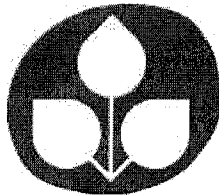


# Uranium Mining in Australia

HOUSE OF REPRESENTATIVES  
STANDING COMMITTEE ON  
13 JUN 2005  
INDUSTRY AND RESOURCES



Australian  
**Conservation**  
Foundation

INC. ABN 22 007 498 482

**Submission to the House of Representatives Standing  
Committee on Industry and Resources Inquiry into the  
Strategic Importance of Australia's Uranium Resources  
2005**

**David Noonan and Dave Sweeney  
June 2005**

13<sup>th</sup> June 2005



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## **To the Secretary, Uranium Inquiry Committee**

### **Introduction:**

The Australian Conservation Foundation (ACF) is a leading national environment organisation with active programs, members and representation in all Australian states and Territories. ACF has been active in promoting, defending and celebrating our natural environment for nearly forty years.

ACF has long held deep concerns over the operations and impacts of uranium mining and the wider nuclear industry in Australia and maintains that there is no net benefit to our environment or community from the activities of this sector.

There are strong strategic, environment, public health and public policy reasons to wind back rather than expand uranium mining and exports and nuclear power overseas.

Nuclear waste management remains unresolved, risks of nuclear accidents are unacceptable, risks of nuclear terrorism increase and international safeguards regimes are seen to have failed. Export and use of Australian uranium contributes to proliferation of dual use nuclear weapons technology, facilities and fissile materials.

Australia needs socially and environmentally responsible answers to the real and pressing challenges of climate change. Nuclear can never provide any such answer.

ACF consider in a number of respects that uranium is the asbestos industry of the 21st century. Australia should exercise responsibility for our uranium reserves by leaving it in the ground and engage clean renewable energy and energy efficiency measures to address climate change issues.

ACF welcome this opportunity to present written evidence on this important public issue. ACF also request the opportunity to present further material and speak to this submission in hearings before the Committee.

Yours sincerely

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## **Term of Reference A.**

### **Global demand for Australia's uranium resources and associated supply issues**

#### **Global nuclear industry issues**

ACF consider that there is no net benefit from the nuclear industry. Australia's global responsibility and national interest is best served by contributing to end the hazards of nuclear power overseas, and to end rather than expand uranium mining in Australia.

ACF fundamentally disagrees with the position of Foreign Minister Andrew Downer that: *"It is in Australia's national interest, since we export uranium, that there be a global expansion of the nuclear industry"* (The Australian, 4<sup>th</sup> June 2005).

There is no significant expansion of global nuclear power or of total uranium demand, except in China and India - both seriously problematic markets for Australian uranium. The uranium supply shortfall (through a re-alignment of supply sources across mine production, inventories and military sources) presents Australia with a serious challenge given our responsibility for some 40% of world uranium reserves.

Risk of reactor accidents and threat of nuclear terrorism, unresolved nuclear waste management and increasing concern over weapons proliferation are all strong reasons for Australia to end rather than expand uranium mining and exports. Rather than looking to profiteer, in self interest, off our uranium reserves and export options.

ACF request the Committee formally consider the attached report "The World Nuclear Industry Status Report 2004" (Dec 2004, by: The Greens / European Free Alliance Group in the European Parliament) as part of this submission. Available at: [http://www.greens-efa.org/pdf/documents/greensefa\\_documents\\_106\\_en.pdf](http://www.greens-efa.org/pdf/documents/greensefa_documents_106_en.pdf)

In the countries of origin of nuclear power, the US, Europe and Russia, there is no nuclear expansion and a new nuclear power plant (NPP) is a rare exception. The number of NPP peaked across the US and Western Europe some 15 years ago and is likely to continue to decline over the next 15 years.

Across the EU-15 countries in the last 25 years only 2 NPP have been ordered and started construction, in France in 1991 and in Finland in 2004. In the expanded EU-25 group of countries Finland now has the only NPP under construction and there is only 1 other NPP at a planning stage, in France, which may start construction in 2007.

The number of reactors in the EU-25 will continue to decline with legislative nuclear power phase outs in Germany and in Belgium to see 25 nuclear reactors close by 2025. Germany recently closed its second NPP. Nuclear phase out policies in Spain, the Netherlands and Sweden will see a further 21 reactors close by 2030.

There are no new orders in Russia, where the 3 NPP under construction were ordered prior to the Chernobyl disaster in 1986 and it is not clear if they will ever be finished.

In the UK 9 NPP are set to close from 2007 to 2020 due to aging of plants that are unsuited and unsafe for any extension of licensing period. Disclosed UK Industry Department advice on any renewal of nuclear power confirmed that a new NPP still

requires a 10 year lead time from order through into operation and faces key hurdles of unresolved nuclear waste management along with a lack of public acceptance.

In the US there has not been a single nuclear power plant ordered and successfully brought through to operation since 1977, the year the last US reactor commenced construction. Even with President Bush's offers of major public subsidies to nuclear power there is still not a single new order and none under construction.

With little prospect for new nuclear orders at home the nuclear industry in the west is dependent on selling reactors to Asia to try and stay in business.

The last potential expansion of the global nuclear industry is in Asia. However industrialised Asia has at most only a slow expansion with a total of 5 NPP under construction across Japan(2), Sth Korea(1) and Taiwan(2). It is to China and India, the only 2 countries in the world with a significant expansion of nuclear power, that the proposed expansion of Australian uranium mining is directed in the long term.

India provides 3% of present electricity capacity from nuclear power and has 8 NPP under construction and further nuclear expansion under consideration. India is also a rogue nuclear weapon state outside of international conventions and is not a signatory to the Non Proliferation Treaty. Therefore India is not eligible to receive Australian uranium under current federal government policy.

However this policy is now under serious pressure given the government's view on uranium, that the national interest equals the economic interest in increased export sales. Minister Macfarlane is ignoring proliferation concerns to profiteer off uranium.

*"Both India and China will increase their nuclear generation, and it's important that Australia exports to those opportunities."*

(Federal Minister for Resources Ian Macfarlane on ABC AM "Federal Cabinet to discuss uranium mining bans" Monday, 6 June 2005).

China has by far the largest potential nuclear expansion under consideration in the world. With 1 NPP under construction and 4 NPP planned and consideration of up to a 6 fold increase on the current installed nuclear electricity capacity over the next 20 years within a nominated doubling of total Chinese electricity supply by 2025.

Under this plan the nuclear share of Chinese electricity generation will only increase from the present 2% toward some 6-10% by 2025 (dependent on the range of actual expansion in nuclear capacity and actual increase in size of the total electricity supply). While representing a significant Mw capacity, a figure of 10% as the upper end of nuclear power's share of electricity generation shows that nuclear is not a major answer to electricity supply in China in the foreseeable future.

Serious unresolved proliferation, nuclear risk and nuclear waste issues predicate against any further Australian support for nuclear power anywhere in Asia. Both China and India are nuclear weapon states still developing nuclear weapons programs. The serious unresolved human rights and labour rights issues in China particularly weigh against current negotiations for proposed sale of Australian uranium to China.

Nuclear trade, in uranium and what follows from the use of our uranium, is never safe and would compromise our responsibilities to our neighbours including Indonesia, Vietnam and Thailand, countries the Foreign Minister has recently targeted.

The catastrophic health consequences that could result from a reactor accident or act of nuclear terrorism and the clear rejection of nuclear waste transport and dumping by communities across Australia preclude against nuclear power Australia.

This prohibition is the clear will of Parliaments in NSW (1986) and Victoria (1983) with legislation passed to prohibit both nuclear power and nuclear waste storage and disposal on State land. And in SA (2000 and 2003), WA (1999 and 2004) and NT (2004) to prohibit the import, transport, storage and disposal of reactor wastes.

So why should we place less value on the safety, health and environment of our neighbours in Asia through the proposed export and usage of our uranium?

### **Limited Sources of Supply of Uranium in Australia**

Significant societal concern over uranium has led to a range of established State Government policy against, and increasing legislation prohibiting, uranium mining.

Legislation has been passed in NSW and in Victoria and is pending in WA following Premier Gallop's commitments in the 2004 election and a policy prohibition since 2002. The Queensland Beattie Government has policy against uranium mining and recently reaffirmed the policy and their intention not to change it.

SA has had clear policy against new uranium mines since election of the Rann Government in 2002 following election policy commitments signed by Mike Rann and by John Hill. See the SA ALP "No Nuclear Dumps Policy" (11<sup>th</sup> Dec 2001):

*"Labor continues to be opposed to the establishment of any new uranium mines and any expansion of the enrichment process."*

At: [http://www.sa.alp.org.au/policy/environment/no\\_nuclear\\_dumps.html](http://www.sa.alp.org.au/policy/environment/no_nuclear_dumps.html)

ACF are confident that the SA Government will continue to honour this commitment.

The proposed Honeymoon acid leach uranium project lacks a key SA Government licensing approval, the commercial uranium mining and milling license under the Radiation Protection and Control Act. The proponent has never applied for the license. The policy commitment by Mike Rann opposes establishment of any new uranium mines. Any future application for this key missing license approval would be contrary to this policy and would not be granted by the SA Government.

In addition there are no operations or potential facilities on the Honeymoon site since closure of the trial mine in 2000. The trial mine can not be used again under order of the Commonwealth Government. The proponent Southern Cross Resources of

Canada, placed the Honeymoon project on hold in late 2004 and has failed since 2001 to raise funding to provide for construction of a commercial plant.

ACF are confident that effective local, national and international opposition will prevent any new uranium mines in Kakadu. The Jabiluka uranium project in Kakadu is now subject to a right of veto by the Mirrar traditional owners who so resolutely and effectively opposed Jabiluka in alliance with national environment groups.

ACF are confident the proposed Koongarra uranium project will not proceed. ACF note recent statements of opposition to the project by the NT Mines and Energy Minister Kon Vatskalis and the clear election policy commitment of Chief Minister Clare Martin against any Koongarra mine (Sunday Territorian 5<sup>th</sup> June 2005).

Any new uranium mine in Australia requires 2 complete sets of separate approvals in Commonwealth and in State/Territory jurisdictions. The Commonwealth can not prevail or legislate to bring on uranium mining within a State. Policy and decision at State and Territory level has a separate and final say in the issue.

Uranium exploration in Australia is at best a long term speculative activity in the face of State Government opposition to new uranium mines.

## **B. Strategic importance of Australia's uranium resources and any relevant industry development**

### **Potential industry development of existing uranium mines**

There are strong environmental and public interest reasons for opposing any expansion of uranium mining in Australia, with the Roxby expansion plan to treble uranium production toward 15,000 tonnes a year facing a range of unresolved issues.

Characteristic of uranium mining is the imposition of toxic radioactive, heavy metal and acidic tailings with serious long term environmental impacts and no credible means of containment. Following processing of uranium some 80% of the radioactivity in the ore remains in the tailings. Under WMC's plans the radioactive tailings are to be left as a permanent hazard on the surface at the mine site.

Tailings production from the proposed open pit mine will massively increase the scale of the current problem without providing any credible answer to tailings containment.

Presently 60 million tonnes of tailings cover an area of approximately 4 km<sup>2</sup> and accumulate at some 8 million tonnes a year from the underground mine. The open pit expansion plans to increase tailings storage toward an area of approximately 10 km<sup>2</sup> covered by radioactive liquid ponds and tailings storage piles 30 metres in height.

Modern legal process, standards and effective scrutiny don't apply at Roxby as WMC operates under a set of legal privileges available to no other company operating in SA.

Contrary to the public interest the *Roxby Downs Indenture Ratification Act* overrides the proper process and powers of the *Environment Protection Act*, the *Water*

*Resources Act*, and the *Aboriginal Heritage Act*. Through the Confidentiality Clause, the Indenture also overrides the *Freedom of Information Act* in South Australia.

Why has WMC been so unwilling to be bound by and comply with the same legal requirements that apply to every other business operating in South Australia?

As a condition of any consideration of an application for expansion of the Roxby uranium mine the State Government should repeal these unacceptable legal privileges.

Mining demands on water supply threaten the Great Artesian Basin and the unique Mound Spring ecosystems dependent on natural groundwater flows for their survival. The Mound Springs are listed ecological communities under the Commonwealth *Environment Protection and Biodiversity Conservation Act* and must be protected.

Already the biggest industrial user of underground water in the southern hemisphere, WMC currently takes about 33 million litres a day and is licensed to take 42 million litres a day free of charge from a limited public water resource - the GAB. This is effectively mining fossil water. WMC are now asking for an *additional* 70 million litres of water a day for mineral processing in the proposed open pit Roxby expansion.

WMC's water extraction reduces groundwater pressure and causes a regional drawdown effect in the GAB that has caused the extinction of some springs and lessens and threatens to cut off the natural flows that the Mound Spring groups depend on. The GAB modelling in use has a limited reliable predictive capacity and is tasked beyond its means in protecting these fragile natural systems. Borefield A was built where it would do the most damage, right in the middle of the fragile Mound Spring arc around Lake Eyre. Borefield B directly threatens the ecologically and culturally significant Hermit Hill spring group reliant on only a 5 m head of water.

The Commonwealth EIS process under EPBC Act must protect the listed mound springs and the State Government should not allow mining at Roxby to further compromise the Great Artesian Basin. WMC's Borefield A should be closed immediately and Borefield B wound back over time and not expanded to its licensed capacity. Mine expansion plans for a new larger scale Borefield C should be rejected.

WMC have been given notice of the importance of demands on regional water supply:

*"In AMC's opinion the main environmental issues for the long term future of Olympic Dam are the impact on and access to regional water resources and the permitting of an open pit or caving operation with respect to land access and heritage."*

In: "WMC Resources Limited - Specialist Technical Report" by AMC Consultants Pty Ltd, Dec 2004, see 2.6 Environmental Impact and Permitting, p.27.

Electricity supply to the mine expansion is also unresolved with WMC nominating Exxon's proposed but unconfirmed Papua New Guinea to Cape York pipeline as source of gas supply for a proposed onsite 250 Mw power plant additional to the 120



Mw present demand on the SA grid. WMC have not cited a 'plan B' to explain sourcing of electricity or gas outside of SA if the Exxon project does not proceed.

Imposition of additional mine expansion power requirements onto the limited SA electricity grid supply, or further sourcing of gas within SA, would be controversial.

There are an array of serious concerns consequent to the mining, export and use of Australia's uranium. ACF consider WMC should have to present economic and mining plans for the existing operation and the proposed Roxby expansion *without* uranium processing and export and setting out management of uranium in the tails.

Regarding other existing mines potential for expansion is limited with Ranger scheduled to finish mining within a few years and finish milling soon after. A previously considered option of mining underneath Magella Creek is obviously not tenable within the environmentally sensitive wetlands and World Heritage values of the area. Ranger should close around the time the Roxby expansion may go online.

Beverley is legally restricted to deposits within the mine lease. Further use of mine plant is dependent on other uranium deposits within proximity of potential pipeline distance to acid leach wellfields subject to approvals for mining outside of the lease.

### **Strategic issues consequent to Australia's uranium reserves**

The nuclear industry is fundamentally 'dual use' across nuclear power capacity and nuclear weapons capabilities. Nuclear power programs provide technology, facilities, experience, skills, nuclear materials and a cover for many countries holding and developing threshold nuclear weapons potential. Australia's role as uranium fuel supplier to the world nuclear industry is inseparable from this dual use reality.

Australians have been misled over time by claims that IAEA and Australian (ASNO) nuclear safeguards regimes could provide assurance against civilian nuclear programs contributing to military nuclear capabilities and programs. The IAEA and Australian approach has been to facilitate the spread of dual use technology, facilities and fissile materials and then hope to control only the very last steps in nuclear proliferation.

It is now increasingly recognised that international safeguards regimes, including the Non-Proliferation Treaty, have failed to deliver on the key strategic requirement to prevent proliferation of nuclear weapons capabilities.

A range of current problems were summarised by IAEA Director General Mohamed El Baradei at the opening of the 2005 NPT Review Conference:

*"In five years, the world has changed. Our fears of a deadly nuclear detonation – whatever the cause – have been reawakened. In part, these fears are driven by new realities. The rise in terrorism. The discovery of clandestine nuclear programmes. The emergence of a nuclear black market.*

*But these realities have also heightened our awareness of vulnerabilities in the NPT regime. The acquisition by more and more countries of sensitive nuclear know-how and capabilities. The uneven degree of physical protection of nuclear materials from country to country. The limitations in the IAEA's verification authority – particularly in countries without additional protocols in force.*

*The continuing reliance on nuclear deterrence. The ongoing perception of imbalance between the nuclear haves and have-nots. And the sense of insecurity that persists, unaddressed, in a number of regions, most worryingly in the Middle East and the Korean Peninsula."*

The IAEA Director General Mohamed El Baradei has stated that there can be *no assurance* for countries which are not a signatory to the IAEA Additional Protocols. After seven years of IAEA request the Additional Protocols have only entered into force in some 65 countries out of over 180 NPT states. IAEA verification provides no assurance today in over one hundred countries and over time provided no assurance in today's signatory countries prior to their having signed up to the Additional Protocols.

Australia is failing in our responsibility to universalise the IAEA Additional Protocols regime by excluding nuclear weapon states from proposed new conditions on export of Australian uranium. With only non-nuclear weapons states to be required to provide entry into force of the Additional Protocols as a condition of uranium supply:

*"Australia will take the lead in making the Additional Protocol on strengthened nuclear safeguards a pre-condition for the supply of uranium to non-nuclear weapon states. ... Australia aims to bring this policy into force as soon as possible and will be consulting others, both suppliers and customers, on timing."*

(“Australian Nuclear Controls to be Strengthened” DEFAT Media Release, 4 May 05)

While the ACF support universalisation of the IAEA Additional Protocol as a minimum required interim step to tighten non-proliferation aims, this will not answer the fundamental premise that nuclear technology and nuclear trade is never safe.

ACF consider that addressing Australia's international nuclear responsibilities require a cessation of uranium sales. However if the Federal Government intend to properly use our potential influence in holding some 40% of world uranium reserves a range of additional key conditions should be placing on any remaining uranium export sales.

Failure to progress the key international non-proliferation instrument, the Non-Proliferation Treaty (NPT), at the recent conference in New York was in large part due to nuclear weapon states refusal to comply with their obligations under the NPT. Principally, to move forthwith to bring the Comprehensive Test Ban Treaty (CTBT) into force and for progress toward irreversible and verifiable nuclear disarmament.

Australia should require commitments from all outstanding relevant states to bring the CTBT into force and for all nuclear weapon states including the US to as soon as possible sign and ratify the CTBT and to demonstrate verifiable closure of nuclear weapons testing facilities as a condition of any further remaining export of uranium.

On principal we should not be exporting uranium to nuclear weapon states full stop. If they do not acceptably progress nuclear disarmament then uranium sales should cease.

Our Federal Government is also undermining the NPT by proposing to sell uranium to India, a rogue nuclear weapon state which is not a signatory party to the treaty and is outside of international nuclear conventions. In looking to profiteer off uranium Minister Macfarlane is unacceptably ignoring our international responsibilities.

*“Both India and China will increase their nuclear generation, and it's important that Australia exports to those opportunities.”*

(Federal Minister for Resources Ian Macfarlane on ABC AM “Federal Cabinet to discuss uranium mining bans” Monday, 6 June 2005)

The agenda of proposed uranium sales to India and the stated position of the Resources Minister are directly contrary to the stated position of the Foreign Minister in the DFAT submission (paragraph 36) to this Inquiry. Which Minister will prevail?

Australia previously undermined the NPT by arrangements through the US for export of our uranium to Taiwan, neither a nation state nor a signatory party to the NPT.

Australia’s uranium exports directly contribute to fissile materials stockpiles around the world. Through production of plutonium in reactors using Australian uranium, and by Federal Government approval for separation of Australian obligate plutonium through reprocessing of spent nuclear fuel arising from use of our uranium.

Over 60 tonnes of Australian obligate plutonium exists through use of our uranium exports in nuclear power. With a nuclear weapon powerful enough to destroy a city requiring a mere 10 kg of plutonium there is a theoretical potential for some 6 000 nuclear weapons to be made from existing Australian obligate plutonium materials.

Reprocessing is an untenable proliferation technology that Australia must oppose if we are to have any credibility in furthering our international nuclear responsibilities.

Reprocessing is the most polluting stage of the nuclear fuel cycle, all reprocessing plants produce and accumulate separated plutonium and unresolved high level nuclear wastes and are key nuclear terrorism targets. Reprocessing plants at Sellafield in the UK and La Hague in France are also respectively the single greatest sources of ongoing marine and of aerial radiation releases in the world.

Our Federal Government is complicit in this direct and long term proliferation risk by previous and continued support for reprocessing of Australian obligate nuclear materials. In an Australian paper "*Approaches to the nuclear fuel cycle*" (para.5, May 2005) presented to the NPT Conference in New York the Minister for Foreign Affairs states an aim to maintain global reprocessing capacity.

This policy and practice also directly compromises any future credible role for the proposed Fissile Materials Cut-Off Treaty (FMCT). The FMCT will have to prohibit separation of so called ‘civilian’ plutonium through reprocessing – a potent if not

optimal fissile material - as well as prohibiting production of plutonium for direct military purposes. All separated plutonium should be subject to the same controls.

Australia should require an end to reprocessing of existing Australian Obligate Nuclear Materials and prohibit reprocessing of future AONM as a condition of any further uranium export sales.

In strategic terms access to the expanding nuclear markets of China and India are primary commercial interests for the proposed expansion of uranium mining in Australia including the Roxby uranium expansion. Both are unacceptable markets.

That China is not an open society predicates against reliance on state assurances over proliferation and management of AONM. Apparently the China export arrangements are proposed to allow enrichment of Australian uranium in China. This would further compromise any claimed control over AONM within China.

China has serious unresolved human rights, labour rights and cultural rights issues including Tibet. Will Australian's concerns over these lead issues be put aside in pursuit of the uranium dollar and corporate nuclear interests?

Both China and India are nuclear weapon states still developing nuclear weapons programs. India is not a signatory party to the NPT and has stated its intention to retain its nuclear weapons regardless. Will Australia reward nuclear weapons status?

Indirectly facilitating nuclear weapon programs should be equally unacceptable.

Both China and India have limited uranium reserves of their own and rely in the medium term on importing uranium to fuel their planned expansion of nuclear power.

If Australia were to sell either or both countries as much uranium as they may request we are in effect then freeing them up to use their own limited uranium supplies in their nuclear weapon programs. An indirect Australian facilitation of these programs.

In taking responsibility for Australia's uranium exports are we to only 'look on one side of the fence', the claimed safeguarded civilian nuclear power program, while on the other side of the fence their military weapons program continues unabated?

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

The ACF request this Inquiry Committee formally consider two recent international reviews on the nuclear industry and climate change, by the World Information Service on Energy (Feb 2005) and by Greenpeace International (April 2005).

#### **A back door comeback: Nuclear energy as a solution for climate change?**

“A back door comeback: Nuclear energy as a solution for climate change?”  
NUCLEAR MONITOR. A Publication of World Information Service on Energy (WISE) and the Nuclear Information & Resource Service (NIRS), incorporating the former WISE News Communiqué. (Feb 2005). At: <http://www10.antenna.nl/wise/>

#### **Summary**

Climate change is widely acknowledged as being one of the most pressing issues for the global community. Climate change affects many aspects of the environment and society, including human health, ecosystems, agriculture and water supplies, local and global economies, sea levels and extreme weather events. Many in the nuclear industry have seen climate change as a '*lever*' by which to revitalise the fortunes of nuclear power.

However, in various stages of the nuclear process huge amounts of energy are needed, much more than for less complex forms of electricity production. Most of this energy comes in the form of fossil fuels, and therefore nuclear power indirectly emits a relatively high amount of greenhouse gases. The emissions from the nuclear industry are strongly dependent on the percentage of uranium in the ores used to fuel the nuclear process, which is expected to decrease dramatic. Recent study estimates that nuclear power production causes the emission of just 3 times fewer greenhouse gases than modern natural gas power stations.

To reduce the emissions of the public energy sector according to the targets of the Kyoto Protocol, 72 new medium sized nuclear plants would be required in the EU-15. These would have to be built before the end of the first commitment period 2008-2012. Leaving aside the huge costs this would involve, it is unlikely that it is technically feasible to build so many new plants in such a short time, given that only 15 new reactors have been built in the last 20 years.

If we would decide to replace all electricity generated by burning fossil fuel with electricity from nuclear power today, there would be enough economically viable uranium to fuel the reactors for between 3 and 4 years. With the use of fast breeder reactors a closed cycle could be reached that would end the dependency on limited uranium resources. But despite huge investments and research over the last decades, breeder reactors have been a technological and economic failure.

Switching the entire world's electricity production to nuclear would still not solve the problem. This is because the production of electricity is only one of many human activities that release greenhouse gases. Others include transport and heating, agriculture, the production of cement and deforestation. The CO<sub>2</sub> released worldwide

through electricity production accounts for 39% of total annual human greenhouse gas emissions.

Numerous studies have shown that the single most effective way to reduce emissions is to reduce energy demand. Studies of future energy scenarios show no evident correlation between CO<sub>2</sub> emissions and nuclear power. In fact the scenario with the lowest emissions was not the one with the greatest use of nuclear power, but the one in which the growth in demand was minimised.

There are also a lot of alternative energy sources. The costs of renewable sources are falling rapidly: in the last 10 years the cost per kWh of electricity from wind turbines fell by 50%, and that from photovoltaic cells fell by 30%. The costs of nuclear power are rising, despite the fact that nuclear power has been hugely subsidised over the last half century. Some of the costs of nuclear energy have been excluded from the price. Examples include costs of decommissioning and liability costs.

In the medium term it is possible to supply all of the world's energy needs through renewable sources based on current technology. Renewable energy sources have multiple benefits. They are free from greenhouse gas emissions and can also increase diversity in the energy market. They can provide long-term sustainability of our energy supply and can be used in rural areas of less developed countries that are not connected to gas and electricity networks.

There are many serious problems associated with nuclear power that have existed since its introduction and are still not resolved. For the storage of high radioactive nuclear waste there are still no final repositories in operation. In the last decades researchers have been working on the technology to reduce radioactivity and the decay time of nuclear waste, the so-called *transmutation* process. There is no guarantee that this expensive research will be successful, and these techniques can only be applied for future spent fuel and not for the present amount of nuclear waste.

Although much progress has been made in increasing safety standards reactors are still not inherently safe and problems are still common. Apart from possible technical failures, the risk of human error can never be excluded. This risk will grow now that the onset of privatisation and liberalisation of the electricity market has forced nuclear operators to increase their efficiency and reduce costs. The reductions in the size of the workforce have in some cases led to concerns over safety.

One of the by-products of most nuclear reactors is plutonium-239, which can be used in nuclear weapons. Nuclear installations could also become targets for terrorist attacks and radioactive material could be used by terrorists to make "dirty bombs". In the event of a nuclear disaster the health concerns are obvious. Exposure to radioactive fallout would lead to an increased risk of genetic disorders, cancer and leukaemia.

There are also health risks associated with the day-to-day production of nuclear power. Employees working in power plants are exposed to low-level radioactivity.

## **Nuclear Reactor Hazards, Ongoing Dangers of Operating Nuclear Technology in the 21st Century**

*“Nuclear Reactor Hazards, Ongoing Dangers of Operating Nuclear Technology in the 21st Century.”* Report Prepared for Greenpeace International by Helmut Hirsch, Oda Becker, Mycle Schneider, Antony Froggatt, April 2005. At:

**<http://www.greenpeace.org/international/press/reports/nuclearreactorhazards>**

This report gives a comprehensive assessment of the hazards of operational reactors, new 'evolutionary' designs and future reactor concepts. It also addresses the risks associated with the unresolved management of spent nuclear fuel.

The first part of the report describes the characteristics and inherent flaws of the main reactor designs in operation today; the second part assesses the risks associated to new designs; the third part the 'ageing' of operational reactors; and the fourth part the untenable terrorist threat to nuclear power.

### **The main conclusions are:**

- All operational reactors have very serious inherent safety flaws which cannot be eliminated by safety upgrading;
- A major accident in a light-water reactor – the large majority of the reactors – can lead to radioactive releases equivalent to several times the release at Chernobyl and about 1000 times that released by a fission weapon. Relocation of the population can become necessary for large areas (up to 100.000 km<sup>2</sup>). The number of cancer deaths could exceed 1 million;
- New reactor lines are envisaged which are heralded as fundamentally safe. However, apart from having their own specific safety problems, those new reactors would require enormous sums for their development, with uncertain outcome;
- The average age of the world's reactors is 21 years and many countries are planning to extend the lifetime of their reactors beyond the original design lifetime. This leads to the degradation of critical components and the increase of severe incidents. The age related degradation mechanisms are not well understood and difficult to predict;
- De-regulation (liberalisation) of electricity markets has pushed nuclear utilities to decrease safety-related investments and limit staff. Utilities are also upgrading their reactors by increasing reactor pressure and operational temperature and the burn-up of the fuel. This accelerates ageing and decreases safety margins. Nuclear regulators are not always able to fully cope with this new regime;
- Highly radioactive spent fuel mostly is stored employing active cooling. If this fails, this could lead to a major release of radioactivity, far more important than the 1986 Chernobyl accident;
- Reactors cannot be sufficiently protected against a terrorist threat. There are several scenario's – aside from a crash of an airliner on the reactor building – which could lead to a major accident.

## **D. Current structure and regulatory environment of the uranium mining sector**

### **Outdated standards in ionising radiation occupational health and safety**

The Australian Conservation Foundation formally request this Inquiry Committee consider the present best independent scientific advice contained in the report:

*“Recommendations of the European Committee on Radiation Risk The Health Effects of Ionising Radiation Exposure at Low Doses for Radiation Protection Purposes. Regulators' Edition.” (ECRR, 2003).*

See Executive Summary at: <http://www.euradcom.org/2003/execsumm.htm>

See ECRR Background at: <http://www.euradcom.org/2003/ecrr2003.htm>

See Basic and Scope to Report at: <http://www.euradcom.org/2003/basisandscope.htm>

*“12. **The committee lists its recommendations.** The total maximum permissible dose to members of the public arising from all human practices should not be more than 0.1mSv, with a value of 5mSv for nuclear workers.*

*This would severely curtail the operation of nuclear power stations and reprocessing plants, and this reflects the committee's belief that nuclear power is a costly way of producing energy when human health deficits are included in the overall assessment.*

*All new practices must be justified in such a way that the rights of all individuals are considered. Radiation exposures must be kept as low as reasonably achievable using best available technology.*

*Finally, the environmental consequences of radioactive discharges must be assessed in relation to the total environment, including both direct and indirect effects on all living systems.” (Executive Summary, ECRR 2003).*

ACF consider that it is unacceptable for current Australian standards in occupational and public ionising radiation exposure to lag so far behind the best independent scientific advice in the European Committee on Radiation Risk's Recommendations.

Workers in Australian uranium mines are legally subject to ionising radiation exposures four times higher than the total maximum permissible dose recommended by the European Committee on Radiation Risk for nuclear workers including mining.

The public can be legally subject to ionising radiation exposures ten times higher than the total maximum permissible public dose recommended by the ECRR from all human practices including uranium mining.

ACF find these disparities unacceptable and call on this Inquiry to recommend uranium mining standards be brought into line with the ECRR Recommendations.



## **Northern Territory uranium mining operations at Ranger and Jabiluka:**

Energy Resources of Australia (ERA) operate the open-cut Ranger uranium mine in Kakadu and have been actively trying to develop the nearby underground Jabiluka project. Both operations remain the focus of deep community concern with ERA recently being found guilty of breaches of the NT Mining Management Act over its operations at Ranger and Jabiluka currently stalled by a lack of traditional owner consent for ERA's preferred development plan and a formal agreement which makes any future development at the site contingent on the explicit approval of the Mirarr traditional owners.

The London based mining group Rio Tinto Ltd is the majority shareholder (68%) and parent entity of ERA.

## **ACF and Kakadu**

ACF maintains an active engagement with the Kakadu region and has a long history of involvement with the issues surrounding uranium mining in the Kakadu region dating from involvement in the Ranger Uranium Environmental Inquiry (the Fox Report) and the proclamation of Kakadu National Park.

The protection of the World Heritage listed Kakadu region is a key concern for ACF and remains an important yardstick of successive Government's environmental commitment and credibility.

Further detail on ACF policies and activities in relation to these areas can be found at [www.acfonline.org.au](http://www.acfonline.org.au)

## **Kakadu's Importance**

The Kakadu region is one of breathtaking bio-diversity and is widely recognised as having outstanding conservation values. It is home to 21 of Australia's 29 mangrove species, over 900 plant species, one third of Australia's bird species, one quarter of the nation's freshwater fish, over 100 species of amphibians and reptiles and an estimated 10,000 species of insects.

Kakadu's extensive Ramsar-listed wetlands contain the world's richest tropical breeding ground for waterbirds. The dominant river systems have created large floodplains, swamps, estuaries, mangroves and mudflats. The sandstone escarpment of the Arnhem Land plateau towers over the floodplains, and the cumulative effect is awe-inspiring.

Kakadu is also far more than a remarkable natural ecosystem. The region is home to indigenous people regarded as having the longest continuous cultural traditions on earth. The area contains more than 7,000 rock art sites with over 400,000 individual paintings which are of importance to local Aboriginal people whose cultural practice remains strong.

It is because of these factors that the Kakadu region is World Heritage listed for both natural and cultural values and properties. There is a clear domestic and international

expectation that this truly unique region deserves the highest level of protection and regard - sadly this is not the case at present.

### **Impacts of Uranium Mining in Kakadu and the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations:**

Recent years have seen an escalation in the trend away from best practise environmental monitoring, reporting and protection regimes in Kakadu. An increasing series of spills, leaks, incidents and reporting failures since 2000 have undermined the credibility of both mining company Energy Resources of Australia and the current environmental protection framework and highlighted serious regulatory deficiencies.

#### **2000 Ranger Tailings Pipe Leak**

In April 2000 ERA identified and repaired a leak in a tailings water return pipe located within the Ranger uranium mine Restricted Release Zone (RRZ). Contaminant materials in the RRZ are required to be maintained and managed in this designated area and not be released to the wider Ranger Project Area or the Kakadu environment.

Between December 1999 and April 2000 an estimated two million litres of material containing high levels of manganese along with uranium, radium and a suite of other contaminants escaped from this broken pipe and the RRZ.

This severe operational failure was compounded by the fact that more than twenty days elapsed before ERA notified the relevant Northern Territory (NT) and Commonwealth authorities of the leak despite the clear reporting requirement contained in section 16 of the Ranger Environmental Requirements (ERs) which reads -

*16.1 The company must directly and immediately notify the Supervising Authority, the Supervising Scientist, the Minister and the Northern Land Council of all breaches of any of these Environmental Requirements and any mine-related event which:*  
*(a) results in significant risk to ecosystem health; or*  
*(b) which has the potential to cause harm to people living or working in the area; or*  
*(c) which is of or could cause concern to Aboriginals or the broader public.*

This situation was a clear and severe system and reporting failure and was identified as such in the Supervising Scientists subsequent report, *Investigation of tailings water leak at the Ranger uranium mine (Report 153, 2000)*. This found that ERA had failed to comply with the ER's by both allowing RRZ material into the external environment and failing to properly report this action.

ERA were not prosecuted despite this breach of the most fundamental formal regulations governing mining operations in a controversial sector with complex stakeholder relationships. ACF maintains that the Commonwealth's failure to take urgent and effective action, including legal action, at this time was inconsistent with community expectation, Commonwealth responsibility and best regulatory practise.

Many of the recommendations which arose from the Supervising Scientists report into the 2000 leak have still not been implemented by ERA. Indeed a full two years after these recommendations were made an ERA internal review into a subsequent leak

reported that "full compliance with the recommendations cannot be achieved with current resources" (*Investigation Report - Catchment management, southern stockpile area, Ranger Mine - March 2002*).

## **2002 Ranger Stockpile Failure**

Further serious operational problems were exposed at the Ranger with the incorrect stockpile placement of a large volume of low grade uranium ore. 84,500 tonnes of material was placed in the wrong area between the period of January 14 to February 26, 2002. This error resulted in the movement of large volumes of rainfall seepage through the uncompacted stockpile with the subsequent mobilisation of high concentrations of uranium.

Although the incorrect dumping of material commenced on January 14 ERA failed to report both this and the resultant increases in uranium contamination in water samples until February 27, 2002. Further, during this period ERA staff provided incorrect information on the stockpile status to an inspection team comprised of Commonwealth and NT supervising authorities.

ERA's handling of this issue was described in a Supervising Scientist report as "inconsistent with the approval given by the NT Minister for Resource Development", (*Investigation of the Stockpiling and Reporting Incidents at Ranger and Jabiluka 2002*). Whilst this report failed to adequately address the fundamental problems at Ranger, excerpts show some disturbing trends concerning ERA's culture and performance:

*"It is also evident that there was no effective communication process between the ERA Environment Department and the Ranger Mine Department. In addition to being symptomatic of deficiencies in internal reporting and communication systems, the action of Mine Department staff also indicates a lack of appropriate environmental awareness amongst some ERA employees." (p. 10)*

*"further evidence of significant room for improvement in ERA's inspection and maintenance systems" (p. 11)*

*"a delay which is not consistent with ERA's reporting requirements...ERA did not take appropriate action internally...clear contravention of ERA's reporting requirements...(p. 12)*

*"There is no doubt that the dumping of additional material on the Grade 2 stockpile by ERA in January and February 2002 was..contrary to the approval issued by the Minister" (p. 15)*

*"ERA has not utilised all the expertise available to it.. and did not have all the required expertise on site at Ranger or Jabiluka" (p. 19)*

## **2004 Water and Vehicle contamination events / 2005 ERA prosecution**

The deficiencies in infrastructure and corporate culture seen with ERA's tailings pipeline and stockpile issues were further highlighted with the high profile water contamination and vehicle clearance issues during 2004.

Energy Resources of Australia's Ranger uranium mine in Kakadu was recently found guilty and fined \$A150,000 and costs over breaches of the NT Mining Management Act in relation to a contamination incident in March 2004 where around 150 people were exposed to drinking water containing uranium levels 400 times greater than the maximum Australian safety standard.

Twenty-eight mineworkers suffered adverse health effects including vomiting and skin irritation as a result of the exposure.

A further charge related to contaminated vehicles leaving the mine site in breach of de-contamination and clearance procedures – causing a serious and preventable radiation exposure to a local mechanic and his children.

The recent contamination event at Ranger is the latest in over 120 leaks, spills and license breaches since the mine opened in 1981. Aging infrastructure and a deficient safety/management culture at the Ranger mine has seen the frequency and severity of these incidents increase in recent years.

The Supervising Scientist 2003-2004 Annual Report raises some important issues and observations in relation to these events and the Supervising Scientist has advised the federal Minister for Industry, Tourism and Resources that he considers ERA has breached the Commonwealth Environmental Requirements (ER's) - particularly ER 1c, 3.4, 5.1 and 12.1 at Ranger. The Supervising Scientist was also of the view that key issues concerning upgrading the water system at Ranger "should be made requirements of the company under legislation."

In the Senate on 31 March 2004 Senator Ian Macdonald read a statement from the Environment Minister on the Ranger contamination and stated "any recommendations made by the Supervising Scientist will be pursued by the Government, and any possible measures will be taken with the intention of ensuring that such incidents do not happen again".

Given that many of the Senate ECITA Uranium Inquiry (2003) recommendations directly deal with enhancing the regulatory framework at Ranger the failure of the federal government to date to implement, or even formally respond to, the outcomes of this Inquiry runs counter to the assurances of best practise regulation.

The Supervising Scientist concluded "that the Commonwealth Government may wish to be satisfied that the occurrence of this incident cannot be attributed to a lack of vigilance on the part of the NT Government in the discharge of its responsibilities in the day to day regulation of uranium mining at Ranger". ACF maintains that the federal government has a key oversight role at Ranger but is failing to adequately address clear license breaches and unsafe practises.

## **History of leaks, spills, accidents and incidents at Ranger Mine:**

The incidents detailed above are part of a litany of operational errors and procedural failures at ERA's Ranger operation. Whilst some of these are not of great individual impact, others are. Cumulatively they document a pattern of systemic under-performance and non-compliance and highlight the growing credibility gap that exists between ERA's self promotion and the reality of it's performance. These incidents are documented in Appendix 1, *Ranger Mine Incident Record*. ACF commends this paper to the Committee's attention and looks forward to a time when there shall be no further additions. ACF believes that even a cursory examination of Appendix 1 and the recent incidents at Ranger shows that there is an urgent and real need for effective action in order to protect the magnificent Kakadu region.

### **Summary:**

ACF maintains that there are serious deficiencies in relation to the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations covering ERA's uranium operations in Kakadu. This has contributed to a significantly reduced environmental protection framework and unacceptable and unnecessary operational and procedural failures.

The current regulatory regime at Ranger was described by the ECITA 2003 Senate Inquiry into Uranium Regulation as 'complex, confusing and inadequate'. The regime does not provide adequate transparency, rigour, recourse or confidence and is not consistent with community expectation, best regulatory practise and Australia's domestic and international responsibility to protect the values and properties of the World Heritage listed Kakadu National Park. Particular concerns include the:

- (i) failure of the Commonwealth to implement or respond to the recommendations of the 2003 Senate Inquiry into Uranium Regulation. This report identified a series of current deficiencies and a prudent set of measures to address these.
- (ii) the preparedness of both Commonwealth and NT regulatory agencies to facilitate ERA's operational needs above other concerns.
- (iii) the potential for serious agency based conflict of interests due to the conflicting roles of industry promotion and industry regulation. This was clearly identified in the report of a 2004/5 review of the structure and operations of the NT Department of Business, Industry and Resource Development (DBIRD) and can be equally applied to the role of Commonwealth agencies, especially DITR.
- (iv) continuing lack of clarity, clear demarcation and lines of accountability and authority between Commonwealth - NT agencies and working arrangements.
- (v) significantly reduced Commonwealth "on-ground" role and an increased reliance on ERA provided data and analysis.
- (vi) growing reluctance of Commonwealth to pursue legal avenues to deliver improved environmental outcomes, instead relying on company /agency agreements which have few benchmarks, little clarity and no formal standing.
- (vii) lack of reporting and attention given to cultural and social impacts and the failure to adequately or appropriately engage Aboriginal Traditional Owners.
- (viii) increased reliance on company commitments, self-assessment models and industry processes, despite ERA's under performance and non-compliance.

- (ix) persistent and growing water management problems, described in the ERA internal 2000 Ranger tailings pipe leak as *"a long term issue with the management and ultimate disposal of water on the lease has not been adequately addressed. The Ranger staff face an increasingly intractable water management problem which is becoming the primary driver behind operational and environmental decision making"*.
- (x) failure of both Commonwealth and NT regulatory authorities to give adequate regard and effect to minimising impacts on the Ranger Project Area despite this being clearly articulated in the ER's. This has seen a consistent pattern of approvals being granted that increase ERA's contaminant footprint and complicate future rehabilitation and final landform options.

### **Commonwealth agency adequacy and effectiveness in Kakadu**

The two key Commonwealth agencies involved with uranium mining in this region are the Office of the Supervising Scientist (OSS) and the Department of Industry, Tourism and Resources (DITR).

The previous section detailing deficiencies in the current regime covering uranium operations in Kakadu has highlighted a range of the recent inadequacies on the part of the Commonwealth agencies.

ACF believes that DITR's role is profoundly compromised as it is an agency which exists to develop and facilitate industry - a position inconsistent with the role of a credible and disinterested regulator.

The partisan approach taken by DITR can be seen in relation to the role played by former Resources Minister Parer in weakening environmental recommendations during the Jabiluka EIS, the failure of former Resources Minister Minchin to prosecute ERA for a clear breach of the ER's in 2000 and the granting of an extended uranium export license to ERA without an increased set of conditions to improve environmental performance.

The key Commonwealth agency that exists to ensure that the environmental protection regime and regulatory arrangements are adequate to protect Kakadu from the impacts of uranium mining is the Office of the Supervising Scientist.

Whilst ACF acknowledges the focus given to the water and vehicle contamination events in its 2003/4 Annual Report ACF holds serious concerns over the performance of the OSS including:

- the reduction of a Commonwealth "on-ground" presence in Kakadu
- the repeated unwillingness or inability of OSS to uphold the integrity of the Ranger ER's through using the full suite of options, including legal action
- the degree of regulatory capture and the organisational independence of the OSS, dramatically evidenced with the movement of the former Assistant Secretary to a senior management position at ERA during the 2003 contamination investigation
- the adequacy of OSS funding and resources
- the over-reliance on company provided data, processes and analysis
- the OSS prioritising ERA's operational needs over other considerations

- the lack of adequate monitoring of social and cultural impacts
- the failure to adequately engage Traditional Owners or reflect their concerns
- the over-reliance on voluntary and informal agency-ERA understandings

### **International Concerns:**

Kakadu's World Heritage status has seen intense international attention given to the management and protection of the natural and cultural values and properties of this region. This has particularly been the case in relation to the Jabiluka project which continues to be the focus of scrutiny by UNESCO's World Heritage Committee (WHC).

The Australian Government has engaged in unprecedented lobbying of the WHC in order to avoid Kakadu being listed on the register of World Heritage In Danger. It should be remembered that the primary recommendation of the UNESCO WHC Expert Assessment Mission which visited Kakadu in October 26 -November 1,1998 stated:

*Recommendation 1: The mission has noted severe ascertained and potential dangers to the cultural and national values of Kakadu National Park posed primarily by the proposal for uranium mining and milling at Jabiluka. The mission therefore recommends that the proposal to mine and mill uranium at Jabiluka should not proceed.*

The impacts of uranium operations on the natural and cultural values of Kakadu have also attracted concern and attention of the European Parliament which has called "on the Australian Government not to proceed with the [Jabiluka] project" (European Parliament Urgency Resolution, 15-1-98).

There are numerous examples of international agencies, NGO's and professional bodies who have called for a halt to the Jabiluka project, an end to uranium mining in the Kakadu region or a significantly upgraded protection regime.

It is increasingly clear that Australia's performance in relation to the protection of Kakadu is failing the test of international and domestic expectation and best practise. The continuing failure of the current regulatory and environmental protection frameworks in Kakadu serves only to heighten these concerns and does nothing to advance our international reputation or stature.

**Koongarra:** The Koongarra uranium deposit forms part of the mid-headwaters of Nourlangie Creek which is a major tributary of the central catchment of Kakadu, the South Alligator River. The deposit abuts the escarpment about 30 km south of ERA's existing Ranger uranium mine and around 3 km east of Nourlangie Rock in a valley bounded by the Mount Brockman outlier and the Arnhem Land plateau.

Nourlangie Rock is a well-known tourist attraction in Kakadu seen by an estimated 90% of the tourists who visit Kakadu annually. The mining lease is visible from Nourlangie Rock which would be compromised as both a site of traditional Aboriginal importance and as a tourist destination by the impacts of mining. As recognised in the federal government's recent shared vision for tourism in Kakadu National Park, tourism is a major revenue earner and the number one employer of

Territorians. In 2002/2003, tourism directly contributed \$1080 million into the NT economy. When indirect effects are taken into account this number increases to over \$2 billion and an estimated 1 in 7 Territorians work in the tourism industry.

If mining at Koongarra was to go ahead it could be expected that the severe visual encroachment on this pristine area of national and cultural importance would see a downturn in both tourist numbers and dollars. The noise and the dust that would be generated by mining would severely impact on Nourlangie Rock and prevent people from being able to enjoy one of the chief attractions of Kakadu – a point noted in welcome recent statements against the proposed Koongarra mine by the NT Mines Minister Kon Vatskalis.

The impacts of mining include not just the visual scarring of Kakadu's exquisite natural landscape, but also the very real threat of ecological damage to the South Alligator River and the Woolwonga wetlands. The Koongarra area is one of the most ecologically sensitive areas of Kakadu. This sensitivity is due in part to its position upstream of the Woolwonga wetlands, one of the wetlands systems listed in the Convention on Wetlands of International Importance (the Ramsar convention). The 1977 Ranger Uranium Environmental Inquiry Second Report (the Fox Report) explicitly stated: "If uranium mining proceeds, it should be restricted, west of the Arnhem Land Reserve, to one drainage basin, so that environmental damage from mining can be geographically contained... We recognise that Noranda, the company concerned will have expectations to mine the Koongarra deposit. However the Woolwonga area is so valuable ecologically that we oppose in principle any mining development upstream of it."

The Fox report went on to say, "...any pollution from operations at Koongarra would be a potential threat to the very valuable wildlife of the Woolwonga Reserve." These concerns led to a view that mining operations at Koongarra should not proceed. The subsequent experience of the uranium mining industry in Kakadu shows that Fox's caution was well founded. Since ERA's Ranger mine opened in 1981, there have been more than 120 documented incidents, spills and leaks.

A detailed investigation of the impacts of uranium mining by the Australian Senate in 2003 found clear evidence of "a pattern of underperformance and non-compliance" and concluded that significant changes were needed to avoid "serious or irreversible damage". ACF maintains that the operational reality shows that claims by mining companies that uranium mining can be done safely, without pollution or adverse impacts, do not hold up to scrutiny.

Following extensive lobbying from Aboriginal traditional owners and environment organisations a high level World Heritage Committee assessment team visited Kakadu in October 1998 to assess the impact of possible mining at Jabiluka. The Assessment committee recommended that Kakadu be listed as "In Danger" due to the threats posed by uranium mining operations in Kakadu. The Australian Government was very concerned not to have Kakadu listed as In Danger and was highly critical of the assessment teams report on Jabiluka. However they endorsed the recommendations made by the Committee in relation to Koongarra. The World Heritage Committee Recommendation, Section 7.15 is as follows:



### **7.15 The Koongarra Mineral Lease**

The mission noted that the Koongarra Mineral Lease (see Map I) is located near the highly culturally significant and highly visited Nourlangie outlier with its outstanding galleries of rock art. The Australian Government articulated a view to the mission that this Mineral Lease excised from Kakadu National Park should never be developed. It was however acknowledged that the legal rights of traditional owners under Australian law include the opportunity to oppose this view.

**Recommendation 13:** The mission is of the opinion that the Australian Government should discuss rescinding the 1981 *Koongarra Project Area Act* (which proposes amendment of the boundaries of Kakadu National Park to accommodate a mine at Koongarra) with the traditional owners and seek their consent to include the Koongarra Mineral Lease in the Park and therefore preclude mining.

In Australia's Response, Section 6.13 Recommendation 13: The Koongarra Mineral Lease, the Federal Government wrote:

"This Recommendation is supported in principle. The Government has raised the scope of this recommendation with the Aboriginal parties concerned. This recommendation is based on a misunderstanding about the process that the company must undergo before it can contemplate mining in the area. Under Australian law, as this is Aboriginal Land, the company must first negotiate a satisfactory legal agreement with the traditional owners of the area concerned, through the statutory Aboriginal body, the Northern Land Council. The Australian Government must also endorse such an Agreement. The previous and current owners have not been able to conclude this process, particularly for the area specified under the 1981 Koongarra Project Area Act (refer Figure 9). Should the current owners finalise a satisfactory Agreement sometime in the future and/or if the company still contemplated mining in the area of the original lease, the project could not commence without a rigorous and transparent environmental assessment under both Australian and Northern Territory environmental law. The Australian Government will not approve a mine that would damage World Heritage values."

With this response the Australian Government has made a valuable step towards ending the threat of mining at Koongarra. The opening and concluding sentences are particularly powerful: "This Recommendation is supported in principle" and "The Australian Government will not approve a mine that would damage World Heritage values." This public statement by the Australian Government to a leading international body is a firm commitment to the protection of World Heritage values and properties and ACF looks forward to action that gives practical effect to this.

The formal status of the Koongarra project has long been regarded as complex and uncertain as there are no current tenements or titles that exist in relation to Koongarra. The Koongarra area is wholly enclosed within Kakadu National Park, though the area SML69 was excised upon proclamation of Kakadu. There are nine Mineral Lease applications and two Exploration Licence applications in this area however only the application for exploration licence EL 10082 is still being considered. This application has been the subject of a moratorium by Traditional Owners. The current

exploration licence application was vetoed on the 26th of April 2000. Exploration license 10082 covers an area of forty-five square kilometres in the South Alligator region including both uranium ore bodies at the Koongarra site. This application is almost double the size of EL 3479, which was initially applied for in 1981 in accordance with the (never proclaimed) Koongarra Project Area Act 1981 and Denison's revised Project Proposal. EL 10082, the current application for an exploration licence at Koongarra covers both the area of SML 69 and that of EL3479. If the Koongarra Project Area Act were proclaimed, EL 3479 would be excised from Kakadu National Park, however the World Heritage boundaries would not change.

Following the Traditional Owners 2000 decision to veto mining at Koongarra, Cogema closed their Darwin office in August 2000. Since the expiry of the moratorium on activity on EL 10082 on April 26 2005, the application process has been again initiated by Cogema. This process of repeated applications for exploration despite previous veto's by traditional Aboriginal owners can continue indefinitely and this persistent pressure to approve unwanted projects is unacceptable.

The Australian Government has a number of options that it can bring into play to resolve the Koongarra issue and preclude mining and its impacts on the World Heritage listed Kakadu National Park including rescinding the Koongarra Project Area Act (1981). Rescinding the KPA would show a great deal of support for the World Heritage Committee recommendation regarding the future of Koongarra and enhance Australia's reputation for environmental protection both here and abroad. Such action would also demonstrate the Government's active commitment to the protection of Aboriginal culture and the integrity of Kakadu National Park.

Rescinding the never proclaimed KPA Act would also be consistent with the provisions of the Environment Protection and Biodiversity Conservation Act (1999) that explicitly ban mining operations in Kakadu National Park.

The Australian Government should again seek to follow up Recommendation 13 of the World Heritage Committee's report on Kakadu. It is understood that the Government made efforts to do so in 1999 and did not receive a response. It is possible that no response was forthcoming given uncertainty and confusion over the succession process and debate over the ownership of the Koongarra estate. The matter of ownership has now been resolved and this increased clarity since the recommendations of the World Heritage mission were made now requires action on the part of the Federal Government. The Australian Government should reiterate to the Northern Land Council its desire to ascertain the views of Traditional Owners with regards to Recommendation 13 of the report of the UNESCO World Heritage Mission to Kakadu National Park.

The Australian government now has the very real opportunity to comply with this recommendation and to preclude mining at Koongarra and in so doing act to protect a most unique and important place.

## **Rehabilitation issues:**

There are serious and continuing concerns in relation to the impacts of former uranium mining operations in the Kakadu/ West Arnhem/ Alligator Rivers Region including at the Nabarlek site and in the South Alligator Valley.

**Nabarlek:** In 1959 Queensland Mines Ltd was formed as a uranium exploration company. In May 1970 it discovered Nabarlek, a small high-grade deposit just inside Arnhem Land, 15 kilometres east of Oenpelli and in the East Alligator River region of the Northern Territory.

Queensland Mines opened Nabarlek in 1979. The Nabarlek 1 orebody was mined out in just over 4 months of the dry season and 600,000 tonnes of average 2% grade ore stockpiled for treatment from 1980. Around 10,800 tonnes of uranium oxide ( $U_3O_8$ ) was produced and about 2.3 million tonnes of waste generated during this operation.

Pioneer International Ltd as the parent company of Queensland Mines, which is virtually defunct, wrote off Nabarlek except for a liability in its balance sheet to allow for rehabilitation of the site. In August 2003 the operators of the now closed Nabarlek uranium mine in western Arnhem Land received 95% of the money previously held in a trust fund dedicated to pay for the mine's clean up and rehabilitation. Pioneer International got a payment of \$A9.5 million – leaving only \$A500,000 to cover all remaining costs. The decision to grant this money was made by officers in the NT Department of Business, Industry and Resource Development (DBIRD).

This action occurred without the knowledge or consent of the areas traditional Aboriginal owners, the Northern Land Council or the Supervising Scientists Division (SSD) – the Commonwealth agency charged with oversight of uranium mining operations in the Alligator Rivers region.

The formal record of a meeting of the Nabarlek Minesite Technical Committee – which includes representatives of the NLC, SSD and DBIRD – held in the same week as the return of the money states the meetings focus was “to *commence a process* for the *development* of final closeout plan (*sic*) for Nabarlek” (our emphasis). Thus we have the unacceptable situation where the action to return the bond money was made despite there being no final agreed and approved mine closure plan.

This most irregular action bodes very poorly for future clean up works, especially on the Ranger mineral lease as well as undermining the site specific clean up options and processes at Nabarlek.

## **Continuing unresolved environmental and radiological issues at Nabarlek**

An expert group from the Alligator Rivers Region Technical Committee (ARRTC) visited the Nabarlek site in September 2003. A later ARRTC discussion of the site visit paints a clear picture of an operation that is nowhere near 95% rehabilitated and confirmed serious concerns including:

- adverse social and cultural impacts: “one Traditional Owner had indicated no desire to have bush tucker grow on the Nabarlek site; he indicated that he would not eat bush tucker..from the site. This would suggest possible concerns in relation to radiological contamination”.

- Dr Arthur Johnston – the Supervising Scientist – described the rehabilitation at Nabarlek as “far from ideal” and “that a lot more work was required at the site”. He was not aware that DBIRD had already handed over the money.
- many weed species were now so wide-spread that minesite control “was likely to be useless” and weeds had spread to the wider environment
- “very basic issues of safety and stability still had not been met”
- obvious areas of disturbance on the site – including asbestos building wastes
- “there was a long way to go if the site was to be rehabilitated to the standards that applied when decommissioning occurred in the 1990’s”
- concerns were expressed about the badlands (the name given to area adjacent to the former mine pit where nothing grows). Comments included: “the reasons for the feature being so desolate remain a mystery”, “noted the badlands as an area of concern”, “noted the badlands as a problem..and a major source of radiological contamination”

### **Former uranium operations in the South Alligator valley:**

Throughout the 1950/60’s 13 uranium mines, 2 uranium mills and a series of exploration sites operated in the South Alligator region. The legacy waste issues from these operations remain unresolved and the focus of a rehabilitation project headed by Parks Australia. Parks has a legal obligation to rehabilitate these sites by the close of 2015 and increased research and resources are required to facilitate this.

ACF urges the federal government to move to address the baseline research, operational aspects and on-going monitoring regime needed to minimise the radiological impact of these sites and believes there is a clear legal and ethical imperative to do so.

The rehabilitation situation at Nabarlek and throughout the South Alligator valley remains unresolved and this undermines stakeholder confidence in the credibility and capacity of past and present operators and regulators to deliver on rehabilitation commitments.

This is a particular concern in the context of the far larger Ranger mine moving into its final operational stages with the resulting rehabilitation and final landform challenges that this will entail. The management of radioactive uranium mine tailings was described by the 1997 Senate Select Committee on Uranium Mining and Milling as one of “the most serious challenges facing mining companies, the wider nuclear industry..and will also continue to be a major pre-occupation for regulators and scientists”. ACF maintains that this challenge is not being effectively addressed in the current operations of the uranium industry or the existing regulatory regime and urges urgent federal attention to this.

### **Commonwealth responsibilities and mechanisms to realise improved environmental performance and transparency of reporting:**

There is a clear and urgent need for action from the Commonwealth to adequately give effect to its domestic and international responsibilities and obligations for the protection of the World Heritage listed Kakadu region. Such action is also needed in order to meet

community expectations on this issue and to realise best practise frameworks for environmental protection.

Appropriate Commonwealth initiatives to address the current deficiencies in the existing regulatory regime include:

- (i) implementing the recommendations of the 2003 ECITA Senate Inquiry *Regulating the Ranger, Jabiluka, Beverley and Honeymoon Uranium Mines*
- (ii) independent review of the status of commitments made by the Australian Government / agencies and ERA to the World Heritage Committee and the implementation of all outstanding commitments
- (iii) an increased "on-ground" role in Kakadu for the OSS and the reduction in reliance on ERA derived primary data and analysis
- (iv) a review of the regulatory regime in order to address the existing complexity and uncertainty, clarify lines of authority and accountability and ensure performance expectations are explicit and implemented – to address a current situation where regulations are 'complex, confusing and inadequate'.
- (v) ensure ERA's full compliance with the Ranger Environmental Requirements
- (vi) advance the incorporation of the Koongarra Mineral Lease into Kakadu National Park (KNP). Such a position would be consistent with community expectation, best environmental protection and the existing Commonwealth in principle support for the World Heritage Committee recommendation to include the Koongarra Mineral Lease into KNP
- (vii) independent review of the adequacy of current plans and financial provision for the forthcoming Ranger mine-site rehabilitation program
- (viii) provide adequate funding and resources to progress the effective rehabilitation of former uranium mine sites in the South Alligator Valley and at Nabarlek.
- (ix) a more comprehensive and active monitoring and data collection process that includes a greater number of monitoring stations and an increased frequency of monitoring with an enhanced event based monitoring approach.
- (x) enhanced reporting processes and public access to data and documentation
- (xi) independent review of the status of the recommendations made in the Senate report *Jabiluka: The Undermining of Process* (ECITA Committee, June 1999) with the implementation of any outstanding recommendations
- (xii) support the Mirarr traditional owners in the identification and development of a post mining regional economic framework
- (xiii) independent review of status of implementation of Government and ERA undertakings and conditions made during Jabiluka assessment and approval process and implementation of outstanding commitments and requirements
- (xiv) facilitate an enhanced role for traditional owners in the development and implementation of appropriate environmental, social and cultural heritage monitoring, reporting and protection regimes

#### **Attachments:**

##### **#1 Ranger Mine Incident Record**

- an annotated summary of environmental incidents, accidents, breaches and divergences at ERA's Ranger uranium mine.

## **Environmental Incidents at Ranger – update May 2005**

Compiled from:

- Annual Reports by the Office of the Supervising Scientist.
- OSS Six-Monthly Reports to the Alligator Rivers Region Advisory Committee (ARRAC).
- Appendix 2.9, Senate Select Committee on Uranium Mining & Milling (1997).
- Appendix 6, ECITA Senate Committee on Regulating the Ranger, Jabiluka, Beverley and Honeymoon Uranium Mines (2003)
- OSS, 2000, *Investigation of Tailings Water Leak at the Ranger Uranium Mine*. Office of the Supervising Scientist, Supervising Scientist Report 153, June 2000, 168 p.
- SKM, 2000, *ERA Ranger Tailings Corridor Review*. Report to the Office of the Supervising Scientist, Supervising Scientist Report 154, June 2000, 27 p.
- *ERA Ranger Mine - Annual Environmental Management Reports*.
- Kinhill, 1996, *Appendix E : Draft Environmental Impact Statement - The Jabiluka Project*. Prepared by Kinhill Engineers Pty Ltd, in association with ERA Environmental Services Ltd, for Energy Resources of Australia Ltd (ERA), October 1996, 775 p.
- Borton, R, 1989, *A History of Ranger Uranium Mine 1979-83*. Unpublished manuscript.

**Compiled by Friends of the Earth, Australian Conservation Foundation and the Sustainable Energy & Anti-Uranium Service Inc.**

## 2005

- **May 6** – ERA pleads guilty to three charges of breaching the NT Mining Management Act following the 2004 water and vehicle contamination events.

## 2004

- **October** – Compressed airlines in the Ranger mill area contaminated. One worker exposed to uranium oxide and other contaminants
- **October** – Around 200 kilograms of sulphur spilt on highway traversing Kakadu National Park en-route to the Ranger mill
- **August** – Leak from tailings pipeline
- **July** – Contract fitter suffers a broken leg and serious head injuries and is airlifted to Darwin hospital following an accident at the Ranger mill
- **March 23/24** – Contamination of potable water lines with process water containing uranium levels 400 times greater than the maximum Australian safety standard. Contamination affected Ranger mine and mill area and water supplies at Jabiru East. Ranger mine shut down following this event that saw 28 workers present with adverse health symptoms including vomiting, gastric upsets, headaches and skin rashes.
- **February** – Concerns over contaminated vehicles leaving the Ranger mine site
- **January** – Large volume of tailings spilt from a broken tails pipeline

## 2003

- **June** – 2 further spills of process water
- **May** – Repeated spills of process water outside of designated bunded areas in both the Ranger mill and tailings corridor

## 2002

- **September** – Process water sprays from a restricted area in breach of ERA's Environmental Requirements
- **April** - It was discovered that further runoff from the Low Grade Ore stockpile - which was supposed to have been redirected - had uranium at 13,785  $\mu\text{g/L}$  and was entering the headwaters of Corridor Creek. Despite being a considerably higher and more significant concentration, ERA (and regulators) do not investigate to find the source.
- **Feb. 26** - It was discovered that Low Grade Ore had been dumped in the wrong area, with contaminated runoff containing uranium in excess of 2,000  $\mu\text{g/L}$  entering the headwaters of Corridor Creek. Subsequent investigations revealed that the incorrect dumping had been occurring for some six weeks from January 14. The total quantity involved 80,900 t of 'Grade 2' material (0.02-0.08%  $\text{U}_3\text{O}_8$ ) plus 3,600 t of 'Grade 3' material (0.08-0.12%  $\text{U}_3\text{O}_8$ ). It was also discovered that runoff from an adjacent medium grade stockpile ('Grade 4') was failing to report to RP2 as intended and was mixing with the contaminated runoff from the incorrect stockpiling and entering Corridor Creek. Remedial works were undertaken immediately.
- **Feb. (early)** - *Fourth year in a row* of high uranium concentrations in water discharging uncontrolled from RP1 to Coonjimba and Magela Creeks. This year the concentrations have increased back to as high as the first episode in 1998/99 (about 70  $\mu\text{g/L}$ ). In response, ERA promise to 'completely re-engineer' the RP1 catchment (though this is four wet seasons too late).

## 2000

- **Sep. 9** - About 20,000 litres of tailings leaked following the failure of a pressure gauge tapping point adjacent to one of the tailings pumps in the mill area. The failure resulted in tailings spraying over the bunds surrounding the pipe and associated infrastructure into an area which drains to RP2. No tailings left the mill area.
- **May 15** - Weeping was detected between two pipe joints in the Tailings Water Return Pipeline. The line was shut down and joints disassembled, checked, reassembled and the complete line was pressure tested. Estimated volume loss was 5 litres.

- **May 12** - A leak was discovered in the 'B' tails line between the processing plant and Pit #1. The contents of the spill were retained by secondary containment systems.
- **April 28** - A major leak of about 2,000,000 litres was announced from the tailings water return pipeline, between Pit #1 and Georgetown Creek. ERA first detected the problem on April 4, but failed to notify the authorities until April 28. The leak, from late December 1999 to April 5, 2000, originated from 2 flanges on the tailings water return pipeline (which pumps water from the tailings dam in Pit #1 to the mill for process use). The burial of the flange joints in silt and moist conditions for up to 6 months of the year allowed three bolts to rust and allow the joint to develop a slow leak. After breaching the bund surrounding the pipeline, about 85,000 litres of tailings water was estimated to have reached the adjacent wetlands in Corridor Creek, from where water discharges through Georgetown and into Magela Creek. The exact way the leak was discovered remains unclear, but appears to be by visual inspection. Follow-up investigation by OSS discovered evidence of a similar leak during the 1998/99 wet season. Tailings water has concentrations of Mn around 1,000,000  $\mu\text{g/L}$  and  $\text{NH}_4$  at 530 mg/L. ERA's monitoring was not required to analyse for these species in sampling in the Corridor Creek area.
- **Feb. 2** - Re-occurrence of high uranium in water discharging uncontrolled from RP1 to Coonjimba and Magela Creeks. Although concentrations were not as high as the previous wet season, the source of the uranium remained uncertain and questions the remedial works undertaken by ERA in the 1999 dry season to prevent this problem again.

## 1999

- **General** - The uranium contamination of RP1 during the 1998/99 Wet Season is the closest ERA has yet come to exceeding their operating requirements. Although the total mass of uranium discharged is below (high) legal limits, the low flows in Magela Creek during the early discharges from RP1 almost led to ERA increasing the U concentration in the Magela greater than the 3.8  $\mu\text{g/L}$  allowed. The U and  $\text{SO}_4$  levels in the Magela at the Kakadu National Park border are higher than background. ERA state that : *"Analysis of water quality and sediments in surrounding billabongs and creeks indicate the presence of the mine is apparent, as was expected by the Ranger Uranium Environmental Inquiry. Whilst the levels are detectable chemically, they are not ecologically significant and no deleterious effects on downstream flora and fauna or downstream users of the creek and its resources have been detected."* This is in contrast to the evidence and earlier OSS comments on such increases.
- **Oct. 7** - 4 new, unused drums used to transport uranium were lost whilst in transit from Perth to Darwin.
- **Aug. 5** - About 5,000 litres of RP2 water was used outside the RRZ for fire fighting. The fire damaged a small joint in the tailings pipeline, leading to a small spill of tailings into the tailings pipeline corridor.
- **June 24** - A pump and back-up system failed at the Brockman borefield, which led to the exhaustion of the potable water supply on site. As a consequence, 7 employees were unable to shower at the end of their shift as part of the decontamination routine.
- **Feb. 17** - ERA attempt to minimise the discharge from RP1 by sandbagging the spillway - in order to avoid the Magela exceeding its allowable uranium concentration.
- **Feb. 4** - Discharge and runoff from the low grade stockpiles on the northern wall of the (old) tailings dam was pumped to RP2.
- **Jan. 30** - Daily monitoring commenced of RP1 discharge - 3 days after high uranium concentrations were first observed.
- **Jan. 27** - The concentration of uranium in water discharging uncontrolled from RP1 to Coonjimba Creek and on to the Magela Creek was found to be approximately 70  $\mu\text{g/L}$  - up to 100 times higher than normal. The RP1 sediment control bund, with uranium at 600  $\mu\text{g/L}$ , was identified as the likely source.

## 1998

- **Dec. 13 (1998/99 Wet)** - Possible leak of tailings water discovered during investigation of the tailings water return pipeline discovered on April 28, 2000.



- **Dec. 10** - The sulphur dioxide (SO<sub>2</sub>) monitor located in the newly expanded acid plant was found to be malfunctioning.
- **Nov. 16** - An estimated 16,000 to 27,000 litres of water between Sump 98 and RP2 escaped through a bypassing valve into a borrow pit adjacent to the RP2 Wetland Filter.
- **Nov. 13** - A small quantity of tailings was reported at the tailings corridor drain. This occurred at the top of the tailings dam ramp when a syphon-break valve on the dredge tailings line allowed the tailings to drain. Neither tailings nor process water left the drain.
- **Oct. (late) to Nov. (early)** - The RP2 Wetland filter had been allowed to dry out during the Dry Season. The first rains of the Wet led to acidification of the wetland waters, with pH around 2.6 and uranium as high as 4 to 6 mg/L.
- **Oct. 31** - A small quantity of tailings was reported at the tailings corridor drain in two locations during the clearing of the tailings lines, which had become bogged.
- **Sep. 24** - About 200 litres of tailings material escaped from a small truck involved in carting some tailings-contaminated earth from the mill to Pit #3 for disposal<sup>1</sup>.
- **Sep.** - The stack sampler failed and so stack emissions could not be monitored or reported.
- **July 27-28** - The B-centrifuge conveyor was decontaminated for return to Alfa Laval in Sydney for repair. The conveyor was dispatched from ERA on July 28, and upon inspection by Alfa Laval, they "flaky yellow material" coated the inside of the bearings being replaced. It was estimated to be approximately 10 grams of ammonia diurate.
- **June (mid)** - Difficulties experienced in analysing water samples at the external analytical laboratories for <sup>210</sup>Pb, <sup>210</sup>Po and <sup>230</sup>Th meant that they were not included in the Non-RRZ Water Release Report for 1997/98.
- **March 16** - To remove rainwater which had collected on the haul road, an ERA employee broke a bund which resulted in about 100,000 litres of water escaping from the RRZ.

## 1997

- **General** - Powerhouse stack emissions had not been reported since 1981, contravening the Authorisation which requires data summary reports to be submitted quarterly.
- **General** - Gross alpha activity in freshwater mussels has not been monitored and reported since 1990.
- **Dec. 19** - About 2,000 litres of tailings slurry escaped from the RRZ due to a leak in the tailings pipeline.
- **June 30** - During the Environment Performance Review (EPR) held in June 1997, two other infringements were identified.
- **June 29** - A monitor installed in the power station stack to continuously record the level of SO<sub>2</sub> and CO<sub>2</sub> emissions failed on 29 June 1997.
- **Feb. 24** - 50,000 litres of Very Low Grade/Low Grade (VLG/LG) ore spilled outside the RRZ zone into the RP1 catchment.

## 1996

- **Dec. 10** - ERA reported another minor failure of the stockpile drainage bund resulting in a small quantity of RRZ runoff entering the RP1 catchment during a severe rainfall event. Further, a drain blocked by sediment at a VLG dump also caused RRZ rainfall runoff to enter a non-RRZ drain discharging to RP1 at that time.
- **Dec. 10** - ERA reported another failure of the stockpile drainage bund resulting in a small quantity of RRZ runoff entering the RP1 catchment during a severe rainfall event. Further, a drain blocked by sediment at a VLG dump also caused RRZ rainfall runoff to enter a non-RRZ drain discharging to RP1 at that time.
- **Nov. 19** - A segment of the perimeter drain around new extensions to the VLG/LG stockpile washed out during a heavy storm. About 100,00 litres of RRZ water and some sediment was released into RP1 catchment.

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<sup>1</sup> It is unsure why tailings-contaminated soil would be disposed of in the operational Pit #3, presumably Pit #1 was intended and Pit #3 is an error (pp 245, OSS-AR, 1999; in EA, 1999a).

- Nov. 6 - Fatal work accident involving a contractor. The worker died when the excavator he was operating collapsed into the excavation.
- Sep. 27 - Preliminary works on the mill expansion commenced before ministerial approval was granted.
- Sep. 21 - A bush fire on the mine site placed significant demand on accessible non-RRZ water for fire fighting. To speed up the turnaround times for water tankers, a decision was made to use RRZ water to create a wet perimeter and to dampen facilities under threat. Approximately 585,000,000 litres was applied to areas outside the RRZ.
- Feb. 18 - 2,000 litres of tailings sprayed from a leak in the pipeline running along the top of the tailings dam embankment. Approximately 250 litres fell outside the RRZ on the outer wall of the dam. This area was scraped up and returned to the tailings dam.
- Jan. 23 - 2,000 to 3,000 litres of tailings spilled from the tailings line and went outside the RRZ, the result of a valve failure. The area affected extended over about 60 to 80 m<sup>2</sup>.

## 1995

- General - Biological monitoring along the Magela Creek following the releases was limited due to other ERA commitments.
- Dec. 13 - An administrative error resulted in a repeat of the incident of 6 Dec. when 8,000 litres of the residual diesel/water mixture was spilled back to RP2. There were no further bird deaths associated with this incident.
- Dec. 6 - 12,000 litres of diesel spilled from tanks at the power station and ran into RP2. Although the spill was cleared up the spill was responsible for the death of forty water birds
- (36 Little Black Cormorants, 3 Australasian Grebe and 1 Australian Darter). The OSS regarded this incident as the first example of an unacceptable environmental impact at Ranger since operations began.
- Aug. to Dec. - Wetland filtration option commenced for disposal of excess water from RP2. Previous trials indicated that the filters would have a capacity to absorb 98% of uranium and that it appears that there is no remobilisation of the uranium later. The actual performance indicated that uranium removal from the RP2 filter decreased from 95% to 45%.
- Aug. 1 - About 120,000 litres of RP2 water was accidentally discharged outside the RRZ due to a failure in a pipeline carrying water to the constructed wetland filter adjacent to RP1.
- July 31 - An asbestos cement pipe failed and about 120,000 litres of water from RP2 was released. The water was pumped over the spillway into Djalkmara Creek.
- July 20 - About 10,000 litres of RP2 water was used in pre-production drilling at ore body #3 outside the RRZ.
- Feb. 21 - ERA sought approval to release water with elevated levels of uranium, sulfates and heavy metals from RP2 demonstrating again the difficulties of operating a mine in monsoon tropical climates. Aboriginal Land Owners took legal action to halt the release.
- Jan. 19 to April 13 - 500,000,000 litres of water from RP4 was released through wetland filter into Djalkmara Billabong and then into Magela Creek. Uranium concentrations in RP4 are increasing.

## 1994

- General - The OSS questioned the capacity of the Land Application Area to receive water without deleterious environmental impacts in the longer term - due to the appearance of salt efflorescence. OSS-AR (1994) expresses concern at the appearance of salts in the Land Application Area, stating that the "... appearance this year of salt efflorescence on soil surfaces in the LAA raises the question of the capacity of the area to receive water without deleterious environmental impacts in the long term" (pp 36).
- May 10 - About 50,000 litres of RP2 water was accidentally discharged outside the RRZ during the installation of a new section of pipe at the RP2 pumping station. The pipe was part of the network that serves the Magela irrigation area.
- April 13 - About 60,000 litres of combined rainfall-runoff and seepage from the high-grade ore stockpile discharged outside the RRZ following a pipe joint failure. The pipe ran alongside the drain downstream of the RRZ boundary at the bund in the high-grade ore stockpile drain. Samples taken

along the flow path showed an increase in U concentration in Georgetown Creek but no change in U concentration could be detected in Georgetown Billabong. The pipe has since been relocated wholly inside the RRZ.

- Feb. - Ranger applied to change the monitoring program such that during a water release from RP4 or RP1 monitoring of Magela Creek water quality is required weekly rather than daily.

## 1993

- Oct. 21 - Failure of a component in the tailings dam sprinkler system, used to minimise dust generation resulted in wind blown spray drifting over the dam embankment outside the RRZ boundary. This resulted from coincidental high winds from the NNW at the time of the failure. The quantity of water was small and the area was cleaned up within two days.
- Feb. 21 to March - 43,000,000 litres of water containing U, Mg and SO<sub>4</sub> was released from RP4 during this time. The OSS reported that ERA and the NTDME altered authorisations and were tardy in providing full information in regard to the toxicity and monitoring of these releases. Mg, Mn and SO<sub>4</sub> concentrations in Magela Creek are higher than background levels.
- Jan. 25 - During heavy rainfall a blocked drain caused a small volume (less than 100,000 litres) of water to escape from the RRZ. The OSS assessed this event as being an infringement of the Ranger Authorisation and a breach of ER27.

## 1992

- Sep. 27 - About 430,000 litres of RP2 water was transported by mine trucks to locations outside the RRZ for use by the Ranger emergency fire crew in containing and controlling a bushfire burning in and near the Magela LAA. The fire, fanned by strong winds and burning on a number of fronts, threatened infrastructure including monitoring installations and powerlines close to RP2 and also threatened to move towards the light industrial area and the Jabiru East site. There were no alternative sources of water in sufficient quantity available to fight the fire. The OSS assessed the transfer of water from the RRZ as constituting an infringement of the Ranger Authorisation and a breach of the ERs.
- Feb. 26 to 27 - During a high rainfall event, water from the high grade ore stockpile, which contained significant U concentrations, escaped from its containment sump and flowed into Georgetown Creek, then into Magela Creek. As a result increased concentrations of U were detected in Georgetown Creek and in Magela Creek. The available information did not enable an accurate assessment to be made of the effect of this uncontrolled release. The OSS estimated that about 25 kg of U was released.

## 1991

- General - "At Ranger, the expected environmental effects of a large operating uranium mine are beginning to be discernible outside the immediate environs of the mine site ... The water quality of Magela Creek close to the boundary of the Project area and Kakadu National Park deteriorated in the 1991 Wet season to the extent that uranium and sulphate reached concentrations higher than background values ... this is the first recorded instance since Ranger commenced mining that the water quality in Magela Creek has deteriorated to the point where it has the potential to cause observable effects on aquatic organisms. Ranger is now a mature mine; losses of contaminants to the environment are increasing and their presence is measurable in local waterbodies and streams. The company has introduced a number of practices which result in the deliberate release of water whose quality will modify the chemistry of nearby natural waterbodies. While each of these sources contributes only minor quantities of contaminants, the resultant effect on water quality is readily measurable and more importantly, the evidence shows it to be increasing. The environmental implications of this trend should be assessed and water management practices re-evaluated to ensure that all sources contributing to losses to the environment have been minimised as required under the definition of Best Practicable Technology (ER 44)." (pp 14-15, OSS-AR, 1991).
- General - The OSS predicted that water management at Ranger was inadequate to cope with 'below average rain' let alone that approaching the 1 in 10 rainfall.

- **General** - High U concentrations were found in the Magela Creek. "Following the observation of intermittent increases in uranium concentrations in Magela Creek during the 1990-91 Wet season, the Committee requested Ranger, NTDME and OSS to collaborate in a sampling program during the 1991-92 Wet season to monitor and investigate the origin of any anomalously high concentrations." The escape of uranium bearing water from the crusher feed ore stockpile was identified as the major contributor to higher uranium levels.
- **Aug. 24 to 25** - Approximately 1,300,000 litres of RRZ water (from RP2) was inadvertently used on the perimeter road of the tailings dam to suppress dust.
- **March 27** - About 320,000 litres of additional water were applied to the land application area following equipment malfunction, leading to a 9% increase in irrigation rate. The water fully infiltrated and there was no runoff.
- **Feb. 26 to 27** - Uranium enriched water draining from the Ranger high grade ore stockpile was accidentally released to Georgetown Creek and subsequently Magela Creek. The event was not classified as an infringement by NTDME. The OSS estimated that about 25 kg of U was discharged to Magela Creek during this event and, based upon the flow conditions at the time, assessed that the concentration of uranium could have been comparable to the receiving water limit for a short period.
- **Feb. 19 to April 8** - 75,000,000 litres from RP4 containing 40 µg/L U.

## 1990

- **General** - "The Supervising Scientist has advised that the 1989 Wet season environmental toxicity tests have shown that waters from RP4 when mixed with Magela Creek water can produce toxic responses in certain aquatic organisms". The toxicity of RP4 is of concern because it is not in the RRZ and the relatively large catchment and the limited capacity of the pond requires the release of water in most Wet seasons.
- **June 22** - Approximately 2,500 to 3,000 litres of tailings leaked from a split pipe; all material was contained with the RRZ.
- **April 25** - A small quantity of tailings sprayed from a pump when the casing failed. No material left the RRZ and a thorough clean up was completed.

## 1989

- **Aug. 13 to 14** - About 315,000 litres of RP2 water was used for fire fighting when a bush fire threatened both the Ranger and Alligator Rivers Region Research Institute laboratories.
- **April 9** - The daily approved application rate of water to the land application area was exceeded. There may have been a small amount of runoff.
- **March** - Approval was given by the NT supervising authority to shut down temporarily (for up to two years) the seepage collector system in the Ranger tailings dam in contravention of ER10. The purpose was to obtain information on the migration of seepage away from the tailings dam so as to calibrate a theoretical model of groundwater contamination.
- **March** - Approval was given by the NT supervising authority for release of water from RP4 via the spillway. This provided less assured control of the environmental impact of the released water than direct discharge to Magela Creek via the installed pipeline.
- **March 20** - RP2 water level was allowed to reach a level almost 1 m above the agreed wet season limit desirable to prevent overtopping as a result of a 1-in-100 year storm event.
- **Jan.** - The NTDME gave permission to release water into Kakadu National Park from RP4 next to a pile of radioactive rock that was dumped in error and even though higher than normal U levels had been detected in the pond on two occasions. ERA released 10,000,000 litres of contaminated water over a spillway to Djalkmara billabong, which flows into the Magela Creek system, despite ongoing advice from the OSS that any release should be via the pipeline rather than the spillway. The OSS criticised this method of release saying water release at Ranger was 'out of control'.

## 1988

- **General** - Following an abnormally low rainfall wet season more than a third of the tailings in the dam were exposed to the atmosphere. Attempts by Ranger to dampen the tailings left a dry portion in the centre of the dam not within the range of the water spray system, causing potential hazards to workers, tourists and the nearby town of Jabiru from the release of wind-carried radioactive dust particles.
- **Nov.** - Following a malfunction of ore discriminators material containing low grades of uranium was being dumped incorrectly on the waste rock dump; up to 500,000 tonnes of material may have been involved, possibly for as long as six months. The area of the waste rock dump was redesignated as RRZ. Criticising Ranger's attitude to the incident, Dr Glen Riley, OSS Director at Jabiru wrote "I regard this situation as the most serious deficiency shown by Ranger in a long series of malfunctions and operational shortcomings since the mine opened ... rather than achieve better (or more sure) environmental control as they gain more experience, Ranger are moving the operation into a more hazardous situation".
- **Oct. 22** - A small quantity of tailings sprayed, mostly into the tailings dam itself, from a burst gasket in the tailings dam.
- **Oct.** - OSS samples showed that unusually high levels of U and Ra in RP4.
- **Aug. 31** - Minor RRZ infringement when a contractor inadvertently used a small quantity of RRZ water for dust suppression outside the RRZ.
- **Feb. 1 to 2** - An overflow occurred of mill process froth from a tailings neutralisation tank; about 13,000 litres of liquid ran into RP2 but no liquid left the RRZ.

## 1987

- **March** - 500,000 litres of RP4 water was inadvertently released via the pipeline to Magela Creek following a valve malfunction and when the creek's flow rate was below the minimum approved rate.
- **March** - NTDME determined that RUM were 6 months overdue in submitting a report on revegetation of waste rock as required by ER 26. Also water from RP3 had been used for dust suppression outside the RRZ on a waste rock dump haul road.
- **Feb. 3 to 27** - 175,000,000 litres of RP4 water released into Magela Creek.
- **Feb. 2** - Between 20,000 and 100,000 litres of treatment water in the Ranger mill with elevated levels of uranium and calcium carbonates overflowed into the RRZ.

## 1986

- **General** - The trial dry tailings plot was observed to be unfenced and with animal footprints in the tailings.
- **Dec. 5** - RUM reported the unlawful removal from site of an empty but radiologically contaminated water tank (truck mounted; after negotiating with the owner the tank was returned to site and RUM control).
- **July 31** - A tailings pipeline failure led to ? kg of tailings being sprayed outside the RRZ.
- **June 3** - About 5,000 litres of water from a tailings pipeline was spilled outside the RRZ.
- **March 21** - Small quantity of tailings dam water sprayed and ran off the tailings dam wall; water mostly returned through the seepage collector system in all probability. The OSS expressed concern over delays in taking positive action to stop the leakage.
- **March 6 to 7** - An island of tailings developed in the tailings dam.
- **March 4** - The sulphuric acid plant was started up at the wrong rate leading to an increase in emissions of sulphur dioxide. Exact monitoring did not take place because Ranger's monitoring equipment had been out of order since Nov. 1985.
- **Jan. to March** - Approval granted to Ranger to release 84,500,000 litres of water from RP4 via a pipeline to Magela Creek. An expected program of biological monitoring was not undertaken even though biological tests undertaken the year before indicated adverse effects on some aquatic species after release of water from RP4.

## 1985

- **Nov. 26** - 200 litres of water leaked from a pipeline between the central seepage collector sump and the north wall of the tailings dam.
- **Oct. 3-7** - Valve failure in the tailings line resulted in 500,000 litres of tailings and process water being inadvertently applied to land application plots within the RRZ.
- **Oct.** - Ranger was requested by the NT Supervising Authorities and the Co-ordinating Committee for the Alligators River Region to carry out a comparative evaluation of options for water management at the mine.
- **Sep. 24** - 25,000 litres of tailings was sprayed over a 1,250 m<sup>2</sup> area outside the RRZ after a tailings line failure, covering the area 2 cm thick in tailings.
- **Sep. 18** - Another tailings pipeline failure resulted in about 25,000 litres of tailings water being released from the RRZ.
- **Sep. 17** - Tailings pipeline failure resulted in about 25,000 litres of tailings water being released from the RRZ.
- **Sep. 3** - A small island was detected in the tailings dam, about 25 m<sup>2</sup> and 5 cm high.
- **Sep. 2** - Accidental release of about 50,000 litres of water from RP2 adjacent to the trial land application area.
- **Sep.** - Scaffolding stained with ammonium diuranate was shipped off site to Darwin for re-use.
- **Aug. 9** - Yet another failure in the tailings pipeline - again resulted in about 2 kg of tailings being sprayed outside the RRZ.
- **Aug. 1** - A further failure in the tailings pipeline resulted in about 2 kg of tailings being Sprayed outside the RRZ.
- **July 31** - A failure in the tailings pipeline resulted in about 2 kg of tailings being sprayed outside the RRZ.
- **June 28** - RUM detected a level of acid mist above the authorised limit; remedial work alleviated the problem and prevented recurrence.
- **March** - A pipeline failure resulted in tailings dam water leaving the RRZ. The OSS expressed concern to Ranger over the delays in taking action to stop the leakage.
- **March** - Ranger discharged about 160,000,000 litres of water from RP4 to the Magela Creek. Water held in RP4 is regularly released and is only supposed to hold rainfall runoff. The OSS reported some mussels in the creek aborted their larvae. It also appeared that the migration routes of some fish were altered during the release.
- **Feb. 28** - Monthly sampling at product packing stack showed uranium levels close to the allowable limit; remedial work undertaken by RUM to repair scrubber system.
- **Feb. 14 to 16** - Fish kill in RP2 was reported after water was pumped from RP4.
- **Feb.** - Pipeline from RP2 to Magela Creek installed. ERA sought permission to release contaminated water into the Magela Creek. Approval for release not granted.

## **1984**

- **Oct. 30** - 600 litres of water leaked outside the RRZ from the tailings dam seepage collector line.
- **July 11** - 200,000 litres of water from within the RRZ leaked outside the RRZ from a joint in a pipe carrying tailings dam seepage back to the dam.
- **April 9** - Estimated 200 litres spilled from a tank at bore 77/13 when it was tipped over.
- **Jan. 25** - 100,000 litres of RP2 water escaped from a pipeline within the RRZ; all water contained.

## **1983**

- **Nov. 16** - 100 litres of diesel fuel spilled from split fuel line at borehole 77/2 over an area of 25 m<sup>2</sup>.
- **Oct. 20** - Non-routine maintenance operations were undertaken in the product packing area with radioactive dust above levels required those required to be reported.
- **Sep. 20** - 40 tonnes of low grade dumped outside the RRZ. Clean up was carried and material returned to RRZ.
- **Sep.** - Workers at Ranger went out on strike for 7 days over health and safety standards. The strike was described as the final straw in a series of incidents at the mine that have endangered the health of workers and have repercussions on the Kakadu National Park.
- **Aug. 15** - Minor tailings leak; contained within RRZ.

- **Aug.** - Planned maintenance operations were undertaken in the calciner and product packing areas with radioactive dust above levels required those required to be reported.
- **July 13** - A contractor, without authorisation, pumped a small amount of RP2 water outside the RRZ to use in tailings dam construction.
- **July** - Drinking water at the mine was contaminated by radioactive water used in the processing of the plant. The processing water and drinking water were connected accidentally. It is uncertain how long this situation went undetected. When the contamination was eventually discovered the system was flushed out and workers were examined for radioactive contamination. Tests on the workers and in the contaminated area indicated 'no danger'; however subsequently a plumber found residue in the pipes which was revealed to have been the radioactive substance ammonium diuranate.
- **May** - High groundwater pressures and seepage discovered at RP2.
- **April 22** - Less than 50 litres of diesel escaped to Gulungul Creek from a spill at a borehole site 74/1.
- **March 9** - Labourer exposed to radioactive dust concentration above derived limits.
- **March** - Small volume of sewage escaped from Jabiru East following entry of stormwater into system; leading to pump failure.
- **Feb. 23** - 7 personnel exposed to above permitted levels of airborne radioactive contamination during modifications to yellowcake scrubbers.
- **Feb. 9** - 200 litres of diesel spilt at a borefield 800 m south of pit #1.
- **Feb. 1** - 1 tonne of low grade ore (0.02-0.05%  $U_3O_8$ ) washed outside RRZ with 150,000 litres of RRZ water following drain blockage in heavy rainfall.

## **1982-83 Wet Season**

- **1982-83** - Ranger imported 1,000,000,000 litres of water during a drought. The mine had recruited management personnel from arid climates who were unfamiliar with the variations of tropical monsoonal climates.

## **1982**

- **Dec. 9** - Tailings spillage within the mill at No. 2 pachuca.
- **Nov. 5** - Blockage in the tailings pipeline with spillage covering 40 m<sup>2</sup> of the bund on the dam wall.
- **Sep.** - The first reports appear on the problems with leakage of the dam. The tailings dam continues to leak with greater seepage than design assumptions.
- **Aug. 13** - Release of tailings from an air release valve. Apparently not discovered until 7 am on August 14. Cleanup effected on August 16.
- **July 5** - Significant incident following a major spill of product, 1 tonne of yellowcake, with two workers ingesting yellowcake, radiation safety measures were investigated.
- **June/July** - SO<sub>2</sub> emissions from acid plant stack over allowable limits (2 kg per tonne of acid produced). Plant shut down and modified to prevent further problems.
- **June 22** - Filter cake from sulphur meter self ignited and was not fully extinguished before dumping in tailings dam; subsequently re-ignited and had to be dowsed with earth.
- **June 16** - Discovered that emissions from scrubber in the product packing area exceeded the allowable rate on May 24; unit was shut down and overhauled; system modified to prevent blockage in water filter. Revised calculations also showed a breach on March 12.
- **June 7** - Minor leakage from a perforation in the tailings pipeline.
- **May** - High groundwater pressures noted at the tailings dam.
- **April 20** - 30,000 litres pregnant organic liquor solution overflowed from an overflow sump into stormwater system thence to RP2. Operation was stopped; sump modified.
- **March 25** - Bleeder valve on tailings pipeline leaked about 30,000 litres of tailings onto inside top of embankment; tailings were hosed into dam.
- **March 16** - SO<sub>2</sub> analyser on acid plant damaged by acid.
- **March 4** - 1 m<sup>2</sup> island of tailings appeared above water in tailings dam overnight when pipe was not shifted on time.
- **Feb. 25** - Acid mist eliminators in acid plant flooded due to blocked drain and mist level exceeded permitted limits; plant shut down and fault rectified (by March 3).

- **Feb. 18** - According to OSS-AR (1982), a small leak from the tailings pipeline was detected. The line was shut down and a repair effected within 1 hour including clean up, all tailings stayed in the 'supervised area'. Based on the Mine Inspectors' entry in the Mill Record Book, however, the spill was actually discovered by a Mines Inspector (and *NOT* OSS or ERA) and was apparently 2 m deep and 0.5 km long.
- **Jan. 22 to Feb. 2** - Acid plant stack emissions measured to be in excess of allowable limit of 2 kg/tonne of acid produced; problem due to incorrect fitting in plant since commissioning (July 17, 1981); part replaced and level fell to about 1.3 kg/tonne.
- **Jan. 22 to 23** - About 40 dead fish were found in Coonjimba Billabong, considered part of natural processes (no abnormal water quality indicators were found).
- **Jan. 5** - Small quantity of yellowcake spilt from two drums in transport outside packing area.
- **Jan. 2** - Break in tailings line inside tailings dam wall; some erosion, wall repaired with waste rock.
- **Jan.** - At least 3 additional failures in the tailings pipelines not reported by OSS-AR (1982). One was at the dam wall while another was along the pipeline corridor.

## 1981

- **General** - At the official opening ceremony in 1981 there were exposed tailings in the dam. The Ranger Uranium Environmental Inquiry recommended that tailings at Ranger be covered by 2 m of water to reduce the release of radon gas and to prevent dry season winds from carrying radioactive dust particles over the region. Regulations were quickly changed to enable tailings to be kept damp instead (ie. no minimum water depth).
- **Dec. 28** - Operator sprayed with ammonium diuranate.
- **Dec. 22** - #3 sewage retention pond overflowed, Contractor failed to be on site as required.
- **Dec. 14** - Small tailings spill from breather valve in tailings pipeline on inside perimeter on tailings dam embankment. Breather valves declared redundant and removed.
- **Dec. 11** - Small amount of tailings leaked from a pipeline to the tailings dam floor above the water level, material was covered in soil.
- **Nov. 26** - Operator found in bare feet whilst working in the tailings dam; operator and supervisor advised of the importance of following safety procedures.
- **Nov. 25** - Two observed emissions of concentrate dust from the scrubber stack, estimated at 2 to 4 kg U. This exceeded the daily discharge limit of 1.5 kg U.
- **Nov. 23** - Spillage of concentrate from a drum outside the store during unloading.
- **Nov. 3 to 23** - Two islands of tailings appeared in the tailings dam, area about 20 m<sup>2</sup>; mine closed for 4 days while authorisation and requirement for 2 m water cover were reviewed. Authorisation amended to show water cover rather than specific depth.
- **Aug. 13** - Sewage manhole at Coonjimba Camp discharged at 3-4 litres/minute and effluent was flowing on the track to the billabong; leak was due to a faulty automatic pump control which prevented pump starting.
- **Aug. 5** - Clarified pregnant liquor tank and associated clarifier tank overflowed into an adjacent bund due to operator error. Liquor was pumped back; further overflow stopped by adjustment of process flow rate; slight increase in radioactivity in bund during incident.
- **Aug.** - During commissioning of the mill process stream waste rock was used. The ground waste accumulated at one point in the tailings dam and some was exposed to air.
- **July 31** - Fugitive slaked lime dust from a lime transfer operation blew into the surface of Djalkmara Billabong and was noted through a pH reading of 9.3 during routine monitoring.
- **July 29** - Recycle tank overflowed spilling process water from RP3 into the neutral thickener area. Some of the water and a minor amount of tailings solids were pumped into the stormwater collection pond which discharges to RP2 during the wet season. The estimated volume pumped was 40,000 litres.
- **April 9** - Small volume of water and silt flowed from RUM's organic dump tank to Georgetown Creek. (Ranger reported the incident to the OSS on April 29).

## 1980-81 Wet Season



- **General** - Sewer at old mess site became surcharged at times and sewage entered Coonjimba Billabong; necessitating remedial works.

## **1980**

- **Nov. 9** - One antilopine kangaroo found shot at Gulungul Creek borefield.
- **Aug. 11** - One sea eagle found shot near junction of Magela and Georgetown Creeks.
- **July** - Large-scale sand mining was found to be occurring at Mudginberri Billabong by Pioneer Concrete for cement and construction works at Ranger and the township of Jabiru. Mining ordered to be stopped by the OSS.
- **June 27** - Dry drilling in Borrow Pit A; wet drilling was to be used under Occupational Health and Safety requirements.
- **June 6** - Release of 1,000,000 litres of silty water discharged from Borrow D to Georgetown Creek.
- **March 29** - Ranger Uranium Mine (RUM) pumped water from Borrow areas A and B to RP2 and RP3 before the ponds were declared officially to be the RRZ.
- **Feb. 23** - Eucalypt tree knocked over by a contractor.
- **Feb.** - The tailings dam floor and walls were identified by the Ranger Uranium Environmental Inquiry as major pathways by which contaminants could enter the Magela Creek. 245 mm of rain fell on the Ranger mine site in five hours. A rapid rise in water level occurred in both RP1 and the partially complete tailings dam. The company was forced to make a four metre breach in the tailings dam wall and about 9,000,000 litres was discharged into Djalkmara Creek. [Note - calculations in Section 4.3.3 suggest that a total of up to 64,000,000 litres was actually discharged, including the outlet pipe.]
- **General (Feb. ?)** - Concrete used in the construction of the tailings dam was faulty.

## **1979**

- **Dec. 7** - Small amount of oil-tar spilled at a sediment control pond at Jabiru Police Station.
- **Nov. 22** - 20 litres of diesel spilled into a drain in Jabiru.
- **Nov. 9** - Contractor's plant encroached on fenced off vegetation; area was re-fenced and vegetation restored.
- **Feb. 28** - Spillage of diesel into Coonjimba Billabong.