject to specific Commonwealth legislation as well as being subject to general Northern Territory mining legislation. The regulatory structure primarily involves the Department of Industry, Tourism and Resources, the Supervising Scientist, and the Northern Territory Department of Business, Industry and Resource Development (DBIRD).

The current structure works well, and is essentially an evolution of agreements between the Australian Government and the Northern Territory in the late 1970s, following Northern Territory self-government in 1978.

However, some important changes have occurred. An important commitment made by the Australian Government to the World Heritage Committee in July 1999, was that “[t]he security of environmental management at the Ranger and Jabiluka mines will be further improved by amending the legal regime governing enforcement of environmental conditions to strengthen the role of the national government.”

This commitment was implemented through the revision of the agreement between the Northern Territory and Australian Government governments on the regulation of uranium mining in the Northern Territory. The agreement was signed by Northern Territory and Australian Government Ministers on 17 November 2000 and is often referred to as the *17 November Agreement*. Under this agreement, before granting or varying an Authorisation under the *Uranium Mining (Environment Control) Act 1979* (since repealed and replaced by the *Mining Management Act 2001*), the Northern Territory Minister is required to refer the matter to the Supervising Scientist for comment. The Northern Territory Minister must not act until that comment is received. Where the Supervising Scientist has advised the Northern Territory Minister that the matter has been referred to the Australian Government Minister for Industry, Tourism and Resources (as the Minister responsible for the *Atomic Energy Act 1953*), the Northern Territory Minister must act in accordance with the advice of the Australian Government Minister for Industry, Tourism and Resources.

3.2.2.1 *Environment Protection (Alligator Rivers Region) Act 1978*

The Supervising Scientist, established under the *Environment Protection (Alligator Rivers Region) Act 1978*, has a monitoring, research and supervisory role with respect to mining activities in the Alligator Rivers Region. The *Environment Protection (Alligator Rivers Region) Act 1978* also establishes the Alligator Rivers Region Advisory Committee (ARRAC), the Alligator Rivers Region Technical Committee (ARRTC), and the Environmental Research Institute of the Supervising Scientist (ERISS).

Alligator Rivers Region Advisory Committee (ARRAC)

ARRAC was established under Sections 16-22 of the *Environment Protection (Alligator Rivers Region) Act 1978* to promote communications between the community and government and industry stakeholders on environmental issues associated with uranium mining in the Alligator Rivers Region. Its membership reflects the variety of community, government and industry organizations with an interest in the mining of uranium in the Alligator Rivers Region.

Alligator Rivers Region Technical Committee (ARRTC)

ARRTC was established under Sections 22A-22F of the *Environment Protection (Alligator Rivers Region) Act 1978*. The primary role of ARRTC is to ensure that the quality of science used in the research into, and assessment of, the protection of the environment from the impacts of uranium mining in the Alligator Rivers Region is of an appropriately high standard. This involves review of the research activities of the Environmental Research Institute of the Supervising Scientist ERISS and other organizations, including uranium mining companies. It also involves the review of the quality of the science used by the Supervising Scientist and the Northern Territory Government to assess and approve proposals by uranium mining companies.

ARRTC consists of thirteen members, comprising seven independent scientific members (including the chair) and six representatives of stakeholder organizations. ARRTC was reconstituted to include the independent members in 2001 in response to an undertaking by the Australian Government to the World Heritage Committee. Members are appointed by the Minister for the Environment and Heritage, with the independent scientific members selected from nominations made by the Federation of Australian Scientific and Technical Societies.

Environmental Research Institute of the Supervising Scientist (ERISS)

ERISS is established under Sections 23-25 of the *Environment Protection (Alligator Rivers Region) Act 1978*. ERISS conducts environmental monitoring and research into the impact of uranium mining on the environment and people of the Alligator Rivers Region. It also conducts research on the ecology and conservation of tropical wetlands, and is a partner in the National Centre for Tropical Wetland Research (NCTWR).

3.2.2.2 Other Commonwealth Legislation

In addition to the legislation noted earlier, there are other Commonwealth instruments specific to Ranger and Jabiluka which provide the Australian Government with powers. Those powers differ slightly between Ranger and Jabiluka due to the different mechanisms by which they were originally established.

The Ranger mine is situated within the Ranger Project Area which is established under Section 41 of the Commonwealth *Atomic Energy Act 1953*. The Act is administered by the Minister for Industry, Tourism and Resources. The Australian Government has defined Environmental Requirements (ERs) for Ranger to ensure the adequacy of environment protection arrangements. The ERs are appended to the Section 41 Authority and have been integrated into the Ranger Authorisation (issued under the Northern Territory *Mining Management Act 2001*) by DBIRD, to the extent that such integration is appropriate. The ERs are also attached to the export

permission for Ranger. It is a requirement that Energy Resources of Australia Ltd (ERA) complies with the Section 41 Authority and the ERs. Failure to comply provides the Minister for Industry, Tourism and Resources with the opportunity to take action against ERA. Such action could include prosecution for an offence under the *Atomic Energy Act 1953* and/or the imposition of additional conditions on the mine operator. The Ranger ERs, originally drafted in the late 1970s, were revised over a period of approximately four years commencing in 1996 to reflect modern environmental protection principles. The revised ERs came into force in January 2000. The ERs reflect the role of the Australian Government; that is, they set the Primary and Secondary Environmental Objectives and broadly identify mechanisms for meeting those objectives with very little prescription.

Jabiluka is located within a Mineral Lease issued under the Northern Territory *Mining Act 1982*. The Australian Government has defined Environmental Requirements for Jabiluka and these are attached to the Jabiluka Mineral lease. ERA must comply with the Jabiluka ERs and the Northern Territory must enforce them when considering approvals and amendments to Authorisations issued under the Northern Territory *Mining Management Act 2001*.

The Australian Government Minister for Industry, Tourism and Resources is the action Minister in relation to the Environment Impact Statement (EIS) and Public Environment Report (PER) for the Jabiluka proposal conducted under the *Environment Protection (Impact of Proposals) Act 1974* and maintains an ongoing role in relation to uranium export licensing. While the EPIP Act was repealed on the commencement of the *Environment Protection and Biodiversity Conservation Act 1999*, the Jabiluka proposal remains subject to that Act in accordance with the *Environmental Reform (Consequential Provisions) Act 1999*. As action Minister he must consider the extent to which ERA has met requirements arising from the assessment of the EIS and PER for Jabiluka when taking the action, i.e. issuing an export permit for uranium mined at Jabiluka (the site is currently in a state of long-term care and maintenance and no uranium production has occurred from the project).

3.2.2.3 Northern Territory Roles and Responsibilities

Mining operations at Ranger and Jabiluka are regulated by the Northern Territory Department of Business, Industry and Resource Development (DBIRD), under the *Mining Management Act 2001*. Prior to 2001, the *Uranium Mining (Environment Control) Act 1979* was the legislation under which the Northern Territory regulated Ranger and Jabiluka. The Northern Territory *Mining Act* provides the mining title framework for mines in the Northern Territory.

Working arrangements between the Territory and Australian Government agencies involved in the regulatory and supervisory process establish Minesite Technical Committees (MTCs) for Ranger, Jabiluka and Nabarlek. MTCs provide a consultation forum for technical review of proposals, statutory reports and operational practices. In addition to DBIRD, the Supervising Scientist, and the respective mining company, the Northern Land Council (NLC) also has a representative on each MTC to ensure that the views of Aboriginal people and the relevant traditional owners can be considered and the NLC can ensure that these groups are kept informed of minesite activities and

developments. The Department of Industry, Tourism and Resources can also attend the MTCs, and receives copies of all minutes.

Authorisations

The primary regulatory instrument under Northern Territory law is the Authorisation which is issued separately for each mine. Authorisations, which were originally issued under *Uranium Mining (Environmental Control) Act 1979* and remain in force under the *Mining Management Act 2001*, set out the conditions with which the mining company must comply. Some of these conditions are stipulated in detail in the Authorisation. Examples include the statutory environmental monitoring program and limits on the increase in concentration of mine derived contaminants downstream of Ranger. However most of the detailed procedural requirements are contained in the reports or plans (for example water management plans) which are required under the relevant Authorisation and assessed by the Regulator (the Northern Territory Minister for Mines and Energy) in consultation with MTC members.

Mining Management Plans

The commencement of the *Mining Management Act 2001* established a new requirement that mine operators submit for approval a Mining Management Plan with which the mining company is required to comply. Section 40 of the *Mining Management Act 2001* requires that the Mining Management Plan include the following information:

- the identification and description of the mining activities;
- particulars of the implementation of the management system to address safety and health issues;
- particulars of the implementation of the management system to address environmental issues;
- a plan and costing of closure activities;
- particulars of the organisational structure; and,
- plans of current and proposed mine workings and infrastructure and other information or documents required by the Minister for Mines and Energy.

Thus some or all of the plans and reports that are required to be produced by mining operators under the relevant current Authorisation are likely to be incorporated into new Mining Management Plans. Consequently, it is expected that the current Authorisations will require amendment once the new Mining Management Plans have been assessed and approved.

Approvals for proposals or amendments to Authorisations fall within the scope of the *17 November 2000 Agreement*, ensuring that regulatory action intended by the Territory is reviewed by, and only implemented in agreement with, the Australian Government. In these instances the initial assessments are conducted on behalf of the Australian Government by the Supervising Scientist as outlined above. In addition, resultant approvals on significant issues are reviewed by ARRTC ensuring that a high degree of scientific rigour has been used in the decision-making process and verified by a panel of experts, the majority of whom are independent of the mining operation or approval process.

3.2.3 Regulation of Uranium Mining in South Australia

DEH does not have a direct ongoing role in the regulation of uranium mining in South Australia, but does participate in consultative committees.

The Olympic Dam Environment Consultative Committee (ODECC) was established to provide for technical information exchange and consultation between the Australian Government, the South Australian government and Western Mining Corporation (WMC - the operator of the mine), to monitor and manage the impacts of operations at the Olympic Dam mine. DEH is represented on the Committee together with DITR. A regular bi-annual meeting of ODECC is held at the offices of Primary Industries and Resources South Australia (PIRSA), in Adelaide.

WMC will continue to present updates on progress on environmental management to the ODECC (with obligations other than on-going commitments, now completed).

The Australian Government in cooperation with the South Australian government has also established the Beverley Environment Consultative Committee to monitor environmental performance at the Beverley uranium mine. DEH is represented on the Committee together with DITR.

DITR is responsible for approving exports of uranium from SA mines subject to compliance with the Australian Government Environmental Requirements.

3.2.3.1 South Australia Roles and Responsibilities

South Australian legislation related to the control of the mining and milling of uranium ores is administered by the South Australian Environment Protection Authority, Department of Primary Industries and Resources and the, Department for Administrative & Information Services (Work Place Services).

As both Commonwealth and State legislation require an environmental assessment process, it has been past practice to conduct a joint State/Australian Government environment impact statement, with Planning South Australia acting as the lead agency. After the completion and consideration of an environmental impact assessment process, a Mining Lease under the South Australia *Mining Act 1971*, may be granted by the Minister for Mineral Resources Development.

3.3 Rehabilitation Bonds

3.3.1 Northern Territory

The Ranger mine, because it operates on the Ranger Project Area under an Authority issued under Section 41 of the *Atomic Energy Act 1953*, must comply with specific rehabilitation requirements. A rehabilitation plan for the Ranger site is submitted each year by ERA to the Department of Industry, Tourism and Resources (DITR). The Supervising Scientist provides an assessment of the adequacy of the plan to DITR. The rehabilitation plan is also assessed by the MTC (S3.2.2.3). The purpose of this annual plan is to provide the basis for estimating the appropriate size of the Ranger Rehabilitation Trust Fund, an ongoing contingency for the cost of rehabilitation of the Ranger Project Area if mining operations were to cease at the date of the preparation of the plan. ERA is required to provide any additional funds required to the Trust

Fund to ensure that adequate funds are always available for rehabilitation should the mining company cease operations prematurely for any reason.

Other mines in the Northern Territory, including Nabarlek and Jabiluka, are on Mineral Leases under the Northern Territory *Mining Act*, and are subject to the requirements of Sections 43-44 of the *Mining Management Act 2001*.

This allows the Northern Territory to impose a security deposit as a condition of an Authorisation for the purpose of securing any of the following: (a) an operator's obligation to comply with this Act or an Authorisation; (b) payment of costs and expenses in relation to the Minister causing an action to be taken to prevent, minimise or rectify environmental harm (i) on a mining site; or (ii) outside a mining site if the environmental harm results from or may result from a mining activity; (c) payment of costs and expenses in relation to the Minister for Mines and Energy causing an action to be taken to complete rehabilitation of a mining site. The security amount is reviewed annually as part of each mine's Mining Management Plan.

3.3.2 South Australia

Under the South Australia *Mining Act 1971* the Minister for Mineral Resources Development may require a miner to enter into a bond in such sum and subject to such terms and conditions as ensure, in the opinion of the Minister, that any civil or statutory liability likely to be incurred by that person in the course of carrying out mining operations, and the present and future obligations of that person in relation to the rehabilitation of land disturbed by mining operations, will be satisfied.

The Australian Government Environment Requirements (as put in place by DITR in relation to export permissions) for the Beverly mine also require that Heathgate Resources is to provide security, in a form acceptable to the relevant South Australian regulatory Authority, to cover the costs of rehabilitation or environmental repair in the event that Heathgate Resources is unable to carry out the required rehabilitation and/or environmental repair.

4 Whole of Lifecycle Waste Management in the Uranium Industry

4.1 Management of Uranium Mine Tailings and Waste Rock

The principal whole-of-lifecycle waste management issues for Australia's uranium mining industry are tailings and waste rock. As Australia does not actually use any of the uranium it produces, all uranium is exported and there are no downstream processing wastes generated here. Downstream waste management issues become the responsibility of purchasers of the product in various overseas jurisdictions (subject to nuclear safeguards controls in respect of Australian Obligated Nuclear Material).

Waste rock

Waste rock is the excess rock that is excavated in order to access the ore. Frequently this waste includes mineralised material which is below economic ore grade or has metallurgical characteristics that make it uneconomic to process. The material does however have varying levels of radioactivity. For open pit mines such as Ranger the proportion of waste rock generated in order to access the ore is relatively higher than

for underground mines, such as Olympic Dam, where excavation and movement of waste is more easily avoided.

In the case of uranium mining the actual amount of product removed from site is typically very small by comparison with the amount of material excavated and the excavated wastes comprise a larger volume than the void created by mining due to swell and breakage factors. After backfilling of workings there is usually a residual amount of material to be accommodated. This is achieved by reserving the most appropriate material for retention at surface and using it to cap and cover any less benign wastes. A similar cover and cap methodology is employed to isolate wastes from the environment in locations where environmental conditions allow for long-term storage above ground.

Tailings

Tailings comprise the solid mineral residues from ground ore after the target commodities have been extracted. In the short term, tailings are often in a slurry form from which the solids settle. Both the solid and decant liquid fractions must be managed on a day-to-day basis to prevent escape from the closed systems that operate at mines. In the long term, tailings must be managed to ensure that the integrity of the tailings mass is maintained and that contact with surface water, ground water and the atmosphere is appropriately managed as they represent potential contamination pathways.

The two most common approaches to long term tailings management involve above ground storage (often in a tailings dam or other engineered structure) or below ground (typically in mine workings). In situ leach mines such as Beverley in South Australia do not involve physical disturbance of the ore and therefore produce no tailings or waste rock.

Waste management

Insufficient rehabilitation of uranium mine sites and containment of waste rock and tailings has the potential to leave a contamination legacy for future generations although current regulatory controls address this risk.

Examples of modern standards for rehabilitation can be found in the Environmental Requirements for the Ranger uranium mine which set out the Australian Government's environmental protection conditions with which the company must comply. The Environmental Requirements state that "... the company must rehabilitate the Ranger Project Area to establish an environment similar to the adjacent areas of Kakadu National Park such that, in the opinion of the Minister with the advice of the Supervising Scientist, the rehabilitated area could be incorporated into the Kakadu National Park."

The major objectives of rehabilitation are:

- a. "revegetation of the disturbed sites of the Ranger Project Area using local native plant species similar in density and abundance to those existing in adjacent areas of Kakadu National Park, to form an ecosystem the long term viability of which would not require a maintenance regime significantly different from that appropriate to adjacent areas of the park;
- b. stable radiological conditions on areas impacted by mining so that, the health risk to members of the public, including traditional owners, is as low as reasonably achievable; members of the public do not receive a radiation dose

- which exceeds applicable limits recommended by the most recently published and relevant Australian standards, codes of practice, and guidelines; and there is a minimum of restrictions on the use of the area;
- c. erosion characteristics which, as far as can reasonably be achieved, do not vary significantly from those of comparable landforms in surrounding undisturbed areas.”

While rehabilitation of current uranium mines is ensured through stringent regulatory oversight, previous uranium mines have not always been rehabilitated to these standards.

The Rum Jungle mine and mill, outside the Alligator Rivers Region, but within the Northern Territory, operated between 1954 and 1971. The mine was insufficiently rehabilitated following the cessation of operations, and this resulted in erosion of tailings with some resultant dispersal and contamination of the environment of the East Finnis River. Often, as was the case at Rum Jungle, the contamination issue from tailings and waste rock dumps is not limited to radioactive materials. Mined materials at surface are exposed to water and oxygen and are therefore susceptible to accelerated chemical decomposition of unstable compounds such as sulfides (the potential for this problem to occur is not restricted to uranium mines). Decomposition of these compounds liberates heavy metals into solution and waterways and produces sulfuric acid. Either of these has potential for greater environmental impact than physical dispersal of tailings. At Rum Jungle the Australian Government subsequently undertook some remedial works in 1977, in 1983-1988, and again in 1990-1991 to encapsulate tailings and chemically unstable waste rocks and minimise acid and heavy metal contamination of drainage.

The continuing legacy of uranium mining in the 1950s and 1960s in the Kakadu region is some twenty abandoned uranium mine sites and associated workings in the south of Kakadu National Park, including the old Coronation Hill mine site. Environmental considerations and controls at the time were significantly less stringent than those in place today.

Past rehabilitation and waste management of these sites does not meet today's expectations, resulting in environmental contamination requiring recent intervention and future works.

Incomplete rehabilitation in the past and ongoing erosion on these sites create risks to the public, Traditional Owners and parks staff.

Urgent remediation works to date resulted in the removal of historic mill residue materials from a roadside and their secure containment within the Park. Remaining mill residues have been covered with rock armour to minimise further soil erosion and movement. These measures are temporary.

Aboriginal Traditional Owners of the area have been closely involved over the last three years in the planning of long term rehabilitation measures and support the appropriate, cost-effective works including permanent disposal of contaminated soil and materials in the park.

While most of the sites require relatively simple in-situ rehabilitation works, some have complex radiological contamination requiring removal and permanent burial in a purpose built containment. Investigations are underway to assist in identifying a suitable site.

Some sites are degrading and are expected to require further temporary remedial works in the absence of specific project funding to complete the task. These sites are an historical legacy unrelated to modern uranium mining and modern environmental standards. However, while the legacy may not impact upon the desire of present day industry to develop our uranium resources, it is the Department's view that unaddressed, the legacy has the potential to adversely reflect on Australia's claims to best practice mining and thus both impact upon demand for Australia's uranium exports and upon the level of community support for new mining proposals.

Lessons from Rum Jungle and the South Alligator Valley mines indicate that in the seasonally wet dry tropics of Northern Australia, return of waste materials to mined-out voids below surface minimises the amount of active intervention required for post mining environmental management.

The Nabarlek mine, which produced uranium oxide between 1981 and 1988 saw a new era in mine planning and waste management. The small deposit at Nabarlek meant that mining was able to be completed in one season while the processing facility was under construction. Milling of the stockpiled ore commenced after mining was complete and tailings were returned directly to the empty pit. After milling was completed the pit was capped with waste rock to prevent erosion. While there are some revegetation issues still to be addressed at Nabarlek, indications are that the return of tailings and waste rock to the pit has been a successful rehabilitation strategy.

At Ranger an above ground tailings dam was constructed to hold tailings during mining operations at the Ranger #Number 1 orebody. When mining was completed and operations moved to the nearby Ranger #Number 3 deposit, tailings deposition commenced in Pit #Number 1. Currently it is planned that all Ranger tailings and mineralised waste rock will be transferred to the pits, the pits capped to prevent remobilisation of the tailings and the tailings dam removed and rehabilitated after mining and processing has ceased. A previous provision providing an option for retention of tailings in the above-ground tailings dam in certain circumstances was removed in the revision of the Environmental Requirements in 2000. All tailings at Ranger will be returned to the pits and covered.

The most recent Jabiluka proposal, which involves underground rather than open cut mining, envisaged a similar approach by replacing tailings and mineralised waste below ground level in mine voids. The Supervising Scientist, in his report to the World Heritage Committee assessed the likely impact on the environment from the long-term storage of tailings underground at Jabiluka. His report concluded that the wetlands of Kakadu would not be harmed as a result of the dispersion of tailings constituents in groundwater. The Supervising Scientist's report was assessed by the United Nations Educational, Scientific and Cultural Organization Independent Science Panel appointed by the World Heritage Committee and the Panel agreed with the Supervising Scientist's conclusions.

The Olympic Dam mine in South Australia uses a different approach, with tailings stored above ground. As previously noted, because it is an underground mine the relative amounts of mineralised waste rock that need to be stored at surface are much lower than for a comparable sized open pit mine. In addition the mine is located in an arid environment which greatly reduces the complexity of waste water management and potential dispersal of waste products by dissolution and erosion.

Olympic Dam tailings are stored in a retention facility, or dam, designed to store the tailings in such a way that the impoundment structure remains stable, the operation has little impact on local residents, environmental impacts are minimised and the storage facility can be rehabilitated once closed. The retention facility is designed to meet Codes of Practice on the containment of tailings in Australia, the United States and Canada which call for a design life of 200 years and a structural life of 1000 years.

In the case of the Beverley in-situ leach uranium mine in South Australia, no tailings are produced. Liquid waste solutions are disposed into the Beverley underground aquifer. This aquifer is isolated from the Great Artesian Basin and any other economically useful source of underground water. It has a very high concentration of naturally occurring salts and radionuclides and is not suitable for human or stock use.

4.2 Disposal of Radioactive Waste

Under the EPBC Act, any proposal for establishing or modifying a large-scale disposal facility for radioactive waste would be a nuclear action. As such, any proposal referred and determined to be a controlled action would require assessment at a level determined by the Minister for the Environment and Heritage (on preliminary documentation, at the public environment report or environment impact statement level or subject to a public inquiry). Being a nuclear action, the assessment would be of the whole of the environment and not only of matters of national environmental significance.

At the completion of that assessment process, the Minister would determine, first, whether the proposal could go ahead or not, and, if it were to, what conditions would be required. Such conditions would be legally enforceable with both civil and criminal penalties being potentially applicable for non-compliance.

The proposal by the Australian Government to establish, operate and decommission a national near-surface repository at site 40a near Woomera in South Australia for the disposal of Australia's low-level and short lived intermediate-level radioactive waste was subject to an environmental assessment which was completed in 2004.

In July 2004, the Australian Government announced that it will establish, on Commonwealth land, a facility to manage radioactive waste generated by Australian Government agencies. Preliminary work (by the Department of Education, Science and Training) is underway on identifying potentially suitable locations for the facility.

The decision was taken in light of the effective failure of the states and territories to cooperate with the Australian Government in finding a national solution for the safe and secure disposal of low-level radioactive waste.

The Australian Government will seek a commitment from all states and territories that they will adopt world's best practice in the management of radioactive waste materials in their jurisdictions. The independent Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has commenced a cooperative approach with relevant state and territory regulators to establish nationally consistent operating principles and guidelines.

4.3 Environment Assessment of the New Lucas Heights Reactor

Activities at the Lucas Heights Science and Technology Centre (the LHSTC) include operation of the existing reactor (HIFAR), soon to be replaced by the new reactor currently under construction, downstream production of radiopharmaceuticals and other scientific and technological nuclear-related activities. The replacement reactor and the downstream production of radiopharmaceuticals are of primary importance in the assessment of potential environmental impacts, particularly those of emissions and waste products of the nuclear fission process (in the reactor) and chemical processing of radionuclides.

In the late 1990s, the design, construction and operation of the then-named Replacement Research Reactor (RRR, now referred to as the Open Pool Australian Light-water Reactor, OPAL) was assessed under the EPIP Act. OPAL is scheduled to replace the obsolescent currently operating reactor, HIFAR, in 2006.

The Department's assessment report (of February 1999) made 29 recommendations, all of which were adopted by the then Minister for the Environment and Heritage, Senator Hill and, in turn, by the then Minister for Science, Senator Minchin, making them conditions for OPAL's design construction and operation. They are generally referred to as the Environmental Conditions. Some of these required sign-off by the Minister for the Environment and Heritage or the Department, others by, for instance, the ARPANSA.

The Environmental Conditions range from reactor gaseous emissions, through the reprocessing of fuel rods and the fate of long-term-intermediate-level wastes to the processing of chemical by-products/wastes from radiopharmaceutical synthesis and environmental monitoring of the LHSTC as a whole.

Most of the Environmental Conditions have been fulfilled, but some await the commissioning and operation of OPAL. Details of them are contained in the Status Reports (produced periodically by the Australian Nuclear Science and Technology Organisation in response to Condition 29).

5 - Social Impact Assessment and Consultation with Traditional Owners

5.1 Consideration of Social Impacts Under the EPBC Act

During the EPBC Act referral and environmental assessment processes, economic, social and cultural aspects of a proposal may only be considered as part of the assessment if the matter protected by the EPBC Act is 'the environment', such as it is for nuclear actions. In making an approval decision under the EPBC Act the Minister

for the Environment and Heritage must also consider broader ‘economic and social matters’ (such as economic and social benefits of the proposal).

In considering the social impacts upon traditional owners of a uranium mine proposal during environment assessment, aspects of a proposal that may be taken into consideration (where relevant) include:

- Archaeological and anthropological studies pertinent to the management of sacred and archaeological sites;
- if necessary, the identification of traditional owners;
- use of the land by Aboriginal people; and,
- likely social impacts of the proposal, including the history and social dynamics of the people concerned, and how the proposed project actions will affect the social dynamics and economic status of the people affected.

This information may be obtained through consultation with traditional owners and affected Aboriginal people, and through social impact analysis conducted by the proponent as part of the preparation of the environment impact statement or public environment report.

In making the approval decision under the EPBC Act about a nuclear matter, the Minister would weigh the benefits and disadvantages associated with a particular action (i.e. its specific environmental, economic, social and cultural impacts) against broader economic and social considerations in the approval decision.

Indigenous people engage and are engaged by EPBC referral, assessment and approval processes through a variety of different avenues. Indigenous groups have utilised the EPBC Act public comment processes to comment on referrals and environmental assessments. For example, comments were received from indigenous groups on the Waste Repository proposal in South Australia. Comments on proposed actions are also received in letters to the Minister.

The Department recognises that indigenous people may prefer other means of involvement in government processes and encourages proponents to facilitate participation through the use of plain English documentation and face to face presentations and meetings with affected indigenous communities to discuss relevant issues, where appropriate. The Department has also met directly with indigenous people to discuss proposed actions.

5.2 Consultation with Traditional Owners Regarding Mining in the Alligator Rivers Region

In the Alligator Rivers Region there has been extensive consultation with Aboriginal people on mining project developments and impacts prior to commencement of projects, during major study initiatives and on an ongoing basis. Nabarlek, Ranger and Jabiluka are situated on Aboriginal owned land under the *Aboriginal Land Rights (Northern Territory) Act 1976*. Consent of the traditional owners was required to the mining and ancillary agreements prior to commencement of mining operations and they retain a statutory right to do so for any future or proposed operations under the

provisions of the *Aboriginal Land Rights (Northern Territory) Act 1976* (including Koongarra).

Major social impact consideration was included in the Kakadu Regional Social Impact Study and traditional owners are involved in longer-term Jabiru town development programs. Ongoing consultation in respect of mining activities occurs through Aboriginal representation on the Alligator Rivers Region Advisory and Technical Committees, various Minesite Technical Committees, the Gunlom Land Trust rehabilitation program of the South Alligator Valley legacy mining sites and numerous ad hoc consultations.

6 - Uranium Mining Health Issues

Human health protection in the uranium mining industry is subject to regulation and review by several organizations at both Australian Government and State/Territory level.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is part of the Health portfolio and was established under the *Australian Radiation Protection and Nuclear Safety Act 1998*. ARPANSA has responsibility for protecting the health and safety of people, and the environment, from the harmful effects of radiation (ionizing and non-ionizing). It leads the development of standards, codes of practice, guidelines and other relevant material to support radiation protection and nuclear safety throughout Australia.

In the Northern Territory, the Northern Territory Department of Business, Industry and Resource Development (DBIRD) administers health and safety regulation at all minesites under the provisions of the *Mining Management Act 2001*.

The Northern Territory Department of Health and Community Services Chief Health Officer is represented on the Alligator Rivers Region Advisory Committee which, amongst other things, reviews developments, operations and incidents at those minesites in the region.

In the Alligator Rivers Region, the Supervising Scientist has a role in the protection of human health (both mine staff and the general public) and the environment (including organisms other than human) from radiological impacts.

Northern Territory Authorisations issued to uranium mining operators require extensive radiological monitoring programs for both workers and members of the public to be conducted by the operator with results reported regularly to the regulator. Minesite Technical Committee members review the statutory monitoring reports and, where appropriate compare them with the results of a number of check monitoring programs undertaken by DBIRD and the Supervising Scientist. Results of the monitoring programs are also presented at the twice annual Alligator Rivers Region Advisory Committee meetings and the design of the programs is reviewed by the Alligator Rivers Region Technical Committee .

Monitoring of radiation exposure to workers has shown that at Ranger dose levels have been generally decreasing with time and typical levels are less than 10% of the statutory limit, with only three incidences of any note over the life of the mine. In 1982 a product packing incident created a dust hazard where the radiation dose may have exceeded the limit for one or both of the affected workers in the area. Such

exposure did not result in any detectable injury to either worker but elevated exposure levels are interpreted as possibly contributing to a statistical increase in lifetime risk of contracting cancer. During a water contamination incident in 2004 a number of Ranger workers were exposed to contaminated water through ingestion and/or showering. However investigations concluded that resultant radiological doses were below statutory limits.

Generally doses to members of the public have been very small, approaching the limits of detection of monitoring equipment. However, in 2004 earthmoving equipment left Ranger site without adequate radiation clearance checking, resulting in contamination of the workplace of a member of the public and exposure of that person and his children to radiation doses that were conservatively estimated to be at or near the statutory dose limit for members of the public. This incident was of concern from a regulatory perspective. However, the radiation doses received by members of the public did not represent a significant health risk.

The two incidents that occurred in 2004 were investigated by the Supervising Scientist, DBIRD and the mining company. The reports of the Supervising Scientist's investigations were tabled in the Senate on 30 August 2004. The Australian Government Minister for Industry, Tourism and Resources subsequently wrote to the mining company requiring it to fulfil a series of conditions. Progress towards compliance with the conditions was assessed during audits by the Australian Nuclear Science and Technology Organisation and ARPANSA in September 2004, November 2004 and January 2005. Those audits have indicated satisfactory progress. The mining company voluntarily shutdown operations following the tabling of the reports to allow it to focus on implementation of the Minister's requirements.

6.1 Role of Bureau of Meteorology in Environmental Emergency Response

The Bureau of Meteorology has a role, as part of a coordinated international strategy, to track and monitor air-borne impacts of any release of radioactive materials

The National Meteorological and Oceanographic Operations Centre (NMOC) of the Bureau of Meteorology maintains an operational (24x7) emergency response system as part of its responsibility as a World Meteorological Organization Regional Specialised Meteorological Centre (RSMC) for Environmental Emergency Response (EER). The system is maintained in a state of readiness so that ad-hoc requests for guidance products can be quickly satisfied, using the latest meteorological data.

The core of the NMOC EER system is a computer model (Atmospheric Transport Model (ATM)) that simulates the movement of air-borne pollutants through the atmosphere. The ATM is driven by meteorological input from NMOC's operational numerical weather assimilation and prediction systems ranging from the global domain down to specific mesoscale domains over Australia. The current operational configurations enable the ATM to provide global forecast guidance out to 10 days ahead and the high resolution guidance over small areas out to 36 hours. The main operational numerical forecasts are updated twice daily for the base times 00 and 12UTC. The operational EER system can be applied to nuclear, bush fire, volcanic ash, air-borne virus and other incidents.

The ATM can produce either forward or backward trajectories showing the path taken by pollutants, or produce concentration or deposition charts showing how pollutants

have dispersed. The pollutant source is defined by its geographic position and, depending on its nature, its strength, type and duration of emission. For a quick response, in the case of a nuclear incident, a default source (which includes specification of the radionuclide) and set of products have been predefined.

The operational EER system has been set up to disseminate products to the various Australian Government and International Agencies as quickly as possible. The dissemination methods make use of fax, email, and external web and ftp facilities. With respect to the nuclear component of the system, monthly tests are held with RSMCs Washington and Montreal. Occasional global tests, involving the International Atomic Energy Agency (IAEA), Comprehensive Test Ban Treaty Organisation, Australian Nuclear Science and Technology Organisation and the Australian Radiation Protection and Nuclear Safety Agency, are also held. In addition, ongoing products are made available to registered users as the need arises.

7 - Adequacy of regulation of uranium mining by the Commonwealth

As outlined in previous sections, day-to-day regulation of mining, including uranium mining is chiefly a state function with Australian Government involvement in the regulation of the environmental aspects of uranium mining restricted to environment assessment and approval and the supervisory role of the Supervising Scientist in the Alligator Rivers Region. Given the sensitivity of the issues involved, it is important to ensure good communication between the relevant State and Australian Government agencies. While DEH has been generally satisfied with the manner in which South Australia and the Northern Territory have discharged their responsibilities, there have been some minor incidents in the past few years where due to administrative problems the Australian Government has not been made aware of spills and other incidents that have occurred at uranium mines in South Australia in a timely fashion. More recently however, communication has much improved between regulators at the state and federal levels. The Department of the Environment and Heritage is currently satisfied that appropriate reporting is occurring between operators and regulators.

At the Australian Government level, limited mechanisms existed under the now repealed EPIP Act for the Environment Minister to monitor and report on environmental performance after a proposal had been subject to environment assessment. Recommendations for environment protection were at best advisory, although historically Australian Government Action Ministers received recommendations for monitoring and reporting in good faith and in most instances translated recommendations to conditions for approvals. In the case of current operating uranium mines, Environmental Requirements are attached to export permissions for each mine.

The EPBC Act, however, which replaced the EPIP Act in 1999, provides a vehicle for the Minister for the Environment and Heritage to issue approval conditions directly to a proponent. The EPBC Act represents the most fundamental reform of Commonwealth environmental laws since the first environmental statutes were enacted in the early 1970s. In particular, it is the first comprehensive attempt to define the environmental responsibilities of the Australian Government.

The EPBC Act focuses Australian Government interests on matters of national environmental significance (such as nuclear actions), puts in place a streamlined

environmental assessment and approvals process and establishes an integrated regime for biodiversity conservation and the management of important protected areas.

The EPBC Act will ensure that all future uranium mines are subject to a stringent and comprehensive environmental assessment process. At the completion of the assessment process, the Minister for the Environment and Heritage is responsible for determining what conditions are required to protect matters of national environmental significance. The Act makes such conditions legally enforceable with both civil and criminal penalties being potentially applicable for non-compliance.

7.1 Role of the Supervising Scientist

The Australian Government's supervisory role in the regulation of uranium mining in the Northern Territory (outlined in 3.2.2) is demonstrably effective and is characterised by the following attributes:

- it is based on openness, transparency and accountability, which are important elements in maintaining community confidence in the regulatory regime;
- it is based on strong, rigorous scientific research with a dedicated research institution (ERISS) and world-class scientific scrutiny (ARRTC);
- it involves ongoing supervision, audit and environmental monitoring by both the Australian Government and Northern Territory; and
- it involves a wide variety of stakeholders working together, co-operatively.

This regime is one of the most rigorous regulatory regimes currently in place for any mining operation anywhere in the world. While the Northern Territory is responsible for the day to day regulation of the uranium mines within its jurisdiction, working arrangements and a specific provision within the Northern Territory's own *Mining Management Act 2001* provide the Australian Government (through the Minister for Industry, Tourism and Resources), aided by the expert scientific advice of the Supervising Scientist, with the final say on all Authorisation processes.

Consequently it involves more process (and some would argue that it is more cumbersome) than other regulatory regimes. The unique World Heritage values of Kakadu National Park adjacent to the Ranger mine, together with the ongoing interest and concern of the area's Traditional Owners, however, demands a strict regulatory regime.

The need for strict regulatory regimes for uranium mining also reflects the fact that uranium is a radioactive element and its mining, processing and use require environmental protection measures that must have a high degree of reliability for unusually long periods of time. Trade in, and the use of, uranium and related products is also subject to international scrutiny through treaties to which Australia is a signatory (eg. the Treaty on the Non-Proliferation of Nuclear Weapons) and the expectations of the marketplace. The level of public interest and concern about uranium and the nuclear fuel cycle are significant both nationally and internationally.

8 - Extent of federal subsidies, rebates etc used to facilitate uranium mining

8.1 Mining Company Financial Contribution to support the activities of the Supervising Scientist

The full range of activities of the Supervising Scientist are funded by the Australian Government through the Environment and Heritage portfolio budget.

Energy Resources of Australia Ltd, operator of the Ranger mine, makes an annual financial contribution, which is paid to DEH, to support the Supervising Scientist research and monitoring activities in the Alligator Rivers Region. The contribution made by ERA amounts to approximately 30% of the uranium-related research costs of the Supervising Scientist. In making its decision on this level of contribution the Government recognised that there was a general benefit to the community associated with the work of the Supervising Scientist and that this portion should not be borne by the uranium industry. Ranger (ERA) should therefore not be expected to bear the full costs of the activities of the Supervising Scientist.

8.1.2 Previous Arrangements

Between 1980 and 1994 uranium producers in the Alligator Rivers Region were subject to a levy under the *Customs Tariff (Uranium Concentrate Export Duty) Act 1980*. The levy was based on the premise that there would ultimately be several mines in the region.

This levy was initially applied to the Ranger and Nabarlek operations but, when Nabarlek ceased production in 1988, Ranger was the only miner paying the levy.

The Australian Government, via the *Customs Tariff (Uranium Concentrate Export Duty) Act Repeal Act 1994*, repealed the levy for several reasons:

- it was seen as inequitable as there was no similar levy applied to other minerals, and that the Olympic Dam operation in South Australia did not pay, putting it at a comparative advantage;
- diminishing uranium exports from the Alligator Rivers Region, resulting from the lower uranium prices prevalent at the time, meant that the level of recovery through the levy was uncertain; and
- the broader public and community benefit gained through the work of the Supervising Scientist should not be solely funded by a single mining company.

The Second Reading Speech for the repeal bill, of 17 November 1994, noted that the levy collected \$1.538 million in 1992-1993 and \$1.207 million in 1993-1994. The speech also noted that “as the export duty is to be repealed on the condition that ERA agree to an annual contribution of at least \$1.5 million to research in the Alligator Rivers Region, there is no net financial impact as a result of the measures contained in this bill”.

A Deed of Agreement was subsequently concluded with Energy Resources of Australia Ltd under which an annual payment of \$1.5m (indexed) is made by ERA as a contribution to the research costs of the Supervising Scientist.

8.2 Safeguards Levies

Under the *Nuclear Safeguards (Producers of Uranium Ore Concentrates) Charges Act 1993* (and associated Regulations), producers of uranium concentrate are required to pay a levy based on production kilograms to subsidise the operations of the Australian Safeguard and Non-Proliferation Office (ASNO). It is understood that the Foreign Affairs and Trade Portfolio will be providing its own submission to the inquiry.

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