Legislative Assembly of the Northern Territory

SESSIONAL COMMITTEE ON THE ENVIRONMENT

REPORT

NOVEMBER 1999

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FOREWORD

On behalf of the Committee comprising Mr John Ah Kit (Member for Arnhem); Mr Steve Hatton (Member for Nightcliff); Mr Philip Mitchell (Member for Millner) and Mr Maurice Rioli (Member for Arafura), I would like to formally express my thanks and appreciation for the assistance and professionalism provided during the course of our visit by Mr Peter Lloyd (Project Manager ERA); Mr Alan Wade (Senior Environmental Officer ERA), and Mr Andrew Jackson (Manager, Environment, Safety and Health ERA).

I am particularly grateful to Mr Tony McGill (Director of Mines) and who has on this and many other occasions acted as the Committee's specialist advisor. He has always provided professional advice, analysed technical information presented and ensured the accuracy of the Committee's report.

My thanks also go to Mr Graham Gadd, Secretary to the Committee for his input and administrative assistance.

Dr Richard Lim, MLA
Chairman

INTRODUCTION

Since the appointment of the Sessional Committee on the Environment at the commencement of the Eighth Legislative Assembly a change in Committee membership has taken place, Mr Hatton MLA being appointed on 16 February 1999 in the place of Mr S Dunham MLA. The Committee now has the following membership:

Dr R. S. H. Lim MLA (Chairman)
Mr J. L. Ah Kit MLA
Mr S. P. Hatton MLA
Mr P. A. Mitchell MLA
Mr M. J. Rioli MLA

TERMS OF REFERENCE

Your Committee has been charged to:

"inquire into and from time to time report upon and make recommendations on:

(a) all matters relating to uranium mining and processing activities and their effects on the environment within the Alligator Rivers Region; and

(b) any matter relating to mining and/or the environment within the Northern Territory which is referred to it by -

(i) the relevant Minister; or

(ii) resolution of the Legislative Assembly."

Your Committee has also been authorised to:

(a) send for persons, papers and records, to sit in public or in private session notwithstanding any adjournment of the Assembly, to adjourn from place to place and have leave to report from time to time its proceedings and the evidence taken and make such interim recommendations as it may deem fit, and to publish information pertaining to its activities from time to time;

(b) publish from day to day such papers and evidence as may be ordered by it and, unless otherwise ordered by the Committee, a daily *Hansard* be published of such proceedings as take place in public;

(c) consider, disclose and publish the Minutes of Proceedings, evidence taken and records of similar Committees appointed in previous Assemblies; and

(d) the foregoing provisions of this Resolution, so far as they are inconsistent with the Standing Orders, have effect notwithstanding anything contained in the Standing Orders.

THE COMMITTEE'S ROLE

During the year, no specific references on mining or the environment were given to the Committee. The Committee's role was one of monitoring and watching over the various government and non-government agencies participating in the mining and monitoring of uranium in the Alligator Rivers Region.

The Committee, accepting that mining has been authorised to take place in this region, is concerned that it is carried out in an orderly and safe manner and that the mineral resources are recovered in a manner which ensures, by all means possible, mining causes no permanent deleterious effects on the environment.

In the context of mining operations in the Alligator Rivers Region and the regulatory regime in place to ensure minimal impact of mining on the environment, the Committee is pleased to see an increased emphasis on the assessment of the social impacts of mining in the Region.

Visit to Ranger and Jabiluka Mine

Wednesday 25 August 1999

The Committee comprising:

Richard Lim MLA	Chairman
Phil Mitchell MLA	Member
Steve Hatton MLA	Member
Graham Gadd	Committee Secretary

and accompanied by:

Tony McGill	NT Director of Mines

met with the following senior representatives of ERA who provided detailed information on the reported issues and accompanied the Committee on a mine site inspection of Jabiluka:

Peter Lloyd	ERA, Project Management
Alan Wade	ERA, Senior Environmental Officer
Andrew Jackson	ERA, Manager, Environment, Safety and Health.

The Committee was welcomed in the Jabiluka Board Room by Mr Andrew Jackson of Energy Resources Australia Ltd [ERA] at 10 am. A presentation by the Company covered a number of matters –

RANGER

(i) *Water Management*

Ranger had 1891 mm of rainfall last wet season compared with an average of 1483 mm for the Region. 1.85 million cubic metres of water was contained in the Restricted Release Zone at the end of the wet and 50% of this had already been lost through evaporation and irrigation. Ranger demonstrated its flexibility when mining methods were changed in Ranger # 3 due to excessive rainfall in October 1998. 400 mm of rain was recorded in that month, usually 1600 mm is the average annual record for the area.

(ii) *The Uranium Market*

The Company indicated that market conditions for uranium production had improved and ERA will be producing approximately 4,200 tonnes of product this financial year. Contracts have been drawn up for the next ten years in anticipation of Jabiluka coming on stream and producing a similar annual tonnage of product.

(iii) *Management Restructuring*

The Committee was advised that there had been significant management restructuring within ERA in May 1999 with the elimination of the position of General Manager, Operations at Ranger. In a flattening of the organisation Mr Bob Cleary has been appointed the new Chief Executive Officer with seven line managers reporting to him.

The previous General Manager, Mr Ken Lonie, had taken up a position at Mt Todd and Mr Phillip Shirvington, the previous CEO, had transferred to the position of General Manager - New Business Evolution within North Limited's corporate office in Melbourne.

ERA has also concentrated its focus on obtaining approval for the processing of Jabiluka ore at the existing Ranger mill (the Ranger Mill Alternative – RMA). While approval exists for a mine and mill development at Jabiluka, the company views the RMA as the most responsible option to deliver the best environmental, social, cultural and economic outcomes for all stakeholders. To achieve the RMA, a Darwin based team headed up by Mr Peter McNally has been established. In tandem with the new team, Ms Karen Oxnam has been appointed Director – Jabiluka with a primary role as spokesperson for the Jabiluka project.

(iv) *Environmental Audits*

In the past 12 months there had been two Environmental Performance Reviews [EPR] conducted by the Office of the Supervising Scientist and the Department of Mines and Energy. Both reports had concluded that everything was satisfactory.

These Audits take the form of a review by certified environmental auditors from the Supervising Scientist Group and the Northern Territory Department of Mines and Energy. Upon completion, these audits are brought before the Alligator Rivers Region Advisory Committee, a forum for the exchange of information between the mining companies, the Commonwealth and Territory government authorities and environmental, aboriginal and community groups.

The first annual Jabiluka Environment Report had indicated that there had been four technical infringements reported which had been agreed by the authorities as having no permanent deleterious impact on the environment.

JABILUKA

(v) *Jabiluka approvals*

It was reported that approvals are now in place for the Jabiluka Mill option but the preferred RMA option requires further approval. The terms of 1991 assignment of the project from previous owner Pancontinental Mining Ltd to ERA includes the condition that consent was required from the Traditional Owners for the treatment of external ore at Ranger. To date this approval has not been forthcoming [Attachment A - Legal Matters].

However, there appears to have been some repositioning in relations between the stakeholders in the Alligator Rivers Region since the July World Heritage Committee outcomes regarding the World Heritage status of Kakadu National Park. Dialogue has begun to be opened between representatives of the Mirrar and the Federal Minister for the Environment, Senator Robert Hill. The Chief Executive Officer of the Gundjehmi Aboriginal Corporation, Ms Jackie Katona, has resigned as an Australian Conservation Foundation Councillor and ERA and the Northern Land Council are finalising a company communications protocol to progress consultation with affected Aboriginal people.

(vi) *Cultural Heritage Management Plan*

The company advised that the World Heritage Committee identified finalisation of the interim Cultural Heritage Management Plan (CHMP) as an essential component of building trust and confidence between all stakeholders. The company views the CHMP as a vital linking document to better understand the social and cultural concerns that exist between Aboriginal groups and with non-Aboriginal people.

ERA also anticipates that the consultation process to finalise the CHMP will draw out broader issues within the Kakadu community that, in partnership with the Kakadu Region Social Impact Study [KRSIS], will provide the cornerstone for regional development planning with a focus on better social, environmental and economic outcomes. However, the company realises it is only part of the solution to achieving sustainable outcomes for Aboriginal people. It is of the firm view that both the KRSIS and the CHMP require urgent attention and that a coordinated approach needs to occur.

ERA stated that it sees Northern Territory Government involvement as vital to help achieve long term community benefits for the Kakadu region. While the company has identified that some outcomes could include different ownership of a range of assets and services in the region and the empowerment of Aboriginal people in decision-making processes, a better understanding of the outcomes Aboriginal people want will only become apparent through coordinated discussions on between stakeholders.

(vii) The claimed Boiwek-Almudj sacred site complex

Attempts to reinterpret and extend the identified Boiwek site is causing some concern to the company and between Aboriginal groups in the region. The Senior Traditional Owner has lodged new claims which has seen the Boiwek site of influence progressively grow and extend below the surface. At present, the new claim sees Boiwek incorporated into a broader area of influence that has been given the title of the Boiwek-Almudj Sacred Site complex. If found to be genuine, such a new recognition has the capacity to severely restrict - and possible halt company activities and also entrench intra-Aboriginal conflict in the region for a long time. [Attachment B, documented report of this site by Environment Australia]. As such, ERA believes that the resolution of Boiwek is best achieved as part of the consultation process for finalising the CHMP, thereby allowing the interpretation to reach consensus through Aboriginal law rather than solely through non-Aboriginal processes.

The company provided graphic evidence on how the Boiwek site had expanded over time. Originally, in 1975, it was recorded as a spring or soak on the Magela floodplain and this was reconfirmed at the time of the 1982 agreement for access and mining at Jabiluka. The previous and current Senior Traditional Owners consistently indicated to the lessees of the Jabiluka Mineral Lease that the major site was confined to the area of the soak. It was also stated at that time that there were no sacred sites within the Jabiluka fenced area (the fenced area being the area to be disturbed by Pancontinental Mining Ltd's proposed larger operations).

During ERA's EIS processes in 1997, the first claim of a larger Boiwek site was first made known to the company. The claim identified the Boiwek area of influence as covering Jabiluka mine valley and tapering toward the Almudj site. This claim was extended again in early 1999 to now include a much larger surface area with subterranean manifestations that included the entire Jabiluka orebody. All of the above extensions to the original acknowledged site of significance have been made since the discovery and development of Jabiluka ore body. The figures 7(a), 7(b) and 7(c) of Attachment B, pages 65, 66 and 67 illustrate the changes to the Boiwek site from the 1970s to 1999.

The Aboriginal Areas Protection Authority had reviewed the status of the sites and declined to register the site as presently claimed. A further application under Section 10 of the *Aboriginal and Torres Strait Island Heritage Protection Act* has been made.

It was suggested to the Committee that Boiwek was in fact a men's site and that two Traditional Owners, Jacob and Big Bill, had asserted previously that it was not sacred. A further opinion was put to the Committee which inferred that most Aboriginal people would not wish

to speak against the current Senior Traditional Owner, Ms Yvonne Margarula, and may be, rightly or wrongly, interpreted as supporting her point of view on the status and extent of the site.

Your Committee is of the view that securing agreement to resolve cultural and social concerns through progressing the RMA will be difficult, until cultural heritage issues and concerns, particularly those surrounding the claimed Boiwek site, are addressed and resolved in a satisfactory manner with the affected Aboriginal people, including the Mirrar. The Committee therefore supports the need for greater coordinated dialogue to occur involving resource providers, including the Northern Territory Government to achieve sustainable outcomes for the Kakadu region's communities.

(viii) Negotiations with Aboriginal Groups

ERA advised they have committed $200m to the Jabiluka project with annual operating costs of $2m per annum. ERA is trying to establish and co-ordinate a dialogue with and between the various Aboriginal groups to understand the issues of concern and how to address these concerns practically. This flow of information may also consider how Aboriginal people see the region's future development options without Jabiluka proceeding.

ERA have agreed to a short moratorium on the Jabiluka project to permit them to invest more energy into their relationship with the Northern Land Council [NLC] and individual senior lawmakers. There has been some discussion with the NLC about the role of the wider affected Aboriginal groups, including those with site or ceremonial relationships. It was reported to the Committee that there have been meetings of the senior law men of the region to discuss the issues associated with mining, the CHMP and the impact on the Boiwek site .

(ix) Kakadu Region Social Impact Study (KRSIS)

In regard to the Kakadu Region Social Impact Study, the Committee was advised that the Honourable Bob Collins was having difficulty co-ordinating a meeting of the implementation committee. There was $2m in a trust fund awaiting approval to be spent on items such as a Women's Resource Centre. The Committee was informed that the Mirrar discussions with Senator Hill so far had focussed on issues which are government responsibilities. The Mirrar did not want to become involved with the KRSIS because that would legitimise this committee by their very participation in its outcomes and the fact that it is funded by ERA.

The Committee believes that the biggest problem is the social impact upon Aboriginal people by development (including mining) in the Alligator Rivers Region but the Mirrar would not accept the implementation of KRSIS if its funding is tied to a development agenda. It would appear therefore that the challenge lies in achieving

community benefits that are resourced by coordinating a range of sources including ERA, Government and Aboriginal organisations including the region's associations.

It was reported that at the end of September 1999 when contractors Henry Walker Eltin are due to leave the site there will be only 7 or 8 people employed on site, supported by Ranger's environmental monitoring staff.

The Committee queried what the implications would be for ERA's continued operations at the Ranger mine should the Jabiluka mine not proceed. In response, the company reported frankly that if Jabiluka did not eventuate in a short time frame they could only operate in the region for approximately 6 years, at best, before milling of current uranium ore reserves would be extinguished. In addition, they advised that they had no other uranium reserves in the region that could be developed. Ranger advised that once all the ore had been processed they would necessarily reduce their considerable workforce and proceed to the required rehabilitation of the site.

It was suggested this outcome would, in all likelihood, have a severe impact on the Jabiru township. This is due to the fact that the electricity supply for the town is supplied by Ranger and with the close down of the mine this would also mean removal of the only available power generation for the region.

The Committee questioned the company's obligation to the rehabilitation of Jabiru after mining had ceased at Ranger. The Committee was also informed that under the current Federal regulatory regime for mining of uranium in the region ERA was tied to binding agreements to rehabilitate Ranger (Ranger Project Agreement) and Jabiluka (Agreement pursuant to the *Atomic Energy Act* and *Aboriginal Land Rights Act*). The Jabiru town site is and forms part of the Head Lease of the Jabiru township and if the lease is terminated for any reason, the Director of Parks and Wildlife (Commonwealth), the Authority (Jabiru Town) and representatives of the Governments of the Commonwealth and the Territory shall meet to determine what measures (if any) should be undertaken to rehabilitate the demised land – Jabiru. In accordance with this provision the extent of rehabilitation and cost to be incurred by Ranger for rehabilitation is yet to be determined.

The Committee agreed that the social impact of withdrawing mining from the region needed to be more fully assessed by the company and the Northern Territory and Federal Governments. The Committee is of the view that there should be an appropriate and coordinated assessment of the social impact of the possible closure of the mining operations and the affects this will have on the social infrastructure and services of the Jabiru town region. This was alluded to in

discussion during an interview with former Senator Bob Collins, Chair of the Kakadu Region Social Impact Study, 13th August 1999, Darwin 8DDD. A full transcript is at Attachment C.

The Committee believes the following issues are relevant to the continued health of the Region and need to be addressed and planned for:

- Eventual closure of the mine, be it in the short term of 3 to 6 years or longer, and
- Implications for employment and responsibilities for services such as emergency services, water, power, housing and general town infrastructure.

It was noted that benefits from mining royalties are not only restricted to supporting Aboriginal people including the NLC but flow on to the wider community in the Region.

(x) *UNESCO World Heritage listing of Kakadu National Park*

ERA advised that the World Heritage Committee's meeting in Paris on 12 July 1999, provided an important turning point in the debate on Jabiluka. The World Heritage Committee voted 20 to one that Kakadu National Park should not be placed on the World Heritage in Danger list due to mining and milling at Jabiluka. Cuba was the only nation that believed that such a listing was warranted. The World Heritage Committee decision was dependent upon a number of issues being addressed, primarily those relating to social and cultural concerns, and the opening of dialogue to build trust and confidence between the region's stakeholders. As such the emotional debate on Jabiluka has been tempered and the focus has shifted to one of communication, conciliation and ultimately resolution that achieves sustainable outcomes for the region, particularly for local Aboriginal people.

Differences of opinion on the environmental science supporting Jabiluka, primarily relating to issues of hydrology modelling, water management and tailings disposal under the JMA, were also identified as needing resolution. Evidence provided by Prof. Bob Wasson of the Australian National University and consultants for Environment Australia had been reviewed by an independent panel of scientific experts chosen by UNESCO - a panel chosen through the International Council for Science (ICSU). A copy of the ICSU's full report is at Attachment D.

The Committee was also briefed on the visit to Kakadu by a mission from the UNESCO World Heritage Bureau in late October 1998. The environmental and social impact of the proposed Jabiluka mine had

been assessed by this Mission from UNESCO which had made certain recommendations - some of which were controversial.

ERA provided a transcript of an interview which was broadcast on ABC Radio National, 3rd December 1998 with Dr Roy Green, former head of CSIRO and Australian member on the UNESCO mission to Kakadu and Prof. Bob Wasson, Australian National University, who had made strong criticisms of the EIS approval process. During the interview Prof Wasson agreed that many of his concerns with Jabiluka would disappear if the Ranger Mill Alternative [RMA] proceeded. An extract of this interview is at Attachment E.

These comments reinforced the Committee's preference [which was reported in August 1998] for the milling of Jabiluka ore to be undertaken at the Ranger mill, on environmental grounds.

(xi) Review of the independent scientific panel.

The report of the Independent Scientific Panel [ISP] was referred to the World Heritage Committee (Attachment D). ERA stated that the findings of the Independent Panel did not support an argument that Kakadu would be at risk from the Jabiluka project. In fact, the World Heritage Committee based its July environmental science resolutions upon the advice of the ISP. This advice was accepted above that supplied by the World Heritage Committee's existing environmental advisory bodies. Six reports from Environment Australia were also referred to the Sessional Committee:

- Assessment of the Jabiluka Project Report of the Supervising Scientist to the World Heritage Committee - A Johnston & J B Prendergast - Supervising Scientist Report 138;
- Protection of the environment near the Ranger uranium mine – A Johnston & R S Needham - Supervising Scientist Report 139;
- Hydrometeorological analyses relevant to Jabiluka – Bureau of Meteorology - Supervising Scientist Report 140;
- Climate change analysis relevant to Jabiluka - R N Jones, D J Abbs & K J Hennessy - Supervising Scientist Report 141;
- Hydrological analysis relevant to surface water storage at Jabiluka – F H S Chiew & Q J Wang - Supervising Scientist Report 142; and
- Analysis of long-term groundwater dispersal of contaminants from proposed Jabiluka Mine tailings repositories - F R P Kalf & C R Dudgeon - Supervising Scientist Report 143.

(These reports will be tabled in the Legislative Assembly on presentation of this report)

(xii) Status of Problems referred to the Committee.

The Committee sought further information in relation to complaints several years ago on the unloading of sulphur for Ranger on Stokes Hill Wharf. This issue had also been raised by the Youth Parliament. The company [ERA] advised that the storage facility for sulphur is now at Tivendale Road and the Humpty Doo site is being rehabilitated to allow the property to be sold.

(xiii) Jabiluka Project Status

Mr Peter Lloyd of North Limited informed the Committee of the small team appointed to construct the Jabiluka site – a greenfields site – about 14 months ago. Key Performance Indicators for this group were safety, environment and Aboriginal relations. Partnership arrangements had been set up with the principal contractor Henry Walker Eltins.

Work commenced at Jabiluka on 15 June 1998 with construction of the mine decline beginning 4 September 1998. Site works, including surface works such as the Interim Water Management Pond - including plastic lining, a hardstand area, ore and waste stockpiles - have been constructed within a fenced area. The Interim Water Management Pond has been lined with a bentonite layer/filter and High Density Polyethelene layer. A sample of the lining materials were shown to the Committee. Apart from some environmental monitoring, there is very little happening outside the fenced area.

Mineralised material (>0.02% U_3O_8 by truckload basis or potentially acid generating) which was excavated has been stockpiled on a specially built pad which has a buried plastic liner and leachate collection system that drains to the Interim Water Management Pond. At the Committee's site visit the stockpile was found to be covered by a suitable geosynthethic liner to reduce any leaching of the stockpile.

The 'material' or ore stockpile comprises rock containing greater than 0.02% uranium or any other rock that contains sulphides. ERA stated that the economic cut off grade for Jabiluka ore milling is now 0.2%. A quantity of gold on the eastern end of the Jabiluka orebody section has been proved up but no permission had been sought or given to recover this resource.

The Jabiluka mine decline is 6 metres wide by 5.5 metres high with a 1:8 gradient. It has been driven to a length of some 1200 metres and reaches a depth of about 200 metres below the surface. ERA have driven through the orebody and have taken measurements of the radiation emission rate in the ore zone.

The company has identified four ways it proposes to reduce radiation exposure:

- Using shotcrete to blanket uranium rich areas;
- Using remote control vehicles where the exposures may be high;
- Improving ventilation rates; and
- Air-conditioning vehicles.

All of these techniques involve engineering solutions to minimise the radiation emission risks to workers and these are additional to regulatory occupational health and work safety programs for individual worker monitoring of their exposure to radiation.

A drilling program currently being undertaken of the orebody is obtaining geotechnical information that will be used to redefine the orebody for stope design and mine management. Altogether 4500 metres of 50mm core drilling have been undertaken and the drilling program will be completed before the onset of the wet season.

Mr Lloyd displayed for the Committee a three dimensional computer representation of the underground ore body and planned mine workings. The Committee questioned what plans were in place to deal with the underground voids after mining has been completed. The Committee was informed that during ore removal waste from Ranger will be crushed and placed as crushed aggregated fill which will be cemented where structural support is needed throughout the mine on a progressive basis.

In conclusion the Supervising Scientist's Assessment Report of the Jabiluka Project – Report 138 at page 84 supports the Committee's view of recognising the fact that should the mine proceed it is to be in an environmentally responsible manner with all the accepted safeguards currently in place. The milling of Jabiluka ore should be undertaken at Ranger. The Supervising Scientist went on to say:

> *It is the perception of the public that uranium is a very dangerous substance and the failure of the scientific community to persuade the public otherwise that has lead to adoption of extreme measures to ensure that no amount of uranium should leave the site of the uranium mine.*
>
> *Similarly, in its natural state, uranium does not pose a particularly severe radiation threat.....Thus, on scientific grounds, there is no reason why water collected at Jabiluka could not be discharged into the surface waters of the Magela flood plain under a suitably designed control regime that would protect both people and eco-systems.*

The proposal by ERA, that these waters should be totally contained at the mine-site, was made in response to social concerns and perceptions, not scientific evidence. .....The conclusion of this review, therefore, is that contrary to the views expressed by the Mission, the natural values of Kakadu National Park are not threatened by the development of the Jabiluka uranium mine and the degree of scientific certainty that applies to this assessment is very high.

Your Committee, from a purely scientific view, could only agree with this statement by the Supervising Scientist in his report. This report was in response to a request of the World Heritage Committee that he conduct a full review of scientific issues raised by the Mission to Kakadu National Park in October/November 1998.

ATTACHMENT A

Committee Briefing

19 August 1999-

Jabiluka Mining Project

Processes, Approvals to mine and outstanding environmental and associated issues

ATTACHMENT A
Minutes of Environment Committee, 19 August 1999

Jabiluka Mining Project – Processes, Approvals to mine and outstanding environmental and associated issues

General Overview

The approval to commence mining at Jabiluka was given in 1982 when a lease (MLN1) was issued under the NT Mining Act. (There was also an approval granted under the Uranium Mining (Environmental Control) Act to commence construction of an access road.) This approval was given consequent on the approval of Pancontinental's Jabiluka EIS and the setting of environmental requirements by the Commonwealth. An Aboriginal agreement (NLC) to the project was approved by the Minister for Aboriginal Affairs under Section 43 of ALRA. The traditional owners supported the mine.

Pancontinental did not proceed with the project at the time because the Commonwealth Minister refused to issue export permits. The lease was sold to ERA in August 1991.

ERA prepared a change in scope for the project in 1997 which led to further environmental assessment and a requirement for further Commonwealth approvals. The procedure to allow for a change in scope was written into the Aboriginal Section 43 agreement and an arbitrated approval was given for the change of scope in 1997.

The current traditional owners of the Jabiluka lease area, the Mirrar, do not agree to the mining of the Jabiluka deposit and have sought support from the green movement and subsequently the United Nations World Heritage Commission (UNESCO).

The basis of the Mirrar's representation to UNESCO was that the rights and culture of Indigenous peoples had been ignored or were being put at risk by Government actions.

They have drawn their approach by aligning their perception with the International Labour Organisation's Convention 169 (1989) which provides that indigenous peoples should be given prior notice of both mineral exploration and resource development, participate in the benefits and receive compensation and mitigation from the adverse impacts of such development. These principles are adopted by institutions such as the world bank and give indigenous peoples certain expectations.

UNESCO sent a Mission to Australia between 26 October and 1 November 1998 (3 days in the NT) which reported to the Bureau of the World Heritage Committee on 28 November 1998. The report contained 16 recommendations and was accompanied by a dissenting view by the Australian representatives, Dr Roy Green and Prof. Jon Altman.

The Mission met with NT Government officials for about one hour and the framing of questions which were asked and the subsequent report indicated that they were more interested in social matters than environmental impact.

The pragmatic argument put forward by the Northern Territory Government was that Aboriginal issues:

- are recognised by the NT as being difficult:
- are being managed by the NT;
- are not being accurately represented by the Mirrar; and
- that it has taken years to develop a relationship of cooperation and trust and that the actions of the Mirrar are divisive.

The Mission recommended the closure of Jabiluka, the resumption of Koongarra and closer controls on the development of Jabiru. It made six references to cultural matters but only three to environmental matters:

- control of cane toads;
- control of weeds; and
- the use of the precautionary principle (because environmental outcomes are uncertain).

The thrust of the dissenting view was that the Leader of the Mission, Prof. Francioni, added the recommendation to close Jabiluka and that it was not a majority view.

There was widespread media speculation that the World Heritage Commission were driven more by ideological motives than the need to protect the environment of Kakadu.

The World Heritage mission relied heavily upon information provided by the Mirrar who represent one of the 28 Aboriginal Land owner groups of Kakadu and whose land comprises 5% of the Park. According to customary law, the senior Traditional Owner for the Mirrar is not permitted to speak on behalf of the Owners of the remaining 95% of the Park. The views of the majority were not sought although there was a submission made by the Gagadju.

There were mixed signals coming from the various Kakadu groups. Jacob Nyangal was trying to organise a group of 20 senior Traditional Owners of the region (based on blood) to oversight all Aboriginal organisations.

Nobody from the mission which made the recommendation to list Kakadu as endangered and to close Jabiluka showed the courtesy of sitting down with the major Aboriginal groups in Kakadu to explain their decision or the ramifications this listing could have on them.

There is a question as to whether damaging the name of Kakadu is a pathway to improving the lot of Kakadu Aborigines. The motive of the greens was clear – no uranium mining. The alliance between the greens and the Mirrar now appears to be breaking up.

The Local People

The Aboriginal population in the Jabiru region has multiplied by approximately 500% since the commencement of mining and the establishment of Jabiru township. Most of the facilities and services in the town are directly attributable to Ranger.

Although the NT is not represented on the Board of Management of Kakadu or Uluru it can claim a good record of joint management at both Nitmiluk and Gerig National Parks. The traditional owners of Nitmiluk are also traditional owners of Kakadu.

In 1995 the Gundjhemi Association, comprising 28 members, was set up to replace the Gagudju Association as the major recipient of royalties and lease payments from the Ranger uranium mine. This Association has received approximately $5m since it was established.

ERA claim that they have not fully understood the concerns of the affected Aboriginal people, including the Mirrar, and the company is at present opening dialogue through co-operation with the NLC, Governments and KRSIS.

There has been a suggestion that the Jabiluka agreement was signed under duress. This was denied by the Chairman of the Northern Land Council at the time, Mr Gerry Blitner, and the agreement was approved by the then Federal Minister for Aboriginal Affairs when he accepted the agreement pursuant to Section 43 of the *Aboriginal Land Rights (Northern Territory) Act 1976*. Yvonne Margarula's father was a public officer for the Gagadu Association and also the Djabulukgu Assoc. which were set up expressly to receive uranium mining royalties and have received $30m from Ranger and $1.5m from Jabiluka.

The Preferred Option

ERA propose to mill the Jabiluka ore at the Ranger facility and place the tailings in the Ranger pits. The Jabiluka Mill Alternative was proposed to answer the concerns of the Traditional Owners who did not want Jabiluka ore transferred to Ranger for milling. Both alternatives were assessed and have passed environmental approval. The Jabiluka Mill alternative has also received Aboriginal approval through the change of scope process.

The ERA preferred option (Ranger Mill Alternative) would disturb a total of 63 Ha, most of which is the area of the 22 Km road connecting Jabiluka to the Ranger mill. The Jabiluka Mill option would disturb a further 135 Ha for a mill and tailings facility. This should be compared to a disturbed area of some 620 Ha at Ranger. The approved Pancontinental project would have disturbed 819 Ha. Kakadu National Park occupies an area of almost two million Hectares.

In percentage terms the Ranger Mill Alternative occupies 0.0045% of Kakadu and only 1.2% of the Jabiluka Lease (7275 Ha).

Legal Matters

By a deed made on 25 June 1982 under the *Aboriginal Land Rights (Northern Territory) Act 1976*, the Governor-General granted to the Jabiluka Aboriginal Land Trust an estate in fee simple in an area of Land in the Northern Territory identified as Portion 2253. The grant was subject to an express reservation to the Commonwealth and the Northern Territory of the rights to any mineral on or below the land. The Jabiluka land is held by the Jabiluka Aboriginal Land Trust for the benefit of groups of Aboriginal entitled by Aboriginal tradition to the use and occupation of the Jabiluka land.

Section 43 of the Land Rights Act permits a Land Council to agree to give its consent to the granting of a mining interest in respect of Aboriginal land on terms and conditions. By an agreement made on 21 July 1982 the Northern Land Council consented to the grant of a mineral lease to Pancontinental Mining Limited and Getty Oil Development Company Limited over an area of the land which included the Jabiluka land for the purpose of mining uranium ore.

On 12 August 1982, the Northern Territory granted to Pancontinental and Getty a mineral lease No. MLNI of about 7275 hectares of land and all deposits of uranium ore and prescribed substances in or under the land. The lease was for an initial term of 42 years with an option to renew for a further 10 years, for the purposes of milling uranium ore and other prescribed substances and for "all purposes necessary effectively to carry on milling operations".

MLN1 was granted pursuant to the *Mining Act* of the Northern Territory. Section 60 of the *Mining Act*, which came into operation on 1 July 1982, empowers the Territory Minister to grant a mineral lease for a period not exceeding 25 years. However, Pancontinental and Getty had applied for a special mineral lease under the (subsequently repealed) *Mining Ordinance*, which could be granted for a term of 42 years. The transitional provisions in section 391(15) and (15B) of the *Mining Act* enabled the Minister under section 60 to grant a mineral lease for a term not exceeding the 42 year term for which the special mineral lease could have been granted.

In accordance with section 175 of the *Mining Act*, the Mineral lease was granted by the Territory Minister on the advice of the Commonwealth Minister administering the *Atomic Energy Act*.

In Margarula v Minister for Resources and Energy and Others (11 February 1998) Justice Sackville held that the mineral lease had been validly granted under section 60 of the *Mining Act*, and in accordance with the advice of the Commonwealth Minister. The plaintiff appealed that decision. On 30 June 1998, the Full Court of the Federal Court reserved its judgment on the appeal. This was dismissed and a further appeal to the High Court was dismissed at an application for Special Leave to Appeal.

No mining operations were undertaken by Pancontinental and Getty in the Jabiluka project area, although in July 1979 they prepared an Environmental Impact Statement as required by the Commonwealth *Environment Protection (Impact of Proposals) Act* (EPIP) which described the proposed design and operation of a uranium mine and

treatment facilities on the Jabiluka project area. The principal features of their proposal included an underground mine and an ore treatment plant on the site.

On 6 August 1991, ERA purchased the mineral lease for the Jabiluka project area and related assets from Pancontinental. The Mirrar are the traditional Aboriginal owners of the land on which both the Ranger uranium mine is conducted and Jabiluka.

Clause 27 of the agreement made under section 43 of the *Aboriginal Land Rights (Northern Territory) Act 1976* allowed Pancontinental and Getty to assign their rights under the agreement, but stated that Pancontinental could not assign its rights as operator of the Jabiluka project without the consent of the Northern Land Council. On 21 August 1997, the lessees assigned all of their rights, title and interest under the section 43 agreement to Energy Resources of Australia (ERA), except for Pancontinental's rights as operator of the project. On the same date, ERA made a deed poll in favour of the Northern Land Council, undertaking to assume and comply with all of the obligations under the section 43 agreement.

By an agreement made between the NLC and ERA on 24 December 1991, the NLC consented to an assignment to ERA of Pancontinental's rights as operator of the project with certain conditions.

ERA's acquisition of the Jabiluka mineral lease enabled the ore body to be jointly developed with the existing Ranger infrastructure. Jabiluka ore could be taken by road train to Ranger, and because of the similarity of Jabiluka and Ranger ore, they could be combined for processing through the mill at Ranger, and tailings waste deposited in the existing pits at Ranger. By an agreement between ERA and the Northern Land Council in December 1991 ERA agreed that it would not mill Jabiluka ore at Ranger without the NLC's consent, which was to be given in accordance with the direction of the traditional Aboriginal owners of the Ranger Project Area.

In his letter to the Environment Minister dated 14 May 1996 the Resources Minister designated ERA as proponent "in relation to prospective decisions to grant approvals for uranium exports from the Jabiluka mine under reg 11 of the Customs (Prohibited Exports) Regulations ". On 23 June 1996 the Environment Minister agreed that the appropriate level of environmental assessment was an EIS. No inquiry was directed. On 17 October 1996 ERA released a draft EIS for public comment. The draft EIS was on display until January 1997. Public submissions were received. The draft EIS repeated the proposal to truck all ore from the Jabiluka mine site to the Ranger mine for milling, but said that if approval was denied or delayed, an alternative was to mill and process Jabiluka ore and dispose of tailings within the Jabiluka lease. On 17 June 1997 after taking into account the public comments and government reports, ERA prepared a "Supplement to Draft Environmental Impact Statement".

On 12 August 1997 the Environment Protection Group in the Environment Department assessed the EIS and recommended to the Environment Minister that "the risks to the bio-physical, historical, cultural and social environments from the Jabiluka proposal going ahead are acceptable, provided that the mine operates under stringent environmental controls". On 22 August 1997 the Environment Minister agreed with the Department's recommendations. By letter of the same date he informed the

Resources Minister that "On the evidence available to me, there does not appear to be any environmental issue which would prevent the preferred Jabiluka proposal from proceeding. However the Minister went on to say that he had made a number of recommendations which he requested be taken into account in accordance with the EPIP Act. One of the recommendations was that if an alternative to the preferred proposal contained in the final EIS was to be implemented, further environmental assessment would be required before any export approval could be given by the Commonwealth. By letter of 8 October the Resources Minister informed ERA that he had no reason to disagree with the recommendations of the Environment Minister. The Resources Minister required ERA to undertake certain studies as identified in the recommendations of the Environment Minister, and to provide other reports and information. The letter also referred to the possibility of ERA milling Jabiluka ore at the minesite. The Resources Minister stated that there would be no environmental impediment to prevent ERA commencing work on elements that were common to both the Ranger Mill Alternative and the Jabiluka Milling Alternative [JMA], subject to compliance with conditions which were common to both proposals. He said he would be in a position to consider the issue of an export permit after all requirements had been met and any other considerations raised by the Environment Minister had been dealt with

On 24 October 1997 the Northern Land Council [NLC] informed ERA that as a result of consultations with the traditional Aboriginal owners, the NLC refused to consent to Jabiluka ore being milled at Ranger. By letter dated 22 April 1998 the Resources Minister informed the Environment Minister that he designated ERA as the proponent for the JMA in relation to prospective decisions to grant approvals for uranium exports. On 24 April 1998 the Environment Department recommended to the Environment Minister that he conduct an assessment of the JMA by means of a Public Environmental Report [PER], a recommendation which the Environment Minister adopted on 25 April. On that day, the Environment Minister made a determination under par 3.1 of the Procedures under the Commonwealth *Environmental Protection [Impact of Proposals) Act* [EPIP) requiring a PER for the purposes of a decision to be made by the Resources Minister in relation to the approval of uranium exports that might result from ERA's proposal to mine, mill and process uranium ore at Jabiluka. The Environment Minister informed the Resources Minister that the assessment of the Public Environmental Report [PER] would be conducted jointly with the Northern Territory. He said that the information contained in the EIS previously prepared for the Ranger Mill Alternative would be sufficient to address a number of areas of the Jabiluka Mill Alternative [JMA], so that the PER should concentrate on impacts associated with the proposed milling operation at Jabiluka. Nevertheless, work carried out by ERA was required to be consistent with conditions previously specified.

ERA prepared a Public Environmental Report [PER] for the JMA. It was available for public comment, and many submissions were received. The JMA proposed to adopt cemented paste-fill technology for the disposal of the tailings. Tailings would be treated with cement additives to form a paste that would harden into a solid mass when placed in the cavities of the underground mine. It was also proposed to build tailings disposal pits of a size to accommodate all tailings that could not be disposed of in the underground mine void. On 27 July 1998 the Environment Department advised the Environment Minister that there were uncertainties about the use of the cemented

paste technology for the long term disposal of tailings, and a real but low risk of contamination of ground water. A report was prepared which contained a series of recommendations concerning further investigations, analysis, research, testing and plans.

On 12 August 1998 the Environment Department engaged Unisearch Ltd to provide an independent review of the available scientific information, to assist the Environment Minister to determine whether or not the JMA proposal was environmentally acceptable. Unisearch was asked to address the hydrogeology of the site prepared for the tailing pits at Jabiluka and the long-term efficacy of the proposed cemented paste method. A report entitled "Review of Jabiluka Mine Alternative Tailings Management Proposal" was prepared by Unisearch and was released on 19 August. Later in August ERA submitted to the Minister a report entitled "Jabiluka Mill Alternative - Synopsis of Key Issues and Processes". In essence the principal environmental question was not the technology of placing cemented paste into the underground mine void, but the disposal of some of the tailings using conventional slurry tailings disposal in pits that were not underground. ERA presented an alternative of placing 100% of the tailings back underground into the mine void.

By letter of 25 August the Environment Minister informed the Resources Minister that he had been advised that, provided the recommendations set out in the letter were complied with, the proposal to mill uranium ore at Jabiluka could proceed with no significant threat to the environmental and world heritage values of Kakadu National Park. One of the recommendations set out in the letter was that "the milling of uranium ore at Jabiluka will be environmentally acceptable if 100% of the tailings are placed back underground in the mine void and the recommendations in Attachment A are complied with". However, the Environment Minister went on to say that "On the basis of advice from the Supervising Scientist, I believe there is every prospect that further assessment can identify design amendments which ensure that tailings can be adequately managed and disposed of without the need to return all tailings underground".

By letter of 27 August the Resources Minister informed ERA that he had no reason to disagree with the recommendations of the Environment Minister, and he stipulated numerous requirements for ERA to meet before he would be in a position to consider the issue of an export permit for uranium produced from mining conducted under the JMA. The letter recited the Environment Minister's indication that the milling of uranium ore at Jabiluka would be environmentally acceptable if 100% of the tailings were placed back underground subject to "ERA preparing an amended proposal, to the satisfaction of the Supervising Scientist and the supervising authority, under which 100% of the tailings are placed back underground in the mine void". The letter also noted the Environment Minister's belief that there was every prospect that further assessment could identify design amendments to ERA's preferred option which would ensure that tailings could be adequately managed and disposed of without the need to return all tailings underground, and referred to the Environment Minister's recommendation for a process to consider options other than placing 100% of the tailings in the mine void.

Result of UNESCO Inquiry

The 22nd session of the World Heritage Committee at Kyoto in 1998 had expressed grave concern over the ascertained and potential dangers to the world Heritage cultural and natural values of Kakadu National Park posed by the proposal to mine and mill uranium at Jabiluka.

The 23 session in 1999 resolved that mining and milling at Jabiluka was not cause to list KNP as in danger provided important concerns are addressed. These included concerns about the impacts to the living cultural values of Kakadu National Park posed by the proposal to mine and mill at Jabiluka and that there needed to be more dialogue between the Mirrar and the Australian Government while acknowledging that some progress had been made.

They were concerned about the lack of progress with the preparation of a cultural heritage management plan and had reservations concerning the scientific uncertainties relating to mining and milling at Jabiluka. They noted that the report of the Independent Scientific panel had been assessed by the Supervising Scientist.

Kakadu Region Social Impact Study

In mid-1996 the Territory, Commonwealth, NLC and ERA agreed to sponsor KRSIS to understand Aboriginal concerns regarding development, including mining, in the Region.

The harmony of this study papered over some large ideological and policy differences between the participants. (The Territory paid 25% of the costs ($50,000), the Commonwealth 25%) and ERA paying 50%.
The study was conducted in two stages. An Aboriginal Project Committee, consisting of Aboriginal people from the region, identified the concerns and ambitions of the Aboriginal people. The Study Advisory Group reviewed the Committee document, recommending a number of key areas or action.

In essence, it was found that after many years of development in the region, and associated royalty and rental payments, Kakadu's Aboriginal inhabitants were no better off than their contemporaries elsewhere in the NT.

Whilst KRSIS was separate to the Jabiluka environmental assessment and approval process, the two have become increasingly linked.

The study concluded in July 1997 with the publication of the KRSIS action plan.

Although it was recognised that the Territory had a little presence in the region, many recommendations were within Territory jurisdiction. Overall, KRSIS recommendations covered 18 major areas such as the future of Jabiru, education, housing, health, education, economic development, social impact monitoring, governance, etc.

Implementation of the recommendations could represent significant expenditure by the Territory but at this early stage it would appear that ERA, in consultation with the

NLC, have taken on implementation of (or funding of) some major recommendations that may have been assigned to the Territory (and the Commonwealth).

Recommendations of major interest to the Territory are:

- **Jabiru Township:** that Jabiru be legally recognised as Aboriginal land. This was opposed by the Territory but ERA is prepared to discuss the issue, contingent upon commercial interests being safeguarded and an extension to the head lease. A native title claim by the Mirrar and commencement of the process under the *Native Title Act* is an added complication.

- **Housing and Infrastructure:** that IHANT negotiates joint funding agreements with ' interested parties' to meet housing, infrastructure and environmental health backlogs. Housing was identified as a major social problem in the region. Another housing related recommendation was that 'non-industry' Aboriginal housing and community facilities be built at Jabiru.

- **Implementation Team:** that all agencies involved in KRSIS establish and fund a KRSIS recommendation implementation team. This could involve major resource commitments for a full-time, regionally-based secretariat.

- **Ongoing Social Impact Monitoring and Research:** that following the start of the implementation program, an ongoing social impact monitoring program be initiated. This would be co-funded by the Territory and Commonwealth. This could involve a significant funding commitment.

- **Other** recommendations that could involve the Territory are in the areas of education, employment and training, health, alcohol abuse, sport and recreation, establishment of a women's resource centre.

The NT noted that the KRSIS reports had been completed and delivered to the Commonwealth, Territory, NLC and ERA for consideration; and directed that no further action be taken by the Territory until;

- there is a firm commitment to the mine proceeding; and
- present disputes between Aboriginal community groups (ie Gundjehmi and Gagudju) are resolved such that constructive Aboriginal participation can be assured.

On 15 December 1999 the Gundjehmi announced that they would not attend any meeting organised by the NLC and will not support the KRSIS approach. Bob Collins was told that he should secure the dollar value of all Commonwealth and NT services and transfer that to the Gundjehmi.

Current Status of the Jabiluka Project

The decline has been developed at 1:8 grade for 1150 metres from the portal. A raise bore approximately 2.4m diameter was installed about 700 metres along the decline for ventilation. It will operate as an intake only.

A horizontal drive towards the footwall has been developed near the end of the decline (at the 880 level i.e 120m below sea level). Footwall drives either side of the 880 level have been developed for about 150 metres in each direction. An orebody crosscut has been developed across the orebody to the hanging wall. The orebody intersection was about 70 metres.

Mineralised material (>0.02% U308 by truckload basis or potentially acid generating) which was excavated has been stockpiled on a specially built pad which has a buried plastic liner and leachate collection system that drains to the interim water management pond. This stockpile is to be covered by a suitable geosynthethic liner.

With the intersection of mineralised material, a Restricted Release Zone was declared (no release is allowed from the site ie total containment).

Rainfall recorded for 98/99 wet season at the weather station on site was 1951mm which was similar to that recorded at Jabiru airstrip compared with the 27 year average of 1483mm at Jabiru airstrip.

The Interim Water Management Pond (IWMP) is holding 2.8m of water which equates to about 80,000m3, well below 50% capacity. Catchments and water balances/management for 99/2000 are under review.

Major mining equipment has been demobilised and removed from the site but adequate equipment will be retained for maintenance and environmental monitoring. All inactive disturbed areas are being rehabilitated.

A geotechnical and hydrogeological hole at eastern end of deposit has been drilled from surface (directional drilling from an old Pancontinental drill site) to a depth about 700m – test work is being undertaken in sandstone and schist.

Detailed radiological investigations are being carried out in ore crosscut primarily to provide adequate information for radiological assessment for the detailed mine design.

About 4500m of diamond core drilling is being undertaken from the footwall drive. This will define less than 7% of the total ore body and is required for detailed mine planning of the first stopes.

The development team will hand the project back to ERA Ranger personnel for ongoing management, environmental monitoring and maintenance whilst detail mine design (based on diamond drilling and radiological investigations) and further negotiations take place.

Almost all baseline reports have been finalised and/or submitted. The surface water quality report is still outstanding awaiting laboratory analysis and review by independent limnologist before submission to a Minesite Technical Committee.

The Jabiluka project team is carrying out a review of the Jabiluka mining plan looking at;

- Geotechnical issues such as smaller stopes and the need for backfilling,
- Mining directly in the orebody rather than from outside,
- Mining only the higher grade material (>2%),
- Reviewing all ancillary functions,
- Ventilation/ energy usage,
- Environmental aspects.

The object of the review is to make the project less environmentally intrusive, to assess project economics and to improve social outcomes.

At Ranger, the project team is also reviewing issues such as;

- Tailings management
- Fly in fly out
- Water management
- Ownership of the powerstation and properties at Jabiru,
- Empowering the Aboriginal people in the decision making process; and
- section 43/44 ALRA arrangements with the Aboriginal traditional owners.

The outcome of this is likely to be a significant drop in the total reserves at Ranger /Jabiluka which will lead to a shorter project life, reduced royalties and other benefits to the Northern Territory and the Aboriginal people in particular.

ATTACHMENT B

EXTRACT

Chapter 5

Australia's Kakadu response by Government of Australia to UNESCO World Heritage Committee regarding Kakadu National Park

April 1999

Territory Department of Mines and Energy (NT DME). Ten EPRs of Ranger and Nabarlek have been conducted to date and two during the construction phase of Jabiluka.

The EPR protocol involves design of an extensive questionnaire on environmental performance, meetings with the companies to gather responses to the questionnaire, examination of documentary evidence to verify the responses given, a site inspection, and an evaluation of the adequacy of the response given to each question. The review team then prepares a summary report for presentation to the Alligator Rivers Region Advisory Committee following completion of the EPR. This is a community based committee established to discuss environmental issues in the ARR and to exchange information.

Technical assessment

The Supervising Scientist is represented on the Minesite Technical Committees established for each mine in the ARR. The committees receive regular environmental reports and special reports (eg. relating to development of new operational techniques) and applications from the companies to the NT Minister for Mines and Energy for the introduction of new procedures and changes in mining operations. These reports are evaluated and feedback is provided, mainly to the company and/or to the NT authorities. The NT Minister for Mines and Energy must "have regard to" recommendations made by the Supervising Scientist in making his decisions on matters which relate to environmental protection at the uranium mines.

The Ranger Environmental Requirements specify that operations must be consistent with Best Practicable Technology (BPT). Assessments of major applications from ERA are made under a BPT assessment framework, a process commonly strongly influenced by the Supervising Scientist as a member of the Minesite Technical Committee.

Working Arrangements

The 'Working Arrangements' is a memorandum of understanding between the Commonwealth and Northern Territory Governments. The MOU clarifies the roles of NT DME and the Supervising Scientist in implementing the procedures described above, describes expectations for appropriate reporting and exchange of information, and emphasises the need for close consultation between NT DME and OSS and between those two parties and the Northern Land Council as representatives of the traditional owners. The Working Arrangements are generic in wording and apply to all uranium mines in the Alligator Rivers Region. The document also contains a general description of the functions of each currently operating Minesite Technical Committee.

5.6 CULTURAL HERITAGE PLACES PROTECTION: THE BOIWEK AND ALMUDJ SITES

The UNESCO mission recommended cultural mapping of the Boiwek-Almudj site complex. The traditional owners have declined opportunities to participate in such processes. In order to inform the World Heritage Committee of the background and current status of this issue the State party submits:

- an introduction to sacred sites in Kakadu;
- a chronology of events in the recording and mapping of Boyweg, its significance, and its connections to other sites;
- a description of the statutory regime for site protection and its applications in this case.

In Australia in general, and in the Northern Territory in particular, an extensive network of laws and regulations controls access to and management of sacred sites. On Aboriginal land in the Northern Territory, permission must be sought and given from traditional owners or custodians before the land can be used by any outside party, including Governments. The Northern Land Council has the statutory responsibility to consult and negotiate for such use. They have a responsibility to ensure that sites are protected, and traditional owners fully consulted before any development can take place. The Aboriginal Areas Protection Authority also has a statutory role in the protection of sites. Commonwealth heritage protection legislation is also available to respond to community requests for the protection of sites.

A number of issues arise that illustrate the complexity of the situation for Aboriginal people, the proponents and the State Party. These issues relate to the ways in which sacred sites, a key element of the land based cultural heritage cared for by Aboriginal people and respected under Australian law, can be accommodated in changing circumstances. In the interface between an oral tradition and a system of laws and negotiated land use agreements, there are often points of tension. The Australian Government is committed to ensuring that these points are acknowledged and understood.

5.6.1 Sacred sites in Kakadu

Kakadu National Park is inscribed on the World Heritage List for its direct association with living traditions of outstanding universal significance and is protected as such in the management of the Park. Particular groups are associated by descent with areas of land, their inherited clan estates.

As Chaloupka (1993:72) explains, "The extent of the clan estate is defined by a set of Dreaming sites... Clan members have the responsibility to physically protect, and ritually look after, the Dreaming sites within their estate. They may also share responsibility for sites located in adjacent or even more distant clan territories." Those shared responsibilities are defined through marriage and other forms of relatedness. On the Jabiluka lease, the Mirrar clan holds primary responsibility, as traditional owners, for protecting the sites in their clan estate. Traditional owners from other clan estates share custodial responsibilities.

Aboriginal sacred sites within Kakadu National Park vary in type or power from being:

Djang: places that relate to creation or the Dreaming, through to sites that are,

Djang andjamun: places that relate to creation and because of their particular religious significance are considered especially dangerous and have restricted access.

For any development process to commence, in accordance with Australian law, measures for the identification and protection of all the sites in the project area were necessary. While many significant archaeological and rock art sites are on the lease area and are being protected, recent public comment has focussed attention on the sites of Boiwek (or Boyweg) and Almudj as sacred sites.

The site of Boiwek has been described in reports by anthropologists on sacred sites in the Jabiluka region since 1975. Boiwek was listed as a *'djang'* sacred site involving the ancestral dreaming figures the Knob-tailed Gecko ('Boiwek') and the Rainbow Serpent ('Almudj'). Anthropologists have documented these sites in conjunction with the Aboriginal traditional owners, including the father of the current senior traditional owner. Until 1997 the Australian Government was not aware of any claim that Boiwek was a *Djang andjamun* place that was especially dangerous or had specific restrictions on access by traditional owners and others.

THE BOIWEK SITE

Claims have been made that the Jabiluka project threatens the sacred site complex of Boiwek-Almudj. Boiwek and Almudj, according to all reports reviewed by the Australian Government, are not in the World Heritage area nor linked to sites in the World Heritage area.

From 1975 on, the site of Boiwek has been studied, photographed, mapped and protected. Several highly regarded anthropologists, working closely with traditional owners, including the father of the current senior traditional owner, have defined the site of Boiwek as a small, discrete soakage or swamp on the edge of the wetlands located to the west of the Jabiluka mine valley. It was a sacred, but not necessarily a dangerous site. There will be no damage or disturbance to this site. It is protected by conditions of approval.

This site is linked by a dreaming track to another separate site, known as Almudj, also protected and registered. The area between these sites (including the earth beneath this area) is now claimed by the senior traditional owner to be a sacred site. This claim was first made in 1997 and an expanded claim then made in 1999. It is this extended area which, it is claimed, will be threatened or disturbed.

The location and definition of the Boiwek site as a discrete swamp or soak on the edge of the wetlands were discussed and confirmed in:

- The 1977 Fox Inquiry;
- The claim book for the 1982 Alligator Rivers stage two land claim;
- *The research necessary for registration on the National Estate for sites on the lease, including* Boiwek and Almudj; and
- Decisions by traditional owners and the Northern Land Council on site permits for workers in the Jabiluka lease area.

Between 1971 and 1978, Pancontinental drilled some 250 holes in Mine Valley in the area, now claimed to be part of the sacred site between Boiwek and Almudj.

When negotiating agreements for access and mining, the previous and current senior traditional owners consistently indicated to the owners of the Jabiluka Mineral Lease that the major site was confined to the area of the soak. This is reflected in the 1982 Agreement. As a member of the Bininj working committee the current senior traditional owner ratified in 1992 a map showing Boiwek as a small site at the soak. This map identified the parts of the lease where particular conditions would be attached to any permits issued to non-Aboriginal people. The map was to be attached to any permits so permit holders would not inadvertently enter the area of any sacred sites.

It was not until 1997 that claims were made about a possible extended area for Boiwek, possibly covering the whole of Mine Valley. These revisions also upgraded the category of the site from sacred to sacred and dangerous, and involving sub-surface manifestations, perhaps defined by the ore body. The recent claims are not consistent with anthropological records or the previous statements and permissions given between 1976 and 1997 by traditional owners, including the current senior traditional owner. Those permissions were freely given and the Northern Land Council has confirmed the consultation process was adequate and effective.

In 1997 the Aboriginal Areas Protection Authority, with a majority of Aboriginal site custodians, declined to register the extended site, citing disagreement amongst custodians over its location and significance.

The Jabiluka mine will proceed in accordance with the extensive provisions in Australian law applying to indigenous heritage.

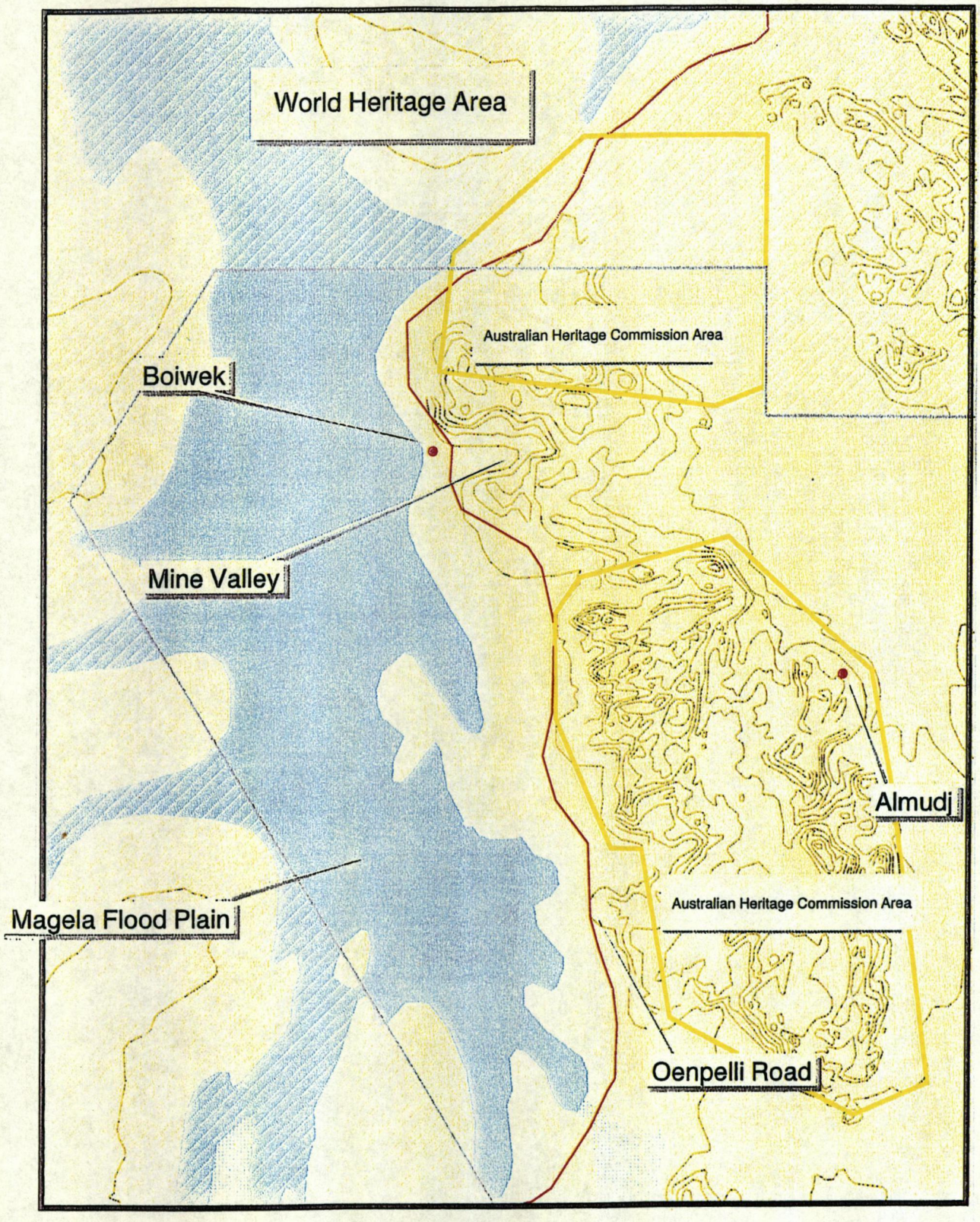

Figure 7(a): 1970s to 1990s Boiwek and Almudj sites.

Legend
Major Roads
Watercourse
Mangrove
Waterbodies and Wetlands
Seasonal Flooding

Approx. 2.5km

N
W
E
S

This figure is for illustrative purposes only.

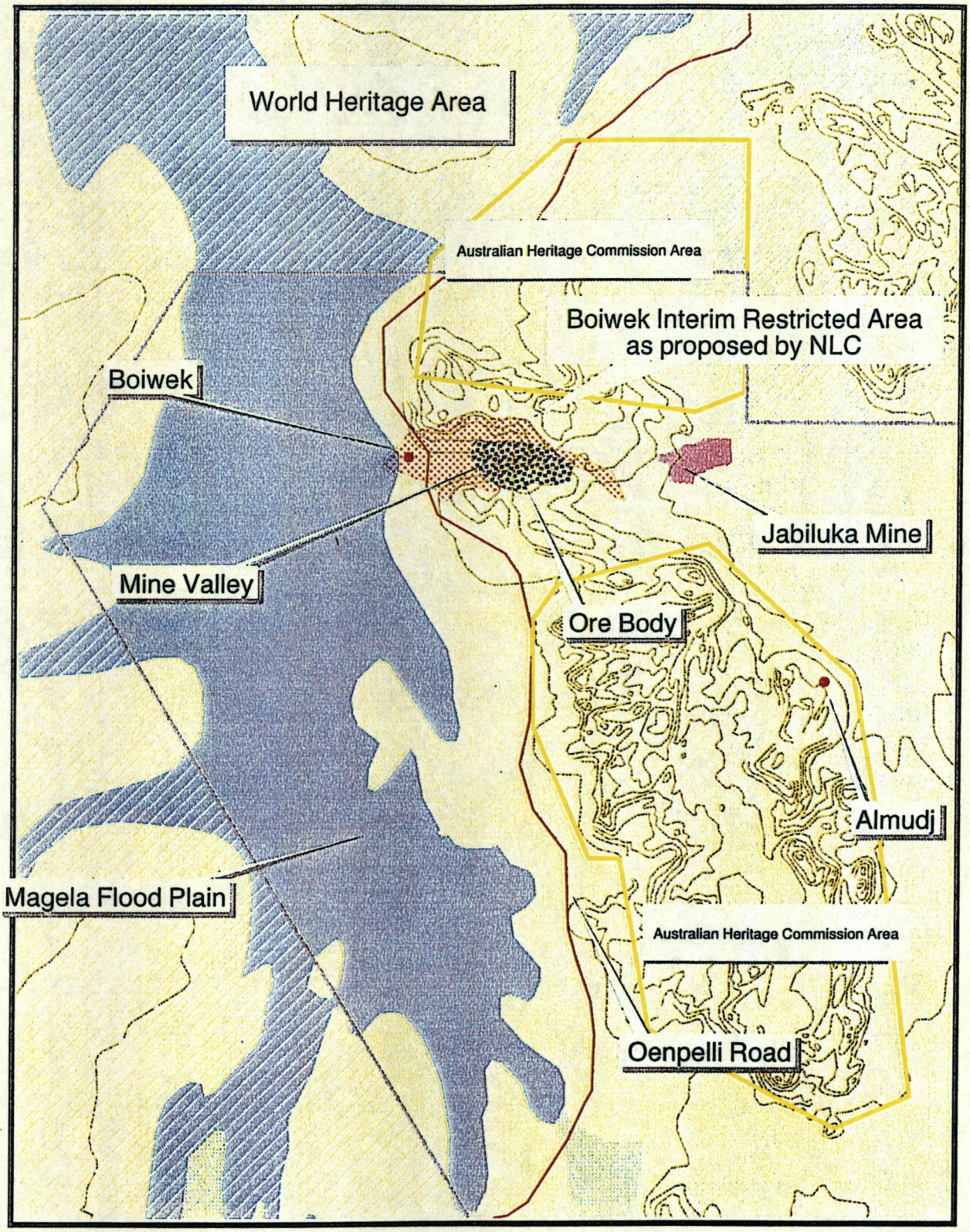

Figure 7(b): 1997 Boiwek and Almudj sites:
Location as proposed by Northern Land Council and acknowledged by proponent in mine management.

Approx. 2.5km

This figure is for illustrative purposes only.

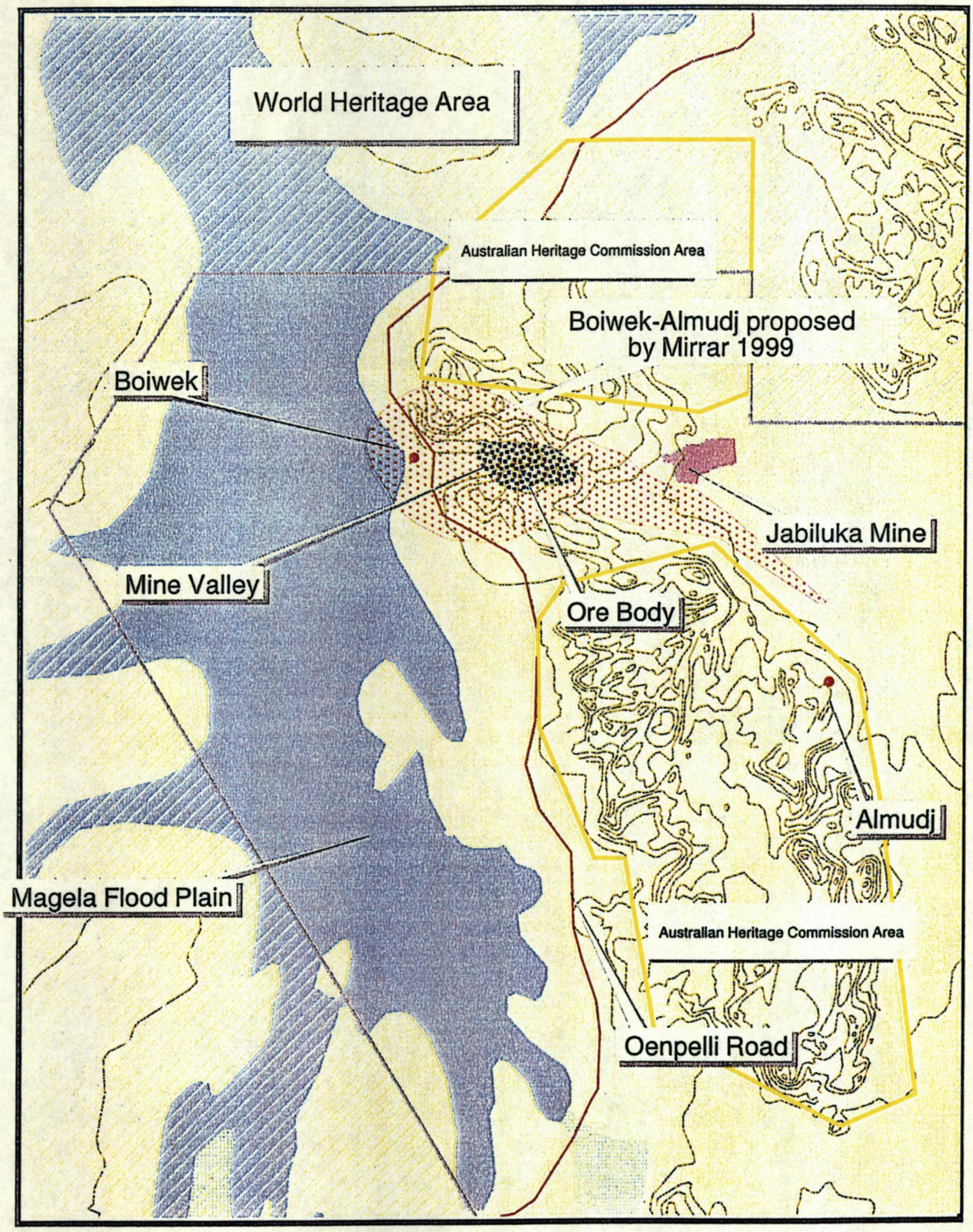

Figure 7(c): 1999 Boiwek and Almudj sites:
Figure based on Mirrar publicity materials.

Legend
Major Roads
Watercourse
Mangrove
Waterbodies and Wetlands
Seasonal Flooding

Approx. 2.5km

N
W
E
S

This figure is for illustrative purposes

5.6.2 Boyweg: Chronology of Site Recording

Note: *the orthography of the region has undergone several revisions. Place names (and the names of people and clans) vary according to different sources. The following account uses the spelling recorded in the documents quoted.*

Phase One: Pre Land Rights

In 1975, George Chaloupka, a respected site recorder and rock art specialist working for the Northern Territory museum and Dr Ian Keen, an Australian National University anthropologist, mapped the Mirrar Gunjeimbi clan estate with senior owners. With Toby Gangali, Jimmy Madjandi, Nipper Gabarrigi and George Namingum, Chaloupka located 35 places and depicted the routes taken by mythological creator beings.

In 1976, Chaloupka recorded Boywek Bagolui as a spring on the edge of Wirrmuyurr swamp that had been degraded as a result of trampling by feral buffalo (Figure 7a). He was told (by Frank Djandjul) that the ancestral being associated with Boywek had travelled from another site, Almudj, located some 5 km south-east on the eastern escarpment of the Jabiluka outlier.

In 1977, Justice Fox of the Ranger Uranium Environmental Inquiry considered Chaloupka's report and commented that it is "detailed; obviously was prepared with care, and, we believe, with objectivity".

In 1978 Dr Ian Keen in reviewing sites of significance in the vicinity of the proposed Arnhem Highway extension with Nipper Kabirriki, Thomas Balmana, Albert Balmana, Kenny Alderson and Matthew Kamarrawu, noted the Almudj (Rainbow Snake) and Buyweg Dreaming. A female traditional owner (not named) accompanied the research team. One design at Almudj was said to "probably represent Buyweg who travelled from that place to the swamp where it made permanent spring waters." He quoted a senior traditional owner, "That one went right through to Buyweg - where that Buyweg are - that's dreaming. I don't reckon -spring water is that bit of ground there. Buyweg made it that way." He noted that the springs associated with Buyweg are located in the Pancontinental deposits, and test drillings have been made immediately beside it.

Between 1971 and 1978, before the area became Aboriginal land, Pancontinental had drilled some 250 holes in Mine Valley in the area between Boyweg and Almudj.

In 1978, 1979 and 1980, Dr Ian Keen, as part of land claim research visited Mirrar sites with senior traditional owners including the current owner's father and mapped twenty sites, including a *djang* site known as Buywek bakulwuy (knob tailed gecko came down). The claim book describes its significance: 'A permanent spring at the edge of the flood plain. Buywek came down from the outlier to the east, stopped here and made himself a dreaming' (Keen 1980).

In 1978 Chaloupka prepared a comprehensive outline of the Djawumbu-Madjawnja site complex for inclusion on the Register of the National Estate. He includes Bojweg Bagolu, photographing the spring , describing it: "*Djang*, a dreaming site of *bojweg*, a knob tailed gecko (*Nephurus asper)*, an actual animal but also a dangerous mythological being. The soak never dries up, even when during extreme drought the wetlands dry out. This is believed to be because Almudj, the Rainbow Snake is below ground here."

The 1978 Chaloupka report describes Boyweg as a sacred site as a small, discrete soakage or swamp located to the west of the Jabiluka Mine Valley. The site lies immediately to the west of what is now the Oenpelli road. The report states that Boyweg is connected by a dreaming track to a sacred site to the east of the mine valley named 'Almudj'. The site of Almudj relates to the Rainbow Serpent, a prominent Dreaming figure across large areas of Australia. A map in the report shows the line of the dreaming track. It travels the length of the Mine Valley, connects Boyweg and Almudj, and is confined to the area now covered by the Jabiluka Mineral Lease. The dreaming track has no connection with the World Heritage property (see Figure 7a).

Phase Two: Alligator Rivers Stage Two Land Claim

In 1980, Justice Toohey heard evidence in the Alligator Rivers Stage Two Land Claim. Evidence was provided by Toby Kangele, the current traditional owner's father who described Boywek Balgoluyi as "just up here where the buffalo wallow is now...It used to be a sacred place before but people are just walking up there back and forth now...".

In 1981, Justice Toohey reported his findings on the Land Claim. While his report gives considerable attention to the proposed Jabiluka project (as it was planned then), including the reproduction of a model showing the effect of the project on the Jabiluka outlier and consideration of changes to the siting of facilities, and to the protection of sacred sites, no concerns over Boywek or Almudj were noted.

Although the proposal was much larger than the present initiative, the site does not appear to have been perceived by Justice Toohey, on the basis of evidence before him from traditional owners, to be under any threat.

Phase Three: The Agreement: 1982–1997

In the years leading up to 1982, the Northern Land Council carried out extensive consultation with traditional owners and affected Aboriginal communities over the Jabiluka project. Traditional owners were fully informed about the project by NLC staff and consultant anthropologists and had ample opportunity to express their views on sites that required protection and to have those views reflected in the final agreement.

In 1982, after this exhaustive consultation process, an agreement (the 1982 Agreement) was signed that stated, in part, "It was agreed by NLC on behalf of traditional Aboriginal owners that there are no sacred sites within the fenced area. Traditional Aboriginal owners have instructed NLC that they have no present intention of conferring upon any place the status of a sacred site within the Fenced Area during the term of this deed." The Agreement defines the extent of the operational area and refers to it as the 'Fenced Area'.

The 1982 Agreement also set out processes to be followed should sacred site issues arise, including a Bininj Working Committee, formed by traditional owners (including at the time Toby Gangele, Jacob Nayinggul and Big Bill Neidjie) on which the NLC has representation. The Committee was not asked to consider the status or boundaries of Boiwek, or to consider issues arising from the drilling program in Mine Valley (including the new extended site area) by Pancontinental.

After the 1982 Agreement, Pancontinental (and later ERA) sought and received a succession of approvals from the traditional owners through the NLC for drilling works in and around Mine Valley, as well as approval for the construction of the access road to the mine.

In 1989, the Oenpelli Road realignment was surveyed by the NLC and a works clearance provided which restricted gravel extraction on the western (Boiwek side) of the proposed road but allowed unrestricted extraction on the eastern (Mine Valley) side of the road (Figure 7a). A gravel pit was excavated within Mine Valley for this purpose.

Between 1992 and 1993 a further 31 drill holes were made by ERA, including 5 in the area that was later to become restricted.

In August 1992, the Bininj Working Committee (including Yvonne Margarula, Joseph Bumarda, Mick Alderson, Liam Maher and Jonathan Nadji) discussed a "map to be attached to all permit applications to avoid confusion and to ensure people going into Area A near Boywek and other sacred sites are identified." The minutes indicated that all agreed to use a map showing Boywek as a small site at the spring and Almudj as a separate site. The Mine Valley was clear of sites.

Phase Four: The Jabiluka campaign 1997-1999

The next available information comes from a supplementary Northern Land Council (NLC) submission (in 1997) on the Draft EIS for the Jabiluka Project. The summary states that Boyweg is not '*djang*' but is in fact recorded by the NLC as a dangerous sacred site (ie *djang andjamun*). The submission noted that 'there is potential for the sacred integrity of this site to be compromised if the [Jabiluka] development proceeds'. No information was provided on why the site was dangerous, the sources of the information, the apparent contradiction of the 1982 Agreement, inconsistencies with the extensive anthropological research, and the findings of Justice Toohey.

During 1997, ERA was presented with a series of maps depicting several boundaries for a new site of several square kilometres described as the Boyweg/ Almudj site complex. These maps were understood to be based on anthropological research carried out by the NLC (Figure 7b). One map had a kilometre wide corridor in which mining was banned, including an area directly over the mine site, which has been extensively and consistently cleared. Another boundary extends over most of the western lease area. These reports have not been supplied to the Australian Government.

In mid 1997, following the preparation of the Draft EIS for the Jabiluka Project, the traditional owners approached the NLC seeking registration of the site complex Boyweg-Almudj. A comprehensive anthropological investigation was carried out by the NLC which resulted in an enlarged area of influence being listed by the NLC for Boyweg (Figure 7b). This area is many times larger than that of the immediate soakage or swamp, which in the past had been recorded as the Boyweg site. Much of the enlarged area extends into the Fenced Area and covers localities planned for the installation of mine facilities (particularly mine vents) by ERA in the 1996 Draft EIS. The NLC advised ERA of the location of this area of influence and the area is shown in ERA's Public Environment Report. The company bans entry by mine staff into the area.

A comprehensive anthropological investigation was undertaken by AAPA of the claimed significance of the site and they noted at their 36th meeting, held 2-3 June 1998, that:

> 'In the course of discussion it was noted that on a number of key issues, including the location and extent of the site and the physical features that constitute the site and the significance of the site according to Aboriginal tradition, there were widely divergent and strongly held positions taken by various custodians. Disagreement on the part of some senior custodians with the proposed registration had the effect of creating substantial doubt from a legal point of view that the area proposed for registration is a sacred site.'

AAPA also declined to issue ERA an approval for works in the form of an Authority certificate for works in Mine Valley, given the continuing doubts around the issue. AAPA has been kept fully informed of the works being carried out by the Company and has not sought to use its powers to limit or restrict those works.

At the request of the NLC, the AAPA carried out a further investigation into possible desecration of Boiwek, after police contractors cleared areas adjacent to the Oenpelli Road vacated by a protest camp. The AAPA decided not to take action, due to insufficient evidence and disagreement between traditional owners on the nature and extent of the site.

Recent Actions

At a meeting between the Minister for Environment and Heritage, on the 9th February 1999, and the traditional owners of the Jabiluka Mineral Lease, the senior traditional owner made several statements concerning Boiwek. In brief these were:

- the site is three ancestors;
- the site has sub-surface manifestations; and
- any disturbance would destroy the community.

These are inconsistent with previous information provided by traditional owners, researched by anthropologists, and spelt out in legal agreements and site permits agreed by the current senior traditional owner as recently as 1992. Despite requests, no other evidence has yet been supplied by traditional owners to the Australian Government to substantiate the recent claims

Traditional owners, in comments made to Australian Government officers, claim that the subterranean ore body below the Boiwek-Almudj site complex is the manifestation of the 'kudduk' (faeces) of the Almudj (rainbow creation figure) and Boiwek, mixed up underground. It has been explained by the traditional owners that disturbance of this ground will cause it to sink, become boggy and that water will bubble up from the ground, causing flooding and serious harm to the people.

The Australian Government has not previously been provided with the information that the site is related to the two additional dreaming ancestors, that it has sub-surface manifestations and that its disturbance could destroy the community. In 1999, the official Mirarr web site displayed a map showing an even larger location for the boundaries of the site (see Figure 7c). Independent anthropological assessment requested by the Australian Government has confirmed that this information on boundaries and significance is not consistent with previous descriptions of the site.

Statutory regime and comment

The *Aboriginal Land Rights (Northern Territory) Act 1976* (the Act)

The 1982 Agreement between the Northern Land Council (NLC) and Pancontinental states that sacred sites will be protected. The Agreement was signed under the *Aboriginal Land Rights (Northern Territory) Act 1976*, which includes provisions for the protection of sacred sites on Aboriginal Land.

The 1982 Agreement has provisions to protect sacred sites from mine construction. The provisions relate to the protection both of sacred sites known at the time of the 1982 Agreement and those places which may take on that status over time. The provisions relate especially to the protection of sacred sites within the area of the Mineral Lease covered by the operational area of the mine.

ERA states in the Supplement to its Interim Cultural Heritage Management Plan (October 1998) that they have not received complete advice as to the impact of the extended area of Boiwek (ie whether there would be any restrictions on operational or monitoring activity within it), however they have been requested not to carry out any work in the area other than to cross it via the existing track.

Under the 1998 Deed Poll (resulting from arbitration over changes to the Jabiluka development), ERA has agreed to a number of additional measures while awaiting confirmation and complete advice on the site boundary:

- to not, without the prior written approval of the NLC, enter upon or occupy any part of the extended area,
- to realign the Access Road to a route acceptable to the NLC, and
- to comply with the decisions and requirements of the Northern Territory Aboriginal Areas Protection Authority with respect to whether or not the vents which it has proposed to construct on the Boiwek–Almudj complex can be constructed within those sites.

ERA has listed in the Supplement the measures which it has undertaken to comply with each of these agreements, and also the recommendations and requirements set by Australian Ministers (for information on the latter see earlier sections of this chapter).

ERA states in the Supplement that it is very conscious of the importance of the Boiwek area of influence and, both in mine design and environmental practice, has sought to take account of the concerns of the landowners and custodians.

It would therefore seem that the locality covered by what is now the extended area of influence of Boiwek which lies within the Fenced area (ie most of the extended area) was not of sufficient concern to the NLC at the time to be noted in the 1982 Agreement (Figure 6b). This is despite there being an opportunity for such issues to be raised.

The traditional owners have made no moves under Australian law to rescind the 1982 Agreement.

The *Northern Territory Aboriginal Sacred Sites Act 1989*

The Northern Territory Aboriginal Sacred Sites Act 1989 provides for the protection of sacred sites in the Northern Territory and is administered by the Territory's Aboriginal Areas Protection Authority (AAPA). The AAPA consists of 12 members, ten of which are Aboriginal custodians of sacred sites.

The application to register the site was rejected. The Chief Executive of the AAPA noted that the application could be reconsidered in the light of any new evidence regarding the significance of the site.

It is understood that one of the main areas of disagreement between senior custodians was on whether the site was a dangerous sacred site. There may have been a difference of opinion between the senior traditional owner of the Mirrar Gundjehmi clan and the senior traditional owner of a neighbouring clan. This latter person is a contemporary of the father of the current senior traditional owner of the Mirrar-Gundjehmi. He has a deep and comprehensive knowledge of the sacred sites of this area of Kakadu and is understood that he has a long-term understanding of the site and its significance which stretches back to his boyhood.

Jabiluka Project statutory requirements

Under the recommendations and requirements listed by Senator Hill and Senator Parer, ERA is required to take all reasonable steps to identify potential dewatering effects at the Boyweg site. It is also required to prevent contamination of groundwater and conduct baseline studies to establish the degree of connection between deep and shallow aquifers.

Due to access restrictions imposed by the traditional owners, ERA has relied on desktop modelling to address these requirements. The modelling suggests that there could be little or no connections between the deep and shallow aquifer and thus mine construction could expect to have little or no hydrological impact on the site.

In terms of other possible impacts relating to Boiwek, ERA undertook to move any surface facilities (mainly ventilation shafts, weather monitoring post, access tracks) away from the area of influence of the site as identified by the NLC to the AAPA.

CONCLUSION

The Jabiluka project has been subjected to three years of intensive, exhaustive open and transparent environmental impact assessment. There is an extensive and comprehensive program of environmental monitoring in place. This assessment process specifically included binding measures to ensure no damage to the World Heritage values of the Park, or to sacred sites in the project area.

The sacred and significant site protection measures available to traditional owners include both Commonwealth and Northern Territory legislation through which traditional owners could apply for sites to be protected. For over 20 years the site at Boiwek located at the soakage and Almudj on the outlier have been recognised and protected.

Recent claims that the site is larger, (covering a wider area) deeper, (extending lately to the ore body) and of greater significance (more ancestors, more dangerous) needs to be weighed against the historical facts

that approvals for any mine project, including exploratory drilling needed to be provided by traditional owners before any work could commence. These permissions were given. The recent claims are not consistent with anthropological evidence or the previous statements and permissions given between 1976 and 1997 by traditional owners, including the current senior traditional owner. Those permissions were freely given and the Northern Land Council has confirmed that the consultation process was adequate and effective.

The State Party has asked traditional owners to discuss the cultural mapping exercise recommended by the Mission. These requests have been rejected by traditional owners.

The World Heritage Committee needs to consider these issues on objective and factual evidence. It needs to consider these issues carefully, with awareness of the rights of the State party to uphold and manage the values of the World Heritage area and also the extensive rights of Aboriginal people under domestic law to seek and receive protection for sacred sites.

ATTACHMENT C

TRANSCRIPT

Darwin 8 DDD Fred McCue 8.45 am, 13 August 1999

DISCUSSION ON SOCIAL AND ECONOMIC ASSESSMENT OF THE

KAKADU REGION

INTERVIEW WITH BOB COLLINS, KAKADU REGION

SOCIAL IMPACT STUDY IMPLEMENTATION GROUP

REHAME
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Date: 13 August, 1999
To: Helen McInnes
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DARWIN 8DDD FRED MCCUE 8.45 AM
13TH AUGUST, 1999.

DISCUSSION ON SOCIAL AND ECONOMIC ASSESSMENT OF THE KAKADU REGION.

INTERVIEW WITH BOB COLLINS, KAKADU REGION SOCIAL IMPACT STUDY IMPLEMENTATION GROUP.

FRED MCCUE - PRESENTER:
In July the World Heritage Committee meeting in Paris decided not to place the Kakadu National Park on its in danger list as a result of the Jabiluka uranium mine. But that decision definitely didn't mean a green light for Energy Resources of Australia when it came to developing that mine, a mine which, of course, has attracted international condemnation from conservation groups.

Well, ERA agreed to an eighteen month moratorium on mining while an assessment takes place of Aboriginal sites near the Jabiluka mine. Former Labor Senator Bob Collins is chair of the Kakadu Region Social Impact Study Implementation Group - there's a mouthful for you - and Bob, good morning to you.

BOB COLLINS - KAKADU REGION SOCIAL IMPACT STUDY IMPLEMENTATION GROUP:

G'day, Fred.

MCCUE:
Bob, I mentioned yesterday it might be worth trying to actually catch up with you ...

COLLINS:
Yes.

MCCUE:
... to find out what's happening in a social sense in Kakadu because obviously whatever happens at Jabiluka impacts not only in ... on the township of Jabiru but also the whole Kakadu region. And as I understand it, at the moment there's a real sense of uncertainty in the region.

COLLINS:
Yes, there is, Fred. And that's ... you know, that's across the whole community, Aboriginal and non-Aboriginal, and that's understandable. You mentioned in your introduction, I think probably the most significant concession that was made in Paris - there were a number of concessions made, all of which impact on what I'm doing out there - but I think the most significant one was the agreement of eighteen months and the agreement delay and the agreement by the company to phase out Ranger before they phased in Jabiluka, if Jabiluka goes ahead at all.

Now, one of the most important recommendations, in my view, that I'm charged to implement in the long term is to get a long term strategic social and economic strategy developed for the whole region. Now, that's got to be, in my view, as a minimum, a twenty year strategy.

Now, Jacqui Katona has said on your program - and I agree with her - that these long term aspects of the social impact worked out that there the really important ones. But I think Paris has changed the time frame for this.

MCCUE:
When you say changed the time frame, what do you mean?

COLLINS:
Well, I'll tell you, Fred. I'll get right down to the bottom line. The company has been saying consistently, as they've a right to say, that if they're forced to do so, they will construct milling facilities and tailing stands and everything else up at Jabiluka instead of proceeding to utilise the facility ...

MCCUE:
Clearly, not their preferred option.

COLLINS:
Way, way from it. They've in fact used that word, forced, if they're forced to do so. Now, that's correct, they've got a

legal right to do that. But all of the assumptions I am making in respect of the work I'm doing out there is that that's not going to happen. I think it's a highly arguable proposition economically. I think it's beyond argument environmentally. I just don't think it's going to happen.

So, what that means is this. If they do not have a successful negotiation on what they call the RMA, the Ranger Milling Alternative, with the road just taking (indistinct) over, in my view, Jabiluka simply won't happen. Now ...

MCCUE:
I can understand [speakers talk over each other] ... nervous, because if Jabiluka doesn't happen you'd have to then start asking questions about the future of Ranger itself, wouldn't you?

COLLINS:
Well, a lot of people don't realise that this has been in the public domain for years but people haven't talked about it till now. The Ranger mine is due to cease operations in six years from now. I mean, it's been part of the landscape for such a long time out there people sort of just see it being there. But in the ... on the current planning - and this is all ... this is known, it's been in the public domain forever - six years from now Ranger mining and milling will cease.

However, the company, of course - and again, this is my assumption and I think it's correct - I don't think the company, if they did not get a successful negotiation with Jabiluka, would frankly want to hang around for that long. The company has got management operations already planned that would allow them to in fact cease mining and milling in three years from now.

MCCUE:
So, 2003 ...

COLLINS:
Three years from now.

MCCUE:
Three years from now, you're saying that effectively the whole social landscape, the economic landscape of the Kakadu region could change ultimately. Jabiru could become ...

COLLINS:
Change considerably, and I ... yes, and I think what has to happen immediately - and I discussed this with the Gundjehmi Association the other day - let me tell you, I've discussed it with a wide range of parties over the last six months - is that I've ... that certainly the concessions that were made in Paris, and the ones you've mentioned - well, one in Paris by negotiation - have changed, I think, the timetable (indistinct).

I think it's got to be done now. I think there are local people like, for example, the Northern Territory University in NARU, who could provide the necessary skills for it. But there needs to be an immediate start to a long term plan for the social and economic future for Kakadu which looks at two options - a mining option for the next twenty years, mining plus tourism and all the other things, and a non-mining option, because I believe that if the RMA alternative is not successfully negotiated, then ERA will not proceed.

I mean, the public outcry would be enormous. They'd just ... aren't going to shift. You've seen all the stuff out there. They're not going to put all that up at Jabiluka without a major brawl which I don't think, frankly, they could win. So, it's either the RMA or nothing. If it's nothing, I believe the company will seriously look at its option of exiting out of there in three years from now.

Now, there is of course a rehabilitation process that has to take place. But to give you the comparison, the company is currently ... the mining operations currently generate about a hundred and thirty million dollars a year into the economy. That's, you know, wages, royalties, purchases, and so on. The rehabilitation will be thirty million dollars over five years. So there needs to be an alternative strategy for a non-mining future for Kakadu.

MCCUE:

Now, we've Karen Oxnam, who's the director of the Jabiluka mine, holding on. I'll be speaking to her shortly. But just finally, I mean, the Mirrar people, through the Gundjehmi Aboriginal Corporation have been absolutely intransigent. They are just saying no to that twenty-two kilometre road from the Jabiluka mine to Ranger. Do you see any prospect at all, because as I say, you've spent an awful long time in that region. Is there any leverage at all ...

COLLINS:
It's a matter entirely for the traditional owners to make a determination on it. There's a timetable I know being organised now for those negotiations to start, but from my perspective, from the social impact perspective, I think it's imperative that this long term strategy be developed. And I mean, I think the skills are here to do it.

Things like tourism, for example, have got to be carefully analysed because you can't simply look at extracting dollars out of tourism, there's a huge social impact involved in increasing tourist activity of the park ... in the park that has to be factored into any analysis.

But what I'm saying, Fred, is that it ... we could be looking at a situation where the mining and milling operations at Jabiru cease three years from now, and there needs to be an immediate start made to a long term strategic, social and economic plan for Kakadu.

MCCUE:

All right then, Bob. Thanks very much for that. And that's Bob Collins, who is the chair of the Kakadu Region Social Impact Study Implementation Group, and sounding a pretty stark warning there about the future for the Kakadu region.

END OF SEGMENT

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DARWIN 8DDD FRED MCCUE 8.52 AM
13TH AUGUST, 1999.

DISCUSSION ON THE FUTURE OF MINING IN THE KAKADU REGION.

INTERVIEW WITH KAREN OXNAM, JABILUKA MINE.

FRED MCCUE - PRESENTER:
With me now, as I mentioned earlier, is Karen Oxnam who's the director of Jabiluka. And Karen, good morning. Thanks very much for your time.

KAREN OXNAM - JABILUKA MINE:
Good morning.

MCCUE:
A pretty stark sort of warning there from Bob Collins, by the sound of it.

OXNAM:
Yes. Well, the UNESCO World Heritage decision was a real turning point for us as a company, and it does make us realise that we do have to open up dialogue, we have to make a much bigger effort to understand what the Aboriginal groups want out of Jabiluka and we need to

focus on the future of Jabiluka to actually get the outcomes that we'd both like.

MCCUE:
I see in a speech that you delivered yesterday to the Melbourne Mining Club, in fact, along the way you said that nevertheless in an effort to move beyond the facts of the matter, we are refocussing our efforts to plan an eventual departure from Kakadu. How so?

OXNAM:
What we're meaning there is that whenever we're in any sort of mining development anywhere, it's not just the immediacy that we're looking at. We're actually looking at ... when we leave the area, what we want to do is leave the area in such a state that it existed ... that it looks like it was before we were even there.

So, that point's really talking about rehabilitation. And as you're aware, ERA has been rehabilitating since the Ranger mine's been in operation, and we've already commenced the mine rehabilitation around the Jabiluka area.

But what we're really focusing on now is Jabiluka and the Ranger Mill Alternative, trying to open up dialogue, we're making a fresh effort to actually identify what it is that the Aboriginal groups would like to get out of Jabiluka,

because we believe the Ranger Mill Alternative presents a number of opportunities for the Aboriginal groups.

MCCUE:
All right. But without the Ranger Mill Alternative you could be in trouble, and you've just heard Bob Collins mention two critical dates there. There's the 2006 as far as the future of the Ranger mine itself's concerned, and the fact that he said that you actually have possible plans in place at the moment which would allow you to walk away from that region by 2003?

OXNAM:
Well, firstly let me say that we're actually very confident ...

MCCUE:
Sure. But let's just ... I understand that. But let's just look at that. Is that ... is what he's saying there, are those two dates in fact part of your overall strategy? Have you got those pinned down as far as your management teams is concerned?

OXNAM:
Well, we've been very clear that our current plans show that Ranger will complete in about 2006, and part of what we're doing at the moment in reviewing our outlook to Jabiluka is looking at the mining plans for both the Ranger operation and the Jabiluka operation. But they're in their infancy at the moment. We actually haven't come to any

final conclusions there but we are looking at the mining plans for both Ranger and Jabiluka.

MCCUE:
Well, let's just look at that basic concept, that is, that if you don't get the okay for the Ranger milling option, that obviously Jabiluka itself looks pretty shaky, doesn't it?

OXNAM:
Oh, we're confident that we ...

MCCUE:
Oh sure. Sure, I understand you ...

OXNAM:
... the consequences of not proceeding with Jabiluka are very serious. And we do need approval to proceed with Jabiluka, but we think that we can actually work through this process and show the Aboriginal groups the opportunities that they can get out of the Jabiluka project.

MCCUE:
All right. Look, just a simple question then. Could you be out of the region before 2006?

OXNAM:
There are a number of options that we could look at if we don't get approval for Jabiluka. I can't commit to any of those at this point in time.

MCCUE:
All right then, Karen. Thanks very much for your time.

OXNAM:
Thank you.

MCCUE:
Bye. And that's Karen Oxnam, who's the director of Jabiluka, and talking there about the future of the region. And it sounds as though, as she said herself, there are a number of options being examined, and she's not willing to be pinned down, but I think we'd better keep our eye on that one.

END OF SEGMENT

ATTACHMENT D

Review of an Independent Scientific Panel of the scientific issues associated with the proposed mining of uranium at Jabiluka in relation to the state of conservation of Kakadu National Park

Undertaken between 22 April and 13 May 1999

World Heritage 23BUR

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CONVENTION CONCERNING THE PROTECTION OF THE WORLD CULTURAL AND NATURAL HERITAGE

BUREAU OF THE WORLD HERITAGE COMMITTEE

Twenty-third session
Paris, UNESCO Headquarters, Room X
5 - 10 July 1999

Information Document: Review of an Independent Scientific Panel of the scientific issues associated with the proposed mining of uranium at Jabiluka in relation to the state of conservation of Kakadu National Park. Undertaken between 22 April and 13 May 1999

Background

This Information Document contains the peer review by an independent scientific panel of the *Assessment of the Jabiluka Project – Report of the Supervising Scientist to the World Heritage Committee* (WHC/99/CONF.204/INF.9C) as requested by the twenty-second session of the World Heritage Committee (Kyoto, Japan 30 November – 5 December 1998)

Other relevant documents

WHC-99/CONF.204/5	Reports on the state of conservation of properties inscribed on the World Heritage List (see section concerning Kakadu National Park, Australia)
WHC-99/CONF. 204/INF.9A	Report on the mission to Kakadu National Park, Australia, 26 October to 1 November 1998
WHC-99/CONF. 204/INF.9B	Australia's Kakadu – Protecting World Heritage. Response by the Government of Australia to the UNESCO World Heritage Committee regarding Kakadu National Park (April 1999)
WHC-99/CONF.204/INF.9C	Assessment of the Jabiluka Project: Report of the Supervising Scientist to the World Heritage Committee
WHC-99/CONF.204/INF.9D	Written independent expert review of the advisory bodies (IUCN, ICOMOS and ICCROM) concerning the mitigation of threats posing ascertained and potential dangers to Kakadu National Park by the Jabiluka mine.

Review of an Independent Scientific Panel of the scientific issues associated with the proposed mining of uranium at Jabiluka in relation to the state of conservation of Kakadu National Park.

Undertaken between 22 April and 13 May 1999

The review was carried out by a panel established through the International Council for Science (ICSU) at the request of the World Heritage Committee of UNESCO. The Independent Science Panel was composed of four scientists (Appendix 1).

Review of an Independent Scientific Panel of the scientific issues associated with the proposed mining of uranium at Jabiluka in relation to the state of conservation of Kakadu National Park

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5. General Environmental Protection Issues – Chapter 7 of SSR

   5.1. Introduction
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   5.3. Extent of the Ore Body and Mine Life
   5.4. Landscape-Wide Analysis
   5.5. Rehabilitation and Monitoring
   5.6. References

6. Recommendations

Appendix 1

Executive Summary

The Independent Science Panel established by ICSU has assessed the scientific and technical issues contained in the review by the Australian Supervising Scientist relevant to the proposed uranium mine site at Jabiluka, and in supporting documents to this review.

The panel reached the conclusion that the Supervising Scientist's Report and its supporting documentation contains new information and analyses that enable a scientific assessment to be made of the impact of the Jabiluka Mine on the World Heritage values of Kakadu with a much greater degree of certainty than formerly. However, the panel consider that there remain issues on which they would require further information before they could reach a firm judgement. There are additional measurements and analytical activities that the panel would wish to see undertaken. The uncertainties and requirements for additional work are presented in the report and in the recommendations.

1. Introduction

The study that the Independent Panel of Scientists (Appendix 1) has undertaken has been essentially based on the Supervising Scientist's Report and supporting documents to that report. The panel have carried out its work diligently but with the limitation that all of the information it would have wished for, was either not readily available, or was too voluminous to digest in the time at its disposal. Insights have also been restricted by not having visited Jabiluka.

We have met our Terms of Reference in that we have:

- provided an assessment of the scientific issues contained in the Supervising Scientist's review;

- identified a number of issues we consider may impact on World Heritage values at Kakadu.

We reached the conclusion that the Supervising Scientist's Report and its supporting documentation contains new information and analyses that enable a scientific assessment to be made of the impact of the Jabiluka Mine on the World Heritage values of Kakadu with a much greater degree of certainty than formerly. However we consider that there remain issues on which we would require further information before we could reach a firm judgement. There are additional measurements and analytical activities that we would wish to see undertaken. The uncertainties and requirements for additional work are presented in the report and in the recommendations in Section 6.

We would wish to receive the responses to our report from UNESCO and the Supervising Scientist.

2. Hydrological Modelling and Prediction, Impact of Severe Weather Events, and Retention Pond Capacity - Chapters 3, 4, 5.1 and 5.2 of SSR

2.1 Introduction

These three sections of the SSR have scientific issues that are closely interrelated and we have therefore considered them together in this review. The following supporting documents of the SSR are also addressed here:

> *Hydrometeorological Analysis relevant to Jabiluka* – Commonwealth Bureau of Meteorology (RHU)
> *Climate Change Analysis relevant to Jabiluka* – Jones *et al* CSIRO (RCC)
> *Hydrological Analysis relevant to the Surface Water Storage at Jabiluka* – Chiew & Wang, University of Melbourne (RCW)

These chapters and supporting documents are aimed primarily at the design of the pond to retain surface water, ground water and process water in the total containment zone, water which it is assumed would otherwise drain into watercourses forming part of the East Alligator River. The main issues are:

1. The estimate of the annual rainfall at Jabiluka not likely to be exceeded, on average, on more than one occasion in 10,000 years (referred to as the 1:10,000 annual exceedance probability {AEP}).

2. The estimate of the evaporation from the water surface of the pond.

3. The estimate of the evaporation in the mine in relation to the size of the pond.

2.2 Rainfall Data

The RHU (Table 1) sets out the rainfall, evaporation and climate data that are available in the area, while the locations of the stations where the data are captured are shown in Fig 2.1 of the RSS. We consider it very fortunate that so many data are available—comparisons with similar locations in the tropics in other continents would generally reveal far fewer stations, with each of these having much shorter records. The existence of an 88 year record of rainfall (1911 to 1998) at Oenpelli, 25 km north east of Jabiluka is particularly important: records from other sites, although closer, are briefer. The RHU comments that 'there was very little missing data in the Oenpelli daily rainfall record and the 88 years of data is an excellent record'. It also comments on the method of infilling missing data.

The RHU and RCW make no reference to the nature of the site of the raingauge at Oenpelli and any site history which may have revealed changes which could have

affected the reliability of the record. Nor are there similar remarks for any of the other sites. However, the sites must meet the Bureau of Meteorology requirements, or the Bureau would not have employed the records from them in its report (RHU). None of the reports mention raingauge errors, such as evaporation from the gauge or the effect of wind, both of which would tend to make the recorded rainfall less than the amount actually reaching the ground (Sevruk 1989). Nor is there comment on the site of the evaporation pan at Jabiru Airport, probably an exposed site which would lead to over-estimates of evaporation by the Class A pan.

It is probable that these over-estimates are compensated for in the pan factors that are applied to the monthly pan totals.

In view of the likely underestimate of the rainfall at Oenpelli and other sites, we recommend that consideration be given to increasing the design AEP annual rainfall for Jabiluka by 5% unless there is evidence to the contrary. This would mean a reassessment of the storage capacity of the retention ponds but the likely increase in volume would be modest.

2.3 Tests of the Rainfall Data

Comments are made in RSS and RHU on the choice of data sets used to estimate the 1;10,000 AEP annual rainfall. We consider that the reasoning behind the selection of the record for Oenpelli is sound. The monthly and annual rainfall totals for Oenpelli from 1911 to 1998 are presented in Appendix A of RHU. A high correlation between the Oenpelli and the Jabiru records is shown to exist for the monthly and annual totals and the monthly correlation is demonstrated in Fig 3.2.1 (RSS). Comparisons of certain statistics for these two rainfall stations are given in Table 3.2.1. (RSS) and these show close agreement.

The Wasson *et al* Report asserts that the distribution of annual rainfalls at Jabiru Airport is skewed (page 17) and draws conclusions about the estimation of the 1:10,000 AEP based on this assertion. However, when the Oenpelli annual rainfall record was tested for normality (RHU), the tests proved that these annual totals are close to a normal distribution; the coefficient of skewness is very small. This normality is also shown in Fig. 1 (RHU), where the ranked values plot as a straight line, as of course they should. The annual totals for Jabiru Airport were also found to be close to a normal distribution.

A test was also made (RHU) to establish whether the total of 2223 mm recorded at Jabiru in the exceptionally wet year of 1975-76 (the highest of the plotted points in Fig 2) was an outlier. The method used for this test was not described, but the result reported in RHU indicates that this was not the case. Hence this total and the 2011.6 mm recorded at Oenpelli in the same year should not be excluded from the analyses. Rather this rainfall was estimated to have an AEP of 1 in 88 years in the Jabiru record. There seemed to be an assumption in the RHU that the presence of an outlier might distort the analyses. Such an outlier would seem to represent an exceptionally strong monsoon, one which might have a return period of several hundred years. In a sequence of 88 annual rainfalls, a small number would be expected which would represent AEPs greater than 1:88.

There is reference (RSS) to a study using the CUSUM method, which revealed that 'the period 1960 to the mid 1980s was one of significantly higher average rainfall than the long term mean'. Presumably this phrase should have said: 'the period 1960 to ..... significantly higher annual rainfalls than the long term mean'. This finding was repeated at a number of other stations and RSS suggests that the short term (88 year) Oenpelli record which is dominated by this period of higher than average rainfall, has a mean for the 88 years which is higher than the long term mean. We consider that this suggestion could be misleading without the evidence to support it from a longer rainfall record.

2.4 Estimation of the 1;10,000AEP Annual Rainfall for Jabiluka

Estimation of events with a long recurrence interval from a short record is a topic which has attracted a considerable amount of attention over the years. There are large numbers of papers in the literature dealing with this matter, especially for events of a short duration such as floods and heavy rainfalls (Cunnane 1989). The method (IE Aust 1987) employed in RHU and RSS is a recognised one, more than likely based on Chow's (1951) general frequency formula. No doubt it produces estimates which are little different from those others would produce. This point is demonstrated in RSS which compares an estimate made by the Beard (1960) method with the result obtained by the Institution of Engineers of Australia (1987) method. The important point is that the estimate of the 1;10,000 AEP annual rainfall is limited more by the available data than by the choice of the method of analysis from amongst those that can be applied. In this regard it is fortunate that such a long and apparently reliable rainfall record is available at Oenpelli.

There is a suggestion in the Wasson *et al* Report that a synthetic record of rainfall should be generated, with the implication that a synthetic record would give a better estimate of extreme events. The result of such an exercise is mentioned in RSS (page 25) where a figure of 2702 mm was obtained from a daily rainfall distribution generated by a stochastic model from the Oenpelli record. Neither this method, nor the application of storm generating models, extended to a year would seem more realistic than the RHU and RSU quoted estimates of the 1:10,000

event derived from the recorded rainfalls. These are the values of 2460 mm ± 170 for Oenpelli and 2610 mm± 320 for Jabiru, with the Oenpelli figure being employed for Jabiluka. However, the synthetically generated data set based on the Oenpelli records leads to a slightly higher AEP and as this data set has been used in determining the retention pond capacity it would appear appropriate to use this higher AEP.

If measurements have not already started we would recommend that measurements of rainfall and Class A pan evaporation are commenced as soon as possible at Jabiluka so that comparisons can be made with the Oenpelli rainfall and Jabira evaporation records.

2.5 Pond Evaporation

The performance of the US Weather Bureau Class A pan against lake evaporation was the subject of a large number of studies in the 1950s and 1960s and fewer in recent years. Comparisons of its performance against other types of pan and tank have also been made, together with comparisons with estimates of evaporation obtained by the so called indirect methods, such as combination formulae, for example that of Penman (1948). A range of pan factors (or coefficients) have been developed to try to take account of differences of surface, site and season, with values between 0.6 and 0.8 being the most commonly applied. Such factors are discussed in RSS and RCW with values from 0.64 to 0.70 being advocated for the dry season and 0.75 to 0.95 for the wet. We consider that the application of these factors is appropriate to the design of the pond.

Some of the errors occurring in pan-based estimates of evaporation are mentioned in the Wasson Report (page 18) and their probable origin, particularly the difference between gauge measured and pan measured rainfall. The Wasson Report calls for use of solar radiation records in a combination formula as a check on pan values. That this was carried out and that good agreement was found is reported in RCW and RSS (page 26), although few details of the comparison are given. RSS and RCW also mention a number of other studies, some leading to the confirmation of the pan factors used in those reports. The inverse relation between evaporation and rainfall is a further point discussed in the Wasson report, particularly the bias which the neglect of this relationship would impart to the design. It is clear from the discussion of this relationship in RCW (see Table 3.1 and Figs 3.5 and 3.6) that it has been sufficiently investigated. We welcome the conclusion in RSS that 'a linear relationship between evaporation and rainfall is to be incorporated into future water management modelling' (page 29).

2.6 Mine Evaporation

The decision on whether or not to install heaters, blowers and humidifiers in the mine seems to rest with the mining company - a matter of economics rather than science. However the impact of the extra four hectares of pond, should the decision be not to install the system, is a point for consideration with the other landscape and visual amenity matters. This increase in pond size is dismissed rather lightly by RSS in relation to the size of the disturbed area. However, an increase of 45% in the area of the pond could make it a more significant feature of the environment. The Wasson *et al* Report is more concerned with the design of the ventilation system and some of these concerns are dealt with in RSS. Our opinion is that the relationship between pond and pan evaporation is the critical one.

2.7 Evidence of Past Severe Weather Events

The evidence put forward by Wasson *et al* that climate in the region has been significantly different over the past 10 000 years and that it may be significantly different over the next 10 000 years is accepted by all. However, the SSR dismisses this as an issue in that all tailings will be returned underground and that contaminated material will only be in surface repositories for periods of approximately 30 years. This being the case we accept, on the basis of the information available to us, that there will be no long term containment of the tailings on the surface and a problem of surface contamination from this source will not arise.

2.8 Probable Maximum Precipitation Events

Wasson *et al* suggest that the design method used to assess the height of bunds to prevent local water entering the Total Containment Zone is satisfactory but is concerned that the correct rainfall intensity should be used. The SSR has examined two methods to determine the 6 min PMP. The two estimates lie within 4%. The SSR recommendation is that the higher value from the Bureau of Meteorology (RHU), of 1380 mm/hr be used in the detailed design of the local drainage works. We find this acceptable. The estimation of PMPs is at best a difficult exercise as the Bureau Report (RHU) acknowledges. However the Bureau claims to have produced the best estimate given the limitations of data and the methodology. We are in agreement with this statement.

It would be valuable to see what analyses have been undertaken from any rainfall recorder within the humid part of the Northern Territory and to compare the recorded most severe storms for durations from 5 min to 72 hr with the envelope

curve in Fig 4 of RHU. We would recommend that the Bureau be asked to look at this approach and examine the envelope of the most severe recorded storms.

2.9 Climate Change

Much uncertainty and misinformation surrounds the issue of predicting climate change arising from the increasing concentration of carbon dioxide and other 'so called' green house gases in the atmosphere. The CSIRO Report (RCC) provides an excellent basis for the examination of this issue and it is appropriate that the SSR should have reviewed the implication of climate change in relation to the proposed mining operations at Jabiluka. The SSR uses the results from a number of internationally recognised atmospheric/ocean models that are used to predict climate change resulting from the increase in green house gases. The SSR identifies the difficulties in using such results and the uncertainties associated with them. It is therefore important that the results are considered as being preliminary. However, modelling methods are improving and we anticipate that over the next five years major advances will be made and the predictions from these models will be used with greater confidence. In the meantime, we consider it prudent to err on the safe side when using the results.

The results from the models were compared for both temperature and rainfall. For the Jabiluka region the temperature changes compare well (14%) between models. These predict an increase in temperature at Jabiluka by 2030 in the range of 0.35 to 0.8 C . The increase in temperature will lead to an increase in evaporation rates from the retention ponds but the SSR has been prudent and has recommended that this should not be taken into account in the design of the ponds.

Estimates of change in rainfall due to green house gas induced change have also been made. There is much less consistency between the model predictions here. The model predictions for the dry season of 2030 fall in the range of + 6% to – 50%. For the wet season the range is +1% to – 6%. The wet season changes are clearly the most important in relation to Jabiluka. If the model results can be accepted, such changes will be small with a worst case of 1% increase in rainfall. The SSR identified a trend in the Oenpelli Record (although it lies well within the historic variability and so is not statistically significant) which if extended would increase the annual rainfall from 2000 to 2030 by 4%. It is impossible to say whether the trend in the record represents a climate change signal or not at present.

On the basis of a 1000 year analysis of a stochastically generated data set based on the Oenpelli Record the SSR suggests that the trend is already incorporated in the generated data and there is therefore no reason to increase the design rainfall to account for a possible increase of 1% as indicated by the climate models. This conclusion is questioned as the stochastically generated data appears to have been based on the assumption of stationarity. The recommendation from the SSR in

Chapter 4 is that the new atmospheric modelling outputs will be kept under review and the design rainfall increased, if necessary, is, we believe, an acceptable approach. We were concerned therefore to read in Chapter 5.2 of the SSR that climate change impacts will be negligible and can be accommodated in the variability of the storage simulations. We do not accept this and consider that the SS should keep the predictions from the atmospheric models under review and the design of the retention ponds should be flexible so as to accommodate any increase in predicted runoff as necessary.

All of the atmospheric models being used to predict climate change indicate an increase in the intensity and frequency of storminess even though in some areas the average precipitation may decline. The SSR draws on analysis by Jones et al (RCC) which suggests that for the Jabiluka area over the period 2000 to 2030 the PMP may increase by 30%. We consider the SS to be prudent in making the recommendation that the PMP should be increased by this amount in the final design of the exclusion bunds which form part of the water management system at Jabiluka.

The contention that the 1960-84 rainfalls are higher than the average (see Fig 4.4.1) should be treated with caution. It raises the questions - what is the long-term mean? – which are the natural variations of climate and which are those due to human interventions? – what is there to say that the 1920-60 record was not drier than average and that the long term mean is best approximated by the 1960 – 84 record? The wetter 1960-84 record should not be used to argue that the long term average is lower.

2.10 Retention Pond Capacity (Chapter 5.2)

Wasson *et al* raised a number of important concerns in relation to the use of hydrological data in designing the retention ponds. For example, they:

- suggest that there is the need to generate a synthetic rainfall data sequence for use in simulation studies to determine the 1 in 10 000 year pond design capacity;

- identify the importance of establishing a relationship between rainfall and evaporation records; and

- point to errors in the calculation of evaporation in the exit stream of the mine ventilation.

The SSR has addressed the above issues in a systematic way and in particular through the study by Chiew & Wang. This study is based on a simulation analysis of 50 000 sets of 30 year daily rainfall and monthly pan evaporation data which have been stochastically generated. Such techniques are widely used in

hydrological analysis and the statistical checks used on the generated data in comparison with the observed show it to be robust for design purposes. However, we have noted earlier that the rainfall data may be underestimated and we would therefore recommend reanalysis with a 5% increase in rainfall records.

In the simulation modelling Chiew & Wang (RCW) use what appear to be conservative runoff coefficients for a range of surfaces. This approach is acceptable but it would be valuable to attempt to validate these using hydrological observations at the Ranger Site.

Relationships between rainfall and evaporation were established and used in the storage model (see 2.5 above).

The SSR recognises that the evaporation loss in the ventilation shaft has been overestimated. The original values used in the first design could only be achieved by the use of a large humidifier. In the event of an expensive humidifier not being installed, an allowance to increase evaporation from the ponds could be made. The SSR recommends that in the detailed design of the Water Management System increased use of pond evaporation rather than enhanced evaporation from the ventilation system should be used. Careful modelling will be needed but the analytical tools are available. We therefore consider that the additional evaporation can be achieved by the use of larger retention ponds but this will increase the 'footprint'. The environmental significance of this will need to be considered.

There are some elements of the water management system that are not clear to us from the documentation provided. These are as follows:

(a) The mill requirement is given as 180 000 m3/year. What happens to this water? Does it evaporate or does it generate an effluent? And, if so, what is its disposal route?

(b) The ore wet-down and plant-wash water is small in comparison with the mill water, but how is it disposed of?

(c) Wasson *et al* refer to ground water inflow to the mine. What is the quantity of water involved? How will it be used and how disposed of?

(d) Have there been any simulations of the type reported in RCS carried out for Ranger Mine? If not, could these be undertaken. They should give an insight into the runoff coefficient, evaporation rates, etc, for use in the Jabiluka designs.

2.11 Overall Assessment

We consider that the meteorological and hydrological analyses that have been carried out and reported in the SSR overall follow good international practice. The rainfall and evaporation data have been used in a runoff model to develop a robust retention pond design method for Jabiluka .

We have raised a number of issues where we have been unable to make a judgement because information was not readily available to us.

We have recommended a number of measurements and analyses which should marginally improve the reliability of the hydrological predictions and design approach.

2.12 References

Beard L R (1960) probability estimates based on small normal distribution samples. Journ Geophys Res 65, 2143-2148.

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Cunnane C (1989) Statistical distributions for flood frequency analysis, WMO Operational Hydrology Report No. 33, World Meteorological Organisation, 73.

Institution of Engineers of Australia (1987) Australian rainfall and runoff—a guide to flood estimation. Inst Eng Aust, Canberra 1, 373.

Sevruk B (1989) Reliability of precipitation measurement. In WMO/IAHS/ETH Workshop on Precipitation Measurement, St Moritz 3-7 December 1989, (Sevruk, B., Ed.), 13-19.

3. Risk Assessment for the ERA Proposal – Chapter 5.3 to 5.4 of the SSR

3.1 Introduction

These sections of the SSR are concerned with a risk assessment resulting from releases of water from the Jabiluka site. The SSR makes reference to the supporting documentation:

> Protection of the environment near the Ranger uranium mine – Johnson & Needham (RPE).

The SSR, in considering environmental protection objectives, suggests that considerable quantities of water from the mine area could be safely discharged to surface water courses. However, in view of the concerns of local people the ERA proposal adopted a policy of containing mill and stockpile water and any material with a concentration greater than 0.02% uranium on the site during the working life of the mine. We are in full agreement with this approach.

These sections of the SSR thus consider the probability of failure of the water containment facilities under a range of situations such as extreme storm events or earthquakes leading to overtopping or collapse of the retention pond embankments. The impacts and risks to people and ecosystems arising from such extreme events are assessed.

3.2 Water Quality of Runoff from the Ore Stockpile

The ERA based their assessment of water quality in the ore stockpiles at Jabiluka on data collected from the Ranger mine. To allow for the higher concentrations of uranium ore at Jabiluka a concentration of uranium and other related radionuclides in the drainage water in excess of that for Ranger was used in the risk analysis. The concentrations of magnesium and sulphate selected also appear to be conservative values in relation to risk analysis. While we accept the approach that has been adopted it would have been useful to have had information to support these assessments and statements such as 'The information obtained from kinetic testing of a number of samples of the Jabiluka ore showed that, while a number of metals and metalloids were present in the ore at concentrations greater than the average in the earth's crust, none other than uranium was at a concentration that, under the general chemical environment of the ore stockpile, will present a threat to ecosystems or people beyond the mine site'. This statement was given with neither attribution nor justification. In the time available, we were not able to obtain a copy of Appendix B of the PER, an ERA review, although a request was made. The water from the ore stockpile will be held in the retention ponds. We were uncertain whether any allowance had been made for the effects that evaporation will have in concentrating contaminants in the pond.

3.3 Radiation Exposure of Members of the Public

We accept that, as a result of the extensive containment facilities that are proposed at Jabiluka, the probability of exposing members of the public to radiation doses from Jabiluka will be very small. We know that the SS has developed a model for Ranger. This model is then applied to the Jabiluka situation and the conclusion is reached that the water management system at Jabiluka poses an insignificant radiological risk to local people and people living downstream. We accept this assessment subject to evidence that the model is applicable at Jabiluka. Are the water management, hydrology and receiving waters at the two sites sufficiently similar so that this modelling transfer can be made? Uranium is chemically toxic and we assume that risks associated with, (a) soil ingestion, especially if the local people practice geophagia, and (b) dust inhalation, have been taken account of in the Ranger model. If not a risk assessment based on the chemical toxicity of uranium is required.

3.4 Impact on Aquatic Ecosystems

The SSR makes an assessment based on RPE of the impact of radiological and chemical exposure of aquatic organisms resulting from the Ranger Mine discharges. These studies were for fish and macro-invertebrates. We have reservations about the approach adopted here. The section implies impact (risk) on aquatic ecosystems but no ecosystem analysis has been carried out. The analysis relies on 'surrogates for the whole ecosystem'. Emphasis is given to the effects on fish in summary statements such as ' ... some effects do occur in invertebrates, but adverse effects on fish would not be expected. Any adverse effects on invertebrates would be very short lived.' This conclusion assumes that there is no in-stream processing including biotic and abiotic uptake in the sediments of Swift Creek. Because the discharges of contaminated material would be of very short duration the assumption that the effects of biological recycling might be minimal would be acceptable but this would need to be clearly demonstrated. Without such a study the restriction of the analysis of the aquatic ecosystem to direct chemical and radiological toxicity towards a few species is unsatisfactory.

We accept the assessment of probabilities ascribed to overtopping of the pond, static failure of the pond embankments and earthquake risks. The estimation of radiation exposure of the public associated with such extreme events appears to be acceptable but, as indicated above, justification is required for these single species and as indicators of impacts on the whole aquatic ecosystem.

3.5 Contingency Measures

The proposal to have the means, under extreme conditions, to separate the poor quality water from the ore stockpile from that draining from the rest of TECZ is sensible and acceptable. Protecting the retention ponds with a properly designed spillway, as suggested in SSR, we would consider as essential. Partitioning the retention ponds and the installation of interconnecting spillways would reduce the risk of discharging all of the retention pond volume if an embankment were to fail (ie, it would be unlikely that all of the embankments would fail together). We consider that this should be examined at the detailed design stage.

4. Long Term Storage of Tailings – Chapter 6 of SSR

4.1 Introduction

The proposal considered in Chapter 6 of the SSR is to place all the tailings from the processing of the Jabiluka ore in the mine void or in specially excavated silos in the vicinity of the void. The detailed proposal for such containment has not been received but the SSR identified the principal environmental issues that need to be assessed as:

i. Containment of the solid tailings so that they do not represent a long term threat to the wetlands of Kakadu and
ii. Leaching of containment from the tailings, dispersion of the solutes in ground water and the potential impacts on the wetlands.

The SSR draws on the findings in a report on:

> The analysis of long term ground water dispersal of contaminants from the proposed Jabiluka Mine tailings repository – Kalf & Dudgeon (RGD)

The mine void and silos will be at least 100 m below the land surface and we accept the conclusion in the SSR that the tailings, once placed in these containment facilities, and sealed, would not present a threat to Kakadu as a result of erosion processes for some hundreds of thousands of years. However, the leaching of contaminants and their rate of dispersal in the ground water is recognised by the SSR as a potential issue and this is considered in some detail in both the SSR and in RGD.

4.2 Hydrogeology of the Area

A hydrogeological description of the area is presented in RGD. This covers the range of aquifers, their flow characteristics and ground water quality. As in most subsurface investigations the data is somewhat sparse and there is a wide range in

the flow characteristics of the principal water bearing foundations as expressed through their permeabilities and dispersivities. The permeability values appear to have been determined from bore hole pumping tests and the range of values subsequently used in the modelling work should be acceptable for rocks of the type described. However, in the modelling work a normal distribution of permeability values was chosen for the Monte Carlo simulations, whereas it may have been better to have assumed a logarithmic distribution.

No mention is made of isotope measurements on the ground water samples or in stream base flow. The use of such measurements, eg, O18/ deuterium ratios can give an indication of ground water and base flow age. This may enable flow rates and bulk permeability values to be assessed for comparison with pump test results. It is recommended that if such measurements have not been made then a sampling and measurement programme should be put in place.

4.3 Solute Transport Modelling

The groundwater flow and contaminant transport modelling carried out for this review is simplified with several consequent limitations and, as such, represents essentially a first pass at the problem. This is explicitly recognised in the modelling report (RGD), but is perhaps not adequately acknowledged in the SSR. However, we consider that the general approach adopted is reasonable and, given the realistic choices of parameter values, should have produced a relatively robust picture of potential outcomes. Some areas where the limitations might be significant are given below.

We were encouraged to see Monte-Carlo simulations used to assess the uncertainty in the predictions. It would have been useful if the RGD had included cumulative probability plots. These would have indicated the range of possible outcomes and their relative probabilities. The median breakthrough plots really provide little more information than a single deterministic calculation.

The models as developed do not appear to be able to predict the regional flow of groundwater and the rate of movement of contained contaminants. That is, the time it takes natural recharge from the ground surface to move through the mine waste and aquifer systems and emerge in surface water courses or the sea. The time scale is likely to be many thousands of years but it is important that the models be modified so that the scale of the problem can be assessed. We found it encouraging that the movement of sulphate, and in particular, uranium, from the tailings waste in both the mine void and the silos is restricted to such short distances and at such low concentrations after 1 000 years. However, a modelling study to assess the movement over a much longer time period (possibly 10 000 years) and also to identify where ground water flows emerge, is also necessary.

4.4 Properties of the Tailings

The tailings are to be dry mixed with Portland cement prior to disposal. This mixture is expected to produce a permeability contrast two to three orders of magnitude less than the host rock.

The report is deficient in not providing chemical modelling results to demonstrate that future water-rock interactions will not compromise the silos' integrity and increase U mobility.

There is little attention in the SSR given to the geochemical reactions that may occur between the cement and tailings. This may well be covered by the ongoing research that is referred to in the SSR. The comments in the following paragraph may aid ongoing work.

It is stated that the cement grout will serve to lower the permeability of the tailings in the mine voids and silos, and hence reduce the potential for groundwater movement and will create alkali conditions which would help to retard heavy metal migration. We would agree with this. However, there appears to be little or no detailed information on the effects of alkali conditions on the tailings or host rocks.

Alkali porewaters associated with the grouted waste will migrate as an alkaline plume controlled by the local hydrogeological conditions. These are likely to react with the host rocks. The reaction rates and solubilities of many aluminosilicates are increased under alkaline conditions.

Models, coupling fluid flow and geochemical reactions, should be used to predict the development of the alkaline plume. Such modelling will need to consider what phases are likely to dissolve (eg, aluminosilicates) and what are likely to precipitate [eg, Calcium Silicate Hydrate (CSH), zeolites, ettringite, etc]. Such phases may also take up radionuclides within their structures and thus be a further retardation mechanism.

Changing mineralogy may result in changes in permeability, and hence, changes in fluid flow. Many minerals associated with alkaline conditions would precipitate and help to seal porosity and retard fluid flow. However, increased dissolution could lead to an increase in porosity and possibly enhanced fluid flow in the host rocks. It is the overall effect of these two competing processes that will be important. Other studies on alkaline plumes (relating to cementitious radioactive wastes) appear to favour a sealing of porosity.

The information given in the report on tailings solute composition used in the transport modelling does not mention solution pH. It is therefore difficult to make detailed comments on the high sulphate concentrations. However, it should be clarified whether the solute composition is for approximately neutral or alkaline

conditions. If there are uncertainties in this, it is suggested that geochemical modelling (possibly allied to simple laboratory experiments) be undertaken to ascertain the porewater composition within the cement grout/tailings mixture.

The potential for high pH, high sulphate waters is important because of the possibility of ettringite (Ca6Al2(SO4)3(OH)12.26H2O) formation. Although this mineral only tends to form under very high pH conditions, it has a very high molar volume and is very good as sealing porosity. However, delayed ettringite formation can cause fracturing and other problems in concretes. Has thought been given to the possibility of this in the grout/tailings mixture?

Has consideration been given to sorption of the radionuclides on Fe and Mn oxides/hydroxides? It may be worth noting that information from other studies (relating to radioactive waste disposal) appears to show high sorption on these phases, and thus it may be an additional retardation mechanism.

4.5 Overall Assessment

Our overall view is that the SSR has correctly identified the principal risk from the buried tailings as that arising from the transport of contaminants in groundwater.

There are some uncertainties in ascribing aquifer properties for the modelling work but these are overcome by selecting a wide range of permeability and dispersion values and modelling groundwater flow and contaminant movement using a Monte Carlo approach.

The addition of cement has been used in other radioactive waste facilities and observations indicate that this may significantly reduce the permeability of the waste and contaminant mobility. Chemical interactions in the highly alkaline environment of the tailings and host rock need to be considered alongside the movement of the alkaline plume because under some unusual circumstances an increase in permeability may arise.

We are pleased to note that the preliminary results from the modelling show that the transport of uranium and radium away from the repository is very limited, even after 1 000 years and that the concentrations are very low. This would therefore not appear to present any foreseeable risk to the Kakadu environment. However the models, while robust, simplify the flow conditions and the possible tailings-paste/host rock reactions. We recognise that geochemical studies on the reactions of the paste are currently being undertaken. We recommend that three-dimensional groundwater models are run once new information on rock/water interactions is available and that these models should be extended to encompass regional groundwater flow and its contribution to surface waters.

5. General Environmental Protection Issues – Chapter 7 of SSR

5.1 Introduction

We note in section 7.1 of the Report that the SS has demanded a standard of environmental protection for mining activity in the Region which are seen as 'being among the highest in the world'. In view of the RAMSAR listed wetlands within the Kakadu National Park, it is appropriate that this should be the case. The work at the Ranger Mine has led to setting water quality standards and these have been accepted by the Australian and Northern Territory governments and given wide application. A range of aquatic species have been tested to establish which were the most sensitive to water from Ranger. This led to the choice of dilution factors for effluents. The SS reports that during the entire period of mining at Ranger there has been no detectable impact on larval fish, freshwater snails, fish migration and community structure, and macro-invertebrates or on the people living in the vicinity. We welcome this appraisal. The SSR states that the regulatory regime for Jabiluka will be strengthened and the retention pond arrangements and tailings storage facilities that have been proposed support that contention. We urge that this be done.

5.2 Jabiluka milling alternative

It appears from section 7.2 that if mining at Jabiluka is to proceed then the so-called 'Jabiluka milling alternative' (JMA) will be adopted. This is the option we have been examining throughout our assessment. We note reference in section 7.2 to the sandstone stockpiles and the prospect of discharge from them to Swift Creek. Measures will be needed to reduce sediment loads arising from these to background levels and we note that this has been recognised by the Ministry of the Environment. We seek some explanation as to how this will be done.

5.3 Extent of the ore body and mine life

We note in the SSR(7.3) that if the ore body is larger than anticipated and the mining were to continued beyond the proposed 30 year horizon, then under the JMA there would be no need for further assessment under the Environment Protection (Impact of Proposals) Act 1974. We consider the prospect of extending the life of the mine as a realistic possibility. Most of the probability analyses undertaken by the SS are based on a 30 year horizon and we believe that analysis should be repeated to test the sensitivity of impacts to a mine life of 40, 50 and 60 years.

5.4 Landscape – wide Analysis

We do not consider that the SS has adequately addressed the Jabiluka Mine in the land scale context (Rees & Wackernagel, 1994; Wackernagel & Rees, 1996). In view of the proximity of the mines to the Kakadu National Park a more comprehensive ecosystem scale study is needed. It should be recognised that the management of the Kakadu World Heritage area is best conducted at the watershed or landscape scale, and as the current plan is to add the Jabiluka lease area to Kakadu after rehabilitation, such an approach is critical. The environmental impact assessment for Jabiluka must consider the potential ecosystem effects of the movement of both contaminated and uncontaminated water, air, dust and animals within the mine site and across its boundaries, as well as the role of the Jabiluka and Ranger Mines within the larger landscape. A comprehensive risk analysis at the landscape scale should be done to show that the Kakadu park World Heritage Site will not be significantly degraded by the combined operation of the Jabiluka and Ranger Mines. How will plant or animal populations, habitats, resources, travel corridors etc be impacted by the Jabiluka Mine? The influence of the potential impacts of the Jabiluka Mine within the ongoing development of the Kakadu area, including Jabiluka, should also be assessed. While the water management plan (including the bore field) for Jabiru focuses on the mine site the question has to be asked as to what will be the impact of changing the water balance within the area on the ecosystem. We are unable to judge on the basis of the information provided. The assessment should be included in the land form/catchment study framework.

5.5 Rehabilitation and Monitoring

We were pleased to have an outline in SSR 7.6 of the rehabilitation objectives for Jabiluka . We also noted the progress that had been made at Ranger as described in the brochure 'Rehabilitation at Ranger', but without detailed information or a site visit we are unable to assess the level of success. We note reference to the Jabiluka rehabilitation fund and the Guarantee from the Department of Mines and Energy. Such arrangements are essential in such a sensitive area and assurance should be sought that the size of the fund would be adequate to any rehabilitation task. It will also be important to establish a commitment (possibly 100 years) to monitor surface water and ground water flow and quality and the ecosystem following rehabilitation. The monitoring programme would need to be periodically reviewed and extended or reduced as necessary.

5.6 References

Rees W E. & Wackernagel M 1994 *Ecological footprints and appropriated carrying capacity.* Pp362-3980 In *Investing in Natural Capital. The Ecological Economics Approach to Sustainability* A M Jansson, M Hammer, C Folke & R Costanza (eds), Island Press, Washington DC

Wackernagel M & Rees W 1996 *Our ecological footprint: reducing human impact on the earth.* New Society Publishers, Gabriola Island, GA

6. Recommendations

We recommend that:

1. because the rainfall measurements at Oenpelli may be underestimated due to wind effects etc and in view of the crucial importance of the rainfall record in terms of the design of retention pond capacity the rainfall record should be increased by 5 % unless there is any evidence to the contrary. The hydrological analysis, including the stochastically generated data , should be repeated using this enhanced rainfall data (2.2);

2. rainfall and class A pan evaporation measurements should be commenced at Jabiluka as soon as possible (2.4);

3. the predictions of climate change from observations and atmospheric models should be kept under review during the life of the mine and the design of the retention pond area should enable the storage to increase to accommodate a predicted increase in runoff should this be necessary (2.9);

4. the runoff coefficients used by Chiew & Wang in the runoff modelling should be validated on the basis of hydrological measurements from the Ranger site. The runoff models should be modified if necessary (2.10);

5. an assurance should be obtained that the uncertainties in relation to water requirements at the mill, effluent disposal routes etc have been adequately dealt with in the design of the water management system. Due to lack of information it is not clear to the Independent Science Panel that this was the case [2.10 (a to d)];

6. justification for the use of the Ranger 'Public Exposure Radiation Model' at Jabiluka is required. A risk assessment based on the chemical toxicity of uranium is needed with particular reference to (a) soil ingestion, and (b) dust inhalation (3.3);

7. the effects of biological recycling of contaminated material in the aquatic ecosystem should be investigated (3.4).

8. the design of the retention pond system should include consideration of the partitioning of the storage volume so as to reduce the risk of the total water volume being discharged should an embankment fail (3.5);

9. isotope measurements should be used to determine the age of groundwater and surface water base flow as a means of assessing flow rates and bulk permeabilities in the aquifers. Comparisons should be made between these values and those already available from borehole tests and if necessary

additional groundwater modelling should be undertaken using the new data (4.2);

10. the results of the Monte Carlo simulations from the groundwater models should be presented as cumulative probability plots (4.2);

11. three-dimensional groundwater models should be run once new information is available on the tailing/cement/water /rock interaction studies. The models should be extended to encompass regional groundwater flow and to identify its contribution to surface waters (4.4);

12. the containment transport groundwater modelling studies should be extended to 10 000 year runs (4.2);

13. the proposals to contain the sediments from the waste rock stockpile should be examined in relation to potential impacts on the aquatic ecosystem (5.3) .

14. environmental impact assessment (including a full ecosystem analysis) should be undertaken assuming a mine life of 40, 50 and 60 years (5.3) ;

15. a comprehensive risk assessment, including ecological, biogeochemical and hydrological factors, at the landscape /catchment scale for both Ranger and Jabiluka should be undertaken in the context of the Jabiluka World Heritage Area (5.4);

16. assurance should be sought that the rehabilitation fund is adequate to meet any long term rehabilitation task should the mine be prematurely closed (5.5);

17. a commitment should be obtained to establish a long term, possibly 100 year, programme to monitor surface water, groundwater and the ecosystem at frequent intervals. This to be subject to periodic review (5.5).

Appendix 1 – Members of the Independent Scientific Panel

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ATTACHMENT E

TRANSCRIPT

ABC RADIO NATIONAL
AUSTRALIA TALKS BACK 12.25 PM
3 DECEMBER, 1999

DISCUSSION ON THE UNESCO WORLD HERITAGE COMMITTEE FINDINGS IN RELATION TO THE JABILUKA MINE

INTERVIEW WITH ROY GREEN, UNESCO MISSION TO KAKADU NATIONAL PARK; AND BOB WASSON, ANU

ABC RADIO NATIONAL
AUSTRALIA TALKS BACK 12.25 PM
3RD DECEMBER, 1998.

DISCUSSION ON THE UNESCO WORLD HERITAGE COMMITTEE FINDINGS IN RELATION TO THE JABILUKA URANIUM MINE.

INTERVIEW WITH ROY GREEN, UNESCO MISSION TO KAKADU NATIONAL PARK; AND BOB WASSON, ANU.

PRESENTER:
Let's come back to Dr Roy Green because I'd just like to get a response on the ... on the comments of Professor Bob Wasson on the flawed EIS. I just wonder how you feel about that, hearing his comments Roy.

ROY GREEN - UNESCO MISSION TO KAKADU NATIONAL PARK:
Well, I don't want to ... and Bob's much more expert in this area than I am and what I ... my recommendation was that the two sets of scientists must get together and resolve that issue. Certainly Bob's concerns should be taken into account. I don't believe that they should simply be ignored. And my view is that the sort of counter arguments ... the two people, or the two groups, should get together and resolve the uncertainties.

One other quick point and I think Bob would confirm this is that most of the concerns disappear if the milling is done at Ranger and not at Jabiluka.

PRESENTER:
Yes. All right. And Bob Wasson, what's your reaction to that?

BOB WASSON - ANU:
Yeah, that's entirely true. Putting the mill at Jabiluka is not a good idea. You will have wastes and contaminants at the site just from the mining but they will be nowhere near as severe as if you mill there.

PRESENTER:
Mm.

END OF SEGMENT