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

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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

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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

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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. …

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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]

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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.
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> …(to) …and the s.43 Jabiluka Agreement.[23]

2.30 The GAC points out that:

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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.
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> 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].
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> 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.
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> 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]

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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

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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]

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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

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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

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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]

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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:

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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.

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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**

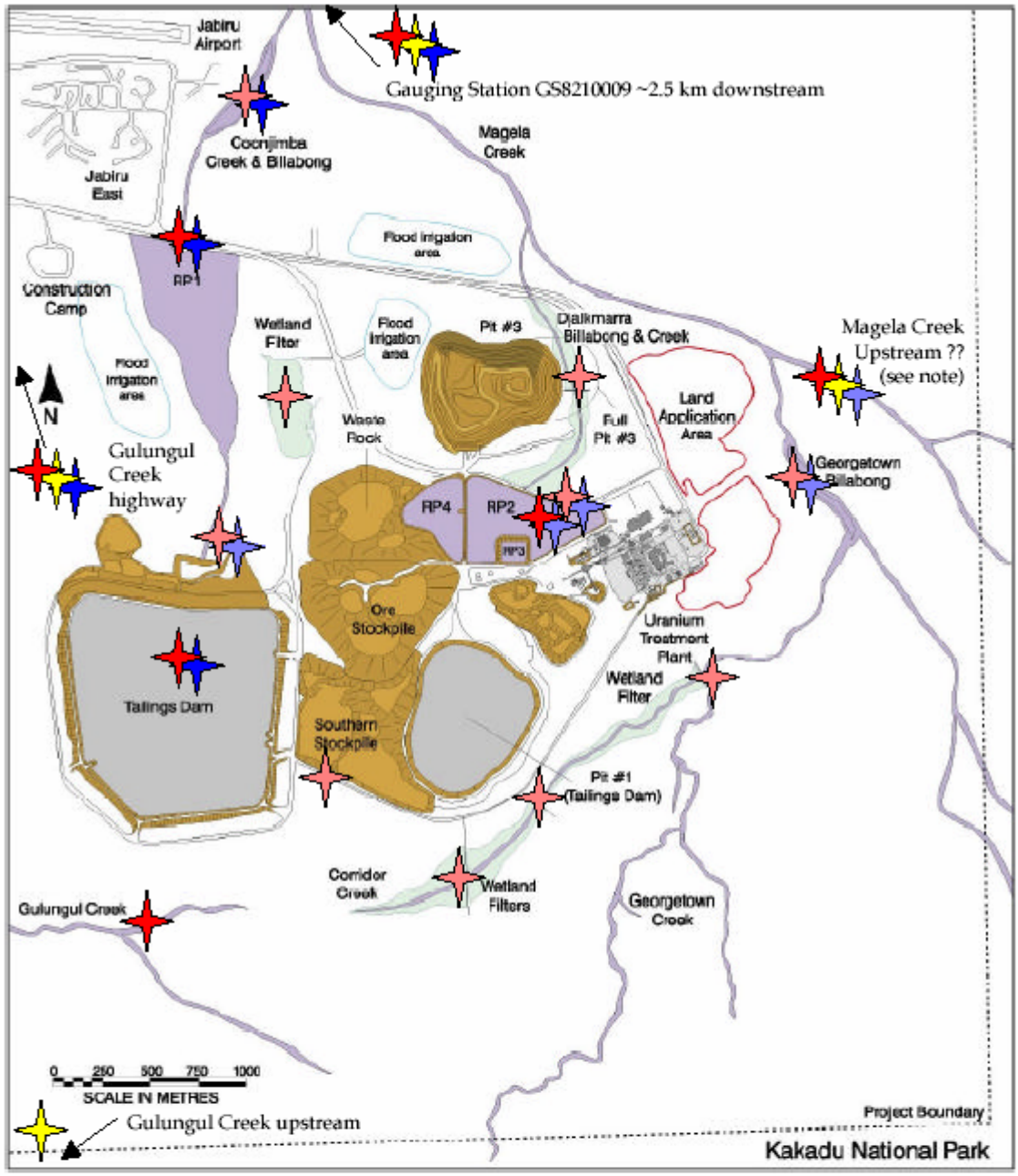

Figure 5 – Surface water monitoring of the Ranger Project

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**

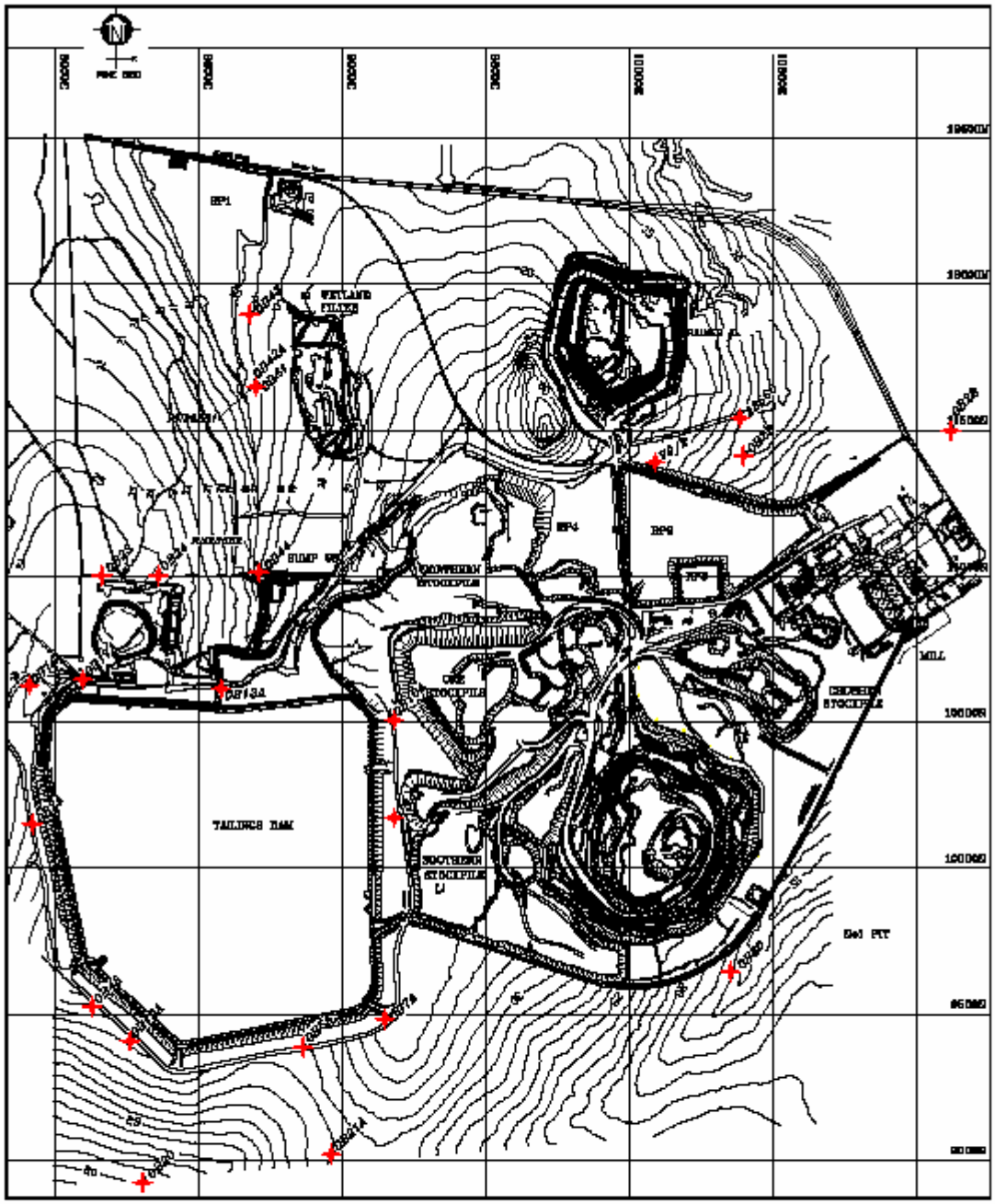

Figure 6 – Groundwater monitoring (ERA) of the Ranger Project (ERA-RAER, 2001)

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**

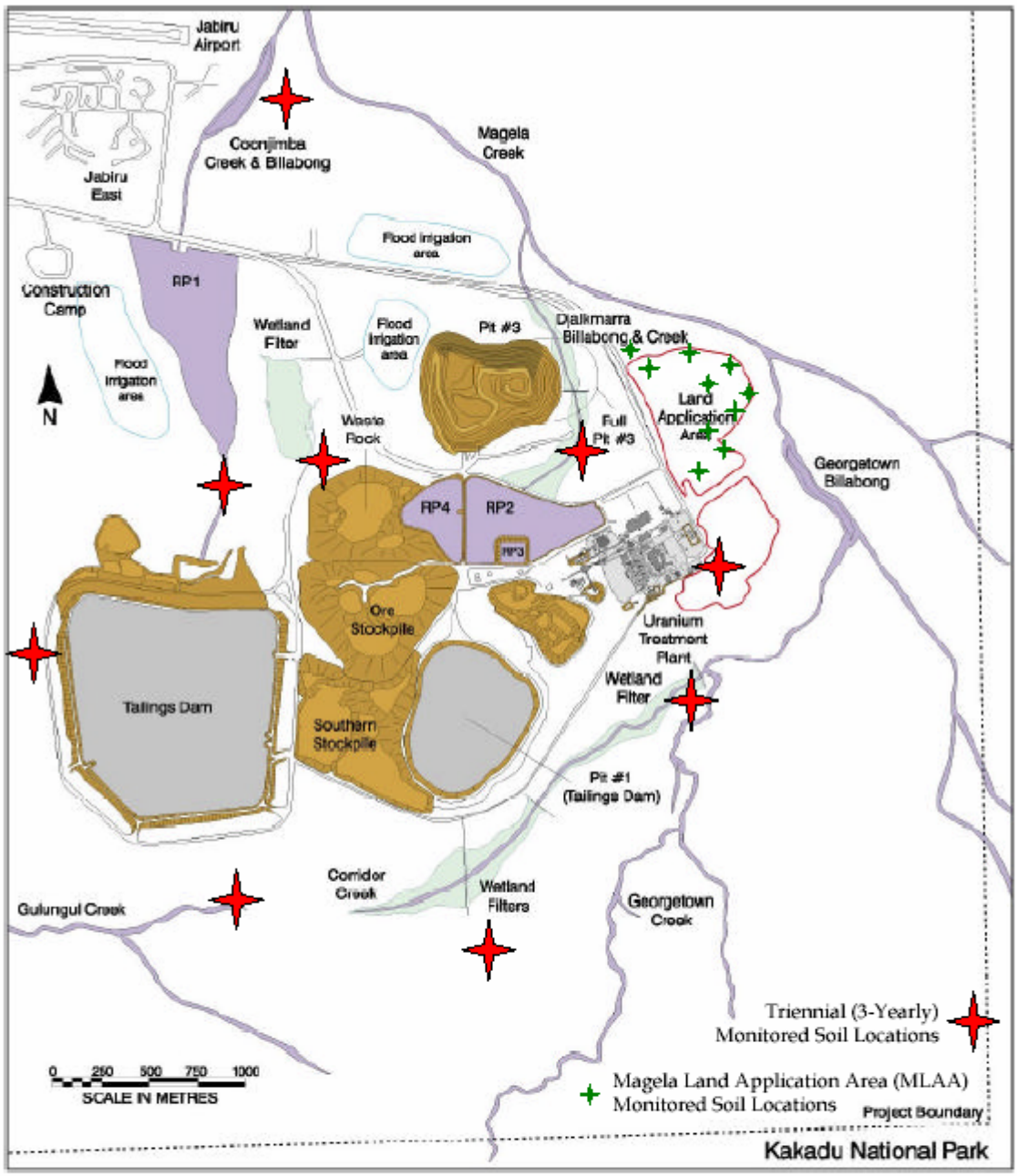

Figure 7 – ERA soil monitoring locations at the Ranger site
(drawn from ERA-RAER, various)

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**

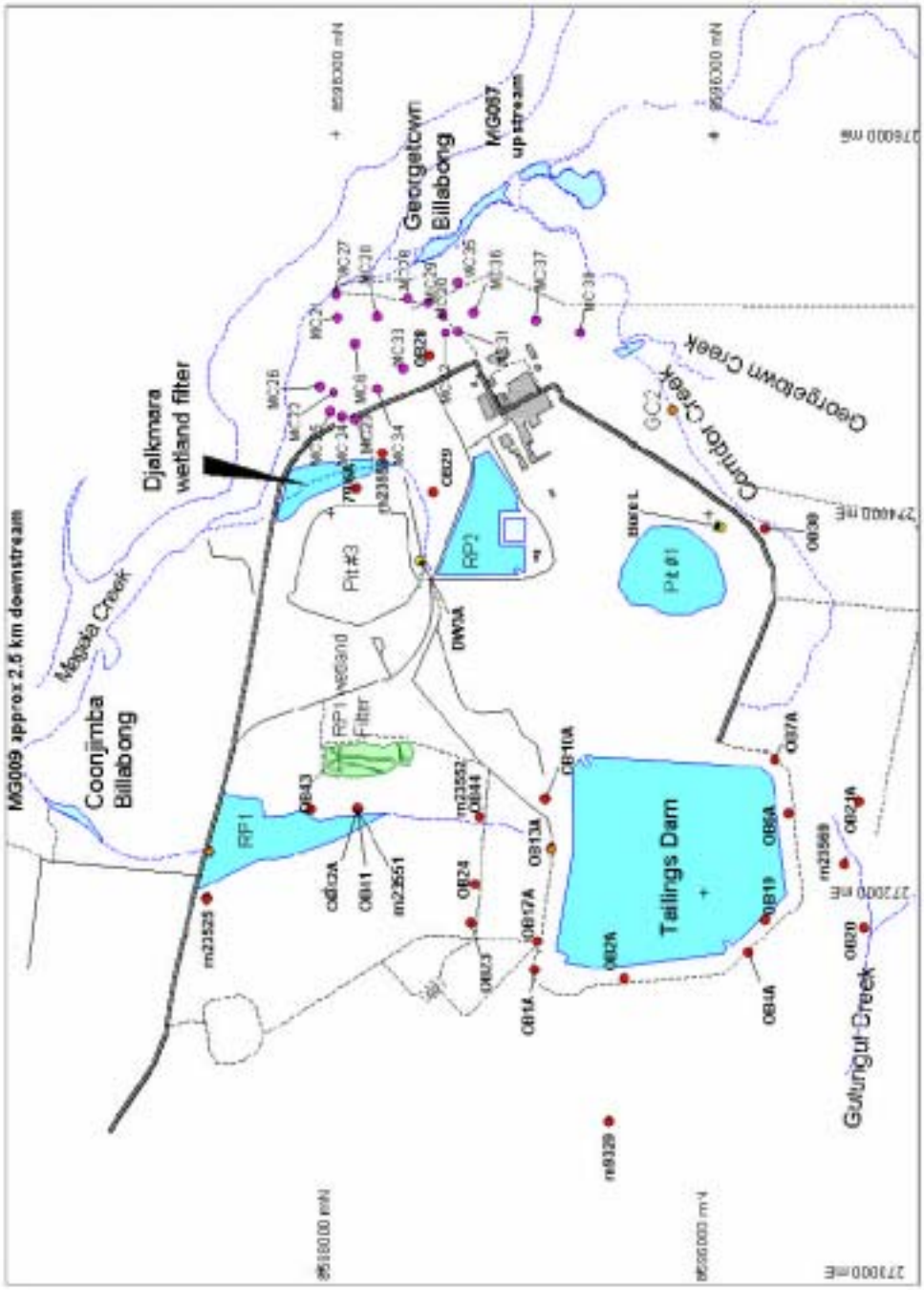

Figure 8 – General layout of DBIRD surface and groundwater monitoring locations (NTSA, various) (Electronic copy courtesy DBIRD)

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.

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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

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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:

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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]

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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.

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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.

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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]

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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]

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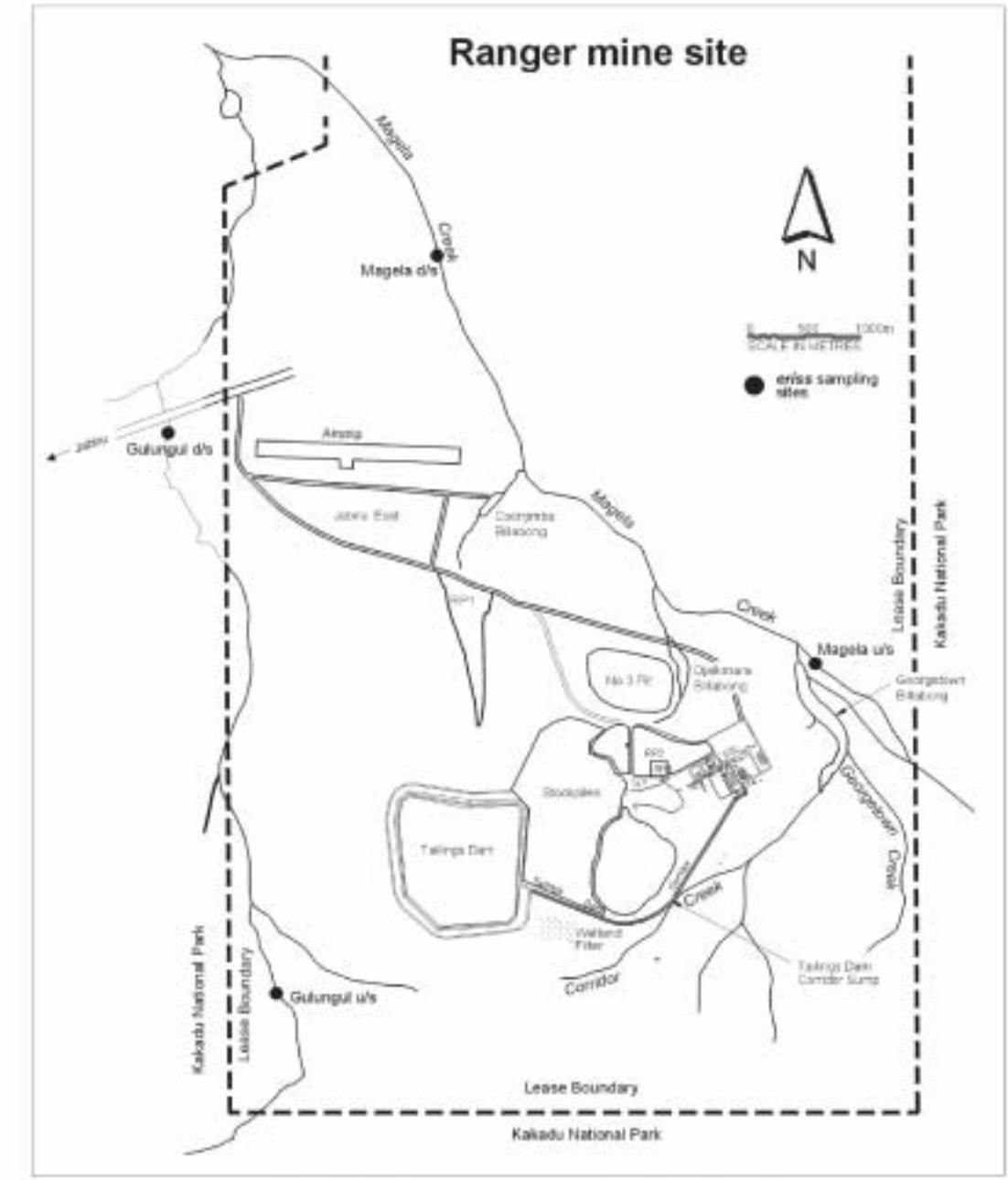
90 Gundjehmi Aboriginal Corporation, *Submission 58*, p 73.

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

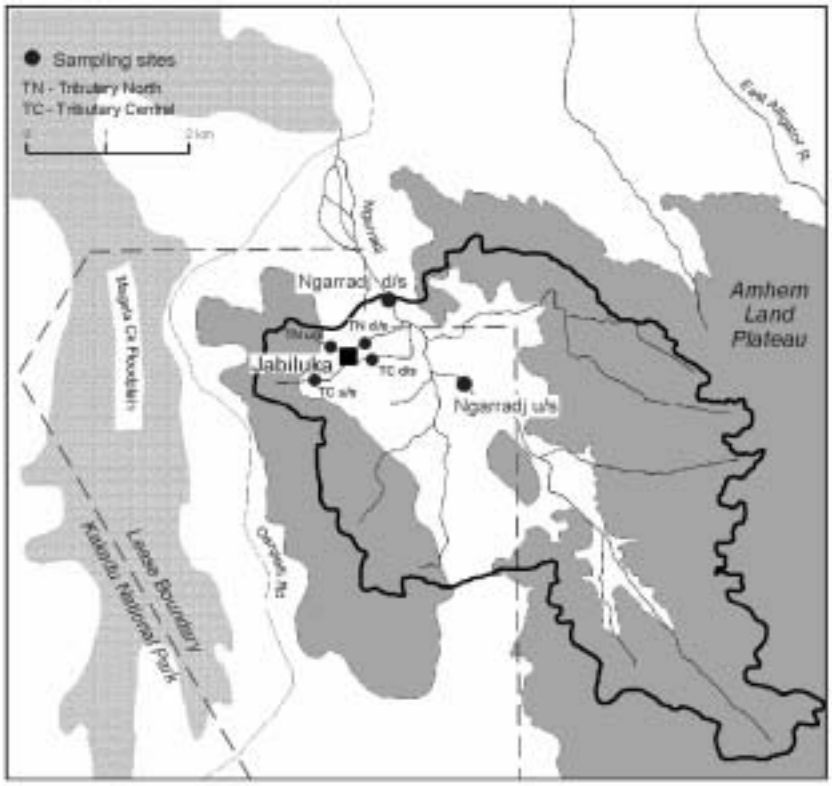
d/s downstream monitoring point

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

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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.

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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

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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]

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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:

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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*

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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:

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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;

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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.

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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;

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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]

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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.

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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.

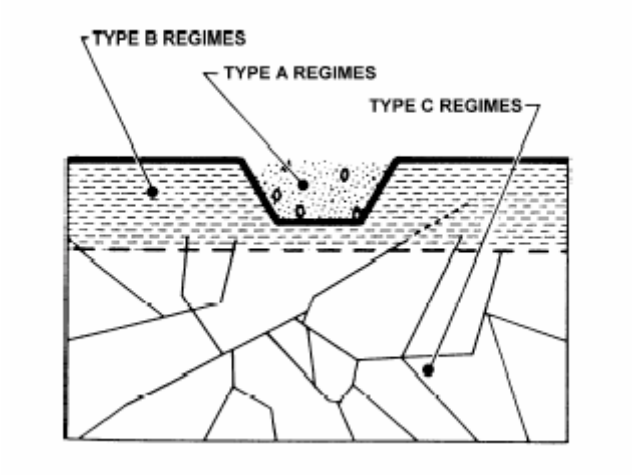
158 Gundjehmi Aboriginal Corporation, *Submission 58*, p 67.

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.

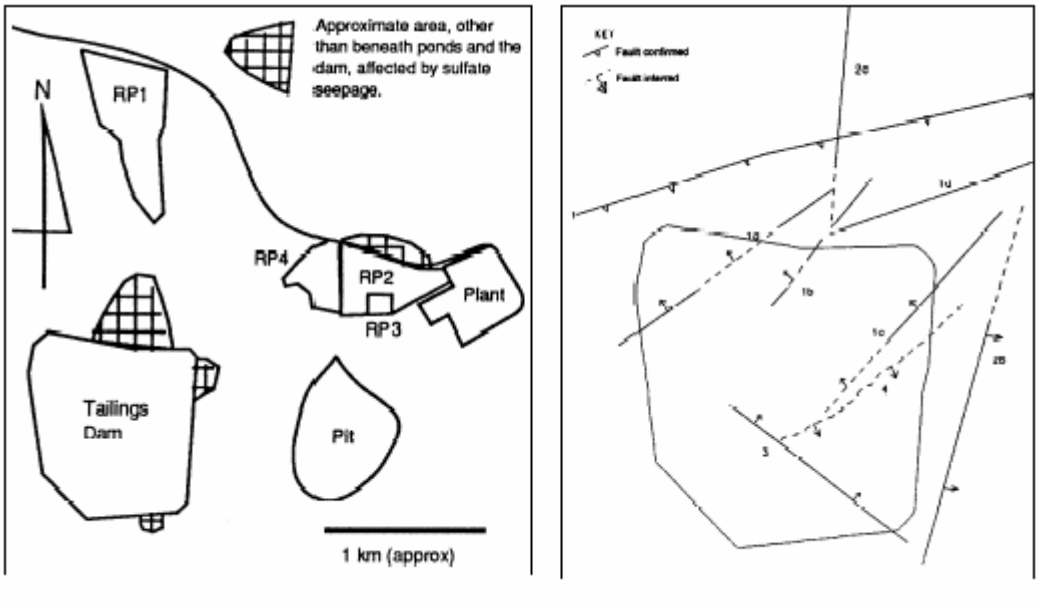
2.191 Of further concern to the GAC is an internal OSS report (Klessa, 2001c 51) which incorporates a 1973 figure of the interpreted fault lines in the area of the above ground tailings dam. The two figures are shown in Figure 10 (GAC Figure 13) A more detailed analysis and cross-section showing permeability 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.

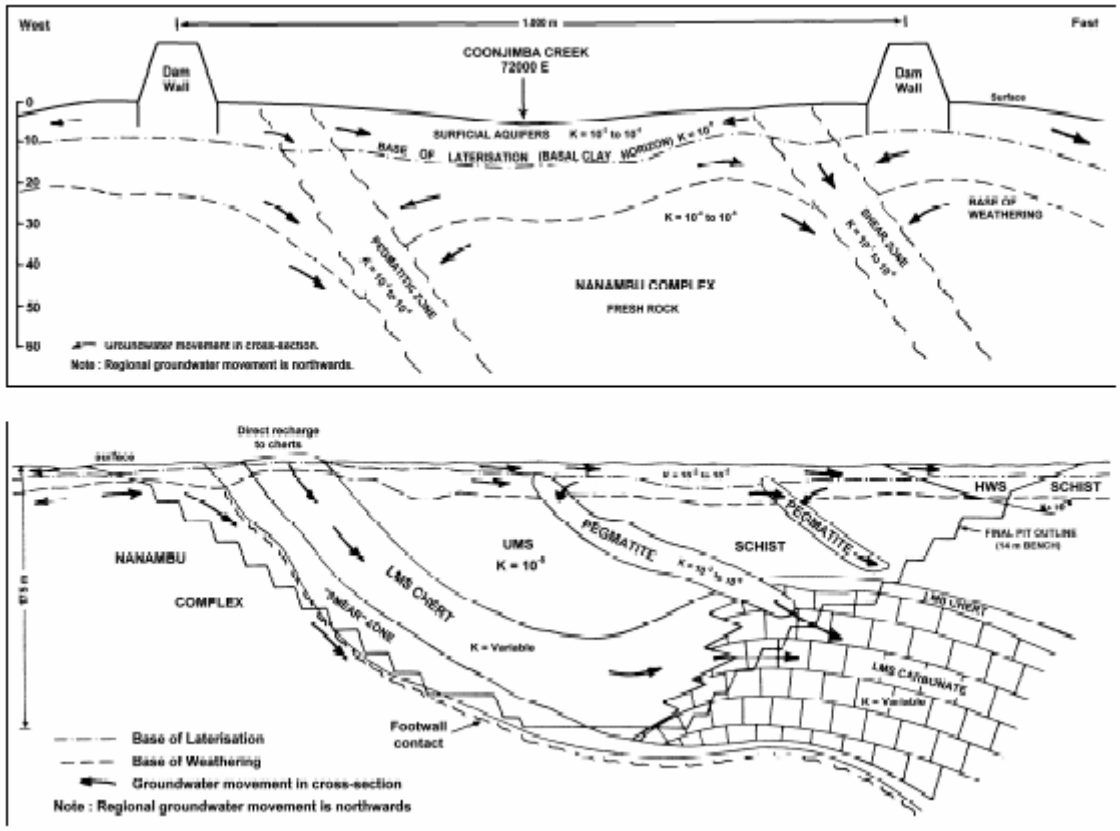
163 Gundjehmi Aboriginal Corporation, *Submission 58*, p 62.



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]

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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.

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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

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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.

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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

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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:

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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

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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;

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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]

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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]

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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:

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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.

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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]

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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;

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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]

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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:

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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.

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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]

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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

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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.

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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.

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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:

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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.

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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]

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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.

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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

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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;

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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.

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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

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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.

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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

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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.