The Senate

Environment, Communications, Information Technology and the Arts References Committee

Regulating the Ranger, Jabiluka, Beverley and Honeymoon uranium mines

October 2003

ISBN 0 642 71216 6

This document was printed by the Senate Printing Unit, Parliament House, Canberra.

Committee membership

Members:
Senator John Cherry (AD, QLD) (Chair)*
Senator John Tierney (LP, NSW) (Deputy Chair)
Senator Kate Lundy (ALP, ACT)
Senator Sue Mackay (ALP, TAS)
Senator Tsebin Tchen (LP, VIC)
Senator Penny Wong (ALP, SA)

Former Members
* Senator Lyn Allison (AD, VIC) (Chair 26-11-98 – 27-03-03)

***Substitute** Members for the inquiry*
Senator Crossin (ALP, NT) for Senator Mackay
Senator Buckland (ALP, SA) for Senator
Senator Scullion (CLP, NT) for Senator Tierney (Deputy Chair for the inquiry)

Participating Members:
Senator the Hon Eric Abetz (LP, TAS)
Senator Lyn Allison (AD, VIC)
Senator the Hon Nick Bolkus (ALP, SA)
Senator the Hon Ron Boswell (NPA, QLD)
Senator Bob Brown (AG, TAS)
Senator Geoffrey Buckland (ALP, SA)
Senator George Campbell (ALP, NSW)
Senator Kim Carr (ALP, VIC)
Senator Grant Chapman (LP, SA)
Senator Stephen Conroy (ALP, VIC)
Senator the Hon Helen Coonan (LP, NSW)
Senator Alan Eggleston, (LP, WA)
Senator Christopher Evans (ALP, WA)
Senator the Hon. John Faulkner (ALP, NSW)
Senator Alan Ferguson (LP, SA)
Senator Jeannie Ferris (LP, SA)
Senator Brian Greig (AD, WA) for information technology portfolio
Senator Brian Harradine (IND, TAS)
Senator Leonard Harris (PHON, QLD)

Senator Gary Humphries (LP, ACT)
Senator Susan Knowles (LP, WA)
Senator Meg Lees (AD, SA)
Senator Brett Mason (LP, QLD)
Senator Julian McGauran (NPA, VIC)
Senator Clair Moore (ALP, QLD)
Senator Shayne Murphy (IND, TAS)
Senator Kerry Nettle (AG, NSW)
Senator Marise Payne (LP, NSW)
Senator Aden Ridgeway (AD, NSW) for arts portfolio
Senator John Watson (LP, TAS)

Committee Secretariat
Mr Michael McLean, Secretary
Ms Amanda Hill, Senior Research Officer
Mr Jonathan Curtis, Principal Research Officer
Dr Derek Drinkwater, Principal Research Officer
Ms Stephanie Holden, Senior Research Officer
Ms Sharon Babyack, Executive Assistant
Ms Chris Wilson, Executive Assistant

Committee Address:

Environment, Communications, Information Technology and the Arts Legislation Committee

S1. 57, Parliament House

Canberra ACT 2600

Tel: 02 6277 3526

Fax: 02 6277 5818

Email: ecita.sen@aph.gov.au

Internet: http://www.aph.gov.au/senate/committee/ecita_ctte/index.htm

TABLE OF CONTENTS

EXECUTIVE SUMMARY

AND RECOMMENDATIONS

Introduction

This inquiry was initiated in response to numerous leaks and spills at the four uranium mines in question and its terms of reference require the Committee to assess the adequacy and effectiveness of the current system of environmental regulation.

Debate centred on the extent to which these incidents have impacted on the environment and whether or not they are attributable to an over-reliance on self-regulation, unsatisfactory management practices and/or inadequate monitoring, reporting, oversight and enforcement by regulating authorities.

Authorities and mine operators acknowledge that there has been contamination from mining activity but argue that even though there have been hundreds of incidents, the number is not significant and that, in any case, environmental damage has not been proved.

It is the case however that a pattern of underperformance and non-compliance can be shown. The Committee also identified many gaps in knowledge and found an absence of reliable data on which to measure the extent of contamination or its impact on the environment.

Uranium mining at Ranger and Jabiluka in the NT raised different sociological, geophysical and operational issues and environmental challenges from Honeymoon and Beverly mines in South Australia. However, the shortcomings in the operations of all four mines suggests that short-term considerations have been given greater weight than the potential for permanent damage to the environment.

Uranium mining is contentious but the Committee was not asked to examine the validity of the industry's existence. It did seek to evaluate the arguments of industry, governments, indigenous groups and conservationists in making its recommendations and concluded that changes in were necessary in order to protect the environment and its inhabitants from 'serious or irreversible damage'.

Ranger and Jabiluka

The Alligator Rivers Region is invaluable — a World Heritage area of high conservation values, which has unique scenic and ecological importance and an Indigenous culture that has existed continuously for at least 50,000 years. Its Ramsar-listed wetlands – floodplains, swamps, estuaries, mangroves and mudflats - are the world's richest tropical breeding ground for waterbirds.

The Commonwealth has responsibility for the management of nuclear activities and matters of national environmental significance but the regulation and oversight of these mines is a joint Commonwealth and Northern Territory Government responsibility.

The Ranger Uranium Environmental (Fox) Inquiry (1977) identified serious regulatory inadequacies, in particular, the ability of the NT Government's regime to prevent pollution from mining. The Government of the day adopted the bulk of the Fox Inquiry recommendations, setting up a complex regulatory regime, transferring title to the land to the Northern Land Council, establishing a system of environmental requirements under the authority to mine, setting up the Office of the Supervising Scientist to monitor and peer review policing efforts by the NT administration and managing the area as a national park.

Many argued that Ranger and Jabiluka were heavily regulated but others said that in practice the mine operations are self-regulated. The current legislative and regulatory framework is certainly complex but it is also confusing and inadequate in many respects.

The independence and effectiveness of the Northern Territory Department of Business, Industry & Resource Development (DBIRD) was questioned and it was argued that this department had a conflict of interest in 'facilitating the mining industry' whilst performing a regulation function.

The Office of the Supervising Scientist (now the Supervising Scientist Division or SSD) argued that the fact that there have been no prosecutions of Energy Resources of Australia Ltd (ERA) was proof of the success of the regulatory framework. Given the more than 110 incidents at Ranger and numerous breaches of Environmental Requirements, the Committee considers this logic to be flawed.

The Committee considers that the NT Government should adopt specific strategies for improving the transparency, rigour and effectiveness in its management plans and authorisations for mining. A tougher enforcement policy is also called for where the test for taking legal action should be the significance of the breach.

The exclusion of the Traditional Owners

The Mirrar People, although Traditional Owners, have no direct role in the regulatory system and power of veto was removed in 1976 over both the Ranger and Jabiluka mining rights for the Mirrar and the NLC. This was despite Justice Woodward's statement in 1974 that 'to deny to Aborigines the right to prevent mining on their land is to deny the reality of their land rights'.

The Mirrar still say 'no' to uranium mining at Jabiluka, however, the Northern Land Council, is the principal party to NT mining agreements and the Mirrar are barely consulted about mining operations. As the report of the Committee's inquiry into Jabiluka points out:

> The provisions of the Land Rights Act, in which Traditional Owners are not parties to contracts negotiated on their behalf, already create scope for those rights to be unfairly alienated within contracts which may otherwise be technically legal

The Committee holds the view now as did the previous Committee report in 1999 that there is a prima facie case for reviewing the 1982 Jabiluka Agreement and for the Land Rights Act to be reformed to remove the 'national interest' provisions and ensure that Traditional Owners are fully consulted and informed about developments on their land, that their views are allowed to prevail and that their agreement to significant changes in scope is required.

Despite the existing Agreements which provide for participation of Traditional Owners on committees, the involvement of the Mirrar is at best dysfunctional. The Mirrar argue that it is their right to protect and manage their land and that they should play a significant role in the environmental regulation, monitoring and reporting regimes at Jabiluka and Ranger.

Overhaul of legislation

The Committee found inadequacies in the existing legislative arrangements and calls for an overhaul of the separate and joint roles and responsibilities of the Commonwealth and Northern Territory governments.

Despite the history of incidents, there has been a reluctance on the part of Federal agencies to publicly challenge the NT Government or to hold ERA to account. Regulatory frameworks in the NT were said have too little legislative clout to be effective in discouraging incidents and breaches and the *Atomic Energy Act* was never designed for regulating uranium mining. Complexity and the inconsistent mix of Commonwealth and NT responsibilities added to the ineffectiveness of the laws governing mining. Furthermore, there is no Environment Protection Agency and, until recently, no FOI laws in the NT that might provide greater scrutiny over the operation of these mines.

The Committee concluded that new legislation needs to establish and clearly set out the roles and functions of the SSD; the Environmental Research Institute of the Supervising Scientist (ERISS); the Alligator Rivers Technical Committee (ARRTC); Alligator Rivers Region Consultative Committee (ARRAC), and the Minesite Technical Committees (MTC).

Monitoring

The intense and highly seasonal wet season of the NT makes the dispersion of mine waste waters the main threat to ecosystems surrounding these sites. For this reason, comprehensive environmental monitoring is necessary and, for these two mines, that monitoring is focussed almost entirely on aquatic ecosystems.

ERA is required to conduct ground, potable and surface water as well as atmospheric monitoring at Ranger and to conduct groundwater, site water, creeks and billabongs, soil, meteorology and blasting emission monitoring at Jabiluka. DBIRD is responsible for checking the veracity of ERA's monitoring and reporting. Since the Ranger tailings leak in 2000, SSD has been required to assess changes to biological diversity of aquatic ecosystems and ensure adequate early warning systems were in place.

Monitoring at Jabiluka and Ranger was said to be lacking in rigor and independence, periodic rather than continuous, insufficient for assessing intermittent and accumulative impacts and too often used as a mechanism to downplay operational problems.

The Gundjehmi Aboriginal Corporation (GAC) argued that the upstream monitoring point for Ranger, with which downstream data is compared for natural variation, was too close to potential impacts from the mine. They criticised the fact that at Jabiluka the Swift Creek monitoring point is one kilometer to the east of the site and point out that any breach at this point would mean contamination had already occurred within the World Heritage Area.

The Committee was persuaded of the need to increase the number of monitoring sites to allow ongoing analysis and checks on the source, loads, dilution, reactions and uptake of contaminants by the ecosystems.

The adoption of event-based monitoring where samples are rapidly collected in heavy rain events or leak incidents (both on-site and off-site), was recommended to allow all components of the water management system to be tested for compliance with set limits.

The International Science Panel (ISP) in its 2000 examination of whether the Kakadu World Heritage status was at risk from impacts of uranium mining, recommended landscape and ecosystem analyses and called for a comprehensive risk assessment, including ecological, biochemical and hydrological factors at a landscape/catchment scale for both Ranger and Jabiluka, within the context of the Kakadu World Heritage Area.

Trigger system

A three-levels response system is in place whereby limits are based on mean or average background concentrations. One standard deviation from background triggers a watching brief, two an investigation and corrective action, and three or a concentration deemed to be ecologically toxic, triggers corrective action and advice to the Minister on whether or not this constitutes a breach of environmental requirements.

Whilst SSD argues that this system is scientifically defensible and produces a very high standard of protection, others said the limit levels were too high and did not represent background levels. The third level response for uranium contamination, for

instance, was set at 5.8 ppb whereas GAC argued that this was too high at 580 times the background level of 0.01 ppb and called for limit for Ranger to be 0.5 ppb and for Jabiluka 0.05 ppb.

Environmental Management Complaints

Former ERA employee and environmental chemist, Mr Geoffrey Kyle, made serious complaints about environmental management at Ranger including under-reporting and misreporting of discharge water, failure to clean up spilled tails material, ad hoc water management strategies and laboratory practices that compromised results. The Committee found fault with the handling of these complaints by ERA, SSD and ERISS and recommended that a thorough independent investigation be conducted.

Social and Cultural Impact Monitoring

ERA is required to protect cultural as well as natural values and it must protect *the health of Aboriginals* but the current system was said to be outdated and lacking in accountability. Social impact monitoring has not been conducted since 1997 because Traditional Owners have been reluctant to participate or to accept the royalties held in trust from Jabiluka, arguing that to do so would be to give legitimacy to the mine. It is the Committee's view that a culturally appropriate forum should be established to allow dialogue with Traditional Owners and commission independent research on the social impacts of Ranger.

Ranger - Groundwater, wetlands, stockpile, tailings management and rehabilitation

The challenge of physically isolating uranium mill tailings from the environment for more than 10,000 years is significant but management to do so is nonetheless a requirement of the ERs.

It was argued that the many changes and extensions in the operational life of Ranger Pit #3 have placed strains on tailings storage capacity and have implications for rehabilitation. Whether ERA should be permitted to store tailings in pits above RL 0 (sea level) is contentious and ERA has been allowed ten years to research and justify a case for rehabilitating the above ground dam without removing the tailings.

Although there is evidence in internal ERA and SSD reports of seepage from tailings dams via fault zones into shallow and deep aquifers, the matter is not adequately researched, monitored or reported. The Committee sees the need for more specialist research on groundwater flowpaths, groundwater bores and rigorous monitoring and reporting of groundwater contamination.

GAC argue that low grade ore has long term environmental risks and wants to see this material backfilled into mined out pits but there is no regulatory requirement on ERA to do so.

The reliance on wetlands at Ranger to retain uranium and other contaminants, was questioned because wetland filters are limited in that salts such as Mg and SO_4 are only minimally reduced and uranium is captured within the plants and sediment. It was also argued that that once wetlands are fully saturated, unfiltered contaminants may flow downstream causing irreversible harm to waterways and associated biota. The contaminant retention capacity of wetlands is not clear and the Committee recommends further research to determine their effectiveness. It would appear that plants and sediment material should be considered radioactive waste and excavated at the completion of mining to be dealt with as part of rehabilitation works.

The practice of disposing of contaminated water through irrigation was also criticised for the lack of certainty about the capacity of the soil to retain contaminants and the lack of load limits, sampling and monitoring.

There is much evidence that the management of existing stockpiles has been inadequate—a prime example is the 2002 incident where approximately 84,000 tonnes of ore was incorrectly placed on the No 2 stockpile for more than a month with the runoff draining freely into waterways. This was not described by SSD as a breach of ERs although the Committee was persuaded that this was indeed the case.

A rigorous and independent inspection and check monitoring program is required for all stockpiles especially pre-, during and post- wet season rains. The untreated run-off from the stockpiles, especially the highly mineralised ones, needs to be monitored and controlled to prevent it entering Alligator Rivers Region (ARR) waterways.

ERA is required to prepare an Environmental Management Plan to rehabilitate the site to the point where it could be incorporated into the Kakadu National Park however this will be a major exercise and the forms rehabilitation might take and the practicalities of ensuring protection of the environment over timeframes of hundreds of years once the mine is closed are as yet unclear.

Jabiluka – water management and rehabilitation

Work stopped at Jabiluka in September 1999 and the only substantive activity onsite is management of the water in the decline and rainfall on the site in the wet season.

It is argued that the retention pond is inadequate, the impact on groundwater of storing water in the decline in early 2001 was poorly understood and analysed, that seepage (30 ML/year containing 200 kg of uranium) pumped from the decline is a major source of contamination and that consultation and reporting of water management has been poor. Irrigation of contaminated water is also blamed for heightened uranium levels in surface water.

Water management at Jabiluka is under review and, according to SSD legal enforcement of the water quality trigger system will be sought.

As for Ranger, ERA is required to rehabilitate Jabiluka so it can be incorporated into Kakadu National Park and a plan of rehabilitation (#6) has been prepared backfilling

the decline and removing the pond. According to Rio Tinto, a closure plan existed and would be updated in the light of new knowledge and circumstances.

(An announcement has since been made (1 August 2003) that the NT Government has approved ERA's 'long term care and maintenance' proposal including backfilling the mine - returning the mineralised stockpile and waste rock to the decline in the current dry season - and a water management plan for the site.)

Reporting

Technical language, insufficient context to reports and poor understanding of the reporting system are barriers to public acceptance of reporting however it is also the case that many reports have been withheld on grounds of confidentiality or are inadequate, leading to lack of trust in ERA and regulatory authorities.

Calls have been made for the release of short and long term plans for mining including timing of tailings management, reports and data on known environmental problems at treatment areas such as wetlands and irrigation sites, quantities of ore and uranium grade, use of industrial chemicals and reagents at Ranger, the Ranger Mining Manual and stockpile and groundwater data.

ERA argued that the context of incidents should be reported so that the significance of leaks or spills is better understood and not always assumed to be major. Communications and relations between ERA and the Mirrar were said to be in a parlous state which ERA said it was trying to improve.

The Committee welcomes this commitment however it is the case that ERA failed to inform stakeholders, failed to follow correct procedures and did not take timely action on a number of major incidents. Until their operational performance is significantly improved, efforts at improving relations will founder.

Beverley and Honeymoon

Much of the debate surrounding the two South Australian uranium mining operations dealt with the *in situ* leach (ISL) mining method which is employed at both projects. This is what distinguishes them from the Olympic Dam uranium mine in South Australia that uses conventional mining techniques, and which was not included in the Committee's terms of reference. The Committee is concerned that the ISL process, which is still in its experimental state and introduced in the face of considerable public opposition, was permitted prior to conclusive evidence being available on its safety and environmental impacts. The Committee believes that, at the very least, strict regulation of the use of the ISL technique is required, with mandatory monitoring by independent bodies, to assure the community that the technique does not have a significant impact on the environment.

Independent monitoring

The frequency of leaks and spills is evidence that self-regulation by the mining companies has failed to prevent incidents which have the potential to cause significant environmental damage. The Committee believes that the evidence overwhelmingly points to the need for a comprehensive system of independent monitoring.

Role of Commonwealth and State Government and their agencies

The Committee was concerned that the day-to-day environmental regulation of the two projects falls to the South Australian Department of Primary Industries and Resources (PIRSA) rather than the State's environment agency, the Environmental Protection Authority. The Committee feels that PIRSA is an inappropriate agency to monitor the environmental performance of the two mines as it also actively promotes industry development. There is a clear conflict of interest between those two roles. Likewise it is the Commonwealth Department of Industry Tourism and Resources rather than Environment Australia that is responsible on the federal front. The Committee recommends that oversight responsibility for both the Beverley and Honeymoon mines should be transferred to the South Australian EPA and Environment Australia.

The Committee also believes that the Commonwealth needs to play a far more prominent and assertive role in assessing and regulating ISL mining within South Australia.

Incident reports and investigations

As already noted, there have been a large number of incidents at both sites since trial and full-scale mining commenced. The mining companies should be required to prepare written reports on all incidents regardless of their severity, and all stakeholders should be immediately informed as soon as an incident occurs.

The Committee recommends that Environment Australia should be responsible for comprehensively investigating all serious leaks and spills and that the South Australian Chief Inspector of Mines, in collaboration with EA, should be responsible for investigating more minor incidents. Given that different reporting requirements attach to these different categories, the Committee also recommends that the definitions as to what constitutes a "major" or a "minor" spill be the subject of public consultation, and be publicly available.

Reporting and Bachmann Review

Transparency of the uranium mining industry in South Australia would be aided by improved reporting procedures. The Committee is concerned about the current standard of reporting and it is recommending the public release of all reports and corresponding data. Such improved communication and transparency would assist restore the community's faith in the independence of government agencies and the honesty of the mine operators.

The South Australian Government's efforts to examine reporting procedures by way of the Bachmann Report is to be commended and the Committee strongly supports his recommendations with regards to upgrading and strengthening reporting procedures

Consultative Committees

The Committee believes that the existing consultative process at the Beverley mine is inadequate and that the Beverley Environmental Consultative Committee (BECC) should be made responsible to Environment Australia (EA). Likewise if the Honeymoon project commences full-scale mining, the corresponding consultative committee should also be the responsibility of EA.

Research

When compared to the Northern Territory, the amount of research into the environmental risk from the two South Australian mines is minimal. The Committee argues that, although the environment in the Alligator Rivers Region is considered more fragile than that of the Beverley and Honeymoon areas, it is no less important to the traditional owners, local residents and the broader community, and that the biota and water resources in these areas must also be protected to an appropriately high standard.

In the Committee's opinion the research and subsequent trials undertaken into the ISL technique and existing aquifers in question were inadequate and that a more comprehensive research effort needs to be undertaken, based on better organised and more systematic data collection. The success of these studies will be dependent on the most rigorous analyses being undertaken. They should be carried out individually and collaboratively with the mining companies, Commonwealth and State agencies and involve independently funded scientists.

Honeymoon

The Committee has grave reservations about the commencement of full-scale mining at Honeymoon. The use of the contentious ISL mining method coupled with the doubts surrounding the nature of the Honeymoon aquifer and its connectivity with other aquifers is reason enough for the Committee to recommend that the project should not proceed.

Schedule of Recommendations

Northern Territory

Recommendation 1

The Committee strongly supports the Mirrar in their wish to actively participate in their land's management and protection and recommends that they be given a position on the Minesite Technical Committee (para 2.30).

Recommendation 2

The Committee recommends that DBIRD adopt the recommendations of the David Lea Consulting *Review of Environmental Regulations at Ranger and Jabiluka Uranium Mines,* viz:

- The development of a comprehensive enforcement policy for Jabiluka;
- Devising mining management plans and authorisations fore the mines; and
- Introducing information strategies for government agencies designed to address public perceptions (para 2.55).

Recommendation 3

The Committee recommends that:

a. The joint and separate responsibilities of the Commonwealth and the Northern Territory be clearly outlined in relevant Commonwealth and NT legislation, particularly with respect to monitoring.

b. The functions of the Alligator Rivers Region Consultative Committee (ARRAC), the Alligator Rivers Region Technical Committee (ARRTC) and the Minesite Technical Committees be clearly outlined.

c. The Environmental Requirements attached to the mining lease and land rights agreement for Jabiluka be updated and enshrined in relevant NT legislation.

d. The NT Government adopts specific strategies for improving the transparency, rigour and effectiveness in its management plans and authorizations for mining.

e. The NT Government adopts a tougher enforcement policy where the test for taking legal action is the significance of the breach (para 2.58).

Recommendation 4

The Committee recommends that DBIRD updates the 'Revised Working Arrangements for Co-ordinating the Regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region (para 2.59).

Recommendation 5

The Committee recommends that ERA complies with ISO 14001 as soon as possible (para 2.67).

Recommendation 6

The Committee holds the view that contaminants from these mine sites must be measured accurately and kept within broadly accepted limits whether adverse effects are demonstrated or not. Accordingly it recommends:

a. That adequate and appropriate resources are made available for the technical staff and laboratory to carry out the necessary monitoring.

b. An increase in the number of monitoring sites and compliance points, especially along critical drainage features such as Gulungul, Corridor and Georgetown Creeks and Coonjimba and Djalkmarra Billabongs to allow ongoing analysis and checks on sources of contaminants, loads, dilution, reactions and uptake by the ecosystem, and therefore possible impacts.

c. The adoption of broad event-based monitoring to ensure all necessary water management system components are compliant with limits set.

d. More rigorous horizontal and vertical monitoring and reporting of all groundwater units around tailings facilities

e. Increased check soil monitoring programs by SSD and DBIRD, more sampling points located in areas of active water treatment and more field studies to quantify the long-term containment retention characteristics of soils.

f. That ERISS adopts the ISP recommendations for its proposed 'landscape-scale program' (para 2.152).

Recommendation 7

The Committee recommends:

a. The Commonwealth commence dialogue with the Northern Land Council and the Traditional Aboriginal Owners of the Ranger and Jabiluka sites to, as a matter of priority, fund and establish a culturally-appropriate forum for Traditional Aboriginal Owners and other local Aboriginal people to monitor and commission independent research in relation to social and environmental impacts of mining operations and to develop policy recommendations in response to the findings.

b. The forum should be accorded full legal standing and be incorporated into the contractual arrangements that exist between the Commonwealth and Energy Resources of Australia.

c. Provision should also be made for this forum to instigate sanction processes where breaches of the existing Commonwealth Environmental Requirements occur (para 2.165).

Recommendation 8

In relation to water quality management, the Committee recommends that:

a. the re-incorporation of load limits into water quality criteria which are no more than twice the average natural loads in a system (preferably lower)

b. the limit for uranium at gauging station 8210009 in Magela Creek lowered from 5.8 µg/L to 0.5 µg/L

c. a separate system of trigger levels at important discharge sites such as Corridor Creek, RP1 and Gulungul Creek

d. the trigger system for water quality to be expanded to include other contaminants from Ranger such as NO_3, PO_4, Cu, Pb, Zn, radium Al, Mn, P and Re,

e. The trigger levels for NO3 should be re-assessed, including the addition of NH4 trigger levels, utilising a data set which includes sufficiently low detection limits and the effects of blast residues leaching removed to provide concentrations more closely representative of natural NO_3 and NH_4 in Swift Creek.

f. the trigger system to include the loads of contaminants as well as concentrations

g. the trigger system to be enhanced to include statistical analysis of difference between upstream and downstream water quality monitoring locations.

h. Greater emphasis be placed on collecting hydrology data for joint interpretation with water quality data (para 2.185).

Recommendation 9

The Committee recommends that groundwater should be better protected by:

a. more groundwater bores to allow the checking and analysis of groundwater quality

b. the conduct of more detailed field studies aimed at quantifying groundwater flow paths to enable more accurate short and long term modelling.

c. greater emphasis on identifying potentially permeable rock units, especially carbonate features as identified by Haylen (1981);

d. more rigorous monitoring and reporting of different components of groundwater, both vertically and horizontally;

e. investigation of methods needed to ensure low permeability of tailings liners, especially where the pit walls are in more permeable strata (especially above RL 0 m) (para 2.193).

Recommendation 10

The Committee recommends that the ARRTC becomes involved in the rehabilitation planning process for both Jabiluka and Ranger and works closely with operators and the Traditional Owners in formulating and implementing rehabilitation and closure plans (para 2.209).

Recommendation 11

The Committee is concerned that the management of radioactive uranium mill tailings at Ranger has been inadequate and makes the following recommendations:

a. That a deadline be set in Authorisation 82/3 and the ERs for removing the tailings from the above ground dam.

b. That detailed analysis be made of the existing contamination of groundwater by seepage from tailings storage facilities above ground dam and Pit #1.

c. A more suitable technique be developed and applied to measure tailings density in Pit #1, incorporating known mill data.

d. Any application to vary the current RL 0m limit for Pit #1 triggers a new EIS.

e. That detailed field studies are undertaken by SSD to quantify radon flux, microbiological behaviour and the physical properties of tailings, particularly permeability.

f. That specialist research is undertaken by SSD on groundwater flowpaths, such as fracture zones and faults zones, to allow more detailed quantification of contaminant migration rates (para 2.227).

Recommendation 12

The Committee recommends:

a. the incorporation of maximum cumulative load limits into specific areas for disposal, specific to the use of irrigation or wetlands,

b. more rigorous sampling under the requirements of Authorisation 82/3 and the ERs of wetland and irrigation areas including more sites and frequencies

c. check monitoring and analysis of wetlands and irrigation sites by OSS and DBIRD and a reduced reliance by those authorities on company data and assertions in managing these contaminated areas.

d. investigation of the Corridor Creek wetlands to discover whether they have any capacity to continue to perform as wetland filters in the future.

e. detailed studies and analyses to be prepared of the capacity of wetland filters to retain uranium and other contaminants (including Mg, SO_4, Mn, U, ^{226}Ra, etc.), the ultimate fate of those contaminants and the long-term cumulative impacts on plants and animals within the wetlands until rehabilitation (para 2.244).

Recommendation 13

The Committee agrees that there are serious inadequacies in the management of the various stockpiles of material at Ranger and makes the following recommendations:

a. That SSD and DBIRD develop a rigorous, independent inspection and checking program for all stockpiles which is ongoing rather than random, particularly prior to, during and immediately after each wet season.

b. That all necessary steps be taken to prevent discharge from runoff from the southern stockpile entering the Corridor Creek system until the wetlands have been ascertained to be suitable for the remainder of Ranger's operation and improved environmental monitoring is in place (para 2.254).

Recommendation 14

The Committee regards these allegations as serious and is not satisfied that they have been properly investigated. It recommends:

a. The appointment of an independent body to make a thorough investigation of all aspects of Mr Kyle's April 2002 statement and the adequacy of responses provided by ERA, SSD and ERISS.

b. That this body should make recommendations on any action to be taken with regard to breaches of licence conditions and agreements and determine what if any changes are required to be made to current monitoring and reporting systems (para 2.324).

Recommendation 15

a. the Committee can see no legitimate argument for reports to be withheld from public scrutiny and calls for them to be released without delay; and

b. the Committee also recommends that ERA and SSD provide a comprehensive response and action to address the many criticisms of reporting, detailed in this report.

The Committee is persuaded that there are many areas in which reporting should be more thorough and more open to scrutiny. It recommends that:

c. the short and long term plans for mining are publicly stated each year including the timing of tailings management, ores mined compared with predicted quantities, heap leaching and/or beneficiation and the potential for underground mining;

d. all detailed studies and reports that already exist within ERA, DBIRD and SSD and those prepared in future, are made publicly available including all reports and data on known environmental problems at treatment areas such as wetlands and irrigation sites;

e. the annual reports of ERA and SSD include:

   i. quantities of ore, low grade ore and non-mineralised rock mined from Ranger Pit #3 including uranium grade and other minerals such as sulfide and copper, and

   ii. the annual use of industrial chemicals and reagents used in the ranger processing mill.

f. the Ranger Mining Manual (and its successor the Mining Management Plan (MMP) under new NT legislation) to be made publicly available;

g. more thorough reporting of stockpile locations, plans and quantities by ERA, SSD and DBIRD, including water management aspects for each site; and

h. more thorough reporting of groundwater data, both horizontally and vertically by ERA, SSD and DBIRD, including cross-sections, plume maps and groundwater elevations.

Monitoring recommendations specific to Jabiluka:

i. Statutory monitoring point for determination of the impact of Jabiluka downstream on Swift Creek be moved to within the Jabiluka Mineral Lease

j. Separate trigger levels applied for the North and Central Tributaries at the sampling locations closest to the site (ie JSCTN2, JSCTC2)

k. The statutory program for Jabiluka to include upstream monitoring of water quality in the North and Central Tributaries, including radium activities

l. An additional statutory monitoring location established within the West Branch of Swift Creek

m. The frequency for statutory water quality monitoring (for parameters currently listed as monthly as per the authorisation) be changed to at least weekly during

the first month, followed by at least three samples per month for the remainder of the wet season.

n. Analysis of radium included with metals

o. A succinct and accurate location plan of sampling sites provided with all relevant reports, publications and scientific papers.

p. Adequate resources allocated by ERA to allow personnel to be available at times of first flush or other necessary and opportune times to obtain water quality or other environmental samples.

q. Provision of detailed electronic and automatic sampling equipment across the Swift Creek catchment (para 2.372).

South Australia

Recommendation 16

The Committee recommends that, owing to the experimental nature and the level of public opposition, the ISL mining technique should not be permitted until more conclusive evidence can be presented on its safety and environmental impacts.

Failing that, the Committee recommends that at the very least, mines utilising the ISL technique should be subject to strict regulation, including prohibition of discharge of radioactive liquid mine waste to groundwater, and ongoing, regular independent monitoring to ensure environmental impacts are minimised.

The Committee further recommends that the continuation of both the Beverley and Honeymoon projects should be contingent on the presentation of strong evidence supporting the conclusion that the natural levels of attenuation are consistent with existing projections. (para 3.40).

Recommendation 17

The Committee recommends a greater level of independent monitoring of the Beverley mine.

The Committee recommends the public release of all data and reports relating to monitoring and incidents (para 3.71).

Recommendation 18

Owing to the risks posed by the mine to the environment and the level of public concern, the Committee recommends that the Commonwealth and the South Australian Government play a more active and assertive role in assessing and regulating ISL mining at Beverley (para 3.74).

Recommendation 19

The Committee is of the view that uranium mining presents unique hazards and risks to both human health and the environment. Accordingly, its regulation at both the Commonwealth and State levels should be primarily the responsibility of environment agencies rather than agencies whose principal concern is with the advancement of mining interests (para 3.94).

Recommendation 20

The Committee supports the ACF recommendation that the BECC be made responsible to Environment Australia and that the BECC publicly report all reviews of environmental performance at Beverley (para 3.106).

Recommendation 21

The Committee recommends that mining companies are required to prepare written reports (as opposed to verbal) on incidents.

The Committee recommends that all serious leaks and spills be investigated by Environment Australia and that minor leaks and spills be scrutinised by South Australia's Chief Inspector of Mines in collaboration with EA. Given that different regulatory requirements attach to different categories of incidents, the Committee also recommends that the definitions as to categories of incidents be the subject of public consultation and be publicly available. A regulatory response, publicly available, should be provided following the investigation of an incident (para 3.109).

Recommendation 22

The Committee supports the recommendations of the Bachmann Review aimed at updating and strengthening reporting procedures, viz:

- Maintenance of a register of incidents at each site
- Revised secrecy/confidential clauses to ensure anonymity for concerned individuals
- Closer reporting liaison between the CIM, EA and the DITR
- All agencies to be informed of incidents at the same time
- The adoption by relevant agencies of a common incident reporting form
- The identification of a lead minister and agency to deal with a significant incident as soon as it occurs (para 3.130).

Recommendation 23:

In view of evidence of inadequate consultation in the past, the Committee recommends that Heathgate Resources should encourage and strengthen relations with the local Indigenous community through improved and open communications (para 3. 142).

Recommendation 24

The Committee recommends that a more comprehensive research effort be made based on better organised and more systematic information collection and greater rigour in analysing data. Such research should be undertaken both individually and collaboratively by mining companies, the responsible Commonwealth and South Australian agencies, and independently funded scientists, both in Australia and abroad (para 3.174).

Recommendation 25

Given the seriousness of potential risks to the environment, the Committee recommends that mining operations at Honeymoon not proceed unless and until conclusive evidence can be presented demonstrating that the relevant aquifer is isolated (para 3.186).

John Cherry
Chair

PREFACE

Terms of reference

On 20 June 2002 the Senate asked the Committee to undertake an inquiry with the following terms of reference:

> The regulatory, monitoring, and reporting regimes that govern environmental performance at the Ranger and Jabiluka uranium operations in the Northern Territory and the Beverley and Honeymoon *in situ* leach operations in South Australia, with particular reference to:
>
> (a) the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations;
>
> (b) the adequacy and effectiveness of those Commonwealth agencies responsible for the oversight and implementation of these regimes; and
>
> (c) a review of Commonwealth responsibilities and mechanisms to realise improved environmental performance and transparency of reporting.

The Senate originally asked the Committee to report on 5 December 2002 but it subsequently agreed to extend the reporting deadline to 14 October 2003 to allow the Committee to give its fullest consideration to the issues.

The inquiry

The Committee invited written submissions from interested individuals and organisations by an advertisement in the national press and in the *NT News* and Adelaide *Advertiser* on 26 June 2002, with an initial request that submissions be lodged by Friday, 9 August 2002. Submissions were received from 87 submitters, with several providing the Committee with additional material and supplementary submissions during the course of the inquiry. Submitter details are shown in Appendix 1.

The Committee undertook a series of six public hearings with some 46 witnesses in Darwin, Jabiru, Adelaide and Canberra in order to gain a more detailed understanding of the issues. Details of these hearings are shown in Appendix 2.

The Committee supplemented the formal discussions of the public hearings with site visits and informal briefings at each of the four uranium mining operations specified in the terms of reference. No details of these are given in this report, given their informal nature.

In the course of the hearings, a large number of documents were tabled for the Committee's information. These are listed in Appendix 3.

Acknowledgements

The Committee wishes to express its appreciation for the cooperation of all witnesses to its inquiry, whether by making submissions, by personal attendance at a hearing or, as in many cases, by giving both written and oral evidence.

The companies operating the four uranium mines visited by the Committee ensured that the inspections were beneficial to its understanding of the issues raised by the terms of reference and the Committee also wishes to extend to them its appreciation for their cooperation.

The Committee also records its appreciation to the officers of the secretariat who assisted with the conduct of the inquiry.

CHAPTER 1

The Current Legislative and Regulatory Framework

Introduction

1.1 Within Australia's federal system of government, both the regulation of mining operations and the protection of the environment are principally State responsibilities. However the Commonwealth's national and international responsibilities for the management of nuclear activities and its specific responsibilities in relation to the Northern Territory, combined with its increasing role in environmental protection of matters of national environmental significance, has led to a situation where the oversight of uranium mining is a shared responsibility between the Commonwealth Government and the governments of the Northern Territory (for the Ranger and Jabiluka uranium mines) and South Australia (for the Honeymoon and Beverley uranium mines, as well as the Olympic Dam uranium mine at Roxby Downs, which is not included in the Committee's terms of reference).

1.2 This shared responsibility is described as 'cooperative federalism' which is reflected in the *Intergovernmental Agreement on the Environment* signed by the Commonwealth and all States and Territories in 1992. The agreement seeks to achieve sound environmental management through a system of parallel and complementary legislation. This concept is no better demonstrated than in section 41 of the *Atomic Energy Act 1953 (Cth)*, the key section dealing with uranium mining in the Ranger Project Area, which explicitly states that, except as provided by the regulations, the section shall not be construed as intended to exclude or limit the operation of any provision of a law of a State or Territory that is capable of operating concurrently with the section.[1]

1.3 State and Territory law governs most operational aspects of the uranium mines and State and Territory agencies administer many of the approval processes. While the Commonwealth retains strong powers through its export permit processes, without which uranium mines would have no commercial future, it has chosen to delegate day-to-day administration of the mines to the South Australian and Northern Territory governments. This approach minimizes unnecessary duplication in administrative processes.[2]

---

1 *Atomic Energy Act 1953 (Cth),* section 41(4).

2 See *Revised Working Arrangements for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region*, at Appendix 9 to submission 77 from the Office of the Supervising Scentist, for a specific statement of the purpose of the working arrangements put in place in the NT in 1995.

1.4 This partnership arrangement is particularly the case in the Northern Territory where the Commonwealth has retained ownership of the uranium ore by virtue of section 35 of the Atomic Energy Act. The situation in this respect is the reverse of that in the States, in that it has been the position in Australia over the past century that uranium and other minerals are the property of the Crown in right of the States.[3] In conjunction with section 35 and rights in respect of Aboriginal Land under the *Aboriginal Land Rights (Northern Territory) Act 1976,* the Commonwealth has also by means of regulation 4(2) of the *Northern Territory (Self Government) Regulations (Cth)* specifically reserved its powers over uranium mining in the Northern Territory. The emergence of native title in fact led to some broad community discussion of Aboriginal rights over minerals, but in August 2002 the High Court essentially confirmed that native title rights over minerals had been extinguished by State legislation.[4]

1.5 As will be apparent from the discussion below, many of the statutes that govern the four uranium mines are of a generalised nature, with many of the detailed environmental requirements set out in the various subordinate instruments, such as plans and other documents, which are mandated by the mining authorisation process.

1.6 This Chapter describes the laws and regulatory roles of each of the three governments, and succeeding chapters analyse the adequacy of the current system as it operates in the Northern Territory and South Australia. It should be noted that this regulatory framework is complicated by changes to the law since the mines subject to examination by the Committee were approved. For ease of reference, therefore, the Committee has included four tables at the end of this Chapter which identify which laws applied at the time of the original approvals, and as they are now.

1.7 The discussion in this Chapter examines, in turn the Commonwealth's national role, before examining in turn the Northern Territory and South Australian situations.

Commonwealth regulation

1.8 The powers of the Commonwealth to regulate uranium mining and other activities concerning the environment are primarily contained in Section 51 of the Commonwealth *Constitution*.[5] Of particular importance are: the trade and commerce power;[6] the taxation power;[7] the quarantine power;[8] the corporations power;[9] the

3 Chris McGrath, "Uranium Mining, Use and Disposal Law in Australia: the Case for Cradle-to-Grave Philosophy", *Environmental and Planning Law Journal*, Volume 17, No. 6, December 2000.

4 *Western Australia v. Ward* (2002) 76ALJR1098.

5 See generally, the Report of the Senate Environment, Communications, Information Technology and the Arts References Committee, *Commonwealth Environment Powers*, May 1999.

6 Section 51(i).

external affairs power;[10] the power over Commonwealth instrumentalities and the public service;[11] the power over customs, excise and bounties;[12] the financial assistance power;[13] and the territories power.[14] It has been suggested that the defence power (section 51 (vi)) also provides a source of legislative competence over uranium.[15] Further, the powers of the Commonwealth to make laws for the government of territories (section 12.2) is relevant to the regulation of uranium mining in the Northern Territory.

1.9 Importantly, where any law of a State or Territory is inconsistent with a Commonwealth law, the Commonwealth law prevails,[16] and the Commonwealth therefore has the ability to over-ride State laws should it choose to do so in areas within its legislative competence.

1.10 The Commonwealth's involvement in the regulation of uranium mining at the national level derives from the following seven key statutes:

- ***Atomic Energy Act 1953*** – The Atomic Energy Act provides for the authorisation of uranium mining on any land in the Ranger Project Area in the Northern Territory. While the Act itself does not provide substantive regulation of environmental performance, any environmental restrictions and obligations placed on the uranium mining operators in the Ranger Project Area must be consistent with the framework established by the Act. The Act is important in that it vests in the Commonwealth ownership of all uranium found in the Territories.[17]
- ***Environment Protection and Biodiversity Conservation Act 1999 –*** The principal legislative scheme for the mining, use and disposal of uranium is found in the Environment Protection and Biodiversity Conservation Act,[18] which came

---

7 Section 51(ii).

8 Section 51(ix).

9 Section 51(xx).

10 Section 51(xxix).

11 Section 52.

12 Section 90.

13 Section 96.

14 Section 122.

15 See DE Fisher, *Environmental Law: Text and Materials*, cited in McGrath op cit, p. 507.

16 Section 109.

17 Section 35.

18 The *Environment Protection and Biodiversity Conservation Act 1999* amounted to a major consolidation of existing Commonwealth environment protection legislation and repealed (among others) the *Endangered Species Protection Act 1992* (Cth); *Environment Protection (Impact of Proposals) Act 1974* (Cth); *National Parks and Wildlife Conservation Act 1975* (Cth); and the *World Heritage Properties Conservation Act 1983* (Cth).

into force on 16 July 2000. The key purpose of the Act is to clarify the matter of Commonwealth environmental jurisdiction, based on six matters of national environmental significance, one of which is 'nuclear actions' (defined in section 22 to include 'mining or milling uranium ore').[19]

Where a nuclear action has, will have, or is likely to have, a significant impact on the environment, approval must be sought from the Commonwealth Environment Minister. Before a project can proceed, the proposed action must undergo a Commonwealth environmental assessment and approval process, although these can be undertaken jointly by the Commonwealth and the State/Territory governments when required under both Commonwealth and State or Territory law.

Approvals granted under the earlier regime, the *Environmental Protection (Impact of Proposals) Act 1974,* remain valid,[20] with the approvals and environmental assessments for all four mines being examined by the Committee—for Ranger, Jabiluka, Beverley and Honeymoon—having been conducted under this Act.[21] Accordingly, the provisions of the Environment Protection and Biodiversity Conservation Act do not apply to their current operations.[22] Environment Australia representatives told the Committee that any major expansion, intensification or modification from the operation as approved would trigger the processes of the current legislation.[23]

- ***Nuclear Non-Proliferation (Safeguards) Act 1987 –*** The Nuclear Non-Proliferation (Safeguards) Act relates to the 1973 Treaty on the Non-Proliferation of Nuclear Weapons and has the objective of ensuring the physical security of nuclear materials within Australia.
- ***Environment Protection (Alligator Rivers Region) Act 1978 –*** The Environment Protection (Alligator Rivers Region) Act was introduced by the Commonwealth following the report of the 1976 Ranger Uranium Environmental Inquiry (the Fox Inquiry) about the need for strong protection measures for the region's environment in relation to uranium mining activities. The Act is concerned with the administrative arrangements for the Commonwealth Government's oversight of uranium mining operations in the Alligator Rivers region in the Northern Territory, which incorporates the Ranger and Jabiluka mine sites. The legislation established the Office of the Supervising Scientist (OSS)[24], which operates as a Division of Environment Australia and incorporates the Environmental Research

19 Sections 21, 22 and 22A.

20 *Environmental Reform (Consequential Provisions) Act 1999* Section 3, Schedule 3.

21 Mr Early, *Proof Committee Hansard*, Canberra 18 Oct 2002, pp. 304-305.

22 By operation of the *Environmental Reform (Consequential Provisions) Act 1999.*

23 Mr Gerard Early and Mr Malcolm Forbes, *Committee Hansard,* Canberra 18 October 2002, p. 315.

24 Discussed in Appendix 4.

Institute of the Supervising Scientist (ERISS). The OSS gathers and assesses information/data concerning the effects of mining on the local environment.

The Act also established the following bodies:

- the Alligator Rivers Region Advisory Committee, to facilitate communication between community, government and industry stakeholders on environmental issues associated with uranium mining in the Alligator Rivers Region; and
- the Alligator Rivers Region Technical Committee, to perform reviews of the research and monitoring programs relevant to uranium mines in the Alligator Rivers Region.

- ***Australian Radiation Protection and Nuclear Safety Act 1998 –*** The transportation of uranium and its by-products is regulated through general provisions of the Australian Radiation Protection and Nuclear Safety Act which relate to radiation hazards.[25] The object of the Act is to '[p]rotect the health and safety of people, and to protect the environment, from the harmful effects of radiation.'[26]

  The Act also established the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)[27] which is the statutory body responsible for the administration of the Act.

- ***Aboriginal Land Rights (Northern Territory) Act 1976 –*** The Commonwealth gains additional jurisdiction in the Northern Territory through the operation of the Aboriginal Land Rights (Northern Territory) Act. The Act establishes the Northern Land Council (NLC) as a statutory authority to represent the interests of Aboriginal traditional owners. Both Ranger and the proposed Jabiluka mine are located within the NLC's area of jurisdiction, and both are on land which is traditionally owned by the Mirrar-Gundjehmi people.

- ***Customs (Prohibited Exports) Regulations 1958 under the Customs Act 1901 –*** Under regulation 11, an export licence is necessary for the export of radioactive material, including refined uranium, plutonium and thorium. Amendments to the regulations were made in August 2000 to strengthen Commonwealth control over uranium exports by enabling export permissions (or licences) for uranium to be granted subject to conditions. The amendment was made in response to Recommendation 9 of this Committee's June 1999 report entitled *Jabiluka: The Undermining of Process.* The amendment provides the Commonwealth Minister for Industry, Tourism and Resources with a clear and administratively efficient

25 McGrath, C, 'Uranium mining, use and disposal law in Australia: the case for a cradle-to-grave philosophy', *Environmental and Planning Law Journal ,* 2000, 17(6), p509.

26 Section 3.

27 See Appendix 4.

mechanism by which he/she can place legally binding conditions, including mine-site environmental conditions, on the export of uranium.[28]

Exports of uranium from the four mines being examined by the Committee are subject to the Environmental Requirements developed under the *Environmental Protection (Impact of Proposals) Act 1974.*[29]

Commonwealth Codes of Practice

1.11 The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) publishes the *Radiation Protection Series* to promote practices which protect human health and the environment from the possible harmful effects of radiation. ARPANSA is assisted in this task by its Radiation Health and Safety Advisory Council, and by its Radiation Health Committee which oversees the preparation of draft documents and recommends publication.

1.12 The *Series* contains four categories of publication, two of which apply to uranium mining:

- **Codes of Practice** are prescriptive in style and may be referenced by regulations or conditions of licence. They contain practice-specific requirements that must be satisfied to ensure an acceptable level of safety in dealings involving exposure to radiation. Requirements are expressed in 'must' statements.

- **Recommendations** provide guidance on fundamental principles for radiation protection. They are written in an explanatory and non-regulatory style and describe the basic concepts and objectives of best international practice.

1.13 The Codes and Recommendations relevant to uranium mining include:

- Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores (1987);

- Code of Practice on the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores (1982);

- Codes of Practice for the Safe Transport of Radioactive Substances (1982); and,

- Recommendations for Limiting Exposure to Ionising Radiation (1995).

Compliance with the Codes of Practice or aspects of them is a requirement of Authorisations issued by the Northern Territory Government or licences by the South Australian Government for the mining of uranium. At the time of finalising this

28 Department of Industry ,Tourism and Resources, *Submission 87*, p 4.

29 Department of Industry ,Tourism and Resources, *Submission 87*, p 4.

report, the Committee understood that the first two codes listed above are being reviewed by ARPANSA's Radiation Health Committee.[30]

Northern Territory regulation

1.14 As noted above, the Commonwealth has specifically reserved its powers over uranium mining in the Northern Territory by means of the Atomic Energy Act and the Northern Territory (Self Government) Regulations. However, in July 1978, the same year as the NT gained self-government, the Commonwealth had indicated that:

> The Commonwealth considers that uranium mining in the Territory should be regulated to the maximum extent possible through the laws of the Northern Territory.[31]

1.15 The environmental regulation of uranium mining in the NT has since been shared between the NT and Commonwealth Governments by virtue of a series of intergovernmental agreements. The earliest instrument was the September 1979 Memorandum of Understanding between the two governments entitled *Agreed Working Arrangements for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region* that effectively delegated responsibility for day to day regulation of uranium mining to the Northern Territory. That agreement was substantially updated in September 1995 and November 2000.[32] It has been said that the division of regulatory responsibilities sees the Northern Territory Government taking responsibility for day-to-day regulation of mining activities and the Commonwealth, via the OSS, being vested with the responsibility of protection of the Alligator Rivers Region from the effects of uranium mining.[33]

1.16 Northern Territory mining operations in general, but including both the Ranger and Jabiluka uranium mines, are regulated by the *Mining Management Act 2001 (NT*) administered by the Northern Territory Department of Business, Industry and Resource Development (DBIRD). The Mining Management Act amalgamates all operational provisions for mining into a single statute leaving the *Mining Act 1982 (NT)* to regulate titles.[34] The Mining Act is said to contain only very minimal

---

30 Private correspondence from ARPANSA to Committee, 1 October 2002.

31 Letter from Prime Minister Malcolm Fraser to Mr Paul Everingham, NT Chief Minister, 17 July 1978 – see OSS *Submission 77*, Appendix 1, p 3.

32 See OSS *Submission 77*, Appendix 1, pp 7-11, Appendix 4, pp 1-2, Appendix 5, pp 1-7, for the agreements.

33 The Environment Centre NT Inc, *Submission 50*, p 2.

34 Prior to 2001, the primary NT legislation was the *Uranium Mining (Environment Control) Act 1979* (NT*)*. The Mining Management Act replaced the Uranium Mining (Environment Control) Act and the *Mine Management Act 1990,* although Authorisations issued under these previous Acts remained in force. New Authorisations were required to be sought by 30 June 2002, unless an extension was applied for before 31 May 2001.

provisions governing environmental performance, although the Minister can attach specific environmental conditions as part of the grant of tenement.[35]

1.17 The Mining Management Act mandates a regime of audits, inspections, investigations, monitoring and reporting to ensure compliance with agreed standards and criteria, and mining officers are appointed to enforce the Act. Mining site operators are obliged to report any serious accident or critical incident on site which may be subject to investigation.[36] The Act has also established a system of offences of intentionally doing or failing to do acts that cause environmental harm and institutes a system of criminal penalties for such offences.[37]

1.18 To carry out mining activities in the Northern Territory, an operator must have four authorisations.

1.19 Firstly, an operator must apply to the Minister for an Authorisation,[38] which is granted subject to the condition that the operator complies with a current Mining Management Plan (or MMP, which must be submitted with the application for Authorisation), and any additional conditions specified in the Authorisation that the Minister considers appropriate.[39]

1.20 Importantly under section 34 of the Mining Management Act, before granting an Authorisation that relates to uranium, the Minister **must** consult with the Commonwealth Minister and **must** act in accordance with any advice provided by the Commonwealth Minister. In effect, the Commonwealth Minister has the ability to veto any planned action by the NT Minister with which he/she disagreed. In addition, when granting or varying an Authorisation that relates to the Ranger Project Area, the Minister must ensure that the Authorisation incorporates or adopts by reference (with the necessary modifications) the Ranger Project Environmental Requirements.[40]

1.21 Secondly, in the case of Jabiluka, the operator must have a Mineral Lease under the *Mining Act 1982 (NT)* or in the case of Ranger, an Authority to Mine issued under the *Atomic Energy Act 1953 (Cth.).*

1.22 Thirdly, the operator must have a licence to export uranium (issued by the Commonwealth Minister for Industry, Tourism and Resources) under the *Customs Act 1901 (Cth)*.

---

35 Northern Land Council, *Submission 81*, p 9.

36 Part 3, Division 4.

37 Part 9.

38 Section 35, Mining Management Act NT. These are frequently referred to as 'General Authorisations' or GA's.

39 Section 37.

40 The Committee has emphasised the word 'must' because, under the former Uranium Mining (Environment Control) Act, the NT Minister was not required to consult or comply with such advice.

1.23 Fourthly, if the operator intends to export uranium, it must have approval by the relevant Commonwealth Minister (at the time of approvals for both Ranger and Jabiluka, this was the Minister for Resources under the now repealed *Environmental Protection (Impact of Proposals) Act 1974*, or henceforth the Minister for the Environment under the current *Environment Protection and Biodiversity Conservation Act 1999 (Cth))*.

1.24 The Mining Management Plan attached to the NT Government's Authorisation is the principal administrative document for the mine. Section 40 of the Mining Management Act stipulates that the plan is to include the following:

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

1.25 The regulatory framework of both Northern Territory mines is complicated by their location within Aboriginal lands and therefore within the jurisdiction of the Northern Land Council (NLC) under the *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)*. A number of agreements have been created pursuant to this legislation between the Commonwealth, the NLC and the mining companies, that affect the environmental management of the mines and give the NLC a specific role.

1.26 Having described above the overarching regulatory structure in the Northern Territory, the Committee now addresses the system of environmental regulation at Ranger and Jabiluka.

Ranger

1.27 The Ranger mine is situated within the Ranger Project Area, which was established under the 26-year Authority to Mine issued under section 41 of the *Atomic Energy Act 1953 (Cth)* in January 1979, and which is administered by the Federal Minister for Industry, Tourism and Resources. The current section 41 Authority is granted subject to Environmental Requirements (ERs) defined by the Commonwealth to provide for environment protection, and are appended to and integrated into the Ranger General Authorisation from the NT Government (and the extension of the agreement under section 44 of the *Aboriginal Land Rights (Northern Territory) Act 1976* - see next paragraph for details). Ranger's current ERs came into force in January 2000 – as part of a renewal for another period of 26 years of the Commonwealth's Authority to Mine following the expiry of the original section 41 Authority, and are a revised version of the originals drafted in the 1970s. Where there

is a failure to comply with the section 41 Authority and the ERs, the Minister may take action against the mining operator.

1.28 Section 41 also specifies that operations at Ranger are bound by the Ranger Uranium Project Government Agreement, which was originally made on 9 January 1979 between the Commonwealth, Peko-Wallsend Operations Ltd (Peko), Electrolytic Zinc Company of Australasia Ltd (EZ) and the Australian Atomic Energy Commission (AAEC). By this agreement, those named in the section 41 Authority carry out operations on behalf of the Commonwealth. Another agreement in November 1978 was struck between the Commonwealth and the Northern Land Council under section 44 of the *Aboriginal Land Rights (Northern Territory) Act 1976,* which contained the original 45 ERs governing the operations at the Ranger Mine as well as Broad Principles as recommended by the Ranger Uranium Environmental Inquiry to be taken into account by the Supervising Authority in developing water release standards.[41]

1.29 Subsequently by the *Ranger Uranium Project Deed of Assignment – Commonwealth of Australia and Australian Atomic Energy Commission to Energy Resources of Australia Ltd* and the *Ranger Uranium Project Deed of Assignment*— both signed in September 1980—ERA became the sole operator with Peko, EZ and AAEC assigning the whole of their respective interests to that company. At the same time, the Commonwealth sold and assigned to ERA its share of Concentrates of Ranger Uranium Ore and Other Mineral Products and certain other rights and entitlements under the January 1979 Government Agreement.[42]

Management Plans

1.30 The Ranger operator is required to maintain the following:

- Ranger Mining Manual;[43]
- Ranger Rehabilitation Plan;[44]
- Ranger Ore Treatment Manual;[45]
- Radiation Protection Manual;[46]and

---

41 Ranger Uranium Project Government Agreement, AGPS, Canberra 1979. The section 44 agreement is at Annexure B and the ERs are at Appendix A to Annexure B (there are no page numbers).

42 Both reports, AGPS, Canberra 1980.

43 Ranger General Authorisation Section 3.3.

44 Ranger Environmental Requirements (conditions of the Authority issued under s.41 of the *Atomic Energy Act 1953 (Cth)*, Section 9.

45 Ranger General Authorisation Section 4.1.

46 Ranger General Authorisation Section 6.4. The General Authorisation requires all mine site employees to be issued with the Manual.

- Water Management System Operation Manual.[47]
- Mining Management Plan[48]

Monitoring

1.31 The Ranger operator is required to carry out environmental monitoring based on an approved program, including proper analysis of results.[49]

Reporting requirements

1.32 The Ranger operator is required to provide an Annual Environmental Management Report approved by the Commonwealth Minister for Resources, the Supervising Authority (usually the Supervising Scientist) and the Northern Land Council.[50]

Incident reporting

1.33 The Ranger operator is required under the General Authorisation to notify the NT Minister 'as soon as is practicable' of any infringement of the conditions and requirements of the Authorisation or the Environmental Requirements.[51] More detailed instructions are contained in the Environmental Requirements, which require the company to 'directly and immediately notify' the Supervising Authority, the Supervising Scientist, the Minister and the Northern Land Council of any breaches under three criteria set out in the relevant section.[52]

47 Ranger General Authorisation Section 7.2.

48 *Mining Management Act 2001* (NT), Division 3 of Part 4.

49 Ranger Environmental Requirements, Section 13.

50 Ranger Environmental Requirements (conditions of the Authority issued under section 41 of the *Atomic Energy Act 1953 (Cth)*, Section 18. Matters that must be addressed are listed at Section 18.2.

51 Ranger General Authorisation Section 6.1.

52 Ranger Environmental Requirements Section 16.

Jabiluka

1.34 The Jabiluka Uranium mine was established by a Mining Lease issued by the Northern Territory Minister for Resources under the Northern Territory's *Mining Act 1982* and *Uranium Mining (Environment Control) Act 1979*, but is now regulated by the Mining Management Act. It is not subject to authorisation under the *Atomic Energy Act 1953* - however, as at Ranger, ownership of uranium is vested in the Commonwealth by section 35 of the Act.

1.35 Jabiluka is subject to ERs established in the Environmental Impact Statement (EIS) conducted under the Commonwealth's then *Environmental Protection (Impact of Proposals) Act 1974* and the *World Heritage Properties Conservation Act 1983*.

1.36 As the Jabiluka Mineral Lease is on Aboriginal Land, the operator is obliged to comply with ERs that are contained in what is called the section 43 Jabiluka Agreement entered into in 1982 directly between ERA and the Northern Land Council (NLC) – the Commonwealth is not a party. These ERs can be enforced by the NLC by a civil court action for breach of contract.[53] This document is understood to be confidential between the parties and the Committee is unable to confirm its contents.

1.37 The operator at Jabiluka is therefore bound by environmental requirements contained in two separate instruments: the Authorisation (and attached Mining Management Plan and, since 31 July 2003, the Mineral Lease with ERs as annexed), and the section 43 Jabiluka Agreement.

Management Plans

1.38 The operator is required to develop an approved Environmental Management Plan.[54] The operator must also appoint a suitably qualified Environment Protection Officer and Radiation Safety Officer[55] and prepare, for the approval of the Supervising Authority,[56] the following:

- Water and tailings management plans, including the designation of Restricted Release Zones.[57]
- Air quality models in relation to emissions from the installation.[58]

---

53 The role of the Northern Land Council is set out further in Appendix 4. See also NLC, *Submission 81*, 14.

54 Jabiluka General Authorisation, Annex D.4.1.

55 Jabiluka Mineral Lease, Schedule 3, Para 3.

56 The Northern Territory Minister for Business, Industry and Resource Development.

57 Jabiluka Mineral Lease, Schedule 3, Para 9.

58 Jabiluka Mineral Lease, Schedule 3, Para 16(b). Under para 17, these emissions may not exceed the values specified in the National Emission Standards for Air Pollutants, National Health and Medical Research Council.

- Contingency plans covering natural disasters, operational emergencies, materials failure and other unscheduled events.[59]
- Site revegetation plan.[60]

1.39 Prior to the commencement of any works, the operator shall conduct surveys of flora and fauna, cultural heritage, hydrogeology and geotechnical conditions.[61]

1.40 The operator must also prepare an approved:

- Radiation Protection Program and Acid Rock Plan;[62] and
- Water Management System Operation Manual.[63]

Reporting requirements

1.41 Detailed reporting requirements are set out in Annex D of the Jabiluka General Authorisation, which includes:

- annual updates to the Environmental Management Plan;[64]
- annual Report on the operation and performance of the Water Management Plan;[65]
- monthly environmental monitoring data reports;[66]
- quarterly trend and environmental monitoring data summary reports;[67]
- annual interpretative environmental monitoring report;[68]
- quarterly radiation and atmospheric monitoring data summary reports;[69] and
- annual radiation and atmospheric monitoring interpretative reports.[70]

59 Jabiluka Mineral Lease, Schedule 3, Para 29.

60 Jabiluka Mineral Lease, Schedule 3, Para 25.

61 Jabiluka General Authorisation, Schedule 4.

62 Jabiluka General Authorisation, Schedule 5.

63 Jabiluka General Authorisation, Schedule 6.

64 Jabiluka General Authorisation, Annex D.4.

65 Jabiluka General Authorisation, Annex D.1.

66 Jabiluka General Authorisation, Annex D.2.1.

67 Jabiluka General Authorisation, Annex D.2.2.

68 Jabiluka General Authorisation, Annex D.2.3.

69 Jabiluka General Authorisation, Annex D.3.1.

70 Jabiluka General Authorisation, Annex D.3.2.

Monitoring

1.42 The operators must establish, subject to the approval of the Supervising Authority:

- monitoring programs covering construction, commissioning, operating and decommissioning phases in accordance with detailed provisions;[71] and
- an atmospheric monitoring station.[72]

1.43 The operators must also comply with the detailed requirements of the Jabiluka Environmental Monitoring Program[73] and the Occupational Health Monitoring Program.[74]

Incident reporting

1.44 The Jabiluka operator has two sets of incident reporting requirements. Under the General Authorisation, the operator must report 'as soon as practicable' to the Minister any infringement of the conditions and requirements of the Authorisation.[75]

1.45 Secondly, under the Mineral Lease, the operators are required to ensure that the provisions of the Environmental Requirements are observed and to inform the Supervising Authority of any infringement,[76] or the occurrence of any other events as defined in the documents in para 1.38.[77]

South Australian regulation

1.46 In South Australia, uranium mining operations require approvals under the following Commonwealth and State legislation.

- A licence to export uranium (issued by the Commonwealth Minister for Resources) under the *Customs Act 1901 (Cth)*
- Approval by the relevant Commonwealth Minister (prior to 1999, the Minister for Resources under the now repealed *Environmental Protection (Impact of Proposals Act 1974,* or since 1999 the Minister for the Environment under the current *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*.
- A Mining Lease, granted under the *Mining Act 1971 (SA)*, which may be granted by the Minister for Mineral Resources Development (the Mining Minister)

---

71 Jabiluka Mineral Lease, Schedule 3, Para 32 – 36.

72 Jabiluka Mineral Lease, Schedule 3, Para 15.

73 Jabiluka General Authorisation, Annex B.

74 Jabiluka General Authorisation, Annex C.

75 Jabiluka General Authorisation Schedule 3.

76 Jabiluka Mineral Lease, Schedule 3, Environmental Requirements, Para 7.

77 Jabiluka Mineral Lease, Schedule 3, , Environmental Requirements, Para 31.

following consideration of the results of an assessment, including assessment of the likely environmental impacts, and satisfactory resolution of Native Title.

- Licence to Mine or Mill Radioactive Ores under the *Radiation Protection and Control Act 1982 (SA)*,[78] which is the principal Act controlling all types of activities involving radiation, including mining and milling of radioactive ores. A licence is subject to conditions that the State Minister for Environment and Conservation may attach and includes requirements to comply with the Commonwealth Codes of Practice for uranium mining.[79] These Codes require that uranium mines have a Radiation Management Program and a Radioactive Waste Management Program, approved by the Government for the mining lease.
- Permits are also required under the *Water Resources Act 1997 (SA)* for all well holes drilled.
- Mines are also subject to the provisions of the *Mines and Works Inspection Act 1920* (SA) and the *Occupational Health Safety and Welfare Act 1986* (SA).[80]

1.47 Conditions may be attached to these instruments, based on the findings of the environmental impact assessment as carried out by Planning SA under section 75 of the *Development Act 1993 (SA)* in cooperation with the Commonwealth, because of the joint nature of the Environmental Impact Statement. The environmental impact assessment process results in the State Planning Minister and the Commonwealth Environment Minister providing advice to the South Australian Mining Minister and the Commonwealth Minister for Resources respectively, to be taken into account in developing conditions of approval.

1.48 South Australia has incorporated the Commonwealth's two Codes of Practice on Radiation Protection and Management of Radioactive Wastes into the *Radiation Protection and Control Act 1982*, which provides for an 'Appropriate Authority' to implement the provisions of the Codes and to grant approvals or authorisations. The Appropriate Authorities for the purposes of the several Codes are as follows.

- Radiation Protection Branch of the Environment Protection Authority: Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores (1987) and the National Health and Medical Research Council's recommendations for limiting exposure to ionising radiation (1995).
- Department of the Premier and Cabinet: Codes of Practice for the Safe Transport of Radioactive Substances (1982).

---

78 Note that on 27 June 2002, the administration of the RPC Act was transferred from the Minister for Health to the Minister for Environment and Conservation.

79 See para xxx above.

80 Southern Cross Resources, *Honeymoon Uranium Project – Environmental Impact Statement*, 2.9.4.

- Department of Primary Industry Resources South Australia: Code of Practice on the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores (1982).

1.49 The EPA also has responsibilities for radiation safety aspects of mines under the *Environment Protection Act 1993,* which specifies responsibility for pollution and environmental harm, environmental authorization processes and conditions, environment protection order processes and conditions, and actions to deal with environmental harm. At the time of finalising this report, amendment of the Environment Protection Act was underway to apply its provisions to all mine sites, including uranium mine sites subject to the Radiation Protection and Control Act.

Management Plans[81]

1.50 The Honeymoon and Beverley uranium mines are required to produce and abide by the following.

- Environmental Management and Monitoring Program (EMMP).[82]
- Radioactive Waste Management Program (RWMP).[83]
- Mining and Rehabilitation Program (MARP).[84]
- Radiation Management Program.[85]

Reporting requirements[86]

1.51 The two mine operators are required to provide the following reports under their respective mining leases.[87]

- Annual Environmental Report – to the Mines Minister, required by the EMMP.
- Annual Environmental Report – to the Minister for Environment and Conservation, required by the Licence to Mine or Mill.
- Quarterly Reports – to the Chief Inspector of Mines, covering groundwater monitoring and management of hazardous chemicals.
- Quarterly Reports – to the Manager, Radiation Protection Branch, EPA, containing occupational and environmental radiation monitoring data.

Summary of allocation of responsibilities between the Commonwealth and the States

1.52 This discussion demonstrates that regulation of *mining operations*, including uranium mining, is principally the responsibility of the State and Territory governments and that regulation extends beyond environmental matters, to include such issues as the health of workers and the safety of the mine operation. The Commonwealth is involved in the initial environmental impact assessment process and in the granting of an export licence for the uranium. For reasons of administrative efficiency, a single Environmental Impact Assessment was undertaken for each of the

---

81 South Australian Government, *Submission 84*, Appendix 2.

82 For Honeymoon: Mining Lease First Schedule, para 6.

83 For Honeymoon: Mining Lease Second Schedule, para 2.9.

84 For Honeymoon: Mining Lease First Schedule, para 7 an Second Schedule paras 2.5 & 2.6.

85 a condition of the Licence to Mine or Mill.

86 South Australian Government, *Submission 84*, Appendix 2.

87 Beverly Mining Lease, Second Schedule, paras 1 and 2; Honeymoon Mining Lease, Second Schedule, para 3.

four mines being examined by the Committee, with the State/Territory governments taking the lead in each case with Commonwealth cooperation.

1.53 Regulation of the operational mines in the Northern Territory is the responsibility of the Northern Territory Department of Business, Industry and Resource Development, with the Commonwealth Supervising Scientist having a monitoring, research and supervisory role over mining activities in the Alligator Rivers region. In South Australia, day-to-day management of uranium mining is the responsibility of the Office of Minerals and Energy Resources, with regulation of radiation safety aspects of mines being the responsibility of the Environment Protection Authority.[88]

Tables showing former and current legislative regimes

Table 1.1 **Ranger (NT) approval process - 1970s**

Instrument	**Authority**	**Legislation**
Authorisation to Mine	Commonwealth Minister for Industry & Resources	s.41 *Atomic Energy Act 1953 (Cth)*
Permit to Export ERs attached	Commonwealth Minister for Industry & Resources	*Customs Act 1901 (Cth)* *Customs (Prohibited Exports) Regulations 1958 (Cth)*
Environmental Impact Statement	Commonwealth Minister for the Environment providing recommendations to the Commonwealth Minister for Industry & Resources (the action Minister)	*Environmental Protection (Impact of Proposals) Act 1974 Cth*
General Authorisation ERs at Appendix A	NT Minister for Mining	*Uranium Mining (Environmental Control) Act 1979 (NT)(UMEC)*

88 Mr Early, *Committee Hansard*, Canberra 18 Oct 2002, p. 305

Table 1.2 **Jabiluka (NT) approval process - 1990s**

Instrument	**Authority**	**Legislation**
Mineral Lease ERs attached	NT Minister for Mining	*Mining Act 1982 (NT)* (and section 43 Jabiluka Agreement)
Permit to Export ERs attached	Commonwealth Minister for Industry & Resources	*Customs Act 1901 (Cth)* *Customs (Prohibited Exports) Regulations 1958 (Cth)*
Environmental Impact Statement	Commonwealth Minister for the Environment providing recommendations to the Commonwealth Minister for Industry & Resources (the action Minister)	*Environmental Protection (Impact of Proposals) Act 1974 (Cth)*
General Authorisation	NT Minister for Mining	*Uranium Mining (Environmental Control) Act 1979 (NT)*

Table 1.3 **Approvals in the NT under current legislation**

Instrument	**Authority**	**Legislation**
Permit to Export	Commonwealth Minister for Industry & Resources	*Customs Act 1901 (Cth)* *Customs (Prohibited Exports) Regulations 1958 (Cth)*
Environmental Impact Statement	Commonwealth Minister for the Environment.	*Environmental Protection and Biodiversity Conservation Act 1999 (Cth)*
General Authorisation	NT Minister for Mining	*Mining Management Act 2001 (NT)*

Table 1.4 **Approvals in SA under current legislation**

Instrument	**Authority**	**Legislation**
Permit to Export	Commonwealth Minister for Industry & Resources	*Customs Act 1901 (Cth)* *Customs (Prohibited Exports) Regulations 1958 (Cth)*
Environmental Impact Statement	***At time of approval*** Commonwealth Minister for the Environment providing recommendations to the Commonwealth Minister for Industry & Resources (the then action Minister) ***Now*** Commonwealth Minister for the Environment.	*Environmental Protection (Impact of Proposals) Act 1992 (Cth)* *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)*
Mining Lease ERs contained in Schedules	SA Minister for Mining	*Mining Act 1971 (SA)*
Licence to Mine or Mill Radioactive Ores	SA Minister for Mining	*Radiation Protection and Control Act 1982 (SA)*

CHAPTER 2

Northern Territory:

Ranger and Jabiluka Projects

Introduction

2.1 This chapter sets out the regulatory and monitoring and reporting regimes of the Ranger and Jabiluka uranium mines in the Northern Territory and examines the performance of the mining operation and regulatory authorities in terms of protecting the environment of Kakadu National Park and its inhabitants.

2.2 Situated about 250 kilometres east of Darwin, the Ranger Project Area (RPA) lies in the north-eastern extremity of the Pine Creek Geosyncline. Both Orebody #1 and Orebody #3 are located within the RPA (defined in Schedule 2 of the *Aboriginal Land Rights (Northern Territory) Act 1976*). Jabiluka is situated 230 kilometres east of Darwin and 20 kilometres north of Jabiru on the edge of the floodplain of Magela Creek, a tributary of the East Alligator River. Both the RPA and the Jabiluka Mineral Lease lie within the external boundaries of Kakadu National Park, which was declared in progressive stages (Stage One in April 1979 and Stage Two in February 1984) around the project area and the mineral lease.

2.3 The Kakadu Board of Management said in relation to the significance of land within the Jabiluka lease:

> Given the wider extent of the Kakadu cultural landscape and the associated World Heritage values, what happens inside the lease areas can affect the land, people and culture. Mirrar and other groups have camped around the Jabiluka sandstone country and nearby billabongs since the beginning of time, balanda say at least 50,000 years. The Australian Government in its nomination for Kakadu for World Heritage property listing noted the importance of the Mirrar camp place Malukunanja II because it is one of the oldest known sites of human occupation in Australia. This place is on the Jabiluka lease area, is Aboriginal land and the Mirrar still look after that country today.[1]

2.4 According to the Australian Conservation Foundation (ACF):

> The Kakadu region is one of breathtaking biodiversity 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

---

1 Kakadu Board of Management, *Submission 68,* p 1.

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 active importance to local Aboriginal people and cultural practices remain strong.[2]

2.5 The geology in which the mines are located, the history of mine development and the history of the approvals processes are attached to this chapter as Appendix 5.

Figure 2.1 **Aerial view of Ranger Uranium Project**

Source: Energy Resources of Australia Pty Ltd

2 Australian Conservation Foundation, *Submission 74,* p 5.

Figure 2.2 **Aerial view of Jabiluka Project Area**

Source: Energy Resources of Australia Pty Ltd

A history of leaks, spills, accidents and incidents

2.6 Central to this inquiry has been the large number of incidents attributable to unsatisfactory management practices and, many have argued, the inadequate monitoring and oversight by regulating authorities. The Mirrar (the traditional owners of the Ranger Project Area), conservation groups and others say that it should not be necessary to prove environmental damage, that limits on levels of contamination should be more stringent, that the operator must be held accountable for breaches in licence conditions and that the processes should be subject to audit.

2.7 Submissions argued that whilst Ranger and Jabiluka were heavily regulated, in practice the mine operation is self-regulated and the many incidents are evidence of a culture that does not take environmental protection seriously.

2.8 Furthermore, the Gundjehmi Aboriginal Corporation (GAC), an organisation established, managed and controlled by the Mirrar People, argued that there were many gaps in knowledge about the impact of contaminated effluent that required more research. Reforms were needed in monitoring and reporting and they called for a greater involvement of the Traditional Owners in decision-making in management of the mining operations.

2.9 The incidents at Ranger are documented in *Ranger Mine Incident Record*[3] attached as Appendix 6.

2.10 Energy Resources of Australia Pty Ltd (ERA) and the Supervising Scientists Division (SSD), formerly known as the Office of the Supervising Scientist (OSS), say that despite the fact that these 'incidents' resulted in the release of contaminated material into the environment, no long or short-term environmental damage resulted. The SSD argues that only one of some 178 incidents—where diesel fuel spilled into a man-made water retaining pond in 1995 and caused the death of forty waterbirds—had any ecological significance.[4]

2.11 In Dr Johnston's view, the main reporting and monitoring challenge is to argue that such incidents are of no significance.[5]

> One of the problems has been the number of 'incidents' which have occurred which are of absolutely no environmental significance. … we have analysed something like 120-odd incidents reported at the Ranger mine since mining started in 1981. We have analysed every single one of those to try and classify them with respect to environmental significance. That analysis was presented in our submission. Virtually all of them come down into the box that says 'no change of any kind'—not even a chemical or a physical change, never mind a biological one. Most of them come into that category. The reporting regime has given rise to public concern—undue in my view—because what you find is that an incident gets reported and gets in the press but it has not actually been of significance.[6]

2.12 The ACF however argued that whilst some of the incidents did not have a great individual impact, many others did and that:

> 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 its performance.[7]

2.13 The ACF points to the Federal Minister for the Environment's response to incidents in 2002:

> At the time of 2002 incidents at ERA's Kakadu operations the industry publication Mining News stated that, "Australia's Federal Government has told uranium miner ERA to lift its game or risk Commonwealth intervention". The report quoted Federal Environment Minister Kemp as

---

3 As provided by the Australian Conservation Foundation *Submission* 74, Attachment 1.

4 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 2.

5 Senator Crossin and Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 20.

6 Dr Johnson, *Committee Hansard*, Darwin, 30 September 2002, p 27.

7 Australian Conservation Foundation, *Submission 74,* p 9.

> "willing to use Commonwealth powers if necessary" (Mining News 24 April). Newspaper reports quoted Dr Kemp as expecting "nothing short of best practice in environmental management. ERA will clearly have to lift its game" (The Age, 25 April 2002).
>
> ACF believes that even a cursory examination of Appendix 1 [*Ranger Mine Incident Record*] and the recent incidents at Ranger shows that there is an urgent and real need for effective action and serious "game-lifting" in order to protect the magnificent Kakadu region.[8]

The independence and effectiveness of regulatory authorities

2.14 Some submissions argued that the Northern Territory regulator—the Department of Business, Industry & Resource Development (DBIRD)—has a conflict of interests in being responsible for the day-to-day regulation and promotion of uranium mining and raised doubts about the independence of its role and the veracity of its reports.

2.15 The DBIRD is responsible for the supervision of mining in the territory as well as the regulation of mining's environmental impacts. Other States devolve environmental regulatory functions to a body, such as an Environmental Protection Agency, which lessens the possibility of perceived and actual conflicts of interest.

2.16 Mr Tony McGill, the DBIRD's Director of Mines, assured the Committee that:

> Our division is involved solely in regulation – we do not have anything to do with resource development. The resource development arm of DBIRD was transferred to the Department of the Chief Minister and became the Office of Territory Development. They are no longer within our department.[9]

2.17 The ACF disputed this:

> I do not think it is a fair impression for the committee to have a view that all DBIRD mining group does is regulate. DBIRD mining group is the primary and most significant point of contact between the Northern Territory mining industry and the Northern Territory government. Its mission statement is 'to facilitate the mining industry through the provision of quality information and service'. Its subsection is to regulate. It is an industry body. We are very concerned. To be generous to Mr McGill, perhaps the misunderstanding happened with the use of the term 'development', because that task has been given to the Office of Territory Development inside the Chief Minister's office. But the concern about a clear, direct, daily linkage between an industry support function and an

8 Australian Conservation Foundation, *Submission 74*, p 9.

9 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, p 106.

> industry regulation function exists, and that is a concern we believe is reflected in the performance of DBIRD.[10]

2.18 The SSD informed the Committee that its routine monitoring program was established largely in response to a prevailing lack of trust in the Northern Territory regulators and ERA. This program's purpose is to assure the Australian community that information is independently available.[11] However, the Committee notes that this is little consolation to those who question the independence of the SSD.

2.19 The SSD claim the fact that there have been no prosecutions of ERA is proof of the success of the regulatory framework in protecting Kakadu. For GAC, this absence of prosecution in the face of a history of incidents, is evidence of both a failure to report and a failure to protect the environment on the part of the regulator:

> [The Mirrar] are outraged when the government regulator prepares flimsy defences on behalf of the mining company or interprets the environmental regulations in its favour. They have done this almost without exception in 110 incidents over the last 21 years. The mining company has never been prosecuted or penalised by regulators in that time.[12]
>
> Of great concern to the Mirrar is the repeated history of leaks, spills, accidents and poor performance at Ranger – which are customarily downplayed by ERA, OSS and DBIRD as merely "incidents", "technical divergences", "occurrences" or "unplanned events". It is rare that ERA is held to public account for these ongoing problems and to date the company has never been convicted of breaching the Environmental Requirements – despite clearly documented breaches and statements by the OSS in the past (eg. OSS, 2000a). A detailed list of such 'occurrences' was prepared as Appendix 2.9 to the report of the Senate Select Committee on Uranium Mining and Milling (SSCUMM, 1997). The Mirrar wish to highlight that 'incidents' continue to occur, including some of significant scale in 2000 (process water leak of some 2 million litres) and 2002 (incorrect dumping of some 84,500 t of low grade ore).[13]
>
> A recent example of downplaying 'incidents' is the OSS 2000-01 Annual Report (OSS-AR, 2001). It states that there were "no reportable incidents during the year" (pp18). In its 6-monthly report of December 2000 to the Alligator Rivers Region Advisory Committee (ARRAC), however, the OSS described the following significant incident (pp 1-22, OSS, 2000b):
>
> > Sept. 9, 2000 – 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

10 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 299.

11 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 13.

12 Mr Ralph, *Committee Hansard*, Jabiru, 1 October 2002, p 131.

13 Gundjehmi Aboriginal Corporation, *Submission 58*, p 48.

> the bunds surrounding the pipe and associated infrastructure into an area which drains to RP2[14]

2.20 ERA on the other hand, complained that media reports misinterpret data, with minor incidents at the mine sites being reported in sensationalist terms by the undiscriminating use of words such as 'leak', 'spillage', and 'serious incident'.

2.21 Mr Wakeham, from the Environment Centre of the Northern Territory (ECNT), considered that media misreporting of events would continue until the regulatory system is improved:

> I think that you are only going to get that level of public confidence in the system when you have a regulatory system which has the appropriate checks and balances and vests regulatory authorities with independent, or as close to independent as possible, stakeholders.[15]

Regulation and agreements

The role of Traditional Owners

2.22 The GAC drew attention in its submission to the lack of direct involvement of the Traditional Owners in regulation of uranium mines on their land saying the regulatory regime prevents the Traditional Owners effectively managing those parts of Mirrar land subject to uranium interests:

> There is perhaps no other group of people in Australia which has more experience with uranium mining on its country than the Mirrar People. As Traditional Owners with responsibilities to protect and manage their country, the Mirrar have a unique and important role to play in the environmental regulation, monitoring and reporting regimes at Jabiluka and Ranger.[16]

2.23 The Commonwealth Social Impact Study into uranium mining in the Alligator Rivers Region said in 1984:

> The local Aboriginal people always appear at a distance … They are problems, not participants. And they are not to be assigned an active role. The administrative arrangements are left to outsiders: specialists. The local people may participate as workers, but not as decision-makers, or as the makers or imposers of sanctions. They are not a determining voice. Their voices may be heard but not heeded: they are nowhere decisive. …

---

14 Gundjehmi Aboriginal Corporation, *Submission 58*, p 53.

15 Mr Wakeham, *Committee Hansard*, Darwin, 30 September 2002, p 85.

16 Gundjehmi Aboriginal Corporation, *Submission 58*, p 4.

> How this could be reconciled with granting of land ownership, and the fact of Aboriginal responsibilities to land, is not explained.[17]

2.24 Environment Australia's Jabiluka EIS in 1996 stated:

> There would appear to be evidence of marginalisation of the Traditional Owners and the broader Aboriginal community as a result of past decisions concerning development and management of the region.[18]

2.25 The GAC provided the Traditional Owners' perspective on land rights legislation:

> Although one of the first Aboriginal nations to 'regain' part of their land under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) the Mirrar have not enjoyed a peaceful occupation of their traditional estate. In fact, over the past 30 years, well-intentioned land rights legislation in the Northern Territory has been manipulated to the detriment of the Mirrar People.[19]

2.26 Back in April 1974, Justice Woodward delivered his Second Report to the Whitlam Government recommending, *inter alia,* the creation of a new form of Aboriginal statutory title in the Northern Territory to be granted by Aboriginal Land Commissioners to Aboriginal land trusts on the basis of claims from traditional Aboriginal owners. While the land trust could act only at the direction of the land councils, the traditional owners would possess a right of veto over mining on their land. Woodward stated that, 'to deny to Aborigines the right to prevent mining on their land is to deny the reality of their land rights'.[20]

2.27 The GAC points out that the Mirrar People, as Traditional Owners, have no direct role in the regulatory system:

> The Mirrar receive information emanating from the reporting process via the Northern Land Council. The Mirrar may also attempt to assert rights and interests, via the Northern Land Council, pursuant to the terms of the s.44 Land Rights Agreement.[21]

---

17 Australian Institute of Aboriginal Studies, *Aborigines and Uranium: Consolidated Report on the Social Imapct of Uranium Mining on the Aborigines of the Northern Territory*, Canberra, 1984, pp 84-85.

18 Gundjehmi Aboriginal Corporation, *Submission 58*, p 29.

19 Gundjehmi Aboriginal Corporation, *Submission 58*, p 7.

20 Woodward, A.E. *Aboriginal Land Rights Commission: Second Report*, AGPS, Canberra, 1974, p 104.

21 Gundjehmi Aboriginal Corporation, *Submission 58*, p 23.

2.28 Nonetheless, the Mirrar regard it as their responsibility to actively participate in the land's management and protection, and contend that, in order to effectively manage and protect their land:

> … agreements under the *Aboriginal Land Rights (Northern Territory Act 1976* (Cth), on conjunction with relevant Commonwealth and Northern Territory legislation, should provide the Mirrar with the legally enforceable right to:
>
> i) access independent and appropriate information about the way that mining operations on Mirrar land, and arrangements for regulating those operations, directly and indirectly impact upon the physical environment and living culture of the Mirrar;
>
> ii) seek compliance and/or remedies where operators of mining projects on Mirrar land do not comply with the regulatory arrangements;
>
> iii) instigate processes for reforming the regulatory arrangements as they apply to Mirrar land;
>
> iv) disallow changes to the regulatory arrangements which detrimentally affect the exercise of Traditional Owner rights or protection of the environment on Mirrar land.[22]

2.29 The GAC argued that there should be an extension of the relationship between the authorizing legislation and the provisions of the *Land Rights Act* Agreement and that this relationship should be reflected in Northern Territory legislation.

> At Jabiluka the rights of Traditional Owners are severely diminished because there is no Commonwealth legislation authorising mining and no requirement in Northern Territory legislation that authorities and mineral leases be consistent with Commonwealth environmental approvals. As a result, the 'Jabiluka Requirements' established by the Commonwealth Minister during the 1997 EIS and 1998 PER processes are not annexed to the 1982 Agreement nor the Jabiluka Mineral Lease. Nor are they incorporated in (recently passed) NT legislation, contrary to Clause 14 of the MOU between the Commonwealth and the Northern Territory. They are instead 'implemented' via two letters sent by the Commonwealth Minister to the NT Minister in 1997 and 1998.
>
> …(to) …and the s.43 Jabiluka Agreement.[23]

2.30 The GAC points out that:

---

22 Gundjehmi Aboriginal Corporation, *Submission 58*, p 30.

23 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 34-35.

> The willingness of the Mirrar community to engage in this current process, i.e. contribute to improved environmental performance at the Ranger mine and proposed Jabiluka mine, in no way disqualifies Mirrar opposition to further uranium mining on traditional country. The Mirrar still say no to Jabiluka.[24]

Recommendation 1

The Committee strongly supports the Mirrar in their wish to actively participate in their land's management and protection and recommends that they be given a position on the Minesite Technical Committee.

A flawed and outdated regulatory environment?

2.31 The GAC argued that both the Ranger Mine and the Jabiluka Project rely on authorities or approvals derived from outdated, repealed or 'grandfathered' legislation:

> Unfortunately, both the Ranger Mine and the Jabiluka Project continue to rely on authorities or approvals derived from outdated, repealed or 'grandfathered' legislation. While Governments have improved and reformed legislation, mining operations at both sites have been burdened with historical regulatory frameworks.
>
> For example, operations at Ranger rely on a statutory fiction that those named in the s.41 authority issued under the *Atomic Energy Act 1953* (Cth) are carrying out operations on behalf of the Commonwealth. In addition, while the holders of an authority under the *Atomic Energy Act 1953* (Cth) may be convicted of an offence under the Act for failing to comply with the authority [section 41A(7)], the penalty is merely $2,000 in the case of a natural person and $10,000 in the case of a body corporate [section 41D].
>
> To compound the problem, even instruments developed to deal with inadequate legislative direction for appropriate regulation, such as the Working Arrangements agreed to in September 1995, are now outdated. The Working Arrangements make no specific provision for the Jabiluka Project and have not been updated to reflect the repeal of the *Uranium Mining (Environmental Control) Act 1979* (NT). The Working Arrangements also make reference to the creation of further important regulatory instruments, such as 'Agreed Commonwealth Requirements for Environmental Monitoring by the Northern Territory Regulatory Authorities of Uranium Mining in the Alligator Rivers Region', which have never been developed.
>
> The primary role of the Ranger Minesite Technical Committee in the administration of measures to ensure compliance with the Environmental Requirements is, while arguably implicit, not specifically codified in the

24 Gundjehmi Aboriginal Corporation, *Submission 58*, p 4.

> Working Arrangements. The ambiguous relationship at Jabiluka authorisations by the NT Minister and deliberations at the Jabiluka MTC is detailed below.
>
> The Working Arrangements also make reference to outdated twice-yearly Environmental Performance Reviews by the OSS and NT Supervising Authority. This regime was replaced in early 2001 by a system comprising an annual Environmental Audit, a mid-term review and routine monthly inspections.
>
> The Environmental Requirements annexed to the Jabiluka Mineral Lease (pursuant to s.64 the *Mining Act 1982* (NT)) and the 1982 Jabiluka Agreement (pursuant to s.43 of the pre-1987 version of the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth)) were formulated from an EIS process carried out in 1979. They do not represent current or best practices…. In addition, their continued effect is contrary to Clause 15 of the MOU between the Commonwealth and the Northern Territory [Footnote: Which states the NT Minister will amend the environmental requirements attached as a condition to the Jabiluka Mineral Lease to "more closely reflect the environmental requirements to which the Ranger Authority is subject".[25]

2.32 The GAC advise that the regulatory framework at Jabiluka is very different from Ranger, adding to the confusion of those seeking to understand why and how decisions are made:

> …. [unlike Ranger] there is no provision in the *Atomic Energy Act 1953* (Cth) for the Commonwealth to authorise uranium mining operations at Jabiluka. Instead authority for mining operations at Jabiluka derives from the Jabiluka Mineral Lease (ML N1) issued under the *Mining Act 1982* (NT).
>
> As the Jabiluka Mineral Lease is on Aboriginal Land, an agreement under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) is required for mining to take place. This agreement is known as the s.43 Jabiluka Agreement. Unlike Ranger, the agreement is directly between the Northern Land Council and ERA – the Commonwealth is not a contractual party.
>
> The Environmental Requirements attached to the Jabiluka *Land Rights Act* Agreement are attached to the Jabiluka Mineral Lease in identical terms. These Environmental Requirements were developed as part of a Commonwealth environmental impact assessment process carried out in 1979 pursuant to the terms of the (now repealed and 'grandfathered') *Environment Protection (Impact of Proposals) Act 1974* (Cth).[26]

---

25 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 32-33.

26 Gundjehmi Aboriginal Corporation, *Submission 58*, p 24.

> …there is not even the limited legislative vehicle for the exercise of traditional owner rights as outlined in respect of Ranger. There is no provision in the *Mining Management Act 2001* (NT) for the incorporation of the Jabiluka Environmental Requirements. In addition, while the (repealed) *Uranium Mining (Environmental Control) Act 1979* (NT) compelled the NT minister to consider *Land Rights Act* agreements (including the 1982 Jabiluka Agreement) in exercising his powers, no such specific provision exists in the *Mining Management Act 2001* (NT).[27]

2.33 Mr Lichacz said in his submission:

> The history of this mining operation in the Alligator Rivers Region of the Kakadu National Park does not entirely agree with the notion of 'the most scrutinised and public mine in the world'. Effective regulation should approach a minimum legal standard but the evidence suggests that experience with uranium mining in tropical areas is very limited preventing the facilitation of 'best practicable technology'' as is required, due to a paucity of relevant baseline data. The legal standards ought to be subject to wider review and application of research with traditional owner involvement needs very urgent attention.
>
> …The stated position of the traditional owners on whose land the mining is taking place, bears out that they are not satisfied with assurances about the regulatory regime achieving a situation of no environmental harm and its ability to deal effectively with their concerns. There is a growing distrust of 'balanda' laws and regulations to achieve optimum environmental protection.[28]

2.34 The GAC says the transfer of responsibility for regulation and monitoring of uranium mining by non-legislative agreement means there is no direct parliamentary scrutiny and no mechanisms for persons with legal standing, such as the Traditional Owners in seeking compliance. GAC claims three key aspects of the 1995 MOU for instance have not been implemented, two of which relate to ER's at Jabiluka.

> …because these agreements are essentially 'private' agreements between the Commonwealth Minister and the Northern Territory Minister, the failure of governments to abide by them carries no sanction and there is no mechanism to enforce compliance with their terms. There does not even appear to be any requirement for them to be made public.[29]

2.35 The ECNT agreed saying that the Atomic Energy Act is not set up to regulate performance and it is unclear at Commonwealth level who would respond to a breach

---

27 Gundjehmi Aboriginal Corporation, *Submission 58*, p 31.

28 Mr Wieslaw Lichacz, *Submission 82*, pp 8-9.

29 Gundjehmi Aboriginal Corporation, *Submission 58*, p 31.

of the Ranger ER's and how. They argue that this lack of clarity is inconsistent with best practice protection of such a unique and internationally recognised region.

2.36 The ECNT also points out that the ER's in place for Ranger were updated in January 2000 but not for Jabiluka because to do so may have required a renegotiation of the Jabiluka lease agreement.

> Reporting requirements for Jabiluka are basically an existing Minesite Technical Committee 'gentleman's agreement'. A failure to report above action levels does not constitute a breach of the legislation as the reporting levels are not outlined in the ER's or legislatively linked to the Mines Management Act.[30]

2.37 While the Supervising Scientist, Dr Arthur Johnston, argued that the existing regulatory system in the Northern Territory has delivered an exemplary record of environmental protection for over two decades,[31] many submissions strongly disagreed.

2.38 Indeed, in an interview on ABC Radio on 24 April 2002, Dr Johnston, when questioned whether the Jabiluka uranium operation constituted an endemic system of failure, said that the regulatory system under which ERA operates had required the establishment of good, very sound environmental management plans. He added however, that one of the problems was that the systems that the ERA seems to have internally operating within the company are such that those plans are sometimes not fully implemented, and on occasions the monitoring data are not properly examined and interpreted. So the systems, the plans are there and the monitoring programs are there, but the internal management of ERA has been at fault.[32]

2.39 The Kakadu Board of Management said in its submission to the inquiry:

> In comparison to other uranium mines throughout the world, these [Ranger and Jabiluka] operations are highly regulated and monitored. Yet, even after advice from the Independent Scientist Panel of ICSU (International Council of Scientific Unions) and seventeen recommendations made in response by the Supervising Scientist to improve the environmental and reporting performances of the mining company, we continue to hear about contaminated water leaks, incorrect stockpiling of material, delayed reporting and allegations of poor environmental management. After all the years of uranium mining and all the reassuring words, we still cannot say that we have full confidence in these regulatory and reporting regimes.[33]

---

30 Environment Centre of the Northern Territory, *Submission 50*, p 3.

31 Dr Johnston, Office of the Supervising Scientist, *Committee Hansard*, Darwin, 30 September 2002, p 2.

32 Dr Arthur Johnston, *The World Today – ABC Radio*, 24 April 2002.

33 Kakadu Board of Management, *Submission 68,* pp 1-2.

2.40 In his press release of 23 April 2002, Dr David Kemp, Minister for the Environment said:

> These [environmental protection] requirements are far more rigorous than at other mines in the Northern Territory, and go beyond Northern Territory law. Had ERA implemented those protocols, the incidents at Ranger and Jabiluka would not have occurred. The Commonwealth will not accept anything less than full implementation of these new measures.[34]

2.41 The Northern Land Council's Mr Norman Fry pointed to difficulties with the regulation of uranium mining in the NT:

> …the environmental regulation of uranium mining in the Northern Territory—including authorisation to mine, the content of environmental requirements, monitoring and enforcement—is split between Commonwealth and Territory jurisdictions. The split of responsibility is sometimes ambiguous and has been further complicated by a series of intergovernmental agreements and the operation of the various regulatory advisory bodies.[35]

2.42 The ECNT argued that administration of Ranger and Jabiluka uranium mines was by a complex and inconsistent mix of Commonwealth and Northern Territory legislation, regulations, memoranda and company commitments and that responsibility of environmental protection is usually explained as:

> … the NTG [Northern Territory Government] has responsibility for the day to day regulation of mining activities and that the Commonwealth, via the OSS is vested with the responsibility of protection of the Alligator Rivers Region from the effects of uranium mining. In practice this demarcation of responsibilities raises as many questions as it answers.[36]

2.43 The ECNT says the resource development bias of DBIRD is not counter-balanced by a strong environment department:

> There is no Environment Protection Agency in the NT. Regulation of the impacts of mining impacts is carried out predominantly by DBIRD rather than the Environment and Heritage Unit. Under the new Mining Management Act, Mine Management Plans are not required to be public documents.[37]

2.44 The ECNT argued that existing regulations lack the legislative clout to be effective regulatory tools, the response of regulators has been too weak to discourage

---

34 Dr Kemp, Minister for Environment and Heritage, Media Release, 23 April 2002.

35 Mr Fry, Northern Land Council, *Committee Hansard*, Darwin, 30 September 2002, p 61.

36 Environment Centre of the Northern Territory, *Submission 50*, p 2.

37 Environment Centre of the Northern Territory, *Submission 50*, p 3.

incidents and breaches and that the Environmental Requirements (ER's) have been too narrowly interpreted, despite the clear intent of the ER's which state:

> Nothing in these Environmental Requirements must be interpreted to prevent or discourage the Company from attaining higher environmental standards than those specified.[38]

2.45 The Australian Conservation Foundation (ACF) emphasized the urgent need to clarify the roles and responsibilities of the agencies involved in uranium mining regulation:

> We are concerned that there is a growing web of memorandums of understanding, informal agreements and ad hoc advisory committees that have an operational status but no legislative or regulatory or recourse or reporting status.[39]

2.46 In the opinion of the GAC:

> … these [current] regimes and regulations are inadequate in themselves without reference to any environmental impact. … they are governed by ad hoc agreements between the Commonwealth and the Northern Territory governments and are essentially reactive to the development agenda and exclude the considerations of the traditional owners.
>
> We believe traditional owners should have the direct means by which they can instigate the investigation of incidents, should have a role in the sanction process and should have a direct role in altering the regulatory regime.
>
> The current system is inconsistent, lacking in accountability and outdated. Agreements under land rights acts do not operate effectively and are not supported by legislation.[40]

2.47 The GAC argued that the *Atomic Energy Act* was never designed for regulating uranium mining. The Government did not accept the Fox Report recommendation against the use of the *Atomic Energy Act* for granting an Authority to mine uranium at Ranger, preferring to 'tack on' Part III of the Act. GAC say this was done to allow Ranger to proceed prior to self-government of the Northern Territory.[41]

2.48 The Atomic Energy Act 1953 (Cth) performs four main functions. Firstly, it vests title of all prescribed substances in the territories of Australia in the Commonwealth. Secondly, it requires those who discover prescribed substances in any part of Australia to notify the Commonwealth. Thirdly, it gives the

---

38 Environment Centre of the Northern Territory, *Submission 50*, p 7.

39 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 292.

40 Mr Ralph, *Committee Hansard*, Jabiru, 1 October 2002, p 129.

41 Gundjehmi Aboriginal Corporation, *Submission 58*, p 32

Commonwealth power to obtain information about prescribed substances from a person possessing or controlling such substances. Fourth, the Act provides authority for commercial exploitation of prescribed substances on the Ranger Project Area.

2.49 Under Section 41, the Commonwealth Minister is empowered to grant authority to a person or persons to discover, mine, recover, treat and process prescribed substances; however this power is restricted to the Ranger Project Area. The Minister is also empowered to vary and revoke the authority in the event of refusal or failure to comply with or observe condition or restrictions imposed, even if this results in indefinite suspension of operations at Ranger.

2.50 In exercising powers under section 41A, the Minister is not permitted to act in a manner that is inconsistent with the obligations of the Commonwealth under the Aboriginal Land Rights Act Agreement section 44 agreement.

2.51 According to the GAC:

> Section 41 (2AA) creates the 'statutory fiction' that those named in the 's.41 authority' are carrying out operations on behalf of the Commonwealth. This 'fiction' was created to deal with the fact that, because the Ranger Project Area is dealt with separately and uniquely under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth), an agreement between the Commonwealth and the NLC is required for mining operations to take place on the RPA.
>
> It is presumed that creating this statutory fiction was favoured over the option of requiring the operators of the Ranger Mine to enter into a new, direct agreement with the Land Council. Instead the Commonwealth has a separate agreement with ERA, "the Government Agreement" and as long as this agreement is complied with, the statutory fiction prevails.[42]

2.52 In its submission to the inquiry, the NLC summarised the problems bedeviling environmental regulation of uranium mining in the Northern Territory:

- the absence of objective, external environmental standards, and, in particular, the lack of comprehensive standards requiring the development of environmental plans (as opposed to those compliant with specific regulations) has led to inconsistent regulation;
- ambiguity and overlap of roles between Commonwealth and Northern Territory agencies, particularly in relation to monitoring and enforcement;
- the absence of an effective independent monitoring authority responsible for ensuring compliance with international and national standards. The progressive weakening of the role of the SSD has

42 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 11-13.

reduced the level of independent assessment of environment protection;

- few opportunities to review the Northern Territory Government's actions or decisions, administrative law being comparatively undeveloped in the Territory (there was, until recently, no freedom of information legislation, for example); and

- the potential conflict of roles between the regulation and the promotion of mining within the Northern Territory's administrative apparatus.[43]

2.53 The ACF argued that to be genuinely effective and to gain the confidence of stakeholders and the community, a robust, thorough and holistic regulatory system must be established and that because of the failure of the Northern Territory as regulator, there should be a greater Commonwealth presence in regulating uranium mining in the Northern Territory.[44]

2.54 Few witnesses did not regard the complexity of the regulatory framework as problematic. However, Mr Lea, of David Lea Consulting argued that:

> The structure that has been put in place over the years to regulate, supervise and monitor the operations at Jabiluka and Ranger is extremely comprehensive. It involves multiple levels of governments and their agencies, stakeholders and independent scientists. This approach ensures a variety of perspectives are brought to bear on achieving the objectives. The framework is not static and has been amended recently to reinforce the power of the Commonwealth agency's monitoring and independent assessment. The framework must be considered to be world's best practice. If judged by results, it has been highly effective in achieving the primary environmental objectives over 20 years.[45]

2.55 Mr Lea presented to the Committee his report commissioned by the Northern Territory Chief Minister's Department titled *Review of Environmental Regulations at Ranger and Jabiluka Uranium Mines*. Mr McGill told the Committee he was not sure whether his government had accepted the report as yet, however, in it, Mr Lea explained that he had made three recommendations with regard to Jabiluka and Ranger.[46]

---

43 Northern Land Council, *Submission 81*, p 14.

44 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 296.

45 Mr David Lea, *Review of Environmental Regulations at Ranger and Jabiluka Uranium Mines*, September 2002, p 3.

46 Mr Lea, *Committee Hansard*, Darwin, 30 September 2002, p 99.

Recommendation 2:

The Committee recommends that DBIRD adopt the recommendations of the David Lea Consulting *Review of Environmental Regulations at Ranger and Jabiluka Uranium Mines,* viz:

- **The development of a comprehensive enforcement policy for Jabiluka;**
- **Devising mining management plans and authorisations fore the mines; and**
- **Introducing information strategies for government agencies designed to address public perceptions.**

2.56 Mr McGill argued that *the Mining Management Act 2001* (NT) was not only consistent, but easy to follow and understand and that problems with the regulatory framework arise from factors extraneous to the legislation, more specifically, the nature of the agreements or undertakings between the various parties as well as Commonwealth recommendations and that the latter are beyond Northern Territory control.[47] Mr McGill acknowledged that inconsistencies exist between the environmental requirements for Jabiluka and for Ranger. He emphasised that they should be the same, an issue which has been raised with the Commonwealth to no effect.[48]Mr McGill also argued that:

> All environmental legislation in the Northern Territory references an act called the Environmental Offences and Penalties Act. The Mining Management Act also references that same legislation so that all environmental legislation references the same system of penalties and offences.[49]

2.57 The GAC disputed this saying that not all offences under the NT Mining Management Act are environmental offences and therefore subject to the provisions of the NT Act.

> In fact, the large majority of them are not. From a cursory examination, it appears that only section 27 offences are subject to the *Environmental Offences and Penalties Act.* For example, breaches of reporting requirements (section 29) and the mining authorisation (section 39) are in no way subject to the provisions of the *Environmental Offences and Penalties Act.*[50]

47 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, p 105.

48 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, p 105.

49 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, p 102.

50 Gundjehmi Aboriginal Corporation, *Submission 58a*, p 1.

2.58 ERA noted that 'if we do something that does damage the environment, we should be penalised for it'.[51] It added its concern, however, that the 'the nub of the issue' is that it is currently considered to be in breach of the environmental regulations despite not having damaged the environment. Mr McGill noted that, in any case where there is a possibility of a legal sanction, the relevant information is provided to the NT Department of Justice for comment, but that the question of prosecution is one for the Minister and the Crown Prosecutor.[52] Mr David Lea expressed the view that '[p]rosecution is used very rarely in environment areas', and only when there is significant off-site environmental harm. He argued that, if a regulator's only regulatory tool is prosecution, a lot of time will be spent in courts, without necessarily achieving its desired outcome of the protection of human life and health and the environment. He underpinned his arguments by reference to the Braithwaite enforcement pyramid, where prosecution is the last resort, and most enforcement activity takes the form of oral and written advice.[53]

Recommendation 3

The Committee recommends that:

a. **The joint and separate responsibilities of the Commonwealth and the Northern Territory be clearly outlined in relevant Commonwealth and NT legislation, particularly with respect to monitoring.**

b. **The functions of the Alligator Rivers Region Consultative Committee (ARRAC), the Alligator Rivers Region Technical Committee (ARRTC) and the Minesite Technical Committees be clearly outlined.**

c. **The Environmental Requirements attached to the mining lease and land rights agreement for Jabiluka be updated and enshrined in relevant NT legislation.**

d. **The NT Government adopts specific strategies for improving the transparency, rigour and effectiveness in its management plans and authorizations for mining.**

e. **The NT Government adopts a tougher enforcement policy where the test for taking legal action is the significance of the breach.**

51 Mr Cleary, *Committee Hansard*, Darwin, 30 September 2002, p 45

52 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, pages 102 and 114-5.

53 Mr Lea, *Committee Hansard*, Darwin, 30 September 2002, p 107

"Working Arrangements"

2.59 The GAC criticised the DBIRD for its lack of awareness of the need to update the 'Revised Working Arrangements for Co-ordinating the Regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region – a commitment to which the GAC say was made some two years ago. (GAC letter 5 November 2002) – and provided the Committee with an outline of those 'Working Arrangements':

> The Commonwealth and the Northern Territory share responsibility via the Revised Working Arrangements for Co-ordinating the Regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region (September 1995) ["the Working Arrangements"].
>
> The purpose of the Working Arrangements is to establish procedures for consultation between the Commonwealth Office of the Supervising
>
> Scientist and the Northern Territory Supervising Authority (currently the Department of Business, Industry and Resource Development) in the performance of their legislative functions with 'maximum efficiency and minimum duplication'.
>
> The Working Arrangements set out reporting, information exchange and decision-making procedures agreed between the Commonwealth and Northern Territory agencies in relation to uranium mining in the region.
>
> The Working Arrangements establish the functions of the Ranger Minesite Technical Committee (RMTC), which is chaired by the NT Supervising Authority and comprises representatives of OSS, ERA Ltd and the Northern Land Council. They also make provision for Ad Hoc Technical Working Groups comprised of the same representatives (and others as necessary).
>
> The primary function of the RMTC is the review and development of Environmental Performance Reviews, which are twice-yearly reviews of the impact of uranium mining operations on the environment of the region carried out by the OSS and the NT Supervising Authority.
>
> The Working Arrangements also reiterate the functions of the Alligator Rivers Region Advisory Committee (ARRAC), which is established in the *Environment Protection (Alligator Rivers Region) Act 1978* (Cth), and consists of the Supervising Scientist, the Director of National Parks, the representatives of Territory authorities, mining companies, unions, Aboriginal organisations, conservation groups and such other members who may be appointed by the Commonwealth Minister for the Environment.[54]

54 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 19-20.

Recommendation 4

The Committee recommends that DBIRD updates the 'Revised Working Arrangements for Co-ordinating the Regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region.

2.60 The GAC argue that the Agreement between the Commonwealth and the NT purports to cover the Jabiluka Project, making particular reference to incorporation and adoption of the 'Jabiluka Requirements' developed by the Commonwealth during the 1997 Jabiluka EIS and the 1998 Jabiluka PER, and includes a statement of intention to amend the 23 year-old Environmental Requirements attached to the Jabiluka Mineral Lease.

> It is presumed that the Office of the Supervising Scientist and the Northern Territory Supervising Authority use the Revised Working Arrangements for Co-ordinating the Regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region (September 1995) (as described above in relation to the Ranger Mine) to govern their shared legislative responsibilities in respect of Jabiluka. There is, for example, a Jabiluka Minesite Technical Committee. However there is no specific mention of the Jabiluka Project in the Working Arrangements because they pre-date the new development of Jabiluka by ERA. The Environment Protection (Alligator Rivers Region) Act 1978 (Cth) applies to the Jabiluka Project.[55]

Authority, Environmental Requirements and Ranger General Authorisation No. A82/3

2.61 The Environmental Requirements for the Ranger uranium mine are conditions of the Authority issued under s41 of the *Atomic Energy Act 1953* and also reflect the Commonwealth's role in the Alligator Rivers Region under the *Environment Protection (Alligator Rivers Region) Act 1978*.

2.62 The operational procedures and practices, and environmental standards, guidelines, codes, regulations or limits relevant to meeting these conditions are set out in Northern Territory legislation and (currently) Ranger General Authorisation Number A82/3 issued under the *Uranium Mining (Environment Control) Act 1979 (NT),* which has been repealed and replaced with the *Mining Management Act 2001 (NT)*.

2.63 The ERs that the Traditional Owners have identified as requiring strict adherence and enforcement, as well as interpretation from an Aboriginal Traditional Owner perspective, are the following:

---

55 Gundjehmi Aboriginal Corporation, *Submission 58*, p 27.

> 1. Primary Environmental Objectives
>
> 1.1 The company must ensure that operations at Ranger are undertaken in such a way as to be consistent with the following primary environmental objectives:
>
> (a) maintain the attributes for which Kakadu National Park was inscribed on the World Heritage list;
>
> (c) protect the health of Aboriginals and other members of the regional community;
>
> 16. Reporting Incidents
>
> 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.
>
> 18. Environmental Management Report
>
> 18.2 The report required under clause 18.1 must deal specifically with the following matters:
>
> (g) social impact monitoring;[56]

2.64 Section 34(4) of the *Mining Management Act 2001* (NT) states:

> In granting or varying an Authorisation that relates to the Ranger Project Area, the Minister must ensure that the Authorisation incorporates or adopts by reference (with the necessary modifications) the Ranger Project Environmental Requirements.[57]

2.65 In compliance with this section, Ranger General Authorisation Number A82/3 includes Primary Environmental Objectives and requires an Environmental Management Report in the same terms as both the Commonwealth Environmental Requirements. It does not directly incorporate the Environmental Requirement relating to the reporting of incidents.

---

56 Environmental Requirements of the Commonwealth of Australia for the Operation of Ranger Uranium Mine.

57 s34(4), *Mining Management Act 2001 (NT)*

ISO 14001

2.66 The Northern Land Council's submission made recommendations for improving the regulatory regime within the Northern Territory and nationally. They included improvements to the environmental management plan process and the implementation of ISO 14001.

2.67 ERA advised that it was committed to complying with ISO 14001 by July 2003 and to achieving certification against the standard by July 2005.[58] However, the SSD stressed that the ISO 14001 regime is essentially one involving compliance with environmental management plans. There is no punitive element, a failure to achieve a positive audit leading only to the removal of certification.[59]

Recommendation 5

The Committee recommends that ERA complies with ISO 14001 as soon as possible.

Monitoring

2.68 Monitoring to identify radionuclides released into the environment is carried out by ERA, the DBIRD and the SSD.

2.69 The GAC points out:

> For uranium mining, the principal radiation exposure pathways are from external gamma radiation, internal exposure due to inhalation of radioactive radon gas, radon progeny and dust (aerosol) particles or internal exposure due to ingestion of contaminated materials (Fry, 1975; Pochin, 1985; Yih *et al.*, 1995). The biological effect of being exposed to radiation will vary with
>
> - the type of radiation (α, β, γ or n),
> - exposure pathway (external, inhalation or ingestion),
> - the chemical behaviour of the radionuclide inside the human body,
> - the radiation sensitivity of the type of tissue exposed (eg. lung, bone marrow).
>
> As a general rule, radionuclides and radiation rates in the environment are low, with some small areas perhaps elevated due to local geological features. It is important to note that despite the higher radioactivity of uranium deposits, most only show a very localised elevated radiation

58 ERA, *Submission 56a*, p. 5.

59 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 74.

> signature at the surface, while some, such as Jabiluka, Beverley and Honeymoon, do not show any signature at all (Mudd, 2002a).[60]

2.70 The two principal mechanisms governing environmental monitoring and reporting by ERA are the Commonwealth Environmental Requirements (attached to the Section 41 Authority under the *Atomic Energy Act 1953*) and the Northern Territory Ranger General Authorisation 82/3 (issued by the NT Minister for Resources under relevant NT legislation).

2.71 The locations of the various surface water, groundwater and soil monitoring sites is given in Figures 2.3, 2.6 and 2.7 (GAC Figures 5 to 7), based on the Authorisation 82/3 and ERA-RAER (various). The general layout of DBIRD monitoring is shown in Figure 2.6 (GAC Figure 8). GAC advised:

> The OSS only recently began formal monitoring of the Ranger site over the 2001-02 wet season (OSS, 2002a), which was a response to the 'manganese (process water) leak' of mid-2000 (OSS, 2000a). The OSS program is not comprehensive, restricted to one upstream and one downstream site on Gulungul Creek and the same for Magela Creek, marked on Figure 5 (include here). The OSS program essentially augments the existing ERA monitoring program as well as the DBIRD check monitoring.[61]

60 Gundjehmi Aboriginal Corporation, *Submission 58*, p 39.

61 Gundjehmi Aboriginal Corporation, *Submission 58*, p 48.

Figure 2.3 **Surface water monitoring of the Ranger Project**

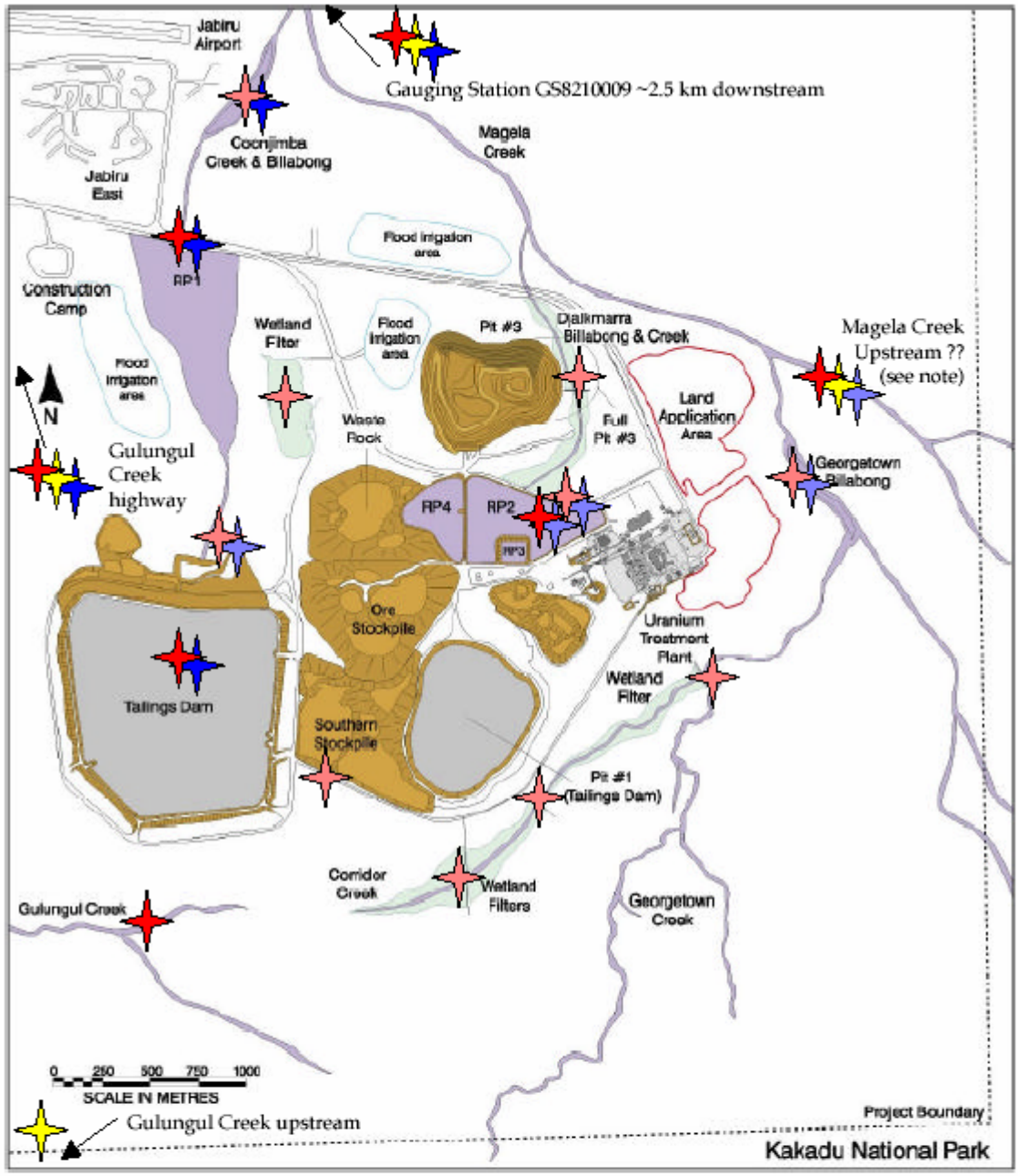


Figure 5 – Surface water monitoring of the Ranger Project

Notes :
- No Magela Creek upstream location often indicated by ERA and OSS (eg. RAER, 1997-2001; Klessa, 2000, 2001a, 2001b; OSS-AR, 2001). Location based on OSS-AR (2000) and recent OSS website on "Environmental Monitoring" (uploaded 31 July 2002 : www.ea.gov.au/ssd/monitoring/).
- Gulungul Creek highway/upstream and Magela Creek '009' just off map to the north-west/south-west and north, respectively.

Figure 2.4 **Groundwater monitoring (ERA) of the Ranger Project**

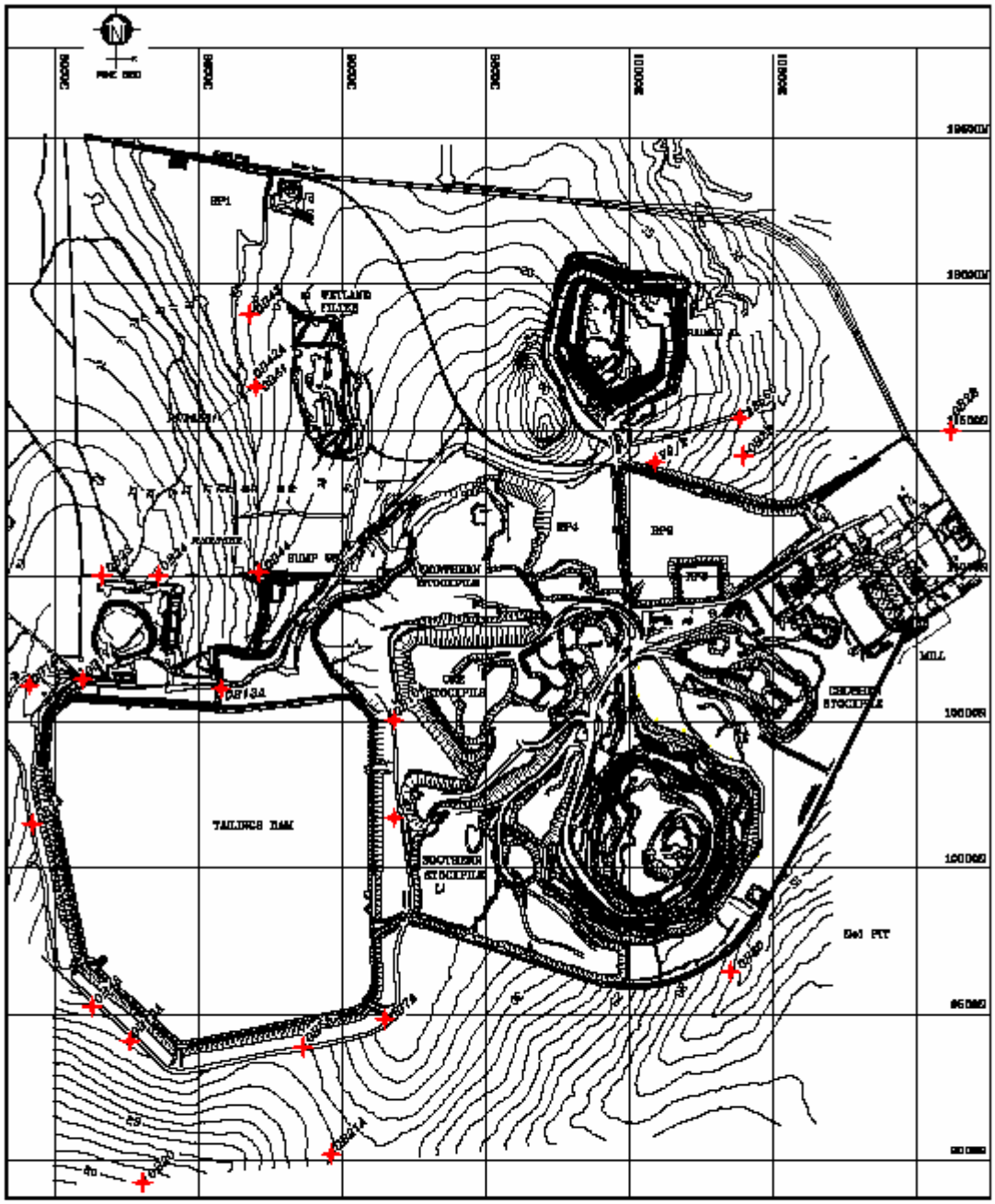


Figure 6 – Groundwater monitoring (ERA) of the Ranger Project (ERA-RAER, 2001)

Note : There are many more groundwater bores around the Ranger site (311 in total), though most are not part of statutory monitoring (i.e. Authorisation 82/3) but may be used by ERA or DBIRD for internal monitoring (see also Figure 8). There is no OSS check monitoring of groundwater.

Figure 2.5 **ERA soil monitoring locations at the Ranger site**

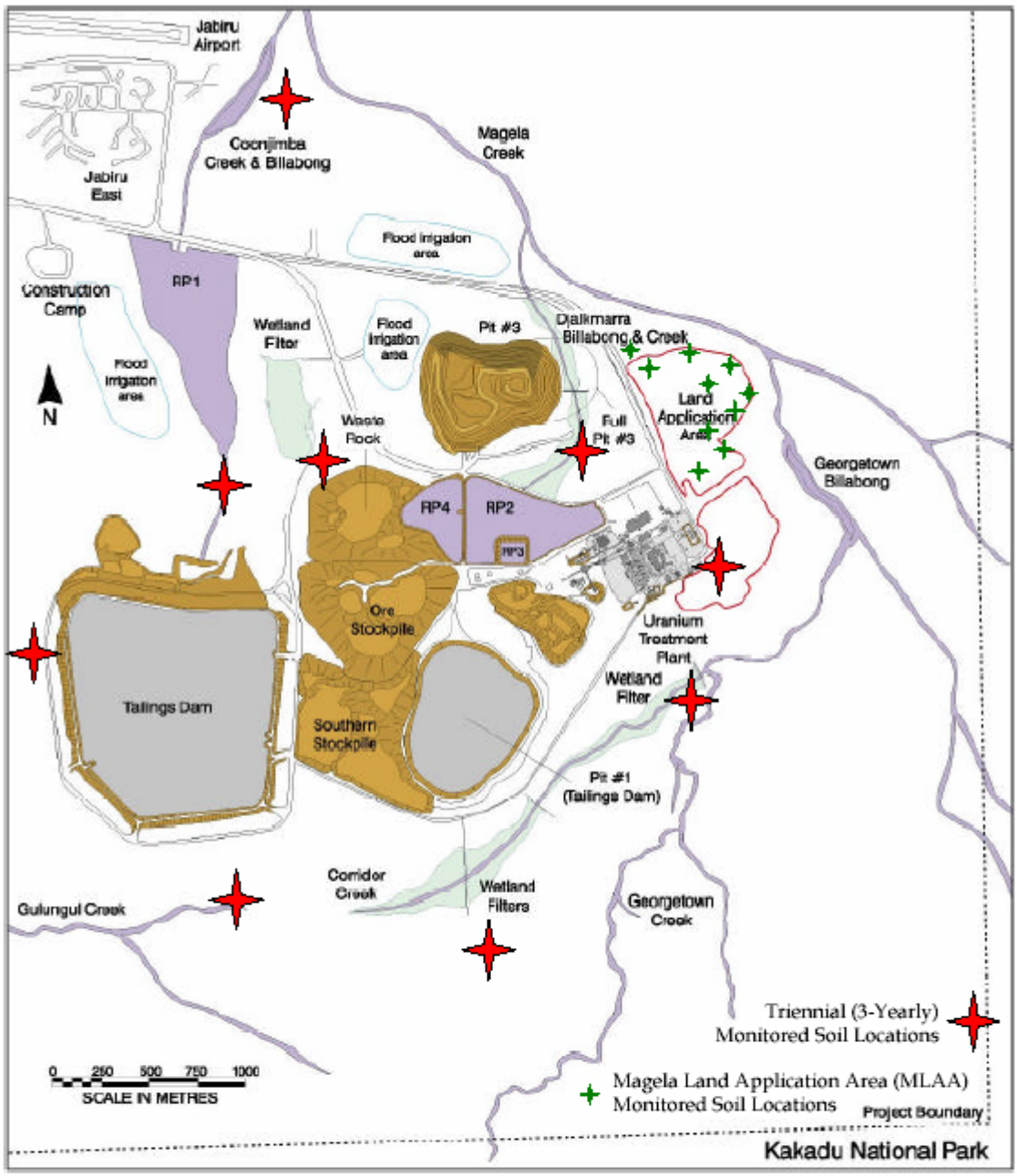


Figure 7 – ERA soil monitoring locations at the Ranger site
(drawn from ERA-RAER, various)

Note : No check monitoring of soils is presently undertaken by DBIRD nor OSS. In the 1980s, extensive soil sampling and monitoring was undertaken by (then) DME, but none by the OSS.

Figure 2.6 **DBIRD surface and groundwater monitoring locations at the Ranger site**

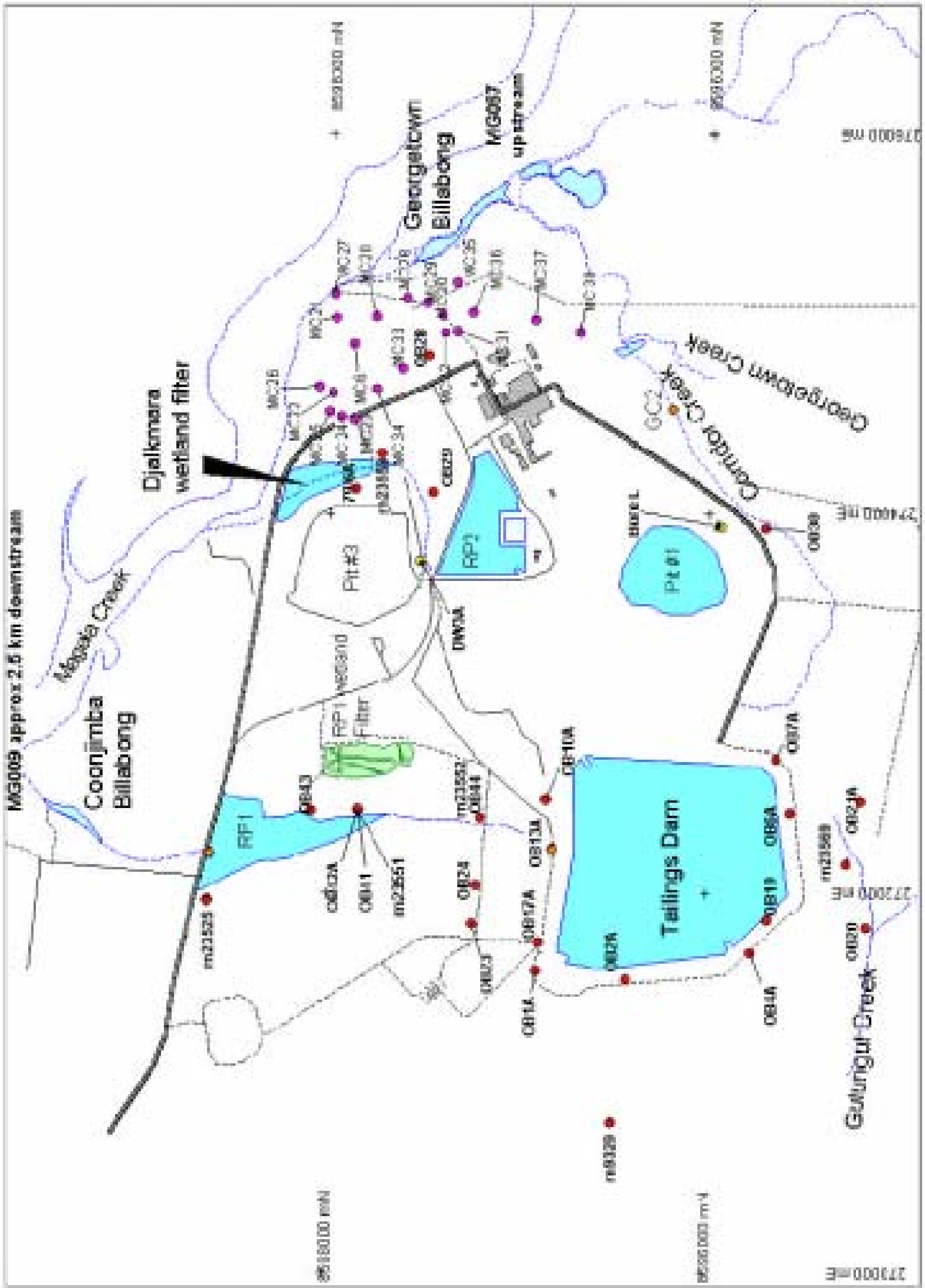


Figure 8 – General layout of DBIRD surface and groundwater monitoring locations (NTSA, various) (Electronic copy courtesy DBIRD)

Note : According to DBIRD and Water Resources (NT), there are 311 registered groundwater bores in the region this map depicts. (McGill – DBIRD, email, 5 August 2002).

2.72 The environmental monitoring of Jabiluka and Ranger uranium mines was criticised by many submissions and it was argued that environmental monitoring and reporting should be extensive and rigorous and demonstrate that the damage or impacts are the absolute minimum. It was also stressed that environmental monitoring and reporting should not be used as a mechanism to downplay concerns over environmental performance.

2.73 The ACF submitted:

> Recent years have seen an escalation in the pre-existing trend away from best practice environmental monitoring, reporting and protection regimes in Kakadu. A 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.[62]

2.74 The FoE argued:

> Adequate effective monitoring of radioactive release into the environment remains an issue of debate. The physical nature of radiation and the mechanisms of release make monitoring a difficult task. However steps can be made to expand present monitoring allowing for assessment independent of the mine operator.
>
> Monitoring in general remains periodic rather than continuous and does not cover the spectrum of potential radiological exposures/release. The location of monitoring stations in most case is not sufficient to assess intermittent and accumulative impacts.[63]

2.75 The Kakadu Board of Management advised that they were concerned about self-monitoring of environmental impacts by the mining company, failure of the company to follow agreed reporting regimes, lack of transparent and timely reporting, the [lack of] ability of the Supervising Scientist's agency to work as a both monitoring and compliance body and the lack of clarity in how the current water management regime operates, particularly in relation to wet season variability.[64]

ERA monitoring program

2.76 ERA conducts the primary statutory monitoring program, which is largely administered through self-regulation (in accordance with Authorisation 82/3 and the limited peer review processes such as the Ranger MTC). ERA also monitors the operation of mining, milling, safety, health and environmental aspects of the projects.

---

62 Australian Conservation Foundation, *Submission 74*, p 5.

63 Friends of the Earth, *ubmission 69*, p 5.

64 Kakadu Board of Management, *Submission 68, p 2.*

2.77 Annex A of the Ranger General Authorisation A 82/3—incorporating the latest amendments as of 17 February 2003[65]—stipulates the type and frequency of the environmental monitoring to be carried out by the operator. It includes groundwater; potable water; surface water, including impounded water; spray irrigation; release water; creeks and billabongs; and atmospheric monitoring.

2.78 In assessing the effects of radiological exposure on people and the environment, Annex B stipulates that the operator must monitor:

- external gamma;
- radon decay products;
- long lived alpha activity (dust);
- surface contamination; and
- meteorology

2.79 Annex B of the Jabiluka Authorisation A 98/2 sets out the type and frequency of the environmental monitoring to be conducted by the operator. It includes monitoring of groundwater; site water; creeks and billabongs; soil monitoring; meteorology; and blasting emissions.

2.80 In relation to occupational health monitoring, Annex C stipulates that the operator must assess external gamma; radon progeny; and radioactive dust.

2.81 The Annexes to the Ranger and Jabiluka Authorisations contain more detail about these requirements.

2.82 According to the ARRTC, the water quality program at Ranger is currently under review[66] and will have a stronger future on-site focus, with monitoring to be carried out at exit points and in other strategic areas so as to provide early warning signals were problems to occur. The Alligator Rivers Region Technical Committee (ARRTC) believes that this revision would provide adequate reassurance concerning the extent to which the Magela Creek and Kakadu environments are receiving contaminants from the site. Water treatment at Ranger was discussed at Budget Estimates and the OSS reported that ERA has submitted an application to install a

---

65 This version is known as Authorisation 0108-01 (variation of Authorisation 82/3). There have been 89 amendments since the authorisation was first issued in 1982. The 1982 General Authorisation was preceded by authorisations given for individual activities, construction approvals and acceptance/authorisation of operating procedures granted under a variety of pieces of legislation. The first of these was issued in May 1974 for sand dredging. The first authorisation issued under the *Uranium Mining (Environment Control) Act 1979* was granted in May 1979 for the construction of the primary crusher.

66 Alligator Rivers Region Technical Committee Meeting, 9-10 September 2002—Initial Summary, p 3.

full-scale water treatment system, following a series of successful trials. The trials were reviewed within the Minesite Technical Committee.[67]

Compliance and statutory monitoring points

2.83 Monitoring point GS8210009 (downstream Magela Creek), generally referred to as '009' is the principal compliance site at Ranger. It is the site at which ERA must observe the three trigger concentration levels (focus, action and limit) as well as load limits in surface water.[68] Upstream Magela Creek is GS8210067. Exceeding the limit or failing to report on and react adequately to this would breach the Authorisation. There are a number of other statutory surface water monitoring sites (including upstream Magela Creek), with which the downstream GS8210009 site data are compared), most being closer to the mine site than GS8210009.

2.84 These sites are specified in the Ranger General Authorisation. They include Coonjimba and Georgetown Billabongs, Retention Pond 1 (RP1) Weir and Gulungul Creek 2 (GC2). Another statutory compliance site is in Gulungul Creek on the western side of the minesite. There are also statutory monitoring sites relating to groundwater (groundwater monitoring sites, potable water supplies). None of these groundwater monitoring sites have statutory trigger concentration levels or load limits. However, they serve as an early warning system for ERA and the regulators of problems at GS8210009.

2.85 The GAC argues:

> … a more appropriate upstream location is needed, as the current point, near Georgetown Billabong, is too close to potential impacts from the mine (such as groundwater solutes from land application). Also, more detailed monitoring of Gulungul Creek is required, especially around the southern and western margins of the tailings dam, upstream and downstream within the Ranger Project Area.[69]

2.86 In response to this, ERA argued that a large number of both statutory and operational sites were already being monitored by ERA and supervising authorities and that an upstream site was being prepared for monitoring during the forthcoming wet season. In addition and, as appropriate, ERA undertakes special project investigations in relation to wetland systems and surface water/groundwater and the resulting reports are also submitted to the MTC for discussion.[70]

2.87 The SSD said:

---

67 *Proof Committee Hansard – Consideration of Budget Estimates,* 29 May 2003, ECITA pp 427-428.

68 The trigger system is discussed in detail in paragraph 2.171.

69 Gundjehmi Aboriginal Corporation, *Submission 58*, p 67.

70 Energy Resources of Australia Ltd, *Submission 56a-4*, p 6.

> The environmental monitoring regime at Ranger is currently under review. The purpose of the monitoring regime, which will consist of statutory monitoring and operational monitoring, is to provide data that facilitates an understanding of the behaviour of the site so that its environmental management can be optimised, to provide early warning data that allow the implementation of corrective or contingency actions to prevent environmental impacts where required, and to provide data suitable for determining the extent to which ERA has complied with statutory requirements for the protection of Kakadu National Park. The number and location of monitoring points, and the type (e.g., hydrological data and event based monitoring) and frequency of monitoring undertaken at those points will be chosen in order to fulfil these objectives.[71]

2.88 Jabiluka equivalents are downstream Swift Creek (JSC–GS8215127) and upstream Swift Creek (JSCUS–GS8215132). As with the principal Ranger compliance site (GS8210009), the main Jabiluka compliance site is downstream Swift Creek (JSC). Here trigger levels apply. As set out in the Jabiluka Authorisation, further statutory monitoring sites are located in Swift Creek (further downstream of the principal compliance site at the Oenpelli Road, and further upstream of the JSCUS site in a billabong), and in the North Magela and 7J creeks well away from the minesite.

2.89 Within the Jabiluka project area, west of Swift Creek, statutory monitoring sites are located in three tributaries which drain into Swift Creek (Northern Tributary and Central Tributary have catchments within the bounds of the minesite; Southern Tributary is in an undisturbed woodland catchment). Monitoring in all of these statutory sites provides data that are used by ERA and regulators to manage the mine site. As at Ranger, there is also a series of statutory monitoring groundwater sites throughout Jabiluka.

2.90 The internal monitoring sites are all managed by ERA with the aim of containing contamination to permitted levels. If the models predict a concentration increase at the downstream compliance site, ERA must intervene to prevent or divert surface flows at the statutory monitoring point. The models, which are scientifically complex, alter with changes in operations and variations in rainfall leading to particular flow regimes.

2.91 The GAC however argue that the point of assessment for the impact of the Jabiluka Project on Swift Creek is approximately 1 kilometer to the east of the site.

> Regardless of the fact that this is due to the engineering design of the site, if the water quality limit is breached at this point, the pollution has already occurred within the World Heritage area.[72]

---

71 Office of the Supervising Scientist, *Submission 77c*, p 7.

72 Gundjehmi Aboriginal Corporation, *Submission 58*, p 96.

2.92 The GAC is also concerned that:

> ... although poorly documented and stated within statutory and other reports, part of the confusion (and sometimes conflict) in interpreting water quality data downstream from Jabiluka is related to the lack of a monitoring point within the 'West Branch' of Swift Creek. This mainly relates to Mg and SO_4, though such confusion should not be allowed to cloud other issues such as the interpretation of U (eg the response to concerns about water contamination in early 2002).
>
> …currently there is no statutory monitoring of upstream locations in these [North & Central Tributaries] water courses (although various historical data sets do exist, as compiled within Table 4). In order to be able to scientifically discern natural variation from the impacts of Jabiluka on water quality, upstream monitoring of North and Central Tributaries is clearly required. According to the Authorisation, only the locations furthest away from the IWMP are required to be sampled (ie. JSCTN/JSCTC, *not* SCTN2/JSCTC2). [73]

2.93 The GAC argues that a greater number of monitoring sites should be established, especially along critical drainage features such as Gulungul, Corridor and Georgetown Creeks and Coonjimba and Djalkmarra Billabongs.

> More data will allow ongoing analysis and checks on sources of contaminants, loads, dilution, reactions and uptake by the ecosystem and therefore possible impacts.[74]

2.94 The SSD outlined what they said were practical reasons for not implementing the GAC recommendations:

> The location of the monitoring point on Swift Creek downstream of Jabiluka was chosen for technical reasons related to maximizing the validity and usefulness of the monitoring data from a scientific and environmental protection perspective. One particular consideration is to ensure that it is downstream of all potential sources of contaminants from Jabiluka. Moving the downstream Swift Creek monitoring point onto the lease would move it upstream of at least one potential contaminant source.
>
> The principal purpose of monitoring in Tributary North and Tributary Central is to provide information that can be used to interpret what is happening on the mine-site and hence to enable corrective action to be taken on the site, if necessary, to ensure that trigger levels are not exceeded in Swift Creek. In this context, the derivation of trigger levels in the tributaries could be a useful management tool but they should not be considered in a statutory context.

---

73 Gundjehmi Aboriginal Corporation, *Submission 58*, p 96.

74 Gundjehmi Aboriginal Corporation, *Submission 58*, p 75.

The catchment of the West Branch of Swift Creek is not potentially impacted by activities at the Jabiluka site. It would thus be difficult to justify establishing an additional statutory monitoring point in the West Branch.

Considering the very limited activity at Jabiluka, the similarly very limited potential for the site to adversely affect water quality in Swift Creek, the monitoring data collected in previous years at Jabiluka, the knowledge of the behaviour of the Jabiluka catchments, and the weekly measurements of gross parameters at Jabiluka including turbidity, EC and pH required by the statutory monitoring program, it is difficult to justify an increase in the frequency of measurement of those parameters which are currently required to be measured monthly. Similarly, it is difficult to justify increasing the frequency of Radium measurements. In this context, it should also be recognized that the biological monitoring program of the Supervising Scientist is designed to detect the integrated effect of all contaminants over time.[75]

Ranger Retention Pond 1 (RP1)

75 Office of the Supervising Scientist, *Submission 77c*, pp 8-9.

DBIRD routine check monitoring program

2.95 DBIRD conducts monitoring to check the accuracy of ERA data at both the Ranger and Jabiluka sites and includes surface and groundwater monitoring.

2.96 In a recent review of environmental regulation at Jabiluka and Ranger Uranium Mines, commissioned by the Northern Territory Chief Minister's Department, Mr David Lea summarised the monitoring and reporting arrangements undertaken by DBIRD:[76]

- monitor and analyse the weekly, monthly, quarterly and annual reports provided by the operator as specified in the Authorisations;
- undertake compliance sampling and analysis according to a specific schedule;
- undertake specific technical audits and inspections;
- participate in monthly site visits and biannual environmental management system audits;
- investigate incidents and accidents as deemed necessary;
- participate in the Minesite Technical Committee (MTC), ARRTC and ARRAC meetings; and
- report six-monthly on the outcome of monitoring and other regulatory activity.

2.97 The results of this monitoring program are provided to the other stakeholders in a formal report every six months, namely, for the periods ending 31 March and 31 August.[77]

Supervising Scientists Division (SSD)

2.98 The SSD conducts independent but smaller check monitoring programs at Ranger and Jabiluka, which were determined on the basis of the research program put in place by the ERISS. The SSD provides information on the biophysical conditions of the region, in particular the aquatic environment.

2.99 Until 2000, the responsibility for monitoring the extent to which the environment had been protected fell to the operator, while the regulator—DBIRD—was responsible for checking the veracity of the results obtained.

---

76 David Lea, '*Review of Environmental Regulation at Jabiluka and Ranger Uranium Mines*', September 2002, p 27.

77 Office of the Supervising Scientist, *Submission 77*, p 31.

2.100 As a result of the Ranger tailings leak in 2000, the Commonwealth Government decided that the SSD should carry out an independent routine monitoring program aimed at enhancing community confidence in the outcomes obtained from monitoring. This program was initiated in 2000–01 and fully implemented in 2001–02.[78] The program—described as 'assurance monitoring' by the ARRTC[79]—was endorsed by both the Independent Science Panel (ISP) of the International Council of Science (ICSU) and the International Union for the Conservation of Nature (IUCN).

2.101 The SSD program comprises two parts:[80]

- Assessing the extent to which the biological diversity of aquatic ecosystems downstream of Ranger and Jabiluka are changed,
- Ensuring that adequate early warning systems are in place to enable management interventions prior to the results of the above being obtained.

2.102 The SSD collects data on changes in water and air quality using biological (creekside), chemical and radiological techniques. [81]

2.103 It is the view of the SSD that the main risk for ecosystems surrounding mine sites in the Alligator Rivers Region derives:

> …from dispersion of mine waste waters to streams and shallow wetlands during the intense and highly seasonal Wet seasons. For this reason, the environmental monitoring programmes instigated for ARR mine sites focus almost entirely on aquatic ecosystems.
>
> For highly-valued sites such as those in the ARR, a comprehensive environmental monitoring programme is required, integrating measurements of key chemical and biological indicators collected from key sites (including controls) and times. The monitoring programmes instigated for both the Ranger and Jabiluka mine sites accord with national and international frameworks for monitoring and baseline data collection, and have both an early detection capability as well as the ability to report on key indicators of biological diversity.[82]

---

78 Office of the Supervising Scientist, *Submission 77*, p 12.

79 Alligator Rivers Region Technical Committee, Meeting, 9-10 September 2002—Initial Summary, p 3.

80 Alligator Rivers Region Technical Committee, Meeting, 9–10 September 2002—Initial Summary, p 4.

81 www.ea.gov.au/ssd/monitoring/index.html

82 Office of the Supervising Scientist, Annual Report 2001–2002, as contained in the *Department of the Environment and Heritage, Annual Report 2001–2002*, p 471.

2.104 The ACF says it holds serious concerns over the performance of the SSD, citing:

- the reduction of a Commonwealth "on-ground" presence in Kakadu and the operational implications of the agency relocation to Darwin
- the continuing movement away from Commonwealth to NT regulatory agencies
- the repeated unwillingness of OSS to uphold the integrity of the Ranger ER's
- the degree of regulatory capture and the organisational independence of the OSS
- the adequacy of OSS funding and resources
- the increasing politicised role of the Supervising Scientist and the wider OSS
- the 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[83]

Biological—Whole Ecosystem monitoring

2.105 According to SSD, the biological monitoring of fish and macro invertebrate communities is to assess uranium mining's effect on the biological diversity of the downstream aquatic environment. The seasonal nature of the program means that results are not quickly available. To compensate for this, creekside monitoring is undertaken throughout the Wet season, measuring rapid toxicological responses in animals exposed to waters downstream of the mine sites.[84]

2.106 Dr Finlayson, of the ERISS, provided details of biological monitoring studies carried out for long-term chronic and cumulative impacts on aquatic species:

> Laboratory ecotoxicity and field ecological studies have been conducted by ERISS for over a decade. Results of the laboratory tests are used to derive safe concentrations of mine constituents for effluent release, and while these are short-term, many of the responses measured are chronic and encompass a very significant portion of the life cycle of the (short-lived) species that are tested. For example, the hydra test period corresponds to approximately three generations of the test species.

83 Australian Conservation Foundation, *Submission 74*, p 11.

84 Office of the Supervising Scientist, *Submission 77*, p 15.

> In the field biological monitoring program, long-term chronic and cumulative impacts are determined using studies of aquatic macroinvertebrate and fish communities, as well as bioaccumulation of constituents found in mine waters in fish and freshwater mussels. Community structure and metal/radionuclide body burden data integrate the effects of any mine impacts over entire Wet seasons, and when examined in a time series, over periods of many years. No off-site chronic and cumulative impacts have been observed in Magela Creek downstream of the Ranger mine. In the process of better understanding the effects of mine water constituents on aquatic organisms and designing robust field measurement programs, ERISS has over the years conducted a large number of field experimental studies in which natural plant and animal populations and communities have been exposed to actual mine wastes.
>
> The results of these studies have provided a direct measure of long-term chronic and cumulative effects on aquatic species. Results of the laboratory and field research and monitoring studies conducted by ERISS have been published in peer-reviewed scientific journals.[85]

Creekside monitoring

2.107 Creekside monitoring measures the effects that waste water from the Ranger mine has on aquatic animals held in tanks on the creekside and exposed to effluent waters. The responses of two species are measured over a four-day period:

- reproduction (egg production) in the freshwater snail, *Amerianna cumingi*; and
- survival of the larvae of black-banded rainbowfish, *Melanotaenia nigrans*.

2.108 According to the SSD, the data collected indicated that mine waste waters had no adverse effects on either of the creekside test species during the 2001–02 Wet season.[86]

2.109 The Mirrar, who are worried about the impacts of radiation on their 'bush tucker', believe that the sampling range of the monitoring program must be extended to incorporate other food stuffs on which they rely:

> …the Mirrar people are not concerned with how low it might be or how high it might be; what they want to know is if their bush tucker is safe. They do not want to see any impact on that bush tucker. They want to be assured that the studies are extensive enough and can look at the full range of their favourite parts of the ecosystem … there are reasons why you need to have a much broader range than, say, just mussels, snails or

85 Office of the Supervising Scientist, *Submission No 77c*, p 2.

86 Office of the Supervising Scientist Annual Report 2001-2002 as contained in the *Department of the Environment and Heritage Annual Report 2001-2002*, p 446.

> fish; especially given that sometimes those samples take many months or years to actually analyse.[87]

Water Quality Monitoring

2.110 The major water quality monitoring points for the Ranger mine are in Magela Creek. The control point is located upstream of the mine influence at gauging station GS8210067 and the potential impact point is located downstream at gauging station GS8210009. Subsidiary monitoring points are situated in Gulungul Creek which drains the southern region of the Ranger mine and enters the Magela Creek downstream of GS8210009.[88]

2.111 According to the SSD water chemistry studies are mainly carried out during the wet season and sampling usually takes place once a week, including assessments of key variables at sites upstream and downstream of Ranger and Jabiluka. Samples are collected from Magela and Gulungul Creeks, which run past the Ranger mine, and from the Swift (Ngarradj) Creek, which flows past Jabiluka. Biological monitoring takes place downstream of Ranger and Jabiluka. Macroinvertebrates are sampled at the end of each wet season at Ranger, monthly at Jabiluka in Swift Creek, in the control stream, and at the end of each wet season in four streams. Fish community structure is measured at the close of each wet season at Ranger and twice each wet season at Jabiluka.[89]

2.112 The GAC points out that ERA is not required to monitor any other point along Gulungul Creek except the downstream monitoring point known as 'Gulungul Creek Highway' and then only monthly. This monitoring point is outside the Ranger Project Area, within Kakadu National Park and is a popular swimming spot for Aboriginal people.

2.113 The GAC advises that it is only since the early 1990s that regular upstream monitoring has been adopted (eg. GS8210028 and GS8210067), though it is not included in Authorisation 82/3. According to the Water Quality clauses of the January 2000 ERs:

> 3.3 Background variables for key variables in water quality, including values for conductivity, pH and uranium, are determined by the Supervising Scientist from time to time and communicated to the company and other major stakeholders. Should the values for these variables measured at Gauging Station GS8210009, or other key locations, show trends away from, or be abruptly divergent from, those background values, and if, in the opinion of the Minister, with the advice of the Supervising Scientist, the results may be attributable

87 Dr Mudd, Gundjehmi Aboriginal Corporation, *Committee Hansard,* Jabiru, 1 October 2002, p 153.

88 Office of the Supervising Scientist, *Submission No 77*, p 14.

89 Office of the Supervising Scientist, *Submission 77*, p 23.

> to mining operations, then the company must undertake such investigations and remedial actions as required by the Supervising Authority after consultation with the Supervising Scientist and other major stakeholders.90

2.114 However, clause 13.1 of the ERs states:

> 13.1 During operations the company must carry out a comprehensive monitoring program, as required by the Supervising Authority or the Minister with the advice of the Supervising Scientist, which
>
> (a) includes monitoring stations on Magela Creek upstream and downstream of the mine at Gauging Stations GS8210028 and GS8210009 and such other sites as may be approved or required by the Supervising Authority; and
>
> (b) is sufficient to allow interpretative analysis of impacts from operations.[91]

2.115 The GAC says that despite ERs 3.3 and 13.1 (a), it is confusing as to which upstream sites should be used for statutory purposes.

> For example, the ERs state '028' while both DBIRD and ERA use '067' (eg. NTSA, 2001b). There appears to be no public report (eg. ERA-RAER, various; NTSA, various; OSS-AR, various) which presents a clear map of the locations of these monitoring points. Klessa (2000) states that both 028 and 067 data could be considered to be the same for the purpose of analysis of impact (although this assumption could not be statistically verified with existing data sets).
>
> This highlights the arbitrary nature of implementing the monitoring program, and who decides what it should include, with no clearly documented rationale for upstream locations versus downstream monitoring and its interpretative analysis. The only point for the determination of impact from Ranger remains '009', although there is confusion between who uses which upstream site. The trigger levels make no reference to a difference from upstream water quality (except for radium).
>
> The uranium concentration in the Magela Creek is typically less than 0.1 ppb, with occasional samples returning up to 0.5 ppb. It is noteworthy that in the first wet season after the introduction of this new system, the 'focus' level for uranium was reached at 009. The recent uranium and sulfate (SO_4) concentrations at 009 are presented in Figure 18.[92]

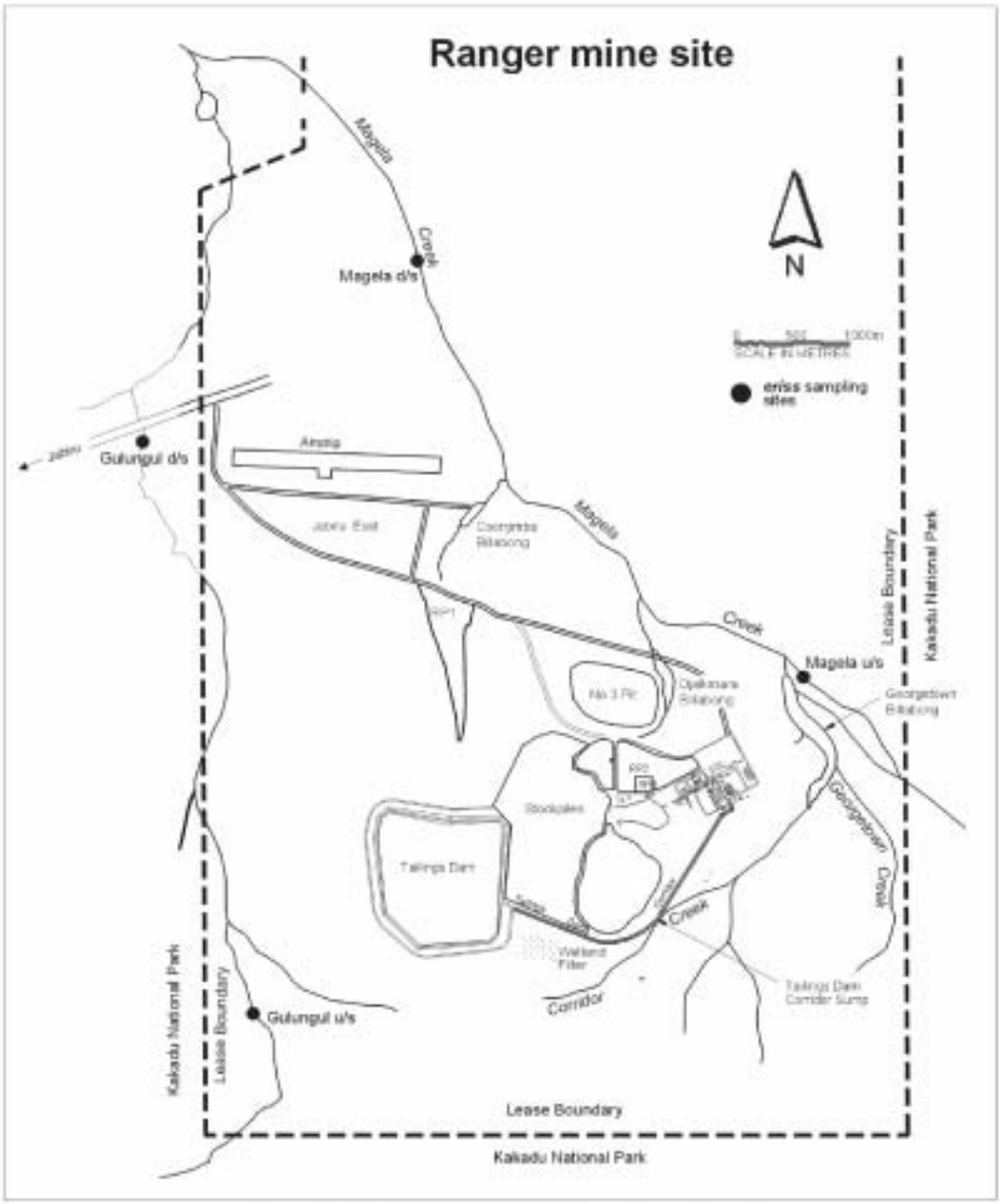
---

90 Gundjehmi Aboriginal Corporation, *Submission 58*, p 73.

91 Gundjehmi Aboriginal Corporation, *Submission 58*, p 73.

92 Gundjehmi Aboriginal Corporation, *Submission 58*, p 73.

Figure 2.7 **Ranger monitoring points**



Legend: u/s upstream monitoring point

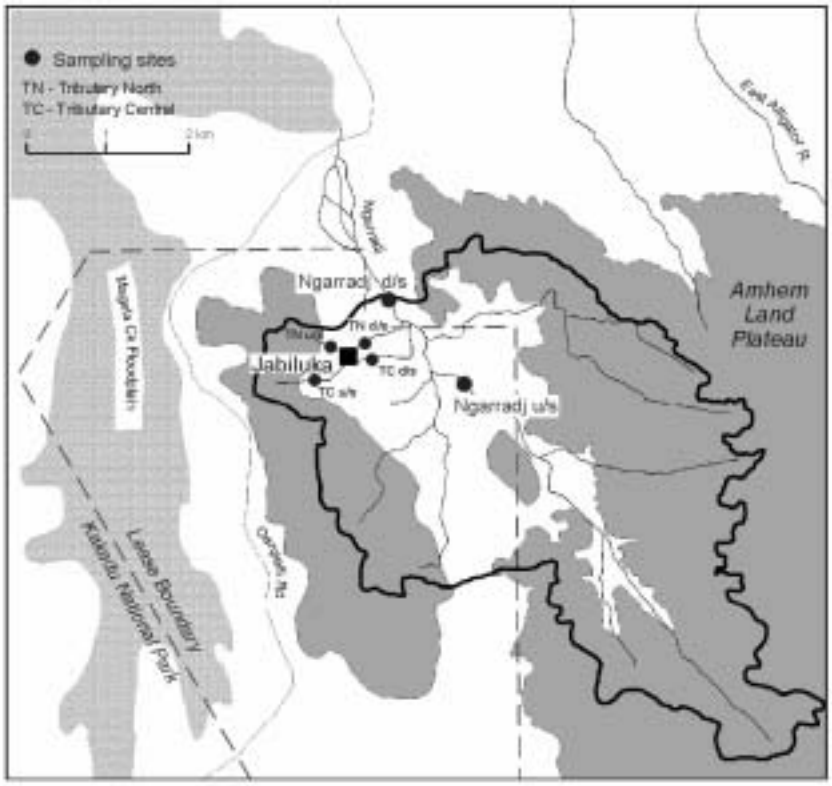
d/s downstream monitoring point

Source: Office of the Supervising Scientist

2.116 The Jabiluka project's chief water quality monitoring points are located in the Swift (Ngarradj) Creek, which is the main water course flowing past the mine site and onwards into Kakadu National Park. The control point (JSCUS-GS8215132) is situated upstream of any mine influence, the potential impact point being located at a

gauging station downstream (JSC-GS8215127) from Jabiluka. This lies beyond the point at which all tributaries of Swift Creek which could be affected by further development of the project enter the main creek channel. Subsidiary monitoring points are positioned within the two principal tributaries of Swift Creek, which pass the mine, and samples are collected for investigatory purposes to ensure that, should effects be observed in Swift Creek, additional data will be available to investigate any mine related effect.[93]

Figure 2.8 **Jabiluka monitoring points**



Legend u/s upstream monitoring point

d/s downstream monitoring point

Ngarradj = Swift Creek

Source: Office of the Supervising Scientist.

2.117 Water samples are taken from the monitoring points, shown *in Figures 2.7 and 2.8,* on a weekly basis throughout the Wet season and analyzed for:

- chemical indicators, such as acidity, conductivity and turbidity;

93 Office of the Supervising Scientist, *Submission 77*, p 19.

- major ions, for example, calcium, magnesium, nitrate, phosphorus and sulphate; and
- trace elements, such as aluminium, copper, iron, manganese, lead and uranium. [94]

2.118 However, the GAC argues that the comprehensive analysis of water quality samples (salts, nutrients, metals including uranium) is only performed 'monthly commencing with first flush' (Authorisation 98/2) and say that for reliable determination of the impact of Jabiluka on water quality in Swift Creek and its tributaries, more frequent analysis is required and water samples should be more thoroughly analysed for various indicator and important contaminants such as Mn, ^{226}Ra and major solutes (Mg, SO_4).[95]

Radiological Monitoring

2.119 Radiological monitoring must be carried out at both the Ranger and Jabiluka Project sites.

2.120 The Commonwealth requirements for Ranger, which are found in the ERs, stipulate that the 'company must implement a system to control the radiological exposure of people and the environment arising from its mining and milling activities', and that it must 'comply…with the relevant Australian law'. The monitoring requires that exposure to company employees and contractors remain lower than the prescribed dose limit for workers; exposure to local residents remain below the dose limit for members of the public; and that the surrounding ecosystems must not suffer from any significant deleterious radiological impacts. [96]

2.121 The SSD radiological monitoring program covers radionuclide concentrations in biota, surface waters, ground waters, sediments and the air. The program's stated purpose is to:

- protect humans from the potentially harmful effects of radiation; and
- track the transport of mine materials into the environment.[97]

2.122 ERISS maintains a continuous radon gas monitoring station near the Mudginberri community and radon progeny are measured monthly at Jabiru. Mudginberri, which was chosen because of the presence of a group of Aboriginal

---

94 Office of the Supervising Scientist, *Submission 77*, p 15.

95 Gundjehmi Aboriginal Corporation, *Submission 58*, p 96.

96 Clause 5, Environmental Requirements of the Commonwealth of Australia for the operation of Ranger Uranium Mine.

97 Office of the Supervising Scientist Monitoring Program: *Instigating an environmental monitoring program to protect aquatic ecosystems and humans from possible mining impacts in the Alligator Rivers Region*, May 2002. p14.

people, is situated approximately half way between Ranger and Jabiluka.[98] Unlike radon gas, which can be monitored over long periods, radon progeny concentrations are measurable only over one-day periods, owing to current technology. Full details of the program are contained in the OSS Monitoring Program of May 2002.[99]

2.123 The radiological monitoring program, defined in Annex B of the Ranger General Authorisation, must include:

- external gamma;
- radon decay products; and
- long-lived alpha activity (dust).

2.124 Clause B.1.6 states that:

> The monitoring frequencies to be adopted are to be sufficient to allow reliable monthly averages to be calculated.

2.125 The ERs for Jabiluka are included in Schedule 3 of Mineral Lease ML N1. Clause 28 'Radiation Protection' states:

> The lessees shall ensure that exposures to radiation of all persons on or near the Jabiluka Project Area shall be reduced to the lowest practicable level below the appropriate limits set out in the Mines Safety Control (Radiation Protection) Regulations of the Northern Territory.

2.126 The Jabiluka Authorisation details the radiological monitoring program to be carried out in Annex C, and includes:

- external gamma;
- radon progeny; and
- radioactive dust.

2.127 ERA is required to submit annual radiation and atmospheric interpretative reports and quarterly radiation and atmospheric monitoring data summaries for both Ranger and Jabiluka as stipulated in the respective authorisations. For details see Annex C of the Ranger General Authorisation and Annex D of the Jabiluka Authorisation.

---

98 Office of the Supervising Scientist, Monitoring Program: *Instigating an Environmental Monitoring Program to Protect Aquatic Ecosystems and Humans from Possible Mining Impacts in the Alligator Rivers Region*, May 2002, p 16.

99 Office of the Supervising Scientist, Monitoring Program: *Instigating an Environmental Monitoring Program to Protect Aquatic Ecosystems and Humans from Possible Mining Impacts in the Alligator Rivers Region*, May 2002.

2.128 The effects of radiation, uranium associated by-products and the existing radiological monitoring program drew comment from a number of witnesses. The ACF said they were:

> …concerned about the cumulative effects of radiation, radioactive materials and heavy metal contamination. We are concerned about the long-term impacts and containment of those materials in the pits for the tailings at Ranger.[100]

2.129 GAC referred to the long term effects on the Mirrar people:

> When the company and the governments have long forgotten about Ranger in the centuries to come, the Mirrar will be unfairly burdened with a monument made of radioactive waste rock that was the former mine site.[101]

2.130 The GAC argued that there was a need for a more comprehensive chemical and radiological analysis of water samples:

> For example, radium is often only analysed quarterly in waters which are receiving drainage or seepage from uranium-rich sources. Nutrients are also important, as are other metals.[102]

2.131 The Kakadu Board of Management outlined to the Committee radiation's possible impact on sacred sites and the lives of the community's young people. Mr Nayinggul explained how radiation can act as a 'river' or barrier to prevent access to sites and impede the teaching of youth in traditional ways:

> Sacred sites can be damaged by radiation. If radiation gets in between what we try to teach young people and access to the sites, any sites at all, then we are not going to be able to educate any of our young ones.
>
> …It will also be really difficult to visit hunting sites. Even visiting other clans, tribes visiting other tribes like we used to, will be difficult. We do not know if we will be able to visit one another, even using vehicles. For example, we would have to cut across creeks which have uranium contamination. I would like to hear how we can overcome these sorts of fears.[103]

2.132 Mr Thompson, of the Friends of the Earth, Australia (FoE), called for 'effective monitoring of radioactive release into the environment', claiming that the 'physical nature of radiation and the mechanisms of release make monitoring a very

---

100 Mr Sweeney, *Committee Hansard,* Canberra, 18 October, 2002, p 296.

101 Gundjehmi Aboriginal Corporation, *Committee Hansard,* Jabiru, 1 October 2002, p 131.

102 Gundjehmi Aboriginal Corporation, *Submission 58*, p 116.

103 Kakadu Board of Management, *Committee Hansard*, Jabiru, 1 October 2002, pp 159-60.

difficult task.'[104] The FoE, which is concerned about the long-term effects on workers of radiation exposure, advocated that steps be taken:

> …to expand the present monitoring and allow for assessment, independent of the mine operator. In general, monitoring on sites remains periodic, rather than continuous, and it does not cover the spectrum of potential radiological exposures or release. The location of monitoring stations in most cases is not sufficient to assess intermittent and accumulative impacts. Aside from long-term accumulation of radiation, potential worker exposure is a very significant issue. The current practice in assessment of human exposure continues to use risk analysis with acceptable worker and accident doses above a general population dose. In the history of the past 50 years, the acceptable level of exposure for humans has exponentially dropped, and we believe that that will continue, even with further scientific evidence to say that there is no safe level of radiation exposure.
>
> In this context, there remains no government collection of records to assess long-term health impacts of workers. Given the health impacts now recognised with asbestos mining, for example, long-term health assessment should be a public duty of care. We believe the actual assessment of worker doses over a long period of time is a significant issue that could expand regulation. It is a duty of care. We believe that there are obviously broader impacts. We have seen litigation to do with smoking and asbestos. We believe that the recognition of or some work in assessing the long-term impact to workers would be in the public interest.[105]

2.133 The Construction, Forestry, Mining and Energy Union (CFMEU) has also voiced reservations regarding the long-term effects of exposure to radiation:

> there was concern over efforts in Australia to apply "exceptional circumstances" provisions to interpretations of acceptable radiation exposure standards, particularly with regard to averaging of annual exposures through setting a "lifetime exposure" limit. It is also noted that the "national register" concept supported by the LHMU has not been implemented, so there is no long term monitoring of the health of workers who have been employed in the uranium mining and processing industry. These issues/problems continue today, indicating that Australian practice in this area does not seek to be world's best practice in health and safety.[106]

104 Friends of the Earth, Australia, *Committee Hansard* , Canberra, 18 October 2002, p 281.

105 Friends of the Earth, Australia, *Committee Hansard* , Canberra, 18 October 2002, p 281.

106 Construction, Forestry, Mining and Energy Union, *Submission 80*, p 3.

Soil monitoring

2.134 The GAC called for 'more frequent and thorough analysis of soils', pointing out that the existing soil monitoring program is substantially reduced from that which was once carried out:

> …there is a range of soil monitoring undertaken by ERA, though DBIRD no longer undertake any check soil monitoring. Historically, the former Conservation Commission of the NT undertook extensive soil monitoring and testing across the Alligator Rivers Region. This work lasted from 1979 to the mid 1980s. The OSS undertakes no statutory check program for soils at Ranger, although they do have a considerable amount of data acquired in the course of various research projects.[107]

Event-based Monitoring

2.135 Submissions to the inquiry argued that the existing monitoring system could deliver better environmental performance through the introduction of event-based and landscape monitoring, and reforms to the water management regime.

2.136 Event-based monitoring refers to a process whereby samples are rapidly collected throughout a hydrological event such as individual storms or flood peaks[108] and where there is a need to source a leak or other problem. Several interest groups, including GAC, supported its introduction both on-site and off-site in order to provide accurate measurements of contaminant loads.

2.137 ERA advised that for several years they have employed the event-based monitoring technique at operational sites at Ranger and Jabiluka using multiparameter datasondes:

> For example, during the 2001/02 wet season continuous monitoring was undertaken at 7 sites at Ranger and 4 sites at Jabiluka.[109]

2.138 The GAC points out that ERA used event based samples between March and April 2002 to check for continuing impacts from the southern stockpile region and should do so at:

> …key locations such as 009, Gulungul, Coonjimba and Corridor Creeks at Ranger, as well as in the North and Central Tributaries and Swift Creek at Jabiluka (JSC & JSCUS).
>
> Given that ERA has in situ pH and EC probes at many locations it is reasonable to expect that a more rigorous field system could be established.[110]

---

107 Gundjehmi Aboriginal Corporation, *Submission 58*, p 84.

108 Office of the Supervising Scientist, *Submission 77*, p 27.

109 Energy Resources of Australia Ltd, *Submission 56a-4***,** p 6.

2.139 Mr Geoffrey Kyle, former technical officer at Ranger for five years argued in favour of event-based monitoring. He submitted that on several occasions contaminated effluent was mobilized and flowed into the creek system during discrete rain events. He reports that the highest level of uranium recorded at TDSRC during routine monitoring to February 1997 was around 5,000 ppb. He identified a possible mechanism that could have been responsible high levels of uranium (referred to in more detail later in the report) and said:

> If one wanted to accurately establish the progress of this mechanism, one would need to be present to catch the peak of the first flush rain event of the season at TDSRC [Tailings Dam South Road Culvert]. Sampling should then continue at short time intervals at TDSRC 1000, TDSRC2000, GCH [Gulungul Creek Highway], and at the confluences between them, in order to catch the diluted peak of the first flush event as it progressed through the creek system to the Magela. The initial rain event would produce the biggest slug of effluent as it would represent the accumulated dry season load. Subsequent rain events would encounter less salt load and the peaks would therefore be lower.
>
> My chief concern was that, because of the monthly or weekly nature of the water quality snapshots we were acquiring, we had no measure of the magnitude of the problem at the entry end. Moreover, we were certainly not seeing the full extent of what was occurring downstream, and were therefore failing to appreciate the ultimate consequences for the surrounding environment. The design of the monitoring programme, and the availability of staff and resources, did not allow for the synchronisation of sample acquisition with the first TDSRC overflow event, much less the proper investigation required of both entry and exit sites.
>
> Subsequently, in the wet season of 1997-8, a peak of nearly 10,000 ppb was recorded at TDSRC. To me, that result confirmed that the monitoring programme had a significant gap in it.[111]

2.140 According to the GAC there is a long history of event-based monitoring in the USA (see Wagner *et al.*, 2000).[112]

2.141 Although he recognized the benefits of this approach, Professor Hart argued that there were several practical difficulties:

> … one is that it is very difficult and quite expensive in that particular region and the second is that really event-based monitoring will only pick up materials that are being transported in particulate form or in dissolved form. It does not indicate what the effects are, and I guess the focus,

110 Gundjehmi Aboriginal Corporation, *Submission 58*, p 116.

111 Mr Geoffrey Kyle, *Submission 35*, pp 11-12.

112 Gundjehmi Aboriginal Corporation, *Submission 58*, p 116.

> certainly ARRTC's focus, has been on the ecological integrity of the region. So event based sampling does not give you any indication of what the biological effects are.
>
> ARRTC looked quite closely at the monitoring that is taking place and the suggested modifications to that being undertaken by both ERA and OSS and we were confident of the monitoring that is in place at the moment. We have a number of things that we are still watching in terms of the implementation of the new monitoring program that ERA have proposed but, given what the OSS has in place off-site, coupled with what ERA have on-site, we are at this stage confident that any adverse effects will be picked up. That is a longwinded way of saying that event-based monitoring has a place on-site but, at this stage, I do not really think that it is necessary off-site.[113]

2.142 The Supervising Scientist expressed a similar view:

> … while the use of event based monitoring is not supported as an integral part of the monitoring program to demonstrate environmental protection, it does have a potential role from an investigative or early warning perspective, particularly at specific locations on the mine lease.[114]

Landscape Monitoring

2.143 Landscape monitoring records changes to characteristic landscape elements and then assesses the effect of these changes on the character of each landscape type and the overall quality of the landscape being monitored.

2.144 Professor Hart, when asked what landscape monitoring entailed, explained that:

> … landscape ecology, or landscape effects, is really just saying that you have got to look at the catchment—you have got to look at what is going on upstream and what is coming from the site that is likely to be putting adverse effects into the system and you have got to look downstream. That is the way I describe landscape ecology. It is really about trying to get the effects of the mine—or the mine sites—into context with other activities that are going on within the catchment.[115]

2.145 This approach was encouraged by the International Science Panel of the International Council of Science and the World Conservation Union (IUCN), following their July 2000 visit to Kakadu National Park to examine uranium mining's possible impact on the Park and surrounding areas. In September, the ISP released a report that included Recommendation 15, which states:

---

113 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 334.

114 Supervising Scientist, *Submission 77*, p 28

115 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 335.

> The ISP considers it would be prudent and necessary to put landscape and ecosystem analyses in place … This would enable the effects of mining-related activity to be distinguished from those due to other causes.[116]

2.146 Justification for the recommendation was as follows:

> Because of the proximity of the mines to the Park and the possibility of the eventual addition of the mining lease areas to the Park after rehabilitation, the ISP considered that a comprehensive risk assessment, including ecological, biogeochemical and hydrological factors, at the landscape/catchment scale for both Ranger and Jabiluka within the context of the Kakadu World Heritage Area, was required.[117]

2.147 The IUCN recommendations, which were annexed to the ISP report, supports the ISP recommendation. According to Recommendation 3:

> Design and implement long-term broad based monitoring of the leases and adjacent park areas, with emphasis on the aquatic but not excluding other environments. The objective is to describe patterns of change, which are inevitable and will have many causes eg. Climate, introduced species and land use. This long-term monitoring will provide a context for distinguishing any role of mining activities in causing the changes. If possible this monitoring scheme should be implemented soon so that several years of data can be collated before any new mining activity is begun.[118]

2.148 In response, the ARRTC observed that landscape scale approaches recommended by the ISP and IUCN could be relevant to both park management and mining impact assessment, and concluded that the program should proceed with the following aim:

> To identify the landscape/process-based elements which contain both the Jabiluka and Ranger projects.[119]

2.149 Some members of the ARRTC were concerned that 'such a large-scale approach would not distinguish mining and non-mining impacts because of the increase in the number of factors and complexity.'[120] Overall, the ARRTC was concerned at the breadth of the objectives, arguing that the program should focus *inter*

---

116 ISP of ICSU, Report, No.3, September 2000, p 29.

117 ISP of ICSU, Report, No.3, September 2000, p 18.

118 P. Horwitz, 'Final Report on the UNESCO Mission to Kakadu, 3–7 July 2000', in 'Final Report to the IUCN', p 6.

119 ARRTC Meeting, 9–10 September 2002—Initial Summary, pp 1, 5.

120 ARRTC Confirmed Summary Record, 25–27 February 2002, p 14.

alia on 'the goal of the potential re-incorporation of Mineral Leases into the Kakadu National Park.'[121]

2.150 A landscape-scale program proposed by the ERISS will entail collaboration from Parks Australia North (PAN), the Kakadu Board of Management (KBM) via the Kakadu Research Advisory Committee (KRAC), and other stakeholders. The program's focus is to be on aquatic/wetland issues as these habitats are considered to be most at risk from mining activity. Analysis of terrestrial issues may be included. According to ARRTC, data/information will be gathered and then assessed. With a staff of two or three, this is expected to take five years.[122]

De-regulation and a culture of irresponsibility?

2.151 Mr Kyle, a Technical Officer and Senior Technical Officer employed at Ranger Mine Environmental Laboratory between September 1993 and 1998 lodged a complaint to the Minister for Resource Development NT and SSD in April 2002 saying that although heavily regulated by statute, the operation of the mine was largely self-regulated and that ERA was not committed to environmental protection:

> My intention in that exercise [of making a statement of complaint] was to show that, having demonstrated its incompetence, insouciance, and unwillingness to employ best practice in the management of mining a dangerous substance in a sensitive area, Ranger had breached its licence conditions and behaved as an unsuitable operator and an irresponsible corporate citizen.
>
> Irrespective of what might be done to tighten up the various aspects of ERA's operation of the Ranger Mine, my experience with ERA culture, and the very loose regime of self-regulation to which it has been subjected, does not fill me with confidence that the situation will improve unless ERA is required to:
>
> - recommission its on-site environmental laboratory
> - employ sufficient competent technical staff who have the resources and support to investigate problems,
> - augment set frequency sampling with a comprehensive event-based programme, and
> - accept direct regulation from government officials who regularly inspect the operational sites, independently acquire and test environmental samples and review extant data[123]

121 ARRTC Confirmed Summary Record, 25–27 February 2002, p 14.

122 Landscape-scale projects: Proposals under development, September 2002., pp 1-5.

123 Mr Geoffrey Kyle, *Submission 35*, pp 3-4.

2.152 The incidents that led Mr Kyle's to call for these changes are addressed in more detail later in the report.

Recommendation 6

The Committee holds the view that contaminants from these mine sites must be measured accurately and kept within broadly accepted limits whether adverse effects are demonstrated or not. Accordingly it recommends:

a. That adequate and appropriate resources are made available for the technical staff and laboratory to carry out the necessary monitoring.

b. An increase in the number of monitoring sites and compliance points, especially along critical drainage features such as Gulungul, Corridor and Georgetown Creeks and Coonjimba and Djalkmarra Billabongs to allow ongoing analysis and checks on sources of contaminants, loads, dilution, reactions and uptake by the ecosystem, and therefore possible impacts.

c. The adoption of broad event-based monitoring to ensure all necessary water management system components are compliant with limits set.

d. More rigorous horizontal and vertical monitoring and reporting of all groundwater units around tailings facilities

e. Increased check soil monitoring programs by SSD and DBIRD, more sampling points located in areas of active water treatment and more field studies to quantify the long-term containment retention characteristics of soils.

f. That ERISS adopts the ISP recommendations for its proposed 'landscape-scale program'.

Social and Cultural Impact Monitoring

2.153 The Primary Environment Objectives of the Commonwealth Environmental Requirements for Ranger (as incorporated in the Northern Territory Ranger General Authorisation) contain a provision that the mining company must ensure its operations maintain the attributes for which Kakadu National Park was inscribed on the World Heritage list which includes both natural and cultural values. Furthermore, the company must 'protect the health of Aboriginals and other members of the regional community'.

2.154 Environment Australia, in its response to the Jabiluka EIS said:

> …mining and its cumulative impacts have the potential to contribute to existing sources of stress, potentially leading to increased alcohol usage…[124]

2.155 The Northern Land Council in response to the same EIS said:

> Aboriginal people in the region have faced profound social, environmental and economic changes since the Ranger Uranium Environmental Inquiry examined the basis of their land claims and their opposition to uranium mining. There has been constant monitoring of biophysical environmental change in the region. In contrast monitoring of the social and cultural impacts of uranium mining … has been far from systematic and rarely aimed at securing equitable and sustainable benefits for Aboriginal groups.[125]

2.156 People's perceptions of the natural landscape also differ. For example, some Mirrar concerns not readily understood by non-Aboriginals extend beyond uranium pollution to include mining in general:

> There is a perception, and sometimes it is difficult for European people to understand, that Aboriginal people believe certain unconformities, fissures, rock formations and creek systems should not be touched for cultural reasons.[126]

2.157 Not since the Kakadu Region Social Impact Study (KRSIS) in 1997 has an assessment been made of the social impact of uranium on the Alligator Rivers Region community. According to GAC the KRSIS was a 'once-off' or 'snapshot' analysis of the social impact of uranium mining in the region.

2.158 The KRSIS Community Action Plan was considered by Commonwealth and Northern Territory Governments, and ERA during 1998, and responses to and commitments regarding against KRSIS recommendations were detailed in a document entitled 'Consolidation of Responses to the KRSIS Community Action Plan' in November 1998. A KRSIS Implementation Team was then established to implement the KRSIS program.[127]

2.159 The non-participation of the Gundjehmi Aboriginal Corporation in the KRSIS process was of concern to the KRSIS Implementation Team. The Committee understands this concern:

---

124 Gundjehmi Aboriginal Corporation, *Mirrar Living Tradition in Danger – World Heritage in Danger: Submission to the World Heritage Committee Mission to Kakadu, October 1998*, p 39.

125 Gundjehmi Aboriginal Corporation, *Mirrar Living Tradition in Danger – World Heritage in Danger: Submission to the World Heritage Committee Mission to Kakadu, October 1998*, p 38

126 Mr O'Brien, *Committee Hansard*, Jabiru, 1 October 2002, p 135.

127 ERA Website: http://www.energyres.com.au/community/krsis/index.shtml

> The KRSIS implementation process has regrettably been boycotted from the beginning by the Gundjehmi Aboriginal Corporation. The Corporation has refused to participate while ERA is involved in any way. All other Aboriginal Associations and the Northern Land Council have continually reaffirmed their view that the involvement of ERA, in any Kakadu regional social impact forum is essential, given their status as a major organisation and employer in the region.
>
> Considerable effort has been made to accommodate the concerns of the Gundjehmi Aboriginal Corporation. Following a meeting last year with officers of the Corporation, a proposal to restructure the KRSIS Implementation Team, by forming a Bininj only decision making group and a second group of all other organisations (including ERA), was negotiated with and supported by all other participants, but rejected by the Gundjehmi Aboriginal Corporation. ERA has tried to accommodate Gundjehmi concerns by making arrangements for local Aboriginal staff, employed in ERA's community development office, to represent ERA on the Implementation Team.[128]

2.160 The issues investigated in the 1998–2000 report are as follows:

Social Conditions

- housing and infrastructure;
- employment and training;
- education;
- health;
- Gunbang (Alcohol); and
- sport and recreation.

Cultural Issues

- Women's Resource Centre;
- ceremonies; and
- communication.

Economic Development

- economic futures;
- business development;
- mining and tourism moneys; and
- funding substitution.

Recognition and Empowerment

- the future of Jabiru;
- governance and service provision;

---

128 Bob Collins (2000), *Kakadu Region Impact Study Community Report: Report on Initiatives from the Kakadu Region Community and Government, on the Implementation of the Kakadu Region Impact Study*, November 1998–November 2000, Darwin, p 6.

- political futures; and
- monitoring.[129]

2.161 Mr Cleary, from ERA, outlined the Company's involvement in social impact monitoring and remediation:

> There have been a number of actions over the last few years, probably starting with the KRSIS—the social impact study that was done to look at the local impacts of uranium mining and how they can be minimised and mitigated. A number of actions have come out of it, which the company has supported and funded, and continues to do so. They are mainly to do with helping with the program on alcohol and substance abuse. Some of the programs are to do with activities for Aboriginal women in the area, to give them ongoing interest and to provide a community for engagement. We have also undertaken our own interim cultural heritage management plan. We have raised that as a possibility with the local traditional owners and asked them about their involvement in developing such a plan because, obviously, they have to have input into that. They are initiatives that we have taken. In the past, a number of forums were set up to allow engagement between the local Aboriginal communities and the mining company. Some of those have fallen into disuse, mainly as a result of the programs around the Jabiluka development. We would like to see those reinstituted, if they are seen by the traditional owners and the Northern Land Council as an effective forum for moving forward.[130]

2.162 The comment by Mr Cleary concerning some of the initiatives falling into disuse refers to the Mirrar people's refusal to accept any money emanating from the Jabiluka project.

> **Mr Fry—**…it is not that the Mirrar or any of the traditional owners of Jabiru are saying that they do not want monitoring of social impacts; it is that they do not want the Jabiluka mine. They are saying that they do not want to participate in any forum associated with that particular operation or moneys that flow from it. They are not saying that they do not want social impact; they certainly do want social impact. To that effect, the Commonwealth, the Northern Land Council, the Territory government and the company, ERA, instituted what is known as KRSIS, the Kakadu Region Social Impact Study. That was conducted some time ago and chaired by Pat Dodson. In that document there is a whole raft of recommendations and I understand that the chair, Bob Collins, is implementing those over time. It is fair, too, to say that the traditional owners have had concerns with that process but, nevertheless, to a certain degree, they are participating in it.

---

129 Bob Collins (2000), *Kakadu Region Impact Study Community Report: Report on Initiatives from the Kakadu Region Community and Government, on the Implementation of the Kakadu Region Impact Study*, November 1998–November 2000, Darwin, p iii.

130 Mr Cleary, *Committee Hansard*, Darwin, 30 September 2002, p 48.

> **Senator SCULLION—**So, just to get this clear again, the traditional owners are saying that they cannot really do this because, if they do, somehow they are saying that Jabiluka has to go ahead. Is that correct?
>
> **Mr Fry—**Yes, from their perspective that is correct.[131]

2.163 The Gundjehmi Aboriginal Corporation reinforced this view:

> …the mining company outlined that there is $600,000 held in trust by the NLC to progress social monitoring. Unfortunately, that is Jabiluka mine money and the Mirrar want nothing to do with it. It is common knowledge that there are millions of dollars in royalties held by the NLC on trust. Mirrar do not want to touch that money. They will never touch that money because it has to do with the Jabiluka mine.[132]

2.164 The GAC, which considers the issue of social impact monitoring to be crucial, commented as follows to the Committee:

> The current system is inconsistent, lacking in accountability and outdated. Agreements under land rights acts do not operate effectively and are not supported by legislation. While, strictly speaking, outside the terms of reference of this inquiry, social impact monitoring, crucial to the maintenance of the World Heritage values of Kakadu, is almost non existent. Although required for reporting under the Ranger environmental requirements, there is no ongoing social impact monitoring and minimal willingness to separate it from the development agenda. Thus the inclusion of a single clause for social impact monitoring in the environmental regulations is considered with the cynicism it deserves.[133]

2.165 It is clear that social impact monitoring is an issue that needs to be addressed. The ARRTC acknowledged that although it does not have the in-house expertise to supervise or conduct such work, it is an issue of high importance. At its February 2002 meeting, the ARRTC resolved that:

- it is desirable that social impact research and monitoring be undertaken in the Alligator Rivers Region (ARR) on a sustained basis;
- considerable biophysical research has been undertaken in the ARR. However, adequate social research is required to facilitate the application of this research;
- social research and monitoring should be progressed in the region in a strategic manner;

---

131 Senator Scullion and Mr Fry, *Committee Hansard*, Darwin, 30 September 2002, pp 65-66.

132 Mr Ralph, Gundjehmi Aboriginal Corporation, *Committee Hansard*, Jabiru, 1 October 2002, p 140.

133 Mr Ralph, Gundjehmi Aboriginal Corporation**,** *Committee Hansard*, Jabiru, 1 October 2002, pp 129-30.

- the ARRTC will seek to establish strong linkages with whatever body is established to manage social research and monitoring; and

- the ARRTC noted that no progress appears to have been made with social research and monitoring in the region, and resolved to bring this to the attention of the Minister.[134]

Recommendation 7

The Committee recommends:

a. **The Commonwealth commence dialogue with the Northern Land Council and the Traditional Aboriginal Owners of the Ranger and Jabiluka sites to, as a matter of priority, fund and establish a culturally-appropriate forum for Traditional Aboriginal Owners and other local Aboriginal people to monitor and commission independent research in relation to social and environmental impacts of mining operations and to develop policy recommendations in response to the findings.**

b. **The forum should be accorded full legal standing and be incorporated into the contractual arrangements that exist between the Commonwealth and Energy Resources of Australia.**

c. **Provision should also be made for this forum to instigate sanction processes where breaches of the existing Commonwealth Environmental Requirements occur.**

Mine Waste

2.166 The GAC provided the committee with an outline of the main types of wastes from uranium mining and milling:[135]

> High Grade Ore (various grades, generally >0.1% up to 10% U3O8; Ranger ~0.3% U3O8; Jabiluka ~0.5% U3O8)
>
> significant potential for impacts on water quality due to uranium and other metals (often associated with uranium mineralisation);
>
> source of sediment;
>
> strong source of radon gas and progeny;
>
> Low Grade Ore (generally 0.02-0.1% U3O8)
>
> significant potential for impacts on water quality due to uranium and other metals (often associated with uranium mineralisation);
>
> source of sediment;
>
> significant source of radon gas and progeny;

134 ARRTC meeting 9-10 September 2002 'Initial Summary', p 6.

135 Gundjehmi Aboriginal Corporation, *Submission 58*, p 40.

Inert or 'Non-mineralised' waste rock (generally <0.02% U3O8)

some potential for impacts on water quality, depending on weathering and metals and uranium;

source of sediment;

reasonable source of radon gas and progeny;

Tailings – finely ground ore remaining after milling

very high potential for impacts on water quality due to uranium and other metals (often associated with uranium mineralisation) and the numerous industrial chemicals used in milling and uranium extraction;

significant source of seepage to and potential for contamination of groundwater;

strong source of radon gas and progeny;

Contaminated minesite water

various ponds which are intended to retain the contaminated runoff from ore stockpiles, low grade ore stockpiles and/or store water for use by the mine and mill;

major source of potential risks and impacts to surrounding surface water ecosystems;

significant source of seepage to and potential for contamination of groundwater;

minor source of radon gas and progeny.

2.167 The list does not include the open cuts, mill area, Corridor and Georgetown Creeks, among other areas.

2.168 The GAC argued:

> For large and complex sites such as Ranger, construction of which commenced some 23.5 years ago, the quantities of these various types of wastes are significant. [136]

2.169 The GAC provided the committee with the following inventory of wastes from Ranger, as at December 2001:

Table 2.1 **Ranger Project inventory of wastes[137]**

• High Grade Ore Stockpiles :	7.9 million tonnes (Mt) at 0.20% U_3O_8
• Low Grade Ore Stockpiles :	about 35.032 Mt (approx. 0.06% U_3O_8)
• Non-Mineralised Waste Rock :	about 65.4 Mt [#] (<0.02% U_3O_8)

[# ERA and OSS data does not clearly distinguish or correlate, see Appendix 2; apparently includes some 'very low grade ore'.]

136 Gundjehmi Aboriginal Corporation, *Submission 58*, p 40.

137 Gundjehmi Aboriginal Corporation, *Submission 58*, p 42.

- Tailings (total) : 23.306 Mt (residual ~0.033% U3O8)

- Contaminated water (as of September 2001; NTSA, 2001b) :
  - o Tailings Dam 2,800,000,000 litres
  - o Pit #1 / #3 5,750,000,000 / 260,000,000 litres
  - o Retention Pond 1 (RP1) 260,000,000 litres
  - o Retention Pond 2 (RP2) 850,000,000 litres
  - o Retention Pond 3 (RP3) 52,000,000 litres

- Contaminated wetlands (water treatment) :
  - o Retention Pond 1 (RP1) 159.9 ha
  - o 'RP1' 38 Wetland Filter 27.8 ha
  - o Djalkmarra Creek/Billabong 57.7 ha

- Contaminated soils (irrigation) :
  - o Magela Land Application Area 55 hectares (ha)
  - o 'RP1' Wetland Filter Irrigation 46 ha
  - o Djalkmarra Irrigation Area 38 ha

- Average chemical / reagent usage in the Ranger mill (Appendix 2) :

Pyrolusite (MnO_2) 4,807 t (5.2 kg/t ore) Ammonia (NH_3) 1,303 t (0.52 kg/kg U_3O_8)
Sulfuric Acid (H_2SO_4) 42,272 t (43 kg/t ore) Kerosene 840,000 L (0.3 L/kg U_3O_8)
Lime (CaO) 16,554 t (17 kg/t ore) Amine 33,500 L (0.01 L/kg U_3O_8)

Water Quality Management

Uranium limits, trigger levels and expansion of contaminants monitored

2.170 The management of water quality is governed by a system structured around 'focus', 'action' and 'limit' levels. A new system for water quality compliance, introduced in 2001, is based on the Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) National Water Quality Management Strategy.[138]

2.171 In general, the trigger values are based on statistical variation from average background concentrations and/or ecological toxicity for various contaminants or solutes, as derived by the work of the SSD (eg. Klessa, 2000, 2001a, 2001b; Van Dam, 2000). The terms for each trigger level are defined as (SSD, 2001):

> Focus: one standard deviation from the mean or average concentration; requires a '*watching brief*' or closer attention paid to whether variation is natural or possibly mine-related, further sampling may be necessary;

138 ANZECC and ARMCANZ (2000), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy', ANZECC and ARMCANZ, Paper No. 4, October 2000.

Action: two standard deviations from the mean or average concentration; requires *'investigation and corrective action'* to ascertain the cause of the elevated values;

Limit: three standard deviations from the mean or average concentration or an alternate concentration based on ecological toxicity; potentially due to operations at Jabiluka and a *'breach'* of environmental authorisations, clear corrective action required. Supervising Scientist to advise Minister on whether the Environmental Requirements have been breached.

Table 2.2 **Water quality triggers for Magela Creek at GS8210009**

	Units	MAAs [1]	Focus	Action	Limit	NWMQS
Electrical Conductivity (EC)	µS/cm		21	30	43	20–250 [2]
pH	-	no data	5.8–6.50	5.1–6.8	5.2–7.2	6.0–8.0 [3]
Turbidity	NTU	15	10	24	56	no data
Calcium (Ca)	mg/L	1.3	not set	not set	not set	
Magnesium (Mg)	mg/L	10	use EC	use EC	use EC	no data
Nitrate/Nitrite (as N)	mg/L	0.6 (4.4)	not set	not set	not set	0.075 [3]
Phosphate (as PO_4)	mg/L	0.01 (2.8)	use EC	use EC	use EC	no data
Sulfate (SO_4)	mg/L	19	use EC	use EC	use EC	no data
Copper (Cu)	µg/L	0.6 (90)	not set	not set	not set	
Lead (Pb)	µg/L	0.7 (8)	not set	not set	not set	
Manganese (Mn)	µg/L	24 (6)	10	18	32	
Uranium (U)	µg/L	3.8 (3.2)	0.20	1.40	5.8	0.5 [4]
Zinc (Zn)	µg/L	5 (200)	not set	not set	not set	
Radium (^{226}Ra)	mBq/L	(13)	>10	>10 over 90 days	>10 over 1 year	no data

[1] Maximum Allowable Additions (MAAs) based on Authorisation 82/3 – Loads in brackets are t/year except uranium (^{238}U & ^{234}U) and radium in GBq/year (10^9 Bq/year) (the 88 GBq/year is approximately 3.5 t of uranium, assuming radioactive equilibrium between ^{238}U & ^{234}U);
[2] Recommended values for 'slightly disturbed' NT tropical upland and lowland rivers;
[3] Recommended values for 'slightly disturbed' NT tropical wetlands, freshwater lakes and reservoirs, and lowland rivers;
[4] Considered a 'low reliability' toxicity-based guideline.

Sourced from Gundjehmi Aboriginal Corporation Submission 58, p 58.

2.172 The trigger values for pH, Mg and SO4 are considered guidelines only whereas U, ^{226}Ra and Mn are statutory.[139]

2.173 ERA claims that:

> …focus and action levels provide ERA and key stakeholders with an early awareness system to track very small fluctuations in variables, such as uranium, so that the source of any change in water chemistry can be

139 Gundjehmi Aboriginal Corporation, *Submission 58*, p 58.

> understood and, if necessary, action taken to prevent any actual detrimental environmental impact.[140]
>
> While an individual value falling above the action levels may not in itself be significant, when a value lying above the action level is part of a clear trend or there are successive values above the action levels it can be interpreted that there is a reasonable likelihood that there has been a real change in water chemistry.[141]

2.174 The uranium levels that are currently acceptable for Jabiluka and Ranger vary and are given in the table below:[142]

Table 2.3 **Focus, Action and Limit Levels for Ranger and Jabiluka**

Project	**Focus (ppb)**	**Action (ppb)**	**Limit (ppb)**
Ranger (Magela Creek) (GS8210009)	0.2	1.4	5.8
Jabiluka (Swift Creek) (JSC-GS8215127)	0.02	0.03	5.8

2.175 These levels reflect what are considered by SSD the 'normal' range of values encountered during a wet season.

2.176 Trigger levels were the subject of considerable debate in the inquiry. When questioned regarding the validity of the levels, the Supervising Scientist, Dr Johnston, stated:

> The limit in our view is the one that is completely scientifically defensible—at a very high standard of protection. But the focus and the action levels are right down in the natural distribution, so that you would expect those volumes to occur every now and again. But there is no doubt that, in the way Ranger mine or the Jabiluka project are operated at the moment, the attempt is being made—and it has been successful—to achieve volumes of uranium which are below the statistically determined focus and action levels. [143]

---

140 Energy Resources of Australia Ltd, *Submission 56*, pp 8-9.

141 Energy Resources of Australia Ltd, *Submission 56*, p 8.

142 ppb = parts per billion, is the same as µg /l, micrograms per litre. For the purpose of this chapter ppb will be used unless in a direct quote.

143 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 11.

2.177 The GAC said the limit levels at both Ranger and Jabiluka should be significantly lowered, proposing 0.5ppb for Ranger[144] and 0.05 ppb for Jabiluka.[145]

2.178 Professor Barry Hart, Chair of the ARRTC, when asked to comment, said it is rare for background levels to rise above about 0.1 parts per billion, arguing that there is a significant difference between the present levels and the levels the ecosystem can tolerate:

> A figure of 5.8 is really indicating that the level is a lot more accurate than I think the basis ecotoxicological data allows. To go back to the way in which ERISS arrived at the figure of six, it was in line with the new ANZECC[146] guidelines for 99 per cent protection of the aquatic biota. That is certainly the internationally accepted methodology nowadays for very high and essentially unmodified ecosystems.
>
> … we were happy with the process that ERISS had gone through to get to that statutory limit, and the Mirrar suggestions are way out of what I think is necessary.[147]

2.179 The GAC say that in general the philosophy of adopting trigger levels based on statistical variation from background water quality is reasonable. However they have specific concerns about the use of the trigger system and the values adopted for specific contaminants:

- ***Uranium*** – the 'Limit' of 5.8 µg/L is some 580 times the well documented background of 0.01 µg/L. If this value is reached at the downstream point in Swift Creek (JSC) – which is within the Kakadu National Park World Heritage area – the increase in uranium loads through the Jabiluka region will be substantial – especially given the extremely low concentrations prior to development. If it is assumed that the entire 5.8 µg/L is derived from discharge from the North Tributary and this is about 1% of flow in Swift Creek, this means that the U concentration in North Tributary would need to reach 580 µg/L – equivalent to the direct discharge of IWMP water and a major failure of the generally accepted mining industry principle of waste containment on-site and 'As Low As Reasonably Achievable' (ALARA). Based on the current system, such performance would appear to be acceptable to regulators. It is unacceptable to the Mirrar that such pollution could or even might occur, regardless of the scientific merits of 5.8 µg/L from an ecotoxicological perspective. The Mirrar strongly object to the type of change – not merely the degree of change.

144 Gundjehmi Aboriginal Corporation, *Submission 58*, p 5B.

145 Gundjehmi Aboriginal Corporation, *Submission 58*, p 5E.

146 Australian and New Zealand Environment and Conservation Council.

147 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 340.

- ***Nitrate (NO_3) / Ammonium (NH_4)*** – ecosystems in the tropics are generally leached of nutrients such as nitrogen and phosphorous, which is reflected in the very low background concentrations found in the Swift Creek catchment (see Table 4 above and Table 9 of Appendix 6). The blasting of rock for construction works and the decline used ammonium-nitrate (NH_4NO_3), which has been detected at significantly elevated concentrations in the tributaries and at the downstream monitoring point in Swift Creek (JSC) (Ref: (see ERA-JAER, 1999, 2000, 2001; Mudd, 2001).(*The NO_3 pollution issue is addressed as an appendix in ERA-JAER (2001), and an internal ERA report (Farrar et al., 1999), however, they merely document the source of NO_3 and assert no impact (ignoring the concerns above). The Farrar et al. (1999) report should be made available on the public record in the process of deriving new trigger levels for NO_3 and NH_4.)*

- The major concern is that additional nitrogen inputs into the catchment could cause algal blooms in surface waters; it is likely that such blooms have already occurred. The initial baseline studies used a chemical detection limit for NO_3 which was too high (0.2 mg/L), with more recent data using 0.02 mg/L. When ammonia leaches into surface waters (or groundwater), it can oxidise (react with oxygen) easily, releasing acidity and converting the nitrogen to the nitrate form. This process led to major impacts on surface water and groundwater quality at Nabarlek from irrigation of evaporation pond waters rich in ammonia (see URG, 1998; Mudd, 1999). Given the poor detection limit and the impacts from blast residues leaching from waste rock, the NO_3 trigger levels are therefore derived from a data set which appears to be biased towards elevated values. There are also no trigger levels for NH_4. The trigger values, as set, therefore allow an unacceptable degree of nitrate pollution in the Swift Creek catchment related to the leaching of blast residues from the site.

- ***Radium (^{226}Ra)*** – although there are trigger levels for radium at Ranger, there appears to be no statutory requirement for such at Jabiluka. It can only be assumed that the same criteria of a difference of 10 mBq/L between upstream and downstream water quality is considered for Jabiluka.

- ***Load Limits*** – the original water quality criteria for Ranger included not only concentration limits but also load (mass) limits. The current trigger system for Jabiluka includes no load limits. For example, assuming the average background concentration of 0.01 µg/L and the (OSS average) flow volume of 14,327 ML at JSC, this gives a natural uranium load of about 0.143 kg – *EXTREMELY LOW*. Assuming that North Tributary is 1% of the flow at JSC, if the concentration does reach 580 µg/L, the load entering JSC would be some 83 kg – or an increase of 580 times background.

- ***Statistical Analysis*** – as with Ranger, the trigger system applies to a single monitoring point downstream of the Jabiluka site. Although upstream water quality data is collected, it is generally not made explicit

> use of (radium being an exception). The trigger system would be greatly enhanced if it was to make reference not only to natural variation at the downstream point but also if there was any statistically significant difference between the upstream and downstream monitoring locations (as is done for radium).[148]

2.180 In a supplementary submission,[149] in response to the recommendations made by the GAC, Dr Johnston maintained that the levels had been based on 'sound science' and are 'highly protective of the environment'. He saw no scientific justification for lowering the limit levels as every effort is made to keep the concentrations below the levels prescribed, as is reflected in the focus, action and limit level system.

2.181 SSD said:

> The limit is either determined from toxicological testing using local native species of animals and plants or, where such information is not available, the value is set at the mean plus 3xSD level.[150]
>
> Load limits were established principally to ensure that Aboriginal people who use the Magela System as a source of food and water are not at risk from adverse health impacts. These load limits, first recommended by the Supervising Scientist in 1985, are still in place. The Supervising Scientist has identified the need to review these load limits to take account of the latest available guidelines and data. This review is planned to take place prior to the 2003/04 Wet season.[151]

2.182 ERA asserts that there is no need to reassess the trigger levels specified by the GAC, on the grounds that the current Authorisation is appropriate for care and maintenance at Jabiluka. SSD agreed saying that the trigger system at Jabiluka was developed considering the natural distribution of parameters in Swift Creek and the potential for the Jabiluka site to impact on those parameters.[152]

2.183 With regard to the GAC's call for expanding the contaminants to be included in the trigger system, ERA said:

> Scientific assessments by the Supervising Scientist from monitoring data compiled since the commencement of operations at Ranger have determined that potential contaminants such as those listed are either not derived in significant quantities from mining activities (Cu, Pb, Zn, PO_4) or are substantially immobilised by wetland filter systems (NO_3) before

148 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 98-99.

149 Office of the Supervising Scientist, *Submission 77c*, pp 7, 9.

150 Office of the Supervising Scientist, *Submission 77,* p 30.

151 Office of the Supervising Scientist, *Submission 77c*, pp 6-7.

152 Office of the Supervising Scientist, *Submission 77c*, p 8.

> entering downstream natural surface water drainage. However, ERA does regularly run ICPMS[153] scans of surface water and groundwater samples to check for elevated concentrations of unusual solutes.[154]
>
> Water samples from statutory monitoring sites are analysed for such indicator and contaminant metals and other solutes according to the Authorisation.[155] Water samples collected as part of the operational monitoring program, or as part of special project investigations, are analysed as appropriate for suites of metals and solutes.[156]

2.184 The SSD argued:

> The chemical constituents which are the subject of the monitoring regime at Ranger have been determined on the basis of their potential to impact on human health or the environment, the significance of Ranger as a source, and their behavior in comparison with other contaminants. It is not considered necessary at this time to develop triggers for NO_3, PO_4, Cu, Pb and Zn.[157]

2.185 The GAC called for a significant improvement in the general monitoring and management of contaminated minesite waters at Ranger through:

> More Monitoring Locations – a more rigorous monitoring program is clearly required. (See section on Compliance and statutory monitoring points)
>
> More Frequent Sampling – in order to distinguish the 'first flush' effects of early wet season rains, more frequent water sampling is clearly required. This should include electronic and automatic samplers to collect samples over storm events or various stages of creek flows. Many water storages should also be sampled more than quarterly or monthly and instead fortnightly during the wet season (eg. RP2, above ground tailings dam, Pits #1 and #3, seepage collection systems).
>
> More Detailed Hydrology – the collection of detailed hydrology and stream flow data should be more comprehensive than at present. There is no flow curve or other hydrology data for Magela Creek or other creeks presented graphically by DBIRD, OSS or ERA. Generally, only dates of first and final flow are reported, with perhaps total flow volumes as available or water discharges from Ranger.

---

153 Inductivity Coupled Plasma Mass Spectrometer (ICPMS).

154 Energy Resources of Australia Ltd, *Submission 56a-4,* p 5.

Note: Cu—Copper, Pb—Lead, Zn—Zinc, PO_4—Phosphate and NO_3—Nitrate.

155 The GAC recommended Manganese (Mn), Radium 226 (^{226}Ra), Magnesium (Mg) and Sulphate (SO_4).

156 Energy Resources of Australia Ltd, *Submission 56a-4*, p 6.

157 Office of the Supervising Scientist, *Submission 77c*, p 7.

More Comprehensive Analysis – at present, the main determinant of what contaminants are analysed in water samples is Authorisation 82/3. Accordingly, some contaminants are not covered in sufficient detail to ensure releases from Ranger are quantified and the minimum or lowest that can be achieved. Some examples include radium (^{226}Ra), nitrate (NO_3).[158]

Recommendation 8

In relation to water quality management, the Committee recommends that:

a. the re-incorporation of load limits into water quality criteria which are no more than twice the average natural loads in a system (preferably lower)

b. the limit for uranium at gauging station 8210009 in Magela Creek lowered from 5.8 µg/L to 0.5 µg/L

c. a separate system of trigger levels at important discharge sites such as Corridor Creek, RP1 and Gulungul Creek

d. the trigger system for water quality to be expanded to include other contaminants from Ranger such as NO_3, PO_4, Cu, Pb, Zn, radium Al, Mn, P and Re,

e. The trigger levels for NO3 should be re-assessed, including the addition of NH4 trigger levels, utilising a data set which includes sufficiently low detection limits and the effects of blast residues leaching removed to provide concentrations more closely representative of natural NO_3 and NH_4 in Swift Creek.

f. the trigger system to include the loads of contaminants as well as concentrations

g. the trigger system to be enhanced to include statistical analysis of difference between upstream and downstream water quality monitoring locations.

h. Greater emphasis be placed on collecting hydrology data for joint interpretation with water quality data.

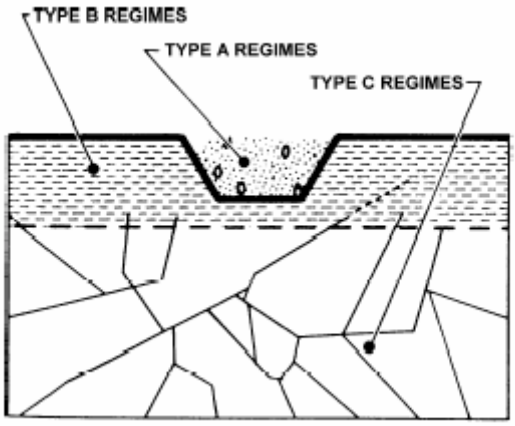
158 Gundjehmi Aboriginal Corporation, *Submission 58*, p 67.

Groundwater contamination

2.186 The GAC claim that the Mirrar are concerned for the protection of groundwater, and that the 'Ranger and Jabiluka sites can generally be simplified as consisting of shallow aquifers ('Type A and B' regimes) and deeper fractured rock aquifers ('Type C')', as shown in the figure below.[159]

2.187 The GAC notes that many of the papers on the proposed in situ rehabilitation of the above ground tailings dam were co-authored by ERA, OSS and/or DBIRD staff.[160]

Figure 2.9 **Simplified groundwater systems at Ranger**



Supplied by Gundjehmi Aboriginal Corporation, Submission 58, p 62, Figure 12.

2.188 The GAC argues that the seepage from the above ground tailings dam and now Pit #1 has not been adequately addressed in public reports by ERA, DBIRD or the SSD. The principal concerns relate to:

- contamination of shallow aquifers connected to surface waters, including billabongs
- contamination of deep aquifers connected to shallow aquifers;
- difficulties in accurately quantifying and predicting groundwater behavior.

As Figure [2.9] highlights, fault and fracture zones can represent an opportunity for rapid groundwater flow, as recognised by the Ranger Inquiry (eg. pp 98-103, Fox *et al.*, 1977). The Mirrar contend that the significance of this contamination pathway has been consistently downplayed in public by the OSS, DBIRD and ERA. For example, no

159 Gundjehmi Aboriginal Corporation, *Submission 58*, p 61.

160 Gundjehmi Aboriginal Corporation, *Submission 58*, p 61.

> known public report or paper shows the existing plume of seepage from the above ground tailings dam. The importance of fracture and fault zones on permeability and therefore the potential for groundwater contamination.[161]

2.189 ERA claims that the implementation of a check monitoring program is a task for the SSD. However, the latter does not refer specifically to groundwater issues in its responses. On the subject of a greater number of groundwater monitoring bores, ERA comments that:

> It is important to point out that groundwater movement in the deeper aquifers, even when associated with preferred pathways, is slow and that an appropriate monitoring strategy is generally not related to frequency of sampling. As the operational situation at Ranger changes, existing groundwater bores may be decommissioned and new bores established. A recent study of pathways for contaminant movement away from mine landforms as a prelude to generating a new environmental monitoring regime has identified new monitoring bore locations.[162]

2.190 The GAC say that a confidential internal DBIRD (then DME) report from January 1992 (Woods, 1992) discusses their check water monitoring program at Ranger and presents a figure of the plume from the above ground dam, which shows major contamination along the major fault zones, as acknowledged by the Ranger Inquiry.

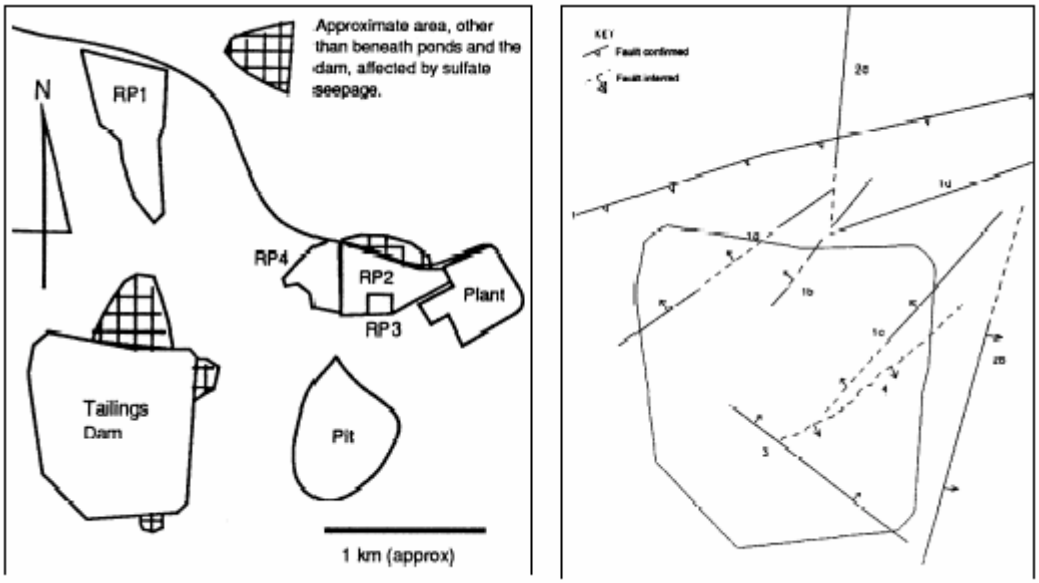
2.191 Of further concern to the GAC is an internal OSS report (Klessa, 2001c 51) which incorporates a 1973 figure of the interpreted fault lines in the area of the above ground tailings dam. The two figures are shown in Figure 10 (GAC Figure 13) A more detailed analysis and cross-section showing permeability of both the above ground dam and Pit #1 was developed by Haylen (1981), both shown in Figure 2.11 (GAC Figure 14).[163]

Figure 2.10

161 Gundjehmi Aboriginal Corporation, ***Submission 58***, p 62.

162 Energy Resources of Australia Ltd, ***Submission 56a-4***, p 9.

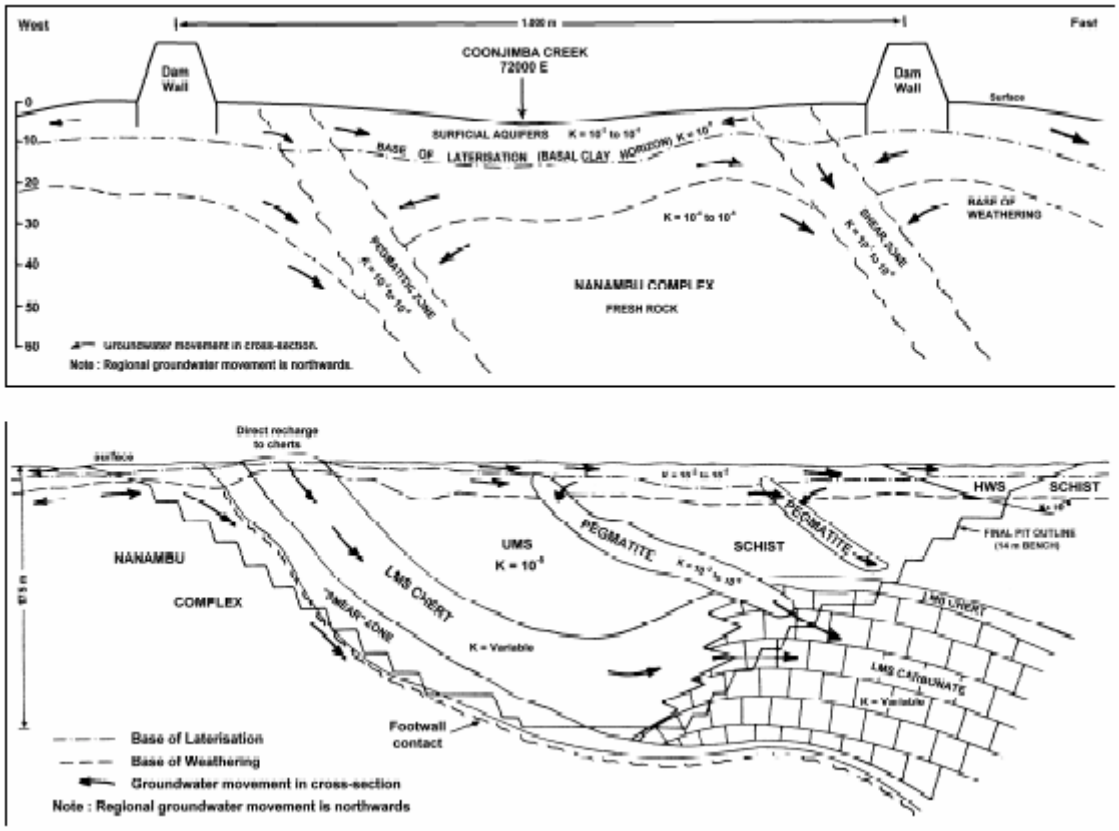
163 Gundjehmi Aboriginal Corporation, ***Submission 58***, p 62.



Left: Seepage plume (based on elevated sulfate) from the above ground dam. Right: Known and inferred fault lines beneath the above ground dam

Source: Gundjehmi Aboriginal Corporation, Submission 58, p63, Figure 13.

Figure 2.11



Permeability of faults, fracture zones and rock units beneath the above ground dam and Pit #1

Source: Gundjehmi Aboriginal Corporation, Submission 58, p63, Figure 14.

> There are a number of internal reports by ERA (compiled within Appendix 5) which address the rate of contaminant migration through faults zones, work often done by the Australian Nuclear Science & Technology Organisation (ANSTO) or the Commonwealth Scientific & Industrial Research Organisation (CSIRO). In a conference poster in Germany in September 1998 (Woods & Foley, 1998), ERA acknowledged the plume migration and the importance of the faults in controlling the pathways for contamination. In recent years ERA has been undertaking research on the use of geophysical surveying methods to locate and identify seepage plumes.
>
> Other research by the OSS mainly centres on groundwater chemistry and the mechanisms of radionuclide migration (eg. U, 226Ra) and major solute migration (eg. Mg, SO4) (eg. Martin & Akber, 1996; Kalf & Dudgeon, 1999; Klessa, 2001c). Based on the bibliography of OSS publications 52, it would appear that detailed hydrogeology studies, especially the quantification of groundwater flowpaths, do not receive priority in the research efforts of the OSS.
>
> It is clear that the OSS, DBIRD and ERA are well aware of the issues raised above although the lack of dedicated expertise in hydrogeology within the OSS is of concern. The lack of scientific rigour by DBIRD and ERA in reporting on the above issues also raises significant concerns about their attention on groundwater protection.[164]

2.192 ERA say that discussions are in progress with stakeholders regarding decommissioning and rehabilitation strategies that require the support of groundwater flowpath modelling.[165]

2.193 GAC advise:

> The Mirrar agree with Mudd (2002a) that the short and long-term impacts on groundwater resources and quality are not give due prominence in environmental monitoring and reporting (the relevant examples include Nabarlek, Rum Jungle and Ranger). There needs to be a greater emphasis on quantifying groundwater behaviour and publicly reporting the results, especially given the needs to predict groundwater behaviour for some 10,000 years into the future to ensure waste containment after rehabilitation.[166]

---

164 Gundjehmi Aboriginal Corporation, *Submission 58*, p 64.

165 Energy Resources of Australia Pty Ltd, *Submission 56a-4*, p 4.

166 Gundjehmi Aboriginal Corporation, *Submission 58*, p 64.

Recommendation 9

The Committee recommends that groundwater should be better protected by:

a. more groundwater bores to allow the checking and analysis of groundwater quality

b. the conduct of more detailed field studies aimed at quantifying groundwater flow paths to enable more accurate short and long term modelling.

c. greater emphasis on identifying potentially permeable rock units, especially carbonate features as identified by Haylen (1981);

d. more rigorous monitoring and reporting of different components of groundwater, both vertically and horizontally;

e. investigation of methods needed to ensure low permeability of tailings liners, especially where the pit walls are in more permeable strata (especially above RL 0 m).

Minesite rehabilitation and 'Sacrifice Zones'

2.194 The regulations and requirements for mine site rehabilitation for Ranger and Jabiluka are outlined in the rehabilitation sections specific to those mines.

2.195 It is clear to the Committee that mine site management and containment of contaminants throughout the operation of these mines is crucial to achieving the reasonable expectations that Traditional Owners and interest groups have of high standards of rehabilitation.

2.196 The short and long-term effects of radioactive waste material pose a significant potential danger to the environment and its inhabitants and 'acid mine drainage, excessive radiation levels, ground and surface water contamination and exposure of radioactive waste materials'[167] have been the legacy of uranium mines in the past.

2.197 Accordingly, the Committee believes that a greater effort must be made, by ERA and regulatory authorities, to see that industry practices and outcomes lead to rehabilitation that is acceptable, particularly to the Mirrar.

2.198 There is by no means agreement about the long term impact of Jabiluka and Ranger on Kakadu National Park.

---

167 Australian Institute of Nuclear Science and Engineers, 'Progress Report for Radionuclide Characterisation of Tailings and Tailings Seepage Precipitates at the Mary Kathleen Uranium Mine.:http://www.ainse.edu.au/ainse/prorep2000/R_00_089.pdf

2.199 Dr Johnston, of the SSD, believes that the environmental record to date has been excellent. He has also called for recognition of such success:

> I consider that this is an exemplary record of environmental protection over a period of more than 20 years, and it is a record that has been delivered by the regulatory system that has been in place. It is disappointing that people continue to focus on relatively minor detail and ignore the most important outcome—that is, the environment of Kakadu has been protected.[168]

> … irrespective of what this [Senate] inquiry might find about the adequacy or otherwise of environmental regulations, the one thing that stands out to me is that, for 25 years, the environment out there has been protected to a very high standard. That is something I would like to see people be a bit proud of.[169]

2.200 The Committee put this question to Professor Barry Hart:

> Have you, in your time and investigations, come across any evidence to suggest there has been any devaluing of the environment outside of the project area and any evidence of an alteration or degrading of the biodiversity values of the park?
>
> **Prof. Hart**—Due to the mine?
>
> **Senator SCULLION**—Yes, due to the mine.
>
> **Prof. Hart**—I think the answer to the latter question is definitely yes due to buffalo and a few things like that, but due to the mine the answer is no, we have not seen any evidence which would suggest that.[170]

2.201 Whilst buffalo may be doing damage to Kakadu National Park, the Committee is not convinced that two uranium mines in its midst pose less risk. Central to the inquiry has been debate about whether the monitoring systems that are in place can be expected to provide the evidence of short or long term impact and whether the many incidents and examples of poor management practices cited elsewhere, can be so easily dismissed.

2.202 There were however numerous critics of current management and its implications for rehabilitation. The ECNT argued mine areas were being seen as 'sacrifice zones':

> Under the environmental requirements, the regulators and the company are supposed to minimise their environmental impacts on the lease. That

168 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 2.

169 Dr Johnston, *Committee Hansard*, Darwin, 30 September 2002, p 31.

170 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 345.

> has not happened. The lease has been viewed largely as a sacrifice zone. We should remember that the Ranger lease shares the same environmental and cultural values as the rest of Kakadu National Park and is ultimately intended to be included in that area. So, in terms of minimising impact, we also have to look at minimising the impact on the lease area.[171]

2.203 The ECNT expressed the view that the SSD 'has been overly focused on off-lease impacts'.[172] It cites as an example the SSD's approval to increase the allowable water application areas at Ranger and Jabiluka—thereby expanding the footprint of the area—as evidence of an apparent SSD 'preparedness' to:

> …facilitate ERA's operational needs ahead of all other concerns and its reporting sophistry … This approach has a direct bearing on environmental values now and into the future and further complicates site rehabilitation issues … It is clear that increasing the size of the contaminated area on the site and the levels of contamination has major implications for rehabilitation and also for the long-term impacts of the mine on areas downstream. Focusing upon off-site impacts also restricts full analysis of the cumulative on and off site impacts of mining and obscures a view of the complete impacts of mining and any potential problems or issues that may emerge at a landscape scale. Given that the Ranger Project Area is supposed to be incorporated into Kakadu National Park following rehabilitation ECNT believes that the OSS needs to pay much greater attention to on-site impacts.[173]

2.204 Mr Tutty, of the Australian Greens–Northern Territory, also criticised the idea or perception of the mine areas as 'sacrifice zones':

> We are shocked at the suggestion that under the Mining Management Act they have to have an impact off site before prosecution is considered. That hints at an attitude which has surrendered the project areas as sacrifice zones, betraying the primary environmental objective to rehabilitate these sites to a state fit for incorporation into Kakadu. It seems to us that the current overarching goal of the regulators is to prove the absence of significant pollution, rather than acting to ensure that it does not happen. Prevention of possible pollution would be far better than reacting after the event. Recent responses by the regulators to breaches of relevant acts have been too weak to ensure any greater protection of Kakadu.[174]

2.205 According to the International Atomic Energy Agency (IAEA), uranium mining enterprises in the Northern Territory require detailed standards and obligations for site rehabilitation and closure. The community, industry and governments have an

---

171 Mr Wakeham, *Committee Hansard*, Darwin, 30 September 2002, p 84.

172 Environment Centre NT, *Submission 50*, p 8.

173 Environment Centre NT, *Submission 50*, pp 8-9.

174 Mr Tutty, *Committee Hansard*, Darwin, 30 September 2002, pp 90-91.

increasing awareness of the environment and the uranium mining industry acknowledges that the environmental protection and rehabilitation record was a poor one. In more recent years rehabilitation has been demanded by the community and stakeholders.[175]

2.206 The DBIRD states that the broad objective for mine closure in the Northern Territory is:

> That mine sites (a mine being defined as the total area encompassed by a Departmental licence/lease) should be rehabilitated to a standard which minimizes or negates restrictions on sequential land use (both on site and in adjacent areas) …[176]

2.207 Rehabilitation is defined in the Ranger Environmental Requirements as encompassing:

> …decommissioning to remove plant and equipment, foundations and related infrastructure; civil works to reshape and stabilize the mine site, primarily to minimize erosion, contain contamination, and for aesthetic reasons; the final placement of tailings and all other excavated material and any hazardous substances; and revegetation.[177]

2.208 The Minerals Council of Australia defines rehabilitation and closure, respectively, as:

> Rehabilitation: the return of disturbed land to a stable, productive and self-sustaining condition, after taking into account beneficial uses of the site and surrounding land.[178]

2.209 The Committee acknowledges that the disturbance caused by mining cannot be entirely reversed by rehabilitation and for the Mirrar the cultural damage cannot ever be undone, however, it is of the view that, because of the importance of this region to World Heritage and to Indigenous Owners, the management of mining activities must, first and foremost, be geared to the highest possible standard of rehabilitation. The Committee is not convinced that this has been the case thus far.

---

175 P. W. Waggitt, and A. Zapantis, 'Improving Rehabilitation Standards to Meet Changing Community Concerns: A History of Uranium Mine Rehabilitation with Particular Reference to Northern Australia.' in *The Uranium Production Cycle and the Environment*, IAEA, C and S Papers Series No. 10/P, Vienna, 2002, pp 465-73.

176 DBIRD, 'Mine Close Out Criteria—Life of Mine Planning Objectives', 2001, p 1.

177 Clause 20, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

178 'Minerals Council of Australia—Mine Closure Guidance Note', p 2.

Recommendation 10

The Committee recommends that the ARRTC becomes involved in the rehabilitation planning process for both Jabiluka and Ranger and works closely with operators and the Traditional Owners in formulating and implementing rehabilitation and closure plans.

Ranger

Tailings Management

2.210 The management of uranium mill tailings requires containment of the wastes and contaminants for more than 10,000 years – an issue, according to Wasson *et al*, which fundamentally challenges modern science.[179]

2.211 The GAC says the issue of interim and long term storage and management of tailings has always been contentious, with the dominant issues radon flux, water management, physical stability, seepage to and contamination of groundwater and long-term management and rehabilitation.[180]

2.212 The GAC described the many changes and extensions in the operational life of Pit #3 which is adjacent to Magela Creek and its significance for tailings management:

> The mining of Pit #3 was initially planned to be completed by 2007 but by mid 1998 the date had already been reduced to 2004 (p. 8 ERA-AR, 1998). In mid 1999 the end date for mining was 2006 (p. 8, ERA-AR, 1999). By mid 2000, detailed drilling and geologic analysis had been undertaken to significantly increase the reserves at Pit #3 and mining was expected to finish by 2007 (p. 5, ERA-AR, 2000). The position by early 2002, however, was that mining of Pit #3 "… is expected to continue until at least 2009" (p. 5, ERA-AR, 2001).
>
> The mining life of Pit #3 is critical since it will be the tailings repository after the filling of Pit #1 with tailings. Depending on timing, Pit #1 may be full of tailings by perhaps 2006 or 2007, with pit #3 not available until about 2010 (based on current mine plans). This would place enormous strains on tailings storage capacity as well as water management and could significantly complicate the timing of rehabilitation after the milling of stockpiles is completed.[181]

2.213 The current ERs (Jan 2000) require all tailings to be placed in the mined out pits #1 and #3 and physically isolated from the environment for at least 10,000 years but ERA was allowed ten years to research and try to justify a case for rehabilitating

---

179 Gundjehmi Aboriginal Corporation, *Submission 58*, p 60.

180 Gundjehmi Aboriginal Corporation, *Submission 58*, p 53.

181 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 44-45.

the above ground dam as is. According to the GAC, ERA only agreed to abide by the ERs in December 1997 after a long drawn out process.[182]

Level at which tailings are stored

2.214 Of some contention is the issue of the level at which tailings can be stored. Fox *et al* (1977) and various analyses of the late 1980's to mid 1990's and research carried out on the potential rehabilitation of the above ground dam conclude that tailings should be managed below grade (RL 0m).

2.215 The GAC point out that although the upper height limit of tailings currently allowed in Pit #1 is RL 0m—about 20-35 m below ground surface—this is not incorporated into Authorisation 82/3 nor the current ERs:

> …ERA is investigating strategies which could allow them to obtain approval for depositing tailings above RL 0m, though this is not being undertaken with great public acknowledgement (or debate) by ERA, OSS or DBIRD.[183]

2.216 SSD advised in their response to questions raised at hearings:

> The Ranger General Authorisation issued by the Northern Territory regulator does not specify that tailings are not to exceed RL0 in pit 1. The application to deposit tailings in pit 1 submitted by the company contained the commitment that tailings would not exceed RL0. Our assessment is that as the application was considered and approved on that basis, it was not necessary to repeat that requirement in the Ranger General Authorisation.
>
> The Commonwealth Environmental Requirements for Ranger set the environmental objectives the company is required to meet but contain little prescription on how to meet them. Thus, they do not require that tailings not exceed RL0 in pit 1.
>
> If ERA submits an application to store tailings in Pit 1 above RL0, the MTC will assess the application in the light of the scientific evidence presented. In particular, the probability of environmental impact arising from the dispersion of constituents in groundwater will be a key issue in any such assessment.[184]

2.217 The report by Riley & Rippon (1997), argues that:

> Previous studies suggest that the risk of failure of the proposed rehabilitation structure at Ranger Uranium Mine over a 1000 year period

182 Gundjehmi Aboriginal Corporation, *Submission 58*, p 55.

183 Gundjehmi Aboriginal Corporation, *Submission 58*, p 55.

184 Office of the Supervising Scientist, *Submission 77c*, pp 4-5.

> is high but that the direct environmental bio-chemical hazard of released tailings is low.[185]

2.218 The GAC point out that:

> The 20-335m is where shallow aquifer sands, gravels and porous soils exist which often have direct connections to surface water systems, such as billabongs. Groundwater discharge to billabongs is especially important in the dry season. There are legitimate concerns about the long-term impacts on groundwater (<10,000 years) from tailings stored above RL 0m.[186]

2.219 The GAC complained about reducing standards in tailings management:

> At present, tailings are deposited into the former Pit #1. The acidic tailings from the mill were neutralised to pH 7, although in more recent times the pH is only adjusted to pH 5 (with current plans to shift lower to pH 4 45 (to cut costs).[187]
>
> The approvals process for tailings deposition into Pit #1 led to ERA not being required to line the pit with an impermeable barrier, such as clay, to minimize groundwater contamination. It was argued that fractures and permeable units such as carbonate rocks would not be dominant in controlling groundwater flow since the tailings would be of relatively lower permeability and therefore only minimal seepage may reach groundwater.[188]

Effects on groundwater

2.220 The Mirrar have concerns for the effects that the tailings may have on groundwater and believe that 'the short and long-term impacts of groundwater resources and quality are not given due prominence in environmental monitoring and reporting.'[189]The Mirrar are concerned that the seepage from the above ground tailings dam and Pit #1 have been inadequately addressed by ERA and the supervising authorities highlighting:

- contamination of shallow aquifers connected to surface waters, including billabongs;
- contamination of deep aquifers connected to shallow aquifers;

185 Gundjehmi Aboriginal Corporation, *Submission 58*, p 60.

186 Gundjehmi Aboriginal Corporation, *Submission 58*, p 56.

187 Gundjehmi Aboriginal Corporation, *Submission 58*, p 53.

188 Gundjehmi Aboriginal Corporation, *Submission 58*, p 55.

189 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 61-64.

- difficulties in accurately quantifying and predicting groundwater behaviour.[190]

2.221 The GAC calls for specialist research to be undertaken by the SSD on groundwater flowpaths, such as fracture zones and faults zones, to allow more detailed quantification of contaminant migration rates. They say this will allow more realistic design and implementation of tailings storage within Pit # 3 as well as long-term groundwater monitoring needs after rehabilitation (around 2016).[191]

2.222 ERA responded saying:

> Specialist studies and investigation of the fractured rock aquifer in relation to potential contaminant transport in groundwater will continue to be investigated by ERA and its consultants in relation to secure containment of tailings in pits and post-rehabilitation behaviour of the minesite.[192]

Timeframe

2.223 Currently there is approximately 13.6 Mt of tailings in interim storage in the above ground tailings dam. The GAC called for a timeframe to be established for the emplacement of tailings back into Pit 1 and say it is a major failure of the new ERs and Government oversight that this has not been done. The Mirrar wish to see that the 13.6 Mt of tailings are emplaced in Pit 1 as soon as possible and no later than the end of 2007 to 'improve the prospects for prompt and more efficient rehabilitation and minimize long-term risks in tailings management.'[193]

2.224 GAC advise that the Mirrar are strongly concerned that in future, if the Ranger Mill Alternative for Jabiluka ever proceeds, ERA may choose to extract the full size of the Jabiluka orebody of some 53 Mt, leaving no room for the 13.6 Mt still remaining in temporary storage. (According to Kinhill, 1996, 1997, predicted storage capacity of Pit #3 is of the order of 43 Mt.)[194]

Low grade ore risk

2.225 The GAC also argues that low grade ore should be recognized as an equivalent long-term environmental risk as tailings and should be backfilled into mined out pits.[195] There is no legally binding requirement to do so despite it being a recommendation of the Ranger Report. The Environmental Requirements allowed:

---

190 Gundjehmi Aboriginal Corporation, *Submission 58*, p 62.

191 Gundjehmi Aboriginal Corporation, *Submission 58*, p 66.

192 Energy Resources of Australia Pty Ltd, *Submission56a-4*, pp 4, 5, 7, 9, 11.

193 Gundjehmi Aboriginal Corporation, *Submission 58*, p 65.

194 Gundjehmi Aboriginal Corporation, *Submission 58*, p 65.

195 Gundjehmi Aboriginal Corporation, *Submission 58*, p 54.

> 29aSubject to paragraph (b) of this clause, all tailings shall be dealt with by being deposited in or transferred to the mine pits in a manner approved by the Supervising Authority not later than 5 years after the cessation of mining (whether under this Authority or otherwise in accordance with law) on the Ranger Project Area.
>
> 29b If after 10 years from the date of issue of the Authority but before the cessation of mining on the Ranger Project Area, the Supervising Scientist reports that he is satisfied that, by dealing with the tailings in the manner outlined in the report, the environment will be less well protected than by depositing or transferring the tailings to the mine pits and, following receipt of such report, the Minister for Science and the Environment, the Council and the Joint Venturers agree that the tailings should be dealt with in the manner outlined in the report, all tailings shall be dealt with in the manner the report.[196]

2.226 The GAC argued that ERA must eventually deposit all tailings back into the mined out Pits 1 and 3, and should not have been allowed ten years to research and try and justify a case for rehabilitating the above ground dam, as is. The Mirrar's position is that tailings should be deposited back into the pits in accordance with the Fox Report (p.149).[197]

2.227 The GAC said:

> Although ER-29b allowed ERA to put a case to the OSS for in situ rehabilitation of the above ground tailings dam from 1989 onwards, the process became long and drawn out. It was not until December 1997 that ERA made a (quiet) commitment 46 to abide by ER-29a and accept the emplacement of all tailings in Pits #1 and #3. Despite the obvious environmental and cultural significance of this decision, OSS-AR (1998) fails to even note ERA's commitment to final below-grade tailings management.
>
> The present Environmental Requirements (January 2000 Section 41 Authority) state:
>
> *11.2 By the end of operations all tailings must be placed in the mined out pits.*
>
> *11.3 Final disposal of tailings must be undertaken, to the satisfaction of the Minister with the advice of the Supervising Scientist on the basis of best available modelling, in such a way as to ensure that:*
>
> *a) the tailings are physically isolated from the environment for at least 10,000 years;*

196 Gundjehmi Aboriginal Corporation, *Submission 58*, p 54.

197 Gundjehmi Aboriginal Corporation, *Submission 58*, p 54.

b) any contaminants arising from the tailings will not result in any detrimental environmental impacts for at least 10,000 years; and

c) radiation doses to members of the public will comply with relevant Australian law and be less than limits recommended by the most recently published and relevant Australian standards, codes of practice, and guidelines effective at the time of the final tailings disposal.

The approvals process for tailings deposition into Pit #1 led to ERA not being required to line the pit with an impermeable barrier, such as clay to minimize groundwater contamination. It was argued that fractures and permeable units such as carbonate rocks would not be dominant in controlling groundwater flow since the tailings would be of relatively lower permeability and therefore only minimal seepage may reach groundwater. It is understood that the upper height limit of tailings currently allowed for Pit #1 is (reduced level 47) RL 0 m or about 20-35 m below ground surface – though this is not incorporated into Authorisation 82/3 nor the current Environmental Requirements.

The maximum height of RL 0 m complies with the spirit of the Ranger Inquiry recommendations. Unfortunately, the main public reports of recent times which acknowledge the current RL 0 m limit is Kinhill (1996) and ERA-RAER (2000 48) – it is not noted or discussed in OSS-AR (various) or NTSA (various). In contrast, Kinhill (1997) uses RL 19 m with no use of RL 0 m (pp 5-27 to 5-42). It is noted, however, that ERA is investigating strategies which could allow them to obtain approval for depositing tailings above RL 0 m, though this is not being undertaken with great public acknowledgement (or debate) by ERA, OSS or DBIRD.[198]

Recommendation 11

The Committee is concerned that the management of radioactive uranium mill tailings at Ranger has been inadequate and makes the following recommendations:

a. That a deadline be set in Authorisation 82/3 and the ERs for removing the tailings from the above ground dam.

b. That detailed analysis be made of the existing contamination of groundwater by seepage from tailings storage facilities above ground dam and Pit #1.

c. A more suitable technique be developed and applied to measure tailings density in Pit #1, incorporating known mill data.

198 Gundjehmi Aboriginal Corporation, *Submission 58*, p 55.

d. Any application to vary the current RL 0m limit for Pit #1 triggers a new EIS.

e. That detailed field studies are undertaken by SSD to quantify radon flux, microbiological behaviour and the physical properties of tailings, particularly permeability.

f. That specialist research is undertaken by SSD on groundwater flowpaths, such as fracture zones and faults zones, to allow more detailed quantification of contaminant migration rates.

Surface Water Management

2.228 The GAC argues that the management of surface water and contaminated minesite waters has been one of the most visible and contentious issues associated with Ranger from its earliest days.[199]

2.229 A new water management system was introduced in 2000[200] which deals with the quality of the water rather than its origin and covers process water, actively managed water and passively managed water. A system of trigger levels was introduced in 2001 and this is discussed in detail in under Water Quality Management.

2.230 The management of Retention Pond 1 (RP1) is of great concern to the Mirrar as there has been a history of high uranium concentrations since 1998:

> During 1998, ERA sought and received approvals to dump low grade uranium ore (~0.02-0.1% U_3O_8) on the northern wall of the tailings dam … Some drainage works were put in place to ensure that contaminated runoff would flow through to Retention Pond 2 (RP2), which was designed and engineered to receive such waters.
>
> During the 1998/99 wet season, the first following the placement of this uranium ore within the RP1 catchment, the uranium concentrations increased 100-fold from a normal background value of <1 µg/L to some 70 µg/L 54 within weeks. … In an attempt to reduce the flow rate ERA placed sandbags over the RP1 spillway. Towards the end of the wet season, uranium concentrations had reduced somewhat to about 10 ppb – still above the pre-1998 levels. Although the obvious source was the dumped ore, this was denied by ERA and investigations were begun by the OSS and ERA to isolate the exact 'source'.
>
> New drainage works were put in place during the 1999 dry season, as well as making the 'sandbag' control feature more permanent through the use of fencing. The 1999/2000 wet season saw the uranium concentrations in RP1 discharge once again reach highly elevated levels of about 40 µg/L.

199 Gundjehmi Aboriginal Corporation, *Submission 58*, p 56.

200 Gundjehmi Aboriginal Corporation, *Submission 58*, p 56.

> During 2000 ERA finally admitted that the source of the elevated uranium was indeed the ore on the tailings dam wall and the failure of drainage controls which overflowed during wet season storms.
>
> Although more drainage control works were done in 2000 and apparently again in 2001, the uranium concentrations have continued to stay elevated in RP1, staying around 10-15 µg/L in the dry season. The levels in the 2000/01 wet season reached about 25 µg/L.
>
> In early 2002 the Mirrar were informed by the NLC that the uranium concentrations had again reached some 70 µg/L – indicating a major failure of the drainage control works and fresh leaching of contamination from the dumped ore into RP1. It is curious that ERA states it was not aware of RP1's elevated uranium concentrations until the 'focus' level for uranium was reached at monitoring point GS009 and it started investigations to trace the source. ERA is required to test the quality of RP1 discharge on a weekly basis and therefore should have known earlier.
>
> The Mirrar are extremely disappointed that such continuing cycles of pollution – with recognised threats to Magela Creek – are allowed to continue without sufficient enforcement of environmental objectives by the OSS, DBIRD or ERA.
>
> In response to these concerns, ERA have recently begun efforts to completely reengineer the RP1 catchment to try and minimise and prevent such continuing cycles of pollution occurring again in the future – returning RP1 to the relatively clean catchment it was prior to 1998. [201]

2.231 The GAC believes that a set of water quality triggers should be established for RP1 in order to ensure that 'decontamination objectives are met and maintained in the future'.[202]

2.232 With regard to Retention Pond 2 (RP2), the GAC are concerned that there have been a number of extremely high surges in uranium concentrations in recent years[203]. They are also concerned for the water quality in Gulungul Creek which they claim is only partially monitored by ERA and DBIRD and that the OSS has only recently implemented a formal monitoring program upstream and downstream.

2.233 One of the Mirrar's greatest concerns in regards to the Gulungul Creek concentrations is the refusal of ERA to allow an in-house scientist to carry out an investigation into a 'potentially regular and significant leak from the Ranger site'. They feel that ERA breached the Environmental Requirements by not reporting by

---

201 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 68-70.

202 Gundjehmi Aboriginal Corporation, *Submission 58*, p 70.

203 Gundjehmi Aboriginal Corporation, *Submission 58*, p 70

'not reporting an incident which could be of concern to Aboriginal people or the broader public.'[204]

2.234 As referred to earlier, the Mirrar are opposed to the limit level being set at 5.8 ppb for uranium in the Magela Creek saying it represents an 'unacceptable degree of pollution above the naturally occurring concentrations.'[205]

> The lack of maintaining strict load limits – which were previously quite generous to Ranger – is also a major failure as significant loads can still flow through and impact on Magela Creek without necessarily reaching the 'limit' values. Under previous guidelines, ERA was allowed to dump up to 3,500 kg of uranium in Magela Creek every year with water releases from Ranger – the natural load of uranium is generally about 25 kg.[206]

Wetland filter systems

2.235 It took many years of research before ERA were finally given permission to establish the wetland filter systems to treat contaminated Retention Pond 2 water.[207] The GAC says it appears that wetland filters are limited, like land application in that salts such as Mg and SO_4 are only minimally reduced while uranium is captured within the plants and sediments of the wetland.

> The wetland filter was constructed from an old borrow pit and first trialled over 6 weeks in 1994, with a full-scale trial over 5 months in 1995. The outlet water is discharged onto a land application area some 46 ha on the western side of RP1. Since the treated water is eventually flows to RP1, the wetland filter is called the 'RP1 Constructed Wetland Filter'. This name is misleading, however, since it treats RP2 water and should in reality be called the 'RP2 Constructed Wetland Filter' (used hereafter). A further 2 wetlands have recently been constructed on the south of Pit #1 and next to the RP2 filter, though it is not known whether they have regulatory approval to being operation as yet. The existing dam walls on the Corridor Creek system are also now referred to as 'wetlands', despite the fact they were never meant to be used in this fashion.[208]

2.236 The Mirrar concerns in relation to the use of wetland filters include:

i. the short-term nature of wetlands – what is the ultimate capacity to retain uranium and other contaminants and the ultimate fate of the various contaminants;

---

204 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 70-72.

205 Gundjehmi Aboriginal Corporation, *Submission 58*, p 75.

206 Gundjehmi Aboriginal Corporation, *Submission 58*, p 75.

207 Gundjehmi Aboriginal Corporation, *Submission 58*, p 77.

208 Gundjehmi Aboriginal Corporation, *Submission 58*, p 77.

ii the need to consider them radioactive wastes after the completion of mining and milling on the Ranger site and excavate them as part of rehabilitation works;

iii the long-term cumulative impacts on plants and animals within the wetlands until rehabilitation – especially the potential for bioaccumulation.[209]

2.237 The GAC says that despite research by ERA and SSD on the internal dynamics and performance of the RP2 Constructed Wetland Filter, there still appears to be no answers to points i. and iii above.

2.238 Of particular concern to the Mirrar is the incident that occurred in 1998 when RP2 wetland filter was allowed to dry out. This was described by ERA reports as an experiment to see the degree of oxidation and contaminant release but the GAC maintains that the Ranger mill personnel demanded the water against the strong advice and protests of environmental officers who said the wetland should not be allowed to dry out.[210]

2.239 There is no requirement for sediment or water quality monitoring of wetland filters although ERA does undertake and report environmental monitoring data.[211]

2.240 GAC also point out that with the new water management system, there is no restriction on the use of Retention Pond 2 water for fighting fires and advise that the Mirrar are strongly opposed to such use of contaminated water.[212]

Irrigation of Contaminated Waters

2.241 The practice of disposing of contaminated water through irrigation drew criticism from GAC, especially in relation to the Magela Land Application Area (MLAA) which receives contaminated water from RP2 over an area of about 55 ha (see Figure 5), a practice first adopted in the mid 1980's.

2.242 The Mirrar are concerned that the MLAA may have reached the end of its useful life (or soil load limits) and is no longer able to retain contaminants such as uranium or radium.[213]

> There is a wealth of evidence that shows that conservative contaminants such as Mg and SO_4 are not retained by the MLAA soils, and they form efflorescent salts during the dry season and flush through into the Magela Creek during the wet season. The salts have even been observed on the

209 Gundjehmi Aboriginal Corporation, *Submission 58*, p 77.

210 Gundjehmi Aboriginal Corporation, *Submission 58*, p 78.

211 Gundjehmi Aboriginal Corporation, *Submission 58*, p 78.

212 Gundjehmi Aboriginal Corporation, *Submission 58*, p 70.

213 Gundjehmi Aboriginal Corporation, *Submission 58*, p 76.

> banks of the Magela Creek in the dry season, related to groundwater discharge from the MLAA. The increasing Mg and SO_4 concentrations at GS009 clearly include a major contribution from the salts derived from the MLAA.
>
> According to Authorisation 82/3, only 12 sites are monitored on a yearly basis in the MLAA, with samples taken from four depths (0-5, 40-50, 90-100 and 140-150 cm). The MLAA must be investigated as a continuing pollution source for the Magela, focusing on the extent and rate of Mg and SO_4 migration and whether there is any residual capacity in MLAA soils to continue retaining uranium and radium. This would ascertain if the MLAA is indeed contributing to the 'focus' level being reached for uranium at 009.
>
> An important issue for the Mirrar is that the salt loadings and extended irrigation of the MLAA led to tree deaths over some 13 ha. The problem was first discovered by ERA during March 1995 and their investigation is reported by Callahan (1995). There is no report or public acknowledgement of this issue in OSS-AR (1995) [214]. … Thus the reporting of environmental performance of the MLAA is therefore selective at best and needs to be more thoroughly addressed. The Mirrar remain concerned at the ever increasing area of sites such as land application and therefore the area of impact on the Ranger Project Area.[215]

2.243 The GAC called for more detailed field studies aimed at quantifying long-term contaminant retention characteristics of soils. ERA argues that such studies were completed at the outset of irrigation at Ranger and say the results were widely published. They say specific studies will be undertaken from time to time to validate the original work and determine the extent of contaminant retention in irrigated areas.

2.244 ERA say studies on the long-term future of existing sites in relation to contaminants are not required because:

> Annual evaluations are undertaken... Particular investigations are carried out from time to time to determine specific behaviours of constructed wetland filters, for example, and the results have [been] reported to stakeholders and have also been published.[216]

---

214 OSS-AR (1994) forewarns that "studies on the long-term impact on vegetation from salt and/or water logging effects were inconclusive (pp35-36). Some internal reports by SSD also study stress symptoms on individual trees (eg. Ashwath & Chandrasekaran, 1993 SSD Internal Report 132). NB Information provided by the Gundjehmi Aboriginal Corporation, *Submission 58*, p 76.

215 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 76-77.

216 Energy Resources of Australia Pty Ltd, *Submission 56a-4*, p 7.

Recommendation 12

The Committee recommends:

a. the incorporation of maximum cumulative load limits into specific areas for disposal, specific to the use of irrigation or wetlands,

b. more rigorous sampling under the requirements of Authorisation 82/3 and the ERs of wetland and irrigation areas including more sites and frequencies

c. check monitoring and analysis of wetlands and irrigation sites by OSS and DBIRD and a reduced reliance by those authorities on company data and assertions in managing these contaminated areas.

d. investigation of the Corridor Creek wetlands to discover whether they have any capacity to continue to perform as wetland filters in the future.

e. detailed studies and analyses to be prepared of the capacity of wetland filters to retain uranium and other contaminants (including Mg, SO_4, Mn, U, ^{226}Ra, etc.), the ultimate fate of those contaminants and the long-term cumulative impacts on plants and animals within the wetlands until rehabilitation.

Groundwater Management

2.245 The GAC argues that there is a 'clear and obvious' need to improve the reporting of groundwater monitoring data across the Ranger site through the use of plume maps, cross-sections, better reporting of physical properties such as permeability and their relationship to geological features.[217]

2.246 ERA and DBIRD carry out a range of groundwater monitoring, however the SSD undertakes no statutory check program and the GAC says that the significance of contamination pathways to groundwater is consistently downplayed by the SSD, DBIRD and ERA.

2.247 The Ranger Inquiry recognized that fault and fracture zones can represent an opportunity for rapid groundwater flow however the GAC points out that no known public report or paper shows the existing plume of seepage from the above ground tailings dam despite internal ERA reports that address the rate of contaminant migration through fault zones and research done by ERA more recently on the use of geophysical surveying methods to locate and identify seepage plumes.[218]

217 Gundjehmi Aboriginal Corporation, *Submission 58*, p 82.

218 Gundjehmi Aboriginal Corporation, *Submission 58*, p 62.

2.248 The GAC provided the Committee with figures, sourced from a confidential internal DBIRD (then DME) report from January 1992 on water monitoring at Ranger of the plume from the above ground dam which shows major contamination along the major fault zones.

2.249 The GAC provided an example of the lack of public reporting on contamination flowpaths:

> A good example where fast preferential groundwater flowpaths have been important in contamination is the Magela Land Application Area. In the early 1990s it was discovered that epsomite salts were forming at the surface of the MLAA as well as being detected on the banks of Magela Creek during the dry season. The confidential ANSTO research report on the issue identified several linear geologic features which gave rise to rapid groundwater transport of salts to the Magela, much faster than would otherwise have been expected. The only publication containing a figure of these zones is a journal paper by ANSTO staff … There is often no discussion of fast groundwater flowpaths at the MLAA in DBIRD or OSS reports, despite this information being commonly understood.[219]

2.250 The GAC argues that research by the SSD mainly centers on groundwater chemistry and the mechanisms of radionuclide migration and major solute migration and that detailed hydrogeology studies, especially the quantification of groundwater flow paths, do not have a high priority for the SSD.[220] Recommendations for addressing these issues are included in the section on groundwater contamination.

Stockpiles and Waste Rock Management

2.251 Many submissions were critical of ERA's stockpile and waste rock management, calling for a more rigorous inspection program to be developed by the SSD and DBIRD including physical checks on all stockpiles prior to, during and immediately after each wet season. The GAC says that such a program should not be reliant on ERA statements or incompetence.[221]

2.252 The Mirrar are concerned that the new ERs do not make reference to what constitutes 'uranium material'. Previously it was defined as rock containing greater than 0.02% uranium. Essentially, according to the original Ranger Authorisation, uranium material included three main rock categories: economic ore, low grade ore, and non-mineralised or waste rock. Owing to the accepted view that Ranger rock is low in sulphides and high in alkaline minerals, there is no requirement to address 'acid mine drainage'. Such a view does not sit well with the Mirrar.[222]

---

219 Gundjehmi Aboriginal Corporation, *Submission 58*, p 82.

220 Gundjehmi Aboriginal Corporation, *Submission 58*, p 64.

221 Gundjehmi Aboriginal Corporation, *Submission 58*, p 81.

222 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 59-60.

Incorrect dumping of ore

2.253 In its submission, the GAC drew attention to the incident that began on 14 January 2002 and continued until 26 February 2002, involving the incorrect dumping of ore on the Grade 2 Stockpile.[223] The Mirrar were not informed until 27 February 2002. The GAC argues that this demonstrates a lack of communication within ERA, a failure to follow reporting procedures and a disregard for the Ranger environment:

> The total amount of ore dumped at the site is about 80,900 tonnes (t) of 0.02-0.08% U_8O_8 ore and 3,600 t of 0.08-0.12% U_8O_8 ore, or 84, 500 t in total. Excess runoff was also being generated at the laterite ore stockpile (>0.12% U_8O_8) and instead of reporting to RP2 as required it was mixing with the runoff from the #2 stockpile.[224]
>
> Although the problem was supposed to have been corrected through urgent remedial works in late February, in late April 2002 the Mirrar were informed that runoff still continuing from the southern stockpile area had reached some 13,875 µg/L uranium. This calls into serious question the effectiveness of the 'stockpile remedial works' undertaken by ERA and their subsequent inspection by the OSS and DBIRD.[225]
>
> Despite incomplete details, environmental monitoring data had indicated a surge in uranium concentration in waters entering Corridor Creek to some 2,000 µg/L. This creek flows into Georgetown Billabong and then to the Magela Creek and Kakadu. Detailed investigations were initiated by the OSS and ERA into the source of incorrect dumping and the levels of uranium contaminating surface waters. The OSS and ERA investigation reports highlight serious deficiencies with current and future environmental performance at Ranger.[226]

2.254 The GAC provided details in its submission of numerous other incidents of incorrect ore dumping, higher than expected quantities of low grade uranium ore production, runoff containing elevated uranium concentration, manganese leaks and a failure to conduct timely investigation and reporting, interpret data or put in place effective remedial works.

Recommendation 13

The Committee agrees that there are serious inadequacies in the management of the various stockpiles of material at Ranger and makes the following recommendations:

---

223 Gundjehmi Aboriginal Corporation, *Submission 58*, p 79.

224 Gundjehmi Aboriginal Corporation, *Submission 58*, p 79.

225 Gundjehmi Aboriginal Corporation, *Submission 58*, p 80.

226 Gundjehmi Aboriginal Corporation, *Submission 58*, p 79.

a. That SSD and DBIRD develop a rigorous, independent inspection and checking program for all stockpiles which is ongoing rather than random, particularly prior to, during and immediately after each wet season.

b. That all necessary steps be taken to prevent discharge from runoff from the southern stockpile entering the Corridor Creek system until the wetlands have been ascertained to be suitable for the remainder of Ranger's operation and improved environmental monitoring is in place.

Rehabilitation of Ranger

2.255 As part of the Commonwealth Environmental Requirements,[227] Ranger is required to prepare an Environmental Management Report (EMP) which encompasses rehabilitation. This plan is updated on a regular basis to accommodate changes.

2.256 The company must also prepare an Environmental Management Plan;[228] subclause 18.2 (n) deals specifically with rehabilitation.

2.257 Ranger's rehabilitation and subsequent closure requirements come under the rubric of Environmental Requirements (ERs), as stipulated in the s.41 Authority of the *Atomic Energy Act 1953*. Clause 6.1 sets out that:

> ERA shall promptly undertake and complete the rehabilitation of the Ranger Project Area in accordance with Appendix A (Environmental Requirements) of this Schedule.

2.258 Rehabilitation requirements are given in clauses 2 and 9 of the Environmental Requirements.

2.259 Clause 2 stipulates that 'the company must rehabilitate the Ranger Project area to establish an environment similar to the adjacent areas of Kakadu National Park such that, in the opinion of the Minister with the advice of the Supervising Scientist, the rehabilitated area could be incorporated into the Kakadu National Park.'[229]

2.260 Subclause 2.2 sets out the major objectives of rehabilitation:[230]

> 2.2 The major objectives of rehabilitation are:
>
> (a) revegetation of the disturbed sites of the Ranger Project Area using local native plant species similar in density and abundance to those

227 Conditions of the s.41 Authority, *Atomic Energy Act 1953.*

228 Clause 18, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

229 Clause 2, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

230 Subclause 2.2, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

existing in adjacent areas of Kakadu National Park, to form an ecosystem the long term viability of which would not require a maintenance regime significantly different from that appropriate to adjacent areas of the park;

(b) stable radiological conditions on areas impacted by mining so that, the health risk to members of the public, including traditional owners, is as low as reasonably achievable; members of the public do not receive a radiation dose which exceeds applicable limits recommended by the most recently published and relevant Australian standards, codes of practice, and guidelines; and there is a minimum of restrictions on the use of the area;

(c) erosion characteristics which, as far as can reasonably be achieved, do not vary significantly from those of comparable landforms in surrounding undisturbed areas.

2.261 Clause 9 of the Ranger ERs provides for the following:[231]

9.1 The company must prepare a rehabilitation plan which is approved by the Supervising Authority and the Minister with the advice of the Supervising Scientist, the implementation of which will achieve the major objectives of rehabilitation as set out in subclause 2.2, and provide for progressive rehabilitation.

9.2 All progressive rehabilitation must be approved by the Supervising Authority or the Minister with the advice of the Supervising Scientist and subject to the NLC agreeing that the aim and objectives for rehabilitation as described in clause 2 are met.

9.3 The company's obligations under clause 9 will cease in respect of any part of the Ranger Project Area over which a close-out certificate is issued by the Supervising Authority subject to the Supervising Scientist and the NLC agreeing that the specific part of the Ranger Project Area has met the requirements of clause 2.

9.4 Where agreements under subclause 9.2 or 9.3 cannot be reached the Minister will make a determination with the advice of the Supervising Scientist.

2.262 The most recent Rehabilitation Plan # 27 was released in March 2002.

2.263 Under the Ranger General Authorisation A82/3 issued by the Northern Territory Government, the operator is required to:

… rehabilitate the project area to establish an environment similar to the adjacent areas of Kakadu National Park such that, in the opinion of the

231 Clause 9, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

> Commonwealth Minister with the advice of the Supervising Scientist, the rehabilitated area could be incorporated into Kakadu National Park.[232]

2.264 Details of rehabilitation requirements are set out in Schedule 8 – Decommissioning and Rehabilitation. Schedule 8.2[233] stipulates that a rehabilitation plan, which must be produced every twelve months, has to include:

> 8.2.1 a detailed specification of all progressive rehabilitation works which are proposed to be undertaken in the 12 months following the preparation of the report;
>
> 8.2.2 a conceptual specification covering decommissioning and rehabilitation for the remaining life of the project.

2.265 In September 1980, the Commonwealth Government ratified an agreement between ERA's predecessor and the Government.[234] The document is termed the '*Ranger Uranium Project–Deed to Amend the Government Agreement, September 12, 1980*'. The major provisions of this agreement relating to the annual Plan of Rehabilitation are as follows:

> Article 9 ERA shall observe all environmental requirements specified in the Authority.
>
> Article 10 ERA shall ensure the adoption of best practicable technology.
>
> Article 22.2 Rehabilitation of the Ranger Project Area shall be carried out progressively.
>
> Article 22.3 Progressive rehabilitation costs after cessation of mining shall be met out of the Trust Fund.
>
> Article 22.4 Rehabilitation costs after cessation of mining shall be met out of the Trust Fund.
>
> Article 23.1 The Plan of Rehabilitation shall set out in a form suitable for costing, a detailed description of rehabilitation work if mining operations were to cease.

232 Schedule 8.1.1, Ranger General Authorization A82/3.

233 Schedule 8.2, Ranger General Authorization A82/3.

234 The original Agreement was made between the Commonwealth, Peko-Wallsend Operations Ltd, Electrolytic Zinc Company of Australasia Ltd and the Atomic Energy Commission, but now operates as an agreement between the Commonwealth and ERA, as amended from time to time.

> Article 23.3 The Plan shall have regard to the conditions and restrictions of the Authority, Section 44 Agreement,[235] Government Agreement and views of supervising authorities and the Supervising Scientist.
>
> Article 23.8 ERA shall ensure that the provisions of the Plan of Rehabilitation are strictly observed except to the extent that the observance would be contrary to law.
>
> Article 24.5 In making an estimate the Assessor shall take into account the Plan of Rehabilitation, information supplied, inspections undertaken and the conditions and restrictions of the Authority and Section 44 Agreement.

2.266 The ACF believes that there needs to be a 'clear movement towards rehabilitation, closure and the implementation of an exit strategy at Ranger'.[236] Dr Mudd, a consultant to the Gundjehmi Aboriginal Corporation, expressed reservations about the long-term management of the sites post-mining:

> It is okay at the moment when you have 50 staff in the environment department spread across DBIRD, OSS and the company, running around the site on nearly a daily basis. When the site is rehabilitated and we walk away, that is when the real challenge starts. If you do not have people checking what is happening on a daily basis—where the water is coming out, what concentrations it might be and things like that—that is when the real challenge will start. That is when we will really be able to assess whether there has been any long-term damage, or how much that long-term damage has been. I do not think there is an extrapolation over time frames of hundreds of years to the 10,000 years, say, required for tailings. There are significant concerns about how you do those sorts of extrapolations. The company is grappling with these issues as much as we are. We would not claim to have the answers, but we certainly do not share that level of confidence.[237]

2.267 Professor Hart[238] acknowledges that the closure and rehabilitation of the Ranger Minesite will be a 'major exercise', and that the ARRTC is 'reasonably familiar' with the rehabilitation proposals to date. He emphasises some concerns regarding ERA's revegetation plans and suggests that additional research is required to provide more information on what forms rehabilitation might take.

---

235 The Section 44 Agreement of the *Aboriginal Land Rights (Northern Territory) Act 1976* specifies compliance with the Environmental Requirements, the best practicable technology principle and the Section 41 Authority.

236 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 292.

237 Dr Mudd, *Committee Hansard*, Jabiru, 1 October 2002, p 147.

238 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, pp 342-343.

2.268 The 'closure plans' required by ERA have not yet been scrutinised by the ARRTC. Professor Hart voiced concern about this, on the grounds that the ARRTC has the in-house expertise to comment, and therefore this should be done at the earliest stages of planning.[239]

2.269 When asked by the Committee 'how realistic is it that a mine can be rehabilitated in a sensitive area like this',[240] he responded by pointing out that rehabilitation is perceived differently by the various stakeholders:

> It is always a case in point that engineers, miners and so forth have a perception of what they see as being a pretty good job and that may be very different what the traditional owners see as being a very good job.[241]

2.270 He went on to say that:

> … the miners might feel that they have done a superb job in rehabilitating, replanting and so forth, but in fact it still looks very different to what it was like before. Some traditional owners have a perception that it is going to look exactly like it was before the mine went there 20-odd years ago.[242]

2.271 Senator Nettle questioned the Supervising Scientist about rehabilitation in view of the increasing prominence of wetland filters and irrigation areas:

> **Senator NETTLE**—What kind of impact does that increasing area of contamination have on the ability of the mine site to effectively rehabilitate?
>
> **Dr Johnston**—Clearing out the sediment at the bottom of these ponds or wetland filters is a trivial task compared to the moving of large quantities of rock involved in the rest of the rehabilitation. I do not see it as a big issue.[243]

2.272 Mr Cleary, of ERA, observed that:

> … planning for the rehabilitation of ERA's mine sites is an ongoing process for us. When our operations cease, the land will be rehabilitated to such a standard that it can be incorporated into the world heritage listed national park. Even though for over 20 years our operations have continued to protect Kakadu National Park.[244]

---

239 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 343.

240 Senator Allison, *Committee Hansard*, Canberra, 24 October 2002, p 343.

241 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 344.

242 Professor Hart, *Committee Hansard* , Canberra, 24 October 2002, p 344.

243 Senator Nettle and Dr Johnston, *Committee Hansard,* Darwin, 30 September 2002, p 24.

244 Mr Cleary, *Committee Hansard*, Darwin 30 September 2002, p 36.

Jabiluka

2.273 According to the GAC submission, the water management at Jabiluka is the primary concern for the Mirrar. The GAC claims:

> There are numerous issues which have failed to be taken into adequate account in the approvals, design, construction, operation and long-term planning of water management for Jabiluka.[245]

Water management

2.274 The Jabiluka Project has historically been promoted as a 'zero-release' operation, however, it has been inactive since September 1999 and is currently on 'environmental care and maintenance' with both ERA and parent company Rio Tinto Ltd publicly stating that Jabiluka will not be developed for at least a decade. The GAC argues that the principal (and only substantive) activity onsite remains water management of the water in the decline and rainfall on the site in the wet season.[246]

2.275 The GAC contends that the Jabiluka site is facing a continually escalating water management crisis because the project was built with the intention that milling would be conducted at Ranger, against the express wishes of the Mirrar. It points out that the current site with its 3.5 hectare retention pond was a temporary facility built for one wet season only.[247] The GAC argues that recent reports of water contamination due to current site management, confirm the Mirrar's many concerns about the lack of environmental planning and protection for Jabiluka in the short and long-term and that:

- The use of "Best Practicable Technology" (BPT), as practised by ERA, fails to account for the legitimate concerns of the Mirrar, generally being an exercise in assuring approvals of the lowest cost option;
- The Mirrar have not been adequately informed and consulted about water management issues at Jabiluka, especially prior to approvals;
- Groundwater behaviour around and discharge into the decline is still poorly understood and analysed, despite this being the major contaminant source for water management at Jabiluka;
- Inadequate reporting of critical water management aspects by ERA, OSS and NT authorities, especially:
    - water level and quantity over time of the IWMP;

245 Gundjehmi Aboriginal Corporation, *Submission 58*, p 94.

246 Gundjehmi Aboriginal Corporation, *Submission 58*, p 86.

247 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 86-87.

- Reverse Osmosis treatment quality and irrigation quantities (and performance of Jabiluka soils from this irrigation);
- groundwater sources, both quantity and quality, remain poorly reported.

- The OSS and DBIRD need to pro-actively support the legitimate concerns of the Traditional Owners, the Mirrar, and argue for active rehabilitation over 2002 and 2003 to alleviate water management strains;
- Water treatment should be continued on-site at Jabiluka in the short term to ensure that contamination levels are not further increased in areas outside of the IWMP.[248]

2.276 The GAC argues:

> The principal source of contamination of the IWMP is uranium found in the seepage pumped from the decline, where concentrations can range from 200 to 13,626 µg/L. The decline water also constitutes 30 ML a year or about one third of the water entering the IWMP. The estimated annual loads of uranium in decline seepage are about 200 kg (which could lead to uranium concentrations in the IWMP reaching 1,350 µg/L or higher). Thus, the best long-term water management option is clearly to prevent the decline seepage from reaching the IWMP.[249]

2.277 The GAC says the higher levels of contamination of IWMP water are due to encountering mineralised ore during the decline construction and early development, and by the decision to store water in the decline during the wet season in early 2001. 20 million litres of uranium contaminated water was pumped out of the decline in June 2001.[250]

2.278 The Mirrar contend 'that the best way to prevent uranium-rich seepage from further contaminating the IWMP is to backfill the mineralised ore into the decline and seal it using clay lining, grouting or another technology to ensure low permeability and minimise cross-contamination of groundwater.'[251]

2.279 The Mirrar oppose any suggestion of removing the mineralised ore to Ranger and have instructed the NLC in this regard, supporting the use of reverse osmosis treatment or another equivalent technology. The Mirrar have made it clear that views on water management are focused on rehabilitating the Jabiluka site, and wish to see

248 Gundjehmi Aboriginal Corporation, *Submission 58*, p 88.

249 Gundjehmi Aboriginal Corporation, *Submission 58*, p 94.

250 Gundjehmi Aboriginal Corporation, *Submission 58*, p 93.

251 Gundjehmi Aboriginal Corporation, *Submission 58*, p 94.

the mineralised ore removed from the surface and returned to, and sealed within the decline.[252]

2.280 The Mirrar argue that a rehabilitated Jabiluka would lead to a reduction in environmental monitoring requirements and maintenance costs meaning a far more economical outcome:

> The Mirrar believe that, in the welcome event of Jabiluka's rehabilitation, a minimum of environmental monitoring would need to be continued at the site to address existing issues and demonstrate that rehabilitation measures are adequate to ensure Kakadu's World Heritage values are protected.[253]

2.281 The Committee notes the decision by ERA and the Traditional Owners in August 2003 to backfill the mine decline, returning the mineralized stockpile and waste rock to the underground mine as part of the long term care and maintenance of the site.

Water Quality – Swift Creek and Jabiluka project site

2.282 The Mirrar acknowledge that the background information existing for the Swift Creek catchment and project site is more extensive and of a higher quality than that which was obtained before the development of Ranger. Nonetheless, the GAC makes the following recommendations to enhance the monitoring program in this area:

Swift Creek[254]

- relocation of the statutory monitoring point to within the Lease boundary;
- an increase in the number of statutory monitoring points and development of corresponding trigger levels;
- separate trigger levels applied for the North and Central Tributaries at the sampling locations closest to the site;
- upstream monitoring of water quality in the North and Central Tributaries, including radium activities;
- an additional statutory monitoring location within the West Branch of Swift Creek;
- the frequency for statutory water quality monitoring (for parameters currently listed as monthly as per the authorisation) be changed to at least weekly during the first month, followed by at least three samples per month for the remainder of the wet season;

---

252 Gundjehmi Aboriginal Corporation, *Submission 58*, p 94.

253 Gundjehmi Aboriginal Corporation, *Submission 58*, p 95.

254 Gundjehmi Aboriginal Corporation, *Submission 58*, p 97.

- analysis of radium included with metals;
- a succinct and accurate location plan of sampling sites provided with relevant reports, publications or scientific papers; and
- the allocation by ERA of adequate resources to ensure that personnel are available at times of first flush or other necessary and opportune times to obtain water quality or other environmental samples.

Jabiluka Box-cut and Portal

Jabiluka Project Site[255]

- development of the trigger level system in relation to the IWMP;
- enhanced analysis of radium and radon;
- studies documenting the biological and geochemical processes within the IWMP; and
- detailed studies to determine the characteristics of the sources of seepage into the decline to 'allow more realistic quantification of proposals for long-term water management'.

2.283 On the latter point, ERA argues:

> Several such studies have been completed and reported to the Commonwealth Minister for Resources in compliance with the

255 Gundjehmi Aboriginal Corporation, *Submission 58*, p 101.

> requirements out of the EIS. Other investigations are currently in progress: results to date have been discussed with stakeholders at MTC meetings and will be formally reported when the investigations are complete. BPT analyses of the large number of water management options have been undertaken by ERA and stakeholders, and further consultations are planned.[256]

2.284 The SSD advises that the Jabiluka 'Water Management System', is under review, and will encompass the issues raised by the GAC, including irrigation and trigger systems:

> The Supervising Scientist is seeking to enable the legal enforcement of the water quality trigger system at Jabiluka through its inclusion in the Mine Management Plan, with which ERA is required to comply under the NT Mining Management Act.
>
> The Jabiluka Water Management System is currently under review. The objective of the water management strategy that will arise from the review is to ensure the ongoing protection of the environment. Irrigation of any water will only be part of that strategy subject to meeting the overall objective for environmental protection. Part of the information set that is contributing to the review are the results of the assessment of the suitability of Jabiluka soils for irrigation including uranium retention capacity.[257]

256 Energy Resources of Australian (ERA), Submission 56a, Appendix 5, p 11.

257 Office of the Supervising Scientist, *Submission 77c*, pp 10-11.

Jabiluka Interim Water Management Pond

Water Quantity

2.285 The Jabiluka IWMP is currently authorised to hold a maximum of 150ML, in order to maintain enough capacity to deal with rainfall from a 1 in 10,000 year storm event. An estimated 30 ML of seepage is pumped from the decline each year and in an average wet season, rainfall volumes on site are about 60 ML, however:

> The well above average rainfall between 1998-99 to 2000-01 and groundwater seepage volumes have necessitated that excess water be disposed of from the (temporary) IWMP in order to maintain the ability to retain a 1-in-10,000 year storm event during the wet season, as per approvals and World Heritage commitments.[258]

2.286 The GAC considers that the information available to it and the public in relation to water quantity is limited and requires detailed inclusion of tables and graphs and that the relevant reports produced by ERA and the supervising authorities should be made available to the public.[259]

258 Gundjehmi Aboriginal Corporation, *Submission 58*, p 93.

259 Gundjehmi Aboriginal Corporation, *Submission 58*, p 102.

Contaminated Water

2.287 Concentrations of uranium found in the seepage in the decline can range from 200 to 13,626 µg/L and have an estimated annual load of 200 kg of uranium.[260]

2.288 From August 2000 to December 2001, reverse osmosis (RO) water treatment units were in use at Jabiluka and irrigated treated water onto 3.8 ha of the site. Owing to an operational failure to achieve production targets in October 2001, small amounts of treated RO water were mixed with contaminated IWMP water and irrigated over 6.34 ha. The Mirrar hold the view that there should be no direct irrigation of contaminated water.[261]

> The use of direct irrigation of IWMP water is clearly only a very short-term solution and should not continue to be used by ERA, nor authorised by the NT regulators nor supported by the OSS.[262]

2.289 The GAC anticipated that direct irrigation of contaminated IWMP water (U at 461 µg/L, May 2002)—with no mixing with RO treated water was likely to be approved at Jabiluka by the NT Minister for Resources and would likely continue until about November 2002. The Committee witnessed direct irrigation taking place on its site visit to Jabiluka on 1 October 2002. This form of irrigation continued until November 2002.

2.290 RO was implemented in August 2002 at the insistence of the SSD and the NLC and failed to meet expected performance targets. The GAC says the units employed were not appropriate for use in the environment that exists in Kakadu and surrounds.[263]

2.291 The Mirrar oppose the practice of pumping IWMP into the decline:

> In February 2001, ERA began pumping IWMP water into the decline for temporary storage, since the 2000-01 wet season was again significantly above average (1,954 mm). It can be reasonably expected that had high quality RO units been used this may have been avoidable.
>
> Of major concern is that at the time of IWMP water being pumped into the decline, assurances were given to the Mirrar that this would not lead to deterioration of water quality, mainly uranium concentrations, when the water was pumped back to the IWMP in the 2001 dry season. It is very clear, however, that the IWMP water quality data in Figure 22 shows a significant increase in uranium concentrations in IWMP water - that is,

260 Gundjehmi Aboriginal Corporation, *Submission 58*, p 94.

261 Gundjehmi Aboriginal Corporation, *Submission 58*, p 93.

262 Gundjehmi Aboriginal Corporation, *Submission 58*, p 105.

263 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 102-103.

> a major decrease in water quality. The quantity of water pumped from the decline between early May and 19 June 2001 was about 20 ML.[264]

2.292 The GAC advised in a supplementary submission that a Jabiluka Minesite Technical Committee meeting was held in January 2002 and the Mirrar, who had originally made a request to attend, did not do so on the assurance that water management issues were not on the agenda. However, the issue was debated and the flooding of the decline was discussed in some detail:

> On 20 January [2003] GAC was advised … that the MTC … had in fact discussed long-term water management strategies at the Jabiluka site. GAC was informed that ERA had presented its preferred option of allowing water percolating into the decline to accumulate and that the decline would therefore be flooded. This option would include the transfer of water from the interim water management pond to the underground workings, with both the mineralised and the non-mineralised stockpiles remaining at surface.[265]

2.293 The NLC had expressed disappointment that such discussions had taken place without the presence of the a GAC observer, and added that:

> … it appeared that flooding the decline was a fait accompli and that the Northern Territory Government was very supportive of the option and had indicated that ERA would need no additional approvals in order to proceed with this option.[266]

2.294 The GAC was later advised by ERA that this option was not fait accompli:[267]

> ERA has advised that its preferred option was misinterpreted as the only option it would pursue. ERA has further advised that, in accord with its commitments of September 2002, the preferred option of the Traditional Owners (the backfilling of the decline) is indeed being investigated. This is, obviously, in stark contrast to other accounts of proceedings at the MTC.
>
> These events clearly illustrate the lack of meaningful input on the part of the Traditional Owners into decisions affecting their country and the overall inadequacy of present MTC arrangements.
>
> … Unfortunately, like all MTC minutes they do not provide an accurate record of discussion during the meeting, focussing instead on outcomes.[268]

---

264 Gundjehmi Aboriginal Corporation, *Submission 58*, p 103.

265 Gundjehmi Aboriginal Corporation, *Submission 58b*, pp 1-2.

266 Gundjehmi Aboriginal Corporation, *Submission 58b*, p 2.

267 Gundjehmi Aboriginal Corporation, *Submission 58b*, p 2.

Water quality downstream of Jabiluka

2.295 According to the GAC:

> The retention characteristics of Jabiluka soils, uranium loads in irrigation and the lack of appropriate high quality treatment technology on-site at Jabiluka demonstrate that the concerns for the short and long-term impacts on water quality in the Swift Creek catchment are well-founded.[269]

2.296 In January and February of 2002 the focus and action levels for Swift Creek were exceeded, highlighting the fact that the measures in force at the Jabiluka site are not sufficient to protect the downstream environment. The GAC recommends that ERA, the SSD and DBIRD adopt an 'approach to ensure that the expected monitoring and reporting requirement can be enforced legally to the satisfaction of the Mirrar and broader public.'[270]

2.297 The Mirrar are concerned that the Swift Creek tributaries are not being protected and that irrigation had a role in the heightened uranium levels. To deal with this problem the GAC has put forward the following recommendations:

- direct irrigation of IWMP water be suspended and replaced by a high quality treatment technology such as RO;
- a detailed investigation of the Jabiluka soils to assess its retention capacity and the rates at which uranium might leach from existing land application areas;
- the uranium grade of the non-mineralised stockpile be reported and investigated to ensure it does not become a source of contamination; and
- the SSD, DBIRD and ERA pro-actively move towards backfilling the decline with the mineralised ore[271], sealing it with clay lining, grouting or another technology to ensure low permeability and minimised cross-contamination of groundwater, and commence rehabilitation of the site.

Groundwater management

2.298 The GAC argues that the lack of hydrogeological research prior to construction and operation highlights the failure of the approvals process and the lack of rigor applied to groundwater issues by the supervising authorities.[272]

2.299 The GAC says it is:

---

268 Gundjehmi Aboriginal Corporation, *Submission 58b*, p 2.

269 Gundjehmi Aboriginal Corporation, *Submission 58*, p 106.

270 Gundjehmi Aboriginal Corporation, *Submission 58*, p 110.

271 Gundjehmi Aboriginal Corporation, *Submission 58*, p 114.

272 Gundjehmi Aboriginal Corporation, *Submission 58*, p 115.

> … disappointing that such important information, especially in the light of rehabilitation designs for backfilling the mineralised ore into the decline, is not being reported by ERA nor demanded by the OSS and DBIRD.[273]

2.300 The GAC adds:

> It has been noted [above] that seepage flow rates into the decline change according to the stage of the wet or dry season. This suggests a degree of hydraulic connectivity between the shallow and deeper aquifer systems. The information presented publicly to try and quantify the source of this variation has been poor and, in reality, mostly non-existent.[274]

2.301 More work in this area is called for and the GAC requests that all existing groundwater monitoring data held by ERA, DBIRD or the SSD be placed on the public record.[275]

Rehabilitation of Jabiluka

2.302 Under the Jabiluka General Authorization A98/2 issued by the Northern Territory Government, the operator must:

> … establish an environment in the Jabiluka Lease Area that reflects, to the maximum extent that can reasonably be achieved, the environment existing in the adjacent areas of Kakadu National Park, so that the rehabilitated area could be incorporated into Kakadu National Park without detracting from Park values of adjacent areas.[276]

2.303 Details of rehabilitation and decommissioning requirements are set out in Schedule 7. Schedule 7.1.1.2 outlines the objectives as follows:

> To revegetate the disturbed sites of the Jabiluka Lease Area with local native plant species in similar density and abundance to that existing in adjacent areas of Kakadu National Park, in order to form an ecosystem the long-term viability of which would not require a maintenance regime significantly different from that appropriate to adjacent areas of the Park.
>
> To establish stable radiological conditions on disturbed sites of the Jabiluka Lease Area so that, with a minimum of restrictions on use of the area, the public dose limit will not be exceeded and the health risk to members of the public, including traditional owners, will be as low as is reasonably achievable.

---

273 Gundjehmi Aboriginal Corporation, *Submission 58*, p 114.

274 Gundjehmi Aboriginal Corporation, *Submission 58*, p 114.

275 Gundjehmi Aboriginal Corporation, *Submission 58*, p 115.

276 Schedule 7.1.1.1, Jabiluka Authorization A98/2.

> To limit erosion in rehabilitated areas, as far as can be reasonably achieved, to that characteristic of similar landforms in surrounding undisturbed areas.

2.304 Schedule 7.1.2 sets out the necessity for a 'plan of rehabilitation detailing specifications for the physical decommissioning and rehabilitation of the mine, the uranium treatment plant and all ancillary works and services'. The specifications must include:

> 7.1.2.1 a detailed specification of all rehabilitated works which are proposed to be undertaken in the 12 months following the preparation of the report; and
>
> 7.1.2.2 a conceptual specification covering decommissioning and rehabilitation for the remaining years of life of the project.

2.305 The current Jabiluka Project Plan of Rehabilitation No. 6, dated February 2003, contains a description of what is required to restore the Jabiluka Project site to its current state. The Plan includes details of work needed and estimates of time and cost. It also deals with the rehabilitation of the Djarr Djarr campsite. The plan covers immediate and deferred closure scenarios.

2.306 The latest Plan outlines how the status of the current Jabiluka operation has altered from being a Standby, Care & Maintenance one to a Long Term Care and Maintenance status, whose major objective is to ensure that the site can be managed passively in the long-term.

2.307 The GAC argued that it would be cheaper for the site to be properly rehabilitated than to struggle to maintain a site that is not going to be considered as an operation mine before 2010.[277]

2.308 According to the current 'Plan of Rehabilitation No. 6' for Jabiluka, the cost of rehabilitation, as outlined in principle above through backfilling of the decline and removal of the pond, is estimated at only $2.3 million. This money is already available since it is guaranteed through bond/surety arrangements. Given the number of personnel involved at Jabiluka, environmental monitoring requirements and maintenance costs, it should clearly be more economical for ERA to rehabilitate the entire site now.

2.309 Rio Tinto Ltd's Mr Lloyd told the Committee that a closure plan existed for Jabiluka, and that it would be 'updated in the light of new knowledge and new circumstances'.[278]

---

277 Gundjehmi Aboriginal Corporation, *Submission 58*, p 95.

278 Mr Lloyd, Rio Tinto Ltd, *Proof Committee Hansard* , Canberra, 18 October 2002, p 266.

2.310 The Australian Greens–Northern Territory believe that delaying rehabilitation increases environmental damage.[279] It recommended that the SSD be given 'political freedom' and that its efforts should be:

> … directed to managing the rehabilitation of the sites. Rehabilitating uranium mines represents an engineering project with scientific problems never successfully met before.[280]

2.311 The organisation further argued that the Northern Territory Government should insist that rehabilitation at Jabiluka is carried out even if only as a temporary measure:

> This positive step would easily be covered by the rehabilitation bond, while vastly reducing management costs. While some monitoring will still be required, the greatly simplified management requirements should provide financial savings that outweigh the costs of temporarily rehabilitating.[281]

Incidents and failures in reporting

Complaints by Mr Geoffrey Kyle

2.312 Former ERA employee, environmental chemist and member of a team of scientists employed at Ranger to monitor water samples, Mr Geoffrey Kyle wrote to the Commonwealth Minister for Environment and Heritage, the Northern Territory Minister for Resource Development and several Commonwealth and Territory officials on 5 April 2002, making serious complaints about shortcomings in environmental management and reporting at the Ranger mine between 1996 and 1998.

2.313 Mr Kyle also raised issues with the SSD, saying in an interview on the ABC *7.30 Report* on 18 April 2002:

> Throughout the tenure of my employment with Ranger, I tried to alert its management to various matters and to take remedial or preventative action. My efforts were not met with success.

2.314 The Committee notes that an investigation into Mr Kyle's complaint was commenced by the SSD and ERISS in April 2002 and was concluded saying:

> Apart from the previously reported breach of the Ranger Authorisation arising from the spillage of tailings outside the Restricted Release Zone on 19 December 1997, no evidence has been found that ERA has operated

279 Australian Greens–Northern Territory, *Submission 45*, p 4.

280 Australian Greens–Northern Territory, *Submission 45*, p 3.

281 Australian Greens–Northern Territory, *Submission 45*, p 3.

> otherwise than in accordance with its Authorisation and the Commonwealth's Environmental Requirements.[282]

2.315 The Committee notes with great concern Mr Kyle's submission to this inquiry in which he says, of the interview with him that took place in May last year:

> Throughout the interview numerous attempts were made to put words into my mouth in respect of assessments of the likely environmental damage caused by the events that I described. I was obliged to point out on several occasions that I believed that some members of the committee were attempting to obscure the pertinent detail of my complaint by obtaining my assent to statements suggested by themselves. These were categorical statements to the effect that no environmental damage had been caused by the incidents I described in my complaint.[283]

2.316 The matters raised in Mr Kyle's letter to the Minister for Resource Development, NT were:

1. The under-reporting and mis-reporting of discharge of water from the Restricted Release Zone (RRZ) into a tributary of Gulungul Creek.

2. Failure to clean up a substantial amount of spilled tails material that occupied the Corridor Road Sump and its feeder drains as a result of the above incident.

3. Employment of *ad hoc* water management strategies that resulted in over 300 kg of uranium being lost into RP2, from which pond water is released into the Magela system;

4. The routine discharge from the RRZ of water containing up to 10,000 ppb uranium from the toe loading of the tailings dam, via the South Road Culvert, (TDSRC), into the headwaters of Gulungul Creek.

5. When an indication was recorded that an effect from the discharge in 4 above, had been found downstream at Gulungul Creek, Ranger refused permission for field staff to investigate the matter, attempted to suppress the datum, and described it as "spurious" in a statement to shareholders. The offending result came from two separate samples, each tested in triplicate by the same experienced analyst who acquired the samples.

6. Laboratory management consistently refused to address technical issues that compromised the performance of the laboratory. This failure led to an inability to honour the conditions of its licence to operate the mine, especially in terms of the NATA registration of

---

282 Office of the Supervising Scientist and Northern Territory Department of Business, Industry and Resource Development, 'Evaluation of Alleged Deficiencies in Management of the Ranger Uranium Mine between 1996 and 1998', SSR 171, 2002, p vii.

283 Mr Kyle, *Submission 35*, p 2.

> certain critical test procedures and equipment. Even when it was demonstrated that the points raised were valid, Ranger did not rectify the problems.[284]

2.317 In relation to 2. above, Mr Kyle described the spill of tailings that occurred in December 1997 from a ruptured pipe in the Corridor Road:

> [The shift supervisor at the RUM plant] had come on-shift at 0700 on the Saturday and found that a tailings line had ruptured and sprayed tailings slurry across the RRZ at Corridor Road into all the perimeter drains along that section of the road, and up the outer bank of the turkey next sump.
>
> From the tailings system pump and lineout log, and from the amount of material spilled, he found that the line had ruptured during a routine line change, and that the ruptured flange had probably been discharging for around four hours before it was discovered.
>
> As soon as I arrived for work on the next day, I went to the site. … Any material that had been sprayed over the road onto the creek banks outside the RRZ, had, by then, been removed. There was evidence of machinery having been used to excavate an area approximately 25 meters square and 250 mm deep, on average. The excavation extended from the foot of the road batter to the creek bank and had removed all vegetation. I estimated that approximately 156 cubic metres of material had been removed. …
>
> I was later told … that several large tipper truck loads of material had been excavated and carted off to the contaminated waste dump.
>
> HBT was operating a water cart that was being used to hose the heavy slurry back across the road and into the perimeter drains. Those drains were full of slurry and were carrying the overflow into the turkey next sump. No attempt was being made to remove the slurry that had been sprayed up to half a metre up the sides of the motor control station operating the sump.
>
> I returned to the environment laboratory and reported the spill to the Chief Chemist. I made clear my fears that an incomplete cleanup would become a health hazard for staff in the dry season. [he] agreed, and said he would raise the matter with the Mine Department. An investigation was mounted in the laboratory to sample the creek at several locations, and to look for any effect downstream in Georgetown Billabong.
>
> A couple of days later, I saw a statutory infringement letter from RUM to the DME and other stakeholders reporting the incident, and describing it. In that letter, PW stated that the amount of material that had been spilled outside the RRZ was one cubic metre, and that a full clean[ed] up had been performed immediately. As a result there was no environmental damage.

---

284 Mr Kyle, *Submission 35*, pp 5-6.

> The material that had been sprayed or hosed into the perimeter drains and turkey next remained where it was for the remainder of the wet season and most of the following dry. During the dry months, the sump was allowed to dry out and the fine tailings blew around in the wind. I was concerned for the health of my people who visited that site on a daily basis as part of their monitoring roles, and again approached AR about the OH&S aspects of the failure to clean up the residue of tailings spills. He agreed, but again, no action was forthcoming to rectify the situation. I also raised the matter at meetings where were present the most senior management and environment staff on the site. The cleanup did not occur.[285]

2.318 According to SSD, the tailings trapped in the original corridor road sump could not be removed until it was dry and capable of being transported as a solid by earth moving machinery. This took some months following a Wet season involving above average rainfall. After consultation with the Northern Territory's Minister for Mines and Energy, ERA isolated the affected area within the process water circuit by containing the spilled tailings in the original sump throughout the Wet season, any overflow being directed into Pit 1. It constructed a new, temporary sump from which water was pumped to RP2; however, runoff from the section of the tailings corridor contaminated by the tailings spill did not find its way into this sump.[286]

2.319 In relation to 5. above, Mr Kyle said:

> In January 1997, I performed the monthly sample collection and uranium analysis for statutory monitoring purposes. As was routine procedure, I acquired duplicate samples from all of the sites. Later, when analysing the samples, I was alerted to a possible problem when GCH [Gulungul Creek Highway] reported 7ppb uranium. I re-tested the sample several times, and then tested the duplicate sample several times. All the tests confirmed the initial value of 7 ppb. …
>
> I reported the occurrence to the then Chief Chemist… I explained that I suspected the source of the higher than expected uranium levels, both now and in the history, might be the elevated uranium readings that were routinely recorded at TDSRC [Tailings Dam South Road Culvert] during the first flush rain events each wet season. I requested permission to sample the two unmonitored arms of the creek system feeding Gulungul at GCH to eliminate any other potentially contributing factors, and to venture further down-grade from TDSRC to sample the creek at various locations with the aim of monitoring the dilution suffered due to rainwater and confluences.

---

285 Mr Kyle, *Submission 35*, pp 14-15.

286 Office of the Supervising Scientist and Northern Territory Department of Business, Industry and Resource Development (2002), *Evaluation of Alleged Deficiencies in Management of the Ranger Uranium Mine between 1996 and 1998*, OSS Report, No. 171, OSS, Darwin, pp 6-7.

> Permission was refused on the grounds that GCH was a monthly site and that we did not need to check it again until February. TDSRC was not statutory and would continue to be monitored on a weekly basis. [The Chief Chemist] suggested that the result was most likely to reflect contamination in the sample or the analysis. He suggested that the result not be recorded on the database. I did not agree, and entered the result.[287]

2.320 Mr Kyle contends that the results clearly established that a contribution to uranium concentration at Gulungul Creek was being made by the run-off from TDSRC possibly caused by a small spring under the tailings dam wall adjacent to TDSRC:

> Assisted by the hydraulic pressure in the dam, the spring expressed 'seepage' onto the toe of the dam wall. The toe consisted of crushed "waste rock" compacted around the foot of the wall. Essentially, waste rock is very low grade uranium ore. It is used as fill, in earthworks, or is stockpiled. It contains uranium, but is not rich enough to warrant processing.
>
> The seepage of water and dissolved salts from the dam continues for the entire year, but is not visible at the surface during the dry season. This is because the large surface area of crushed waste rock, heated by the sun, evaporates the water rather quickly. That leaves the solute salts accumulating just below the surface of the tow. When the rains come, the first good flush dissolves and mobilises the salts and carries them into the perimeter drain, thence into TDSRC, off the mine site, and into the creek system as described above…
>
> My chief concern was that, because of the monthly or weekly nature of the water quality snapshots we were acquiring, we had no measure of the magnitude of the problem at the entry end. Moreover, we were certainly not seeing the full extent of what was occurring downstream, and were therefore failing to appreciate the ultimate consequences for the surrounding environment.
>
> … in the wet season of 1997-8, a peak of nearly 10,000 ppb was recorded at TDSRC. To me, that result confirmed that the monitoring programme had a significant gap in it.[288]

2.321 Mr Kyle reported that his efforts to alert his supervisors did not result in efforts or resources to investigate the source of this considerable contamination nor any acknowledgement that there was a problem in routinely releasing water containing up to 10,000 ppb uranium into pristine creeks when the limit downstream is 6 ppb.

2.322 In relation to 6. above, the SSD said:

---

287 Mr Kyle, *Submission 35*, p 10.

288 Mr Kyle, *Submission 35*, pp 11-12.

> Mr Kyle was also concerned about technical matters affecting the functioning of the Ranger Environment Laboratory. He asserted, for example, that the laboratory had failed to comply with the terms of its National Association of Testing Authorities (NATA) registration. Mr Kyle also argued that, although this failure of compliance did not result in inaccurate reporting in this instance, on some occasions it definitely did. In its assessment of these issues the Supervising Scientist Division concluded that many of the deficiencies identified by Mr Kyle were present and that corrective action was needed. However, the SSD was satisfied that the analytical issues raised by Mr Kyle did not lead to the lack of detection of environmental damage although, if fully accurate, they may have resulted in inconsistent or incorrect analyses.[289]

2.323 Mr Kyle concluded:

> RUM [Environmental Laboratory] knowingly and routinely allowed heavily contaminated water to flow out of the mine site at TDSRC and into the surrounding environment in the catchment of Gulungul and Magela Creeks.
>
> RUM did not report the instances where an indication of this was observed at GCH
>
> RUM discouraged investigation into the elevated level found at GCH in December, 1997.
>
> Senior RUM Environmental Department personnel were alerted to the problem but did not regard it as serious and would not allocate resources to further investigation.[290]

2.324 ERA addressed Mr Kyle's assertions in a supplementary submission. It stressed that the OSS and DBIRD investigation had concluded that there was no substance to Mr Kyle's allegations. While conceding that its documentation was deficient in relation to the alleged elevated level of December 1997, thus confirming its agreement with the finding to this effect of the OSS report, ERA challenged the validity of Mr Kyle's assay and strongly suggested that a 'true' uranium level of 7.4 ppb did not occur at the sample point in Gulungul Creek downstream from ERA's operations inside Kakadu National Park. In addressing its current practices, ERA wrote:

> Installation of a new LIMS [Laboratory Information Management System] was completed in May 2002. This will enable the results of monitoring to be assessed against trigger values and for data anomalies to be flagged more promptly and with greater reliability. These results are

289 Office of the Supervising Scientist and Northern Territory Department of Business, Industry and Resource Development (2002), *Evaluation of Alleged Deficiencies in Management of the Ranger Uranium Mine between 1996 and 1998*, OSS Report, No. 171, OSS, Darwin, pp v, vi.

290 Mr Kyle, *Submission 35*, p 13.

> also available electronically for representatives of NLC, OSS and NTDBIRD to view at any time. Through an auto-prompt facility, any excursion above the set trigger values will be highlighted to ERA Management immediately the validated data are received from the analytical laboratory.[291]

Recommendation 14

The Committee regards these allegations as serious and is not satisfied that they have been properly investigated. It recommends:

a. The appointment of an independent body to make a thorough investigation of all aspects of Mr Kyle's April 2002 statement and the adequacy of responses provided by ERA, SSD and ERISS.

b. That this body should make recommendations on any action to be taken with regard to breaches of licence conditions and agreements and determine what if any changes are required to be made to current monitoring and reporting systems.

Research

2.325 Research is carried out in the Alligator Rivers Region and the wider Kakadu National Park by a number of agencies.

ERA Research

2.326 ERA is required to conduct research at Ranger as stipulated in Clause 15 of the Ranger ERs:

> The company must undertake research with a view to maximising the level of environmental protection at Ranger. Plans and results of environmental research by the company will be provided to the Technical Committee established under the *Environment Protection (Alligator Rivers Region) Act 1978* to enable the committee to effectively co-ordinate environmental research in the region.[292]

2.327 The ERA company must pursue research at Jabiluka as stipulated in clauses 37 and 38 of the Jabiluka Environmental Requirements:

> 37. The lessees shall undertake appropriate investigations as required by the Supervising Authority to define the design and operating conditions capable of meeting environmental protection criteria applied to the Jabiluka Project.

---

291 ERA, *Submission 56a,* p. 7.

292 Clause 15, Environmental Requirements of the Commonwealth of Australia for the Operation of the Ranger Uranium Mine.

> 38. The lessees shall cooperate with the Supervising Authority in undertaking appropriate investigations and in providing information relevant to identifying and overcoming environmental problems within or relevant to the Jabiluka Project Area.[293]

2.328 Earth-Water-Life Sciences (EWLS) Pty Ltd, a wholly owned subsidiary of ERA, provides environmental consultancy services to ERA and selected external customers. According to ERA's website, the major outcomes of project work for 2002 were:

> … the rationalisation of statutory and operational environmental monitoring programs at Ranger; the development of a life of mine closure and rehabilitation blueprint; assessments of best practice management of Ranger stockpiles during wet seasons; advancement of process water treatment technology; successful full-scale wetland trials of ammonia removal from treated process water; and commissioning of a significant reduction of the pH of tailings slurry deposited in Pit #1 with consequent major savings in the costs using lime for neutralising.[294]

ERISS[295]

2.329 ERISS research has two main themes:

- research and monitoring for the protection of people and the environment, focusing on the effects of mining in the Alligator River Region; and
- research on the ecology and conservation of tropical wetlands.

2.330 The ERISS also undertakes research into environmental radioactivity; ecosystem protection; hydrological and ecological processes; and ecological risk assessment. ERISS aims to provide advice to the Supervising Scientist and stakeholders on standards, practices and procedures to protect the environment from the effects of mining in the Alligator Rivers Region, and on the ecology and conservation of tropical wetlands.

2.331 The ARRTC's goals are to ensure 'that the research being undertaken by ERISS and ERA is of the highest quality and relevant and to ensure that that scientific knowledge is used to underpin the regulations, both the management and the policies.'[296]

---

293 Clauses 37-38, Environmental Requirements for the Jabiluka Uranium Project.

294 ERA Website: www.energyres.com.au/corporate/information.shtml#ewl

295 Office of the Supervising Scientist, Annual Report 2001-2002 as contained in the Department of the Environment and Heritage Annual Report 2001-2002, p 467-8.

296 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 334.

Relocation of the Environmental Research Institute of the Supervising Scientist (ERISS)

2.332 The relocation of ERISS has been the subject of considerable debate among the Jabiru community, traditional owners and other stakeholders. Many are convinced the move will adversely affect the monitoring program.

2.333 ERISS conducts environmental research in order to detect, quantify and understand any actual or potential environmental impacts of uranium mining in the Alligator Rivers Region. ERISS also undertakes research on wetlands conservation and management.

2.334 The Supervising Scientist, Dr Johnston, points to the difference between the role of the ERISS in conducting research and its role in monitoring:

> … research is about looking into why things happen, but monitoring is checking for early warning signs that something has changed or could change.[297]

2.335 During Senate Estimates hearings in May 2002, the move was discussed in detail. Although the relocation of staff is the main concern for stakeholders, other issues, such as cost, distance and effectiveness were also canvassed. The SSD has moved the research staff from Jabiru to Darwin. It has also created the Jabiru field station team to carry out routine monitoring of the Alligator Rivers Region and to deal with incidents as soon as they occur. The Jabiru staff are intended to be the officers of first resort, with those based in Darwin able to reach Jabiru and surrounding areas in less than three hours should the need arise. Dr Johnston said:

> We have done a very detailed analysis of the work program and presence of staff in Jabiru and Darwin—for example, on a daily basis, for the next year. We have a very clear idea of what would be expected. We have the ability to respond very quickly to any possible incidents. First of all, we would use the staff located, as I have mentioned, in Jabiru; those from Darwin, if necessary, are a 2½-hour drive away. I do not see this as an issue; in fact, I see that the future for the mine site inspection role has been enhanced, rather than decreased, by the new arrangements.[298]

2.336 Several witnesses were critical of the relocation to Darwin. The NLC, for example, called for ERISS to return to Jabiru:

> You have to address public perceptions. The Office of the Supervising Scientist must go back to Jabiru. It does not look good to the public when a series of environmental questions are being asked about a political issue.

---

297 ERISS (Ranger and Jabiluka), 'An Ongoing Commitment to Monitoring by *Eriss*', June 2002.

298 Dr Johnston, *Proof Committee Hansard,* Budget Estimates, 30 May 2002, p 495.

> It is in a Pandora's Box with uranium mining anyway, and it plays into those public perceptions.[299]

2.337 The NLC recommended that the entire SSD be relocated to Jabiru.[300]

2.338 Dr Johnston told the Committee that:

> … until now, the only presence in Jabiru has been a research presence; that is, ERISS, the Environmental Research Institute of the Supervising Scientist. The OSS, which has the supervisory, quasi-regulatory type role, has never had a presence in Jabiru. They have been either in Darwin or, at some stage in the past, have been split between Darwin and either Sydney or Canberra. All of the OSS people were moved from Canberra to Darwin two years ago. Now that we have the new field station out there, we have one person representing Mr Zapantis out in Jabiru. That person undertakes routine inspections when required.[301]

2.339 The Jabiru Town Council is concerned that the move to Darwin may have deleterious effects on the local Jabiru community, both environmentally and economically:

> From 260 kilometres away, the tyranny of distance factor is a reality. This community's future is decided by people who do not live here, and ERISS has decided to join them. There is a risk that this community and the understanding of this country will become distant. Jabiru is not a field site. It is a unique, vital Territory community of 1,309 people. The ERISS field station is going to need a lot of support from the Darwin office. That will mean a lot of travel in the wet season, when the road is closed annually because of flooding and aircraft and long, overnight stays for field personnel are the only option. It is the expectation of this council that the resources be provided to continue at a high standard the monitoring and reporting of impacts of uranium mining by government to the benefit of all parties involved. This is a particularly sensitive issue for both the Indigenous and the non-Indigenous communities.[302]

2.340 In its submission to the inquiry, the Jabiru Town Council (JTC) addressed the question of the reliability of remote monitoring:

> Council has expressed concerns around the reliability of a remote monitoring service to provide, in an ongoing capacity, an adequate and effective monitoring programme. Councillors have expressed the view that during budgetary cost cutting, some aspects of a programme, such as travel allowances, are more vulnerable. This has led to fears about

---

299 Mr Fry, *Committee Hansard,* Jabiru, 30 September 2002, p 71.

300 Mr Fry, *Committee Hansard*, Darwin, 30 September 2002, p 71.

301 Dr Johnston, *Committee Hansard,* Darwin, 30 September 2002, p 14.

302 Clr Norton, *Committee Hansard*, Jabiru, 1 October 2002, p 125.

> whether or not monitoring groups can be relied upon to adequately monitor the impacts of uranium mining on Kakadu National Park and the communities that inhabit the area from a remote location.[303]

2.341 The JTC referred to the likely impact of such a move on the economic life of the area and to its implications for social services provision within the community:

> The other impacts are a very large diminishment in the population of the town and the effect on the school and child care and all those sorts of things. Basically, this inquiry is to do with the monitoring of mining and if that is going to be done from a distance there is a problem, as far as we can see, with the pressure of finance. If you have to pay people to come out here or stay any length of time that money has to be found to provide the service that is required. I would like to stick to mainly the main issue, but generally speaking, yes. We were never in favour of ERISS going to Darwin in the first place when it was first mooted about four years ago.[304]

2.342 Professor Hart, from the ARRTC, had this to say on the relocation:

> There are always trade-offs in terms of getting and keeping good people, which will be enhanced by being in Darwin, and being able to get to your field sites. I guess one would always have to have some concerns about that. It is a trade-off as to whether the relocation of most of the people into Darwin gets ERISS a more consolidated and better scientific staff in the longer term.[305]

2.343 ERISS has completed its move to Darwin. The Committee believes that the effectiveness of this relocation requires monitoring over the next few years to ensure that it has no adverse impact on the research role of the SSD, and that such a move enhances SSD performance. The Committee recognizes that the SSD's Jabiru-based monitoring function also needs to be reviewed regularly so as to ensure that the highest possible standards and outcomes are attained.

Parks Australia North and Kakadu Board of Management

2.344 Parks Australia North and the Kakadu Board of Management oversee research activities within Kakadu aimed at providing baseline information about natural and cultural resources and visitor use of the park. Monitoring measures are designed to determine whether and, in what ways, the Park's natural and cultural resources have

303 Jabiru Town Council, *Submission 32*, p 1.

304 Clr Norton, *Committee Hansard* , Jabiru, 1 October 2002, p 125.

305 Professor Hart, *Committee Hansard*, Canberra, 24 October 2002, p 337.

changed; the effect of visitors on the Park; and the success (or otherwise) of park management programs.[306]

2.345 Park staff conduct some surveys and monitoring. These are funded from the park's operational and salaries budget.

2.346 The Supervising Scientist conducts research in the course of carrying out his functions under the *Environment Protection (Alligator Rivers Region) Act 1978* in the Alligator Rivers Region, which includes Kakadu. This research is funded through the Supervising Scientist budget allocations.

The National Centre for Tropical Wetland Research

2.347 The National Centre for Tropical Wetland Research (NCTWR) is a collaborative venture between the ERISS and three universities: the James Cook University of North Queensland, the Northern Territory University, and the University of Western Australia. The NCTWR conducts research and training aimed at 'providing information and expertise to assist managers and users of tropical wetlands to use these valuable habitats in a sustainable manner.'[307]

2.348 The Centre concentrates on science-based knowledge extending over a range of wetland issues, including the economic and social values of wetlands; integrated coastal and catchment management with a particular focus on coastal wetlands; management of weeds, feral pests and invasive species; national waterbird monitoring; and human health and wetlands. It also provides an information centre for tropical wetlands knowledge.

2.349 The NCTWR's main sphere of influence encompasses the provision of advice, based on scientific research and the monitoring of tropical wetlands, and the training of wetland users, owners and managers.

Call for more research

2.350 The GAC has called for the following research activities to be undertaken.[308] The debate around the necessity for that research is dealt with in other sections:

- specialist research by SSD on groundwater flowpaths, such as fracture zones and fault zones, to allow more detailed quantification of contaminant migration rates and more realistic design and implementation of tailings storage within Ranger's Pit #3;

---

306 Kakadu Board of Management and Parks Australia, *Kakadu National Park, Plan of Management 1999-2004*, 1998; www.erin.gov.au/parks/publications/kakadu-htm/kakpm-p 146-185.html#research.

307 Office of the Supervising Scientist, Annual Report 2001-2002 as contained in the Department of the Environment and Heritage Annual Report 2001-2002, pp 481-483.

308 Gundjehmi Aboriginal Corporation, *Submission 58*, pp 5A-5F.

- detailed field studies by SSD to quantify radon flux, microbiological behaviour and the physical properties of tailings, especially permeability;
- detailed studies on the long-term future of existing sites to continue to be able to perform effectively, including all contaminants (MG, SO_4, Mn, U, ^{226}Ra, etc.);
- more detailed field studies aimed at quantifying groundwater flow paths to enable more accurate short and long-term (<10,000 year) models;
- more detailed field studies aimed at quantifying long-term contaminant retention characteristics of soils; and
- detailed studies to characterise in sufficient detail the quality of various sources of seepage into the Jabiluka decline to allow more realistic quantification of proposals for long-term water management.

Reporting and communication regimes

Reporting by ERA

2.351 The overall program of reporting[309] is set down in the Ranger and Jabiluka General Authorisations. The Ranger reporting regime requires ERA to notify the DBIRD, the SSD and the NLC of all aspects of its operations by means of several reporting methods at varying intervals. Reporting of incidents and events at Jabiluka is undertaken in the same manner, although it is not yet a legal requirement.

2.352 Results of the Environmental Monitoring and the Radiation Protection Monitoring programs at Ranger are reported. Additionally, there is a range of statutory reports on aspects of the operation such as water management, tailings management and tailings dam surveillance. Water quality and chemistry data are reported on monthly. This reporting is augmented by quarterly reports which must include some trend analysis. The Annual Interpretative Report provides an overall assessment of the monitoring data for the whole year. During periods of water discharge from the mine site, (for example, when the weir at RP1 is overflowing), the company is also obliged to report weekly on key water chemistry parameters.

2.353 In addition to these formal reporting requirements, ERA must, under its Authorisation and the Environmental Requirements, report promptly on a range of incidents and events. It is required to notify the Commonwealth Minister for Resources, the DBIRD, the SSD and the Northern Land Council of all breaches of any of the Environmental Requirements and of any mine-related event which:

- results in significant risk to ecosystem health; or
- has the potential to cause harm to people living or working in the area; or
- is of or could cause concern to Aboriginals or the broader public.

309 This section is based on the OSS submission (*Submission 77*, pp 29-32).

2.354 Because these criteria could be subject to arbitrary interpretation, the trigger values outlined above under monitoring were introduced (see paragraphs 2.180-2.195).

2.355 An additional system of informal reporting of minor events was adopted by ERA in 2000. Unplanned events are reported weekly through an unplanned events register. This is a voluntary system instituted by ERA to ensure that the principal stakeholders are aware of issues on the site and to increase workforce understanding of the importance of environmental issues and reporting.

Reporting by the Northern Territory Department of Business, Industry and Resource Development

2.356 The Minerals and Energy Division of the Northern Territory Department of Business, Industry and Resources implements an environmental check monitoring and surveillance program at the Ranger and Jabiluka mine sites. The results of the program are reported formally to the other stakeholders every six months for periods ending on 31 March and 31 August each year. The reports are tabled at the ARRAC meetings, at which a supporting presentation is made by Northern Territory personnel.

2.357 In the event that incidents, infringements or anomalous data are discovered at other times, procedures are in place to enable the Northern Territory authorities to contact the other stakeholders and advise them of their findings. There are frequent meetings of the Minesite Technical Committee as well as informal sessions at which data is discussed and views exchanged.

Reporting by the Office of the Supervising Scientist

2.358 The SSD produces an Annual Report that is tabled in the Commonwealth Parliament each year. This report, which covers all aspects of the work of the SSD, includes a summary of research activity, supervision and audit activities, community relations and the relevant administrative arrangements. The outcomes of research at the ERISS are reported on throughout the year in internal reports, peer-reviewed reports in the SSD Report Series, and in publications in the scientific literature.

2.359 The Supervising Scientist also reports to the ARRAC and the ARRTC twice a year when these committees meet. The ARRAC meetings are currently held twice yearly (in August and December). The reports encompass all aspects of SSD activity in the region for the previous period, including the assessment of mining company applications, routine periodic inspections, environmental monitoring data, outcomes of meetings of the Minesite Technical Committees and working groups, and environmental performance reviews and environmental audits for which the SSD has been responsible.

2.360 The results of the Supervising Scientist's independent and routine monitoring program are reported on to stakeholders by e-mail and to the broader community using the SSD website. They are also set out in the SSD annual report.

2.361 The NLC receives e-mailed reports of any incidents from the mine sites at the same time as the SSD and it is then responsible for disseminating the information to the traditional owners.

Call for more thorough, more public reporting

2.362 There are aspects of the reporting regime, such as the use of technical language, insufficient context to reports, and poor understanding of the reporting system itself, that separately and collectively may hinder comprehension of information. However, much reporting is not made public or is inadequate and the Committee is of the view that a lack of trust in ERA and the regulatory authorities is, to a large extent, warranted.

2.363 Mr Wakeham of ECNT said reporting delays by ERA exacerbate concerns about mining company accountability, causing stakeholders and the wider community to wonder what ERA is trying to conceal.[310]

2.364 The GAC argues that all detailed studies and reports that already exist within ERA, DBIRD and SSD should be made publicly available, calling specifically for:

- the release of all internal research reports and data on known environmental problems at treatment areas (wetlands, irrigation);[311]
- all existing groundwater monitoring data held by ERA, DBIRD and the OSS;[312]
- the 'Ranger Mining Manual' to be made available publicly, or its successor the Mining Management Plan (MMP) under new NT legislation.[313]

2.365 The GAC complained that the amount of data being reported publicly, both by the SSD and ERA, is gradually reducing:

> The OSS has not published annual ore, low grade ore, waste rock and important mill data since OSS-AR (1997). Quarterly stock market reports by ERA now exclude uranium grade mill data; this data is now only available on an annual basis (eg. ERA-AR various). Mine data is only reported in ERA-RAER (2000, 2001) and ERA-AR (various).
>
> As mine and mill data, especially minesite water volumes, is important for determining the extent of contamination of the various parts of the Ranger site (as outlined above), the OSS and ERA should be more comprehensively reporting such data in their respective annual reports.

310 Mr Wakeham, *Committee Hansard*, Darwin, 30 September 2002, p 84.

311 Gundjehmi Aboriginal Corporation, *Submission 58*, p 78.

312 Gundjehmi Aboriginal Corporation, *Submission 58*, p 82.

313 Gundjehmi Aboriginal Corporation, *Submission 58*, p 81.

2.366 The GAC called for more thorough reporting of stockpile locations, plans and quantities by ERA, SSD and DBIRD, including water management aspects for each site.[314]

2.367 The GAC also argued that ERA and SSD should report annually on quantities of materials utilized at Ranger such as quantities of ore, low grade ore and non-mineralised rock mined from Pit No. 3 including uranium grade and other minerals of concern such as sulfide and copper. It also called for annual reporting of the use of industrial chemicals and reagents used in processing at Ranger – acid, ammonia, lime, etc.[315]

2.368 The prospect of underground mining at Ranger has been canvassed since the 1970's and the GAC points to anomalies in the reporting of the 'inferred resource' of uranium there:

> In ERA-AR (2001), the "inferred resource" category of Ranger #3 is stated to be 6.4 Mt at 0.19% U3O8 (compared to 12.4 Mt at 0.19% U3O8 the previous year). Given previous estimates in ERA-AR (1991) which specified underground ore resources of between 4 to 7.6 Mt (~0.24% U3O8), it is likely that ERA are presently considering its economic options, especially regarding the continued Mirrar opposition to Jabiluka.
>
> It is unclear whether existing approvals allow for underground mining.
>
> The continued extension of mining at Ranger #3 – either by open cut or underground (or both) - is critical to future planning for tailings, water management and rehabilitation and thus the needs for future environmental research, monitoring and reporting at Ranger. Assuming that only the remaining ore within the (currently) planned open cut is extracted, this would give the mill about 29.8 Mt of ore to continue processing until about 2016 (based on data in ERA-AR, 2001).
>
> The problems of lower ore grades, increased quantities of low grade ore and increased leaching potential of Ranger #3 material all point to the contamination strains and demands on the Ranger site being significantly amplified over the next 15 years prior to rehabilitation. (GAC page 46)[316]
>
> The use of heap leaching was originally stated as a possibility in the Ranger Draft Environmental Impact Statement (EIS) (pp46, RUM, 1974) and was still listed in ERA research projects until recently (eg. pp 176 McNally & Unger, 1993; pp 5-6, ERA 1995). It is understood that further

314 Gundjehmi Aboriginal Corporation, *Submission 58*, p 5D.

315 Gundjehmi Aboriginal Corporation, *Submission 58*, p 47.

316 Gundjehmi Aboriginal Corporation, *Submission 58*, p 46.

> beneficiation research is being completed by ERA with a view to enabling a commercial decision in the near future.[317]

2.369 The GAC argues that the short and long term plans for mining should be publicly stated each year, focusing on full transparency of issues such as timing of tailings management, ores mined versus predicted quantities, heap leaching (and/or beneficiation) and the potential for underground mining.[318]

2.370 The GAC points to the fact that the above ground dam at Ranger is inspected annually by an appropriately qualified and independent consultant, according to established industry/government standards for large water and tailings storage dams but that the report, the Annual Tailings Dam Surveillance Report (Annex C.7, Authorisation 82/3), is completed by September every year but remains confidential. The results of the annual surveys are summarised in NTSA (various) though only very briefly in SSD-AR (various).[319]

2.371 The GAC called for detailed analysis and reporting of the existing contamination of groundwater by seepage from tailings storage facilities (above ground dam and Pit #1), especially with regard to the use of contaminant plume maps.[320]

2.372 The GAC claims that ERA, the SSD and DBIRD have failed to address tailings issues in public reports and give the following examples:

- poor reporting of maximum tailings levels allowed for Pit #1 (eg. RL 0 …) and current initiatives to relax this requirement;

  - a critical issue as this has implications for the timing of Pit #1 filling and the need for Pit #3;

- poor reporting of physical properties of tailings (density, permeability, consolidation, particle size);

  - according to information given to representatives of Gundjehmi Aboriginal Corporation, the technique used to measure tailings density in Pit #1 is questionable due to the fact that it largely ignores the thick zone of several metres of fine unconsolidated silts. Thus whether ERA are truly meeting the 1.2 t/m3 density requirement is debatable;

  - despite claims of low tailings permeability, no data is known to be reported publicly;

---

317 Gundjehmi Aboriginal Corporation, *Submission 58*, p 47.

318 Gundjehmi Aboriginal Corporation, *Submission 58*, p 47.

319 Gundjehmi Aboriginal Corporation, *Submission 58*, p 55.

320 Gundjehmi Aboriginal Corporation, *Submission 58*, p 66.

- groundwater issues, especially high permeability zones such as carbonates and fracture zones, fault zones (addressed in detail below);

- microbiology of tailings (especially due to the change in deposition from sub-aqueous to sub-aerial) – closely related to sulfur/carbon behaviour in the tailings;

    - the method for tailings discharge changed from sub-aqueous (below water) to sub-aerial (above water or using beaches) in 1987 and corresponded to a major change in the geochemistry of the tailings. There are a number of internal ERA research and consultancy reports listed in Appendix 5 – all of which are believed to be confidential among probably many other reports. The formation of sulfide (due to microbial activity converting the high sulfate in the tailings) is clearly identified as a major environmental risk, and was probably given considerable weight by ERA in finally accepting final below-grade tailings storage;

- no time-frame established for returning tailings to pits (addressed below);

- incorrectly naming the dam an 'evaporation pond' despite 13 Mt of tailings still stored;

- radon flux remains poorly measured (or reported), especially from water-covered tailings.[321]

Recommendation 15

a. the Committee can see no legitimate argument for reports to be withheld from public scrutiny and calls for them to be released without delay; and

b. the Committee also recommends that ERA and SSD provide a comprehensive response and action to address the many criticisms of reporting, detailed in this report.

The Committee is persuaded that there are many areas in which reporting should be more thorough and more open to scrutiny. It recommends that:

c. the short and long term plans for mining are publicly stated each year including the timing of tailings management, ores mined compared with predicted quantities, heap leaching and/or beneficiation and the potential for underground mining;

d. all detailed studies and reports that already exist within ERA, DBIRD and SSD and those prepared in future, are made publicly available including all

321 Gundjehmi Aboriginal Corporation, *Submission 58*, p 61.

reports and data on known environmental problems at treatment areas such as wetlands and irrigation sites;

e. the annual reports of ERA and SSD include:

i. quantities of ore, low grade ore and non-mineralised rock mined from Ranger Pit #3 including uranium grade and other minerals such as sulfide and copper, and

ii. the annual use of industrial chemicals and reagents used in the ranger processing mill.

f. the Ranger Mining Manual (and its successor the Mining Management Plan (MMP) under new NT legislation) to be made publicly available;

g. more thorough reporting of stockpile locations, plans and quantities by ERA, SSD and DBIRD, including water management aspects for each site; and

h. more thorough reporting of groundwater data, both horizontally and vertically by ERA, SSD and DBIRD, including cross-sections, plume maps and groundwater elevations.

Monitoring recommendations specific to Jabiluka:

i. Statutory monitoring point for determination of the impact of Jabiluka downstream on Swift Creek be moved to within the Jabiluka Mineral Lease

j. Separate trigger levels applied for the North and Central Tributaries at the sampling locations closest to the site (ie JSCTN2, JSCTC2)

k. The statutory program for Jabiluka to include upstream monitoring of water quality in the North and Central Tributaries, including radium activities

l. An additional statutory monitoring location established within the West Branch of Swift Creek

m. The frequency for statutory water quality monitoring (for parameters currently listed as monthly as per the authorisation) be changed to at least weekly during the first month, followed by at least three samples per month for the remainder of the wet season.

n. Analysis of radium included with metals

o. A succinct and accurate location plan of sampling sites provided with all relevant reports, publications and scientific papers.

p. Adequate resources allocated by ERA to allow personnel to be available at times of first flush or other necessary and opportune times to obtain water quality or other environmental samples.

q. Provision of detailed electronic and automatic sampling equipment across the Swift Creek catchment.

Technical nature of reports

2.373 Mr Fry, of the Northern Land Council, suggested that the technical nature of the information presented renders it incomprehensible to the majority of people, thus exposing it more easily to misinterpretation:

> Most non-Aboriginal people's comprehension of mathematics is pretty poor—being a schoolteacher I can tell you that is the truth—so I would argue that most people in the community cannot make practical intellectual sense of those sorts of things.[322]

2.374 The Kakadu Board of Management noted that, although the dissemination of information from the monitoring programs has improved, there is still a need for better communication with stakeholders through the simplification of information.[323] Mr Nayinggul, from the Kakadu Board of Management, told the Committee:

> … the story I have picked up in all that time, in all those many years from the start of the life of the Nabarlek mine and the Ranger mine, is that the scientific side is behind a cloud. It is just like you have got cotton wool, and you talk about things behind the cotton wool or a big dark cloud that you cannot see through to what somebody is trying to explain to you.
>
> It is one thing because it is scientific. As we all know, anything we touch, walk on and exercise on is a different story. The scientific side I think needs to be clarified a bit more in a highly qualified manner, in such a way that Aboriginal people understand. I do not know; it might go to both Aboriginal and non-Aboriginal people. It is a very difficult thing to try and see. You can hear it. It tells you on maps how much up in the air, how far, how low, what it does when the spill is being released, but the scientific side is a very difficult part to try to explain. We have not got to that point yet. It is the heaviest difficulty I have ever tried to understand.[324]

2.375 The issue of contextual reporting was also raised during the inquiry. It was generally acknowledged that the reporting regime would be strengthened by improved, more appropriate reports.

---

322 Mr Fry, *Committee Hansard*, Darwin, 30 September 2002, p 67.

323 Mrs Christophersen, *Committee Hansard*, Jabiru, 1 October 2002, p 158.

324 Mr Nayinggul, *Proof Committee Hansard*, Jabiru, 1 October 2002, pp 160-61.

2.376 Rio Tinto Ltd's Mr Lloyd argued that every minor incident is reported in a manner that does not provide the appropriate context or interpretation to enable people to understand whether the event being reported is significant, or whether it is something that can be quickly controlled.[325] If people are unaware of the requirements of the reporting regime and there is no context for reports, it can be assumed that every 'incident' is a major leak/spill.

2.377 Dr Mudd observed that past assessments of mining impacts are not extensive enough to confirm their benign effects. Such assessments do not adequately document the implications of mining for plants and animals as bush tucker, leaving some doubt in the minds of the Traditional Owners.[326]

2.378 The Committee notes that the SSD is currently conducting research into the identification of traditional Aboriginal foods for radiological assessment. A number of scientific papers based on this research are due for publication as the report is being finalised.

2.379 In evidence to the inquiry, Mr Fry stated that different mechanisms should be employed in imparting information to Aboriginal people:

> Aboriginal people are very observant, and most of our people are very person oriented.
>
> What I find, even as the CEO of the Northern Land Council, is that if I am going to explain things to traditional Aboriginal landowners I have to be extremely transparent. In other words, I have to allow people to see exactly where I am coming from, what I am saying and what the angles are. I have to be up-front and honest and I have to talk to people and get along with people even though they may not agree with me or even like me.
>
> I always find that allowing people to argue with you and to ask all sorts of questions—no matter which angle they come from—is the best way of imparting information and where people are most likely to take it on board and believe you.[327]

2.380 The NLC says that while several environmental 'incidents' have occurred at Ranger and Jabiluka since 1999, none have posed a direct threat to the natural environment, but their occurrence is endemic of:

- an environmental system approaching a major breakdown;
- the lack of a comprehensive environmental strategy; and

---

325 Mr Lloyd, *Committee Hansard*, Canberra, 18 October 2002, p 273.

326 Dr Mudd, *Committee Hansard*, Jabiru, 1 October 2002, p 153.

327 Mr Fry, *Committee Hansard*, Darwin, 30 September 2002, p 68.

- a regulatory regime which has not fulfilled its role.[328]

2.381 The NLC says the events all illustrate at least some of three disconcerting features which were; operational errors by ERA, delay in recognising the seriousness of incidents and major delays in reporting incidents to stakeholders and regulators. The NLC argues that these features have their root cause in poor communications at every level within ERA, as well as the company's even worse external communication.[329]

2.382 The Committee was struck by the parlous state of communication between ERA and the Aboriginal and wider communities. In particular, ERA has not had a good relationship with the Mirrar people over a long period. Mr Lloyd, from Rio Tinto Ltd, noted:

> Trust is a precious and difficult thing to build. It takes time and genuine efforts on the part of everybody involved and ultimately it takes relationships with people. It is a fragile and difficult process and we are doing our best to encourage this.[330]

2.383 According to Mr Lloyd, ERA is trying to improve its relationship with the Mirrar. Resources are being allocated to ensure that relationships and the mechanisms of communication are built. He noted that the reform of reporting arrangements would improve the process as currently these mechanisms 'create noise' around the relationship.[331]

2.384 The GAC says the Mirrar have not been adequately informed and consulted about water management issues at Jabiluka, especially prior to approvals.[332]

2.385 Ranger ER 16.1(c) places an obligation on the company to report any mine-related event which is of, or could cause, concern to Indigenous people or the broader public.

---

328 Northern Land Council, *Submission 81*, p 19.

329 Northern Land Council, *Submission 81*, p 19.

330 Mr Lloyd, *Committee Hansard*, Canberra, 18 October 2002, p 273.

331 Mr Lloyd, *Committee Hansard*, Canberra, 18 October 2002, p 274.

332 Gundjehmi Aboriginal Corporation, *Submission 58*, p 88.

Failures to report

2.386 During the 1999–2000 Wet season, a leak occurred in the tailings water return pipe at Ranger which was not reported to the authorities until 28 April 2000. In its investigation the SSD made recommendations to remedy, among other aspects, deficiencies in the reporting requirements that contributed to the delay in reporting the leak.[333]

2.387 An incident which began on 14 January 2002 and continued until 26 February 2002 involving the incorrect dumping of ore on the Grade 2 Stockpile at Ranger, detailed in paragraph 2.263, was not reported to the SSD until 26 February 2002 and the Mirrar on 27 February 2002. The GAC says this incident demonstrates a lack of communication within ERA, a failure to follow reporting procedures and a disregard for the Ranger environment.[334]

Senators on top of the Grade 2 Stockpile, where incorrect stockpiling took place in January 2002

2.388 In January 2002, ERA monitoring data for uranium, magnesium and electrical conductivity exceeded action levels at Swift Creek downstream from Jabiluka. Some of the exceedances were explicable in terms of first flush and, therefore, did not have

333 Office of the Supervising Scientist (2000), *Investigation of Tailings Water Leak at the Ranger Uranium Mine*, OSS Report, No. 153, OSS, Darwin, pp xi-xiii.

334 Gundjehmi Aboriginal Corporation, *Submission 58*, p 80.

to be reported immediately. However, others could not be explained in this way, in which case ERA was obliged to inform stakeholders immediately and initiate an investigation. It did neither until 15 February 2002.

2.389 According to the SSD, exceedences of the action level for uranium were of particular concern to stakeholders.[335] For Swift Creek, downstream of Jabiluka, the focus level for uranium is 0.02 parts per billion, the action level 0.03 parts per billion. and the limit 5.8 parts per billion. On 2, 8 and 22 January 2002, concentrations of uranium downstream from Jabiluka equaled or exceeded the action level (0.03, 0.05 and 0.06 parts per billion respectively). ERA failed to take appropriate internal action once the action levels had been exceeded.

2.390 The data for 2 and 8 January revealed that similar uranium concentrations had occurred at the upstream site, indicating a natural occurrence unrelated to the mine site. The ERA sample of 0.06 ppb taken on 22 January could not be explained in this way but the reading was not matched by data collected by the SSD. When ERA's duplicate samples for the day were analyzed the result was not 0.06 ppb but 0.014 ppb—a reading on a par with the SSD sample. The SSD says this indicated contamination of the original ERA sample, which produced a misleading result.[336]

2.391 The Committee finds it extraordinary that ERA did not follow correct procedures in the light of the recommendations that were made for improvements following the 2000 tailings leak.

Improving reporting structures

2.392 Mr Lloyd, of Rio Tinto Ltd, acknowledged the value of an interpretation service to simplify technical language to render it more accessible and easily understood:

> We recognise that such an interpretation service, if we could find it, would be ideal. The nub of this issue is that there needs to be a direct exchange between ERA representatives who are able to convey this information and the people who are affected and have concerns. The direct relationship between ERA's employees, representatives and management and the people in their local community is extremely important. This is an area where we believe ERA should be building and encouraging stronger direct relationships. It is a key to making sure that

335 Office of the Supervising Scientist and Environment Australia (2002), *Investigation of the Stockpiling and Reporting Incidents at Ranger and Jabiluka*, Supervising Scientist, Darwin , p 12.

336 Office of the Supervising Scientist and Environment Australia (2002), *Investigation of the Stockpiling and Reporting Incidents at Ranger and Jabiluka*, Supervising Scientist, Darwin , p 12.

> appropriate understanding is passed from the company to the local community.[337]

2.393 Mr Nadji explained to the Committee the benefits to him as a trainee of being shown regularly through the ERISS science laboratory. He suggested that workshops should be organized aimed at enhancing public understanding of uranium mining industry practices and processes.[338]

2.394 In order to deal with these issues ERA submitted that improved interpretation should be provided as part of the reporting regime.[339] The DBIRD discussed with the Committee the possibility of reducing the number of reports, although it acknowledged that this would lead inevitably to claims of concealment.[340] The Supervising Scientist was not in favour of curtailing reporting, but he was concerned about the incorrect interpretation of reports:

> I think there is a difference between reporting and calling it significant. I think reporting is healthy. I think there should be a transparent system. But it gets out of hand when you have to report just because something has happened at the mine site. After all, it is a significant industrial operation and it is not possible to carry out such an operation without things going wrong now and again. The issue is whether the systems are in place that will prevent any environmental impact when things go wrong.
>
> That is one where the responsibility clearly lies with the operator to decide when it is appropriate to tell us things. That has been an area where there has been a falling down occasionally in the past. My view is that it is still the responsibility of the operator at all times to ensure that it runs its business properly. What happens on site is primarily the responsibility of the operator.[341]

2.395 The principal difficulty with altering a reporting structure to improve the quality of the reports is that stakeholders and the public often assume that this will result in less transparency:

> My very strong view is that, for the very reason that it would lead to allegations that they are hiding data as soon as you start to talk about it, there should not be a reduction in reporting but the way in which it is reported and the structure that surrounds it, while being very open, should be a lot clearer about the actual level of the incident and should in fact not

---

337 Mr Lloyd, *Committee Hansard*, Canberra, 18 October 2002, pp 274-275.

338 Mr Nadji, *Committee Hansard*, Jabiru, 1 October 2002, pp 162-163.

339 Mr Lloyd, *Committee Hansard*, Canberra, 18 October 2002, p 265.

340 Mr Lea, *Committee Hansard*, Darwin, 30 September 2002, p 108.

341 Dr Johnston, Office of the Supervising Scientist, *Proof Committee Hansard*, Darwin, 30 September 2002, p 30.

> form judgements on any incident until such time as there has been a proper investigation.[342]

2.396 However, not all witnesses agree that the main problem with reporting resides in its interpretation. For example, the GAC submitted that it is ERA, the SSD and the DBIRD which downplay the 'repeated history of leaks, spills, accidents and poor performance at Ranger' as being merely:

> … "incidents", "technical divergences", "occurrences" or "unplanned events".[343]

2.397 An improved reporting framework advocated by the DBIRD would involve placing incidents within the context of a matrix that categorises them in terms of the severity and duration of the impact.[344] For nearly a year it has been receiving a weekly record of incidents on site from ERA in an effort to determine systematically what needs to be reported. Mr McGill told the Committee that nine-tenths of what is currently being reported are insignificant events which do not need to be reported on.[345]

2.398 On this basis, Mr David Lea, of David Lea Consulting, recommended that if an incident occurred on site, it should be announced as such but no information released on the DBIRD website until an investigation had been completed. At the same time, there should be more background reporting:

> There are a number of very valuable documents which the regulator produces on a six-monthly basis, which go into their analysis of the operation and the reporting …
>
> I believe that that document should in fact be released with some publicity by the state and federal governments on a regular basis so that there is a regular amount of information coming into the public domain about the whole picture. Rather than having reporting and reaction which is purely based upon incidents, and that is all that happens, we actually have a more structured, periodic information flow into the public domain about the totality of the monitoring and reporting outcomes.[346]

2.399 The Kakadu Board of Management (KBM) would like the clan groups to be notified of any problems that arise.[347] The Board currently does not have any formal relationship with ERA but it does have a relationship with the SSD. The latter

---

342 Mr Lea, David Lea Consulting, *Committee Hansard*, Darwin, 30 September 2002, p 111.

343 Gundjehmi Aboriginal Corporation, *Submission 58*, p 48.

344 Mr McGill, Department of Business, Industry and Resource Development, *Committee Hansard*, Darwin, 30 September 2002, p 108.

345 Mr McGill, *Committee Hansard*, Darwin, 30 September 2002, p 108.

346 Mr Lea, *Committee Hansard*, Darwin, 30 September 2002, p 109.

347 Mrs Christophersen, *Committee Hansard*, Jabiru, 1 October 2002, p 159.

provides a pre-Wet season paper to the Board based on its predictions of rainfall over the season as well as a post-Wet season paper outlining what occurred at the minesites. The Board would like closer communication with the SSD, especially through more frequent meetings.[348] Additionally, during the Wet season, when monitoring is undertaken daily, the Board should be informed weekly about water levels.[349]

2.400 Another suggestion is that the SSD provide regular explanations regarding the events that occur to the KBM and others, as well as information about uranium mining.[350]

Consultation

2.401 The two main consultative forums are the Alligator Rivers Region Advisory Committee (ARRAC) and the Minesite Technical Committees.

2.402 The ARRAC was established to facilitate communication between community, government and industry stakeholders. It allows the latter to question and exchange information with the various regulators at twice yearly meetings.

2.403 All material provided to the ARRAC becomes public information, thus facilitating the disclosure of environmental performance information and the building of trust by reducing the potential for misinterpretation of information.

2.404 The Minesite Technical Committees are the key forums for the discussion of environmental matters relating to Ranger and Jabiluka. Their role is to provide advice to the DBIRD in defining, establishing and maintaining best mining practice in relation to site-specific technological, scientific and environmental factors and constraints. The Traditional Owners are directly represented on these committees by the Northern Land Council which is funded largely by mining royalties. Therefore, it has the resources to employ the specialist expertise necessary to be able to perform its role of representing and protecting the interests of the Traditional Owners.[351]

2.405 The Committee received little information from witnesses about the effectiveness of these committees. However, the GAC was concerned about inadequacies in the current process, particularly regarding the MTCs. It considered that decisions are being made without due reference to both local (especially Traditional Owner) and broader social concerns, and it provided the Committee with

348 Mr Nayinggul, *Committee Hansard*, Jabiru, 1 October 2002, p 161.

349 Mrs Christophersen, *Committee Hansard*, Jabiru, 1 October 2002, p 163.

350 Senator Scullion, *Committee Hansard*, Jabiru, 1 October 2002, p 163.

351 Energy Resources of Australia Ltd, *Submission 56b*, p 1.

an example of this, namely, its exclusion from the process of observing MTC discussion about water management issues at Jabiluka.[352]

2.406 ERA commented that this may be attributable to poor communication between the NLC and GAC. While insisting that this is unfortunate, however, it does not regard it as a major indictment of the inadequacies of the MTC process.[353]

2.407 Another area of dissatisfaction for the Gundjehmi Aboriginal Corporation concerns the mine management plans that are to be developed under the *Mining Management Act 2001* (NT). According to the GAC, there will be no consultation with the Mirrar people or the Northern Land Council for developing this plan.[354] Nevertheless, the Mirrar are holding discussions with ERA both directly and through the NLC about the proposed rehabilitation of the Ranger site.[355]

2.408 The Committee received evidence from the Northern Land Council in relation to the lack of consultation over water management at Jabiluka. During 2001 ERA requested a change in the Authorisation applying to Jabiluka which would permit ERA to irrigate on some areas of the mine site. After due consideration by the Jabiluka Minesite Technical Committee the members agreed to this. Various conditions were placed on this irrigation, for example, the stipulation that a full review of water management at Jabiluka was to be completed during 2002 before any further irrigation.

2.409 On several occasions the NLC requested information on behalf of the Traditional Owners regarding the progress of the Jabiluka irrigation. According to the NLC, this request was ignored repeatedly by ERA, and more than a month of irrigation had taken place before any notification of its commencement was obtained, even indirectly.

> The full review of water management at Jabiluka has not been completed; nor has the ERA commitment been kept. However, ERA has since applied, had approved and been granted, an Authorization for further irrigation during the 2002 Dry season. According to the NLC, this has been issued on the understanding that the water management review will be completed in time for the implementation of best practice management outcomes derived from the review, to be in place for the 2003 Dry season.[356]

352 Gundjehmi Aboriginal Corporation, *Submission 58b*.

353 Energy Resources of Australia Ltd, *Submission 56b*, p 1.

354 Mr O'Brien, Gundjehmi Aboriginal Corporation, *Proof Committee Hansard*, Jabiru, 1 October 2002, p 142.

355 Dr Mudd and Mr Ralph, *Committee Hansard*, Jabiru, 1 October 2002, p 143.

356 Northern Land Council, *Submission 81*, p 21.

CHAPTER 3

South Australia: Beverley and Honeymoon

Introduction

3.1 This chapter examines the uranium mining operations in South Australia at Beverley and Honeymoon. From an environmental perspective, the key commonality between these two South Australian operations, and what sets them apart from the Olympic Dam uranium mine in South Australia, is their use of *in situ* leaching (ISL) as the extraction technique. The use of this technique was contentious and the Committee in the first part of the chapter addresses concerns and issues regarding ISL as an extraction technique for mining uranium. This discussion about the environmental impact of ISL is not specifically within the Committee's terms of reference; however the Committee considers that concerns regarding the ISL technique are sufficiently inter-related to the matters being examined by the Committee to warrant consideration. The second section of this chapter, deals with the effectiveness of the reporting, monitoring and regulatory regime for the Beverley uranium mine and the third section relates to the Honeymoon uranium mine.

The ISL technique

3.2 Beverley is currently the only Australian uranium mine in commercial production that employs the ISL extraction method, although it is also proposed for use at Honeymoon in the event that it enters full production. For the sake of convenience, this part substantially addresses the use of ISL at Beverley with only minor references to Honeymoon.

3.3 ISL was originally developed in the USA during the 1970s for use in geological formations containing potable water, and was first employed commercially in 1975. ISL projects are presently licensed to operate in Wyoming, Nebraska, New Mexico and Texas, with most being less than a decade old. Although some are relatively small by Australian standards, they supply some 85% of the USA's uranium output. ISL - in varying degrees of technological complexity - has been adopted by the uranium mining industries of several nations, including the Czech Republic, the People's Republic of China, Uzbekistan and Kazakhstan. Approximately 15 per cent of world uranium production is obtained through ISL, including the whole of the Uzbekistani output and the majority of Khazakhstan's. ISL mining is expected to begin in the Russian Federation soon.[1]

---

1 Uranium Information Centre (2001), *In Situ Leach (ISL) Mining of Uranium*, Nuclear Issues Briefing Paper, No. 40: www.uic.com.au/nip.

A description of ISL

3.4 ISL, known also as 'solution mining', involves leaving the ore in the ground and pumping liquids through it in order to recover the minerals from the ore by leaching. It removes economic minerals from the host ore without also removing the ore and overburden. A concise description of this form of mining has been provided by Environment Australia (EA):

> ISL mining is the process of passing acidic or alkaline groundwater (the reagent) through the ore host (usually sand) to dissolve the uranium minerals where they occur.
>
> Patterns of vertical boreholes (wells) are drilled into the deposit and lined with watertight casings to maintain hole integrity down the well to the top of the ore zone. Perforated screen liners are installed in the wells below the casing, to enable injection and production of fluid from the uranium-bearing sand and fine gravels (ore zone). Natural groundwater is withdrawn from the ore zone via wells designated as production wells and pumped to the processing plant on the surface. At the plant, leaching agents and oxidants are added to replenish the leach solution that is then recirculated to the ore zone via other wells designated as injection wells.
>
> In the ore zone, leach solution dissolves uranium from between the sand grains, leaving the sand intact. The resultant 'pregnant' solution is drawn to production wells and pumped out to the processing plant where the uranium is recovered as the commercial product, yellowcake. The barren solution is then reconditioned, if required, by adding more leaching agent and oxidant, and recirculated through the well field and process plant in a continuous cycle of leaching and uranium recovery, until production and recovery levels of uranium fall below economic levels.[2]

3.5 The ISL method is less capital intensive than conventional mining; it does not require the complex infrastructure necessary for underground mining. Its 'economic viability is dependent on the concentration of uranium in the host ore and on groundwater chemistry, ore permeability and reagent cost'.[3]

3.6 Uranium deposits that are economically suitable for ISL are found in permeable sand or sandstone formations, confined above and below by impermeable strata, and situated underneath the water table. The uranium minerals usually comprise uraninite (oxide) or collinite (silicate) coatings on individual sand grains. The two main methods of leaching are acid and alkaline leach: the former lowers the pH; the latter raises it. Both geology and groundwater chemistry determine which ISL operating regime is used. If the ore body contains a significant amount of calcium, such as limestone or gypsum, alkaline leaching is employed in preference to acid ISL, because the use of acid necessitates uneconomic consumption of that chemical.

---

2 Environment Australia, *Submission 86*, pp 6-7.

3 Environment Australia, *Submission 86*, p 6.

However, acid (sulphate) ISL is generally quicker-acting and more economic than alkaline (carbonate) leaching.

3.7 In the USA, where sandstone deposits contain a high level of limestone, the alkaline method is used. It involves substantial *in situ* solution regeneration and rehabilitation combined with remote, deep well bleed solution disposal. The acid ISL techniques cannot be used in the USA due to prevailing calcium (limestone) levels and the extensive groundwater rehabilitation needed in order to maintain the amounts of potable water relied on by nearby users. Alkaline solutions like ammonia or sodium carbonate were originally employed in the USA. The difficulties encountered in restoring ammonia-based sites, however, led to the substitution of sodium bicarbonate or carbon dioxide-based solutions.

3.8 Whereas in America uranium mines resort to alkaline leach because of limestone's neutralising effects on acid, the Beverley mine operates on acid leach method. According to Heathgate Resources, the prevailing salt levels and the incidence of slight acidity render acid leaching more effective. Theoretically, Beverley could be leached using the alkaline method because its salt content is below the required threshold. However, given the geology and chemistry of the site, the acid leach method is the more efficient.[4]

3.9 Dr Matthews contrasted the acid method adversely with the alkaline approach:

> There are no technical reasons for not using alkaline. In fact, environmentally, if you had to choose between acid and alkaline, it is by far the best choice. Economically, however, sulfuric acid is the best choice. Environmentally, if you use sulfuric acid, you dissolve a heap of other elements apart from the uranium, …
>
> It therefore becomes more important when you are using acid that you have proper waste management. Proper waste management in most places around the world means—for example, as at Roxby [Downs]—that you cannot pump the liquids underground.[5]

3.10 The ACF stated:

> People should understand that alkaline ISL is, by its nature, much less impacting. The use of alkaline tends to be specific to dissolve uranium. With a suite of heavy metals and radionuclides in the ore, the use of alkaline tends to be much more specific to dissolve the uranium rather than that whole suite. The use of acid dissolves the whole suite of radionuclides and heavy metals, so the use of acid leads to a very much larger pollution load. That which was originally immobile, inert and in solid form in the orebody,

---

4 Heathgate Resources Pty Ltd (1998), *Beverley Uranium Mine Environmental Impact Statement: Main Report*, Adelaide, 5.4.1; Amdel Ltd, Mineral Processing Services, *Leach Testing of Beverley Uranium Samples*, Report No 07353, March 1992.

5 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 168.

through the use of acid becomes mobile, soluble and bio-available—and a moving pollution plume in ground water.[6]

Wellfield, processing plant and uranium recovery

3.11 The Beverley project consists of wellfields that are progressively established over the orebody as uranium is depleted from sections of the orebody immediately beneath it. Wellfield design is laid out on a grid with alternating extraction and injection wells, each of identical design and each resembling normal water bores. Each pattern of four separate injection wells, set some 30 metres apart, possesses a central extraction well equipped with a submersible pump.

Beverley Wellfield

Source: Heathgate Resources Pty Ltd.

3.12 Within the active mining area, the volume of solutions extracted is always slightly more than the volume injected, thus ensuring a slight and continuous inflow from the surrounding formation into the designated mine area and minimising leakage of mining solutions away from the active mining area (called 'excursions'). A series of monitoring wells is situated around each mineralised zone to detect any movement of mining fluids outside the mining area. The wells are cased for the purpose of ensuring that liquids flow only to and from the ore zone and to prevent them adversely affecting any overlying aquifers. They are also pressure-tested before use.[7] The ISL method requires the continuous circulation of large volumes (20–40 million litres each day) of leach solution that contains uranium (20–200 mg/litre or 0.002%–0.02%).[8]

3.13 The extraction process involves altering the pH level of the groundwater in the uranium-bearing aquifer and adding oxidising and complexing (acid or alkaline)

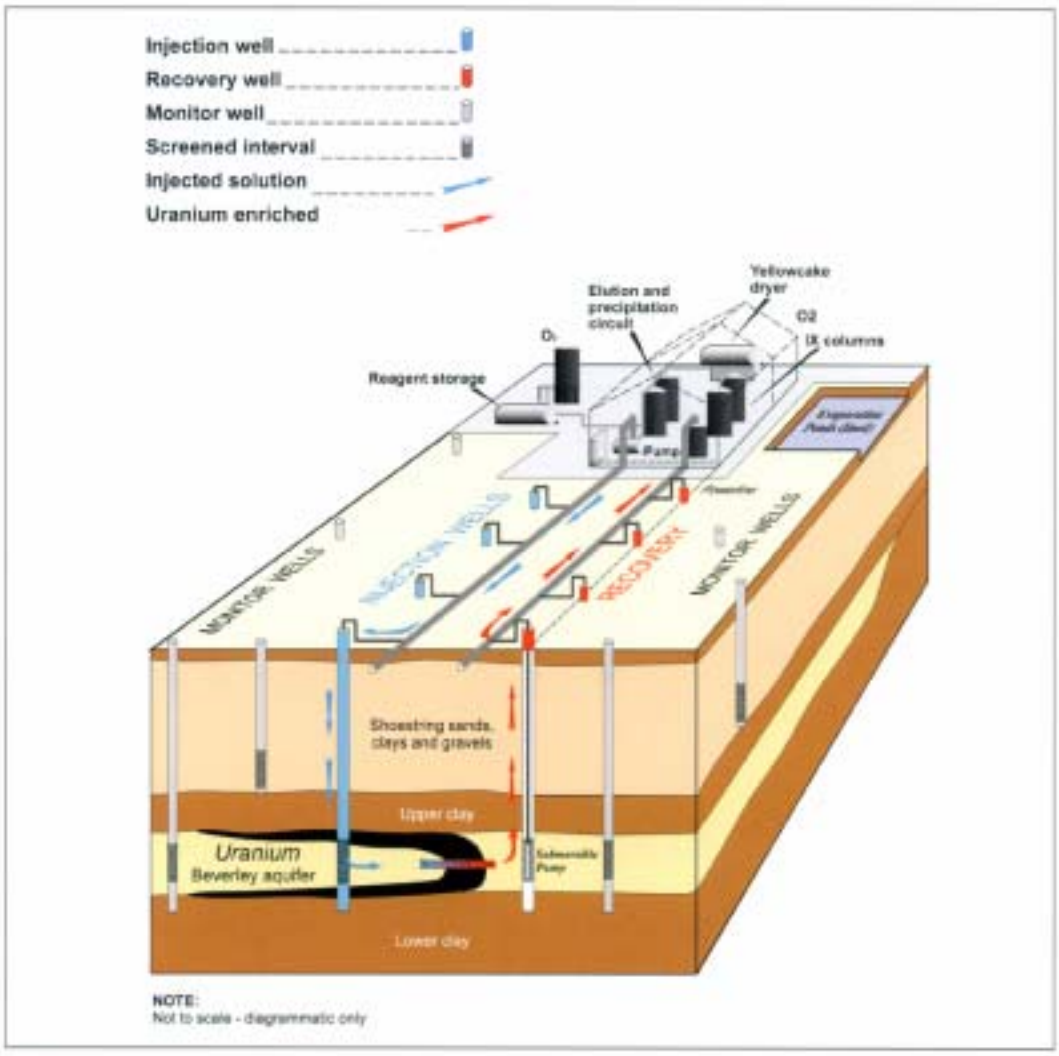
6 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 200.

7 Heathgate Resources Pty Ltd (1998), *Beverley Uranium Mine Environmental Impact Statement: Main Report*, Adelaide, pp 4 (22)-4 (27).

8 South Australian Chamber of Mines and Energy, *Submission 39*, pp 3-4.

reagents to enable the creation of an environment in which the uranium dissolves. The oxidant mobilises the uranium, the acid retaining it in solution until it reaches the processing plant, where it is extracted from the mining solution. Commonly used oxidising reagents are oxygen and hydrogen peroxide, though alternatives are sometimes used. This solution is then pumped to the surface and treated at the processing plant to recover the uranium. The barren solution is refortified in order to replace used reagents, and recycled to the injection wells. Within each area, this cycle continues until the uranium remaining in the core is depleted to uneconomic levels.

Figure 3.1 **Schematic processing model showing ISL leach method used at Beverley**



Source: Heathgate Resources Pty Ltd.

3.14 The two principal methods of recovering uranium from solution are resin ion exchange (IX) and liquid ion exchange, or solvent extraction (SX). The choice of method is determined largely by the chemistry (principally salinity) of the groundwater surrounding the mine. Since IX is more effective in regions of low

salinity, it has been implemented at Beverley. The processing technique used is determined primarily by groundwater chloride levels and orebody characteristics.

3.15 In IX, the uranium attaches itself to resin beads that are constantly re-used as part of a process strongly resembling the way in which the resin in a domestic water softener draws minerals from water.[9] This is known as the 'capture' process. Once 'captured', the uranium is extracted from the resin by reversing the capture process. The resulting liquid is treated with chemicals, leading to the precipitation of the uranium as a flaky solid. Most of the water is then removed, producing yellowcake.

3.16 In SX, the uranium-bearing solution is mixed with a kerosene-based solvent that causes the uranium to transfer to the solvent, which can then be separated from the mining solution. The mining solution is then re-treated with leaching agents and returned to the ore zone to recover more uranium, while the solvent is treated with sodium carbonate which in turn is passed through a hydrogen peroxide circuit to precipitate uranium oxide as yellowcake.[10]

3.17 At Honeymoon, Southern Cross plans to use solvent exchange owing to the high salinity levels. Heathgate may also have to use SX in the southern portion of the Beverley deposit where salt levels in the aquifer are higher than in the northern and central parts.[11]

Discussion of the issues

3.18 There were numerous objections put to the Committee on the ISL method used at Beverley and the regulatory regime that permits discharge of waste to groundwater in particular. The ACF stated:

> … the regulatory regime at state and Commonwealth levels should be able to demonstrate how the company can operate without any ground water impacts and without any surface leaks. That would involve, in our view, that they should have to conduct a new public environmental impact assessment on how they manage their radioactive wastes and on their ground water impacts. That should have some minimum standards in place which should include that there be no discharge of liquid wastes to ground water, that there be rehabilitation of the acid leach impacts on ground water and that there should properly be required bonds for ground water impacts. Just as they require a bond for surface impacts, they should require a bond for ground water impacts. They should also require—as should have been done in the trial mining but was not done—a demonstrated capacity to rehabilitate

9 Uranium Information Centre (2001), *In Situ Leach (ISL) Mining of Uranium*, Nuclear Issues Briefing Paper No. 40: www.uic.com.au/nip.

10 http://www.southerncrossres.com/im/index.html

11 Minister for Primary Industries, Natural Resources and Regional Development, South Australia, Assessment Report on the Environmental Impact Statement for the proposed Beverley Uranium Mine, 1998, p 21.

> the ISL impacts on ground water. Otherwise the company should not be allowed to operate.[12]

3.19 Mr Bruce Thompson, representing the Friends of the Earth, Australia (FoE), called for a re-examination of two major, interrelated features of the ISL process as employed at Beverley: the liquid disposal of radioactive waste and the rehabilitation of groundwater. In order to achieve this, he advocated a review of the Beverley operation under the terms of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).[13] The Australian Conservation Foundation (ACF) shares FoE concerns about the discharge of liquid mine waste into groundwater, and recommended that responsible Commonwealth agencies undertake a new public environmental assessment of Heathgate Resources' Waste Management Program.[14]

3.20 Dr Dennis Matthews, Nuclear Issues Spokesperson for the Conservation Council of South Australia (CCSA), told the Committee that the connected questions of how sulfuric acid and the chosen oxidant react in dissolving the uranium, and of proper waste management, are pivotal in evaluating the ISL method.

3.21 In Dr Matthews' judgment:

> The issue here is: what is the oxidant being used in this process? There are a variety of oxidants. Oxygen, hydrogen peroxide, sodium chloride and ferric chloride are some of the common oxidants. They are crucial to the process. Without them, no effective mining occurs. Depending on which oxidant you use, you will get a variety of contaminants and pollutants in the final solution. Therefore, this has an effect on how you treat and manage those wastes.[15]
>
> It therefore becomes more important when you are using acid that you have proper waste management. … in most places around the world means … that you cannot pump the liquids underground. They are put into a tailings dam. You evaporate most of the liquid. You are left with a relatively small amount of solid which then should be properly managed and kept out of the ecosystem. That is not being done at Beverley and Honeymoon.[16]
>
> In all the documentation that the public has had access to and which it commented on, the oxidant in both cases has been assumed to be oxygen. That is a relatively mild oxidant. Since then, we have learnt—and we still do not know 100 per cent the answer to this—that it appears that the oxidant

---

12 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 181.

13 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, pp 285-286.

14 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 292.

15 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 167.

16 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 168.

> they are now using is hydrogen peroxide. That puts a completely different complexion over the whole process.[17]

3.22 In his submission to the inquiry, Dr Matthews asserts that, as the mobilisation of radioactive and toxic materials is intrinsic to ISL, all waste materials should be kept out of the groundwater. He says that at Beverley, liquid detritus is being disposed of into the groundwater, and the aquifer polluted by acidic, toxic, radioactive liquid.[18] Dr Matthews argues that ISL mine operators should be required to evaporate the liquid wastes at the surface via a tailings dam, which would reduce the volume to a relatively small amount of stable solid:

> The solids that end up after evaporation are relatively easy to deal with because they are much lower in volume. They are a fraction. We are talking about a solid content of, I would say, less than 0.1 per cent.[19]

3.23 Heathgate Resources rejects the idea of above-ground storage, claiming that 'an exhaustive investigation process conducted by the Commonwealth has shown that above-ground storage is not desirable'.[20]

3.24 Heathgate Resources also argues that the aquifer was polluted before mining began by contaminants like natural radioactivity, salt and minerals, which had already rendered it unfit for human, agricultural or livestock use.[21] In similar vein, the company dismisses the suggestion that the extracted solution central to ISL mining poses a potential environmental threat to nearby aquifers. Heathgate Resources argues that extraction levels are increased and decreased to prevent the extracted solution from entering nearby aquifers and the Beverley aquifer is completely isolated, with no demonstrable connection to surrounding aquifers.[22]

3.25 The issue of the connectivity between aquifers was particularly contentious. Several environmental groups, including the ACF, argued that there is considerable uncertainty surrounding this issue. These arguments were supported by Mr Tim Khan of Environment Australia, who suggested that the questions of aquifer self-containment and the ultimate destination of outflows from the ISL process are not yet fully resolved.[23] Heathgate Resources' opinion on this issue is that the Beverley aquifer is 'an isolated palaeochannel' and that the issue of connectivity has been

---

17 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 168.

18 Dr Matthews, *Submission 16*, pp 6, 15-16.

19 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 169.

20 Heathgate Resources Pty Ltd, *Submission 70a*, pp 24-25.

21 Heathgate Resources Pty Ltd, *Submission 70a*, p 24.

22 Dr Matthews, *Submission 16*, p 17; Heathgate Resources Pty Ltd, *Submission 70a*, p 34.

23 Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, p 310.

resolved.[24] Clearly, this is one aspect of the Beverley project that requires additional research.

3.26 Owing to the uncertainty about the linkages between aquifers, there is a concern that the Beverley project may pose a risk to the Great Artesian Basin (GAB). Heathgate Resources argues that the Beverley operation does not pose any threat to the Great Artesian Basin because the mine poses no threat to the Beverley aquifer, and further that the Basin and the Beverley aquifer are separated by 200–175 metres of impermeable shale and clay.[25] Mr David Noonan, of the ACF, disputes this:

> … the aquifer at Beverley may be moving only a few metres a year, but the company claims that somehow it is isolated or stagnant. Again, in our view, that does not make sense in that the Great Artesian Basin only moves at a few metres per year but people readily accept that as a functioning system, although it may function over long periods of time. People do not claim that the Great Artesian Basin is somehow stagnant because it moves at the same rate as the Beverley aquifer.[26]

3.27 Dr Philip Bush, representing Southern Cross Resources Australia Pty Ltd (SXR), the operator of the Honeymoon project, rejected these criticisms arguing that the disposal solution injected into the basal aquifer for disposal is compatible with the natural ground water and generally falls within the range of impurity concentrations found in the area. In this regard, he argued that the disposal solution:

> … contains no component that is not present in the natural ground water. The concentrations of some of those components differ from the natural ground water but the natural ground water does not have a single chemical analysis. We have found quite a range of chemical analyses in that ground water because of the nature of the aquifer. It is almost stagnant—a very low flow rate of the ground water—and it is not flowing through a chemically uniform environment, and so you do get very considerable variations in the chemistry of the natural ground water, as is pointed out in the environmental impact statement.[27]

3.28 The Committee records its concern over the lack of clear scientific agreement on this issue of connectivity/isolation of the Beverley aquifer. The Committee notes that many of the arguments as to the minimal environmental impact of the Beverley project are predicated on an assumption as to the isolated nature of the Beverley aquifer.

---

24 Australian Conservation Foundation, *Submission 74*, p 30; Heathgate Resources Pty Ltd, *Submission 70a*, p 19.

25 Australian Conservation Foundation, *Submission 74*, p 30; Heathgate Resources Pty Ltd, *Submission 70a*, p 19.

26 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 197.

27 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 234.

3.29 In relation to both ISL mines, the FoE also expressed concern about the potential for worker exposure, stating that 'there remains no government collection of records to assess long term health impacts to workers'.[28] The same matter was raised by the Mining and Energy Division of the Construction, Forestry, Mining and Energy Union (CFMEU), which pointed out that, in the absence of any 'national register' concept, 'there is no long term monitoring of the health of workers who have been employed in the uranium mining and processing industry'.[29]

Modelling and 'natural attenuation'

3.30 Natural attenuation is the dilution, dispersion, (bio)degradation, irreversible sorption, and/or radioactive decay of contaminants in soils and groundwater. It causes a net reduction of contaminant toxicity and human and ecological risk.[30]

> Natural attenuation makes use of natural processes to contain the spread of contamination from chemical spills and reduce the concentration and amount of pollutants at contaminated sites. Natural attenuation—also referred to as *intrinsic remediation, bioattenuation*, or *intrinsic bioremediation*—is an *in situ* treatment method. This means that environmental contaminants are left in place while natural attenuation works on them.[31]

3.31 There is considerable disagreement amongst stakeholders about the issue of natural attenuation. A number of environmental groups argued strenuously that there were flaws in the modeling that had been carried out in relation to natural attenuation at Beverley.

3.32 In this regard, Dr Matthews stated:

> The Beverley mine … justifies disposing of its radioactive liquid and wastes into the underground water by referring to what they call natural attenuation. According to the theory of natural attenuation, all the liquid wastes go underground very quickly within a period of anywhere from one to 10 years, depending on who you believe, and very quickly reverts back to the solid form from which it came. There is no empirical evidence for that under these situations. In other words, there is nothing hard or concrete you can show. The only justification or the only reason for that is theoretical; it is computer modelling. That computer modelling uses a part of science called thermodynamics, which, although it will tell you what tends to happen, it does not tell you how quickly it happens. So any conclusions about how

28 Friends of the Earth, Australia, *Submission 69*, p 2.

29 Construction, Forestry, Mining and Energy Union, *Submission 80*, p 3. (According to the CFMEU submission, a national inventory was advocated by the Liquor, Hospitality and Miscellaneous Workers Union.).

30 www.sandia.gov/eesector/gs/gc/snap.html

31 www.environmental-center.com/articles/article45/article45.htm

> quickly this hypothetical process occurs, any conclusions about the time scale, are completely incorrect. The modelling cannot possibly tell you that because it is a thermodynamic modelling. What you need is kinetic modelling, which is extremely difficult modelling and has not been done and is unlikely to be done.[32]

Similar concerns were voiced by the FoE's Mr Thompson, who described current modelling as neither 'rigorous' nor 'independent'.[33]

3.33 Heathgate Resources rejects these criticisms, arguing that evidence from the Beverley Field Leach Trials (FLTs) and from samples taken some two-and-a-half years after the trials affirms the clear and predictable presence of naturally occurring attenuation.[34] The company has no concerns about the adequacy of present modelling in establishing the efficacy of the natural attenuation model.

3.34 The natural attenuation process was also discussed in relation to Honeymoon. This issue was examined in detail in the assessment process discussed above, and the question as to whether or not wrong conclusions have been drawn is a technical issue relating principally to the adequacy of the modelling employed.

3.35 EA's Mr Kahn claimed:

> It is certain that attenuation will take place.
>
> … Even if you just took physical dilution into account, as you have an almost infinite area and you are putting a limited amount of stuff into it, natural diffusion and dilution will occur over time. If you take the physical modelling of that, which is one element of the process, you get diffusion back to background levels within time.[35]

Accordingly, Mr Kahn advocated a new series of tests on the 1982 Honeymoon test site in order to validate the modelling.

3.36 Any projections concerning the future of ISL at Beverley, Honeymoon and elsewhere in Australia must rest on a solid understanding of the most recent research into its environmental implications, especially the question of natural attenuation. Even over the past two years, scientific opinion on the subject has differed considerably. W. E. Falck pointed out in October 2000:

---

32 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, pp 166-167.

33 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 287.

34 Heathgate Resources Pty Ltd, *Submission 70a*, p 65.

35 Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, pp 308-309.

> There is still no unified opinion on what is considered the best process causing the least harm to the environment … Removal or neutralisation of residual process acids, however, has proven to be difficult or impossible.[36]

3.37 In 2001, the IAEA concluded:

> According to the latest research, a contamination halo progressing through unmineralised, unleached rock does not decrease in size (as was previously hoped) but actually spreads out, chiefly due to hydraulic dispersion and gravitation differentiation of the fluid. However, maximum contamination within the halo continuously decreases.[37]

3.38 The Committee considers there is sufficient uncertainty regarding natural attenuation at Beverley and Honeymoon to warrant additional independent research. It is therefore recommending that the continuation of both projects should be contingent on the presentation of strong evidence supporting the conclusion that the natural levels of attenuation are consistent with existing projections.

ISL in Australia: the international perspective

3.39 The use of ISL at Beverley and Honeymoon has provoked continued controversy. Mr Sweeney informed the Committee that acid ISL is applied commercially as a technique of uranium extraction in no other Western country. In response, Heathgate Resources argues that ISL's low international usage rate is due to its unsuitability for the prevailing soil regime (for example, in the USA), rather than to any potential or actual hazardous environmental characteristics.[38]

3.40 The Committee's terms of reference do not require it to find whether the environmental impact of the ISL technique is unacceptable, despite submitters asking it to do so. However, it is clear that ISL is a controversial technique that does not have broad public support.

Recommendation 16

The Committee recommends that, owing to the experimental nature and the level of public opposition, the ISL mining technique should not be permitted until more conclusive evidence can be presented on its safety and environmental impacts.

---

36 W E Falck, 'Overview of IAEA Activities in Restoration of Former Uranium Mining and Milling Sites', *International Symposium on the Uranium Production Cycle and the Environment*, Vienna, 2-6 October 2000, IAEA-SM-362/38, p 358.

37 International Atomic Energy Agency, *'Manual of Acid In Situ Leach Uranium Mining Technology'*, IAEA-TECDOC-1239, Vienna, 2001, p 228.

38 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 292; Heathgate Resources Pty Ltd, *Submission 70a*, p 9; Heathgate Resources Pty Ltd (1998), *Beverley Uranium Mine Environmental Impact Statement: Supplement*, Adelaide, pp 4 (2)–4 (3).

Failing that, the Committee recommends that at the very least, mines utilising the ISL technique should be subject to strict regulation, including prohibition of discharge of radioactive liquid mine waste to groundwater, and ongoing, regular independent monitoring to ensure environmental impacts are minimised.

The Committee further recommends that the continuation of both the Beverley and Honeymoon projects should be contingent on the presentation of strong evidence supporting the conclusion that the natural levels of attenuation are consistent with existing projections.

South Australian Government Inquiry

3.41 Shortly before the finalisation of this report, the South Australian Environment Minister, the Hon John Hill, announced that the Environmental Protection Authority (EPA) will coordinate a project to investigate and assess the environmental impacts of acid leach uranium mining. The specific objectives of the project are:

- hydrology, groundwater management and impacts on aquifers;
- the management of process liquids, spill response and clean up;
- surface disturbance, including vegetation clearance;
- waste management, recovery and disposal (both liquid and solid); and
- issues relating to rehabilitation on cessation of operations (including aquifer and surface rehabilitation)[39]

The Committee awaits the outcome of the EPA inquiry with interest.

The Beverley Uranium Mine

Location and Geological Overview

3.42 The Beverley uranium deposit is situated between 500 and 600 kilometres north of Adelaide, and some 300 kilometres east of Port Augusta. It lies on the plains north-west of Lake Frome, a 5,000 square kilometre salt lake located east of the Flinders Ranges. The uranium deposit at Beverley, South Australia's second largest, is a localised resource comprising some 21,000 tonnes of uranium oxide. It consists of three mineralised zones (north, central and south) lying in a buried palaeochannel, the Beverley aquifer, a porous, water-bearing and ore-yielding geological layer, contained in tertiary sediments of the Frome basin. Groundwater salinity ranges from 3,000 mg/L total dissolved solids (TDS) in the north to 12,000 mg/L TDS in the south.

39 Hon John Hill, Minister for Environment and Conservation, News Release, 27 March 2003.

Historical Development.

3.43 The deposit at Beverley was discovered in 1969 by the OTP Group (Oilmin NL, Transoil NL and Petromin NL). World uranium prices forced the abandonment in 1974 of plans to proceed with mining, but by 1981 mining was again considered to be a commercially feasible proposition. Accordingly, a draft Environmental Impact Statement (EIS) was prepared in July 1982. Due to the geological characteristics of the aquifer, a decision was made to extract uranium using a method not employed previously in Australia, that of *in situ* leaching (ISL). Beverley would later become the site of Australia's first commercial ISL operation. At Beverley, uranium mineralisation is leached from the Mount Painter region using the acid ISL method rather than the alkaline ISL method.

3.44 Plans to mine Beverley using the ISL technique were shelved in 1983 when the newly-elected State Labor Government indicated that mining lease applications containing proposals for ISL extraction would not be approved. Four reasons were given for this decision: numerous unresolved economic, social, biological, genetic, safety and environmental problems associated with the nuclear industry; broad community support for the government's position; a greater commitment by the government to the Roxby Downs uranium project; and considerable community disquiet about the ISL process.[40]

3.45 In 1990, the Beverley mining lease was purchased by the USA's General Atomics Inc, whose Australian affiliate, Heathgate Resources Pty Ltd, has since secured approval to operate the mine. The then State Liberal Government approved the holding of acid ISL Field Leach Trials (FLTs) at Beverley in November 1997. Between January and December 1998, successful FLTs took place under the terms of a Declaration of Environmental Factors (DEF). The trials established the proposed venture's commercial viability. A new draft EIS was released for public comment in June 1998 and a Supplement to it appeared in September 1998. Environmental approval was granted for the project to proceed in March 1999. Other approvals necessary to enable mining to begin, mainly the granting of a mining lease, followed in April. In July 1999, the final report on the trials was presented to the South Australian Government. Commercial mining of uranium at Beverley commenced in November 2000.

The Approval Process

Table 3.1: Overview of the Beverley Uranium Mine Approvals Process

	Action	**Date**
1.	Draft EIS produced but plans to mine abandoned in 1983 owing to the ALP's	1982

40 *The Advertiser* (Adelaide), 23 March 1983, p 3; Dr Matthews, *Submission 16*, p 13.

	'three mine policy' and the South Australian Governments declaration that approval would not be granted	
2.	Formation of Heathgate Resources Pty Ltd	1990
3.	Heathgate Resources began reassessing Beverley Project	1996
4.	Permission granted by South Australian Government to conduct filed leach trials	November 1997
5.	Beverley field leach trials commenced	January 1998
6.	Draft EIS released for public comment	June—August 1998
7.	Supplement EIS released	October 1998
8.	Environmental approvals granted by Commonwealth Minister for Environment and Heritage	March 1999
9.	South Australian Mining Lease (No. 6036) granted and mine construction commenced	April 1999

3.46 The adequacy of the assessment and approval procedures for the Beverley mine, whereby Planning SA undertook an EIS level assessment under South Australian legislation, have been the subject of considerable disagreement amongst stakeholders. The ACF, for example, describes the approval and assessment processes as being 'compromised' from the outset. In its view, the responsible Commonwealth Minister erred in failing to ensure the mining trials were subject to a thorough public environmental assessment process and in giving permission on 15 October 1997 for uranium extraction and processing to be conducted at Beverley outside the terms of the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act).

3.47 The ACF also argues that reports on the outcome of the Beverley trials (including the Groundwater Monitoring Summary) were not prepared by Heathgate Resources until July 1999, after the EIS process had been completed and following the granting of mining approvals.[41] Mr Noonan informed the Committee that 'the guidelines of the federal government EIS for Beverley had not even been completed and made public at the time the trial mine started operations on 1 January 1998'.[42]

41 Australian Conservation Foundation, *Submission 74*, p 14.

42 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 184.

3.48 Dr Matthews also raised this issue stating that:

> According to both Heathgate and the South Australian Government the 4 to 12 month trials were a key step in providing information for an EIS, but one month after the trial started it was announced (*The Australian* February 12 1998) that the EIS would be released in March, that is less that three months after trials began.
>
> The final report on the trials was submitted to the SA Government in July 1999, three months after the Government has given the go-ahead for commercial operation of the Beverley mine.[43]

3.49 Dr Matthews also noted that Heathgate Resources' final report on the Field Leach Trial (FLT) was dated July 1999—thirteen months after the EIS was submitted (June 1998), and ten months after the EIS Supplement appeared (September 1998).[44] In the FoE's view, 'approval of the [Beverley] project was made despite significant uncertainties remaining about potential groundwater contamination and liquid waste disposal'.[45] According to Mr Thompson, decisions for approval were made which ignored 'the basis of scientific uncertainty'.[46] Mr Noonan, and the ACF in its submission, go even further, asserting that the Commonwealth allowed a mine to be conducted at Beverley without fully observing the requirements of a federally supported EIS and, in effect, separate from federal legislation governing the operation of trial mines.[47]

3.50 Heathgate Resources rejects claims of a compromised approval process. In response to the statement that the Beverley EIS was released six months after mining began and one year before the final report of the trials was submitted to the government, the company claims that:

> The Field Leach Trial was not a commercial operation as implied by this claim. It was a small-scale trial designed to identify optimum chemical balances et cetera, and to establish a mining process that would develop the resource to its potential without undue detriment to the environment. While the final report was not released until after the FLT concluded, all relevant government agencies had prior access to information contained in it.[48]

3.51 In responding to the assertion that the trial had been in place for a full year before the Federal Minister authorised further studies to be undertaken of the nature

---

43 Dr Matthews, *Submission 16a*, p 3.

44 Dr Matthews, *Submission 16*, p 28.

45 Friends of the Earth, Australia, *Submission 69*, p 3; Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 279.

46 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 285.

47 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 183-184; Australian Conservation Foundation, *Submission 74*, p 17.

48 Heathgate Resources Pty Ltd, *Submission 70a*, p 33.

and connectivity of the Beverley aquifer, Heathgate Resources argues that experiments that were conducted on the aquifers proved that the aquifer was 'isolated and confined'.[49]

3.52 Owing to the degree of public concern about uranium mining and its potential to have significant environmental impacts, there is a need to ensure that government assessment and approval processes are open and transparent. It is also vital that all aspects of uranium mining operations undergo an environmental assessment before they commence. In this instance, it appears that none of these fundamental requirements were met. These failings have generated a considerable amount of distrust in the community. This trust can only be rebuilt through greater public disclosure of the details of the operation of the mine and its impacts on both workers and the environment.

Monitoring

3.53 The Beverley Environmental Management and Monitoring Plan (EMMP)[50] sets out the reporting and monitoring regime to be followed by Heathgate Resources. The Plan outlines the objectives and program for the following:

- Surface Hydrology;
- Hydrogeology including the monitoring of groundwater, wells and the Great Artesian Basin;
- Vegetation and Landscape;
- Fauna;
- Meteorology;
- Waste Management;
- On site chemicals;
- Rehabilitation.

3.54 The objective of the EMMP is to fulfil the requirements of Heathgate Resources Corporate Environmental Policy (1998), and also the relevant State and Commonwealth legislation, Codes of Practice, and Australian Standards. The EMMP is revised and re-submitted for approval every three years.

Radiological monitoring

3.55 Mining Lease (No 6036) granted by the South Australian Minister of Mines and Energy to Heathgate Resources in 1999 stipulates in the Second Schedule that as

---

49 Australian Conservation Foundation, *Submission 74*, p 15; Heathgate Resources Pty Ltd, *Submission 70a*, pp 8-9.

50 Heathgate Resources Pty Ltd, Beverley Uranium Mine, Environmental Management and Monitoring Plan, 2000 EMMP.

part of the Environmental Management and Monitoring Plan (EMMP), the Company must establish 'a program for monitoring employee and environmental radiation'.[51] Heathgate Resources is also required to carry out radiation monitoring in accordance with the *Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores 1987*. The EMMP goes into detail as to what monitoring is to be carried out. Separate to the EMMP, Heathgate must also provide a Radiation Monitoring Plan which outlines the results of the radiological monitoring program carried out. The Radiation Management Plan has been designed to enable Heathgate Resources to critically review the radiological impact of the Beverley processing plant and associated wellfield. Radiological assessments of vegetation are undertaken as per the requirements of the Radiation Management Plan.

3.56 The Beverley radiation monitoring program is divided into three sections:

- Personal monitoring;
- Area monitoring; and
- Surface contamination monitoring.[52]

3.57 Personal monitoring involves measuring external gamma exposure of wellfield and plant personnel by Thermoluminescent Dosimeters (TDLs).

3.58 Area monitoring includes measuring weekly external gamma doses at both the wellfield and plant. They also measure opportunistically throughout both areas. Area monitoring also involves weekly measuring of the Potential Alpha Energy Concentration (PAEC) of radon daughters. Airborne dust sampling is carried out to monitor long-lived alpha dust.

3.59 Surface contamination monitoring is carried out weekly at the wellfield and at both active and non-active areas of the plant.

3.60 Environmental radiological monitoring is carried out at the permanent Beverley camp as this is the closest human settlement to the mine site.

Implementation

Commonwealth and State Agencies

3.61 Heathgate Resources has indicated that it has established or is planning to establish monitoring in the following spheres: hydrology (surface and groundwater); fauna; flora; meteorological; waste management (radiological and general);

51 Mining Lease No 6036, Schedule 2, Clause 1.

52 Heathgate Resources Pty Ltd, Beverley Uranium Mine, Radiation Management Plan: Programs and Procedures, June 2000, p 7.

rehabilitation; radiation; and more focused occupational and environmental radiation monitoring.[53] However, Friends of the Earth submitted that:

> Adequate effective monitoring of radioactive release into the environment remains an issue of debate. The physical nature of radiation and the mechanisms of release make monitoring a difficult task. However, steps can be made to expand present monitoring allowing for assessment independent of the mine operator.[54]

3.62 Heathgate Resources argues that these assertions are false, contending that independent monitoring is already conducted by Commonwealth and South Australian agencies.[55]

3.63 Mr Noonan, of the ACF, has described past and present Commonwealth and South Australian monitoring initiatives as 'inadequate' and 'ineffective'.[56] The FoE criticises monitoring as being too periodic. It would prefer more continuous monitoring.[57] It is also convinced that the current monitoring arrangements fail to encompass the whole spectrum of possible radiological exposures and releases.[58] In response, Heathgate Resources argues that monitoring is conducted in accordance with Australian and international standards and benchmarks.

3.64 Dr Matthews claims that the details on radiation monitoring provided in the Beverley FLT reports are imprecise, with only estimates of average exposures being supplied.[59] In response, Heathgate Resources argues that operational experience at the mine over an eighteen month period in 2001-02 demonstrated that these estimates were accurate.[60]

Industry

3.65 The FoE asserts that the location of monitoring stations at Beverley makes it difficult to assess 'intermittent and accumulative impacts' of mining on the

---

53 Heathgate Resources Pty Ltd (1998), *Beverley Uranium Mine Environmental Impact Statement: Main Report*, Adelaide, pp 12 (2)-12 (13); Ms Paulka, *Committee Hansard*, Adelaide, 4 October 2002, p 255.

54 Friends of the Earth, Australia, *Submission 69*, p 4.

55 Heathgate Resources Pty Ltd, *Submission 70a*, p 51.

56 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 179.

57 Friends of the Earth, Australia, *Submission 69*, p 4.

58 Friends of the Earth, Australia, *Submission 69*, p 4.

59 Dr Matthews, *Submission 16*, p 28

60 Heathgate Resources Pty Ltd, *Submission 70a*, p 46.

surrounding environment.[61] In response, Heathgate Resources argues that FoE representatives have no knowledge of the Beverley site beyond the mine gate.[62]

3.66 However, Heathgate Resources' response to FoE's claims about the location of monitoring stations only highlights the validity of the concerns raised by many people about the lack of publicly available information on the operation of the mine. There is no doubt that a greater willingness on behalf of Heathgate Resources and relevant Commonwealth and State agencies to disclose information about the operation of the mine to the public would enhance the quality of debate about the regulatory processes and, in doing so, improve regulatory outcomes.

3.67 The 62,000 litre spill at Beverley on 11 January 2002 led South Australia's Chief Inspector of Mines (CIM) to direct that a Hazard and Operability Study (HAZOP) be conducted to enable Heathgate Resources to review its risk control apparatus and procedures. The study, the third of its kind, which was undertaken by QEST Consulting Engineers Pty Ltd, was completed on 15 April. It contained 73 recommendations that Heathgate was required to implement at Beverley by 15 September 2002 in order to secure HAZOP compliance. QEST found that:

> Documentation, maintenance, testing and control of changes to safety critical alarms and trips are the most important items identified for action in the Hazop study. The current functionality of the plant trip systems has been confirmed on site giving a high degree of confidence that the trip systems are functioning as intended and would act to prevent spills. However, to maintain this confidence in the longer term, it is recommended that ongoing monitoring and control of safety critical alarms and trips should be upgraded.
>
> The Hazop study identified possible changes in the following areas:
>
> - drawing updates to bring documentation in line with the plant;
> - a series of small engineering reviews;
> - the Distributed Control System (DCS);
> - minor plant modifications; and
> - maintenance and Operating Procedures.

The study concluded that 'none of the areas identified for attention currently pose an unacceptable risk to personnel or the environment'.[63]

---

61 Friends of the Earth, Australia, *Submission 69*, p 4

62 Heathgate Resources Pty Ltd, *Submission 70a*, p 51.

Senators at the Beverley processing plant. The site of the January 2002 spill is in the background.

3.68 Heathgate Resources regards the HAZOP study document as a proprietary one, which should remain 'commercial-in-confidence'. The ACF, however, argues that in order to evaluate the degree of compliance achieved, the HAZOP findings must be made public.[64]

3.69 Following a further two reportable spills in May 2002, a task group was appointed to investigate mine management. It comprised representatives of the following South Australian agencies: the Environment Protection Authority (EPA); the Department of Human Services (DHS); Workplace Services within the Department for Administrative and Information Services (DAIS); and the Office of Minerals and Energy within Primary Industries and Resources South Australia (PIRSA). After visiting the mine on 10 May, the group tabled a document later that month entitled *Report on Activities and Operations at Beverley ISL Uranium Mine*. Of its ten recommendations, the following dealt with monitoring:

---

63 QEST Consulting Engineers Pty Ltd (2002), *Beverley Uranium Mine: Report on Hazard and Operability Studies for Heathgate Resources*, Attachment 1: Executive Summary and Recommendations, Melbourne, p 1.

64 Heathgate Resources Pty Ltd, *Submission 70a*, pp 16, 69; Australian Conservation Foundation, *Submission 74*, pp 27-28; Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 193-194.

- the findings of the hazard and operability study on the ISL plant undertaken by the company must be implemented by 15 September 2002 and be subject to scrutiny by the EPA, DHS, Workplace Services and PIRSA. The company had set itself a target date of September 2002;

- no new plant to be installed or modifications to the existing plant to be made without being reviewed by a hazard and operability study;

- no new plant to be installed or modifications to the existing plant to be made without being reviewed by PIRSA in consultation with the EPA, DHS and Workplace Services. Where new plant may lead to an increase in radiation exposures, it must be approved under the radiation protection code of practice;

- incidents involving loss of processing fluids due to mechanical failure of equipment or control system malfunction to be considered in detail by the independent review group on spills, with consideration of such spills being reported to the EPA and other regulatory agencies;

- increased input of the EPA in monitoring and evaluation of environmental performance; and

- the Beverley Environmental Consultative Committee (on which the EPA is represented) which meets 6 monthly, is to review and monitor the implementation of these recommendations.[65]

3.70 On 18 September 2002, the Chief Inspector of Mines, Mr Greg Marshall, inspected the mine site in order to determine if the recommendations of the HAZOP Study and the May 2002 task group report had been implemented. He found that Heathgate Resources had complied with the terms of both studies cooperatively and satisfactorily.[66] He also identified two matters for special attention: secondary containment construction around the processing plant and the wellfield; and the management of soil affected by spills of radioactive material.

3.71 These monitoring exercises suggest there is a need for a greater level of independent monitoring of the operation of the mine. The public response to these exercises also demonstrates the need to ensure that monitoring results are available to members of the public.

---

65 Environment Protection Authority *et al*, *Report on Activities and Operations at Beverley ISL Uranium Mine*, Adelaide, May 2002.

66 Chief Inspector of Mines, South Australia, *Report on Inspection of Beverley Mine—18 September 2002*, Adelaide, September 2002; CIM, Mr Greg Marshall, Letter to Mr Mark Chalmers, General Manager, Heathgate Resources Pty Ltd, 2 October 2002.

Recommendation 17

The Committee recommends a greater level of independent monitoring of the Beverley mine.

The Committee recommends the public release of all data and reports relating to monitoring and incidents.

Monitoring – spills and leaks

3.72 FoE provided the following information on known leaks and spills at Beverley.[67]

Beverley

Adapted from PIRSA Public notice below and recent media.

(www.pir.sa.gov.au/pages/minerals/uranium/bev_incident_report.pdf)

Surface Spills

2002

May 5	14,900 litres of water containing 0.0018% U (18,000 ppb).
May 1	6,600 litres of *Evaporation Pond* ('brine solution') containing some U due to over-filling of tank.
March 16	20-50 litres of acid water which came into contact with hydrogen peroxide resulting in a small ignition.
March 12	400 litres of *Extraction* fluid.
March 3	900 litres of *Extraction* fluid.
February 21	400 litres of *Extraction* fluid.
January 19	500 litres of *Extraction* fluid.
January 11	61,000 litres of *Groundwater* (*Extraction?*) containing acid and U, after pipe rupture.

2001

July-Sept.[#]	1,000 litres of *Evaporation Pond* water (41,000 ppb U) from an overhead pipe failure.

67 Friends of the Earth, Spills & Leaks: Accountability at Uranium Mines in SA, July 2002, Appendix 1, p 8, in Friends of the Earth, Australia, *Submission 69*.

July-Sept.[#]	880 litres of *Injection* fluid from a loose bolt in a gasket on an injection flange.
July-Sept.[#]	600 litres of *Injection* fluid from a filter skid overflow.
July-Sept.[#]	600 litres of *Injection* fluid from a vent valve failure.
July-Sept.[#]	759 litres of *Extraction* fluid from a poly weld failure.
July-Sept.[#]	400 litres of *Injection* fluid from a well head filter lid failure.
July-Sept.[#]	1,300 litres of *Injection* fluid from a well head filter lid failure.
July-Sept.[#]	200 litres waste water from laboratory due to sump pump failure.
July-Sept.[#]	Trace quantity of *Process* fluid due to bund leak.
July-Sept.[#]	1,900 litres of *Extraction* fluid at the well house.
Nov.27	3,500 litres of *Process* fluid contained in bund and returned to circuit.
Nov.13	5,000 litres of *Process* fluid contained in bund and returned to circuit.
Sept.9	5,000 litres of *Extraction* fluid contained in bund and released to sump.
July 30	5,800 litres of *Injection* fluid due to oxygen fitting failing on injection well.
July 6	5,700 litres of *Injection* fluid as well-head tagged incorrectly.
June 22	1,500-2,500 litres *Injection* fluid spill due to blown gasket on inlet flange.
June 1[(1)]	600-800 litres of *Extraction* fluid from injection well due to joint leak.
April-June	50 litres to 2,000 litres of *Injection* fluid spills due to butt joints & vent valve leaks. 11 minor spills in total.
February 9	1,200 litres of *Groundwater* due to joint failure at pipe in wellhouse.
<u>2000</u>	
May 4	6,000 litres of *Groundwater* during bore well construction.

1999

May 21[(1)] Trace moisture detected under storage pond.

1998

March 12 500 litres of *Extraction* fluid from split return line.

[#] No date given, only date reported (December 7, 2001).

[(1)] No date given, only date reported.

3.73 Heathgate Resources claims that the:

> … operational standards at Beverley are equal to or higher than those applying at any other ISL uranium project in the world … the incident rate is below that at many mines and certainly within industry norms.[68]

3.74 However a comparison between the number of spills at Beverley (acid ISL) and those which occurred in seven USA mines (alkaline ISL) for a similar time period indicates a higher incidence of spillage and leakage at the Australian mine.[69] This may be due to the experimental nature of the ISL process used at the mine. However, it does raise questions about the effectiveness of the current regulatory regime and the management practices currently being employed at the mine.

Recommendation 18

Owing to the risks posed by the mine to the environment and the level of public concern, the Committee recommends that the Commonwealth and the South Australian Government play a more active and assertive role in assessing and regulating ISL mining at Beverley.

Regulation

3.75 As discussed in Chapter 1, once mining is approved, supervision of the operations of the mines in South Australia is currently left to State agencies. However, the Commonwealth does have the power to regulate the operation of the mine. Further, as uranium mining is a matter of national environmental significance, the Commonwealth has a legitimate role in regulating the activities at Beverley.

3.76 Heathgate Resources has expressed general satisfaction with the present regulatory role of the South Australian and the Commonwealth authorities in the following terms:

---

68 Heathgate Resources Pty Ltd, *Submission 70a*, p 24.

69 Friends of the Earth, Australia, *Submission 69*, pp 8, 11-13.

> … the existing regulatory protocols are working as they were designed to [and they] will only continue to improve over time with experience. It is a dynamic process that has been built into the protocols. The agencies that we deal with, both at the federal and state levels, are first class.[70]

3.77 Environment Australia argues that the Beverley mine's safety record has been basically sound, while welcoming a recent South Australian Government-inspired strengthening of regulation. However, Environment Australia suggested that it was likely that it would have a greater role in auditing and management in the future.[71]

3.78 The ACF rejects the idea of self-regulation by the uranium mining industry, claiming that it has not been a success. In its place it calls for the establishment of a more independent regulatory scheme—'a transparent, independent, genuine watchdog'.[72] The ACF has also advocated an increased role for Environment Australia in regulating South Australia's uranium mining.

3.79 The ACF would also prefer to see greater Commonwealth participation in this respect, since:

> … the Commonwealth has points of intervention now within its existing framework which it could effect to improve the situation. [It] has a range of regulation and law … which it could apply.[73]

3.80 The ACF also advocates closer Commonwealth involvement in regulation via the Beverley Environmental Consultative Committee (BECC), suggesting that Environment Australia, rather than PIRSA, should be the lead organisation in the BECC.[74]

3.81 In evidence to the Committee, an ACF representative summarised its position as follows:

> The issues in South Australia are different from the issues in the Northern Territory. Because the Territory is a territory there is a much stronger Commonwealth legislative role there. The Commonwealth owns the uranium in the Northern Territory, whereas the state government owns the uranium in South Australia. That leads to fundamental changes of direction in what the appropriate legislation and regulatory regimes are. Essentially, the problem in South Australia is the minimal overlap of Commonwealth legislative obligations with uranium mining in South Australia. It is not a problem of needing to standardise or limit the amount of Commonwealth application. It is a matter [of investigating] why there is such a limited

---

70 Mr Graham, *Committee Hansard*, Adelaide, 4 October 2002, p 243.

71 Environment Australia, *Submission 86*, pp 19-20.

72 Mr Sweeney, *Committee Hansard,* Canberra, 18 October 2002, p 298.

73 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 298.

74 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, pp 292, 297-298.

> Commonwealth role in terms of the uranium mines in South Australia. The ACF sees that there should be a fundamental Commonwealth role in regard to uranium mining wherever it is conducted in Australia.[75]

3.82 The ACF's perception of what greater Commonwealth Government regulation of uranium mining would involve is as follows:

> … Environment Australia should have an ongoing legislative privy to the operations of any uranium mine in Australia. They should be allowed to set conditions and vary conditions and intervene in the management of a mine if it fails to properly meet that standard of conditions … Environment Australia should have a direct role to set, vary and change conditions and judge compliance with the environmental operations and the radiological related operations of all uranium mines in Australia.[76]

3.83 This blueprint derives mainly from:

> … the evidence of the years of failure of the South Australian government to properly exercise a control in that way. In terms of uranium issues … uranium mining is always fundamentally a Commonwealth matter. That is accepted in legislation; it is only the Commonwealth government that can ever authorise the export of uranium in Australia … The Commonwealth should be more engaged in the actual operations and the actual impacts of the uranium mining that are consequent to their approvals for uranium export licences.[77]

3.84 The ACF considers the EMMP to be 'the appropriate document under the Commonwealth authorisations to deliver the proper regulatory regime to the operation at Beverley'.[78] However, the ACF believes that the process should be reviewed more frequently than once a year. Environmental groups' principal concerns about current regulatory arrangements have been summed up by the FoE as follows:

> Given the repeated, and at times, chronic incidents, the present regulatory structure fails to enforce environmental protection. Regulation requires independence and potency to deliver effective control over mining operations … Further [in order] to have measurable impacts on operators practice, regulators must have active powers of enforcement. Given the nature and repetition of these incidents, there needs to be a stronger use of financial penalties combined with the suspension or revocation of operating licences.[79]

3.85 A representative of the ACF told the Committee:

---

75 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 201.

76 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 201.

77 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 201.

78 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 191.

79 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 282.

> We are not asking for massive regulatory or legislative change … we are asking that the existing laws be applied rigorously and not in a sense of letting us facilitate further dialogue with the company and to have a self-monitored outcome.[80]

3.86 The ACF, however, speaks for many environmental groups in overview seeking more marked clarification of Commonwealth and State responsibilities and a Commonwealth presence, which is 'on the ground … active … interactive and effective'.[81] In this respect, the ACF has expressed support for the creation of a modified Office of the Supervising Scientist (OSS) in the State despite the fact that the Supervising Scientist has only advisory and research functions.[82] However, it opposes a transfer of the existing OSS model from the Northern Territory to South Australia, asserting that the OSS has increasingly become a 'hands-off' and 'desk-based' operation.[83]

3.87 Environment Australia clearly favours a light-handed regulatory approach. Mr Early described one regulatory option—the revocation of the company's export permit—as a course which might appear to be 'a bit heavy-handed',[84] while Mr Malcolm Forbes told the Committee:

> The option we have is always to apply peer pressure, if you like. We apply peer pressure to our South Australian government colleagues and clearly they also apply pressure to us if they believe we are not being as open as we should be, either. But peer pressure within and between governments is an important issue in actually moving positions.[85]

Regulatory conflict of interest

3.88 An apparent regulatory conflict of interest constitutes one of the chief criticisms of current arrangements. The FoE argued that the current organisational arrangements institutionalise a conflict of interest on the part of regulators. Mr Thompson put it this way:

> In South Australia, regulation remains primarily with the Department of Primary Industries and Resources. This department is responsible for facilitating mining exploration and project development by private companies. This relationship fails to provide the independence or disinterest required to establish firm regulation.[86]

---

80 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 298.

81 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, pp 298, 301.

82 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 282.

83 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 297.

84 Mr Early, *Committee Hansard*, Canberra, 18 October 2002, p 314.

85 Mr Forbes, *Committee Hansard*, Canberra, 18 October 2002, p 314.

86 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p. 282.

3.89 The ACF's Mr Noonan referred to 'the political support for uranium mining in the current Commonwealth political regime'[87] as an important factor handicapping proper regulation. Dr Matthews described this aspect of current regulatory arrangements as 'the regulation-promotion nexus':

> …the government departments, both state and federal, which are promoting the mining industry are also the major regulators. There are a number of major regulators, but they are the lead regulator and yet their chief business is to promote industry. That conflict of interest is behind a lot of the problems in the industry in Australia.[88]

3.90 Mr Sweeney, of the ACF, told the Committee:

> We further welcome the move that is currently happening in South Australia away from PIRSA - Primary Industries and Resources South Australia - having regulatory oversight and towards a dedicated focus of South Australian EPA. We believe that makes more sense; we believe it breaks the connection, the perception and the reality of the regulator being too close to what they regulate.[89]

3.91 Nevertheless, the EPA's new role is a narrow one, the result of a transfer of the Radiation Protection Branch from the Health Commission to the EPA, and its jurisdiction over uranium mining is limited to matters falling within the Radiation Protection and Control Act. In the ACF's opinion, this reform does not go far enough:

> It does not even mention the environment, for instance. So the ACF does not in any way find it acceptable for the EPA's role in regard to uranium mining to be restricted to the aspects that are addressed through the Radiation Protection and Control Act, which is really designed to deal with occupational health and safety issues rather than the management of radioactive wastes.[90]

3.92 The ACF asserts that the EPA is still excluded from most aspects of regulation since the South Australian Environment Protection Act does not apply to uranium mine waste. The ACF therefore argues that the South Australian government should amend the EPA Act to:

> … make uranium mining wastes fully the privy of the Environment Protection Act and that it should be a specific regulatory role for the EPA to manage the safe storage and ongoing management of radioactive wastes from uranium mining.[91]

---

87 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 202.

88 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 166.

89 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 293.

90 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 199.

91 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 198-199.

3.93 In relation to the suggestion of a regulatory conflict of interest, SXR claimed that any conflict is lessened by the separation of tasks within PIRSA, and the fact that other departments are also involved in facilitating the development of mining projects and regulating their operation.[92]

3.94 In considering the potential for a conflict of interest within PIRSA and the associated arguments for an expanded role for the South Australian EPA, the appropriateness of the responses depends on whether it is accepted that uranium mining should be treated differently to other types of mining. In South Australia, mining is the regulatory responsibility of PIRSA. However, as noted above, uranium mining is a matter of national environmental significance under the EPBC Act. This was recognised in the Council of Australian Governments (COAG) Heads of Agreement on Commonwealth/State Roles and Responsibilities for the Environment (November 1997), which states:

> The Commonwealth has a responsibility and an interest in relation to the assessment and approval of mining, milling, storage and transport of uranium and the development and implementation, in consultation with the States, of codes of practice as provided under the *Environment Protection (Nuclear Codes) Act 1978* for protecting the health and safety of the people of Australia, and the environment, from possible harmful effects associated with nuclear activities.[93]

Recommendation 19

The Committee is of the view that uranium mining presents unique hazards and risks to both human health and the environment. Accordingly, its regulation at both the Commonwealth and State levels should be primarily the responsibility of environment agencies rather than agencies whose principal concern is with the advancement of mining interests.

Reporting, consultation and communication

Reporting

3.95 The legislative instruments and machinery governing uranium mining are diverse in character and wide-ranging in application. An overview of the industry reporting regime was provided in Chapter 1. In this section the reporting apparatus and its specific implications for the Beverley mine will be examined in detail.

3.96 The company is required to submit two quarterly and two annual reports on its operations. It reports to South Australia's Chief Inspector of Mines every quarter on groundwater monitoring and waste management, and quarterly to the State's

92 Southern Cross Resources Australia Pty Ltd, *Submission 28a*, p 20.

93 COAG, Heads of Agreement on Commonwealth/State Roles and Responsibilities for the Environment, November 1997, Part 1, Section 6. www.ea.gov.au/epbc/about/agreement.html

Environment Protection Authority (Radiation Protection Branch) on radiation monitoring (occupational and environmental). Under the terms of the EMMP, Heathgate must also provide an annual report on environmental matters to the South Australian Minister for Mines and Energy, and another, also on environmental aspects, to the State Minister for Environment and Conservation.

3.97 There are several other reporting procedures. These include: incident reports; the BECC; the Radiation Review Committee (ISL); the EMMP process; a Radiation Management Plan; a licence to mine and mill radioactive ores; production and shipping reports; a pipeline licence; PIRSA's requirements; the Adnyamathanha and Kuyani Advisory Committees; meetings with pastoralists; discussions with local Aboriginal communities; and a variety of public awareness initiatives.

Incident reports

3.98 The company is obliged to observe South Australian Government written and oral reporting requirements on matters such as solution releases and occupational health and safety. The FoE has called for a higher level of detail in future reporting procedures, such as clearer identification of the source of leaks and spills, as well as better quantification and improved analysis of chemical and radiological concentrations. Heathgate Resources argues, however, that this information is already included in incident reports that form part of an existing process of regular and transparent reporting.[94]

3.99 The submissions and evidence provided to the Committee reveal a widespread concern about the public availability of reporting documentation. According to Dr Matthews, the secrecy surrounding mining operations and the concomitant delay in allowing public access to documents constitute a serious impediment to effective monitoring.[95]

3.100 The ACF describes the need to ensure that all uranium industry reporting material is publicly accessible and able to be scrutinised as 'a fundamental Commonwealth responsibility'. It points out that this is not happening in relation to requirements placed on ISL operations by Commonwealth Codes of Practice on Radioactive Ore Mining and Milling, specifically, the *Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores* (1987); the *Code of Practice on the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores* (1982); and a series of nuclear codes developed pursuant to the *Environment Protection (Nuclear Codes) Act 1978*.[96] The ACF refers to the constraints on the monitoring of Beverley that derive from this low level of

94 Friends of the Earth, Australia, *Submission 69,* p 5; Heathgate Resources Pty Ltd, *Submission 70a*, p 54; *Submission 70*, p 11.

95 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 166.

96 Australian Conservation Foundation, *Submission 74*, pp 34-5; Senator Wong, Mr Early, Mr Forbes and Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, pp 312-13.

disclosure.[97] Although South Australia's Chamber of Mines and Energy (SACOME) produces an annual, public environmental management and monitoring assessment, a monthly report would provide a better basis for evaluation.[98]

3.101 Dr Matthews is also concerned about the alleged late reporting, for example, of the spill that occurred at Beverley in March 1998, the details of which were supposedly revealed only in response to public pressure. Heathgate Resources disputes this, claiming that the spill was minor and any requests for information about it were met in a timely manner.[99] The company also rejects the ACF's claim that a number of Inspection Reports and other documents relating to leaks at Beverley have been kept secret. It asserts that all such documentation is assessed by government agencies under the terms of 'mandated reporting protocols', release and access decisions being made in accordance with Freedom of Information guidelines and procedures.[100]

3.102 Public disclose of incident reports would assist in ensuring the public are able to make an informed assessment of the environmental impacts of the operation. The failure to disclose this material merely serves to generate greater suspicion of the impacts of the mine.

Beverley Environmental Consultative Committee (BECC)

3.103 The Beverley Environmental Consultative Committee (BECC), comprising officers of Commonwealth and South Australian Government regulatory agencies, and two representatives of Heathgate Resources, meets every six months. Its primary purpose is to enhance understanding between government and mining company.

3.104 The present regulatory arrangements applying to the operations of the Beverley project whilst not preventing a large number of leaks and spills, have, it is argued, avoided serious environmental problems. However, as discussed, there are a number of shortcomings in the present regulatory system, particularly with regard to the monitoring and reporting mechanisms.

3.105 However, the narrowness of its membership base and its reporting record has prompted FoE to describe its 'public accountability' record to date as 'effectively zero'.[101] The ACF criticises the BECC, chiefly on the grounds that its responsibility to report orally rather than to produce written reports lessens its already small degree of accountability. To address this situation, the ACF recommends that the BECC be required to undertake public reporting of all reviews of environmental performance at

97 Australian Conservation Foundation, *Submission 74*, p 18.

98 Mr Yeeles, *Committee Hansard*, Adelaide, 4 October 2002, p 207.

99 Dr Matthews, *Submission 16*, pp 60-61; Heathgate Resources Pty Ltd, *Submission 70a*, p 39.

100 Heathgate Resources Pty Ltd, *Submission 70a*, p 12; Australian Conservation Foundation, *Submission 74*, p 22.

101 Friends of the Earth, Australia, *Submission 69*, p 6.

Beverley; monthly provision of information to the public and stakeholders; and the creation of a website-based public register to enable prompt, mandatory reporting of all incidents. It also insists that the BECC should be responsible to Environment Australia, rather than to PIRSA.[102]

3.106 Heathgate Resources does not question the validity of these concerns, conceding that there is a need for some improvement of its disclosure machinery.[103] In the Committee's opinion, the publication of regular written reports on Beverley's environmental performance can only broaden public understanding of both the mine and BECC's operations,[104] and improve BECC accountability.

Recommendation 20

The Committee supports the ACF recommendation that BECC be made responsible to Environment Australia and that BECC publicly report all reviews of environmental performance at Beverley.

Radiation Review Committee (ISL)

3.107 The Committee, which was formed in August 1998 with a general brief to review mining operations and radiation monitoring, has no formal tasks or membership. It split into two parts in August 2001 to permit separate meetings to be held for the Beverley and Honeymoon operations. Heathgate representatives meet quarterly with committee members (officials of the EPA, PIRSA, and Workplace Services within the DAIS). Information on spillage or leakage is communicated orally at these gatherings. The ACF asserts that, in contrast to present practice, radiation management issues affecting the Beverley project (including, impliedly, the outcomes of these meetings) should be included in Heathgate Resources' publicly available annual environment reports.[105]

102 Australian Conservation Foundation, *Submission 74*, pp 33-34.

103 Mr Chalmers, *Committee Hansard*, Adelaide, 4 October 2002, p 250.

104 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 188.

105 Australian Conservation Foundation, *Submission 74*, p 24.

Environmental Management and Monitoring Plan (EMMP)

3.108 Under the terms of South Australia's *Mining Act 1971*, Heathgate Resources is required to submit to the responsible Minister a plan for protecting, managing and rehabilitating the environment affected by the Beverley mine. This plan encompasses waste management, flora, fauna, groundwater spills and air emissions. The company is also obliged to furnish a publicly available annual report to the relevant South Australian regulatory agencies.

3.109 The ACF objects to the fact that certain categories of spills are exempt from reporting requirements, and recommends that such procedures be amended so as to remove all current exemptions relating to leak and accident reporting. Heathgate opposes this suggestion on the grounds that any mandatory requirement to report on small leaks is unnecessary and unproductive.[106] The ACF also advocates replacing oral reporting requirements with written ones when reporting on certain types of spills and leaks.[107]

Recommendation 21

The Committee recommends that mining companies be required to prepare written reports (as opposed to verbal) on incidents.

The Committee recommends that all serious leaks and spills be investigated by Environment Australia and that minor leaks and spills be scrutinised by South Australia's Chief Inspector of Mines in collaboration with EA. Given that different regulatory requirements attach to different categories of incidents, the Committee also recommends that the definitions as to categories of incidents be the subject of public consultation and be publicly available. A regulatory response, publicly available, should be provided following the investigation of an incident.

Radiation Management Plan

3.110 A South Australian Government-approved Radiation Management Program (RMP) and a Radioactive Waste Management Program (RWMP) are required under the provisions of four codes devised by the Commonwealth with the intention of ensuring uniformity of uranium mining regulation throughout Australia: the *Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores* (1987); the *Code of Practice on the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores* (1982); *Codes of Practice for the Safe Transport of Radioactive Substances* (1982); and the National Health and Medical Research Council Recommendations for limiting exposure to ionizing radiation

106 Australian Conservation Foundation, *Submission 74*, p 26; Heathgate Resources Pty Ltd, *Submission 70a*, p 14.

107 Australian Conservation Foundation, *Submission 74*, pp 25-26.

(1995). The company is required to submit both quarterly and annual reports on its compliance with these codes to the relevant South Australian government agencies.

3.111 The ACF advocates greater public disclosure of radiation management findings, in particular the release of the Beverley *Radiation Management Plan* (October 2000).[108]

3.112 Again, the Committee believes disclosure of these materials is essential to ensure the public is able to accurately assess the benefits and disadvantages of the mining operations. Increasing public access to information should assist in the achievement of regulatory objectives.

Licence to mine and mill radioactive ores

3.113 Heathgate Resources is obliged to report annually to the EPA's Radiation Protection Branch on the licence conditions under which it operates. These licence conditions are contained in codes of practice, which are set out above in the section entitled 'Radiation Management Plan'.

Production and shipping reports

3.114 The company must report six-monthly to the Australian Safeguards and Non-Proliferation Office (ASNO) and the Commonwealth Department of Industry, Tourism and Resources (DITR) on its production statistics and shipments.

Pipeline licence

3.115 Natural gas pipeline licence conditions require Heathgate Resources to produce an annual report outlining its compliance in this sphere.

Primary Industries and Resources South Australia (PIRSA)

3.116 PIRSA and the Radiation Protection Branch of the EPA collaborate closely on the application and enforcement of the regulatory codes described in the section above headed 'Radiation Management Plan'. PIRSA reporting requirements necessitate monthly progress reports by the company on: wellfield and plant operations; exploration/retention leases; water monitoring; and occupational health and safety incidents.

Adnyamathanha and Kuyani Advisory Committees

3.117 At meetings held quarterly Heathgate Resources provides information to, and addresses questions raised by, the principal native title claimant groups affected by the Beverley operation—the Adnyamathanha and the Kuyani peoples—as represented by their respective advisory committees. However, concerns remain among some of the

108 Australian Conservation Foundation, *Submission 74*, p 24.

Adnyamathanha people, such as Ms Jillian Marsh, about the extent and effectiveness of Heathgate-Aboriginal interaction.[109]

3.118 It must be stressed, though, that indigenous people themselves, chiefly the Adnyamathanha, are in disagreement over some issues, including the payment of mining royalties. The Port Augusta-based Adnyamathanha Traditional Lands Association (ATLA) has threatened to sue the company if payments are made to trusts established by the Adnyamathanha claimants. This matter was understood to be before the Federal Court at the time of finalising this report.

Meetings with pastoralists

3.119 The company reports to local pastoralists, notably the lessees of Wooltana Station, on the operation and progress of mining and its ramifications for these remote rural landholders at informal gatherings held every six months.

Discussions with local Aboriginal communities

3.120 Heathgate reports at six monthly intervals to the representatives of local Aboriginal communities, such as those at Nepabunna, Iga Warta and Leigh Creek. Issues discussed include employment training, current job opportunities at Beverley, cross-cultural awareness programs, and royalty and community payment matters. Mr Michael Anderson, Chair of Wartali-Owie Inc., and Ms Jillian Marsh, informed the Committee of difficulties with the company's alleged 'top-down', non-consultative business culture; its lack of preparedness to train younger members of the indigenous community for mine work through apprenticeships; and its apparent reluctance to include skilled local Aboriginal people in the Beverley work force, preferring to import higher skilled labour from elsewhere.[110] Mr Stephen Middleton, a Vice-President of Heathgate Resources, disputes these claims and points to the creation of several company training and employment initiatives for the local indigenous population.[111]

Public awareness initiatives

3.121 Heathgate Resources maintains a website and publishes a newsletter entitled *In Situ* that contain information about its operations.

3.122 The ACF has called for the creation of a website documenting all mine related events.[112] While Heathgate Resources currently has a website that provides

---

109 Heathgate Resources Pty Ltd, *Submission 70a*, pp 16, 17-18, 67-8; Ms Marsh, *Committee Hansard*, Adelaide, 4 October 2002, p 350; Australian Conservation Foundation, *Submission 74*, pp 28-30.

110 Ms Marsh and Mr Anderson, *Committee Hansard*, Adelaide, 4 October 2002, p 350.

111 Mr Middleton, *Committee Hansard*, Adelaide, 4 October 2002, pp 256-257.

112 Australian Conservation Foundation, *Submission 74*, p 34.

information on its activities, this website is incomplete. Further, as the company maintains the website, it is unlikely members of the public will trust that the information provided is accurate and that all relevant information has been disclosed. Consequently, an independent website could clearly assist in the timely dissemination of information about the mining operations.

3.123 Heathgate Resources stated that company officials make many public addresses and attend numerous community gatherings to provide information on its mining activities. The FoE labelled these exercises: 'A public relations attempt to manage perceptions of corporate governance of the nuclear industry'.[113]

3.124 The company has established a Visitor and Aboriginal Heritage Centre at the Beverley mine to expand community knowledge of the project and to enhance understanding of indigenous issues. However, Mr Michael Anderson, a Beverley Advisory Committee member, has referred to the paucity of material on indigenous subjects in the Centre; the company's alleged unresponsiveness to suggestions about what to include in it; and Heathgate's apparent failure to consult adequately with, and report to, local Aboriginal people on the Centre.[114]

Summary

3.125 The Commonwealth, specifically Environment Australia, sees a continuing role for itself in uranium mining reporting and oversight. As the EA states in its submission:

> While much of the decision-making process affecting the environment rests largely in local or State hands … there is a legitimate national dimension to environmental policy in relation to uranium mining … Environmental impact assessment by the Commonwealth provides for a degree of reassurance and certainty in the public's perception that environmental protection measures for all proposals are rigorous, fully transparent, open and consistent.[115]

3.126 SACOME is certain that, despite some duplication, present Commonwealth and South Australian reporting arrangements are adequate; that current public reporting machinery will assist in dealing with future incidents at Beverley; and that no need exists for extending Commonwealth participation in reporting and scrutiny.[116] The Chamber argues, too, that agencies are performing their reporting functions fairly and efficiently, and that industry has been assiduous in meeting its obligations.[117]

---

113 Friends of the Earth, *Submission 69a*, p 1.

114 Mr Anderson, *Committee Hansard*, Adelaide, 4 October 2002, p 352.

115 Environment Australia, *Submission 86*, p 5.

116 South Australian Chamber of Mines and Energy, *Submission 39*, p 8.

117 South Australian Chamber of Mines and Energy, *Submission 39*, p 6.

3.127 However, in its submission to the Bachmann Review of Reporting Procedures (August 2002), SACOME supported the idea of revised reporting arrangements, notably, the establishment of a single reporting point to Government; the adoption of a standard form for such reporting; the formulation of spills reporting procedures that recognise factors other than volume, material and location; industry and government developing a publicly accessible web-based reporting system for notifiable incidents; and each uranium mine maintaining an up-to-date spills incident register.[118]

3.128 The Bachmann Review made eight recommendations aimed at updating and strengthening reporting procedures. They include the maintenance of a register of incidents at each site; revised secrecy/confidentiality clauses to ensure anonymity for concerned individuals; closer reporting liaison between the CIM, EA and the DITR; all agencies to be informed of incidents at the same time; the adoption by relevant agencies of a common incident reporting form; and the identification of a lead Minister and agency to deal with a significant incident as soon as it occurs.[119] These proposals, which constitute a significant advance on present practice, should be incorporated into any revised reporting arrangements. The Committee understands from an officer-level informal source that six of the eight recommendations made by Bachmann have been implemented and the remaining two, dealing with legislation and protocol are in progress.

3.129 Mr Sweeney set out the ACF's preferred reporting and regulatory reforms:

> We believe the South Australian model is an appropriate state model whereby the state agency is a dedicated environment protection agency. The role of the Commonwealth would be to work with that agency to also play a role to ensure that all Commonwealth frameworks, guidelines and codes of practice were applied rigorously and made public. It would be in the provision of performance based and clear conditions on export licences and other regulatory tools that the Commonwealth has. It would also be to ensure that there is an increased and heightened transparency and understanding. There needs to be a delineation of the roles so that there is not confusion—and I believe the term has been used—of 'regulatory competition'. There needs to be a delineation so that competition is not there, and there is in fact enhanced regulatory cooperation and enhanced regulatory transparency and effectiveness.[120]

3.130 The absence of a compulsory obligation to report to any responsible Commonwealth authority confirms the view that there is an over-concentration of regulatory power in South Australian Government hands. The Committee believes

---

118 SACOME, Uranium Standing Committee, Submission to the *Report of Independent Review of Reporting Procedures for the SA Uranium Mining Industry (Bachmann Inquiry)*, Adelaide, July 2002, p 8.

119 Hedley Bachmann, *Report of Independent Review of Reporting Procedures for the SA Uranium Mining Industry*, Adelaide, August 2002, p 1.

120 Mr Sweeney, *Committee Hansard*, Canberra, 18 October 2002, p 297.

that the Commonwealth should pay a more active role in the regulation of the mining activities and that there is an urgent need for greater clarity in the division of regulatory responsibilities between the Commonwealth and South Australia. In addition, the Committee believes that public interest would be served by greater disclosure of information about the mining operations and increased transparency in government regulatory processes. This matter is discussed in greater detail below.

Recommendation 22

The Committee supports the recommendations of the Bachmann Review aimed at updating and strengthening reporting procedures, viz:

- **Maintenance of a register of incidents at each site.**
- **Revised secrecy/confidential clauses to ensure anonymity for concerned individuals.**
- **Closer reporting liaison between the CIM, EA and the DITR.**
- **All agencies to be informed of incidents at the same time.**
- **Adoption by relevant agencies of a common incident reporting form.**
- **Identification of a lead minister and agency to deal with a significant incident as soon as it occurs.**

Consultation and communication

Beverley Environmental Consultative Committee (BECC)

3.131 The BECC consists of representatives of Commonwealth agencies (one each from EA and the DITR); South Australian bodies (the Chairperson of PIRSA, one from the Department of Human Resources and one from the Department of the Environment and Heritage); and two from Heathgate Resources Pty Ltd. The BECC has been described by Heathgate's President as 'an important mechanism for effective liaison and exchange of information between the Commonwealth government, the state government and Beverley'.[121] The company stresses that BECC's role is 'to provide a link between Heathgate Resources and State and Federal agencies in regulating uranium mining. It does not have a role in dispersing information to the community'.[122]

3.132 Its chief functions are to review the mine's environmental performance and to disseminate information (chiefly, that relating to leaks) to all affected stakeholders. An ACF Campaign Officer told the Committee that BECC has done neither; he

121 Mr Graham, *Committee Hansard*, Adelaide, 4 October 2002, p 251.

122 Heathgate Resources Pty Ltd, *Submission 70a*, p 21; Australian Conservation Foundation, *Submission 74*, p 33.

claimed, in fact, that it has kept secret all of the data it holds on the continuing leaks at Beverley.[123]

3.133 The BECC, as presently structured, does not satisfactorily communicate with, or take into account the information needs of, a number of key stakeholders such as indigenous groups and the general public. Its only regularly released information—a report based on the proceedings of its six-monthly meetings—is published once a year. Mr Mark Chalmers, of Heathgate Resources, informed the Committee that the BECC was considering how to improve its disclosure mechanisms.[124] It is obvious that more regular communication to all stakeholders, not primarily to government agencies and the company, is necessary. As Mr Malcolm Forbes, of Environment Australia, told the Committee:

> There has been a bit of discussion within the [BECC] itself in relation to the need to release information. [Environment Australia has] been advocating for some time that annual environmental reports must be released to the public … It would be better for [Heathgate Resources] and the South Australian authorities to be a little more open than they have been in the past. There is a general move now within South Australian authorities to be a little more open. The Beverley Environmental Consultative Committee is also privy to some commercial-in-confidence information. Some of that information would clearly be difficult to release. The company and PIRSA are quite keen to try and release other information. The issue of transparency is one which has been put on the table and discussed quite openly within the committee. There is a need to be more transparent than it has been in the past. That has certainly been a position which has been taken by the Commonwealth.[125]

3.134 Mr James Graham, President of Heathgate Resources, pointed out that the information provided by the BECC on its activities is contained in its annual report and publicised through other mechanisms. He stresses that 'the BECC … does not have the belief that we do not report to the public'.[126] Heathgate Resources' Mr Middleton told the Committee that the BECC consults quarterly with native title claimant groups in the forum of advisory committees (specifically, the Adnyamathanha, Kuyani, Nepabunna and Iga Warta communities), as well as local pastoralists, the National Parks and Wildlife Service, and the Arkaroola tourist resort.[127]

3.135 The four indigenous advisory committees recently merged their functions into a single consultative committee. Mr Michael Anderson, a committee member,

---

123 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 188.

124 Mr Chalmers, *Committee Hansard*, Adelaide, 4 October 2002, p 250.

125 Mr Forbes, *Committee Hansard*, Canberra, 18 October 2002, p 314.

126 Mr Graham, *Committee Hansard*, Adelaide, 4 October 2002, p 252.

127 Mr Middleton, *Committee Hansard*, Adelaide, 4 October 2002, p 252.

criticised the company's degree of disclosure about leaks and spills, pointing out that, not only has the provision of written information to Aboriginal people about incidents almost invariably been delayed, but committee members have, as a rule, not been orally notified immediately after individual incidents.[128]

Declaration of Environmental Factors

3.136 Questions have been raised about consultation and the consultative machinery at every stage of Beverley's history. In this regard, the ACF was highly critical of the Declaration of Environmental Factors (DEF) process, arguing that the DEFs were not released for public comment and that the trials did not adequately inform the EIS process. It stated that:

> … Minister Hill decided to allow the conduct of trial uranium mining at Beverley through an entirely non-public process and separate from the EPIP Act EIS process.[129]

3.137 In response to these claims, Heathgate Resources argues that:

> The small scale and minimal potential impact of the Beverley [FLTs] meant the interests of the community and the environment could be protected through the DEF process, which is well recognised as being an effective way to manage developments when they reach this stage. There was full public participation in the subsequent EIS process, including: public comment on the terms of reference; an invitation to make submissions on the draft EIS; and the opportunity to participate in public meetings.[130]

3.138 The Committee strongly believes the failure to subject the DEF process to an open and transparent environmental assessment process has undermined public confidence in the project. In future, all aspects of proposed uranium mining should be subject to an open and transparent environmental assessment process that enables members of the public to contribute to relevant decision-making processes.

Industry-Aboriginal group negotiation

3.139 A major consultation issue relates to mining industry-indigenous community interaction. The ACF argues that good faith negotiations were not carried out with the Adnyamathanha people prior to the commencement of operations and that relevant information concerning leaks from the mine was not disclosed to the native title claimants. In this regard, the ACF stated:

---

128 Mr Anderson, *Committee Hansard*, Adelaide, 4 October 2002, pp 352, 360.

129 Australian Conservation Foundation, *Submission 74*, p 17.

130 Australian Conservation Foundation, *Submission 74*, pp 16-17; Heathgate Resources Pty Ltd, *Submission 70a*, p 10.

ACF consider that the legislative obligation on the proponent *"to negotiate in good faith"* with the NT claimant groups was not met by General Atomics, in that:

- During negotiations General Atomics, through their 100% owned subsidiary Heathgate Resources, would not negotiate an agreement with the Native Title Claimant group representing the main Adnyamathanha community on terms which differed from poor terms that were signed earlier on with another Native Title claimant group; and

- General Atomics held out to use the ERD Court process to seek a mining agreement, knowing that community would lose their future options to royalties should General Atomics win the case against Adnyamathanha community opposition to their terms; and

- In that they failed to properly inform the main Adnyamathanha Native Title claimant group of a radioactive leak which had occurred at the trial mine.

Adnyamathanha people were duly concerned over environmental impacts of acid ISL uranium mining and had a right to be fully informed about impacts of trial mining on their traditional lands. This was not the case in practice.[131]

3.140 In response to the ACF's contention that negotiations with Aboriginal communities must be conducted in 'good faith', Heathgate Resources stresses that this is occurring and that the company-Aboriginal relationship has proved 'a mutually rewarding one'.[132] Yet the ACF claims that, in comparison with their fellow Australians, at every stage of the process of attempting to reach a native title mining agreement with the company, the Adnyamathanha people were at a disadvantage. Mr Noonan stressed to the Committee that the agreement process and the agreement itself were:

> … fundamentally inadequate … under South Australian legislation … the Adnyamathanha community did not have a right to seek conclusion of the environmental impact statement before they were legally forced into an agreed outcome with the company. While all other Australians had a legal right to make a submission to the Beverley EIS to see the outcomes of that submission in the government assessment and response, the Adnyamathanha community were not given that privilege that was extended to every other Australian. They were, through legal means under the acts and by the company, forced to come to an agreed outcome with the company … before

131 Australian Conservation Foundation, *Submission 74*, p 29. Emphasis in original.

132 Australian Conservation Foundation, *Submission 74*, p 28; Heathgate Resources Pty Ltd, *Submission 70a*, p 16.

> they even had access to the public documentation as to what the impacts of the mine may be.[133]

3.141 Ms Jillian Marsh, a member of the Flinders Ranges Aboriginal Heritage Consultative Committee (FRAHCC) and of the Adnyamathanha community, led the opposition to the proposed Beverley mine, which is located on community land. She told the *Green Left Weekly* in 1999 that:

> In 1997, Heathgate Resources approached the two registered native title claimants. At that stage Heathgate was not legally bound to enter into negotiations … When they found the claimants were receptive, they put forward a proposal.
>
> Many months of pressure [by the company] resulted in both claimants signing exploration agreements, without the consent or knowledge of the rest of the Adnyamathanha community.
>
> … Heathgate has used the content of the original agreements … as a template for how they conduct their business with the rest of the community. When the final agreements on the commercial lease were signed by other registered claimants last year [1998], the chairperson of the Adnyamathanha Native Title Management Committee said, "we were forced into signing this agreement".
>
> Under the state Aboriginal Heritage Act, FRAHCC operates as an independent body, separate from the native title claimants. When FRAHCC opposed the mine, it was immediately cut out of the consultation process.[134]

In evidence to the Committee, Ms Marsh stated that as 1998-99 advanced, intimidation rather than collaboration became the hallmark of indigenous-Heathgate relations. She concluded that 'it was not what you would ideally describe as a public consultation process'.[135]

3.142 Heathgate Resources rejects the suggestion that the Adnyamathanha people were in any way coerced into reaching an agreement; rather, the company argues that the former Chairperson of the now defunct Adnyamathanha Native Title Management Committee, Mr Vincent Coulthard, made it clear that he had followed his people's wishes in signing, and was not forced by Heathgate Resources to do so.

Recommendation 23:

In view of evidence of inadequate consultation in the past, the Committee recommends that Heathgate Resources should encourage and strengthen

---

133 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 189.

134 Green Left Weekly (Sydney), 24 March 1999, Media Release, 'Indigenous People Oppose Beverley Uranium Mine': www.greenleft.org.au/back/1999/354.

135 Ms Marsh, *Committee Hansard*, Adelaide, 4 October 2002, p 349.

relations with the local Indigenous community through improved and open communications.

Committees and forums

3.143 The approval machinery for the Beverley mine stipulated that stakeholders, among them environmental organisations like the ACF, the FoE, and the Conservation Council of South Australia (CCSA), as well as pastoralists and indigenous groups, should participate in a Community Consultative Forum. In the FoE's view, consultative *committees*, which were formed in conjunction with these consultative *forums*, have become ineffective—in fact, a one-way dialogue—the mining interest eclipsing environmental, pastoral and indigenous interests in their deliberations. In order to address this, the FoE recommends the creation of two Commonwealth-funded positions on each committee (including the BECC) and the provision of greater scrutiny and disclosure requirements for committees and forums.

3.144 Heathgate Resources, however, dismisses such objections on the grounds that consultative committees were established primarily to facilitate information exchange between mining companies and Commonwealth and State monitoring agencies in the public interest. The company argues that 'anti-nuclear groups have retreated from the consultative process because the committees are not the forums for espousing anti-nuclear sentiment that they attempted to make them'.[136]

3.145 The Committee believes consultative committees and forums have a legitimate role to play in disseminating information and encouraging discourse between stakeholders. However, in order to be effective, they must contain independent community representatives and their activities should be open and transparent. In the absence of these elements, there is the potential for these committees and forums to be seen as vehicles for the advancement of the company's interests.

Disclosure

3.146 Dr Dennis Matthews has described the 'very heavy cloak of secrecy over anything to do with radioactivity'[137] as a significant difficulty bedeviling the uranium debate. The ACF, too, is highly critical of what it calls the atmosphere of 'extensive secrecy' surrounding uranium industry operations in Australia. As an example of this, it cites approximately 30 'routine and secret' uncontrolled surface leaks which occurred at Beverley prior to the major leak of 11 January 2002. The ACF also claims that, contrary to clear Ministerial and Environment Australia directions, Heathgate has failed repeatedly to address radiation management issues in a public EMMP, doing so only in a separate, non-public Radiation Management Plan. In order to redress this apparent reluctance to communicate essential data on mining and environmental

136 Heathgate Resources, *Submission 70a,* pp. 55-56

137 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 166.

performance, and this seeming unwillingness to better inform monitoring agencies and the public, the ACF recommends that all reports regarding ISL operations at Beverley, particularly the relevant Radiation and Waste Management Plans, be made public.[138]

3.147 Heathgate Resources rejects both of these criticisms, arguing that 'there are no secret surface leaks—routine or otherwise … No spills have been "kept secret". Indeed, they are posted on departmental and company websites on a voluntary basis'. It emphasises also that 'radiation management details are considered confidential since it would be a simple matter to identify individuals, which is not considered to be in the interests of the public or the individual'.[139]

3.148 Another serious claim made by the ACF concerns the status and release of Heathgate Resources' reports on the Beverley FLTs, including the Groundwater Monitoring Summary. The ACF states that release of these reports under the Freedom of Information Act was delayed by company claims of commercial-in-confidence for more than two years. A successful ACF appeal to the South Australian Ombudsman finally secured the release of some of these reports, the Ombudsman finding that in no case was a commercial-in-confidence claim justified. In response, Heathgate Resources claims the ACF was undertaking an information trawling exercise. It also claims these actions are evidence of a continuing vendetta against uranium mining companies and their activities.[140]

3.149 The ACF identified a lack of communication and the maintenance of secrecy as major issues:

> We believe that there was full knowledge between state and Commonwealth regulators and the company [Heathgate Resources] about [the Beverley] leaks … throughout really lengthy periods when those leaks were not in the public realm and should have been, and through really important decision making processes, such as the environmental impact statement and the further studies ordered by [the responsible Commonwealth Minister] … That is a failure of those regulators and of those political systems for not informing the public of those leaks.[141]

3.150 The company disputes these statements, calling them 'a gross reflection on the integrity of Heathgate Resources and the professionals who represent the various regulatory authorities responsible for oversight of uranium projects'. However, it does

---

138 Australian Conservation Foundation, *Submission 74*, pp 23-25.

139 Heathgate Resources Pty Ltd, *Submission 70a*, p 13.

140 Australian Conservation Foundation, *Submission 74*, p 14; Heathgate Resources Pty Ltd, *Submission 70a*, p 8.

141 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 188.

not seriously address the substance of the South Australian Ombudsman's findings or the ACF's claims.[142]

3.151 The matter of the public availability on websites of information about acid ISL is also a contentious one. In its submission, the FoE refers to a 'best practice' feature of communication and information transfer in the state of Wyoming, USA, where details of spillage and leakage in ISL mines are entered into a regularly updated online database. The Wyoming Department of Environmental Quality recently redesigned its associated website. The FoE advocates the creation of an Online Database on this pattern to be administered by South Australia's Environment Protection Authority. However, Heathgate Resources argues that the South Australian Government's website already contains such information.[143] The adequacy of the present website is obviously a matter for debate, a subject which could be examined by an Environment Australia-led investigation of current arrangements.

3.152 The Committee recognises that greater consultation and more frequent release of information is a double-edged sword for both the company and the regulators. They find themselves subject to criticism based on the material they disclose, and condemned for engaging in a 'cover-up' when they seek to protect commercial-in-confidence and personal data. This is hardly unique to the uranium mining industry.

3.153 The Committee strongly believes there is a need for greater transparency and public accountability in the operation of the Beverley mine. If Heathgate Resources, the South Australian Government and the Commonwealth want to resolve disputes concerning the legitimacy of Beverley and the adequacy of the management and regulation of the mine, this can only be achieved by ensuring members of the public are fully informed of relevant mining and regulatory activities. The failure to ensure transparency will only generate further resentment and suspicion.

Rehabilitation

3.154 Mining Lease 6036 stipulates in the First Schedule that Heathgate Resources:

> … shall ensure that land disturbed by mining and exploration activity is rehabilitated to achieve a stable and regular land-formation and to return the area to grassland, suited to a grazing after-use.[144]

3.155 The Second Schedule of the Lease sets out *inter alia*, what rehabilitation related work is to be included in the EMMP. It includes progressive rehabilitation of the land and borefields and the methods to be used. Elsewhere it outlines requirements

---

142 Australian Conservation Foundation, *Submission 74*, p 14; Heathgate Resources Pty Ltd, *Submission 70a*, p 8.

143 Friends of the Earth, Australia, *Submission 69*, p 6; Heathgate Resources Pty Ltd, *Submission 70a*, p 55.

144 Clause 7, First Schedule, Mining Lease 6036.

in more detail.[145] Clause 24 refers to the monitoring of fluid migration which is a major concern to many interest groups and witnesses.

3.156 Notably, unlike the Mining Lease issued to Southern Cross Resources for the Honeymoon project, the Heathgate Resources lease does not specify that a Rehabilitation Bond must be lodged.

3.157 The Beverley EMMP states that:

> The objectives of the rehabilitation program will be to rehabilitate disturbed areas and to ensure the long-term viability of rehabilitated areas.
>
> The process of achieving these objectives includes:
>
> > rehabilitating areas disturbed by operational related activities, once they are no longer required for these activities;
> >
> > conducting a monitoring program to quantify the effectiveness of rehabilitation.[146]

3.158 Beverley is required to abide by the EMMP. The Plan outlines the methods to be used, the procedures for both long-term and continual rehabilitation, monitoring and management strategies, and accountability. Table 5[147] in the EMMP outlines the suggested scaling and timing for rehabilitation and subsequent closure.

145 Clauses 1, 6, 11, 14, 17, 22 and 24, Second Schedule, Mining Lease 6036.

146 Heathgate Resources Pty Ltd, Beverley Uranium Mine – Environmental Management and Monitoring Plan, 2000, p 27.

147 Heathgate Resources Pty Ltd, Beverley Uranium Mine – Environmental Management and Monitoring Plan, 2000, p 29.

Injection well I-395 – site of 5 May 2002 spill

3.159 The FoE has expressed a general concern about the uranium mining industry's 'failure to rehabilitate'.[148] The ACF claims that the operators of the Beverley mine were the first Australian mining industry group in the modern era not required to pursue either subterranean or surface rehabilitation. As a result, it argues, serious environmental problems have ensued, especially in the areas of liquid waste disposal and groundwater rehabilitation.[149]

3.160 In response, Heathgate Resources argues that it lodged a bond of more than $1 million to meet rehabilitation costs and that the mining lease is being progressively rehabilitated.[150]

3.161 The FoE has stated that Heathgate should be required to rehabilitate groundwater.[151] The ACF was also highly critical of the fact that Heathgate Resources is under no obligation to rehabilitate the aquifers that will be affected by the mining operations. In this regard, it stated:

> The Beverley uranium mine is the first mine in the modern era in Australia to be granted approvals to not require rehabilitation of the main impacts of

148 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 285.

149 Australian Conservation Foundation, *Submission No. 74,* p. 30

150 Heathgate Resources, *Submission No. 70a,* p. 18

151 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 282.

> the mining operations on the environment. There is no requirement to rehabilitate ISL impacts on groundwater. In addition the approvals allow discharge of all liquid mine wastes into a near surface aquifer of acidic, radioactive and heavy metal waste discharge on groundwater quality and composition.
>
> Federal Minister for Environment did not recognise any inherent or intrinsic value to this part of the Australian environment. Nor did he recognise and value traditional owners cultural right and expectation to protect their country including groundwater. Approvals were given on economic grounds alone.
>
> … These two adverse precedents of ISL practices at Beverley impose a liquid pollution plume moving through groundwater with potential to impact on and pollute any connected aquifer. The Beverley aquifer is adjoined by a major fault line and the Great Artesian Basin is only some 100 metres below.[152]

3.162 The company dismisses the need for the groundwater to be rehabilitated arguing that the mining waste that is discharged into the relevant aquifers 'represents material that originated in the aquifer'.[153] Heathgate Resources also argues that ISL mines in the US also discharge their mine wastes into aquifers of 'comparable standards' to the Beverley aquifer.[154]

3.163 Environment Australia referred to overseas evidence of natural attenuation of groundwater plumes following ISL mining. Similarly, Heathgate Resources cites the alkaline ISL example of Nine Mile Lake, near Casper, Wyoming, USA, to illustrate successful post-trial aquifer rehabilitation, and refers also to post-mine regeneration in Konigstein, Germany, where rehabilitation is taking place with the assistance of a Heathgate Resources affiliate company.[155]

3.164 However, several stakeholders, including Dr Matthews, raised concerns about the persuasiveness of the evidence regarding rehabilitation of groundwater following ISL mining.[156] Most evidence concerning rehabilitation of affected aquifers relates to alkaline ISL mining. The ACF confirms this, asserting even more strongly that no evidence exists of successful aquifer rehabilitation after acid ISL mining or acid ISL mining trials.[157]

---

152 Australian Conservation Foundation, *Submission 74*, p 30.

153 Heathgate Resources Pty Ltd, *Submission 70a*, p 18.

154 Heathgate Resources Pty Ltd, *Submission 70a*, p 18.

155 Heathgate Resources Pty Ltd, *Submission 70a*, p 70.

156 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, pp 176-177.

157 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 199-200.

3.165 Owing to the absence of evidence concerning the rehabilitation of aquifers polluted with ISL mine wastes, Dr Matthews advocated the evaporation of liquid wastes and the management of the resulting solid wastes. In this regard, Dr Matthews stated:

> Unlike most mining projects in developed countries where liquid wastes are evaporated and the resulting solid wastes are responsibly managed, the liquid wastes at Beverley are disposed of by pumping back into adjoining and mined-out aquifers. This is a practice that should be rejected by responsible governments.
>
> An environmentally responsible government would:
>
> > Not allow discharge of liquid wastes into the underground water but would evaporate the liquid wastes and properly manage the solid residue.
> >
> > Require restoration of the aquifer to its original quality by flushing with clean water, evaporating the polluted water and properly managing the solid residue.[158]

3.166 Heathgate Resources disagrees with Dr Matthews' position. It argues that it is acceptable to dispose of mining waste in the aquifers because the material being disposed of derived from the aquifer. The company also rejects Dr Matthew's assertion that the Beverley aquifer should be restored to its original quality by flushing it with clean water, evaporating the polluted water and more effectively managing solid residue. Heathgate Resources argues that 'using clean water to restore an unusable aquifer to its unusable pre-mining condition represents an unjustified waste of the very resource Dr Matthews wishes to preserve'.[159]

3.167 The views of Aboriginal stakeholders toward rehabilitation were expressed by Ms Jillian Marsh, who stated that:

> On the point of rehabilitation: for us as Aboriginal people, culturally, rehabilitation really has a limited application. For us, once something has been disturbed and damaged or once something like a uranium orebody has been extracted, that is it—it is gone. It has been removed, it has been disturbed, it has been damaged and it is not whole anymore, so rehabilitation is something that cannot be done.[160]

158 Dr Matthews, *Submission 16a*, p 5.

159 Heathgate Resources Pty Ltd, *Submission 70a*, p 38; Dr Matthews, *Submission 16*, p 20.

160 Ms Marsh, *Committee Hansard*, Adelaide, 4 October 2002, p 351.

Research

Future directions

3.168 Controversy continues regarding the quantity and quality of research undertaken by Heathgate Resources and other interested groups and individuals into acid ISL's appropriateness as a uranium extraction technique, both in general and specifically at Beverley. Certainly, Heathgate Resources and several concerned organisations conducted extensive hydrological research and testing at the Beverley site prior to, and since, the granting of a mining lease in April 1999. Three principal issues have emerged relating to research: the adequacy of data collection and the maintenance of records; the nature and accuracy of key modelling exercises; and the expertise of authors and the objectivity of their studies of the acid ISL method.

Data collection and record-keeping

3.169 The FoE is concerned with the questions of data collection and record-keeping as they affect mine workers' potential exposure to radiation. As it argues in its submission:

> Current practice in assessment of human exposure continues to use 'risk' analysis with 'acceptable' worker and accident doses above general population. There remains no government collection of records to assess long term health impacts on workers. Given the health impacts now recognised with asbestos mining long term health assessment should be a public duty of care … health records should be maintained independently to assess cumulative effects on workers.[161]

Modelling

3.170 More sustained research is needed to determine the accuracy of present modelling as a tool for evaluating the environmental implications of acid ISL mining. The contrasting approaches employed to assess natural attenuation, for example, are still the subject of considerable debate. Dr Matthews questions the modelling used by Heathgate Resources to justify its adherence to the principle of natural attenuation, wherein the liquid waste residue left from the ISL process supposedly returns to its solid underground state within upwards of ten years. In fact, he brands the theory of natural attenuation 'a fraud'.[162]

3.171 Officers of Environment Australia took a cautious view with regards to modelling, calling the process 'satisfactory' while insisting on the need for further scientific inquiry.[163] Heathgate Resources, which has no such concerns, argues that

---

161 Friends of the Earth, Australia, *Submission 69*, pp 5-6.

162 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 167.

163 Mr Early, Mr Davies and Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, pp 310-13.

evidence from the Beverley FLTs and samples taken some two-and-half years after the trials confirm the presence of naturally occurring attenuation and, therefore, the accuracy of the modelling used by the company.[164]

Analysis of ISL mining

3.172 As discussed, FoE and several other environmental groups expressed considerable concern about the environmental impacts of ISL mining. There is concern that ISL mining has been allowed to occur when the safety of this procedure has not been satisfactorily proven.

3.173 Heathgate Resources rejects these criticisms, claiming the concerns of environment groups are based on flawed research.

3.174 There is clearly considerable disagreement amongst stakeholders about the validity of the research used to support their respective positions. The disagreement amongst experts and the problems associated with perceptions of bias can only be resolved through more active involvement of government in researching the environmental issues associated with uranium mining. Greater public access to materials concerning the operation of the mine and increased transparency in regulatory processes may also assist in bridging the gaps that have developed amongst members of the community.

164 Heathgate Resources Pty Ltd, *Submission 70a*, p 65.

Recommendation 24

The Committee recommends that a more comprehensive research effort be made based on better organised and more systematic information collection and greater rigour in analysing data. Such research should be undertaken both individually and collaboratively by mining companies, the responsible Commonwealth and South Australian agencies, and independently funded scientists, both in Australia and abroad.

Honeymoon Uranium Mine

Introduction

3.175 As is evident from the discussion in both Chapter 1 and above, the Beverley and Honeymoon uranium mines have much in common in relation to the approval and regulatory frameworks under which they operate as well as their use of the acid ISL extraction method. Having already addressed these general issues, the Committee focuses on issues and evidence relating specifically to the Honeymoon mine.

Location and geological overview

3.176 The Honeymoon Uranium Project comprises a number of exploration and mining tenements located on arid plains approximately 400 kilometres north-east of Adelaide and 75 kilometres north-west of Broken Hill, between the Olary Ranges and Lake Frome. Naturally occurring concentrations of uranium minerals lie in buried Tertiary-age river channel (palaeochannel) sediments in several parts of the project area including the Honeymoon and East Kalkaroo ore deposits. The uranium is present predominantly within coarse grained sands of the Basal Sands Aquifer. The palaeochannel, which is incised into rock 100-120 metres below the surface, consists of three interconnected aquifers (upper, middle and basal) with a depth of around 50 metres. The aquifer is covered by a layer of clay around 70 metres deep, known as the Namba Formation, which is itself overlaid by about 30 metres of sand and clay. The naturally occurring groundwater is of poor quality, with high total dissolved solids (TDS) of between 10,000 and 20,000 mg/litre as well as high concentrations of radionuclides.

Historical development

3.177 The operator of the Honeymoon project is Southern Cross Resources Australia Pty Ltd (SXR), which is a wholly owned subsidiary of a Canadian company, Southern Cross Resources Inc. SXR acquired the title to the majority of tenements in early 1997. Ore-grade uranium was discovered there in 1972, but early feasibility studies determined that the deposit was too small to be viably mined using contemporary open-cut or underground mining techniques. This situation altered with the development of the *in-situ* mining method and in 1982, following government approval of an Environmental Impact Assessment (EIS), a demonstration ISL operation at Honeymoon was established. Subsequent changes at both State and Commonwealth government levels signalled changed policy approaches to uranium

mining and in March 1983 the final Approval to Mine was deferred, and the following June the project was placed under 'care and maintenance'. Demonstration plant and equipment was also removed. However, SXR received a conditional approval to conduct a Field Leach Trial (FLT) in 1998 following a review of the Declaration of Environmental Factors (DEF).

3.178 As detailed below, between November 2001 and February 2002, SXR obtained several key approvals necessary to commence operations. It also signed agreements with two native title claimant groups. According to Mr Thomas Hunter, Project Executive with SXR:

> Since that time, we have been undertaking engineering, financial and marketing work of various kinds, with the aim of formally committing to the project early in the new year.
>
> There have been a number of factors that have made that process a bit more protracted than we ideally wanted—namely, a uranium price which has stalled just below the $US10 a pound level and the implosion of the equity markets in North America—but we are presently moving down that track on those three fronts. We have recently organised our bank financing side and we are moving ahead on the equity side.[165]

165 Mr Hunter, *Committee Hansard*, Adelaide, 4 October 2002, pp 222-223.

Honeymoon Trial processing plant.

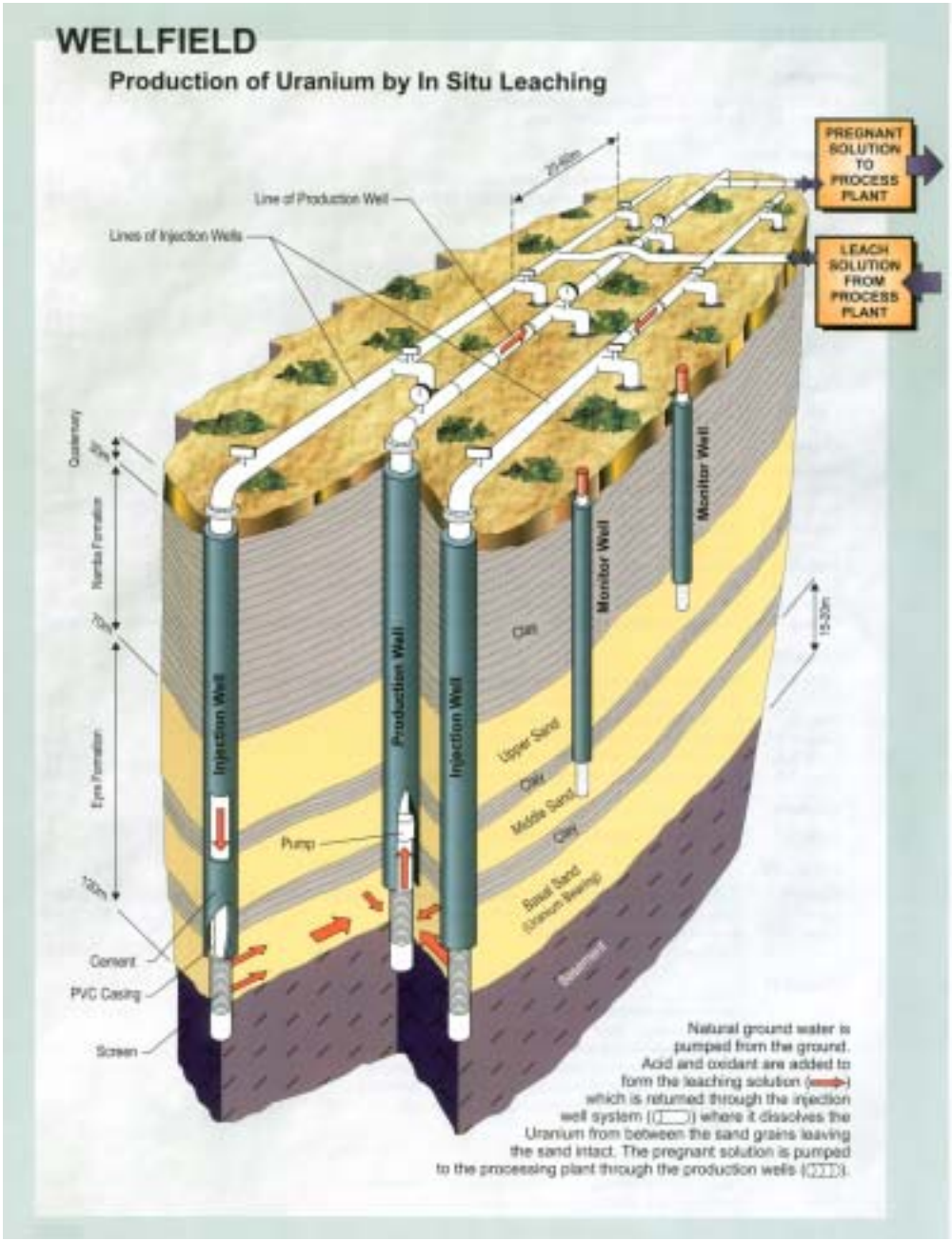
Methods of extraction

3.179 The acid ISL extraction technique used at Honeymoon is described in detail in the section above entitled *The ISL technique*. The process used at Honeymoon differs from that at Beverley only in the exchange process used. Use of ISL at Honeymoon, as at Beverley, has attracted considerable criticism, focusing on four points:

- the underground disposal of mining wastes;
- the resulting danger of widespread pollution of groundwater through interconnected aquifers (based on differing assessments over the connectivity of the aquifers);
- disagreement over the effectiveness of the natural attenuation process; and
- the use of acid ISL (instead of alkaline).

3.180 These issues are essentially common to both Beverley and Honeymoon and, having already been discussed in detail above, will not be repeated here. However, some issues specific to Honeymoon have been raised.

Figure 3.2 **Schematic wellfield showing production lines and stratigraphy.**



Source: Southern Cross Resources Pty Ltd.

3.181 A key area of disagreement that is specific to the Honeymoon site is the nature of the aquifer and the potential for the reinjected mine wastes to travel beyond the basal aquifer into either the middle or upper layers, or beyond the aquifer itself. Many submitters have, of course, raised general concerns about the danger of groundwater contamination at both the Beverley and the Honeymoon sites.

3.182 SXR representatives argue that there is minimal danger of this occurring, based on the knowledge of the aquifer system built up during the exploration and approval processes. With regard to movement between the aquifer layers, Dr Bush explained:

> The geological formation at Honeymoon, as explained in the environmental impact statement … is a series of sand layers and clay layers. The clay layers are not continuous; they are discontinuous. They pinch and swell. In other words, they vary in thickness through their extent. That thickness is zero in some locations and from five to 10 metres in other locations. There is not a single lens or layer of clay above the sand. They are numerous. They will overlap one another. They are interwoven. It is a very complex system. There is not a single clay layer. It is likely that from time to time there will be some vertical movement of leach solution which will be detected in the middle aquifer—as was the case with that particular incident in the field leach trial. But, … the opportunity for vertical movement is restricted by a number of factors, including the decreasing grain size of the sand as one goes vertically within each of the three sand layers and also the decreasing average sand size going from the bottom sand layer - the basal sand - through to the top sand. So the rate of movement of solution in the basal sands is significantly higher than in the other two sands, and it is significantly higher in a lateral direction than in a vertical direction. So there will be the odd occasion when you will get some solution appearing above some of these thin clay layers, where it is pinched out.[166]

3.183 He continues:

> … on completion of leaching operations, all those pressures would be relieved, because you would no longer be injecting solution. So there would be no pressure in the system to encourage those solutions to migrate into the middle aquifer. The second point is that the basal aquifer and our leach solutions have a higher concentration of dissolved material—in other words, we are looking at 15,000 to 20,000 milligrams per litre as opposed to 12,000 to 15,000 milligrams per litre in the middle aquifer—and so the solution in the basal aquifer is more dense than the solution in the ground water in the middle aquifer. So the more dense ground water is going to stay in the bottom and, unless the laws of physics change, there is no way that that dense solution would of its own accord decide to move, without some driving force, into the middle aquifer.[167]

3.184 The potential for contaminated water to leak out of the basal aquifer and into the more widespread groundwater is also a source of concern to many of those making submissions to the inquiry. Mr David Noonan, representing the ACF, argued that Honeymoon is not a confined aquifer, as water both enters and leaves the area at a rate of some 15 to 20 metres per year, and uncertainty remains over the exact location of these recharge and discharge areas:

> We understand that the discharge area is said to be underground near Lake Frome, to the east side of Lake Frome, into what is said to be unconsolidated sands underground. We understand the company does not

166 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 225.

167 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 237.

> know exactly where the discharge point is for that aquifer. We understand the company does not know exactly where the recharge areas are for that aquifer. … but the company cannot map for you where they are.[168]

3.185 The representatives of SXR reject these criticisms. Dr Bush described the Honeymoon aquifer in these terms:

> … the aquifer is confined vertically by the 70 metres of clay that is above the aquifer and the impervious basement that is below the aquifer. These contact on the side. It was one of the prime focuses of the work last year to establish that there was a good seal along the sides of the aquifer. It has always been acknowledged that there was a degree of recharge into the system somewhere to the south of Honeymoon and that the aquifer flows at 12 to 15 metres per year in an overall north-south direction—although at Honeymoon it actually flows north-east to south-west, because of a dog leg in the aquifer. It is recognised that this palaeo-channel continues to the north and dissipates into a blanket sand. In other words, it is like a giant delta that was formed, with the sands discharging out over a lake floor or bed or something like that in the time it was formed. There is a very slow movement of water through the aquifer. It is correct to say that we do not know the precise recharge location. It is likely that there are numerous small locations where there is an inflow of water on the occasions when it rains. They have never been detected. There is no single identifiable location, to the best of our knowledge, where it discharges into the blanket sands away to the north of the site.[169]

3.186 The need to clarify the geology of the aquifer, and the extent of confinement was a major motivation for the additional research work required in 2001 by Senator Hill, the then Minister for the Environment. Generally, Dr Bush is confident that the material will stay within the local confines of the mineral leases for at least 100 years.[170] Mr Tim Kahn, of Environment Australia (EA), observed in relation to SXR's and earlier EA evidence to the Committee on this subject:

> We were giving the worst possible scenario that it would move along with the flows. The evidence is that it is more likely not to move at that speed. As well as physical, natural attenuation—physical dilution—there are also chemical processes which tend to lock up the system, slow down the flow and also precipitate some of the elements that might be of concern—the heavy metals and so on.[171]

Recommendation 25

168 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 197.

169 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 231.

170 Mr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 232.

171 Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, p 312.

Given the seriousness of potential risks to the environment, the Committee recommends that mining operations at Honeymoon not proceed unless and until conclusive evidence can be presented demonstrating that the relevant aquifer is isolated.

The approval process

3.187 Approval for the Honeymoon mine, as outlined in Chapter 1, required a number of approvals from both the South Australian and Commonwealth governments which are set out below.[172]

Table 3.2: **Overview of the Honeymoon Uranium Project Approvals Process**

	Action	**Date**
1.	SA Minister for Mines and Energy directed that an EIS be prepared.	25 June 1997
2.	The Commonwealth Minister for the Environment and Heritage determined that an EIS be undertaken jointly, with South Australia taking the lead role. [Guidelines prepared jointly by Cth and SA governments, based on the requirements of the EPIP Act and the Development Act SA.]	2 August 1997
3.	Draft EIS Guidelines released for public comment.	7 October–3 November 1997
4.	Final EIS Guidelines released.	August 1998
5.	EIS released for public review by SXR.	7 June–2 August 2000
6.	Public meetings held at Cockburn and Adelaide.	5–6 July 2000
7.	EIS; Public Comments on the EIS; and Response and Supplement to the EIS, provided to the Commonwealth Minister for the Environment and Heritage.	20 November 2000
8.	Assessment Report on the EIS released by	January 2001

172 For further detail, see Environment Australia, *Addendum to the Assessment Report on the EIS*, pp 1-3.

	Environment Australia.	
9.	Commonwealth Minister for the Environment and Heritage indicated that additional information was required.	1 February 2001
10.	Terms of Reference for Additional Evaluation of Aquifer released by the Commonwealth Minister.	22 February 2001
11.	Honeymoon Uranium Project, Further Characterisation of the Yarramba Palaeochannel Report released by SXR (Summarising three technical reports commissioned by SXR.)	July 2001
12.	EA commissioned 3 expert assessments of the above reports, by the Australian Geological Survey Organisation (AGSO), the Bureau of Rural Sciences (BRS), and Dr Mark Pirlo.	2001
13.	Addendum to the Assessment Report on the EIS released by EA.	November 2001
14.	Minister for the Environment and Heritage announced his approval of the EIS.	21 November 2001
15.	Minister for Industry, Science and Resources issued an Export Licence for the project. Environmental Requirements are contained in Schedule A.	24 November 2001
16.	Mining Lease for Honeymoon approved by the South Australian Minister for Minerals and Energy. Environmental Requirements are contained in the First and Second Schedules.	20 February 2002

3.188 The approval process for the Honeymoon operation has been criticised on the following grounds:

- the standards set by the Commonwealth and South Australian governments were too low, and are predicated upon a concept of mining operations that will cause routine environmental damage;
- key information was not made available to the public;
- Environment Australia relied on the assessment of a scientist with a pro-uranium bias;
- the conclusions drawn from the EIS process were based on flawed computer modelling, leading to inaccurate and uncertain conclusions in relation to the movement of ground water within the aquifers and the associated rates of attenuation; and
- account was not taken of data from the original 1982 test site.

3.189 In evidence to the Committee, SXR disputed these claims. Mr Hunter emphasised the high standards attained and the 'technical and procedural zeal' displayed by the Commonwealth and State agencies in charge of the EIS process.[173] To the extent that criticisms were directed at the use of ISL, he also claimed there was increasing international acceptance of, and growing interest in, the ISL technique.[174]

Basic standards

3.190 A basic issue underpinning the criticisms of the approval process is the question of different definitions of what constitutes acceptable damage to the natural environment. The ACF queried in particular the approval philosophy governing the discharge of liquid mine wastes and the failure to insist on the rehabilitation of aquifers:

> ACF considers that Commonwealth EIS approvals granted to ISL operations are characterised by unacceptable environmental standards and set adverse precedents for environmental standards in mining in Australia in general.[175]

3.191 It further stressed that:

> Through the Honeymoon EIS process EA had put in place approvals and standards for acid ISL operations characterised by routine radioactive pollution of connected aquifers as well as the mining aquifer.[176]

Dr Matthews stated that channeling the waste into the aquifer, even if that waste remains immobile, still sacrifices the aquifer.[177]

---

173 Mr Hunter, *Committee Hansard*, Adelaide, 4 October 2002, p 221.

174 Mr Hunter, *Committee Hansard*, Adelaide, 4 October 2002, pp 232-233.

175 Australian Conservation Foundation, *Submission 74*, p 30.

176 Australian Conservation Foundation, *Submission 74*, p 31.

177 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 173.

3.192 Mr Bruce Thompson, of the Friends of the Earth, Australia (FoE) stated:

> We believe that recent approvals tend to ignore environmental impacts or assume that this is a reasonable consequence, given the perceived benefits of mining. However, we believe that environmental protection is not just a matter of principle; the impacts of the processes have consequences for communities in these regions and may prevent utilisation of resources, notably water supply, in the future. For example, about 10 kilometres from the Honeymoon mine … there is … water [which] could be used [for watering stock] in the future; it is actually being used at the moment. If there is increased accumulation of radioactive material due to the process in those connected aquifers, that will clearly prevent that water being used.[178]

3.193 These arguments led to calls for the company to be required to lodge a bond, with repayment contingent on the rehabilitation of groundwater; the prohibition of liquid disposal of the mine waste; and a reappraisal of the project under the EPBC Act.[179]

3.194 Environment Australia's view on this issue was presented by Mr Kahn, who argued that:

> The important thing is to protect the environment, and the most important parts of the environment are the biosphere—that is, the living parts of the environment. It becomes a philosophical debate as to whether you consider ground water to be a sacrosanct thing that you can never touch or do anything with, or whether it is something that is already unusable in its natural state so that when you have finished mining it goes back to that state and after a number of years will go back to a very similar state to the original ground water.[180]

Failure to disclose key information in the EIS

3.195 Several submitters criticised the paucity of relevant information in the EIS which made it difficult for the public to make an informed decision on the project. Dr Matthews, for example, told the Committee that a major deficiency of the Honeymoon EIS process was 'the absence of information on radioactivity [which] … should be central to any EIS on uranium mining', since the mines deal, not only with uranium, but with other radioactive materials such as radium and radon gas that are included with the uranium.[181]

3.196 Mr Noonan, representing the ACF, alleged that:

---

178 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 280.

179 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, pp 285-286. See also for example, Mr Birch, *Submission 31*, p 2.

180 Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, p 307.

181 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 167. See also Dr Matthews, *Submission 16A*, p 6.

> … the South Australian regulators and the federal regulators made their own decisions to keep from the public, to keep secret, the evidence of the substantial leaks that occurred at the Honeymoon trial. They were kept secret through the EIS process.[182]

As a result:

> … the public were prevented from the knowledge of what had gone wrong at the Honeymoon mine with the surface leaks and therefore could not exercise an informed view on environmental protection at that site.[183]

3.197 SXR refutes this arguing that, in relation to the last incident, the matter was reported to authorities as required and included in the Honeymoon EIS. SXR stated:

> A change in ground water chemistry was observed in a monitor well adjacent to an area of leaching. The established recovery plan was followed to remove leach solution from the area and to restore the ground water baseline chemistry.[184]

3.198 FoE also claimed that the approval process 'fundamentally failed to openly assess one of the key environmental issues–groundwater impact.'[185] In reply, SXR refuted this claim, arguing that the EIS supplement:

> …contained additional detailed analyses of ground water samples associated with the disposal system.
>
> The additional studies conducted in 2001 comprising stratigraphic and test pumping field tests were aimed at determining the hydraulic boundaries of the palaeochannel (Water Studies 2001a). Relevant ground water data were contained in the reports prepared and made available to the public. There was no detailed analysis of the basal ground water pumped in these tests.[186]

Evaluation of the 1982 test site data

3.199 Conservation groups also criticised the EIS for not taking into consideration data on the environmental effects of the original test site at Honeymoon in 1982. Both regulators and SXR argued that this was not possible for two reasons. First, according to EA's Mr Davies and Mr Kahn, the relevant information could not be located. Secondly, Environment Australia argued that even if this data had been found, it would only be useful if they 'had known exactly what fluids were being injected and

---

182 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 187.

183 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 188.

184 Southern Cross Resources Australia Pty Ltd, Honeymoon EIS, Appendix 10, p A10-4.

185 Friends of the Earth, Australia, *Submission 69*, Attachment: Undermining Environment Protection, p 6.

186 Southern Cross Resources Australia Pty Ltd, *Submission 28b*, p 4.

what the background levels were at that time in the past'.[187] Dr Bush stated that SXR had:

> … only been involved in the project since 1997. We had no association with any work carried out in 1983[188]. … We had no history on exactly what was in those wells nor on what might be found as a result of sampling those wells. So we have never gone back into those wells, because we do not know what the meaning of the data would be.[189]

Independence of research

3.200 In its submission, the FoE also sought to discredit research done by Dr Mark Pirlo, describing him as a pro-uranium PhD student with limited industry experience and no peer-reviewed and published scientific work, and whose academic study was facilitated by SXR. As such, the FoE argued, 'there are serious issues over the independence of his work'.[190]

3.201 Dr Pirlo provided a detailed rebuttal of this statement. Addressing these claims, he argued that he was commissioned by Environment Australia to do the work because he had no links to the industry. He also stated that SXR's facilitation of his work was limited to allowing access to the mine site to collect groundwater samples from the monitoring bores, permitting him to gather limited analytical data from various ISL process points, and accommodating him on site for four nights. This activity, which is usual for doctoral candidates, took place during his doctoral research. Dr Pirlo stresses that the sources of all data are clearly acknowledged and:

> At no stage have I ever received any money, gifts or favours from Southern Cross Resources.[191]

3.202 He also referred to the publication of several of his refereed papers.[192]

3.203 Dr Pirlo's statements are supported by Southern Cross Resources.[193]

---

187 Mr Davies and Mr Kahn, *Committee Hansard*, Canberra, 18 October 2002, pp 308-10.

188 Work carried out in 1982 as clarified by Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 225.

189 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, pp 225-226.

190 Friends of the Earth, Australia, *Submission 69*, Attachment A, p 5.

191 Dr Pirlo, *Submission 85*, p 2

192 Dr Pirlo, *Submission 85*, p 2.

193 Southern Cross Resources Australia Pty Ltd, *Submission 28a*, p 9.

The adequacy of computer modelling

3.204 Environmental groups also expressed doubts over the reliability of the computer modeling done to predict the effects of the mine waste on the aquifer, and the rate at which the groundwater moves through the aquifer.

3.205 Dr Matthews criticised the thermodynamic modeling process, which he asserted cannot reveal the rate at which the attenuation will occur:

> The results of the modelling are highly suspect. … I suspect that what was put into these models—although it has not been available for the public to look at what was put in—was rubbish and we have got rubbish out.[194]

3.206 This is disputed by Dr Pirlo, who submitted that the modeling methods 'were adequately discussed in the various research reports and/or referenced for discussion on other sources'.[195]

Final approval for Honeymoon to operate

3.207 At the time of the Committee's public hearing in Adelaide in October 2002, the approval process for the Honeymoon mine was not yet complete, because a Commercial Uranium Mining and Milling Licence under the *Radiation Protection and Control Act 1982* was still required in order to enable commercial operations to commence. As the ACF stated:

> The company is actually legally prohibited from recovering any uranium from the Honeymoon deposits. … they will now have to apply for that licence to a new Labor government in South Australia.[196]

3.208 SXR also clarified that additional approvals are required before commercial operations can commence. In this regard, it stated that:

> A licence to mine radioactive material was applied for prior to the field leach trial commencement. It was issued in February 1998. That covered the operation of the field leach trial and the production and handling of uranium yellowcake as a result of that trial. These licences have a duration of 12 months and so a new licence was applied for in 1999 and subsequently in the year 2000 while we were continuing that work. For 2001, a modified licence was applied for, because we had finished the field leach trial but we were still handling some uranium yellowcake material and drumming the final amount of product that was produced during that trial.

---

194 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 172. See also Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, pp 286-287.

195 Dr Pirlo, *Submission 85*, p 3.

196 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 182.

> We currently have a licence to cover the work that we are doing at the moment and that we intend to do during this 12-month period, which is the continuation of environmental and radiation monitoring. It is quite correct that that licence does not allow us to produce any uranium. We have no intention of producing any uranium during this period. We also did not apply for a licence to produce any uranium during this period, because the field leach trial has been completed.
>
> We are not in a position—and we certainly were not in a position last year—to apply for a commercial licence to mine and mill radioactive materials, because we have not finalised our engineering work. We have not finalised our monitoring and management programs, which are required as part of the submission for that licence. That work will be done at the appropriate time, and the company will be applying for a commercial licence when it is appropriate. So that is where we stand with licences at the moment.[197]

3.209 The ACF argued that the Labor Government of South Australia was unlikely to grant the necessary licence to enable the commercial operations to commence lawfully. It stated:

> The new Labor government as well as the federal ALP platform, which applies to the ALP across Australia, states they shall oppose the development of any new uranium mines ... We think it is absolutely clear policy of the new SA Labor government that they will not support the establishment or development of new uranium mines.[198]

3.210 Mr Hunter, however, informed the Committee that if the commercial operating licence were refused, SXR would explore legal options to appeal the decision. SXR already possessed the three key licences:

> The three important approvals that the project required for commercial status were the Commonwealth environmental approval; the Commonwealth export licence; and the issuing of the state mining lease. I understand that rejection on unreasonable grounds of any of our licences or plans—in other words, rejection on a political basis—allows us to look at some legal options and appeal relevant decisions. Certainly, after having expended some five years and more than $Can30 million to reach this stage, the company would be expected to take the full range of legal options open to us.[199]

3.211 The Committee notes that there appears to have been inadequacies in the EIS process. One of the more serious flaws appears to have been the failure to include information on leaks, spills and other incidents that occurred during the preliminary stages of the Honeymoon project in the EIS. This amounts to a significant flaw in the

---

197 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 223.

198 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 182.

199 Mr Hunter, *Committee Hansard*, Adelaide, 4 October 2002, p 223.

EIS, as it should have contained all relevant information to enable the public to make an informed judgement on the risks and likely environmental impacts of the proposed development. By failing to disclose this information in the EIS, SXR has jeopardised the integrity of the environmental assessment and approval process and undermined public confidence in the project.

3.212 The Committee is not in a position to make a judgment in relation to the reliability of the modelling processes that were used.

Honeymoon wellfield as used during the field leach trial

Monitoring

3.213 The monitoring program at Honeymoon is not as extensive as that at Beverley because the mine is not currently operational. Exact details of the monitoring regime for the Honeymoon mine will be set out in the Environmental Management and Monitoring Plan (EMMP). This is not expected to be finalised until the mine begins operating. However, the general principles underlying monitoring are contained in the EIS.[200]

3.214 In the meantime, SXR is required to submit quarterly and annual workplace and environmental monitoring reports in accordance with the Declaration of Environmental Factors and Radiation Licence Supporting Documentation.

200 Southern Cross Resources Australia Pty Ltd, Honeymoon EIS, pp. 12-21.

3.215 Workplace and Environmental Radiation monitoring was carried out during the field leach trial (FLT).[201] This monitoring program will recommence as soon as Honeymoon becomes active.

3.216 Workplace Radiation Monitoring includes:

- Gamma surveys;
- Radon decay product measurements
- Long lived Alpha radiation in dusts; and
- Alpha surface contamination.

3.217 Environmental Radiation Monitoring includes:

- Releases of leach solution
- Long lived Alpha radiation dusts
- Radionuclides in dusts
- Continuous Radon monitoring
- Wellfield groundwater monitoring
- Operation of disposal well
- Retention pond monitoring
- Surface water run off monitoring
- Regional bore water monitoring

3.218 SXR carries out radiation monitoring similar to that described above in its current care and maintenance status, and provides quarterly and annual reports to the regulators.

3.219 The monitoring undertaken for the Field Leach Trial attracted criticism from the FoE:

> Monitoring in general remains periodic rather than continuous and does not cover the spectrum of potential radiological exposures/release. The location of monitoring stations in most cases is not sufficient to assess intermittent and accumulative impacts.[202]

3.220 Submitter Mr Adam Beeson noted events which took place during a 1998 tour of the Honeymoon uranium mine site:

> During the tour I asked the guide (who was the site manager I believe) about the effects of in-situ leaching on the ground water of the area. I asked about

---

201 Southern Cross Resources Australia Pty Ltd, Honeymoon Uranium Project – Radiation and Environmental Monitoring Annual Report, January – December 2000.

202 Friends of the Earth, Australia, *Submission 69*, p 2.

> the potential impacts tens or hundreds of kilometres from the site. The response was that he didn't know and could not know because such monitoring was not undertaken. I have paraphrased this conversation. Video and audio tapes were made of the entire tour. Should the committee be interested in seeing it I am sure I can contact those people in possession of them.
>
> In relation to the terms of reference, a monitoring system which elicits such a response is inadequate.[203]

3.221 SXR made the following comments concerning this issue.

> Work carried out in 1982 demonstrated that the ground water in the Yarramba Palaeochannel moved at a rate of approximately 12 m/y (Southern Cross Resources 2000a). Consequently, it was necessary to determine the impacts more locally than at the distances asked. Subsequent studies (Coffey 1999, Southern Cross Resources 2000a, Water Studies 2001b) demonstrated that there would be little effect on the ground water less than 2000m from the operation after 100 years under a worst case scenario. Clearly, monitoring of the ground water tens or hundreds of kilometres from Honeymoon would show no effect.[204]

Reporting, consultation and communication

3.222 The reporting, consultation, and communication regime for the Honeymoon mine was described in general terms in Chapter 1. SXR is required to provide the following reports: [205]

- Annual Environmental Report (to the Mines Minister, as required by the EMMP);
- Annual Environmental Report (to the Minister for Environment and Conservation, as required by the Licence to Mine or Mill Radioactive Ores (1987));
- Quarterly Reports (to the Chief Inspector of Mines, covering groundwater monitoring and management of hazardous chemicals); and
- Quarterly Reports (to the Manager, Radiation Protection Branch, Environment Protection Authority (EPA), containing occupational and environmental radiation monitoring data).

3.223 SXR also participates in ISL Operators' Meetings, which are held quarterly to discuss the results of environmental and radiological monitoring, and attended by company representatives and representatives of the South Australian (PIRSA) and Commonwealth agencies.

---

203 Mr Beeson, *Submission 43*, p 2.

204 Southern Cross Resources Australia Pty Ltd, *Submission 28a*, p 3.

205 South Australian Government, *Submission 84*, Appendix 2.

3.224 If the mine becomes operational, SXR will be obliged under the terms of the EMMP, to establish the Honeymoon Environmental Consultative Committee (HECC), which will meet twice yearly 'to consider environmental data and discuss relevant issues'.[206] This group will 'include representatives of local stakeholders and key local organisations'.[207] Its work is additional to a general commitment to 'maintain and improve relationships with pastoral, local and wider community' which will be achieved through initiatives like the establishment of a visitors centre at Honeymoon.[208]

Criticisms of accountability regime

3.225 Environmental groups have argued that the accountability of the Honeymoon mine is limited by the lack of accessible information. According to the ACF:

> … lack of public availability of a range of key documentation on ISL operations seriously constrains an informed assessment of the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations at both State and Commonwealth levels.[209]

3.226 A common view expressed in submissions is the need for greater transparency and independence of the regulatory regime.[210] Criticisms focused on the unavailability of key regulatory documents; secrecy provisions in South Australian legislation, and claims of commercial-in-confidence.

3.227 According to the ACF, while the licences and associated ERs for the mine are public documents, the detailed plans that are required (for example, the EMMP) are not, nor are the resulting mandated reports. The ACF argues that it should be a fundamental Commonwealth responsibility to ensure that all regulatory documentation is available for full public scrutiny.[211] The ACF also seeks the release of several documents dealing with groundwater monitoring and aquifer studies, including:

- Honeymoon Uranium Project - Groundwater Flow and Quality Monitoring (July 2001);
- Honeymoon Uranium Project - Further Characterisation of Yarramba Palaeochannel (July 2001);
- Radiation and Environmental Monitoring Annual Reports (1998 to 2000); and

---

206 South Australian Government, *Submission 84*, Appendix 2, p 2.

207 Southern Cross Resources Australia Pty Ltd, Honeymoon EIS, pp 12-13.

208 Southern Cross Resources Australia Pty Ltd, Honeymoon Environmental Impact Statement, pp 12-25.

209 Australian Conservation Foundation, *Submission 74*, p 18.

210 Mr Browning, *Submission 54*; People for Nuclear Disarmament, *Submission 57*, p 4.

211 Australian Conservation Foundation, *Submission 74*, p 35.

- Radiation and Environmental Monitoring Quarterly Reports (July-September 1999, January-March 2000 and April-June 2000).[212]

3.228 The ACF singled out for special attention the secrecy provisions in the relevant South Australian legislation that exempt ISL uranium mining documentation from public release, notably, section 19 of the *Radiation Protection and Control Act 1982* (RPC Act) and section 9 of the *Mine Works and Inspection Act 1920*. Referring to the provisions of the RPC Act, Mr Noonan representing the ACF, stressed that:

> … all uranium mining operations and the reports and the plans under that Act are kept secret due to the secrecy provision of that act. In comparison, other mining operations in South Australia are not in any way covered by any such secrecy provision. So in the mining industry there is a unique secrecy in South Australia given to the uranium mining industry.[213]

3.229 The FoE also points out that the recent Bachmann *Report of Independent Review of Reporting Procedures for the SA Uranium Mining Industry* (August 2002) recommended changes to the Act:

> *Recommendation 2*
>
> *In order to allow the release of information about incidents which may cause or threaten to cause serious or material environmental harm or risks to the public or employees, the Government should revise and appropriately amend the secrecy/confidentiality etc. clauses in the legislation referred to in Appendix B …*
>
> This recommendation came following public controversy over undisclosed spills and accidents at Beverley, Honeymoon and Roxby. To date there have been no moves to repeal this clause in the Indenture Act.
>
> Fulfilment of basic public relations obligations does not equate with 'leadership of industry' in transforming 'a culture that wishes to hide something'.[214]

3.230 The Committee notes that the new South Australian Labor Government has introduced amendments to rectify this,[215] which will replace the secrecy clause in the RPC Act with a standard confidentiality provision related to trade processes or financial information.

3.231 Mr Noonan told the Committee:

---

212 Australian Conservation Foundation, *Submission 74*, p 19.

213 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 198.

214 Friends of the Earth, Australia, *Submission 69a*, p 2.

215 These reforms are contained in the Statutes Amendment (Environmental Protection) Bill 2002 (SA).

> … ground water monitoring and waste disposal reports have been contended for years to be commercially privileged, and radiation management plans for uranium mines and the radiation monitoring and the reporting under those management plans have been said to be secret under secrecy provisions of state acts.[216]

3.232 The ACF also points to the difficulties involved in gaining access to a range of documents under South Australian Freedom of Information legislation:

> For 2 years SXR and the SA government refused public release claiming *"commercial-in-confidence"*.
>
> In early 2002 ACF won an Appeal with the SA Ombudsman finding that the PIRSA refusals had not been properly based and rejecting claimed grounds of commercial-in-confidence in every case. PIRSA responded by introduced [sic] new claims of exemption for certain key reports on the ISL trial mines which included the evidence of the leaks. Citing "secrecy provisions" of the *Mine and Works Inspection Act 1920* and the *Radiation Protection and Control Act 1982* as over-riding the FOI Act 1991.
>
> In his final report dated 6 June 2002 on the ACF Appeal the Ombudsman Mr E Biganovsky states in regard to PIRSA that:
>
> **"It is not unreasonable to conclude from this that the agency appears to have adopted an anti-disclosure position with respect to the application from the outset."**[217]

3.233 Accordingly, the ACF calls for all documentation pertaining to ISL mining projects to be made subject to South Australian and Commonwealth Freedom of Information legislation.[218]

3.234 Neither SXR nor representatives of the mining industry accept these criticisms. According to Mr Hunter, of SXR:

> … it would certainly be Southern Cross's intention that we would put on our web site, or inform the public in some other way, basically all the information that was reported to government, as far as incidents or spills or whatever are concerned. We would put that on our own web site.[219]

---

216 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 179-180.

217 Australian Conservation Foundation, *Submission 74*, p 20. Emphases in original.

218 Australian Conservation Foundation, *Submission 74*, p 18.

219 Mr Hunter, *Committee Hansard*, Adelaide, 4 October 2002, pp 238-239.

3.235 Mr Richard Yeeles, of the South Australian Chamber of Mines and Energy (SACOME), after emphasising that the main reasons for non-disclosure are the privacy of individual health records and commercial-in-confidence,[220] stated that:

> … in my view, there is nothing kept from the public about radiation that would stop the public making an assessment about whether or not we operate safely.[221]

3.236 If SXR is prepared to put all relevant information concerning leaks and spills on its website, the question arises why it is reluctant to allow members of the public to have access to formal documents concerning these issues. If SXR's concerns are associated with privacy of individual health records and commercial-in-confidence, it seems reasonable that those aspects of the relevant documents that disclose this information could be omitted. In any case, it is difficult to envisage circumstances where documents concerning leaks and spills would contain information that is commercial-in-confidence.

3.237 The Committee stresses the fundamental importance of ensuring full accountability and transparency for the operations of the mine. It is necessary to maintain public confidence in both the mine and the regulatory process. Accordingly, the Committee supports the statements of the mine operators that they intend to ensure that all key information is available on the company website, as well as recent reforms to the secrecy provisions in the South Australian legislation. However, despite these initiatives, the Committee believes there is a need for the Commonwealth to play a more active role in ensuring all relevant information concerning the operation of the mine and the regulatory process is publicly available.

Response to incidents

3.238 For critics, the greatest indicator of the ineffectiveness of the regulatory regime is the series of incidents (leaks, spills and excursions) that occurred at the Honeymoon site during the trial.[222] According to the ACF, in 2002 PIRSA released a Spill Incident Summary listing the following incidents:

- on 19 February 1999, 1,000 litres of 'barren' solution was spilled in the plant area and 200 litres of acid injection fluid spilled over into the wellfield;
- on 7 May 1999, 360 litres of acid injection fluid spilled from the wellhead;
- on 3 October 1999, 9,600 litres of process fluid spilled into the plant area;
- on 4 July 2000, 2,000 litres of injection fluid spilled in the wellfield; and
- on 22 May 2000, 30,000 litres of basal groundwater spilled into the wellfield.

---

220 Mr Yeeles, *Committee Hansard*, Adelaide, 4 October 2002, p 214.

221 Mr Yeeles, *Committee Hansard*, Adelaide, 4 October 2002, p 214.

222 Australian Conservation Foundation, *Submission 74*, pp 20-21; Friends of the Earth, Australia, *Submission* 69, 'Spills and Leaks', p 9.

3.239 It was also submitted that an underground excursion of radioactive mining solution polluted a connected aquifer during the Honeymoon trials.[223] An FoE representative informed the Committee that:

> On 5 December 2001, only one week after receiving final government approval for the mine, Southern Cross Resources confirmed an asset excursion that occurred in 1999. The leach acid solution—a solution which is injected into a bottom aquifer at the mine site to dissolve uranium ore—escaped into an overlying middle aquifer.[224]
>
> … Friends of the Earth contend that the repeated spills, leaks and incidents and the failures of the principal environmental regulator, the Mines Department (now PIRSA) demonstrate that the long-term impacts of operations and incidents are not being taken seriously.[225]

3.240 The FoE also insists that the regulatory and investigatory response of PIRSA (and its predecessor) to incidents has not been adequate. They give as one example, the leak which occurred on 3 October 1999, which contained high radon gas:

> Spills of this material would have to involve short-term radon exposures which are extremely high due to degassing. Based on the available reports and media to date, there was no radon monitoring data or testing done … nor any post-spill estimate of potential radon exposure to workers and the environment.[226]

3.241 Mr Noonan referred to the delayed response by the Chief Inspector of Mines (CIM) to reports of leaks:

> We believe there is ample evidence of a lack of proper exercise of responsible management by the SA regulators. A good example is the office of the Chief Inspector of Mines. There was a major leak at the Honeymoon trial mine, for instance, in October 1999. It was a leak that I have referred to in my submission to you. It was a leak of 9,600 litres of what are called process fluids. This is the most concentrated fluid involved in acid in situ leach uranium mining. We understand it involved a quantity of uranium somewhere between 15 and 20 kilograms. The company lost control of that solution.[227]
>
> The Chief Inspector of Mines had the responsibility to assess what had gone on in that instance. It is evidenced in our submission that the Chief Inspector

---

223 Friends of the Earth, Australia, *Submission 69*, 'Spills and Leaks', p 9.

224 Mr Thompson, *Committee Hansard*, Canberra, 18 October 2002, p 280; Friends of the Earth, Australia, *Submission 69*, p 4.

225 Friends of the Earth, Australia, *Submission 69*, 'Spills and Leaks', p 4.

226 Friends of the Earth, Australia, *Submission 69*, 'Spills and Leaks', p 4.

227 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 202.

> of Mines visited the site to assess what had occurred at that leak but the visit was some six months after the event.[228]

3.242 The ACF recommends that all radioactive leaks be reported by the company and that the regulator be required to demonstrate its capacity to react in a timely manner to reports of leaks and spills:

> At present, none of the categories require any public report. We would think it should be an obligation … to have a full and public reporting of all radioactive leaks at [the] Beverley and Honeymoon sites, both surface leaks and ground water excursions and other underground leaks, and for that to be through a government-funded web site. It could be attached to the Environment Australia web site, for instance. They should have to immediately and publicly report the leaks, the type of leaks, the solutions involved, the proposed remediation measures and the impacts and the extent of the issue involved.[229]

And:

> … the regulator should have to be able to demonstrate that they are either making an immediate response or, for some other reason, that they do not have to. It almost happens in reverse in South Australia in that the company often does not have to report the leak to the regulator for some time. The regulator is not under any obligation to demonstrate to anyone else that they are meeting the appropriate scrutiny of what has gone wrong at the leak incident. The regulator is not required to make any public report of what had gone wrong.[230]

3.243 In addressing these deficiencies, the FoE emphasised the importance of a number of principles and procedures already applicable to Northern Territory uranium mines, which in its view should apply to incident reporting at all Australian mines - direct and immediate notification of leaks to the appropriate regulatory authority must occur where there exists a significant risk to ecosystem health; where people living or working in the area may be harmed; and where probable or actual concern is caused to Aboriginals or the broader public. The FoE argued that more specific reporting requirements, providing greater detail on leaks, must also be introduced.[231]

3.244 The current reporting arrangements at Honeymoon are in a state of flux, due to the mine not being operational (as a result the EMMP is not in place), and also because of the review of incident reporting procedures by Mr Hedley Bachmann.[232]

---

228 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 202; Australian Conservation Foundation, *Submission 74*, p 21.

229 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 189.

230 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, p 203.

231 Friends of the Earth, Australia, *Submission 69*, 'Spills and Leaks', p 5.

232 Southern Cross Resources Pty Ltd, *Submission 28a*, p 4.

Notwithstanding this situation, SXR representatives still reject many FoE and ACF criticisms on the grounds that the principles proposed by the FoE 'are already in place and have been operating since the start of the Field Leach Trials'.[233] The company also argues that the leaks were relatively minor in nature; that they caused no environmental damage, and that they were responded to adequately. On the subject of the May 2000 leak, Dr Bush stated:

> Southern Cross Resources was requested by the federal Minister for the Environment and Heritage to carry out additional hydrological test work last year to examine the boundaries of the aquifer. As part of this work, a number of test pumping runs were held. This involved pumping water out of a well which had been placed into the basal aquifer and depositing that water in excess of a kilometre away in another well, also placed in the basal aquifer. I should point out that this was some three to four kilometres east of where we were yesterday and it had no connection with or impact on, nor was it impacted on, by any of the work that had been done in the field leach trial. The water was being transferred at as high a rate as possible to maximise the draw-down effect on the aquifer. This rate was of the order of 30 to 35 litres per second. It was being pumped through what is known as 'lay flat' pipe, which is a composite, canvas type of pipe that can be flattened and rolled up for transport. At approximately 2 o'clock one morning a coupling on this line parted, and the ground water discharged onto the surface. The test was being monitored and readings were being taken around the clock. But, by the time this break in the line was detected, in excess of 30,000 litres of ground water had been discharged onto the surface.[234]
>
> … It was just natural ground water being pumped out of the basal aquifer.[235]

3.245 Dr Bush also made the following comments concerning the October 1999 spill:

> … earlier this morning it was stated that we lost control of the system and some 9,000 litres of material was spilled and seeped away. For the record, I would like to correct that. When it was built in 1982, the plant was built with a concrete floor with concrete bunding. It had a sump with a pump in it, for the very point of collecting anything like this and preventing it from contaminating the outside area. In other words, that was so it could be controlled. While this did occur through a breakage of a valve, the spill was controlled because it was contained within the concrete bunded area. It drained into the sump as designed, and the operators were able to pump the solution back into the process and repair the valve and continue. At the time it happened, there was no operator standing adjacent to the valve or under

233 Southern Cross Resources Pty Ltd, *Submission 28a*, p 4.

234 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, pp 227-228.

235 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, p 228.

> the valve, and so there was no injury to personnel and no damage done to the environment, nor to the facility—other than a broken line.[236]

Rehabilitation

3.246 The Honeymoon Mining Lease granted by the South Australian Government outlines the rehabilitation and closure requirements and acts as the main authority until the development of the company's Environmental Management and Monitoring Plan (EMMP). Southern Cross is required by Clause 7 of the First Schedule of Mining Lease 6109 to:

> … ensure that land disturbed by mining and exploration activity is rehabilitated to achieve a stable and regular land-formation and to return the area to sustainable managed pastoral property. [237]

3.247 Clause 1 of the Second Schedule stipulates that the 'lessee shall, prior to the commencement of mining operations, lodge a Rehabilitation Bond to ensure land disturbed by mining operations will be rehabilitated'.[238]

3.248 The Company must 'ensure that areas compacted or disturbed land are progressively rehabilitated when practicable to do so and in accordance with seasonal conditions, to achieve a grazing after-use. The land is to be spread with available topsoil, ripped and sown, with a self sustaining floristic community, using species local to the area that is compatible with pastoral utilisation, to the satisfaction of the Chief Inspector of Mines'.[239]

3.249 As part of the proposed EMMP requirements[240] the following must be provided:

- an ongoing survey program to monitor the impact of mining on native biological communities and measurements of the success of rehabilitation;[241]
- techniques to be implemented for the progressive rehabilitation of land and borefields and methodology to quantify the progressive extent of impact and completed rehabilitation.[242]

3.250 The detailed requirements for the closure and rehabilitation of the Honeymoon Mine will be set out in the EMMP, once the mine becomes operational, although the general principles are to be found in the EIS. The principal area of

---

236 Dr Bush, *Committee Hansard*, Adelaide, 4 October 2002, pp 228-229.

237 Mining Lease 6109, First Schedule, Clause 7.

238 Mining Lease 6109, Second Schedule, Clause 1.

239 Mining Lease 6109, Second Schedule, Clause 20.

240 Mining Lease 6109, Second Schedule, Clause 2.

241 Mining Lease 6109, Second Schedule, Clause 2.4.

242 Mining Lease 6109, Second Schedule, Clause 2.6.

concern for many members of the public is the need to include a requirement to rehabilitate not just surface areas, but also the aquifer and groundwater. In Dr Matthews' view, this would require:

> … flushing it through with fresh liquid, taking the polluted liquids, evaporating them and doing that until you get back to something close to where you started before the mining operations started.[243]

3.251 According to Mr Noonan, of the ACF, this would not be easy to achieve:

> In terms of the use of acid ISL, I am not aware of any successful rehabilitation of the aquifers post the mining operations or even post trial mining operations that used acid ISL. … Acid ISL was commonplace in the former Soviet bloc countries. But in Eastern Europe, for instance in East Germany at the Königstein and other acid ISL mines there, now that Germany has been reunited even the best of West German technology cannot remediate the impacts of the use of acid ISL in those former mine sites.[244]

243 Dr Matthews, *Committee Hansard*, Adelaide, 4 October 2002, p 173.

244 Mr Noonan, *Committee Hansard*, Adelaide, 4 October 2002, pp 199-200.

Regulating the Ranger, Jabiluka, Beverley and Honeymoon Uranium Mines

Government Members dissenting report

Introduction

1 Government members of the committee strongly reject the inferences and statements made in the committee report that misrepresent the nature and severity of reported incidents at the mining operations being reviewed.

2 The emotive nature of much of the evidence provided to the committee, and the final report itself, reinforces the Government Senators' belief that this enquiry was manipulated by many contributors to the committee, to champion a call for an end to uranium mining in Australia.

3 A considerable number of submissions was received by the committee with a large number of these submissions and witnesses providing comment, evidence and opinion relating to either the initial approval process that authorized mining to be undertaken, or in the case of Honeymoon and Beverley mines, the extraction processes utilised.

4 Government Senators believe that the committee was restricted solely to investigating the adequacy, effectiveness and performance monitoring and reporting regimes and regulations of existing mines, and the agencies responsible for the oversight and implementation of these regimes. It was not in the terms of reference to review the approval process that was initially imposed.

5 While it could be argued that this information provided background to the community perceptions of the environmental considerations of the mines in question, any review, if warranted, is for a later date or later committee.

6 The committee's terms of reference were to undertake an enquiry into:
The regulatory, monitoring, and reporting regimes that govern environmental performance at the Ranger and Jabiluka uranium operations in the Northern Territory and the Beverley and Honeymoon in situ leach operations in South Australia, with particular reference to:

a) the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations;

b) the adequacy and effectiveness of those Commonwealth agencies responsible for the oversight and implementation of these regimes; and

c) a review of Commonwealth responsibilities and mechanisms to realise improved environmental performance and transparency of reporting.

7 It is the view of Government Senators that the environmental monitoring and management regimes of all four mines investigated has met the legislative and regulative requirements with no environmental impact being experienced by the surrounding biosphere.

8 While Government Senators believe the performance of existing monitoring and reporting regimes and regulations has been adequate and effective there remains a need for vigilant monitoring and assessment of the processes by the responsible authorities.

9 The key finding of Government Senators in this committee is the issue of poor stakeholder communications. In the face of no substantiating evidence being provided to the committee of any detrimental effect caused to the environment outside of the mining leases, it remains a serious concern to Government Senators that there is the level of misinformation and anxiety among stakeholders that appears to exist.

10 In the case of the Ranger project in the Northern Territory there has been over 20 years of mining and processing without a single event resulting in a release of contaminants from the mining lease. Even so the committee heard evidence from Traditional Owners outlining their fears for their health and the safety of their traditional country.

11 Government Senators find it unacceptable that this level of concern should exist and recommend that the process of publicly informing all stakeholders be immediately reviewed.

12 There is no question that there needs to be continual monitoring of mine site operations in order to ensure that there is no detrimental effect upon the surrounding environment. Of equal importance is the requirement to ensure that there is accurate and timely information, based upon scientifically verifiable monitoring procedures, provided to all stakeholders that reflects environmental considerations.

13 Government Senators believe that this is being done by the mining companies and the monitoring agencies but is not being passed on effectively to all stakeholders by the responsible bodies.

14 For this reason Government Senators reject the report of the committee and the majority of the recommendations there in. As the Government Senators believe that there can always be areas for improvement a number of additional recommendations are also included.

Ranger and Jabiluka

15 Submissions were provided to the committee from a number of eminent scientists and research officers as well as from community and interest groups. Government Senators are concerned that the majority report downplays any submission that may in any way endorse the present environmental management regimes, while relying heavily on any submission that was critical of the mining company practices and the associated monitoring activities and processes that are in effect.

16 The committee received significantly conflicting opinions provided by the various scientists, industry and advocacy groups that gave evidence. Government Senators believe that the true measure of the effectiveness of ERA mining operations and the role performed by the Office of the Supervising Scientist, OSS, must rest with their record of performance. On this there have been no incidents where environmental damage can be inferred.

17 Government members believe that findings must also be based on fact and not on a pre existing philosophical opposition to uranium mining.

18 Notwithstanding the fact that some of the recommendations contained in the committee's report may provide some enhancement to the environmental monitoring of the aforementioned mining operations, Government Senators reject the entire report for the reasons highlighted above.

19 There has not been a single occurrence where there has been any contaminants leave the mine site lease and enter the surrounding Kakadu National Park. Indeed in 26 years of operations there has only been one incident that has had any effect on Kakadu wild life and that was a diesel fuel spill in 1995 into a man made retention pond on the mining lease. In that case a number of birds were killed when they came into contact with the fuel.

20 It would be naive to claim, and certainly ERA have not, that there have been no accidents, mechanical failures, spills or human error incidents during mining operations at the Ranger mine site. The real issue that needs to be investigated with respect to Ranger operations is how are these incidents detected, reported, contained and rectified. Of equal importance is the remedial action taken by ERA and the monitoring authorities to ensure that any incident is not repeated.

21 In the case of ERA and the Ranger Uranium mine evidence was provided that the regulations and practices in force at all times were adequate and have been continually reviewed and improved after any reported event to ensure that future incidents would be prevented or minimised.

22 The committee report quotes evidence provided by Dr Gavin Mudd at length in the report. Government Senators have serious concerns relating to Dr Mudd's evidence and his reported actions discrediting the research and findings of other scientists.[1] When questioned by Senator Buckland about Dr Mudd's own research into Ranger, Dr Mudd responded that he had not completed any.[2] In fact, Dr Mudd's contribution was based on his review and interpretation of other scientists work. On this basis the Government Senators agree with Senator Buckland's sentiments as reproduced below:

> Senator BUCKLAND—So there is no independent sampling of the water or, indeed, of the flora?
>
> Dr Mudd—No. Generally I have only ever reviewed the existing literature that is out there and talked to groups like the OSS and asked some of these questions.
>
> Mr Ralph—What would you call 'independent'? The Supervising Scientist claims to be independent.
>
> Senator BUCKLAND—I understand that but, from listening to yesterday's and today's evidence today, there is some criticism of the OSS. I do not know whether it is justified; that is not for me to say at this stage. It worries

1 Submission from Dr Pirlo 19 Sept 2003

2 Handsard ref Tuesday 1 October 2002 SENATE—*References* ECITA 151

> me that no-one has commissioned some independent testing by, for example, a university. Let me tell you that I am concerned about it. However, I always think that, if there is a problem, someone will try to see whether the data you are examining is matching up. I have to say that I do not put a lot of weight on the report of an extremely high level of contamination, and I might not put very much weight on extremely low levels of contamination either.

23 A continuing theme present throughout the committee's enquiry into Ranger and Jabiluka was the issue of information reporting and dissemination to stakeholders and traditional owners.

24 Government Senators can only deduce from the evidence provided that the Gundjehmi Aboriginal Corporation, GAC, the body responsible for disseminating information relating to mine site events to Traditional Owners, have not fulfilled their responsibility of accurately and succinctly informing stakeholders of mine site issues.

25 On 7 October 2003 ERA announced that their Head Office would be relocating from Sydney to Darwin. Government Senators believe that by co-locating all key stakeholders within the Northern Territory, communications between ERA, the Commonwealth and Northern Territory governments, the Northern Land Council and the Traditional Owners will be improved.

ERISS move from Jabiru to Darwin

26 Government members agree that the relocation to Darwin should help to retain staff and assist in attracting a higher level of scientific staff. The government members of the committee acknowledge that it is the OSS rather than ERISS that is responsible for the day to day management and monitoring of environmental issues at the mine site. It is therefore deemed acceptable that ERISS be based in Darwin where it can best be resourced to fulfil its research functions.

27 If after a matter of time there is evidence that this arrangement could be improved, or that there are deficiencies in the research and monitoring of environmental factors caused through a direct consequence of the move, a reassessment should be made.

Monitoring Point Trigger Levels

28 Uranium is a naturally occurring mineral in the region and there will be heightened concentrations of uranium in the environment from time to time due to wholly natural occurrences.

29 For context the Australian drinking water standard for drinking water is 20 parts per billion uranium. Jabiru drinking water has an average of 6 to 7 parts per billion. Against this background the key monitoring point MG009 has a focus point of 0.2 parts per billion and a threshold level of 5.8 parts per billion. Government members agree with the committee's report that these levels are scientifically defendable, and further believe, that the present levels provide extremely robust safeguards for the environment.

30 One of the highest concentrations recorded by ERA at Gulungul Creek occurred prior to any mining or processing activities commencing at the site. That was on 23 June 1980 with mining and processing not occurring until 1981. It is therefore imperative that focus and threshold levels remain a product of science and not based upon any arbitrary figure.

31 On this basis Government Senators reject the recommendation to lower the trigger levels on the basis of:

- Excessively low levels would result in naturally occurring fluctuating of uranium levels creating an unacceptable rate of unnecessary actioning by ERA.
- Trigger levels continue to be set based on science.

Communication

32 As mentioned earlier in the report, communication is a major issue of concern in the Northern Territory. Procedures need to be established which improve communication between the traditional owners, the SSD, DBIRD, ERA and the NLC. A set of reporting procedures needs to be established and agreed to by all major stakeholders. Such procedures need to accommodate the cultural differences between the traditional owners and the other stakeholders and be presented in such a way that is readily absorbable by the traditional owners and not be presented in complicated scientific terminology. The traditional owners do not think in terms of statistics, but rather in terms on how an event or incident may affect them, their food sources and their land.

33 The Government Senators members eagerly await the deliberations currently taking place in regards to the Section 44 agreement. This agreement sets out the requirements for ERA to observe while operating on Aboriginal lands and is presently being negotiated with the Northern Land Council. Government Senators believe that the successful signing of a new agreement will significantly contribute to the removal of the present conflicting expectations that currently exist.

34 Despite there being no evidence of contaminants leaving the mine site, the committee was informed of a level of uncertainty and fear about the safety of the surrounding land, water and traditional food sources.[3]

35 The role traditional owners play in the data collection processes by ERISS should be commended and expanded to include the involvement of Traditional Owners in selecting where samples should be collected and what specific items are required to be tested. Testing items that are identifiable to Traditional Owners will provide a clearer understanding than the presentation of scientific facts and figures.

36 Government members were greatly concerned by the influence that the Gundjehmi Aboriginal Corporation, (GAC), has over interaction between the Mirrar and the other stakeholders. As the GAC are responsible for liaising with and providing information to the traditional owners, there is significant concern among government members of the committee that the GAC are not reliably reporting issues and facts to the traditional owners. It is

3 Mr Nayinggul Tuesday, 1 October 2002 SENATE—*References* ECITA 157

believed that the GAC are running with an emotive anti-mining sentiment rather than presenting information in an appropriate format to traditional owners based on scientific fact.

South Australia – Beverley and Honeymoon

37 Government Senators believe Beverley and Honeymoon mines to be the most environmentally friendly mine sites that they have ever seen. Parliament, indeed all Australians, should be encouraging such passive means of mining rather than promoting old fashioned and intrusive technologies.

38 The bulk of the evidence provided to the committee on these two mines related to issues surrounding the ISL mining method technique, and the approval process undertaken by the Government in granting an authority to mine.

39 As with the Ranger and Jabiluka mine in the Northern Territory, the committee was not charged with reviewing the approval process or the technique being used. The committee was investigating whether the environmental management, monitoring and reporting regimes were adequate to protect the surrounding environment from detrimental effects from the mining operations.

40 The biggest environmental area of concern with Beverley and Honeymoon is the disposal of waste water and any possible long term effect upon the aquifers. Evidence provided by the mining companies through their Environmental Impact Studies, as part of their approval process, and evidence provided to this committee claim that the approved operating regime will pose no threat to the surrounding environment.[4]

41 Government Senators found that there was sufficient monitoring being conducted at both the Honeymoon and Beverley mine sites to detect any incident that could impact upon the environment. Government Senators also found that the management regimes in place were also capable of containing any such incident and initiating any necessary action that would be required to safeguard the surrounding environment.

42 Government Senators recommend that an on site register of all incidents occurring on the mine site be maintained and kept on site, with a reporting procedure similar to that imposed upon ERA in the Northern Territory be instigated.

Traditional Owner Relations

43 There are a number of issues pertaining to the Traditional Owners of the Beverley Mine site, notably the breakdown in communication, royalty payments and employment opportunities.

- Employment - Government Senators acknowledge the efforts made by Heathgate Resources to fulfil its requirements to employ traditional owners, however greater effort is required to increase this number. Government Senators appreciate the economic constraints that restrict the number of low skilled workers that can be employed within any mining operation but still

4 Dr Matthews, submission 16 p17; Heathgate Resources Pty Ltd submission 70a p34 AND Dr Bush Handsard Adelaide 4 October 2002 p 234

believe that Heathgate Resources should source further Indigenous employees from the surrounding region and initiate an improved training program.

- Royalty and like payments - An effort must be made to ensure that royalty and like payments are made on time and that the disputes among the traditional owners themselves be sorted out as soon as possible. The Government acknowledges that this issue is largely out of the hands of Heathgate Resources, but suggests that Heathgate and the Traditional Owners open direct lines of communication to facilitate this issue.

- Communication - Communication between the traditional owners, supervising authorities and Heathgate Resources Pty Ltd needs to be reviewed. Government Senators do however concede that this issue is tied up with the fiscal considerations discussed above. Clear and open lines of communication will facilitate a greater understanding of all stakeholder requirements and also aid in the remediation of the royalty payment problems.

44 Regular formal reporting and information forums should be adopted to ensure Traditional owners, mine operators and government regulators can discuss and progress outstanding issues.

Honeymoon

45 The environment surrounding the Honeymoon site has already been significantly altered by pastoral activity, and does not enjoy the rich and complex biodiversity values when compared to the Kakadu region in the Northern Territory.

46 The Government Committee members recommend that a comprehensive biodiversity sampling program be carried out prior to full-scale mining to establish a database of existing biodiversity values including existing flora and fauna.

47 A continuous monitoring and review process could then be implemented that would provide reliable environmental impact analysis which would inturn increase the levels of understanding of mining operations by Traditional owners and environmental groups.

Additional Government Senators Recommendations

Ranger and Jabiluka

Recommendation 1

That a watching brief be maintained over the operations of ERISS in Darwin and if deficiencies in the research and monitoring functions are detected as a consequence of the move from Jabiru, a reassessment should be made.

Recommendation 2

The involvement of Traditional Owners in the collection of samples for environmental impact testing be expanded to include the collection of traditional foods and other samples from areas of importance to Aboriginal people. The areas where samples are collected should also be expanded to include areas not necessarily adjacent to the mine, but are considered important to Aboriginal people.

Recommendation 3

The reporting and publicising of mine site events be reviewed to ensure that any information is relayed in the specified timeframes to all stakeholders in a format that they both require and understand. It is unacceptable to Government Senators that many stakeholders do not have a true and accurate appreciation of the nature of reported events.

Beverley and Honeymoon

Recommendation 4

A comprehensive report of all mine site events be maintained and kept on site. All stakeholders should be informed of any event through a similar process as utilised in the Northern Territory by ERA.

Recommendation 5

All events regardless of the assessed potential for environmental impact be investigated by a single independent body with the results of any investigation made available to all stakeholders in a timely manner.

Recommendation 6

Prior to full scale mining at Honeymoon a comprehensive biodiversity audit be conducted in order to establish a baseline of database of existing biodiversity values. This study should also include ground water samples of all adjacent aquifers.

Additional Comments on the Committee Report Recommendations

Recommendation 1

Government members support the Mirrar in their wish to actively participate in their land's management and Protection and recommends that they be actively involved in the identification and collection of samples for testing for possible contaminants. Government Senators do not support the recommendation that the Mirrar being given a position on the Minesite Technical Committee as this is a role for the Northern Land Council under the Northern Territory Land Rights Act (1976).

Recommendation 2

ERA have announced that they will not proceed with any mining operations at Jabiluka without the support of the Mirrar.

Public perception can be addressed by ensuring that individuals and organisations responsible for presenting information to stakeholders do so in an accountable manner by disseminating details in a format readily understood.

Recommendation 3

3a) Current legislation is working well between the Commonwealth and the States and Territories.

3b) Government Senators agree that the roles and responsibilities for all committees must be clearly defined and that members of these committees be accountable for their actions.

3c) Mining is no longer proposed for Jabiluka.

3d) Oppose: Mine operators are currently bound by rehabilitation and decommission requirements.

3e) Oppose: what would be defined as a "tougher approach"? Would this require the re-writing of legislation of the current definitions of breaches in environmental regulations? Furthermore, what will be defined as a "significant breach"?

Recommendation 4

The Environmental Aspects of Uranium Mining in the Alligator Rivers Region are continually being monitored with changes and enhancements to processes and practiced being implemented where necessary. Government Senators believe that this process is far more beneficial than conducting a review of regulations at a prescribed time.

Recommendation 5

ERA is already committed to achieving certification with ISO 14001 by July 2003 with certification by July 2005.

Recommendation 6

6a) Significant monitoring is already being undertaken by ERA and the OSS. ERA also conducts an extensive regime of operational monitoring in addition to the comprehensive statutory compliance monitoring program.

6b) A large number of both statutory and operation sites are current monitored by ERA and supervising authorities. If the OSS determine that there is a requirement for additional monitoring then they should be increased. Other wise any increase is merely an added expense for both the OSS and for ERA providing no added protection for the environment.

6c) Government Senators believes that the current water quality monitoring at Jabiluka is both appropriate and being conducted in accordance with the applicable authorisation.

6d) There was no evidence provided to the committee which established that additional testing would provide any additional information on environmental impact. Government Senators believe that in the face of the evidence provided, additional water bores and monitoring sites may well have more of an impact on the environment than the mining operations themselves.

6e)as per 6d above.

6f) A landscape-scale program has already been proposed by the ERISS which will entail collaboration from a range of stakeholders.

Recommendation 7

Funding for forums to discuss social and environmental impacts of mining on Aboriginal lands is already in place. The concerns that to accept and use this funding may somehow endorse mining, especially Jabiluka, must be allayed so that progress can be made.

Recommendation 8

Water quality and load limits must be set based upon science that take into consideration naturally occurring events. If through monitoring and research ERISS determine that the range of possible contaminants being tested needs to be expanded then they should be incorporated into the testing regime.

Recommendation 9

9a) On the subject of a greater number of groundwater monitoring bores, the ERA comments that: groundwater movement in the deeper aquifers, even when associated with preferred pathways, is slow and that an appropriate monitoring strategy is generally not related to frequency of sampling.

Recommendation 10

The ERA states that as planning for decommissioning proceeds, such investigations have commenced and models have been developed and run. Reports of such investigations have been provided to stakeholders. Discussions with stakeholders regarding decommissioning and rehabilitation strategies that require the support of such groundwater models are in progress.

Recommendation 11

Government Senators believe that the OSS monitoring and testing regime for mill tailings is sufficient. Further that specialist studies and investigation of the fractured rock aquifer in relation to potential contaminant transport in groundwater will continue to be invested by ERA and its consultants in relation to secure containment of tailings in pits and post-rehabilitation behaviour of the mine-site.

Recommendation 12

Annual evaluations of wetland filters are already undertaken. Additional investigations are carried out from time to time to determine specific behaviours of constructed wetland filters and the results have been reported to stakeholders and also published. As a key operational feature of the minesite, ERA have committed to maintaining their efficiency of operation and has planned to decommission and rehabilitate these areas at

the end of mine life, as detailed in Annual Amended Plans of Rehabilitation that are approved by stakeholders and governments as part of the Authorisation.
Recommendation 13

Government Senators believe that compliance with recommendations 12 and 13 will result in a shutdown of mining operations while testing is carried out. Any monitoring and testing can safely be completed while operations continue.

Recommendation 14

There has been a tendency in the majority report to place great emphasis on Mr Kyle's allegations, even though there are serious inconsistencies relating to Mr Kyle's allegations, namely:

> **in relation to the Dec 1997 tailing spill at the Ranger Mine, the statutory report of the incident insisted that "full remedial action (a complete clean-up) had been performed immediately. This was not consistent with Mr Kyle's recollections or observations". In relation to the same incident, the OSS investigated Mr Kyle's claims and conclude that the ERA had neither underreported nor misreported this incident.**

No evidence has been found that ERA has operated otherwise than in accordance with its Authorisation and then Commonwealth's Environmental Requirements. ERA concede that they cannot report how, why or who deleted and corrected the test reading concentration in their records. Process changes have been implemented to correct procedures.

Recommendation 15

Government Senators acknowledge that there are some problems with the current reporting regime such as the use of technical language and the poor understanding of the reporting system itself, but believe that any further calls to reduce the time permitted to release a report would place undue pressure on the writers to produce reports that have not been adequately investigated for the purposes of informing the public.

Government Senators recommend that further attention be provided by groups responsible for disseminating reports to do so in a manner that is acceptable and understood by the relevent stakeholder.

Government Senators reject the calls by the GAC for access to additional reports that the GAC believe exist. This is viewed as an attempt by the GAC to impinge ERA in a cover up of environmental impacts that are clearly not supported by the scientific evidence.

SOUTH AUSTRALIA

Recommendation 16

There was no evidence that supported the claims that mining operations at Honeymoon pose a serious risk to the environment. The ISL mining technique is not "experimental in nature" as it is utilised in other countries that have similar geographical structures.

South Australian and Commonwealth regulators have the view that "the mine has been demonstrated to cause little if any long term environmental damage, especially in the context of the highly saline and contaminated state of the natural groundwater in the basal aquifer." Additionally, "Heathgate provided studies that dismissed the ACF assertion that ISL practices at Beverley are responsible for a moving liquid pollution plume in the groundwater, one that may well pollute or otherwise adversely affect a connected aquifer".

Note Environment Australia's comments: "a high degree of control of mining fluids is a strength of the ISL mining techniques".

Recommendation 17

Refer Government Senators Recommendations. A single independent authority should be responsible for monitoring and investigating any minesite events.

All data and reports relating to monitoring and incident reporting should be made available to all stakeholders.

Recommendation 18

Government Senators do not accept the committee's contention that there are significant environmental risks posed by the Beverley mine. The operation standards at Beverley are considered equal to or higher than those applying at any other ISL uranium project in the world. Furthermore, there is at present no evidence to suggest that ISL is the cause of any large-scale, severe environmental problems at or near the Beverley Mine.

Government members of the Committee support the South Australian and Commonwealth Governments playing a more active and assertive role in assessing and regulating ISL mining at Beverley.

Recommendation 19

Government Senators argue that mining and its regulation must be the responsibility of the relevant department of mines and their scientists. Environmental agencies should be responsible for environmental considerations only.

Recommendation 20

The BECC comprises of officers of Commonwealth and South Australian Government regulatory agencies, and two representatives of Heathgate Resources. This partnership arrangement aims to enhance mining company-government understanding. This

partnership would dissolve if the BECC reported to only one Federal Government agency.

Recommendation 21

Government Senators oppose having the regulation of incidents being subject to public consultation. Even environmental groups would argue that there is a level of expertise involved in determining the basis of incident categories which in general, the public would have little expertise in.

All incidents regardless of their perceived level of impact should be thoroughly investigated by the one agency.

Recommendation 22

An incident recording and reporting process similar to the process applying in the Northern Territory should be instigated.

Recommendation 23

Government Senators strongly believe that a collaborative approach to testing and monitoring should be followed. This is exactly what is practiced in Beverley and Honeymoon.

Recommendation 24

Prior to full scale mining an audit of biodiversity values should be undertaken as per government senators' recommendation No 6.

Senator Nigel Scullion
Senator for the Northern Territory

Senator Tsebin Tchen
Senator for Victoria

Australian Greens Additional Comments

1 During the inquiry, submissions and comments were made to the committee regarding the rights of traditional owners. Many of these comments are reflected in the section of the main report dealing with *The role of Traditional Owners***,** paragraphs 2.22 to 2.30.

2 Recommendation 1 of the main committee report deals with the right of the Mirrar to participate in the Minesite Technical Committees for the Ranger and Jabiluka operations. The Greens support this recommendation. However, the issues raised in the public hearings were far wider than membership of this committee.

3 Many of the comments related to the *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth).* This legislation is being reviewed by the relevant Commonwealth Minister.

4 Suggested changes to Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA) relate to:

(a) Strengthening the powers for Traditional Owners over mining on their land; and
(b) Agreements covered under the Act.

5 The Gundjehmi Aboriginal Corporation argued that agreements made under the ALRA do not operate effectively and are not supported by legislation[1].

6 In particular, agreements do not provide for direct Traditional Aboriginal Owner participation, and if participation occurs at all, it happens on an arbitrary basis. Gundjehmi argued for the Northern Land Council and Traditional Owners to be able to initiate investigations into environmental incidents associated with mining operations on Indigenous lands, and to take a role in the deliberations regarding whether to invoke sanctions against responsible companies[2].

7 Gundjehmi also stated that ALRA agreements are easily excluded from considerations regarding environment measures at the operations. The corporation cited the example of the 'Jabiluka Requirements' developed by former ministers Warwick Parer and Robert Hill in 1997-98, which were non-legislative, not prepared under the ALRA and which did not provide for the input of Traditional Owners[3].

8 There was additional concern expressed that the Northern Land Council is treated as only a stakeholder in various fora, such as the Minesite Technical Committees, even though the Land Council represents parties with a primary interest, that is the Traditional Owners.

---

1 Mr Andy Ralph, Tuesday, 1 October 2002 SENATE-*References* ECITA 129

2 Justin O'Brien, Tuesday, 1 October 2002 SENATE-*References* ECITA 139

3 Justin O'Brien, Tuesday, 1 October 2002 SENATE-*References* ECITA 139

9 Added to this, Gundjehmi stated that the Minesite Technical Committees have no legislative basis. Rather, they operate as 'working arrangements', which are outdated and unenforceable[4].
Nor are they supported by Northern Territory legislation, such as the *Mining Management Act*. Consequently, the only means by which the Northern Land Council may participate in deliberations about environmental matters has no legislative basis in either Commonwealth or NT law.

10 Gundjehmi suggested that agreements under the *Aboriginal Land Rights (Northern Territory Act 1976* (Cth), in conjunction with relevant Commonwealth and Northern Territory legislation, should provide the Mirrar with the legally enforceable right to:

> i) access independent and appropriate information about the way that mining operations on Mirrar land, and arrangements for regulating those operations, directly and indirectly impact upon the physical environment and living culture of the Mirrar;
>
> ii) seek compliance and/or remedies where operators of mining projects on Mirrar land do not comply with the regulatory arrangements;
>
> iii) instigate processes for reforming the regulatory arrangements as they apply to Mirrar land;
>
> iv) disallow changes to the regulatory arrangements which detrimentally affect the exercise of Traditional Owner rights or protection of the environment on Mirrar land[5].

11 Gundjehmi also identified the need to:

> "ensure Commonwealth authorizations comply with a prescribed agreement under the *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth*)"[6]

12 Land rights legislation has been much reviewed. The fact that the ALRA has been raised in this inquiry points to continuing problems with the operation of the legislation.

13 While matters pertaining to land rights legislation fall outside the terms of reference of this inquiry they nonetheless are relevant to environmental regulation of mining activity, particularly given that Indigenous Australians have ownership of 15 per cent of Australia's landmass, including land which is the focus of mineral exploration and extraction in this country.

14 There has been over time a gradual erosion of the authority granted to Traditional Owners to determine the activities that take place on their lands. The collapsing of the right of veto over exploration and mining into a single decision is but one example of this deterioration of rights. The compromises under Labor's original Native Title Act and the

---

4 GAC Submission, p.31; 33

5 Gundjehmi Aboriginal Corporation, *Submission 58*, p 30.

6 GAC submission pg. 122

retrograde amendments made by the Howard government also demonstrate the absence of commitment to achieve just outcomes for Indigenous Australians.

15 The recent whittling away of Indigenous Australians' control over land fails to give proper regard to the centrality of land to Indigenous people, to their cultural obligations to 'care for country' and to the spiritual significance of land.

16 The actions of various governments have fallen well short of what is required. They have undermined the process of national reconciliation and they have failed to deliver justice to Indigenous Australians.

17 The review of the ALRA provides an opportunity to address the issues raised in the course of this inquiry. The process currently involves the Northern Territory and Commonwealth governments, the NT Land Councils and the mining industry. This process may result in positive amendments to the Land Rights Act.

Recommendation
That the Commonwealth Minister for Immigration and Multiculturalism and Indigenous Affairs facilitate discussions with federal and territory counterparts, Traditional Owners and the Land Councils about measures to ensure that agreements made under the Aboriginal Land Rights Act achieve the best possible outcomes for Indigenous Australians.

Kerry Nettle
Australian Greens

Appendix 1

List of Submissions

1	Mr Bob Phillips
2	Jaijin Zah Kenisciehad
3	Mr Rod Novak
4	Ms Andrea Tappe
5	Mr Dean Pratley
6	Mr Eric Campbell
7	Ms Amy Grossbard
8	Temple of the Dark Moon
9	Ms Merelyn Theakstone
10	Mr Michel Beuchat
11	Chris Connors
12	Mr Albert Hempel (Muktananda)
13	Mr Peter Westheimer
14	Ms Charmaine Bittles
15	Ms Helen Stein
16	Dr Dennis Matthews
16a	Dr Dennis Matthews
17	Ms Nicole Rowan
18	Ms Juliet LeFeuvre
19	Mr Geoffrey Buchanan
20	Mr Phillip Evans
21	Mr Keith Armstrong
22	Ms Pen Horner

23 B H Beresford

24 Northside Greens NSW

25 Mr Bill Fisher

26 Ms Felicity Martin

27 Mr Daniel Moss

28 Southern Cross Resources Australia Pty Ltd

28a Southern Cross Resources Australia Pty Ltd

28b Southern Cross Resources Australia Pty Ltd

29 Mr Andrew Reside

30 Uranium Information Centre Ltd

31 Mr Simon Birch

32 Jabiru Town Council

33 National Assembly of the Uniting Church in Australia

34 Ms Judy Blyth

35 Mr Geoffrey Kyle

36 South West Environmental Action Group

37 Chid Gilovtz

38 Mr Jakov Novosel

39 SA Chamber of Mines and Energy

40 Belisarius Tolstoshev-Wansbrough

41 Mr Brad Lucas

42 Mr John Card

43 Mr Adam Beeson

44 Ms Kellie Gee

45 The Australian Greens (NT)

46 Ms Christine Waterhouse

47 Cameco Australia PtyLtd

48 Ms Nikkie Verstappen

49 Ms Simone Siracusa

50 Environment Centre of the Northern Territory

51 Mr Fred McAlister

52 Rewa Jarman

53 Mr Nick Pastalatzis

54 Mr Mike Browning

55 Mr Herb Crompton

56 Energy Resources of Australia Ltd

56 a Energy Resources of Australia Ltd

56 b Energy Resources of Australia Ltd

57 People for Nuclear Disarmament

58 Gundjehmi Aboriginal Corporation

58a Gundjehmi Aboriginal Corporation

58b Gundjehmi Aboriginal Corporation

59 Dr Donald Reid

60 Ms Breony Carbines

61 Mr Alistair John Hart

62 Ms Louise Kavanagh

63 Mrs A Dillion

64 Associate Professor F Fisher

65 Rev L Lee Levett-Olson

66 Mr James Henry

67 Ms Stephanie-Gywnneth Falkiner

68 Kakadu Board of Management

69 Friends of the Earth, Australia

69a Friends of the Earth, Australia

70 Heathgate Resources Pty Ltd

70a Heathgate Resources Pty Ltd

70b Heathgate Resources Pty Ltd

71 The Wilderness Society

72 Chris Chaplin

73 Dr Lois Achimovich

74 Australian Conservation Foundation

74a Australian Conservation Foundation

75 Pat Finegan

76 Medical Association for Prevention of War

77 Office of the Supervising Scientist

77a Office of the Supervising Scientist

77b Office of the Supervising Scientist

77c Office of the Supervising Scientist

78 Minerals Council of Australia

79 Mr Jim Leggate

80 CFMEU Mining & Energy

81 Northern Land Council

82 Mr Wieslaw Lichacz

83 Ms. Jillian Marsh

84 Department of Primary Industry and Resources, Office of Minerals and Energy

85 Dr Mark C Pirlo

86 Environment Australia

86a Environment Australia

87 Department of Industry, Tourism and Resources

Appendix 2

Witnesses at Public Hearings

30 September 2002 - Darwin

Supervising Scientist Division, Environment Australia

Dr Max Finlayson

Dr Arthur Johnston

Mr Alex Zapantis

Energy Resources of Australia Ltd

Mr Robert Cleary

Mr Matthew Coulter

Dr Anthony Milnes

Mr Richard Weston

Northern Land Council

Mr Mark Foy

Mr Norman Fry

Mr Brett Midena

Environment Centre NT Inc.

Dr Gary Scott

Mr Mark Wakeham

Australian Greens (NT)

Mr Justin Tutty

NT Department of Business, Industry and Resource Development

Mr Tony McGill

David Lea Consulting

Mr David Lea

1 October 2002 - Jabiru

Jabiru Town Council

Councillor David Norton

Mr Stephen Thomson

Gundjehmi Aboriginal Corporation

Dr Gavin Mudd

Mr Justin O'Brien

Mr Andrew Ralph

Kakadu Board of Management

Ms Jessie Alderson

Mrs Jane Christophersen

Mr Jonathon Nadji

Mr Jacob Nayinggul

Ms Gabrielle O'Loughlin

4 October 2002 - Adelaide

Ms Jillian Marsh, private capacity

Wartali-Owie Inc

Mr Michael Anderson

Conservation Council of South Australia

Dr Dennis Matthews

Australian Conservation Foundation

Mr David Noonan

Southern Cross Resources Australia Pty Ltd

Dr Phillip Bush

Mr Thomas Hunter

Heathgate Resources Pty Ltd

Mr Mark Chalmers

Mr James Graham

Mr Stephen Middleton

Ms Sharon Paulka

Mr Pablo Velasquez

18 October 2002 - Canberra

Rio Tinto Ltd

Mr Andrew Lloyd

Friends of the Earth, Australia

Mr Bruce Thompson

Australian Conservation Foundation

Mr Michael Kerr

Mr Wayne Smith

Mr Dave Sweeney

Environment Australia

Mr Peter Davies

Mr Gerard Early

Mr Malcolm Forbes

Mr Tim Kahn

22 October 2002 - Canberra

The Wilderness Society

Mr Alec Marr

24 October 2002 - Canberra

Alligator Rivers Region Technical Committee

Professor Barry Hart

Appendix 3

Exhibits

Darwin, 30 September 2002

Office of the Supervising Scientist

Statement by the Supervising Scientist.

Initial Summary, ARRTC Meeting, 9-10 September 2002.

Third Schedule, Environmental Requirements for the Jabiluka Uranium Project.

Northern Territory Government

Review of Environmental Regulation at Jabiluka and Ranger Uranium Mines, David Lea Consulting, September 2002.

Jabiru , 1 October 2002

Gundjehmi Aboriginal Corporation

Letter from Ms Yvonne Margarula, Senior Traditional Owner, and Gundjehmi Aboriginal Corporation Chairperson to the Hon David Kemp MP, Minister for the Environment and Heritage dated 10 May 2002.

Undated reply from Hon David Kemp MP, Minister for the Environment and Heritage, to Ms Margarula.

Adelaide, 4 October 2002

Southern Cross Resources Ltd

Honeymoon Uranium Project: Further Characterisation of Yarramba Palaeochannel, July 2001.

Honeymoon Uranium Project: Groundwater Flow and Quality Modelling, July 2001.

Australia's Honeymoon Project - From Acquisition to Approval - 1997 to 2002, Paper for the IEAE Meeting, Beijing, September 2002.

Heathgate Resources Pty Ltd

Brochure on General Atomics and Affilated Companies.

Canberra, 18 October 2002

Rio Tinto Ltd

Opening Statement.

Rio Tinto in Australia - a seven page briefing paper.

Brochure: *The way we work - Our statement of business practice,* Rio Tinto, London 2000.

Chart: *Rio Tinto - Social and environment performance highlights 2001.*

Brochure: Rio Tinto and the Centre for Appropriate Technology *Employee Fellowship Program 2002.*

Brochure: *Corporate Citizenship in Australia* - The Rio Tinto *Business with Communities* program.

Brochure: The Rio Tinto Aboriginal Foundation.

Friends of the Earth Australia

Document entitled *Presentation to Senate Inquiry into Uranium Mining Regulation*

Australian Conservation Foundation/Friends of the Earth/Mineral Policy Institute document entitled *MMSD and Beyond: Preconditions for effective engagement*.

The Chair

Report of Independent Review of Reporting Procedures for the SA Uranium Mining Industry, Hedley Bachmann, August 2002.

Australian Conservation Foundation

Document entitled *Contraventions by ERA of the Atomic Energy Act 1953 (Cth) and the Mining Management Act 2001 (NT) from the Incorrect Stockpile Incident at Ranger January/February 2002*, prepared by Michael Kerr.

Copy of a web page of the NT Department of Business, Industry and Resource Development.

Appendix 4

Institutional Arrangements

Commonwealth

Department of Industry, Tourism and Resources (DITR)

The Department of Industry, Tourism and Resources (DITR), which develops policy and administers legislation relating to Australia's resources and energy industries, plays an important role in formulating the national response to climate change issues. The Resources area is responsible for providing policy and legislative advice and administrative support to the Government on the resources sector of the economy, including upstream and downstream petroleum, as well as the uranium, coal and minerals industries.

The Department's responsibility for domestic and international energy policy encompasses climate change, renewable energy and energy efficiency policies. It also provides advice on the implications of sustainable development policies for industry and the economy, and plays a significant role in energy market reform. The DITR contributes to the development of domestic and international climate change policy; analyzes existing and proposed environmental policies; and gives advice on the implications of these policies for industry. By taking an active role in environment policy formulation in areas such as climate change and sustainable development, the Department ensures that the issues relevant to portfolio industries are addressed.

The DITR monitors and supports industry applications for environmental approval under the *Environment Protection Biodiversity Act 1999.* The Act legislates the need for environmental approval for new projects and/or extensions of existing projects that affect matters of national environmental significance. The Act requires that relevant Commonwealth Ministers are consulted when approval is sought for proposed projects within their area of responsibility. In addition, the DITR is required under the Act to report annually on Australia's environmental performance and contribution to ecologically sustainable development (ESD). Environmental legislation and other issues within the purview of the portfolio include the *National Environment Protection Council Act 1994*, National Environment Protection Measures, trade and the environment, socially responsible investment, natural resource management, greening government procurement, cleaner production, eco-efficiency, the precautionary principle and other international environmental developments.

Environment Australia (EA)

Environment Australia (EA) advises the Commonwealth Government on policies and programs for the protection and conservation of the environment, including both natural and cultural heritage places. EA administers environmental laws, including the

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999), and is responsible for Australia's participation in a number of international environmental agreements. With regard to the uranium mining industry in South Australia, EA's role as an environmental regulator is evidenced in the approvals process and in its power to set strict conditions governing the operating procedures of the mines. In the Northern Territory, the Office of the Supervising Scientist (OSS) was established to supervise the management of the uranium mining industry and to conduct research into the impact the industry has on the Alligator Rivers Region environment. For a more detailed analysis, see the section on the OSS below.[1]

Supervising Scientist Division (SSD)

The Supervising Scientist Division (SSD), which is a component of Environment Australia, is responsible for environmental oversight of uranium mining activities in the Alligator Rivers Region of the Northern Territory. The primary role of the SSD is to ensure through research, assessment and the provision of technical advice, that the environment of the Alligator Rivers Region is protected from the effects of uranium mining to the very high standard required by the Commonwealth Government. The supervisory functions are carried out by the OSS, and the research functions of the SSD are performed by the Environmental Research Institute of the Supervising Scientist (ERISS).

The position of the Supervising Scientist and the Office's functions and powers were established by the *Environment Protection (Alligator Rivers Region) Act 1978*. These functions and powers, as described in Section 5, are:

> 5. Functions of the Supervising Scientist in relation to uranium mining in the Region:
>
> > (a) to devise and develop programs for research into, and programs for the collection and assessment of information relating to, the effects on the environment in the Alligator Rivers Region of uranium mining operations in the Region;
> >
> > (b) to co-ordinate, and supervise, the carrying out of programs referred to in paragraph (a);
> >
> > (c) to devise and develop, and to promote and assist in the devising and development of:
> >
> > > (i) standards, practices and procedures in relation to uranium mining operations in the Region for the protection of, or in so far as those standards, practices and procedures affect, the environment in the Region; and

1 Environment Australia, *Submission 86*, p 5.

(ii) measures for the protection and restoration of the environment in the Region from the effects of uranium mining operations in the Region;

(d) to co-ordinate, and supervise, the implementation, in relation to uranium mining operations in the Region, of requirements of or having effect under prescribed instruments in so far as those requirements relate to any matter affecting the environment in the Region;

(e) to advise the Minister with respect to:

(i) the effects on the environment in the Alligator Rivers Region of uranium mining operations in the Region;

(ii) standards, practices and procedures in relation to uranium mining operations in the Region for the protection of, or in so far as those standards, practices and procedures affect, the environment in the Region;

(iii) measures for the protection and restoration of the environment in the Region from the effects of uranium mining operations in the Region; and

(iv) requirements of or having effect under prescribed instruments in relation to uranium mining operations in the Region in so far as those requirements relate to any matter affecting the environment in the Region and the implementation of those requirements;

(f) to perform such other functions, in relation to uranium mining operations in the Region, as are conferred on him by or under a prescribed instrument (including this Act); and

(g) to do anything incidental or conducive to the performance of any of the foregoing functions.

In 1993-94, the *Environment Protection (Alligator Rivers Region) Act 1978* was amended to provide for the establishment of the Alligator Rivers Region Technical Committee; the Alligator Rivers Region Advisory Committee; and Minesite Technical Committees. The functions of these bodies are discussed below. The OSS was also incorporated within the then Department of Environment, Sport and Territories. Following the leaks of tailings water at the Ranger mine during the 1999-2000 wet season, the role of the SSD was expanded to focus on environmental monitoring, on the basis that the OSS should collect its own data rather than rely on that gathered by the mining operator, Energy Resources of Australia Ltd (ERA) and the Northern Territory Department of Business, Industry and Resource Development (DBIRD). Its environmental monitoring program consists of biological, chemical water quality, and atmospheric monitoring, which enables it to better assess the impact of uranium mining on the Alligator Rivers Region.

Alligator Rivers Region Technical Committee (ARRTC)

The Alligator Rivers Region Technical Committee (ARRTC) is constituted under section 22A of the *Environment Protection (Alligator Rivers Region) Act 1978*. The ARRTC sees its chief role as ensuring that best scientific knowledge underpins the operation and management of uranium mining within the Alligator Rivers Region so that the risks of adverse impacts are minimized.[2] Thirteen members appointed by the Commonwealth Minister for the Environment and Heritage comprise the ARRTC. The membership component and functions of the ARRTC were revised in 2001 in order to implement a recommendation of the Independent Science Panel (ISP) that a scientific advisory panel be established to review the research activities in the Alligator Rivers Region:

The Committee now includes seven independent scientists nominated by the Federation of Australian Scientists and Technological Societies (FASTS) on the basis of their expertise in specific fields. They are appointed on the grounds of skill, experience and expertise in one of the following five fields:

- Radiation and Public Health;
- Water Quality and Management;
- Earth Sciences;
- Biological Systems; or
- Minesite Rehabilitation.

The other six members represent the following key stakeholder organizations:

- Office of the Supervising Scientist;
- Department of Business, Industry and Resource Development;
- Energy Resources Australia Ltd;
- Northern Land Council;
- Parks Australia; and
- Hanson Australia Pty Ltd.

The membership ratio of seven to six ensures that the scientific panel members provide independence and are free from industry and government pressure when assessing and reporting on issues relating to their brief.

Alligator Rivers Region Advisory Committee (ARRAC)

The Alligator Rivers Region Advisory Committee (ARRAC) is also established under the *Environment Protection (Alligator Rivers Region) Act 1978*. Its role is to facilitate communication between community, government and industry stakeholders.

2 Alligator Rivers Region Technical Committee, *Draft Operational Plan 2002-2005*, para. 1.2.

Essentially, it is a forum for information exchange and policy consultation on the effects of uranium mining in the Alligator Rivers Region.[3] The ARRAC meets twice yearly, immediately following the Environmental Performance Reviews of the mining operations. These meetings facilitate discussion, chiefly of performance issues and environmental protection.

Members of the ARRAC (which has an independent Chair) represent a wide range of stakeholders:

- mine operators (ERA Ltd);
- regulators;
- Commonwealth Departments;
- Northern Territory Departments;
- environmental organizations;
- Aboriginal organizations;
- employees; and
- local government bodies.

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)[4]

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Federal Government body charged with responsibility under the *Australian Radiation Protection and Nuclear Safety Act 1998* (ARPANS Act) of protecting people, wildlife and the environment from the harmful effects of radiation (ionizing and non-ionizing). Prior to the ARPANSA's establishment, the Australian Radiation Laboratory (ARL) was responsible for providing advice to the Government and the community on the health effects of radiation. It undertook research and provided services in this area while the Nuclear Safety Bureau (NSB) was responsible for regulating the HIFAR and Moata research reactors at Lucas Heights in Sydney.

In 1997, the Federal Government announced that it would combine these two organizations and established ARPANSA, as a new regulatory body with underpinning legislation. The ARPANS Act was assented to on 24 December 1998. The Act introduced regulatory controls in respect of all Commonwealth radiation and nuclear activities, including mining, by prohibiting these entities from dealing with radioactive materials or apparatus, or any aspect of a nuclear facility, unless licensed to do so. It established a system of licensing and exemptions and provided for

3 www.ea.gov.au/ssd/communication/committees/arrac/index.html

4 Australian Radiation Protection and Nuclear Safety Agency: http://www.arpansa.gov.au/org.htm

enforcement of the legislation through the appointment of inspectors with enforcement powers. A (statutory) Chief Executive Officer (CEO) was appointed to administer the ARPANSA's operations.

The Radiation Health and Safety Advisory Council (RHSAC) was also established. It provides expert advice to the CEO on a range of issues including emerging radiation protection and nuclear safety issues, matters of concern to the community, and the adoption of codes of practice and standards. There are two supporting committees to the RHSAC—the Nuclear Safety Committee and the Radiation Health Committee.

The ARPANSA is understood to be currently preparing a draft *Code of Practice and Safety Guide—Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing*. This Code is intended to replace two Codes of Practice applicable to the mining industry: the *Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores* (1987) and the *Code of Practice on the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores* 1982.

Northern Land Council (NLC)

The Northern Land Council (NLC) is a statutory authority created by the *Aboriginal Land Rights (Northern Territory) Act 1976* to represent the Aboriginal people in the Northern Territory. There were four land councils established in the Northern Territory under the Land Rights Act: the NLC covers the area in which the Ranger and Jabiluka uranium mines are situated. The Land Council has 78 members elected from communities throughout the region, and five co-opted women's positions. The members are elected and nominated by Aboriginal people and organizations. Elections are held every three years.

Section 23(1) of the Land Rights Act sets out the functions and responsibilities of the Northern Land Council as follows:

- to ascertain and express the wishes of Aboriginal people about the management of their land and legislation concerning their land;
- to protect the interests of the traditional owners of, and other Aborigines interested in, Aboriginal land;
- to assist Aboriginal people to protect sacred sites, whether or not they are on Aboriginal land;
- to consult traditional owners and other Aborigines with an interest in Aboriginal land and land under claim;
- to negotiate on behalf of traditional owners with people interested in using Aboriginal land and land under claim;
- to assist Aboriginal people claiming land and, in particular, arrange and pay for legal assistance for them;

- to maintain a register of Land Council members and members of Aboriginal land trusts and descriptions of Aboriginal land;
- to supervise and assist Aboriginal land trusts;
- to attempt to conciliate disputes between Aborigines regarding land matters;
- to hold in trust, and distribute to Aboriginal associations, statutory payments from the Aboriginal Benefits Account (ABA) to communities affected by mining operations and income received on behalf of landowners under negotiated agreements; and
- to process applications for permits to enter Aboriginal land.

The NLC is primarily funded through the ABA. Under the Land Rights Act, the Commonwealth Government pays into the ABA an amount of money equal to the royalties paid to it and the Northern Territory Government from mining on Aboriginal land. These "statutory royalty equivalents" are allocated by the ABA as follows:

- 40% is distributed among the four Northern Territory land councils to fund operations necessary in carrying out their statutory responsibilities to look after the land interests of all Aboriginal people in the Northern Territory;
- 30% is allocated through the land councils to Aboriginal groups and to people in areas affected by mining on Aboriginal land via their royalty receiving organizations; and
- 30% is used for ABA expenses, grants to Aboriginal organizations and to supplement the operational funding to land councils.

The NLC's budgets are approved by the Commonwealth Minister for Aboriginal Affairs and accounted for in audited financial statements within Annual Reports, which are tabled each year in the Parliament. The NLC may also receive grants from bodies such as the Aboriginal and Torres Strait Islander Commission (ATSIC), the Indigenous Land Corporation (ILC) and the Natural Heritage Trust (NHT).

Kakadu Board of Management (KBM)

The Kakadu Board of Management was established on 26 July 1989. The Board has fifteen members, ten of whom are appointed by the Commonwealth Minister for the Environment and Heritage to represent the traditional owners of the park area. The remaining members consist of the Director of National Parks; the Assistant Secretary of Parks Australia North; an individual prominent in nature conservation; a person employed in the tourism industry in the Northern Territory; and a representative of the Northern Territory Government.

Its functions as set out in the National Parks and Wildlife Conservation Act 1975 are:

- to prepare, along with the Director, plans of management for the park;
- to make decisions, consistent with the Plan of Management, about the management of the park;

- to monitor, with the Director, the management of the park; and
- to give advice, along with the Director, to the Minister for the Environment on all aspects of how the park develops in the future.

The Board seeks to make decisions which balance the interests of the park, the Bininj/Mungguy (Aboriginal) people and the wider community. It operates in accordance with the requirements of the *National Parks and Wildlife Conservation Act 1975*, the *Aboriginal Land Rights (Northern Territory) Act 1976* and the provisions of the lease agreements for Aboriginal land in the park. In making decisions about the management of the park, the Board is also responsible for determining the overall allocation of resources in the park and for setting priorities to meet the actions in the Plan of Management.[5]

Northern Territory

Department of Business, Industry and Resource Development (DBIRD)

The Department of Business, Industry and Resource Development (DBIRD) was established on 13 November 2001. It incorporates the major business, industry and resource development functions of the former Departments of:[6]

- Mines and Energy;
- Primary Industry and Fisheries;
- Industries and Business; and
- Asian Relations and Trade.

Minerals and Energy Section

The role of the Minerals and Energy Section is to facilitate the development of mineral, petroleum, major agribusiness and allied industries, and to regulate the operations of mining and petroleum enterprises in the Northern Territory. The monitoring and reporting arrangements undertaken by the DBIRD in relation to uranium mining in the Territory are as follows:

- monitor and analyse the weekly, monthly, quarterly and annual reports provided by the operator as specified in the Authorisations;
- undertake compliance sampling and analysis according to a specific schedule;

---

5 The Plan of Management—http://www.energyres.com.au/kakadu.shtml#plan—was developed in 1999.

6 Department of Business, Industry and Resource Development, Mines Division: http://www.dme.nt.gov.au/

- undertake specific technical audits and inspections;
- participate in monthly site visits and biannual environmental management system audits;
- investigate incidents and accidents as deemed necessary;
- participate in the MTC, ARRTC and ARRAC meetings; and
- report six-monthly on the outcome of monitoring and other regulatory activity.[7]

Community Services Branch (CSB)

DBIRD's Community Services Branch serves as a conduit for communication between the Department and its clients. Its twofold mission is to ensure that:[8]

- indigenous people and communities are provided with sufficient information to enable them to make informed decisions about mining issues; and
- through proper consultation, Aboriginal land will be accessible for geological investigation, and that identified mineral potential will be developed in a sustainable manner. Any development needs to consider environmental, social and economic issues for the overall long-term benefit of the indigenous land owners, custodians and the Northern Territory.

The CSB is actively involved in supplying information and providing assistance to indigenous people, communities and representative bodies to improve the understanding of the mining and petroleum industry.

Minesite Technical Committees (MTC)

The Minesite Technical Committees (MTCs) for Ranger and Jabiluka are the key forums for discussion of environmental matters relating to the mines. They were established under a set of working arrangements agreed between the Commonwealth Government and the Northern Territory Government.[9] Both committees are chaired by the Northern Territory Government (specifically, the DBIRD) and include representatives from ERA, the NLC, and the OSS.

The role of the MTCs is to provide advice to the DBIRD in defining, establishing and maintaining best mining practice in relation to site-specific technological, scientific and environmental factors and constraints.[10] The Ranger and Jabiluka MTCs meet

---

7 David Lea, *Review of Environmental Regulation at Jabiluka and Ranger Uranium Mines*, September 2002, p 26.

8 Department of Business, Industry and Resource Development: http://www.dme.nt.gov.au/

9 The current MTCs originated in a Memorandum of Understanding (MOU) between the Commonwealth and Northern Territory Governments dating from September 1995. The MOU does not create any legal obligation between the parties but adopts a set of working arrangements which clarifies the respective roles of the Commonwealth: i.e. of the OSS and the DBIRD.

10 Information obtained from ERA: http://www.energyres.com.au/environment/regulators.shtml

every six to eight weeks to take action in response to the outcomes and recommendations of environmental performance reviews, audits and reports, and to routinely address the following issues:[11]

- practices, procedures and measures for the management, storage and disposal of water and tailings and waste material;
- performance of the approved water and tailings management systems and structures;
- radiological exposures to workers and members of the public;
- environmental monitoring programs and reports, and the environmental impact of mining operations;
- applications for Authorisation alterations or approvals, where practicable within the required time frame for action; and
- minesite rehabilitation planning and works.

South Australia

Department of Primary Industries and Resources (PIRSA)[12]

PIRSA employs approximately 1400 personnel in the agricultural, fisheries, mining, petroleum, natural resources and energy management sectors. The Department undertakes a wide range of activities throughout the State including research and development, scientific field programs, drilling, sampling, analysis, advisory services and industry regulation. PIRSA is committed to ecologically sustainable development:

> It is our aim to ensure that all activities we undertake are managed in terms of their environmental impacts and are carried out in an environmentally sustainable manner.[13]

Its goal is to achieve environmental sustainability through the ongoing development and operation of environmental management processes—principally project planning and risk-assessment—which are integral components of the Department's overall management operations.

Office of Minerals and Energy Resources

PIRSA's Office of Minerals and Energy Resources manages South Australia's mineral and petroleum resources on behalf of the people of the State. It is the "lead agency"

---

11 David Lea, *Report of Environmental Regulation at Jabiluka and Ranger Uranium Mines*, September 2002, pp 14-15.

12 Department of Primary Industries and Resources: http://www.pir.sa.gov.au

13 Department of Primary Industries and Resources: http://www.pir.sa.gov.au

facilitating ecologically sustainable mineral and petroleum exploration and development in South Australia. Its functions include:

- the promotion of South Australia as an investment destination through the provision of pre-competitive geoscientific data and information;
- the regulation of the resources industry through policy and legislation; and
- the optimization of royalty income streams to the State.

Mineral Resources Group

The Mineral Resources Group manages South Australia's minerals by undertaking the following activities:

- Mineral promotion;
  - promote responsible exploration and development of South Australia's mineral resources.
  - promote the mineral prospectivity and potential of the State nationally and internationally.
- Geoscientific information;
  - define mineral resources and their potential to support industry development throughout South Australia.
  - generate and manage geoscientific information to provide geoscientific advice and data to industry, Government and the community.
- Mining regulation; and
  - regulate exploration and mining industries to ensure responsible and environmentally sound resource development.
  - determine and collect statutory royalties.
- Strategic policy and support.
  - facilitate and operate as a "lead agency" in developing various mining projects.
  - provide advice and statistics to the Government and the community.
  - maintain a legislative framework that supports efficient and appropriate development of the State's mineral resources.

Environment Protection Authority (EPA)

In July 2002, responsibility for monitoring South Australia's radioactive waste and uranium mining industry was transferred from the Department of Human Services to the newly independent Environment Protection Authority (EPA), which is part of the South Australian Department of Environment and Heritage. The Environment Protection Authority is a statutory body established under the *Environment Protection Act 1993* to protect South Australia's environment. The Act governs environment protection where the effects on land, air and water are considered simultaneously. The

EPA also fulfils formal and informal responsibilities under the *Development Act 1993*. In November 2002, the South Australian Parliament approved amendments to the *Environment Protection Act* giving the EPA greater powers to prosecute individuals or businesses that harm the environment.[14] Penalties have been increased and fines of up to $2 million can now be imposed.

Radiation Protection Branch (RPB)

The Radiation Protection Branch of the EPA is responsible for regulating the use of ionizing radiation in medical, research, industrial and mining organisations, including the use of X-rays, and the safe transport, storage and disposal of radioactive substances. The branch also advises on radiation safety of non-ionizing radiation sources, including lasers, microwaves, powerlines, mobile phones and communication towers.[15]

Legislation administered by the Radiation Protection Branch includes:

- *Radiation Protection and Control Act 1982.*
- *Radiation Protection and Control (Transport of Radioactive Substances) Regulations 1991.*
- *Regulations under the Radiation Protection and Control Act 1982.*

The RPB also has responsibility for a wide range of radiation related issues. Relevant to this inquiry are the:

- Radiation Health Group.
- Mining and Environment Group.

ISL Radiation Review Committee

The ISL Review Committee was formed in August 1998 after the commencement of the Beverley and Honeymoon field leach trials. The Radiation Protection Branch of the South Australian Heath Commission (now the EPA) wanted to have regular meetings similar to those conducted at Olympic Dam in order to keep abreast of operations and the radiation monitoring being conducted. At the time it was decided to have a single meeting incorporating both operators. In August 2001, the committee was split when Heathgate Resources Pty Ltd and Southern Cross Resources Australia Pty Ltd decided to hold separate meetings.

Although the committee has no formal terms of reference or membership, its role is to discuss occupational and environmental radiation monitoring. The original membership comprised representatives of the Radiation Protection Branch, PIRSA, Heathgate Resources and Southern Cross Resources. The Mines Inspector from

14 Press Release, Hon John Hill, Minister for Environment and Conservation, 27 November 2002.

15 http://www.environment.sa.gov.au/epa/radiation.html

Workplace Services[16] began attending meetings some twelve months after the meetings commenced. In June 2002 (following a change of government) an EPA representative was also invited to attend.

The original spill-reporting criteria were developed by this Committee. Oral reporting criteria were devised to ensure the reporting of all relevant spill incidents between meetings. Issues discussed by the Committee include:

- the status of operations;
- approvals sought or granted;
- incidents; and
- occupational and environmental monitoring results.

The ISL Radiation Review Committee serves as a vehicle for interchange between the key South Australian uranium industry participants. Its functions differ from the BECC and the Olympic Dam Environmental Consultative Committee (ODECC) (discussed below), which are communication forums for the mine operators, and South Australian and Commonwealth government agencies.

Beverley Environmental Consultative Committee (BECC)

The inaugural meeting of BECC was held on 6 March 2001. Its formation was a requirement of the approval process for the mine's commencement by the then Minister for Industry, Science and Resources, Senator the Hon Nick Minchin in response to a recommendation by the Commonwealth Minister for the Environment at that time, Senator the Hon Robert Hill, in the following terms:

> Heathgate Resources must participate in an environmental monitoring committee for the Beverley mine to be established by the South Australian government and provide information as agreed that would be necessary to support the functions of that committee. The committee will review the environmental performance of the mine and provide information to stakeholders.[17]

The BECC comprises the following members:

- South Australian Department of Primary Industries and Resources (Chair);
- South Australian Department of Human Resources (1 representative);

16 Workplace Services is part of the Department of Administrative and Information Services (DAIS).

17 Environment Australia, *Beverley Uranium Mine, South Australia, Environment Assessment Report: Proposal to Extract, Process and Export Uranium Oxide from the Beverley Uranium Mine*, South Australia, December 1999; http://www.erin.gov.au/assessments/epip/notifications/beverley/assessmentreport.html

- South Australian Department of the Environment and Heritage (1 representative);
- Environment Australia (Cth) (1 representative);
- Department of Industry, Tourism and Resources (Cth) (1 representative); and
- Heathgate Resources (2 representatives).

Honeymoon Environmental Consultative Committee (HECC)

An environmental consultative committee will be established for the Honeymoon project when and if it commences for full-scale mining. The Committee's functions and membership will resemble those of the BECC.

Appendix 5

Ranger and Jabiluka – Background Information

Geology[1]

The Alligator Rivers Region contains a number of uranium deposits, including Ranger and Jabiluka. These deposits are located in the eastern part of the Pine Creek Geosyncline which extends from Darwin to Pine Creek. The geology of the area is dominated by a variety of sediments and volcanics dating back some 2470 million years (Ma). The existing geological formation, which was laid down in layers over millions of years, has been subjected to extensive change, erosion and weathering. The uranium is mainly to be found in the Cahill Formation.

The ancient surface was gradually uncovered by erosion of the Kombolgie Formation (which now forms the escarpment) around the early to middle Tertiary period, some 20–30 Ma ago, and the uranium deposits were again exposed to a new regime of weathering and erosion which has continued to the present day. Therefore, the whole Alligator Rivers Region seawards of the Arnhem Escarpment, representing the retreating edge of the Kombolgie Formation cover over the ancient surface, contains many areas that have been exposed to elevated levels of uranium and radiation for millions of years. Current ecosystems have evolved naturally in this environment.

The Ranger mineralisation extends for about 14 kilometres; Ranger #1 and #3 are located in the southern portion. They occur in exactly the same stratigraphic position, their host rocks and mineralogy being identical. There are three mine sequences and ore is mined from the Lower and Upper Mine sequences. Ranger #1 produced 18.036 million tonnes of ore at an average grade of 0.338 per cent U_3O_8 for a contained metal of 60,962 tonnes U_3O_8.[2] On current projections, mining at Ranger #3 is expected to continue until at least 2009, after which the pit will be utilised for storage of process residue.

---

1 Information derived from the following sources:

T. J. East and R. J. Wasson (1992), 'Chapter 1: Introduction', in R. J. Wasson (ed), *Modern Sedimentation and Late Quaternary Evolution of the Magela Creek Plain*, Supervising Scientist for the Alligator Rivers Region Research Report No. 6, AGPS, Canberra.

R. S. Needham and P. G. Stuart-Smith, (1980), 'Geology of the Alligator Rivers Uranium Field', in '*Proceedings of the International Uranium Symposium on the Pine Creek Geosyncline, 1980*', International Atomic Energy Agency (IAEA), pp 233–57.

2 http://www.lpe.nt.gov.au/enviro/EIAREG/Jabiluka/jabear4.htm

The Jabiluka #2 ore body is divided into two blocks: the eastern and western blocks, and is divided by the Hegge Fault which has resulted in the western block being downthrown by about 50 metres.[3] The total Mineral Resource at Jabiluka is estimated at 163,000 contained (in situ) tonnes of uranium oxide (U_3O_8) at an average grade of 0.53 per cent U_3O_8, with an estimated total Proved and Probable Ore Reserves at 71,000 tonnes U_3O_8 at an average grade of 0.51 percent U_3O_8. According to ERA, it is one of the world's largest high grade uranium deposits.[4]

History of Mine Development

Ranger

Energy Resources of Australia Ltd (ERA) sells uranium oxide from the Ranger mine and uranium concentrates sourced outside Australia to nuclear energy utilities in Japan, South Korea, Europe and North America. ERA, a 68.4 per cent owned subsidiary of Rio Tinto Australia, is the third-largest uranium mining company in the world.

The Ranger ore bodies were discovered by aerial radiometric survey in October 1969 by joint venturers Electrolytic Zinc Company of Australasia Ltd (EZ) and Peko-Wallsend Operations Limited (Peko). Drilling confirmed the feasibility of mining both the Ranger #1 and Ranger #3 orebodies by open cut means and the companies established Ranger Uranium Mines Pty Ltd to manage and develop the project.

The Commonwealth Government assumed half the ownership of the ore bodies in 1974. In October 1975 a Lodge Agreement was signed by the joint venture parties giving the Australian Atomic Energy Commission (AAEC), as the Commonwealth agent, ownership of the uranium. The AAEC also provided financial assistance for the development of the project.

The Ranger mine started operating in May 1980, and full production was reached in October 1981 at c.3300 tonnes per year of uranium oxide concentrate. Mining of Ranger #1 was by open pit, and from 1992-1995 this was on a campaign basis, with mining occurring for six months of the year during the dry season and the treatment plant being run for the other six months. Ranger #1 was mined out in December 1994 and stockpiles of this ore are still being utilised. In January 1996 there was a return to year-round milling, using stockpiled ore. Final approval for Ranger #3 was granted by the Northern Territory Government in May 1996 and open cut mining commenced in June of that year. This orebody was included in initial environmental

---

3 A. Milnes, 'Geological Summary of the Alligator Rivers Region', (unpublished), 2002.

4 Energy Resources of Australia, Press Release, August 2000.

approvals for Ranger. As at December 2001, Ranger had ore reserves of 22 million tonnes ore on stockpile and in situ at an average grade of 0.27 per cent containing 54,241 tonnes of U_3O_8[5]. In 2002 production at Ranger was 4470 tonnes of U_3O_8, sales were 4517 tonnes from Ranger and 628 tonnes from purchased materials.[6]

Mining of Ranger #1 was completed in December 1994. Since 1996 the Company has extracted ore from its Ranger #3 open pit. At the completion of mining, Ranger #1 had mined 18.036 million tonnes of ore at an average grade of 0.338 per cent U_3O_8 for a contained metal of 60,962 tonnes U_3O_8. In 2000 ERA was granted a second 26-year operating approval.

Jabiluka

The Jabiluka #1 uranium deposit in the Northern Territory was discovered in 1971 by Pancontinental Mining Limited. In 1973, further drilling located the larger Jabiluka #2 uranium orebody about one kilometre to the east.

In 1991 ERA purchased the lease on the Jabiluka ore body from Pancontinental Mining for $125 million. The Jabiluka uranium deposit is considered to be one of the largest undeveloped ore bodies of its type in the world.

ERA undertook a feasibility study of the Jabiluka development in 1993 and significantly altered the design of the project from that envisaged in the original Pancontinental plan. Construction commenced at Jabiluka in June 1998. To date, the mine consists of:

- An underground decline for access, mine development and exploration with a main tunnel approximately 1,150 metres long with cross-cuts and drives totalling about 667 metres
- Office and workshop facilities, including diesel storage tanks
- An 'Interim Water Management Pond' intended for one wet season
- A 'mineralised' stockpile of 47,000 tonnes of uranium ore and potentially acid-forming rock containing reactive sulphide minerals

---

5 Energy Resources of Australia Pty Ltd, website: www.energyres.com.au/ranger/geology.shtml

6 Energy Resources of Australia Media Release and Stock Exchange Announcement, 29 January 2003, p1.

- A 57,000 tonne 'non-mineralised' stockpile
- A 140 metre ventilation shaft for the underground decline
- Contaminated soils and other industrial wastes, and
- Sediment traps for erosion and drainage control

Work stopped on the mine in September 1999 after 47,000 tonnes of radioactive material and 57,000 tonnes of non-mineralised material was extracted in constructing the decline. The site is now in a 'long term environmental care and maintenance' mode.

Extraction and Processing Methods

Ore is currently being mined and milled at the Ranger open cut uranium mine. By contrast, Jabiluka is an underground, long-hole open stoping uranium mine and no extraction or processing has yet taken place there. If Jabiluka proceeded, processing methods would closely resemble those at Ranger[7].

The ore is crushed initially to a size finer than 19mm, mixed with water and ground to a size finer than 0.22mm in a grinding circuit that includes one rod and two ball mills to increase leaching efficiency. Excess water is removed in the thickener prior to it being pumped into leaching tanks containing sulfuric acid. Ninety per cent of the uranium is removed over a 24 hour period. The uranium solution is then separated from the depleted ore which is neutralised with lime before being deposited in the tailings dam. Next, the uranium solution is put through a clarifier and sand filters to remove any residual solids, after which the solution enters the solvent extraction plant where the uranium is selectively removed from the water into a kerosene solution. Ammonia is then used to precipitate the uranium from the strip solution. The uranium compound (ammonium diuranate) goes into a thickener to remove excess water and the commonly called yellowcake is produced. The latter is heated to a temperature of 800 degrees celsius in a calciner where the ammonia is driven from it to produce uranium oxide (U_3O_8). The product is then packed into 200 litre steel drums and loaded into shipping containers for transportation.[8]

---

7 Long-hole open stoping: A mining/stoping method employing long blast holes to fragment ore between/above developed levels or sub levels.

8 http://www.energyres.com.au/ranger/mill_diagram.pdf

The Approvals History

Ranger

For mining at Ranger to commence, a number of approvals were required from the Commonwealth, the Northern Territory Government and the traditional owners. For further detail of this see Chapter 1.

Table A5.1: Overview of Ranger Uranium Mine Approvals Process

	Action	**Date**
1.	Proponents of Ranger, Peko and EZ entered into contracts to supply Japanese nuclear utilities with uranium	1972
2.	Commonwealth Government approved contracts	November 1972
3.	Ranger Environmental Impact Statement completed	February 1974
4.	Justice Woodward delivered his Second Report to the Whitlam Government recommending a new form of Aboriginal statutory title and the right of veto over mining on their land	April 1974
5.	Environment Protection (Impact of Proposals) Act 1974 enacted	1974
6.	"Lodge Agreement" for Peko and EZ to mine uranium at Ranger entered into with the Whitlam Government providing for a 50% equity stake for the Commonwealth and for 72.5% of the capital costs to be met by the Commonwealth	October 1974
7.	Ranger Uranium Environmental Inquiry (Fox Inquiry) established to inquire into the proposal for the development by the AAEC in association with Ranger Uranium Mines Pty Ltd of uranium deposits in the Northern Territory	July 1975
8.	Fox delivered his first report which while not ruling out Ranger, recommended the	October 1976

	Government proceed with caution and that any decision be postponed until the second report is presented	
9.	First Fox report interpreted by Government and media as a green light for the mine	October 1976
10.	*Aboriginal Land Rights (Northern Territory) Act 1976* enacted by Fraser Government removing the Mirrar right of veto over Ranger	1976
11.	The Fox Inquiry presented its second and final report, finding that the 'hazards of mining and milling uranium, if those activities are properly regulated and controlled, are not such as to justify a decision not to develop Australian uranium mines.' But recommended that 'Policy respecting Australian uranium exports, for the time being at least, should be based on a full recognition of the hazards, dangers and problems of and associated with, the production of nuclear energy, and should therefore seek to limit or restrict expansion of that production.' Fox recommended that construction of uranium mines in Kakadu commence sequentially, that a national park be created, the Aboriginal land claimants be granted title and that Ranger and Jabiluka mine sites would be excluded from the national park Two weeks after publication of the Fox Report the Fraser Liberal Government announced that existing contracts for uranium supply would be filled, opening the door for future development	May 1977
12.	Ranger EIS approved by the Fraser Government	August 1977
13.	Agreement to mine at Ranger reached between the Commonwealth Government and the Northern Land Council (NLC) acting on behalf of the traditional Aboriginal land	1978

	owners	
14.	26 year Authority to mine at Ranger granted by the Commonwealth Government. Construction begun immediately	January 1979
15.	Release of the Agreed Working Arrangements on Procedures for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region	September 1979
16.	Ranger General Authorisation A82/3 issued. This consolidated other authorisations issued since the project began. The first of these was issued by the Mining Registrar in May 1974	3 June 1982
17.	Release of the Revised Working Arrangements for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region	September 1995
18.	Memorandum of Understanding (MOU) signed regarding the supervision and regulation of environmental aspects of uranium in the Alligator Rivers Region	September 1995
19.	Final approval to develop Ranger #3 granted.	May 1996
20.	Commonwealth Environmental Requirements re-issued for the operation of the Ranger mine	June 1999
21.	ERA's Authority (Section 41) to operate Ranger under the Atomic Energy Act was renewed for 21 years (plus 5 years rehabilitation period)	January 2000
22.	Ranger General Authorisation A82/3 re-issued	March 2000
23.	Agreement between the Commonwealth and the Northern Territory Governments in relation to principles to be observed in the regulation of uranium mining in the Alligator	November 2000

	Rivers Region	

Jabiluka

Table A5.2: Overview of Jabiluka Uranium Project Approvals Process

1.	Agreed Working Arrangements on Procedures for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region	September 1979
2	Pancontinental completed an EIS for an underground mine and milling facilities at Jabiluka	July 1979
3.	Jabiluka EIS approved	August 1979
4.	Pancontinental reached agreement with the Northern Land Council on mining at Jabiluka. Serious doubts have been raised about the means by which this agreement was reached	July 1982
5.	Northern Territory Government granted mining lease (ML N1) over the Jabiluka area for an initial period of 42 years following the signing of an agreement with the NLC. The agreement was approved by the Commonwealth Minister for Aboriginal Affairs	August 1982
6.	All necessary approvals provided for underground mining and ERA was able to seek sales	1982
7.	The newly elected Hawke Labor Government announced it's 'three mines policy', effectively halting the development of Jabiluka	1983
8.	The Commonwealth Social Impact Study into uranium mining in the Alligator Rivers Region criticises the administrative arrangements that leave Aboriginal people as 'problems, not participants', not assigned an active role	1984

9.	ERA purchased Jabiluka from Pancontinental for $125 million	1991
10.	Northern Land Council assigns Aboriginal agreement to ERA, on condition that the milling of Jabiluka ore at Ranger would require further consent from the Traditional Owners	1991
11.	ERA undertook feasibility study of milling the ore at Jabiluka which demonstrated that only milling at Ranger would be viable	1993
12.	Release of Revised Working Arrangements for Co-ordinating the regulation of the environmental aspects of uranium mining in the Alligator Rivers Region	September 1995
13.	Memorandum of Understanding signed regarding the supervision and regulation of environmental aspects of the uranium in the Alligator Rivers Region	September 1995
14.	Environment Australia, in response to the Jabiluka EIS releases its Environmental Assessment Report, saying *there would appear to be evidence of marginalisation of the Traditional Owners and the broader Aboriginal Community as a result of past decisions concerning development and management of the region*	1996
15.	ERA develops a new proposal to mine uranium at Jabiluka with the preferred option of milling uranium from Jabiluka at Ranger – the Ranger Mill Alternative (RMA) and developed an Environmental Impact Statement under the EPIP Act Draft Jabiluka RMA EIS presented to Commonwealth and Territory Governments	October 1996
16.	EIS for RMA forwarded to Northern Territory and Commonwealth Environment Ministers	June 1997

17.	Commonwealth Minister for the Environment makes recommendations to the Minister for Resources and Energy on the RMA EIS	August 1997
18.	Minister for Resources and Energy approves RMA EIS subject to 77 environmental conditions – the Jabiluka Requirements	October 1997
19.	Consultations with the NLC (representing the traditional owners) completed with regard to change in Jabiluka development	May 1998
20.	Commonwealth directs ERA to prepare a Public Environment Report (PER) for mining and milling at Jabiluka (JMA)	1998
21.	JMA PER submitted to Commonwealth Minister for the Environment with a 50-50 option for disposal of tailings underground and in surface pits	June 1998
22.	Northern Territory Minister for Resource Development authorised construction of common elements of the RMA and JMA—the portal and decline and associated facilities—and construction commences	June 1998
23.	Minister for the Environment reported to Minister for Resources and Energy on JMA PER	August 1998
24.	JMA PER approved subject to additional 'Jabiluka Requirements' that all the tailings be returned to the underground mine voids	27 August 1998
25.	Blasting and excavation of the decline begins	September 1998
26.	The approvals process for the Jabiluka uranium mine including the JMA and the RMA referred to the Senate Environment, Communications, IT & the Arts References Committee (ECITA)	30 May 1999
27.	ECITA reports, making 24 recommendations and finding serious flaws in the EIA process relating to the quality of the environmental	June 1999

	impact statements prepared by ERA, their assessment by government agencies and the level of assessment applied to the consideration of continuing scientific project uncertainties	
28.	Construction of the mine suspended	September 1999
29.	NLC advises that it will not consider the trucking of ore from Jabiluka to the Ranger mill for processing until at least 1 January 2005	October 1999
30.	North Limited is absorbed by Rio Tinto which publicly concedes that Jabiluka cannot proceed without support of Traditional Owners	August 2000
31	Agreement between the Commonwealth and Northern Territory Governments in relation to principles to be applied in the regulation of uranium mining in the Alligator Rivers Region, making particular reference to the 'Jabiluka Requirements' in the 1997 EIS and 1998 PER and includes a statement of intent to amend the Jabiluka Mineral Lease	November 2000
32.	Jabiluka Authorisation A98/2 re-issued	February 2001
33.	Office of the Supervising Scientist reports on mismanagement of low-grade ore stockpile at Ranger and the delayed reporting of environmental monitoring data at Jabiluka and ERA commits to: • External specialists to review environmental tasks and duties with a restructure of the ERA Environment Department to meet these requirements to follow • Replacing the ERA Environment Manager • The commissioning of a new environmental data management system that automatically alerts ERA	April 2002

	managers when reportable levels are exceeded • The ERA General Manager of Operations to attend all Minesite Technical meetings Improvements to internal communications systems to deliver a cultural shift towards better environmental management	
34.	Minister Kemp asks the Supervising Scientist to work with NT regulators to tighten enforceability of environment protection protocols and place monitoring information on the website[9]	23 April 2002

9 Dr Kemp, Minister for Environment and Heritage, Media Release, 23 April 2002.

Appendix 6

Environmental Incidents at Ranger – update August 2002

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).
- 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.

2002

- **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 µg/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 µg/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% U_3O_8) plus 3,600 t of 'Grade 3' material (0.08-0.12% U_3O_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 µg/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 µg/L and 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 µg/L allowed. The U and 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 µg/L - up to 100 times higher than normal. The RP1 sediment control bund, with uranium at 600 µg/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_2) 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 [1].
- **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 diurinate.
- **June (mid)** - Difficulties experienced in analysing water samples at the external analytical laboratories for ^{210}Pb, ^{210}Po and ^{230}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 $S0_2$ and $C0_2$ 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.

[1] 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).

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.
- **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^2.

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 dab 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_4 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_4 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^2 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^2 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^2.

- **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^2 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_2 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_2 analyser on acid plant damaged by acid.
- **March 4** - 1 m^2 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^2; 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.

Appendix 7

Timeline of Uranium Mining in Australia

Historic Projects

Mine	Year	Action
Radium Hill	1930's	Ore obtained from underground mine at Radium Hill to recover minute amounts of radium for medical purposes
	1954	U/g mine recommissioned and operated by SA Government to satisfy a cost-plus contract signed by the Commonwealth and SA Government with the UK-USA Combined Development Agency for delivery of Uranium over 7 years.
	1954-61	Mine operated with annual output of 970,000 t of 0.09-0.13% ore and the treatment plant operated from 1956 to 1962 presumably treating c.120,000 t of the 0.59-0.76% U concentrate to produce 850 t of uranium oxide
	1954-55	Mypongs mine nearby contributed about 1t of U_3O_8 (Uranium oxide) to the above
Rum Jungle	1949	Deposit discovered by local prospector
	1952 March	Commonwealth Government provided funds to set up mine to provide uranium oxide cons to the UK-USA Combined Development Agency (CDA) under a contract which ran from 1953 to 1962 • The Commonwealth, through the Australian Atomic Energy Commission (AAEC), was responsible for the mine, though management of it was on a contract basis by Territory Enterprises P/L a subsidiary of Consolidated Zinc P/L set up for that purpose. In 1962 Consolidated Zinc merged with interests of Rio Tinto Co Ltd to form ConZinc Rio Tinto of Australia Ltd.
	1950-53	The White's orebody developed underground

1953	White's open cut mine commenced
1954	Treatment plant commenced
1957-58	Dyson's open cut mined
1958	White's open cut mined out at depth of over 100m
1958	Small amount of ore mined from Mt Burton open cut
1958	Tailings from Rum Jungle put into White's Pit
1960	Rum Jungle South Creek orebody discovered by Territory Enterprises (no sales contract)
1961	Commonwealth Government decided to proceed with development and deposit was mined from 1961 to 1963 to a depth of 67m. Ore stockpiled for treatment beyond the Jan1963 expiry of CDA contract. • The product was to be offered on the open market or stockpiled at AAEC in Sydney until market improved in the 1970's. About 2000 t of yellowcake was therefore stockpiled by the time the mine closed in 1971
Up to 1962	AAEC purchased high grade ore from other deposits for treatment at Rum Jungle
1962	Treatment plant changed process from acid leach and ion exchange to solvent extraction and magnesia precipitation to treat Rum Jungle ore.
1971	Mine closed
1977	Attempts to clean up Rum Jungle (it had become one of Australia's most notorious pollution problems)
1983-88	Commonwealth funded project to rehabilitate mine ($16.2m)

	1990-91	Work to improve Rum Jungle waste dumps ($1.8m)
Mary Kathleen	1954	Deposit discovered by Prospectors
	1955	Mary Kathleen Uranium Ltd (MKU) formed with majority of shares held by Rio Tinto Co of Australia Ltd.
	1956	Sales contract with UK Atomic Energy Authority signed
	1956 end of	Mining commenced
	1958 June	Treatment plant commissioned
	1958-63	First phase of mining – treated 2.9m t of ore at average grade of 0.135 for a yield of 4082t (4500 short tons or 9 million pounds weight of U_3O_8) of uranium concentrate
	1960	Electric radiometric ore sorting introduced to concentrate ore prior to crushing which resulted in a head grade increase of 0.17% to 0.24%.
	1963 Oct	Mine closed and plant put on care an maintenance • Improvements in treatment plant meant the contract was filled faster than the 9yrs originally envisaged • Ore reserves of 2.8 m t at 0.148% remained
	1970's early	New contracts with utilities in Japan, Germany and the USA were negotiated
	1974	Recommissioning began, Co made share issue to raise capital and Commonwealth Government underwrote it through the Australian Atomic Energy Commission (AAEC)
	1976	Mine and mill reopened. The plants ion exchange section replaced with a more effective solvent extraction process
	1982	Mine depleted and mine finally closed down after 4802 t of uranium oxide cons had been produced in 2nd phase of mining
	1985	Rehabilitation of site completed at a cost of $19 m

	1986	Rehab work won award from Institute of Engineers Australia for environmental excellence
	Late 1980's	MKU liquidated after Mary Kathleen leases relinquished
Narbarlek	1959	Queensland Mines Ltd formed as uranium exploration company.
	1970 May	Deposit discovered (small high grade deposit just inside Arnhem Land) • Agreement reached with Northern Land Council (NLC) and other indigenous groups to enable development
	1979	Queensland Mines opened N. Orebody mined out in just over 4 months of dry season and 600,000t with average grade of 2% ore stockpiled for treatment from 1980
	1981-88	A total of 10,858 t of U_3O_8 produced @ 1500t/y and sold to Japan, Finland and France
	Post 1983	Narbarlek remained 1 of 3 mines approved under ALP 3 mines policy
	1994	Part of plant sold after decontamination to very stringent standards - chemically and radiologically. Rehabilitation commenced
	1995	Rehabilitation work completed at end of year
	1998	Vegetation becoming well established with little erosion. • Monitoring and research continues

South Alligator Mines	1953	First of a group of deposits/mines discovered • 2 companies involved in area – United Uranium NL (UUNL) and South Alligator Uranium NL (SAU NL) – each with its own treatment plant drawing on ore from different mines
	1956-57	UUNL negotiated contract with US Atomic Energy Commission to supply 200t of pitchblende ore, and concentrates from El Sharana mine. Plant commenced production in October
	1957	SAU NL continued underground exploration at Rockhole prospect and discovered Coronation Hill orebody
	1958	SAU NL commenced construction of small treatment plant at Rockhole Creek
	1958	The two Co's (UUNL and SAUNL) contracted with UK Atomic Energy Authority for supply of uranium oxide from the South Alligator mines. • UUNL then purchased North Hercules gold plant at Moline (65kms away) and converted it for acid leaching and solvent extraction of uranium oxide with magnesia precipitation
	1959 May	Moline plant commissioned
	1959 Sept	Rockhole Creek plant commissioned
	1962 June	Rockhole Creek plant reopened (for 3 months) to produce 24 t of U_3O_8 for sale on open market.
	1962 end	Rockhole Creek plant sold and partly dismantled
	1963	UU NL treated 15,000 t of 0.69%U_3O_8 of ore at Moline
	1964	Coronation Hill mine ended
	1964-65	Moline plant converted to extract Au from tailings and finished in Oct '65.

Current Projects

Jabiluka

Year	Action
1971	Jabiluka 1 uranium deposit discovered by Pancontinental Mining Ltd
1973	Further Drilling located larger Jabiluka 2 orebody (1km to east)
1977	Fox Inquiry presented its second and final report. The report found that the 'hazards of mining and milling uranium, if those activities are properly regulated and controlled, are not such as to justify a decision not to develop Australian uranium mines.'
	Pancontinental completed an Environmental Impact Statement for an underground mine and milling facilities at Jabiluka
1979 August	Environmental Impact Statement approved
1979 September	Release of the Agreed Working Arrangements on Procedures for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region.
1982	By end of year all necessary mining and environmental approvals had been obtained for undergound mining of Jabiluka 2 orebody and Co cleared to seek sales contracts. Significant marketing progress was made and firm commitments obtained for supply of 15,600 t of uranium oxide over 10yrs. However in 1983 ALP Government came to power and withdrew approval and development ceased.
1982 July	Pancontinental reached an agreement with the Northern Land Council on mining at Jabiluka
1982 August	Mineral Lease MLN1 granted by Northern Territory for 42yrs following agreement with Northern Land Council (NLC) representing the traditional landowners
1983	ALP Government came to power and introduced "3 Mines" policy ending Jabiluka 2 work
1987	Pancontinental bought the 35% equity in project then held by Texaco.

1991 August	Energy Resources Australia Ltd (ERA) purchased lease from Pancontinental for A$125 m
	NLC assigns Aboriginal agreement to ERA
1993	ERA undertook feasibility study (incl 12,000m drilling) ERA published proved and probable reserves of 19.5m t at average grade of 0.46% U_3O_8 containing 90,400 tons of uranium oxide. ERA reduced projects footprint from 820 to 80 hectares
1995 September	Release of the Revised Working Arrangements for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region
	Memorandum of understanding (MOU) signed regarding the supervision and regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region
1996 May	Senate Select Committee established on uranium mining and milling
1996 October	Draft Jabiluka EIS presented to Commonwealth and Territory Governments
1997 May	Senate Select Committee on uranium mining and milling released report
1997 June	EIS for the Ranger Mill Alternative (RMA) forwarded to Northern Territory and Commonwealth Ministers
1997 August	Commonwealth Minister for the Environment makes recommendations to the Minister for Resources and Energy on the RMA EIS
1997 October	EIS for mining Jabiluka 2 orebody and milling the ore at Ranger (Ranger Mill Alternative) approved subject to environmental conditions
1998 May	NLC approved development of underground mine thereby completing the Aboriginal approvals process under 1982 Agreement. • ERA continues to negotiate with the traditional owners regarding the location of the mill. • Mine development is on standby with environmental maintenance and planning
1998 June	Jabiluka Mill Alternative (JMA) Public Environment Report (PER) submitted to Commonwealth Minister for the Environment
	Northern Territory Minister for Resource Development approves development of the Jabiluka mine
1998 August	Minister for Environment report ed to Minister for Resources and Energy on JMA PER

	Public Environmental Report (PER) on the alternative of milling ore at Jabiluka approved conditional upon all tailings being emplaced underground.
1998 September	Work on portal and decline commenced
1999 April	Senate Inquiry into Jabiluka Uranium Mine Project referred to Senate ECITA Committee
1999 June	Report of ECITA Committee into Jabiluka Uranium Mine Project released
1999 October	NLC advises that it will not consider the trucking of ore from Jabiluka to the Ranger mill for processing until at least January 2005
2000	Intensive drilling led to a revision of the overall resource • Proved and probable ore reserves stand at 13.8Mt ore @0.51%, containing 71,000 t U_3O_8 • Overall measured and indicated resources are 88,000 t U_3O_8 in 0.57% material, and inferred resources a further 75,000 t in 0.48%. (figures based on 0,20% cut off grade)
2000 November	Agreement between the Commonwealth and Northern Territory Governments in relation to principles to be applied in the regulation of uranium mining in the Alligator Rivers Region
2001 February	Jabiluka Authorisation A98/2 re-issued
Present	Jabiluka is on long term environmental care and maintenance. Company will not proceed to mine without consent of traditional landowners

Ranger

Year	Action
1969	Orebody discovered by a Joint Venture of Peko Wallsend Operations Ltd (Peko) and The Electrolytic Zinc Company of Australia Ltd (EZ)
1974	Lodge Agreement set up Joint Venture between Peko, EZ and the Australian Atomic Energy Commission (AAEC)
1974 February	Ranger Environmental Impact Statement completed
1974 May	First approval/authorisation issued (for sand dredging) by Mining Registrar
1975	Ranger Uranium Environmental Inquiry (Fox Inquiry) established to review effects of uranium mining in the Alligator Rivers Region
1976	First Fox Inquiry Report
1977	Fox Inquiry presented its second and final report. The report found that the 'hazards of mining and milling uranium, if those activities are properly regulated and controlled, are not such as to justify a decision not to develop Australian uranium mines.'
1977 August	Ranger Environmental Impact Statement approved by the Fraser Government
1978	Following a wide ranging public inquiry (the Ranger Uranium Environmental Inquiry) and publication of its 2 reports (Fox Reports), agreement was reached between the Commonwealth Government and the Northern Land Council (NLC), acting on behalf of the traditional owners. • Terms of the Joint Venture were finalised and Ranger Uranium Mines Pty Ltd was appointed manager of project
1979 January	26 year Authority to mine at Ranger granted by the Commonwealth Government. Constructed began immediately
1979 May	First authorisation issued under the Uranium Mining (Environmental Control) Act
1979 August	Commonwealth Government announced intention to sell interest in project. Energy Resources Australia Ltd (ERA) was set up with 25% equity holding by overseas customers
1979 September	Release of the Agreed Working Arrangements on Procedures for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region.

1980	Energy Resources of Australia Ltd established. In establishing the company the AAEC interest was bought out for $125 million (plus project costs) and Peko and EZ became major shareholders. Ranger Uranium Mines P/L became a subsidiary of ERA
1980	Mine commenced operation
1981 October	Full production at rate of 3300t/y of concentrates
1982 June	Ranger General Authorisation A82/3 issued. This consolidated other authorisations issued since the project began.
1987-1988	EZ's interest in project taken over by North Broken Hill Holdings Ltd and that Co merged with Peko. • Consequently ERA became a 68% subsidiary of North Ltd. And this holding was taken over by Rio Tinto Ltd in 2000
1992-1995	Mining of Ranger #1 on a campaign basis
1995 September	Release of the Revised Working Arrangements for Co-ordinating the Regulation of the Environmental Aspects of Uranium Mining in the Alligator Rivers Region
	Memorandum of understanding (MOU) signed regarding the supervision and regulation of Environmental Aspects of Uranium Mining in the Alligator Rivers Region
1996 May	Senate Select Committee established on uranium mining and milling
	Final approval to develop Ranger #3 granted
1997 May	Senate Select Committee on uranium mining and milling released report
1997	Completion of mill capacity upgrade
1998	Cameco obtained 6.45% interest in the company by its acquisition of Uranerz
1999 June	Commonwealth Environmental Requirements re-issued for the operation of the Ranger mine
2000	Rio Tinto took over ERA & North Ltd
2000 January	ERA's Authority (Section 41) to operate Ranger under the Atomic Energy Act was renewed for 21 years (plus 5 years rehabilitation period)

2000 March	Ranger General Authorisation A82/3 re-issued
2000 November	Agreement between the Commonwealth and the Northern Territory Governments in relation to principles to be observed in the regulation of uranium mining in the Alligator Rivers Region
2003 February	Amendments to General Authorisation A82/3. This version is known as Authorisation 0108-01

Beverley

Year	Action
1969	Deposit discovered by OTP Group (Olimin NL, Transol NL, & Petrmin NL)
1982	Draft EIS produced, but plans to mine by ISL were abandoned 1983 owing to ALP's "Three Mine Policy" and South Australian Government declaration that approval would not be granted
1983	Plans to mine by ISL abandoned when SA Government refused to grant permission for development to proceed (ALP "3 mines" policy). SA Government made it clear that mining lease would not be approved.
1990	Formation of Heathgate Resources Pty Ltd
	Deposit sold to Heathgate Resources Pty Ltd (affiliate of General Atomics of USA)
1996	Heathgate began reassessing Beverley Project
1997 Nov	Permission granted by South Australian Government to conduct field leach trials
1998	Successful field leach trial with recoveries 3x what was expected, establishing the project as commercially viable
1998 June-August	Draft Environmental Impact Statement released for public comment
1998 October	Supplement Environmental Impact Statement released
1999 March	Environmental and other approvals given and mine construction subsequently followed
1999 April	Mining Lease No. 6036 granted by South Australian Government and mine construction commenced
1999 July	Final Report by Heathgate Resources to Department of Primary Industry and Resources (PIRSA) on the 1998 field leach trials
1999 Mid	Construction of ISL plant commenced
2001 January	Commercial production commenced

Honeymoon

Year	Action
1972	Deposit discovered
1970's	Plans to develop and extract uranium oxide by ISL. Draft and Final EIS's produced.
1981	Both South Australian and Commonwealth environmental approval obtained for production of 450t/yr. Field tests carried out and pilot plant (110 t/yr) built
1983	Project abandoned due to the ALP's "3 mines" policy
1997	Sedimentary Holdings NL reached an agreement with MIM Holdings Ltd to acquire the Honeymoon and two adjacent deposits next to its own East Kalkaroo deposits (purchase funded by Southern Cross Resources Inc of Toronto Canada)
1997 June	South Australian Minister for Mines and Energy directed that an EIS be prepared
1997 August	Commonwealth Minister for the Environment and Heritage determined that an EIS be undertaken jointly with South Austrlai taking the lead role
1997 October	Declaration of Environmental Factors (DEF) written re: permission to conduct trials. Was not made public until after April 1998 when permission was granted
1997 October-November	Draft EIS Guidelines released for Public Comment
1998	Field leach trials using refurbished plant resumed, and have confirmed viability
1998 August	Final EIS Guidelines released
1999 April	Agreement reached with Original Native Title claimants, the Kuyani
2000 June- August	EIS covering Honeymoon-East Kalkaroo deposits on 5 Mineral Claims released
2000 July	Public meetings held in Cockburn and Adelaide

2000 Nov	Response Supplement for Honeymoon Uranium Project EIS released, and conditional approval for granted
2001 Jan	Assessment Report on the EIS for the proposed Honeymoon Project released by Environment Australia (EA)
2001 February	Commonwealth Minister for the Environment and Heritage indicated that additional information was required
	Terms of reference for Additional Evaluation of Aquifer released by Commonwealth Minister
2001 July	Honeymoon Uranium Project, Further Characterisation of the Yarramba Palaeochannel Report released by SXR (summarising 3 technical reports commissioned by SXR)
	Environment Australia commissioned 3 expert assessments of the above reports, by the Australian Geological Survey Organistaion (now Geoscience Australia), the Bureau of Rural Sciences and Dr Mark Pirlo.
2001 Nov	Addendum to the Assessment Report on EIS released by EA
2001 Nov 21	Federal Minister for the Environment and Heritage announced approval of EIS
2001 Nov 26	Federal Minister for Industry, Science and Resources issued an Export Licence for the export of natural uranium concentrates from Honeymoon
2001 Dec	State Mining Lease Approval
2002 Feb 7	A Native Title Agreement was concluded with the Adnyamathanha Native Title Claimants.
	Mining Lease 6091 was issued by Minister for Primary Industry and Resources of the SA Government

Major Commonwealth Inquiries and Reports relating to Uranium Mining.

1976 October	First Fox Report – Ranger Uranium Environmental Inquiry - Whether Australia should mine and export uranium
1977 May	Second Fox Report - Ranger Uranium Environmental Inquiry – Proposed Development of Ranger
1986 October	Ranger Uranium: Water Management System PPNo. 273/86. Government responded in November 1987 - House of Representatives inquiry
1988 November	The Potential of the Kakadu National Park Region, PPNo. 389/88 - Senate Standing Committee on Environment, Recreation and the Arts.
1991	Mining and Minerals Processing in Australia (4 Vols) – Industry Commission
1991 April	Kakadu Conservation Zone Inquiry Final Report – Resources Assessment Commission
1996 April	Report of the Senate Select Committee on Radioactive Waste. In response to this the Senate decided to reconstitute the Committee as the Select Committee on Uranium Mining and Milling.
1996 May	Senate Select Committee established to report on Uranium Mining and Milling
1997 May	Senate Select Committee on Uranium Mining and Milling released report
1999 April	Australia's Kakadu – Government response to UNESCO World Heritage Committee regarding Kakadu National Park.
1999 April	Senate Inquiry into Jabiluka Uranium Mine Project referred to ECITA Committee
1999 June	Report of ECITA Committee into Jabiluka Uranium Mine Project released
2002 June	Senate Inquiry into Environmental Regulation of Uranium Mining

Appendix 8

Glossary of Terms

Aquifer	Permeable rock formation capable of storing and permitting the transmission of water
Complexing	The process of converting insoluble minerals to a form which can be transported in effect as a solution. *Complexing agents* are the specific chemicals used.
Excursion	The migration of leach solution from the mining zone in the wellfield either horizontally or vertically
Extraction well	A screened water bore capable of removing fluids from an aquifer. Also known as a 'production well'.
Fault	A fracture in rocks along which some displacement (the throw of the fault) has taken place. The displacement may vary from a few millimetres to thousands of metres.
Gamma radiation	Form of electromagnetic radiation similar to light or X-rays, characterised by high energy and strong penetration of matter. Emitted from a nucleus left in an excited state after emission of alpha or beta particle.
Geosyncline	A major elongated downwarp of the Earth's crust, usually hundreds of kilometres long and filled with sediments and lavas many kilometres in thickness.
Injection well	Screened water bore capable of injecting fluid into an aquifer
In situ leach (ISL)	Chemical leaching of ore conducted by introducing lixiviant to sub surface geological strata
Ion exchange (IX)	The transfer of uranium from pregnant lixiviant to resin beds in an ion exchange column. The process is very similar to that applied in domestic water softeners.
Macroinvertebrate	Animals that have no backbone and are visible without magnification.
Mineral	A naturally occurring substance of more or less definite chemical composition and physical properties.

Mineralisation	Term used almost exclusively for the introduction of ore minerals and gangue (valueless) minerals into pre-existing rocks, whether by veins, replacement or in a dissemination fashion
Natural Attenuation	The dilution, dispersion, (bio)degradation, irreversible sorption, and/or radioactive decay of contaminants in soils and groundwater. It causes a net reduction of contaminant toxicity and human and ecological risk.
Ore	Term applied to any metalliferous mineral from which the metal may be profitably extracted.
Ore Reserves	Ore whose grade and tonnage has been established by drilling etc. with reasonable assurance
Overburden	Useless material which overlies a bed of useful material
oxidant	An oxidising agent – a substance that brings about oxidation by being reduced and gaining electrons.
Palaeochannel	Ancient river or stream channels that have been preserved in the sedimentary record.
Permeability	The capacity of a porous rock for transmitting a fluid
pH	A measure of hydrogen ions in solution; it indicates acidity (pH 1 to 7) or alkalinity (pH 8 to 14) of an aqueous solution
Precipitation	The process of producing a separable solid phase within a liquid medium by chemical reaction
Pregnant Solution	Mining solution/lixiviant containing mineral components leached from the ore body
Radiation dose	A measure of the amount of radiation absorbed by the body and the damage this radiation causes the person. This is determined by the type and energy of the radiation (alpha, beta, gamma), and the exposure scenario. Units of dose are Sieverts (Sv).
Radionuclide (radioisotope)	Isotope which is unstable and undergoes natural radioactive decay.
Radon	A radioactive element (Rn)
Radon daughters/Radon	Series of radionuclide resulting from the radioactive

progeny`	decay of radon.
Solution (Lixiviant/leachate)	Water, usually groundwater from the ore zone aquifer, to which chemicals including complexing agents and oxidants have been added to leach minerals from ore.
Solvent Exchange (SX)	A separation process in which two water-based and organic-based solvents are brought into contact for the transfer or recovery of a component, in the present case uranium. It so known as liquid exchange.
Tailings	The waste material remaining after the processing of finely ground ore.
Tailings dam	Facility where tailings / mill residues are stored after treatment.
Tertiary period	First period of the Cenozoic covering an approximate time span from 65-2 million years ago
Three Mine Policy	
Totally Dissolved solids (TDS)	Measurement of all mineral elements found in water
Uraninite	Uranium oxide, UO_2. Known as *pitchblende* when massive and apparently amorphous.
Well casing	In unconsolidated sands wells must be cased using black steel pipes, for structural purposes to ensure that the hole does not cave. It also prevents exchange of liquor from the inside to the outside.
Yellowcake	A name originally given to the bright yellow substance ammonium diuranate (ADU), now applied to a mixture of uranium oxides, principally U_3O_8, which may be yellow or dark green in colour.

Acronyms

AAEC	Australian Atomic Energy Commission
ACF	Australian Conservation Foundation

AGSO	Australian Geological Survey Organisation, now known as Geoscience Australia
ARR	Alligator Rivers Region
ANSTO	Australia Nuclear Science and Technology Organisation
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Asutralia and New Zealand
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ARRTC	Alligator Rivers Region Technical Committee
ARRAC	Alligator Rivers Region Consultative Committee
ASNO	Australian Safeguards and Non-Proliferation
ATLA	Adnyamathanha Traditional Lands Association
BECC	Beverley Environmental Consultative Committee
CCSA	Conservation Council of South Australia
CFMEU	Construction, Forestry, Mining and Energy Union
CIM	Chief Inspector of Mines
DAIS	Department of Administration and Information Services (SA)
DBIRD	Department of Business, Industry and Resource Development, Northern Territory
DEF	Declaration of Environmental Factors
DITR	Department of Industry, Tourism and Resources, (Cth)
EA	Environment Australia
EIS	Environmental Impact Assessment
EMMP	Environmental Mine Management Plan
EMP	Environmental management Plan
EPA	Environmental Protection Authority
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*

EPIP	*Environment Protection (Impact of Proposals) Act 1974*
ERA	Energy Resources of Australia Pty Ltd
ERISS	Environmental Research Institute of the Supervising Scientist
ER's	Environmental Requirements
EWLS	Earth-Water-Life Sciences Pty Ltd
FLT	Field Leach Trial
FoE	Friends of the Earth
FRAHCC	Flinders Ranges Aboriginal Heritage Consultative Committee
GAB	Great Artesian Basin
GAC	Gundjehmi Aboriginal Corporation
HAZOP	Hazard and Operability Study
HECC	Honeymoon Environmental Consultative Committee
IAEA	International Atomic Energy Agency
ICSU	International Council of Science
ISO	International Standards Organisation
ISP	Independent Science Panel
IUCN	International Union for Conservation of Nature
IWMP	Interim Water Management Pond
JMA	Jabiluka Mill Alternative
JTC	Jabiru Town Council
KBM	Kakadu Board of Management
KRAC	Kakadu Research Advisory Committee
KRSIS	Kakadu Region Social Impact Study
LHMU	Liquor, Hospitality and Miscellaneous Workers Union
MARP	Mining and Rehabilitation Program
MOU	Memorandum of Understanding

MTC	Minesite Technical Committee
NLC	Northern Land Council
NCTWR	National Centre for Tropical Wetland Research
OSS	Office of the Supervising Scientist
PAEC	Potential Alpha Energy Concentrations
PAN	Parks Australia North
PER	Public Environment Report
PIRSA	Department of Primary Industries and Resources, South Australia
RMA	Ranger Mill Alternative
RMP	Radiation Management Program
RP1	Retention Pond 1
RRZ	Restricted Release Zone
RWMP	Radiation Waste Management Program
SACOME	South Australian Chamber of Mines and Energy
SSD	Supervising Scientist Division
SXR	Southern Cross Resources
TDS	Totally Dissolved Solids
TLD	Thermo-luminescent dosimeter
UMEC	Uranium Mining (Environmental Control) Act

Ma	million years
mSv	millisieverts
Sv	Sievert
µSv	micro Sieverts
ppm	parts per million
ppb	parts per billion

µg/L	micrograms per litre
U	Uranium