

CHAPTER THREE

MINERAL RESOURCES

GEOLOGY OF THE PARK REGION

1. The Kakadu National Park region is situated in the eastern part of a major geological structure known as the Pine Creek Geosyncline, which extends from about 80 km east of Oenpelli, south to Bamyili, west to the Fitzmaurice River, and north to Fog Bay. The combination of rock formations in the Pine Creek Geosyncline, particularly in the eastern part, is regarded by geologists as a favourable setting for mineral deposits of economic significance.

2. In the Stage 1 and Stage 2 areas of the Park, the mineralisation is principally located in a series of rocks known as the Cahill Formation which contains the Ranger, Jabiluka and Koongarra uranium deposits. Exploration results in this area have indicated the presence of a range of metals, including gold. The concentrations of uranium in the Cahill Formation are described by geologists as 'unconformity-type' deposits. This is a major form of uranium deposit on a world scale, another example being the very large deposits in Saskatchewan, Canada. In the Stage 3 area of the region, the mineralisation located to date occurs principally in a series of rocks known as the El Sherana Group and includes gold, platinum and minor deposits of uranium.

3. While regarded as highly prospective for minerals, the region presents difficulties for mineral exploration. In many areas the prospective rocks are masked by younger overlying sequences, the most notable of which are the sandstones forming

the Arnhem Land escarpment. These rocks, which are not known to contain ore accumulations, can be up to 300 metres in depth. In addition, erosion of the younger rocks has produced a deep soil cover over much of the region, typically some 40 metres deep. The soil has undergone a process known as lateritisation which hampers recognition of the chemical and other non-geophysical criteria used in mineral exploration. A further obstacle to exploration is posed by the wet season when accumulations of water in many areas hinder vehicle access and impede the operation of drilling equipment.

HISTORY OF MINERAL ACTIVITY IN THE REGION

Background

4. Although exploration and mining in the area between Darwin and Katherine extends back for over 100 years, the Kakadu region to the east received little attention until about 1950. The discovery of uranium at Rum Jungle, south of Darwin, in 1949 led to further exploration in the Kakadu area and in 1953 a uranium deposit was discovered at Coronation Hill in the Gimbat lease.¹ By 1960, thirteen uranium mines, five also carrying gold, had been discovered in the Gimbat and Goodparla leases, particularly in the South Alligator River Valley. This activity was relatively short-lived however, and the mines progressively closed during the early 1960s in the face of a declining uranium market and low gold prices.²

5. Following improvements in the mineral market in the late 1960s, many exploration tenements were taken up in the Kakadu region, particularly in the future Stage 1 and Stage 2 areas. Technological advances, including the use of airborne surveys, allowed difficult terrain to be prospected more easily and, with the assistance of such techniques, a number of significant uranium deposits were identified. These included the large

deposits at Ranger, Nabarlek, Koongarra and Jabiluka, which had all been discovered by 1971.³

6. Shortly afterwards, a number of significant government decisions led to the scaling down of exploration activity. In 1973 the Commonwealth Government appointed Mr Justice Woodward to inquire into the establishment of land rights for Aborigines in the Northern Territory. This resulted in restrictions on mineral activity in the region and by 1974, following the second report of the Woodward Commission, the granting of new exploration or mining tenements had effectively ceased pending the outcome of expected Aboriginal land claims.

7. The Ranger Uranium Environmental Inquiry, established in the following year, had major implications for mineral activity. The second report of the Inquiry, tabled in Parliament in May 1977, recommended the staged development of a national park in the region, the exclusion from the Park of project areas at Ranger and Jabiluka if mining were to proceed there,⁴ and that most of the land in Stage 1 of the Park, together with the Ranger area, become Aboriginal land.⁵ The Report recommended against any early resumption of mineral activity in the proposed Park, stating that:

there should be no activities associated with mining, including exploration, within the park for the time being. In the future it should not be permitted except after very careful consideration. If it is found necessary it should be carefully controlled in accordance with a formally developed plan of management as provided for in the National Parks and Wildlife Conservation Act.⁶

8. The Commonwealth Government subsequently gave approval for uranium mining at Ranger and production commenced in 1981. Project areas at Jabiluka and Koongarra were excluded from the Park although approvals to mine were not granted. In line with the Ranger Inquiry's recommendation, further mineral activity

within the Park was discouraged and no new exploration or mining titles were granted.⁷

9. Prior to 1980, exploration in the Kakadu National Park region can therefore be seen as taking place in two phases: an early period in the 1950s and early 1960s when deposits of uranium were located and mined in the Gimbat and Goodparla leases; and a period from about 1969 to 1974 when an improved market for minerals encouraged further exploration efforts, principally in the future Stage 1 and Stage 2 areas. This second phase concluded with the developments outlined above. Exploration activity recommenced in the early 1980s when a surge in gold prices stimulated renewed interest in the Gimbat area on mineral leases granted prior to 1974. In 1987 a Conservation Zone was created within Stage 3 of the Park in which a five year mineral exploration program is to be permitted. (This is discussed in more detail later in this chapter.)

Legislative provisions affecting mineral activity

10. Current provisions concerning mineral activity in the Kakadu region need to be seen in the context of a series of legislative and administrative developments which have taken place over the past decade. In June 1978 the Northern Territory (Self-Government) Act received royal assent. The Act vested mineral rights in the Territory with the Northern Territory Government. In the same year however, pursuant to Section 70 of this Act, the Commonwealth acquired from the Northern Territory the area of land corresponding to the planned three stages of the Kakadu National Park, and the mineral rights for this area consequently reverted to the Commonwealth. (The position with respect to 'prescribed substances' in the Territory - notably uranium - is slightly different. From the early 1950s, rights over these substances were exercised independently by the Commonwealth through the Atomic Energy Act 1953. This situation remains unaffected by the changes discussed here.)

11. On 5 April 1979, Stage 1 of Kakadu National Park was proclaimed following the settlement of a lease-back arrangement with Aboriginal traditional owners to whom the land had been granted under the Aboriginal Land Rights (Northern Territory) Act 1976. Stage 1 did not include mining project areas set aside at Ranger and Koongarra. The National Parks and Wildlife Conservation Act 1975, under which the Park was proclaimed, provided that no operations for the recovery of minerals could be carried out within the Park except with the approval of the Governor-General and in accordance with conditions to be laid down in the Park plan of management. In 1981, Stage 1 was accepted for inscription on the World Heritage List and the Commonwealth Government accepted the obligations imposed by the UNESCO World Heritage Convention to ensure the protection and conservation of the area. This obligation is widely seen as precluding the possibility of mining.

12. In February 1984, Kakadu National Park Stage 2 was proclaimed, omitting a mining project area at Jabiluka. Stage 2 henceforth became subject to the provisions of the National Parks and Wildlife Conservation Act relating to exploration and mining. Prior to proclamation, title to approximately seven per cent of the land, including the Jabiluka project area, was granted to Aboriginal traditional owners under the Aboriginal Land Rights (Northern Territory) Act. In 1986 the Commonwealth Government decided to seek the inclusion of Stage 2 on the World Heritage List. This decision was declared invalid by the Federal Court, however, following an application by Peko-Wallsend Pty Ltd on the grounds of a denial of natural justice, which required that they be given a chance to be heard before such a decision was made.⁸ However, the Commonwealth appealed to the full court of the Federal Court and the appeal was upheld on the grounds that the decision of the executive government to seek listing of Stage 2 on the World Heritage List could not be reviewed by a court, nor did it attract the obligations of natural justice.⁹

13. Stage 3 of the Park, which comprises about 66 per cent of the Gimbat and Goodparla leases, was proclaimed in June 1987. The remaining portion of the leases was declared a Conservation Zone under the National Parks and Wildlife Conservation Act. Within the Zone a mineral exploration program is to be permitted for a period of five years. The policy announced by the Commonwealth Government prior to proclamation is that mining will be allowed to proceed in the Zone only where projects prove to be of major economic significance, not merely where they are economically viable. Following the five year exploration period, any areas required for mining projects will be set aside for that purpose and the remainder incorporated into the Park. Special arrangements (which are discussed later in this chapter) have been introduced to control the environmental effects of mineral activities in the Zone. In addition, the Aboriginal Land Rights (Northern Territory) Act has been amended to make provision for Aboriginal land claims over the areas incorporated into the Park and the Conservation Zone.

14. While the developments outlined above placed serious obstacles in the way of mineral activities within the Park itself, they did not exclude that possibility completely. This situation changed in 1987 when amendments to the National Parks and Wildlife Conservation Act expressly prohibited exploration for minerals or mining on any lands within Kakadu National Park. The prohibition extends to pre-existing mineral interests, and the Commonwealth is not liable to pay compensation as a result of the amendment.

15. Recent legislative changes affecting conditions applying to mineral activities on Aboriginal land should also be noted. Previously the Aboriginal Land Rights (Northern Territory) Act required that the consent of traditional owners be obtained before either exploration or mining could take place on Aboriginal land. Under the new provisions, consent of Aboriginal

owners is required before exploration can commence, but is not required for the grant of a mining interest. In practice once an exploration licence is granted it cannot be withdrawn to prevent mining. However, an application for an exploration licence must set out a comprehensive proposal for exploration, including the likely effects of the proposed exploration and the methods for the recovery of any minerals found as a result of exploration. Once exploration has begun, the relevant Land Council can notify the Minister that exploration is not being conducted in accordance with the proposed program and the Minister has power to cancel the licence under certain conditions. This change may affect the conduct of mineral operations in the Conservation Zone if parts of the area become Aboriginal land. This matter is discussed in further detail later in this chapter.

16. In essence therefore, the present position is as follows: the major part of the Gimbat and Goodparla leases has been added to the Park, with the remainder of this area being declared a Conservation Zone. Both exploration and mining are now prohibited over the whole Park. A five year exploration program is to be permitted over the remaining portion of Gimbat and Goodparla (the Conservation Zone area), with the possibility that mining will be allowed to proceed in certain cases. Almost all of Stage 1 is Aboriginal land, as well as the project areas at Ranger and Koongarra which were excluded from the Park. A small portion of Stage 2 (about seven per cent) is Aboriginal land as well as the excluded Jabiluka project area. Stage 3 and the Conservation Zone are now the subject of Aboriginal land claims.

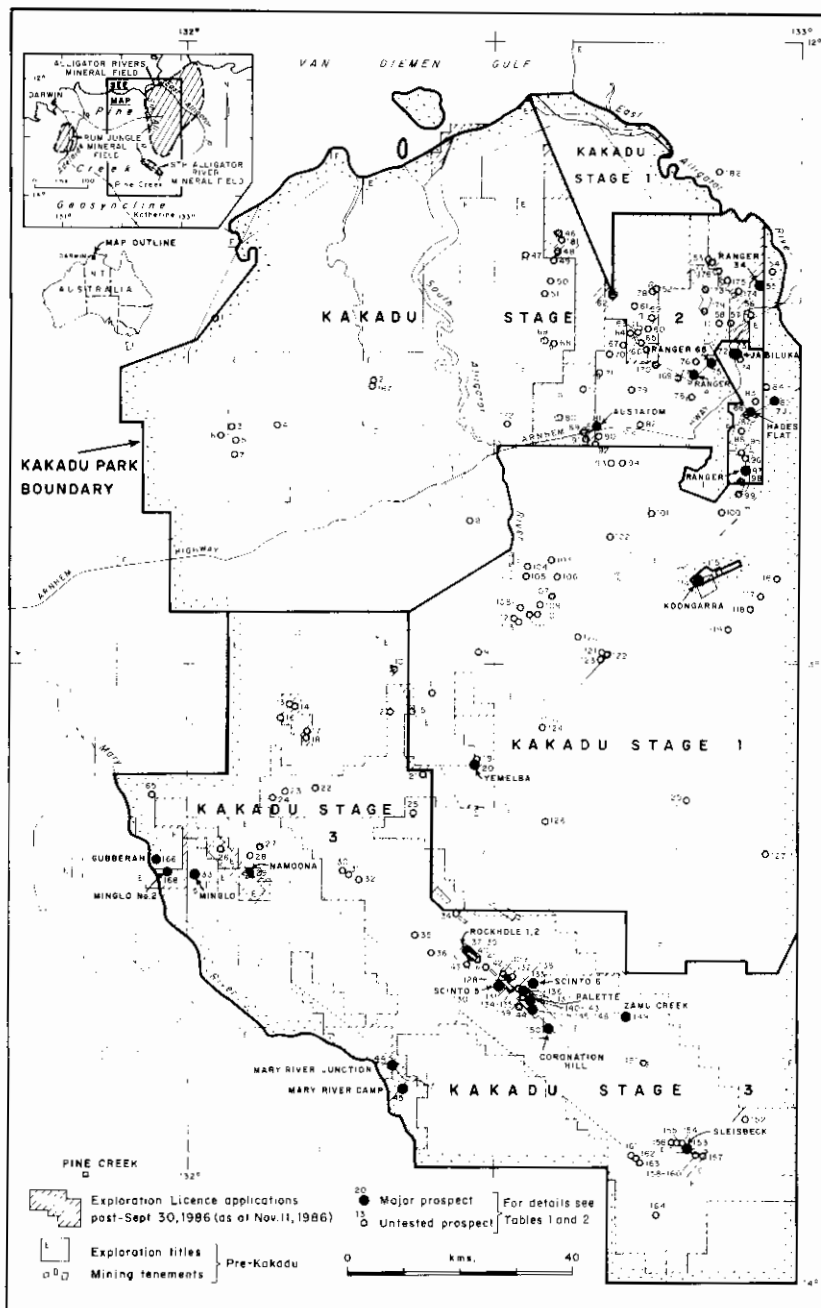
ASSESSMENT OF THE REGION'S MINERAL POTENTIAL

17. Mineral exploration of the Kakadu region has been relatively limited. The total area is large - one third the size of Tasmania¹⁰ - and there are difficulties of access in many places.¹¹ Apart from the early uranium discoveries in the Gimbat and Goodparla areas, surface exploration over much of the region

did not commence until about 1969 and, as indicated above, this fell away rapidly after 1974. In addition, much of the exploration effort was concentrated on uranium, with little attention being paid to other metals. Exploration for gold, in particular, was not a serious interest until the early 1980s when world prices rose sharply, and at this time (prior to the declaration of the Conservation Zone) only small areas in the proposed Stage 3 remained accessible to mineral explorers. According to information provided by the Northern Territory Department of Mines and Energy, some 182 mineral prospects had been located in the region by the time intensive exploration was curtailed in the early 1970s. These prospects are shown on Figure 3.1. Thirty four of these prospects were considered to be of major importance, including those where some mining had already taken place. About a half of these would require further testing if their status were to be determined accurately. The remaining 148 prospects are virtually untested.

18. In addition to the fragmentary nature of these data, there are other factors which need to be borne in mind in assessing the mineral potential of the region. One major variable is fluctuation in mineral prices. This can have quite dramatic effects on the economic viability of mining operations. Other variables include changes in mining technology, the extent of the infrastructure already in place in the area of the deposit, and the nature of the legislative and regulatory conditions applying at the time exploration and mining occurs. Factors such as these have an important bearing on the ease with which deposits can be identified and recovered, and hence on the ultimate value of a mineral resource. The information provided to the Committee on the mineral potential of the Kakadu National Park region is summarised below.

Figure 3.1



Mineral Prospects, Exploration and Mining Titles in Kakadu National Park: Courtesy Australian Mining Industry Council

Uranium

19. Several witnesses expressed the view that the Kakadu region contains uranium deposits on a par with the world's largest known deposit in the Athabasca Basin in Saskatchewan, Canada. The then Department of Resources and Energy noted that:

[t]he region is probably the world's greatest uranium province. Although by comparison with other major uranium provinces little exploration has been carried out, several world class and a number of smaller uranium deposits have been found.¹²

20. As at July 1986 the total 'proved and probable' resources of uranium in the Park region, including Nabarlek, amounted to 355 426 tonnes of uranium oxide (U₃O₈). Total production from Ranger to July 1986 was 14 886 tonnes and production from Narbalek to the same date was 8 325 tonnes.¹³ The size of each resource, as published by the companies concerned, is shown in Table 3.1.

21. Other deposits and prospects which have been identified in the region include: Ranger 68, five kilometres west of Jabiluka 1, at which the approximate contained uranium so far defined is some 5500 tonnes of U₃O₈ and where substantial further ore may exist;¹⁴ Hades Flat, ten kilometres north of Ranger 1 which is estimated to contain at least 700 tonnes of U₃O₈; and Austatom, 28 kilometres west of Ranger 1 which, according to information provided by the Northern Territory Department of Mines and Energy, contains a deposit of 10 000 tonnes of U₃O₈.

22. The Northern Territory Department of Mines and Energy provided the Committee with estimated values of these deposits. Including Narbalek the estimated, total in-ground value of these uranium deposits, expressed in June 1985 prices, is almost \$34 billion of which Ranger and Jabiluka account for 88 per cent.¹⁵

**Table 3.1: Published proved and probable
uranium resources (U₃O₈),
Major Deposits, Alligator Rivers uranium field,
as at 1 July 1986**

	Grade %	Tonnes	Reference and year published
RANGER 1			
No 1 Orebody	0.328	31 652 proved)	Energy Resources of Australia Ltd (1986)
	0.147	329 probable)	
Stockpiled	0.308	6 834)	
No 3 Orebody	0.207	72 838 probable)	
JABILUKA 1	0.25	3 400	Pancontinental Mining Ltd (1979)
JABILUKA 2	0.39	204 000	
KOONGARRA			
No 1 Orebody	0.269	13 300	Noranda Australia Ltd (1979)
No 2 Orebody	-	2 300	
NABARLEK	1.84	773(a) (in ore stockpile)	

Total proved and probable 335 436 tonnes U₃O₈

Grade per cent is the percentage of uranium oxide (U₃O₈) in the ore.

(a) Final EIS (January 1979) stated the in-situ resource as 9098 t U₃O₈, from which production to 1 July 1986 (8325 t) has been deducted.

Source: Australia's Uranium Resources, BMR, 1987

23. An alternative indication of the size of the reserves may be gained by national and international comparisons. As shown in Table 3.1, the total proved and probable resources of the Alligator Rivers field, excluding Narbalek, is 334 653 tonnes of U₃O₈. This represents 41 per cent of Australia's proved and probable uranium deposits as at 1 January 1986. The size of these deposits in international terms can be gauged by noting that Australia's total reserves represent 29 per cent of the Western world's low cost, reasonably assured resources of uranium. 'Western world' in this context is equated with WOCA - World Outside Centrally-Planned-Economies Areas. Reasonably assured resources can be defined as uranium occurring in deposits such that it can be recovered within given production cost ranges with current mining and processing technology.

24. Several witnesses expressed the view that further exploration in the region would reveal a lot more uranium. According to Mr A. Hosking of the Northern Territory Department of Mines and Energy, '[i]t is entirely feasible to state that at least twice as much again remains undiscovered'.¹⁶ The Commonwealth Department of Resources and Energy commented that:

[t]he potential for discovering additional uranium deposits in the region is very high ... Most of the known deposits occur in a particular stratigraphic formation, much of which, however, is covered by younger sandstone and superficial deposits; consequently, it is estimated that less than 20 per cent of the unit has been effectively explored and only a fraction of the uranium present in the region found.¹⁷

25. Apart from Narbalek, the only producing uranium mine in the region is Ranger. The current level of production at Ranger is approximately 3000 tonnes of uranium oxide per annum and there is the potential to increase this. To place this production level in context, Ranger Uranium Mines Pty Ltd commented that the current annual production of uranium oxide from Ranger provides fuel for power generation at a rate of 30 000 megawatts of electricity continuously for a year, which is about one and a half times Australia's current annual electrical power consumption.¹⁸ On current estimates of reserves, Ranger could continue to supply uranium at this rate until well into the twenty first century.¹⁹ The economic impact of Ranger on the Kakadu region, on the Northern Territory generally, and on the Australian economy as a whole is discussed later in this chapter.

Gold

26. Small amounts of gold were extracted from the uranium mines which were worked in the Gimbat lease in the 1950s and early 1960s. Numerous gold workings also existed in the Goodparla area much earlier in the 1920s and 1930s.²⁰ The substantial increase in gold prices in the early 1980s has seen renewed exploration in this area, principally by the Coronation Hill Joint Venture, comprising BHP Minerals Ltd, Noranda Australia Ltd, and the Electrolytic Zinc Co of Australia Ltd. Exploration drilling on pre-existing leases in the South Alligator River Valley has produced encouraging results including a significant deposit at Coronation Hill. In March 1988 BHP Gold advised the Committee that at the present stage of exploration an in situ resource of approximately 650 000 ounces (20217 kg) of gold was indicated at Coronation Hill, consisting of drill proven plus possible resources.²¹ At March 1988 prices this would have a value of about \$394 million. Mining could commence in 1988 if results continue to be favourable.²² In the context of current price levels, much of the Conservation Zone is regarded as prospective for gold. Contained gold at the El Sherana West site might equal or exceed that at Coronation and according to BHP there is a 'very high probability' that yet another deposit of at least equal size could be discovered in the Conservation Zone.²³

BHP estimates that the total value of the gold/platinum/palladium deposits in the Conservation one is \$1.5 billion at March 1988 prices.

27. Another significant gold discovery occurred at Jabiluka 2 in the course of exploration drilling for uranium. Pancontinental Mining Ltd advised that the total contained gold in the deposit is 12 000 kilograms (385 809 ounces). At current gold price levels of \$23 per gram this would have an in-ground value of \$276 million. The location of the deposit within the orebody would prevent it from being mined separately from the uranium. Similarly, the Koongarra Number One orebody contains more than 100 000 ounces (3110 kg) of gold which at March 1988 values would be worth over \$60 million.²⁴

28. While little is known of the extent and nature of the gold mineralisation in the Kakadu region, a number of submissions saw a strong likelihood of further significant deposits. According to the then Department of Resources and Energy:

[e]xploration specifically for gold in this part of the Northern Territory was deterred until the 1980s by the low world price. The attitude has changed as the price of gold has risen, but exploration has been prevented by the effective locking up of the region. The incidental discovery of gold at Jabiluka 2, and the occurrence of gold in some of the former uranium mines, make areas in the Kakadu region with particular geological characteristics highly prospective for gold with or without accompanying uranium.²⁵

Platinum and Palladium

29. Platinum and palladium were discovered in association with gold at Coronation Hill. In March 1988, the Committee was informed that at the current stage of exploration 40 000 ounces (1244 kg) of platinum and 100 000 ounces (3110 kg) of palladium were indicated, consisting of drill proved plus possible resources.²⁶ At current prices these would have a value of over \$28 million and over \$16 million respectively. The Joint Venture is currently investigating the most efficient method of extraction.

30. Platinum group metals (platinum, palladium, osmium, iridium, rhodium and ruthenium) are principally used as catalysts in the automotive, chemical and petroleum industries, and as corrosion-resistant materials in the chemical, electrical, glass and dental-medical industries. They are also regarded as important strategic minerals. Platinum and palladium are the two most widely used metals in the group. World production emanates almost entirely from South Africa and the USSR, with South Africa supplying about 80 per cent of the platinum. High prices and limited sources of supply have generated interest in exploration for platinum group metals within Australia. At the present time the Coronation Hill deposit is regarded as one of the most promising, and is seen as evidence of further deposits in the region.²⁷ According to information provided by BHP all the areas in the South Alligator Valley which are prospective for gold are also likely to contain associated platinum and palladium, with the contained gold, platinum and palladium at El Sherana West perhaps equalling or exceeding Coronation Hill. There is a high probability that another resource at least equal to these two also exists in the Conservation Zone.²⁸

Other Metals

31. Exploration in the Kakadu region has revealed deposits of other metals such as copper, iron, tin, nickel, lead, zinc and silver. Little is known of the extent of the deposits although they appear to be less significant than the minerals discussed above, particularly in the context of current prices. Commenting on copper, lead and zinc, the then Department of Resources and Energy stated that:

[although base metals (copper, lead and zinc) occur in most of the uranium ore mined in the South Alligator Valley and in some of the ore discovered in Kakadu National Park, base metal deposits are rare. On present knowledge the region is considered to have only moderate potential for the discovery of economically viable base metal deposits, particularly at current low price levels.²⁹

BHP representatives who appeared before the Committee were somewhat more optimistic and considered that there is potential for significant lead zinc deposits in the Goodparla area. They suggested that previous exploration had not always used modern techniques which have proved to be successful recently in similar environments in Australia.³⁰ The NT Department of Mines and Energy also saw potential for zinc mining in this area.³¹ BHP Gold Mines Limited informed the Committee that some significant silver assays have been recorded at El Sherana in the Conservation Zone and that it is possible that silver could become a byproduct from some of the gold/platinum/palladium deposits in the Zone.³²

Diamonds

32. Evidence of diamond deposits in the Kakadu region is as yet rather slim. BHP representatives expressed the view that the whole of Arnhem Land is an area of regional uplift, geologically comparable with other major diamond-producing areas in the world. They reported the recent discovery of a diamond in the Katherine River which drains part of the Stage 3/Conservation Zone area,³³ and said that Kimberlitic indicator minerals have also been found in the vicinity. Stockdale Prospecting Ltd also told the Committee that they saw potential for diamonds in the region.³⁴

ECONOMIC IMPACT OF MINERAL ACTIVITY

33. Mining activity in the Kakadu region has an impact on the local economy, the economy of the Northern Territory, and on Australia as a whole. A number of submissions provided information on these issues.

Ranger

34. Much of the evidence relating to economic impact concerned the operation at Ranger. Information from Ranger³⁵ indicated that between commencement of production in 1981 and the end of June 1987, Ranger had:

recorded sales of	\$ 1 344 000 000
made pre-tax profits of	\$ 588 000 000
paid income tax of	\$ 277 000 000
created payment to Aboriginal interests of	\$ 65 000 000
made royalty payments to the Commonwealth Government of	\$ 19 000 000

35. The Department of Primary Industries and Energy provided the following information on recent financial year expenditures and tax payments from the operation of the Ranger mine.

- . Wages and salaries paid in 1986-87 - about \$8.4 million. (Average weekly earnings at Ranger were \$595, against NT \$506 and Australia \$465.)

- . Purchases of goods and services in 1986-87 - \$43.3 million, spent as follows:
 - \$4.0 million in Jabiru
 - \$11.8 million in Darwin,
 - \$0.3 million elsewhere in the NT,
 - \$27.2 million in rest of Australia and overseas.

- . Taxes and government charges paid in 1986-87 - \$63.7 million, comprising
 - Local Government rates at Jabiru - \$0.6 million,
 - NT payroll tax and royalties - \$4.2 million,
 - Commonwealth company tax, withholding tax, customs duty, and employee income tax - \$58.9 million.³⁶

The mine employs about 500 people, comprising some 400 Ranger employees and 100 on-site contractors. The Office of the Supervising Scientist, which is responsible for environmental standards at Ranger, has about 83 staff, 53 of whom are based in the region. Indirect employment has been generated in a number of other areas.

36. According to the Northern Territory Government, Ranger plays an important part in the Territory's economy. Mr A. Morris of the Department of the Chief Minister commented that:

[m]ining is an extremely important activity in this part of Australia. In 1984-85 mining contributed nearly \$900m to the Northern Territory. It is our principal economic

activity. Over \$400m of this, that is, nearly half, came from Ranger and Nabarlek.³⁷

37. Submissions also drew attention to the upgrading of infrastructure in the region which had resulted from the establishment of the mine. This included the construction of the town of Jabiru, with a current population of about 1500, the sealing of the road from Darwin to Jabiru, and the construction of the Ranger airstrip. These developments, it was argued, had also assisted the growth of the tourist industry in the region, and the mine itself had become a significant tourist attraction with over 22 300 visitors in the calendar year to the end of October 1987.

38. In considering the economic impact of Ranger, the Committee had the benefit of a useful report prepared by Dr C. O'Faircheallaigh of the Australian National University's North Australia Research Unit which examines the impact of the Ranger uranium mine on the local, Northern Territory, and Australian economies. The report covers the period from 1982 to 1985.

39. In relation to government revenues Dr O'Faircheallaigh found that:

[t]he Ranger project will have a major impact on Commonwealth revenues from 1984/85, the first year in which the parent company, Energy Resources of Australia (ERA), incurred full tax liability. ERA's tax liability in 1984/85 was approximately \$54 million, and during the next decade it is estimated that ERA, which is only one of 80,000 companies paying tax in Australia, will account for 1 per cent of all company tax payments. On recent trends, it will probably account for between 10 and 20 per cent of income tax paid by the mining sector, and its payments will be considerably more stable than those of other major mining companies.

Since its inception, Ranger has had a major impact on NT government mineral royalty receipts, accounting for 46 per cent of all royalties and grants-in-lieu of royalties during 1982-84.³⁸

40. The report also comments on Ranger's net contribution to NT and Commonwealth revenues - that is, revenues from Ranger minus expenditures attributable to the project. Expenditures attributable to the Commonwealth include, for example, its funding of infrastructure at Jabiru (directly and via grants to the Northern Territory Government) and its funding of the Office of the Supervising Scientist.³⁹ The positions of the two governments appear to differ considerably with respect to Ranger's net contribution to revenues:

[t]he Commonwealth will recover its total expenditures to date on Ranger/Jabiru during ERA's first year of full tax liability, and thereafter will receive a very substantial net contribution from Ranger (probably \$50 million plus per annum). In contrast, the NT government's expenditures on provision of services in Jabiru and on regulation of uranium mining will absorb nearly all of the additional revenue generated directly and indirectly by Ranger.⁴⁰

41. The report provides an analysis of Ranger's impact on Australia's balance of payments, which was an issue raised in a number of submissions to the Committee. It examines net foreign exchange inflows associated with the project (i.e. export earnings less outflows of foreign exchange to repay loans, pay dividends to foreign shareholders, purchase imports, etc.) and finds that:

[n]et foreign exchange inflow averaged \$136.5 million during 1982/83-1984/85, and will increase substantially as overseas loans are repaid and foreign interest payments consequently decline. In 1982/83 and 1983/84, Ranger's net foreign exchange inflow amounted to 2.3 per cent and 1.9 per cent respectively of Australia's current account deficit.⁴¹

42. In relation to employment generation the report concluded that:

[t]he Ranger project is highly capital intensive and consequently provides little direct employment (about 400 jobs) in relation to the investment involved. Less than 2 people were employed at Ranger in 1982-83 per million dollars of value added, compared to 10 in Australian mining as a whole and 34 in Australian manufacturing.⁴²

On the other hand, the report contends that the capital used to develop Ranger would not otherwise be available for investment in more labour-intensive uses, and that over 60 per cent of the jobs fall in the skill categories in which unemployment nationally and in the Northern Territory is concentrated. Total indirect employment is put at 485, in addition to some 160 people employed in government departments and in agencies providing services in Jabiru or monitoring the impact of uranium mining in the region.

43. Certain economic side-effects of Ranger are also noted. These include training programs which help to raise skill levels in the general workforce, development of infrastructure which assists the tourist and related industries, and environmental programs which generate scientific knowledge with possible applications elsewhere.

44. These findings are useful in placing the economic impact of Ranger in context. They confirm the Committee's own conclusion that, like mining operations generally, Ranger has not created large employment opportunities in relation to the capital investment involved and that the indirect employment effects are fairly modest in absolute terms. However it should be noted that in the context of the Northern Territory the employment opportunities resulting from the project are significant. On the other hand, the analysis indicates that while the net revenue

result for the Northern Territory Government seems less advantageous than might have been expected, the position in relation to net Commonwealth revenues and net foreign exchange inflows is quite favourable.

Impact of further mining

45. The Committee also received evidence on some economic aspects of the proposed operations at Jabiluka and Koongarra, the project currently under consideration for the recovery of gold and platinum group metals at Coronation Hill, and possible further mining in the Conservation Zone.

Jabiluka and Koongarra

46. As indicated earlier the Jabiluka deposit contains both uranium and gold. The uranium resource is almost twice as large as that at Ranger and is a major deposit of high grade ore. The gold grading is 10.76g/t, which is superior to most operating gold mines in Australia.⁴³ Pancontinental Mining Ltd, which holds a 65 per cent interest in the Joint Venture seeking to develop the Jabiluka Project, told the Committee that the gross value of the resource is 'in excess of \$A20,000 million at the uranium oxide floor price of \$US31 per pound, a gold price of \$US 325 per troy ounce and a \$A/\$US exchange rate of 0.70'.⁴⁴ The capital cost of developing the project was estimated in 1983 to be \$600 million. Authorisations were given in 1982 to the Joint Venturers to enter the market place as a prospective supplier of uranium oxide and, during the period they were in force, commitments from end users covering 50 per cent of the planned annual production had been achieved 'by the securing of a signed contract, a detailed memorandum of understanding and a number of letters of interest'. The authorisations were withdrawn in 1983, following the change of government and the signed contract was not approved by the Government.

47. The following information on the possible economic implications of the Koongarra project was provided to the Committee by Denison Australia Pty Limited in March 1988.⁴⁵ It is based on the need of Denison Mines Limited to increase its current production rate in order to meet existing long term contracts and it assumes commencement of production from Koongarra One on 1 July 1991. If the decisions necessary to allow this production to take place are not made, the forward sales are to be sourced from Denison mines in Canada.

48. Construction and development costs are estimated to total \$185.9 million, with 78 per cent of the development expenditure being incurred in Australia. The construction period would require a workforce of 580 people while operations would require 130 workers. The non discounted ten years total export revenue is estimated at \$1.76 billion, with the total cost of sales amounting to \$420 million. Other fixed costs amount to 6.8 per cent of gross revenue. Payment to Aboriginal interests would amount to \$256 million, with \$170 million going to the Kunjeidmi Association, \$44 million to the Aboriginal Benefit Trust Fund and the remainder to the Northern Land Council. Total government revenue from sources directly connected to the project is estimated at \$175 million, including Northern Territory Royalties and the Custom Export Duty.

49. The Committee does not make any recommendations as to whether permission should be given for the Jabiluka and Koongarra mines to go into production. A wide range of matters would need to be considered in making such recommendations, including the state of the world market for uranium. However, the Committee believes that any decision made by the Government to allow mining should, as a necessary but not sufficient condition, require the companies involved to meet stringent guidelines. These guidelines, which should apply to any mining project, should cover environmental safeguards; rehabilitation; consultations with ANPWS regarding impact on the surrounding Park and the

planning of necessary infrastructure; and consultation and agreements with traditional land owners regarding employment opportunities, royalties and management role. The extent to which these preconditions are already being met is discussed in later sections of this chapter. At this point it is intended to do no more than note that the Federal Government approved the Environmental Impact Statement prepared for the Koongarra project in February 1981, and that the Environmental Impact Statement prepared for the Jabiluka project was approved in 1982.

Coronation Hill

50. The value of the Coronation Hill gold/platinum/palladium deposit is estimated at \$500 million. According to information provided by BHP, Coronation Hill is planned to have an initial annual production of 50 000 ounces gold, 1 600 ounces platinum and 7 000 ounces palladium extracted from an open cut mine. With the introduction and expansion of underground mining operations production is planned to rise to 100 000 ounces gold, 35 00 ounces platinum and 15 000 ounces of palladium.⁴⁶ This higher annual production level would generate export earnings of around \$65 million at current prices and 'should stimulate an additional \$46 million in output elsewhere in the economy'.⁴⁷ The development phase of Coronation Hill is expected to involve a workforce of 200 and the operational phase around 150 permanent workers, rising with the projected mine expansion to 200-250. It is stated that these would generate another 175 indirect jobs.⁴⁸ The annual wage payment in the initial phase would be around \$5 million, then rising to possibly \$9 million in 1988 values.⁴⁹

Conservation Zone

51. In view of its high prospectivity, the Conservation Zone is likely to attract keen interest from mineral explorers over the five year period set aside for exploration. Gold and platinum group metals will probably be major targets in current market

circumstances. At this stage it is difficult to predict whether further mining operations will result but BHP believe that it is quite likely that in situ mineral resources with a value of \$1.5 billion at today's prices will be discovered. They informed that Committee that:

[b]ecause 45 mineral prospects are presently known and awaiting exploration in the area it is probable further commercial deposits could be discovered if rational and responsible mineral exploration is allowed to proceed. Capital investments of around \$150 million and direct employment of up to 500 people could reasonably be expected.⁵⁰

This would involve an annual wages bill of around \$20 million in 1988 dollars. The figures quoted include Coronation Hill itself and are based on a postulated three gold/platinum/palladium deposits, two of which could be in full production at the same time.

ENVIRONMENTAL IMPACTS OF MINERAL EXPLORATION AND MINING

Mining and national parks

52. Proposals to explore or mine inside the boundaries of Kakadu National Park raise the broader issue of whether mineral activity should ever be regarded as legitimate within an area designated as a national park. Conflicting views on this point were expressed to the Committee. These ranged from the position that exploration and mining should be banned from national parks in all circumstances to the view that, given suitable conditions, mining activity is compatible with national park status. These views are considered in the following paragraphs.

53. A submission received from the Western Australian Government claimed that, given suitable environmental controls, mining should be permitted in national parks.⁵¹ The submission

argued that the community regularly makes demands for both resource development and resource preservation, and that these competing demands need to be reconciled by an appropriate land use policy. 'Land use decisions', the submission continued:

can only be made effectively when a full inventory of the land and its resources is available. In most cases in Australia, the knowledge of mineral and petroleum resources in areas which have been declared as National Parks is minimal. While it is accepted that there will be specific areas and locations within National Parks that will need to be preserved and protected, this should not prevent the adequate assessment of the mineral or petroleum resources of National Parks.⁵²

The submission concludes that:

mineral and petroleum resource exploration, and carefully planned, managed, and controlled resource developments are not incompatible with the concept of National Parks as areas of natural environment for public enjoyment and conservation.⁵³

54. A similar view was expressed by representatives of the Northern Territory Government who argued that a policy of 'multiple land use', which would allow for exploration and mining under controlled conditions, is compatible with the concept of a national park, particularly one as large as Kakadu.⁵⁴ The Northern Territory Government argued that there is support for their view in the World Conservation Strategy developed in 1980 by the International Union for the Conservation of Nature and Natural Resources (IUCN). One of the themes of this strategy is that policies for conservation and sustainable development are mutually dependent although 'conservation and development have so seldom been combined that they often appear and are sometimes represented as incompatible'.⁵⁵ The Northern Territory Government proposed that this approach should be adopted in the case of Kakadu National Park and that development should include mining.

55. The National Conservation Strategy for Australia was also cited in support of this view. This document resulted from the IUCN World Conservation Strategy, which had recommended that a national conservation strategy be developed by each member country. The National Conservation Strategy for Australia, which was accepted by the Commonwealth Government in 1984, endorses the World Strategy concept of the interdependence of conservation and sustainable development. On this basis a number of submissions argued that the National Strategy does not exclude mining in national parks.

56. These arguments were contested by several witnesses. The then Department of Arts, Heritage and Environment for example submitted that the National Conservation Strategy should not be interpreted in this way. According to the Department:

[t]he strategy is concerned with the conservation of living resources and supporting ecosystems such as soil and water. More specifically, the stated objectives of the strategy are to maintain ecological processes, preserve genetic diversity and ensure the sustainable utilisation of species and ecosystems. The only mention of mining in the strategy is a reference which reads:

Promote the retention of native vegetation on all lands including those used for agriculture, pastoralism, forestry, mining and transportation.⁵⁶

57. The Department regarded mining as an activity which is not compatible with the national park concept. The general understanding of that concept, in the Department's view, 'precludes any exploitative industries, such as mining, which degrade national park attributes'.⁵⁷ In support of this, the Department's submission referred to the International Union for the Conservation of Nature and Natural Resources (IUCN) definition of a national park which states in part that:

[a] national park is a relatively large area ... where the highest competent authority of the country has taken steps to prevent or eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment.⁵⁸

The Department added that the IUCN has compiled a United Nations List of National Parks and Equivalent Reserves and that the criteria for inclusion in the list include effective protection against exploitation of natural resources, including the removal of minerals. In the Australian context, the Department drew attention to a definition of national parks adopted in 1970 by a meeting of Ministers with environment responsibilities in all States and the Commonwealth. The definition refers to a national park as a 'relatively large area ... protected from all interference other than essential management practices so that its natural attributes are preserved'.⁵⁹

58. In considering these issues the Committee was interested to note the policies of the various State and Territory governments concerning exploration and mining in national parks. It should be noted that in some cases State governments have taken steps to identify and exclude areas with mineral potential before a park is declared. Moreover national parks vary greatly in size and some are quite small. There are also various kinds of recreation parks and conservation reserves which have a lesser status than national parks and which are often subject to less stringent provisions. With these qualifications however, the position in the various States and Territories for areas expressly designated as national parks is essentially as follows:

New South Wales:

The combined effect of legislative requirements and government policy effectively prohibits all exploration or mining.⁶⁰

Victoria:

Government policy is opposed to exploration and mining. There are rare exceptions in the case of certain pre-existing commitments. These operations are to be phased out.⁶¹

Queensland:

Exploration and mining within national parks is prohibited except in the case of petroleum where exploration and extraction is possible under conditions specified by the State Director of the National Parks and Wildlife Service.⁶²

Western Australia:

Controlled exploration is permitted. Mining may be permitted after approval of an Environment Review and Management Program.⁶³

South Australia:

Exploration and mining are permitted only under special circumstances, which include the requirement for a resolution of both Houses of Parliament (Oil exploration has been allowed in the State's two largest national parks).⁶⁴

Tasmania:

Exploration or mining may be allowed under a management plan which is subject to approval by a resolution of both Houses of Parliament. Management plans so far approved have not included any provision for exploration or mining.⁶⁵

Northern Territory:

Exploration or mining are permitted under specified conditions relating to environment protection.⁶⁶

Australian Capital Territory:

The ACT is not considered as an area of significant mineral potential. Approval for exploration or mining is in any case unlikely.⁶⁷

59. This survey indicates some differences in policy. The majority view of the States, nevertheless, seems to be that exploration and mining are activities which are difficult to reconcile with the national park concept as defined in paragraph 57. The Committee concurs with this approach while noting the wide variation in the concept of a national park as described in the preceding paragraphs. The conclusion is not inconsistent with passages in the World Conservation Strategy, which stress the

compatibility of conservation and development. A careful reading of both those documents indicates, in the Committee's view, that these passages should be seen as applying to a nation's land use policies generally, rather than to management policies specifically for national parks. The IUCN's concept of a national park, which was referred to by the then Department of Arts, Heritage and Environment, seems to be more directly relevant. That concept involves the exclusion of activities which exploit a park's natural resources. Operations to recover minerals would clearly fall into this category.

Mining and World Heritage Values

60. Stage 1 of Kakadu is not only part of a national park but is also inscribed on the World Heritage List. This point was stressed by Professor J. D. Ovington who commented that:

[w]hat I think this inquiry is about is not about a national park; it is about the fact that, having looked at all of the suite of national parks within Australia, Kakadu was selected as the premier, the first national park, to go on the World Heritage List, because of its outstanding cultural and biological value which are recognised internationally. So we are not talking about mining in a national park, we are talking about mining in the first area that Australia put on the World Heritage List. I think that is a very big difference.⁶⁸

61. Under the World Heritage Convention, governments undertake to ensure that effective and active measures are taken for 'the protection, conservation, and preservation' of places inscribed on the World Heritage List. The degree of international prestige and importance attaching to areas inscribed on the list places governments under an obligation to provide the maximum possible degree of environmental protection. A policy which permitted mining in Kakadu Stage 1 or 2 would almost certainly be seen as incompatible with this obligation, and Australia's

reputation as a signatory to the World Heritage Convention would undoubtedly suffer if mining were to take place.

62. The World Heritage status of Stages 1 and 2 also has implications for areas adjacent to it. The South Alligator River has its headwaters in Stage 3 and flows through the Conservation Zone before flowing through part of Stage 1. Tributaries of the East Alligator River, including Magela Creek, flow through the Ranger project area and parts of Stage 2 before joining the East Alligator in the northern section of Stage 1. These interconnections highlight the environmental importance of the areas adjacent to Stage 1 and constitute a further reason why mineral activities should be discouraged within the Park region as defined in this report.

Environmental effects of exploration and mining

63. The Committee received evidence concerning the environmental impact of mineral activity within the region. The main topics raised were: the likely effects of uranium mining at Ranger; the likely impact of mining at Jabiluka and Koongarra; and the proposed mineral activity in the Conservation Zone including the possible operation at Coronation Hill.

Mineral activity within the Park

64. Some witnesses argued that any damage to the Park which might result from mineral activity would be minimal and quite within acceptable limits; others felt that despite environmental controls, an unacceptable level of damage would be virtually inevitable, at least in the long term. This section will consider these arguments as they relate to exploration, mining and rehabilitation.

(i) Exploration - a mineral resource inventory?

65. One proposal advanced in the course of the inquiry was that, whether or not mining was eventually to be permitted, the national interest requires that an exploration program be conducted throughout the entire region to establish an inventory of the mineral resources which it contains.⁶⁹ There was some disagreement, however, about the means which might be employed to carry out this task. Professor J. D. Ovington, who agreed that an inventory was desirable, saw it as 'knowledge of the basic stratigraphy', much of which could be gained without drilling. He thought that the Bureau of Mineral Resources might properly be responsible for this work.⁷⁰ A somewhat different view was expressed by Mr A. Hosking of the Northern Territory Department of Mines and Energy. Mr Hosking regarded drilling as indispensable in drawing up an inventory. He commented that:

[y]ou have to decide what is an inventory. You can do as much work as you like on the surface. You can walk around and use all sorts of sophisticated techniques on the surface. At the end of the day, you still have to drill holes.⁷¹

This view was supported by Mr L. Nicholls, Planning Manager with Ranger Uranium Mines Pty Ltd. Mr Nicholls argued that a knowledge of the stratigraphy would not be sufficient and that the Bureau of Mineral Resources would not be the appropriate body to do the work:

[a]n organisation such as BMR is not in a position to carry out a survey and produce an inventory of economic mineralisation of the region. A broad knowledge of stratigraphy, rock types, and sequences, indicates only where minerals may occur ... Mineral discoveries are normally made by looking for unusual (or anomalous) features in an area that is known to be favourable for valuable minerals to occur, and then painstakingly investigating those anomalies. Of the methods

available for the investigation of what are usually quite small target areas, drilling is the only one to define an orebody at depths of more than a metre or two, to, occasionally a few metres below the surface.⁷²

66. The question of possible environmental damage which might result from exploration activity of this kind was discussed in a number of submissions. The Northern Territory Department of Mines and Energy, which claimed that any environmental effects would be negligible, sought to substantiate this view by describing the steps involved in exploration. The preliminary phase of geologic mapping, the Department explained, involves traversing the area of interest by vehicle and foot with perhaps some sampling of rock formations. This causes 'virtually no disturbance to rock, soil or wildlife'. Where drilling takes place, the area affected rarely exceeds 10 metres square. Holes may vary in depth from a few metres to hundreds of metres and may be drilled at intervals of about 100 metres over areas of special interest, or at intervals of one or two kilometres for 'wildcat drilling'. On completion, the Department said, 'holes are sealed, rubbish collected and the site restored to as near natural condition as possible'. There is localised noise but this has 'no lasting effect' on wildlife.⁷³ As areas of particular interest are defined, some small-scale excavations may be required. These are usually less than five metres wide and 50 metres long and are filled-in after use. Excavators or back-hoes are normally used. Exploration may involve the setting up of temporary camps, construction of access tracks, and the pegging of grids. Control is maintained on camp sites, and wooden grid pegs are either left in the field to decay naturally or removed. On completion of work the effects of exploration are, the Department claimed, 'undetectable' after one or two years.⁷⁴

67. Not all witnesses accepted this view of the matter. Professor Ovington mentioned the exploration activities at Coronation Hill which, he felt, had resulted in damage. Problems caused by exploration, he argued, take a variety of forms:

[ilt is not just a matter of the point of the drill. You have drilling engineers and vehicles travelling quite widely in the Park. This can pose a variety of threats - partly in terms of physical damage, partly in terms of more people wandering around in the Park in not such a controlled way and in the spread of weeds such as mimosa and others. Drilling programs can have important environmental effects. In fact, some of the environmental problems which the Park now faces have arisen because of exploration people bushwhacking all through the Park.⁷⁵

This view received some support from CSIRO, whose submission noted that the movement of people and vehicles through the Park would be likely to increase the incidence of unwanted fires and the spread of noxious weeds.⁷⁶

68. The Committee believes that the environmental consequences of mineral exploration in the Park are difficult to predict with any accuracy. Much would depend of the extent of the area covered, the intensity of the effort, techniques employed, and equipment used. Some drilling would seem to be an essential element, and it might reasonably be assumed that minor excavations of the kind described above would be required periodically. If the exploration program were to provide a reasonably comprehensive inventory, it would need to range extensively throughout the Park since the locations regarded as prospective are widely scattered. (See Figure 3.1) This would require the transport of workers and equipment, frequently through areas where there are no established roads. The effects of this could include the spread of noxious weeds, increased fire risk, and damage to vegetation. Even, if the exploration sites themselves could be restored to something approximating original condition, it is less certain that the consequences of the movement of exploration teams through the Park would be equally controllable. There exists the potential for significant damage, particularly if the exploration program were a large one.

(ii) Mining and rehabilitation

69. Some witnesses were firmly of the view that mining operations would be unlikely to cause significant damage to the Park. Mining companies, it was argued, have become keenly aware of the need to protect the environment from any adverse effects of their operations and are now skilled in the procedures necessary to achieve this. In addition, there are strict controls imposed by environmental legislation. Disturbance at the mine site itself is inevitable but mining companies, it was submitted, are now aware of the need for effective rehabilitation and are capable of carrying this out. Appropriate rehabilitation procedures have been developed, such as the stockpiling of topsoil for later resspreading, and the careful management of revegetation. Such techniques, according to Mr W. Thomas of the Conservation Commission of the Northern Territory, ensure that 'the land surface becomes virtually indistinguishable from the surrounding countryside in terms of its flora and fauna characteristics'.⁷⁷ It was conceded that there are many examples of environmental damage from mining in the past, but such consequences would now be prevented.

70. Members of the National Resources Committee made a number of site visits to examine for themselves the effectiveness of the rehabilitation measures employed on mined areas. In May 1986 the the Rum Jungle Rehabilitation Project at Batchelor was visited with a view to assessing the quality of rehabilitation at the site of a former uranium mine. The Committee was able to observe the rehabilitation of areas including the tailings dam, overburden heaps, the diversion of the Finnis river, the treatment of water in the open cuts and the general clean up and re-vegetation of the area. In September of the same year the Committee undertook a further two days inspections in the Hunter Valley and Myall Lakes districts in New South Wales. In the Hunter Valley district the Committee observed coal mine

rehabilitation and re-afforestation at a number of mine sites. In the Myall Lakes district, north of Newcastle, the Committee inspected sand mining rehabilitation. In no cases did the Committee see land restored to its original state but did see attempts with varying success to stem further degradation and provide acceptable land status.

71. It was argued also that in view of the large surface area of the Kakadu National Park region, the proportion likely to be affected by mining and requiring rehabilitation would always be very small. The Northern Territory Government claimed that if all the locations which they regard as prospective were mined, the surface area affected would be less than one per cent of the total.⁷⁸ Moreover, this activity would not all take place at once since mines would commence operation at different times and would not all have the same productive life. It was contended also that the small proportion of the region which might be affected by mining would not generally be in locations which are of major scenic or cultural value. According to a submission from Geopeko, 'those places in the Region which have high and obvious Park values do not generally coincide with those places of high mineral potential'. The prime example was the escarpment areas which were important in terms of park values but were not regarded as a favourable location for exploration or mining. The more likely target, Geopeko indicated, would be the 'monotonous plains area that comprise much of the Region, but little of its Park value'. Even here only 'minute' areas would be affected.⁷⁹

72. Some submissions expressed strong reservations about these claims. A number of witnesses questioned the reliability of measures to prevent the escape of contaminants used in processing plants. This raised the possibility of material being released which could threaten the ecosystems of the Park. This threat would persist for long periods where highly polluted water and tailings need to be contained on a long term basis.⁸⁰ A submission from Dr R. J. Wasson, who had carried out substantial

research on these issues, argued that 'there is a real chance that even the best engineered impoundment structure will fail under extreme weather conditions' with devastating consequences for the environment.⁸¹ Other detrimental effects of mining which were mentioned included more opportunities for weed infestations and the introduction of feral animals, increased fire risk, a greater demand for roads and material for road construction, and erosion.⁸² Doubts were also expressed about the effectiveness of rehabilitation. The then Department of Arts, Heritage and Environment argued that:

even if ... disturbed areas are stabilised and re-vegetated, the landscape is usually markedly different from the natural form. This is particularly the case with open-cut mining where permanent loss of environmental quality of large areas is likely to be involved.⁸³

73. The proposition that mining would affect only small areas was also contested. It was pointed out that the Park is located across the catchments of a number of river systems and that mining activity in any one locality would represent a potential threat to much larger areas. One scientist who appeared before the Committee described the suggestion that mining could affect only a small area as 'alarming' because it ignored this ecological situation.⁸⁴ Whether or not some parts of the Park are regarded as 'monotonous and unappealing', as Geopeko suggests, is of little consequence on this view. All areas are potentially vulnerable since all are part of wide catchment systems.

74. The Committee is aware that there are some unknowns in this debate. Of necessity, one is discussing an unspecified number of mines, extracting one or more of a range of possible minerals, in unspecified locations. In addition there is little 'hard evidence' about the environmental effects of mining in the region. The only operating mine is Ranger and despite the ongoing research program of the Office of the Supervising

Scientist, much is still unknown about the effects of Ranger on the environment. This dearth of information about the environmental consequences of mining was one of the points stressed in the submission from CSIRO which commented that:

[i]t is easy to speculate in general terms on the likely effects of mining in Kakadu National Park ... it is more difficult to predict with certainty the specific impact of ... mining development.⁸⁵

Dr J. Landsberg and Professor P. Werner from CSIRO stated that, on the basis of their research in the region, they saw the potential consequences of increased mining as including the spread of pollutants, the risk of erosion resulting from the construction of access roads, weed dispersal, and increased fire risk. Strict environmental controls and the limiting of operations to specific localities could reduce these risks and in such circumstances, Dr Landsberg conceded, 'mining probably can be carried out with minimal mess (although) it is not going to be absolutely safe and there will be weeds ...'. The CSIRO submission stressed, however, that there are many uncertainties involved and that it may be 'unwise' to encourage mining or large scale tourist facilities 'while we are ignorant about the ecological processes at work ... and without a full understanding of the consequences'.⁸⁶

75. In view of these uncertainties the Committee is not confident that the proportion of the Park likely to be affected by mining would never exceed the figure of one per cent mentioned by the Northern Territory Department of Mines and Energy and others. Representatives of the Department rejected the suggestion sometimes made that mining companies would like to 'swiss cheese' the Park. Such a phrase gives an inaccurate impression of the likely effects of mining, given the large area involved and the limited number of mines which would ever be likely to operate. On the other hand, the estimate of one per

cent does seem open to question. The Department itself acknowledged in the course of hearings that this figure referred to mine sites only, and did not include roads, possible towns, and other infrastructure.⁸⁷ These additional components have their own consequences such as soil erosion and other risks associated with the presence of larger populations within the Park, including the spread of weeds and the introduction of feral animals. Even where a mine does not lead to the establishment of a mining town, these risks cannot be completely discounted. There are also the possible effects of the mine itself on the ecosystem through the entry of contaminants into creeks and rivers, either through spillage or seepage. For all of these reasons it could not be guaranteed that mining would never affect more than one per cent of the Park. There are unavoidable effects which extend beyond the mine site, and possible effects which could extend to the ecosystem as a whole. These factors seem likely to operate in much the same way wherever the mine is located. Roads and other infrastructure will be a requirement in virtually every case, and the heavy monsoonal run-off throughout the region ensures that all locations are in some way linked to the complex system of creeks and rivers.

76. These considerations also cast some doubt on the possibility of satisfactory rehabilitation after the cessation of mining. The Committee accepts that rehabilitation techniques have improved in recent years and that mining companies generally aim to restore a mined area to a condition which closely approximates its natural state. Given that this is possible - and in cases such as open-cut mining it may not be possible at all - the point remains that in the case of Kakadu National Park the area of concern stretches well beyond the site of the mining operation itself. The environment at risk includes the downstream portion of the catchment in which the mine is located and, potentially, damage which happened to extend this far would be virtually impossible to repair.

Ranger

77. The Committee did not attempt a detailed study of all environmental aspects of the Ranger mine as these have already been the subject of a number of reports including the Ranger Uranium Environmental Enquiry itself, the Annual Reports of the Office of the Supervising Scientist, a 1986 report on Ranger's water management system by the House of Representatives Standing Committee on Environment and Conservation and, most recently, a study by a Technical Working Group entitled Application Of Best Practicable Technology To Water Management At Ranger Uranium Mine.⁸⁸ This is not to suggest that the environmental effects of Ranger have now been adequately studied. On the contrary, the Committee agrees with a number of witnesses who felt that many aspects are not fully understood and that further research is essential. Given that its terms of reference concerned the whole Park region however, the Committee chose to focus on the main points raised in submissions.

78. The uranium ore mined at Ranger is processed on site and the process used is essentially the same as that intended to be used at Jabiluka. In outline, the ore is first crushed, mixed with water and ground to a slurry. This slurry is then thickened and pumped to leaching vessels where, over a 24 hour period, 90 per cent of the uranium ore is dissolved using sulphuric acid and pyrolusite. The uranium solution is then separated from the depleted ore and the latter is neutralised before being pumped to the tailings dam. The uranium solution is then filtered and passes through a solvent extraction process in which organic compounds are used to separate uranium from the unwanted elements. The result is a relatively pure, weak solution of uranium. This is precipitated in the form of yellowcake (ammonium diuranate) which is dried to U_3O_8 before being packed in sealed drums for transportation.

79. The general layout of the Ranger mine is shown in Figure 3.2. In establishing the mine, a Restricted Release Zone (RRZ) was designated which includes all areas likely to generate or store contaminated run-off from the mine or from processing activities. Water from within the RRZ cannot be released except under specified conditions and with the written approval of the supervising authorities. There have been no releases to date. The area enclosed by the RRZ includes the mine pit, the tailings dam, retention ponds 2 and 3 (RP2 and RP3) and the mill site.

80. The significance of the Restricted Release Zone does not always seem to have been fully appreciated. The Movement Against Uranium Mining expressed concern about the release of 'contaminated' water from the mine site, stating that:

regulated releases of about two million cubic metres of contaminated water from the mine during each wet season carry radioactive radium and such toxic pollutants as selenium, copper, lead, calcium and arsenic down nearby Magela Creek and into the floodplains.⁸⁹

81. The controlled releases into Magela Creek have been from retention pond 4, outside the RRZ. Mr R. M. Fry, Supervising Scientist for the Alligator Rivers Region, told the Committee that although the water from retention pond 4 is constituted somewhat differently from the water in the creek, it has not been the subject of any environmental concern. According to Mr Fry, approval is required to release water from retention pond 4 and this approval is given only if specified standards are met - which had been done so far without difficulty.⁹⁰

82. The Committee believes, nevertheless, that the effects of these releases merit careful study. During the 1984-85 wet season a program of biological monitoring of water released from retention pond 4 was conducted by the Office of the Supervising Scientist and the results were described by Mr Fry in the following terms:

Figure 3.2



Legend

- A Tailings dam
- B Number 1 mine pit
- C Mill area
- D Retention pond 1
- E Retention pond 2
- F Retention pond 3
- G Retention pond 4
- H Jabiru East
- I Magela Creek

Ranger Uranium Mine: Courtesy NT Department of Lands and Housing.

[w]e did detect two effects while the water was being discharged quite near the pipeline outlet where the concentrations of the elements in the water and the temperature were perhaps different from that flowing in the stream. We observed that some of the fish that normally swim up the creek were inhibited in doing that by the plume of water that was coming out from the pipeline. I do not believe we know what the cause of that was - whether it was just the mechanical effect of the plume or different temperatures or a different smell to the fish. The other effect was a temporary inhibition of the production of larvae in some mussels which were living close to the outlet of the pipe. The intensity of this effect decreased as you went away from the discharge point. This diminution in the production of larvae lasted while the discharge occurred and returned to normal some days after the discharge ceased.⁹¹

83. Mr Fry said there had been no report of lasting effects on the mussels. The Committee is aware nevertheless that this incident has been a source of concern in some quarters - and to the local Aboriginal community - and has been interpreted in some cases as evidence that dangerous contaminants are entering the creek system. The Committee believes that the monitoring program which took place in the 1984-85 Wet season should be repeated for future releases until it is firmly established that the procedure has no adverse effects.

Recommendation

The Committee recommends that the Office of the Supervising Scientist should continue to monitor the biological effects of all water releases from Retention Pond 4 at the Ranger Uranium Mine.

84. A number of submissions expressed concern about the volumes of water accumulating within the RRZ. The Ranger Uranium Environmental Inquiry recommended that a basic objective of water management at Ranger should be to ensure that the total amount of contaminants released from the operation was minimal.⁹² This was to apply to run-off and to intentional releases, both during and after mining. As mentioned above, no approvals have so far been given for releases from within the RRZ. This policy of complete containment, together with Wet season rainfall which has varied substantially from the anticipated pattern, has led to an unexpectedly large accumulation of water within the RRZ. This is despite the fact that in the 1981-1982 Wet season there was a very low rainfall, during which Ranger pumped water into RRZ mainly to keep the tailings covered.⁹³ It became necessary in 1986 to canvass the options for disposal of the excess water, which included the possibility of release into the creek system. The issues involved in this have been analysed in the 1986 House of Representatives report referred to above and, more recently, by the Technical Working Group which reported to the Commonwealth Government on the Application Of Best Practicable Technology To Water Management At Ranger. The Government announced its policy in March 1987, deciding that no releases of water would be permitted in the short term, and that Ranger should be required to enlarge its water storage capacity in retention pond 2 so that the probability of water releases would be no more than one year in ten.

85. The Committee does not intend to re-examine the issues involved in this decision, particularly in view of the detailed nature of some of the material involved. It wishes to stress however that there is continuing disagreement about the safety of releases into the creek system. Mr L. Nicholls of Ranger Uranium Mines Pty Ltd told the Committee that:

[w]e believe that the release of this water would have no adverse impact whatever on the Magela Creek system and its biota, and hence on human users of the creek's resources. The water in RP2, if diluted seven times, would meet current National Health and Medical Research Council standards for all contaminants. The minimum proposed dilution factor for release is 70:1, a factor of ten higher, and when we would actually want to release it there could be a further factor of ten higher, that is 700:1.⁹⁴

However, such assurances are frequently not accepted. Mr C. Moore of the Movement Against Uranium Mining argued that 'to suggest that that sort of release can take place without endangering people who drink the water downstream ... and whose food supplies are affected by the water, is just implausible'.⁹⁵ The Environment Centre, Northern Territory suggested that the mine operators had opted for releases into Magela Creek because this was 'a very cheap alternative'.⁹⁶

86. An alternative method employed recently to assist in the disposal of excess water is spray irrigation - sometimes termed land application. This process is used during the dry season and is designed to dispose of waste water by infiltration into the soil and by evaporation. Following a trial period, Ranger was given approval in April 1986 to use the spray irrigation technique over a 33 hectare area.⁹⁷ The approval allowed for irrigation with water from retention pond 2, which is inside the RRZ. Over a period of 230 days, this procedure could result in the disposal of nearly 1 000 000 cubic metres of water.⁹⁸

87. Some concern was expressed at the possible environmental effects of this technique. Professor Ovington of ANPWS commented that 'very little, if any, research' had been done on the effects of 'putting large quantities of water day after day on an area which has an ecologically monsoonal type of climate'. The possible consequences which he mentioned were the creation of an imbalance in the micro-organisms in the soil and an alteration in

the properties of the soil itself.⁹⁹ The Committee is also aware of concerns that the groundwater in the area may eventually be affected.

88. Little appears to be known about the effects of this method of water disposal and further research would seem to be essential. The 1985/86 Annual Report of the Office of the Supervising Scientist comments that extensive monitoring of groundwater quality and observation of any biological or other effects within or near the trial area will continue and a project with the principal aim of assessing the capability of irrigated soils to retain retention pond 2 contaminants during both irrigation and Wet season rains was set up with CSIRO on a consultancy basis.¹⁰⁰ The Committee would see this as a high priority, particularly in view of the heavy reliance which seems likely to be placed on this technique to reduce the need to release excess water into the creek system.

Recommendation

The Committee recommends that the Office of the Supervising Scientist should continue to give a high priority to work directed towards assessing the effects of the spray irrigation technique being used by Ranger Uranium Mine to dispose of excess water.

89. Another major source of concern to some witnesses was the tailings dam itself. The Movement Against Uranium Mining expressed concern about the current method of storing tailings within the dam. The previous requirement was that a cover of two metres of water should be maintained over the tailings, since this was thought necessary to minimise the emanation of radon. Currently the tailings need only be kept damp. The Movement Against Uranium Mining commented that the original requirement is now being 'ignored' and that '[t]his is one indication that companies place less importance on environmental protection than

they do on profits'.¹⁰¹ The Committee notes, however, that the changed method of storage has the approval of the Office of the Supervising Scientist which explains in its Annual Report for 1985-86 that:

[o]riginally it was required that the settled solids should be under a cover of 2 metres of water but for some years, and at the urging of the OSS, no minimum depth of water is now specified. The belief that a substantial layer of free water was necessary to control radon emanation from the tailings is mistaken. Reduction in radon emanation is brought about by filling pore spaces in the tailings pile with moisture and adequate control of radon levels in the atmosphere in the vicinity of the dam is obtained merely by keeping the tailings damp. OSS believes that any small and doubtful benefit associated with a free water layer is outweighed by a number of certain environmental advantages of keeping water volumes in the tailings small.¹⁰²

90. The possible leakage of contaminated water from the tailings dam into the creek system was also a matter of concern to the Movement Against Uranium Mining which claimed that there had been 'growing seepage of contaminated water caused by rising groundwater'.¹⁰³ Recent monitoring by the Office of the Supervising Scientist has identified some movement of seepage into the groundwater. The Office's Annual Report for 1985-86 comments that '[t]hese changes in groundwater quality are not, in themselves, of environmental concern,' but adds that 'the trends in the results of further monitoring are being closely watched'.¹⁰⁴ The Committee agrees that this and any other possible causes of leakage from the tailings dam need to be carefully monitored.

Recommendation

The Committee recommends that the Office of the Supervising Scientist should identify all possible causes of leakage from the Ranger Uranium Mine tailings dam and should monitor the level and any effects of the leakage taking place.

91. Dr R. J. Wasson expressed concern over the long-term storage of tailings. The Second Report of the Ranger Uranium Environmental Inquiry recommended that all tailings be replaced in the mine pit and did not favour the option of permanent storage in the tailings dam because 'it fails to cope with the major problems associated with the tailings dam - its stability over hundreds of years, continuing seepage from the dam, and the continuous release of radon from tailings in the dam'.¹⁰⁵ Dr Wasson commented that 'none of the options which I have seen would make it economically feasible to put all the tailings back in the pit'¹⁰⁶ but he believed this would be the best solution available.¹⁰⁷ Given the long half-lives of some of the radioactive substances in the tailings, Dr Wasson explained, the tailings impoundment would need to last for at least a thousand years if the tailings are not to be removed to the pit. During such a long period, extremes of weather would be certain to occur and these would 'severely strain a tailings impoundment and most likely lead to extensive pollution of the wetlands'.¹⁰⁸ Moreover large feral animals such as buffalo 'tramping up and down the sides of the impoundments' would inevitably cause damage to tailings dams.¹⁰⁹

92. The Committee agrees that the long-term storage of tailings in the dam would be likely to pose grave risks to the environment and should not be contemplated. The then Department of Resources and Energy told the Committee that 'under the present plan of rehabilitation, at the end of the day those tailings go back into the pit. They are covered with certain layers of material and they remain there'.¹¹⁰ The Committee understands this to be the safest option by far and has not received any evidence to support the view of Dr Wasson that this is not economically feasible. It believes it should be considered a matter of settled policy unless a more secure alternative is eventually found. Ranger Uranium Mines Pty Ltd allocates funds each year to cover costs of rehabilitation and the Committee

believes the objective should be to set aside amounts sufficient to ensure the eventual return of tailings to the pit.

Recommendation

The Committee recommends that at the completion of mining at Ranger, and unless any more secure alternative is found, all tailings be replaced into the pit and properly secured.

93. In examining the environmental effects of Ranger account should also be taken of the impact of the town of Jabiru, which was established to accommodate mine employees. Jabiru is the major centre in the Kakadu region and, after construction of the motel mentioned in Chapter Two, will begin to play a role in the development of tourism. In view of the growing importance of the town and the variety of issues which it raises, the impact of Jabiru is considered separately in Chapter Four.

94. Speaking generally of the impact of Ranger, Geopeko asserted that:

[w]e know of no publication in which the impact of Ranger One on Park values has been shown to be more than that produced by the presence of a town and its associated population.¹¹¹

Ranger Uranium Mines Pty Ltd also claimed that the mine 'has not had any adverse impact on the surrounding Park', pointing out that the successive annual reports of the Supervising Scientist for the Alligator Rivers Region 'contain no reference to any

untoward effects on the environment' from the minor infringements of the mine's authority to operate which have been reported since commencement.

95. While not disagreeing with these statements as they stand, the Committee believes they present a somewhat too comfortable picture. Certainly there seems to be no warrant for some of the more extreme comments which are sometimes directed at the mine - such as the remark that it is 'leaking like a sieve',¹¹² or the claim in another submission that mining companies seek to use Magela Creek as an 'industrial drain'.¹¹³ However, there are a number of aspects of the mine's operation which are potential sources of concern and which require continuing attention. These include the safe, long-term storage of tailings, the degree of seepage from the tailings dam, the consequences of spray irrigation, the effects of possible releases of excess water from within the restricted release zone and the effects of water releases from outside the restricted release zone (As noted in Chapter Four, the impact of Jabiru also needs to be monitored on a continuing basis). The Committee believes that there is much still to be understood about these matters and the environmental effects of Ranger generally. There should certainly be no diminution of effort in the ongoing program of research into these issues and the Committee would not favour any suggestion that the resources made available for this purpose should be reduced.

Recommendation

The Committee recommends that the resources made available for the study of the environmental impact of the Ranger Uranium Mine should, as a minimum, be maintained at current levels.

96. Finally, the Committee believes that, in the interests of improving community understanding of the Ranger operation, information about the environmental aspects of the mine should be

as accessible as possible to the public at large. Mr R. Charles of the Friends of the Earth claimed that too little is known about the operation and that:

[i]f you care to ask the authorities I am sure that they will say that they are monitoring this, that and the other, but in terms of what the public is getting it is nothing. They will offer you computer ticker tape, if you can interpret and analyse that.¹¹⁴

The Supervising Scientist, Mr R. M. Fry, explained to the Committee that the secrecy provision in the legislation under which he operated imposed restrictions on the information which could be made available to the public. The precise effect of this provision was not clear but advice from the Attorney-General's Department appeared to give it a very broad application. The advice suggested, Mr Fry said, that 'if I divulge anything I might learn about in the course of my duties that concerns the activities of Ranger or the mining company, I am up for a \$1000 fine or six months gaol'.¹¹⁵ Mr Fry added that he believed the legislation should be changed and that he had brought the matter to the attention of his Minister. The Committee agrees that the provision should be amended. Generally speaking, no good purpose seems to be served by restricting public access to information about the environmental aspects of Ranger. Removal of these restrictions may help in correcting misunderstandings, and promoting more informed public debate.

Recommendation

The Committee recommends that Section 31 of the Environmental Protection (Alligator Rivers Region) Act 1978 be amended as a matter of priority so that the Supervising Scientist is no longer prevented from making available information on the environmental impact of the Ranger Uranium Mine collected by his Office.

Koongarra

97. The likely environmental effects of developing Koongarra would be similar to those at Ranger. Koongarra would be mined using an open cut method. Mining would be completed over three years and the mined materials placed in separated stockpiles and reclaimed as required by the mill. Uranium production would be at an annual rate of three million pounds of U₃O₈ over a ten year period using a process similar to that described for Ranger. An environmental impact statement for the project was prepared in 1979 and in February 1981 the Minister advised that there were no environmental objections to approval being given for the project. According to Denison Australia Pty Limited, the process of environmental consideration:

has gone far beyond the normal requirements of the legislation in an attempt to secure the higher environmental protection standards that can be achieved.¹¹⁶

The company also informed the Committee that, following the preparation of the environmental impact statement for the project, it had been informed in September 1981 that the then Minister for Environment, Housing and Community Development had advised that there were no environmental objections to approval being given to the project. Environmental requirements for the project have been endorsed by the Commonwealth, the Northern Territory, the Northern Land Council and the Company. Draft applications filed in 1982 and 1983 under the Uranium Mining (Environment Control) Act 1978 to mine and construct a uranium mill facility were approved, among others, by the Commonwealth Departments of Environment, ANPWS, the Australian Radiation Laboratory, the Office of the Supervising Scientist, the Northern Land Council, and the Northern Territory Conservation Commission.¹¹⁷ While noting this the Committee is aware that Koongarra is situated on the head waters of the Nourlangie River system and that this is separate from the Magela Creek on which Ranger is situated.

Jabiluka

98. In July 1979 the Pancontinental and Getty Oil Joint Venturers published the Jabiluka Project Environmental Impact Statement pursuant to the Environment Protection (Impact of Proposals) Act 1974. This document was assessed as required by the Act. When the Company subsequently satisfied further conditions imposed by the Minister and an agreement between the Joint Venturers and the Northern Land Council, advice was given to the Northern Territory Minister for Mines and Energy by the Federal Government that a Mineral lease be granted to the Joint Venture. The lease was granted in 1982. According to Pancontinental Mining Limited:

[t]he major conclusion reached in the preparation of the Environmental Impact Statement and subsequently endorsed by the Federal Government was that the impact on the physical and social environment would be acceptable.¹¹⁸

Jabiluka is situated very close to the Magela creek system on which Ranger is situated. Because mining at Jabiluka would be underground, disturbance of the surface area would be less than that created by the open cut mining at Ranger.¹¹⁹ The visual impact of the mine would also be less than that at Ranger. Disturbance of the above ground areas would be restricted to ore treatment, water management, tailings disposal, shafts, entrances to underground tunnels and facilities for filling the underground tunnels after use. Cement and waste from the mine would be used to fill underground excavation. Pancontinental contended that with underground mining there would also be less accumulation of water from rainfall¹²⁰ and less radon produced in the

atmosphere.¹²¹ Dr Wasson considered that the mining of Jabiluka posed difficulties for the environment, if the preliminary proposal's most economic method for mining went ahead. This involved boring a tunnel at the back of the escarpment and putting a mill and mill tailings pond next to the Magela Swamp. He stated that the fallibility of rock and earth filled dams was well known and that the tailings impoundment would eventually fail. When this happened a substantial fraction of the tailings would end up in the Magela swamp. If the tailings dam at Ranger failed there would be a substantial distance between the impoundment and the Magela swamp and contamination would therefore be less. Dr Wasson considered the biological component of Kakadu was a vital aspect of the Park and said that 'the development of Jabiluka is setting off a time bomb for biological destruction'.¹²² He also indicated there were severe hazards to miners working under ground.¹²³

Coronation Hill

99. The proposed gold mine at Coronation Hill is still in the planning stages. In compliance with the Environment Protection (Impact of Proposals) Act 1974, the Coronation Hill Joint Venture is currently in the process of preparing an environmental impact statement. The Committees visited the mine site on three occasions in the course of their inquiry and also held two hearings with BHP personnel responsible for management of the project. At the second of these hearings in June 1987, the Committee was given a progress report on the preparation of the environmental impact statement which is expected to be completed by the end of 1988.

100. BHP representatives told the Committee that the shallow portion of the Coronation Hill deposit would be mined by standard open pit methods, resulting in an excavation which would initially be about 400 metres long, by 170 metres wide, by 120 metres deep. Extensions to both length and depth are envisaged,

although the maximum depth would be about 150 metres. Deeper parts of the orebody could be recovered by underground mining methods.

101. In addition to the mine itself, the project infrastructure would include a treatment plant, a short haul road between the mine and the plant, a residue dam, a waste rock dump, a process water dam and workers' accommodation. Metallurgical studies are currently being carried out on optimum treatment methods for the ore. A conventional sodium cyanide leaching process is likely to be used to dissolve the gold, for recovery by conventional carbon in pulp technology.¹²⁴ Research will be undertaken in conjunction with CSIRO to investigate ways of maximising the recovery of platinum group metals.¹²⁵

102. BHP explained that waste from the process plant would be pumped to the residue dam located at the head of a small valley behind Coronation Hill, where the catchment of natural run-off is expected to be small. They informed the Committee that:

[t]he tailings dam is deliberately located at the very extremity of that valley so that its catchment area is also minimised. We believe that by doing this most of the water from this particular valley can actually be diverted around the retention pond from undisturbed areas and actually bypass the whole process of the Coronation Hill project.¹²⁶

It was expected that the concentration of free cyanide dissolved in the alkaline tailings liquor would be about 50 parts per million on discharge and that this level would subsequently decline through oxidation.¹²⁷ Studies of regional hydrology and subsurface conditions are being conducted to assist in the dam design. A 'retention pond' would also be constructed further down the valley to trap any spillage from the dam, although BHP regards this as an 'unlikely event'.¹²⁸ These arrangements are intended to ensure that chemicals such as cyanide do not enter

the South Alligator River or any of its minor tributaries in the area. Fluids in the residue dam would be recycled through the plant in a closed system to make maximum use of the treatment chemicals.¹²⁹ Residue in the dam itself is expected to break down naturally with time. The Joint Venture's submission stated that:

[c]yanide is rendered harmless by oxidation in normal conditions and this process is aided in the tropical environment by such factors as increased temperature and higher rainfall. Remnant toxic levels in the residue dam will therefore decrease naturally with time. This will minimise any long term problems.¹³⁰

The Joint Venture believes that the ore at Coronation Hill has a very low sulphide and base metal content so that residues will not pose the kind of potential long-term threat to the environment which arose at Rum Jungle.¹³¹ This matter is still under investigation by BHP.

103. The proposed water management arrangements provide that water which has been contaminated by the mining operation will be contained on site for use in the treatment plant, although the Joint Venture's submission commented that 'the option of ... treatment (of the water) before being discharged from the project site will also be evaluated'.¹³² Contaminated water would include rainfall run-off from areas such as the open pit, process areas, haulroads, overburden dumps, and the residue dam. Water which is not chemically contaminated would be allowed to pass from the project area.¹³³

104. The existing road from Pine Creek, which would form the major route to the southern part of Stage 3 of the Park, would be used to provide surface access to the mine. Once the mine was operational, the need for road access would be reduced as most personnel would be flown in, and the gold bullion produced by the mine flown out. The main use of the road would then be for the transport of bulk operating supplies.¹³⁴

105. At its initial level of operation the mine is likely to employ a total workforce of about 100, with additional personnel of up to 200 required during the construction phase. The workforce would operate on a seven or fourteen day cycle and commute on a fly-in/fly-out basis. Single person accommodation would be provided at the project site.

106. Several studies of the physical, biological and social environments of the region are either proposed or currently under way. In addition to those mentioned above, these include a study of the terrestrial and aquatic biology of the area, an assessment of the natural revegetation which has occurred since mining ceased in the 1950s, research in conjunction with CSIRO on rehabilitation techniques, a study of the social impacts of the project, and archaeological and ethnographic studies of the area to be undertaken by the Northern Territory Museum.

107. Summing up the situation at the Committee's hearing in June 1987, Mr W. Hewitt, Project Manager for Coronation Hill, expressed the view that exploration and mining at Coronation Hill, and elsewhere in the South Alligator Valley, 'will prove in practice to be fully acceptable on any rational assessment and fully compatible with the national park status of the surrounding country'.¹³⁵ The Committee considers that it is not in a position to say whether these standards will in fact be reached. As witnesses from CSIRO pointed out, the environment of the Gimbat/Goodparla area, including its hydrology, is not well understood. In addition, the environmental research program for the Coronation Hill project is not yet completed. In these circumstances, the Committee believes it would be premature to express an opinion about the likely effects of the project on the surrounding environment and its ecosystems. The Committee notes, for example, that studies yet to be completed include those concerning rainfall patterns, and groundwater movements. These issues will be critical in ensuring that spillage or seepage of

contaminants does not occur, and they will need to be fully understood before the project could proceed with any degree of safety. As indicated above, the option of discharging some processed water into the river has not been completely excluded, and this would also require careful evaluation.

108. The eventual rehabilitation of the project area is another issue which requires close attention. Witnesses from BHP assured the Committee that the open pit, which will remain as a large excavation after the mine is decommissioned, would be 'made safe' after mining had ceased. Parts that might slump in would be fenced off and a bund would be pushed up around the pit so as to prevent people casually wandering into it. Whether or not water would readily drain out of the pit is still being determined.¹³⁶ Such matters are of importance in view of the proximity of the mine to the South Alligator River and the Committee believes that if mining is to proceed arrangements should be put in place to ensure that a full and detailed rehabilitation plan is agreed in advance and that payments are made by the Joint Venturers to a rehabilitation trust fund on a year by year basis.

Recommendation

The Committee recommends that a full and detailed plan for rehabilitation should be required before any mining operations are allowed at Coronation Hill and that payments should be required on an annual basis into a trust fund to be used for the rehabilitation work. ANPWS and the Office of the Supervising Scientist should be fully involved in the preparation and approval of the rehabilitation plan. Similar arrangements should be in place for any further mining or exploration activity in the Conservation Zone.

109. As mentioned earlier, the South Alligator River river plays a central role in the ecosystem of Kakadu National Park and flows through the World Heritage Area. Extreme care will need to

be taken both during and after the mining phase to ensure that nothing is done which could adversely effect the river or the biological systems which depend upon it. No doubt this will be seen as a critical consideration when the environmental aspects of the project are formally evaluated. The Committee recommends nonetheless that the Environmental Impact Statement pay special attention to all factors which might cause discharge of contaminated water from the mine site, either during or after the mine's operational life. This matter should also be carefully monitored through the continuing environmental protection arrangements for the Conservation Zone which are described below.

Recommendation

The Committee recommends that in examining the Environmental Impact Assessment being prepared by the Coronation Hill Joint Venture in relation to the proposed mine at Coronation Hill the Government should pay special attention to all factors which might cause discharge of contaminated water from the mine site, either during or after the operational life of the mine.

Further exploration and mining in the Conservation Zone.

110. As indicated earlier, legislation passed by Federal Parliament in 1987 provides for the declaration of a Conservation Zone in the Gimbat and Goodparla leases. The Zone, covering approximately 33 per cent of the area, has now been declared. Government policy allows a five year period of exploration and a resource assessment program for the Zone, which will run from the grant of the first Commonwealth Government exploration licence. The Committee understands no licences have been issued to date although the Minister for Administrative Services has issued two authorities covering the operations of BHP Gold Mines Ltd at Coronation Hill. One authority allows exploration work to continue on the pre-existing mineral lease areas, the other permits access to parts of the Conservation zone outside the

leases so that work can be undertaken on the environmental impact statement. Both authorities are subject to stringent environmental conditions and can be varied at any time, or terminated, if these conditions are not met.¹³⁷ Proposals to mine will be considered only where projects are of 'national economic significance'. BHP representatives told the Committee in June 1987 that they anticipated 'intense interest' in the Zone on the part of mining companies in view of its high mineral prospectivity. The level of mineral exploration activity in the Zone is therefore likely to increase markedly in the near future, and proposals to establish further mines may eventually be put forward.

111. Amendments passed in 1987 to the Environment Protection (Alligator Rivers Region) Act 1978 and the National Parks and Wildlife Conservation Act 1975 make arrangements for environmental protection in the Conservation Zone including Coronation Hill. The amendments confer on the Supervising Scientist for the Alligator Rivers Region the functions of providing advice on environmental aspects of exploration and mining activities within the Zone. In addition, the powers of the Director of ANPWS are extended to allow for the regulation of environmental aspects of exploration and mining within the Zone. This power covers any areas later excised from the Zone for mining purposes. Conditions relating to environmental protection will be attached to exploration or mining leases to be granted under the Commonwealth's Lands Acquisition Act, and the Environmental Group attached to the Northern Territory Department of Mines and Energy will be invited to assist in the monitoring of these conditions. A Conservation Zone Advisory Committee comprising representatives from the Department of the Arts, Sport, the Environment, Tourism and Territories, the Department of Primary Industries and Energy, and the Australian National Parks and Wildlife Service will have a policy co-ordinating role.¹³⁸

112. These arrangements have been introduced to minimise environmental damage arising from exploration and mining within the Conservation Zone. The Committee supports these measures although it notes that there appear to be overlaps of responsibility which may cause confusion - for example between ANPWS and the Northern Territory Department of Mines and Energy, which are both likely to play a direct role in environmental monitoring and control. The important question, however, is whether even the strict regime of environmental protection which is envisaged will be able to provide sufficient assurance that unacceptable damage will not occur. If, as BHP predicts, there is intense interest in the mineral deposits in the Zone, there is likely to be strong pressure for a high level of exploration activity. The five year time limit on the exploration program will add to these pressures since companies will probably seek to extract the maximum amount of information in the time available. These pressures may well pose serious environmental risks for the area. The Coronation Hill Joint Venture expressed concern on this point in its submission to the Committee, commenting that:

[t]he CHJV considers that it is not practical to have a number of exploring groups sharing access tracks and undertaking field disturbing activities in close proximity to each other in an area of such widespread environmental interest. Heavy use by numbers of groups of existing limited access tracks will result in an inevitable increase in environmental damage.¹³⁹

The Joint Venture added that such a situation would also be likely to cause confusion for those charged with the responsibility for supervising and monitoring environmental impacts.

113. The Committee shares these concerns, particularly since much of the exploration is likely to be concentrated in the South Alligator River Valley or in the catchment areas of its local tributaries. To help cope with these problems, the Coronation

Hill Joint Venture suggested that the number of companies granted exploration titles in the Conservation Zone be minimised and that each organisation be allocated a large area. Where a company wished to explore within the catchment of the South Alligator River, the Joint Venture proposed the area granted to them should include a major stretch of the river and all tributaries entering within this length. The Committee supports this general approach, which it sees as one way of defining areas of responsibility with some degree of clarity and reducing the complexity of the situation for those responsible for environmental protection. As noted later in this chapter, the increase in the number of mining companies active in the Conservation Zone may also pose problems for the Aborigines with traditional ties to the area. The allocation of a large area of land to each company may help alleviate these difficulties as well.

Recommendation

The Committee recommends that in order to reduce to the minimum possible the environmental impact of exploration activity in the Conservation Zone, strict environmental guidelines and safeguards, developed in conjunction with ANPWS and the Office of the Supervising Scientist, should be strictly enforced.

114. One can only speculate at this stage about the number of applications to mine which might result from the proposed five year exploration program. The Coronation Hill Joint Venture has already had promising results in at least one other lease in the vicinity of Coronation Hill, and the whole Conservation Zone area is generally regarded as highly prospective. The policy of granting approval only to those operations which are of 'national economic significance' may limit the possibilities, although this criterion has not been defined with any precision. The Committee would recommend that any further proposals to mine be examined very carefully, particularly if - as is not unlikely - such proposals involve the catchment of the South Alligator River. It

cannot be stressed sufficiently that the Conservation Zone is an integral part of one of the major river catchments on which the Kakadu National Park depends, and that it flows through part of the World Heritage area. A proliferation of mining operations within the Zone could pose a serious threat to the Park in both the short and long term, despite strict environmental controls. It should be borne in mind also that the Zone itself, with mining areas excised, is to be incorporated into the Park after the expiry of the period set aside for exploration. Mining damage to the area should be minimised if it is to represent a worthwhile addition to the Park and any infrastructure required for the exploration activity should be planned in such a way as to facilitate the use of the area as a national park.

Recommendation

The Committee recommends

- (i) that any proposal for mining activity in the Conservation Zone should be examined very carefully, and that approval should not be given if the proposal has the potential to cause environmental damage within the catchment area of the South Alligator River which might result in damage to areas of the Park; and
- (ii) that any infrastructure permitted for exploration or mining activity should be planned in consultation with ANPWS and in such a way as to facilitate the later use of the area as a national park.

IMPACT OF MINERAL ACTIVITY ON ABORIGINES

115. An important focus of the Committee's inquiry was the impact of mineral activities on the Aboriginal people of the Kakadu region. The evidence received on this topic included hearings conducted in the Northern Territory with representatives

of the Northern Land Council and of two of the region's Aboriginal communities. The major issues which arose were the impact on Aboriginal communities of mining royalties, the availability of employment opportunities in mining projects, the effects of exploration or mining on areas registered as sacred sites, and the environmental and social consequences of mining as they affected Aboriginal communities. The present section discusses these issues in relation to Ranger, Koongarra, Jabiluka, Coronation Hill and the Conservation Zone.

Ranger

Royalty payments and indirect benefits

116. As part of the arrangements for the establishment of the Ranger mine, agreement was reached for the payment of stipulated amounts to Aboriginal interests as provided for under the Aboriginal Land Rights (NT) Act. As a result of this agreement, the Gagudju Association, which represents the traditional owners in the area, gained an entitlement to:

- (1) an annual rental of \$200,000
- (2) sequential payments, tied to stages of the mine's development, totalling \$1.3 million
- (3) a 30 per cent share of monies paid to the Aboriginals Benefit Trust Account from the 4.25% royalty paid by Energy Resources of Australia (the parent company of Ranger Uranium Mines Pty Ltd) to the Commonwealth Government.¹⁴⁰ (Anticipated payment for 1987-88 to Aborigines through the Aboriginal Benefit Trust Account under the Aboriginal Land Rights (Northern Territory) Act 1976 from Ranger is \$12,659,000).¹⁴¹

The sequential payments have now been completed. Figures supplied by the Department of Aboriginal Affairs indicated that from commencement in 1981 to June 1986 the royalty payments received by the Gagudju Association totalled more than \$14m.¹⁴² The Department said that the Association receives approximately \$3.2m in royalty equivalents per year.¹⁴³

117. In 1987, the Gagudju Association had 210 adult members. There were also 108 children, who would become eligible for membership of the Association at the age of 18. The Association has used its funds to establish a number of commercial enterprises and also to improve the material welfare of its members. The enterprises include the Cooida Hotel-Motel, near the popular tourist attraction of Yellow Water, the Border Store which is a small tourist store on the border of Arnhem Land, and a contracting company. As indicated in Chapter Two, the Association has engaged in a joint venture with Industrial Equity Limited to build a major new tourist motel at Jabiru. Some funds have also been placed in investments. Projects undertaken by the Association for the welfare of its members include the erection of houses, provision of water supply and lighting, and the running of two schools at outstations in the Park. A small portion of the funds is also paid directly to individual members of the Association. The Department of Aboriginal Affairs indicated that as at August 1986, \$1,500 per annum was paid to each adult member, with a similar amount paid into trust for each child.

118. Amounts equal to monies received by the Northern Territory and Commonwealth Governments in respect of mining on Aboriginal land in the Northern Territory are paid into the Aboriginal Benefit Trust Account from Consolidated Revenue. The Gagudju Association receives a 30 per cent share of the total royalty amount paid by Energy Resources of Australia to the Commonwealth Government in respect of the Ranger mine. A further forty per cent of the amount paid into the Aboriginal Benefits Trust Account is distributed among the three land Councils, with the remainder being used for the benefit of Aborigines in the Northern Territory generally. This thirty/forty/thirty division is in accordance with the procedures laid down in the Aboriginal

land Rights (NT) Act. Figures supplied by the Department of Aboriginal Affairs indicated that from 1981 to mid 1986 the total amount emanating from Ranger which was available for distribution in this way was over \$50 million.¹⁴⁴

119. Money derived from mining royalties is providing various sources of employment for Aboriginal people in the area. Through its income-generating enterprises and welfare projects, the Gagudju Association provides employment for approximately 30 local Aborigines in areas such as teaching, teaching assistants, health care assistants, office work and laboratory jobs. The Committee understands that there will be employment opportunities for local Aborigines at the new motel at Jabiru.

Impact of royalties on Aboriginal communities

120. The impact of mining royalties on Aboriginal communities is a complex matter which has been examined in a number of studies including a report completed in 1984 by the Australian Institute of Aboriginal Studies entitled Aborigines and Uranium. This report, which examined the effects on Aboriginal communities of uranium mining at Ranger and Nabarlek over the period from 1978 to 1984, sees royalty payments as having both positive and negative consequences. On the positive side, the report points out that funds from royalties have led to the establishment of the Gagudju Association which 'is rapidly growing into an organisation which is felt to be representative of Aborigines in the area'.¹⁴⁵ The Association is described as 'viable' and 'dynamic', with a range of activities which now 'far exceeds that of handling of money from the Ranger agreement'. Facilities including outstation vehicles, outstation servicing, education and health have been provided for communities in the Park. This means that 'the Kakadu residents, as well as Kakadu owners derive benefit from the Association'.¹⁴⁶

121. Speaking of both Ranger and Nabarlek the report argues, however, that the establishment of the Gagudju Association and the counterpart Kunwinjku Association for Nabarlek royalties has led to a degree of social division:

[m]ining provides a large source of money; those who control the channels through which it is distributed exert the greatest power and influence. Serious inequities have arisen through uneven distributions: this has created divisiveness and a 'money greed'.¹⁴⁷

The claim is also made - again with reference to Nabarlek as well as Ranger - that mining royalties are not necessarily laying the foundations for a secure financial future for recipient groups. The report comments that 'Aborigines know little or nothing about investment and the workings of the economy in general'.¹⁴⁸ In addition, the Aboriginal economy is based on sharing rather than accumulation. These two factors mean that 'no relationship can be established between present and future royalty payments, and Aboriginal financial security in the future'.¹⁴⁹

122. The conclusion reached by the report is that 'a delicate, perhaps precarious, equilibrium is being established between Aborigines and the other actors in the region'.¹⁵⁰ If mining is to continue even at the present level 'this embryonic equilibrium will need careful nurturing'.¹⁵¹ The report recommended the establishment of a task force to assist Aborigines in gaining the knowledge and skills which they lack, as well as efforts to 'draw [them] further into the decision-making process'.¹⁵² A caution is given against any new projects of substantial size:

[g]iven the findings of this Project and the demonstrated fragility of the community at this point, any new mining or other major development in the Region, including tourism, in the present circumstances and under

prevailing conditions will seriously intensify the grave problems already being faced by people in the Aboriginal domain.¹⁵³

123. Evidence received by the Committee also suggested that there are positive and negative consequences from mining royalties. The Department of Aboriginal Affairs stressed the improvements in material welfare, and educational and health facilities which mining royalties had made possible. The Department also commented in favourable terms about organisational changes which had resulted. The Aboriginal people, the Department commented:

have had to establish institutions which allow them to make decisions about distribution and about various developments that they either want to be involved in or indeed, may wish to oppose. But, when one considers what the area and the Aboriginal people's capacity to organise was, prior to all of these developments having occurred, and this regime being put in place, then it certainly was a very different situation then, than it is now. Now, we have a group of people who have the capacity to be heard; have the capacity to organise; have the capacity to participate in a way that certainly was not the case, more than just a decade ago.¹⁵⁴

124. A somewhat different view was expressed by Mr V. Brown and Mr R. Buckle, two administrators working with the Kunwinjku Trading Association which receives mining royalty funds generated from Nabarlek. Mr Brown spoke of the situation at nearby Oenpelli where, he said, 'the greatest pollutant of all is money.' At Oenpelli, according to Mr Brown:

[t]he introduction of dollars and cents into what was once a poor community has brought it to people that they have to try to make decisions about a substance they know nothing at all about.¹⁵⁵

The availability of money, he felt:

can ruin a community; it can get misused; it causes racism, simply because other people in the community look around and say 'Why give them all that money? They spend it on cars, they drink too much', and so it goes on.¹⁵⁶

Mr Brown urged the introduction of controls over money so that only limited amounts were available for spending and the rest could be invested for the future.

125. One difficulty in dealing with this issue is to distinguish the effects of income generated by mining royalties from the effects on Aboriginal communities of contact with white Australian society generally. This point was put to the Committee persuasively by Dr K. Palmer, Director of Research at the Australian Institute of Aboriginal Studies. Responding to the question 'Are mining royalties a mixed blessing?' Dr Palmer said:

I suppose the answer to that has to be yes, but a lot of Aboriginal people would say that most of their encounters with white Australia are a mixed blessing. You would have to see it in that context.¹⁵⁷

Referring to the report Aborigines and Uranium, Dr Palmer continued:

The Australian Institute of Aboriginal Studies ... spent five years monitoring the effects of uranium mining on the Oenpelli people and the people in the Park. Its conclusions were that this was a society in crisis. Having worked in a great many Aboriginal communities across Australia, I remind members of this Committee that there are a great many Aboriginal communities in crisis and some of them are a very, very long way from any mine. So again, there is not necessarily a connection or a relationship between the exploitation of natural resources and the payments of royalties and the concurrence of a group of Aboriginal people living in a certain way.¹⁵⁸

126. The Department of Aboriginal Affairs indicated that Aborigines had mixed views on further mining development in the Park. Radioactive pollution of major river systems and damage to flood plain areas were matters of particular concern. In this respect the development of Koongarra, on the head-waters of the Nourlangie water system, which at this stage was unaffected by any mining development, was known to cause concern to traditional owners. On the other hand there was less opposition to the Jabiluka mine, on the Magela Creek system which was already perceived to be at some risk from pollution from the Ranger mine.¹⁵⁹ It is interesting to note the Department stated that financial benefits from mining are in no way regarded as compensating for damage to sacred sites or disruption to the social environment.¹⁶⁰ In October 1987 nineteen Aboriginal people were employed at Ranger Uranium Mine.¹⁶¹

Koongarra

127. In February 1980 Denison entered into negotiations with the Northern Land Council in order to reach an agreement for the payment of stipulated amounts to Aboriginal interests as provided for under the Aboriginal Land Rights (Northern Territory) Act 1976. This Agreement provides for an annual royalty payable directly to the Northern Land Council; a land rental; a series of cash payments after certain specified events have occurred; and a number of non-financial commitments. These include preferential employment for Aborigines; five long-term contracts for preferential tender by Aborigines; scholarships for secondary and tertiary training; the construction of an Aboriginal outstation supply store; the free transfer to Aborigines of residential facilities no longer required by the company; and assistance with the establishment of outstations and an Aboriginal school. Other conditions relate to non-Aboriginal employees residing in Darwin and being flown to the site on a roster basis. A second agreement by which the Aboriginal traditional owners will acquire an undivided 25 per cent interest in the project was negotiated in parallel. According to this Agreement the operation should be carried out as a Joint Venture between Koongarra and the

Association, and administered by a Joint Venture Committee formed by two Aborigines and two company representatives. The two Agreements received endorsement from the traditional owners at Koongarra in 1985, and from the Northern Land Council in 1986. They were also approved by the Federal Minister for Aboriginal Affairs on 3 June 1987, pursuant to statutory obligations under the Aboriginal Land Rights (Northern Territory) Act 1976.¹⁶²

Jabiluka

128. Following the assessment of the Jabiluka Environmental Impact Statement and compliance by the Joint Venturers with further conditions imposed by the Minister, an agreement was signed in 1979 between the Joint Venturers and the Northern Land Council.¹⁶³ Pancontinental told the Committee that an agreed consultative process will be instituted with local Aboriginal groups and individuals to ensure that the impact of the companies' activities on the local Aboriginal social structure is a positive one. The agreement entered into between the Joint Venture partners and the Northern Land Council on behalf of the traditional Aboriginal land owners:

provides for acknowledged substantial social and financial benefits to Aboriginal people and communities for the duration of the development and operation of the Project.

The financial benefits include payments to the Northern Land Council for distribution to local Aboriginal Associations.¹⁶⁴

According to Pancontinental the social benefits would include the encouragement and maximisation of Aboriginal employment, the provision of educational, training and apprenticeship facilities for Aborigines, and the providing of advice and assistance to Aborigines to identify and take advantage of business

opportunities associated with the development of the project. There would also be special rights of access to the Project area for Aborigines and assistance in protecting Aboriginal sites.¹⁶⁵

Coronation Hill and the Conservation Zone

129. As indicated earlier, recent legislative changes clear the way for the determination of Aboriginal land claims over Stage 3 and the Conservation Zone. The original Jawoyn (Katherine area) land claim covered a small part of Stage 3 of the Park, but this was not recommended for grant by the Land Commission - no decision has been made by the Government on the granting of land in this claim. In June 1987 the Northern Land Council lodged a claim on behalf of the Jawoyn people over the whole of Gimbat and Goodparla. This claim has not yet come on for hearing by the Commission. It is likely therefore that a number of exploration projects will be sited in areas which may become Aboriginal land, and it is possible that some of these projects will proceed to the mining stage.

130. The sequence of events may however work to the disadvantage of the Jawoyn. Previous experience in the settlement of land claims suggests that the Jawoyn claim may take some time to finalise. Given the time limit on the exploration program in the Conservation Zone, mining companies have commenced exploration work there with the minimum delay. In all probability, this will mean that most of the exploration will have commenced before the Jawoyn land claim is settled and (assuming their land claim is successful) before there is any requirement to seek their consent to explore. Recent legislative changes may also place them at a disadvantage. As indicated earlier, recent amendments to the Aboriginal Land Rights (NT) Act provide that while the consent of Aboriginal traditional owners is required before exploration can commence, consent cannot be withdrawn if a company wishes to proceed to the mining stage. Assuming the Jawoyn land claim is successful, it seems likely

therefore that even if the claim is settled before any mining commences, some projects would be able to proceed to the mining stage on Jawoyn land without consent having been granted at any point.

131. The amended legislation retains the requirement for a 'terms and conditions' agreement at both the exploration and mining stages (which allows, *inter alia*, for the negotiation of royalty payments if mining is to proceed). The sequence of events may however affect this as well. Depending on the time required for the settlement of the land claim, companies may in some cases be ready to commence mining before a land grant is made. As the Committee understands the position, this would have the effect of removing the legal requirement for a 'terms and conditions' agreement in relation to mining even if the area to be mined were subsequently to be included in the land grant.

132. In the Committee's view it will be unfortunate if delays in settling land claims have the effect of allowing Aboriginal interests to be ignored. The Committee acknowledges that the problem is difficult. Even assuming that the Jawoyn land claim has some success, the boundaries of the land which is granted will not be known until the claim is settled. There is a real possibility that procedural delays may prevent the Aborigines concerned from exerting any influence on developments taking place on land which they have claimed and which may eventually be theirs. In these circumstances, the Committee believes that even where no legal obligations exist, mining companies should consider the interests of Aborigines who may eventually be affected. Specifically the Committee recommends that where applications for exploration or mining leases are being considered with respect to land which is the subject of a land claim, mining companies should be required to demonstrate that they have consulted with the Aborigines concerned, and have given due consideration to their views regarding both the question of consent to explore, and any arrangements for terms and

conditions. The fulfilment of this requirement - which does not go beyond a requirement to consult and consider - could be made a condition of exploration or mining leases. The Committee also recommends that the mining companies should establish a trust fund, or make other appropriate arrangements, to ensure that any approval of mining before a land claim is settled does not prove detrimental to the financial or other interests of the successful claimant.

133. The Coronation Hill Joint Venture told the Committee that in the course of their activities at Coronation Hill they had consulted extensively with the Jawoyn people and had included in their Aboriginal Affairs budget some provision for community aid for the outstation at Eva Valley where the Jawoyn are attempting to establish a viable cattle operation.¹⁶⁶

Recommendation

The Committee recommends:

- (i) that applications for exploration or mining leases within the Conservation Zone be considered only when the applicants are able to demonstrate that full consultation has taken place with Aborigines having land claims in the area concerned, that the views of the Aborigines have been taken into account and that appropriate arrangements for compensation of the Aborigines have been negotiated and;
- (ii) that the Joint Venture should be required to make provision for royalty payments, even if the Coronation Hill project proceeds before a land claim is finalised.

134. Mining activities in the Conservation Zone could provide opportunities for the training and employment of Aborigines, particularly those whose land may be affected. The Committee

notes that the Coronation Hill Joint Venture has already taken initiatives in this direction. In February 1988 the Joint Venture reported that ten Jawoyn were working at their exploration site, which represented 50 per cent of the full-time field work force. The Joint Venture indicated an intention to expand employment and training opportunities for Aborigines as the project progressed. The Committee endorses this objective and recommends that all companies seeking exploration or mining licences in the Zone be required to adopt employment policies which provide opportunities for Aborigines, especially those with traditional ties to the area.

Recommendation

The Committee recommends that all companies seeking exploration or mining licences in the Conservation Zone be required to adopt employment policies which provide opportunities for Aborigines, especially those with traditional ties to the area.

135. Professor J. D. Ovington of the Australian National Parks and Wildlife Service told the Committee that land systems 'associated with the riverine situation of the South Alligator' could be under threat from mining.¹⁶⁷ Dr J. G. Mosley, the Director of the Australian Conservation Foundation, also expressed concern to the Committee over the problems posed by mining in the upper catchment of the South Alligator River at Gimbat. He told the Committee that the associated mineral processing in particular 'should be looked at more thoroughly by means of an environmental impact assessment'.¹⁶⁸ The Committee recognises the importance of this catchment area in relation to the overall Kakadu region, the fact that the proposed mine is very close to the South Alligator River and the serious nature of the potential chemical pollutants involved. The Committee is also aware of concerns being expressed by Aborigines about possible contamination from mining activities in the area. The environmental impact assessment required under existing procedures will need to deal with these issues. Because this assessment has not yet been released the Committee is unable to reach a definite opinion on these matters.

Sacred sites

136. The Department of Aboriginal Affairs indicated a major concern of Aboriginal people in the Stage 3 area was that exploration activities should not disturb sacred sites. These sites were capable of releasing enormous destructive power if disturbed and the Jawoyn people had taken steps to register sites under the Northern Territory Legislation out of concern for their protection.¹⁶⁹

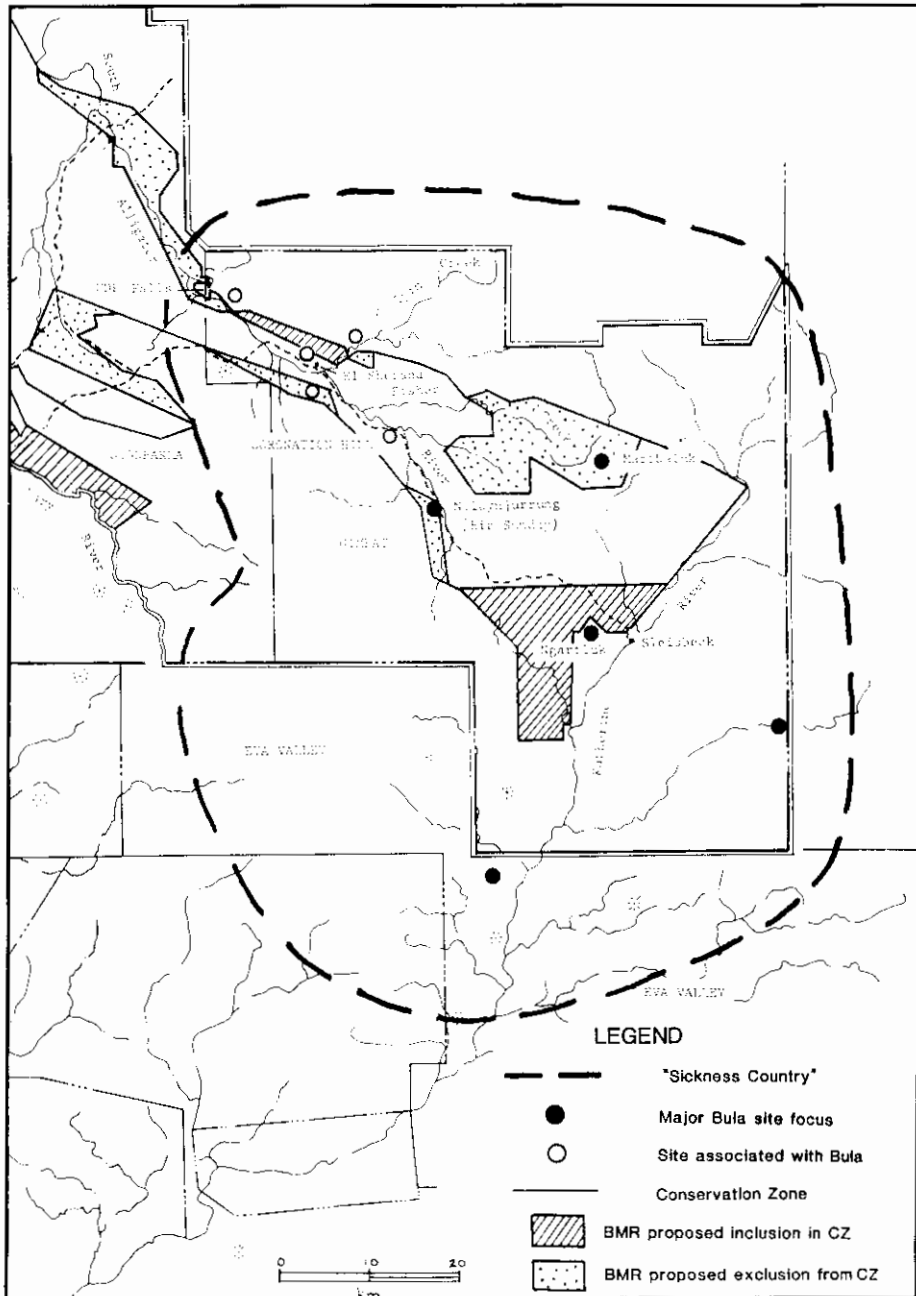
137. The impact of exploration and mining on Aboriginal sacred sites is a question which the Committee considered in some depth. Where the Ranger mine is concerned, this issue was dealt with by the Ranger Uranium Environmental Inquiry which recommended the relocation of the boundaries of the project area to avoid the Djidbidjidbi and Dadbe sacred sites in the vicinity of Mt Brockman. In the Park itself, mining has ceased to be a potential threat to sacred sites following the recent amendments to the National Parks and Wildlife Act prohibiting all mineral activity in the Park. (As indicated in Chapter Two, ANPWS has closed certain sacred sites within the Park to protect them from entry by tourists.) There are sacred site areas in the Conservation Zone, however, which may require protection from proposed mineral activity (see Figure 3.3).

138. This issue has already caused some difficulty in relation to the exploration and proposed mining on the Joint Venture's lease at Coronation Hill. The circumstances surrounding this matter are complex and it is not possible to provide a detailed account here. The main points however are relatively straightforward. In 1980, the Northern Territory's Aboriginal Sacred Sites Authority was advised by an anthropologist, Dr F. Merlan, of a request by Jawoyn custodians for protection of sacred sites in the Gimbat and Goodparla lease areas.¹⁷⁰ In 1982, Coronation Hill was recorded as a sacred site in a land claim lodged by the Jawoyn.¹⁷¹ On 18 September 1985, Aboriginal

custodians made an oral request to an Aboriginal Sacred Sites Authority field officer for registration of the site, and a formal, written request signed by four custodians was subsequently made on 27 September 1985. A few days later, the Aboriginal Sacred Sites Authority determined the boundaries of the site and formally registered it. Under the terms of the relevant Northern Territory legislation, registration provides legal protection for a site against access or interference without consent of the Aboriginal custodians. The site was described as the Upper South Alligator Bula Complex and included part of the lease areas then held by BHP at Coronation Hill as well as a larger area to the south and west.¹⁷² (See Figure 3.3)

139. The Coronation Hill Joint Venture commenced exploration work at Coronation Hill in 1984. Following notification of the registered sacred site, BHP held the planned investigation program in abeyance and representatives made contact with the Jawoyn community to seek permission for the work they wished to undertake.¹⁷³ In March 1986, a full meeting of the Jawoyn Association, which is the formal body representing the interests of the Jawoyn community, declined to grant this permission. BHP made further approaches to the Jawoyn in an effort to secure a more favourable outcome. On 1 July 1986 a further meeting of the Jawoyn Association reversed the earlier decision and agreed to exploration at Coronation Hill. On 3 July 1986 a meeting of the Aboriginal Sacred Sites Authority duly considered the result of the 1 July meeting and issued BHP with a formal authority to carry out exploration work. On 4 July, however, the Jawoyn Association held a further meeting at which it agreed to ask the Aboriginal Sacred Sites Authority not to issue the consent to explore. The Aboriginal Sacred Sites Authority reviewed these developments shortly afterwards. It decided that the permission issued on 3 July should stand.¹⁷⁴ The BHP exploration program then went ahead.

Figure 3.3



The Conservation Zone in Relation to the Bula 'Sickness Country' and Major Mythological Sites.

140. A related event which was described to the Committee involved the intervention of Mr S. Davis, manager of a firm which had previously carried out negotiations relating to sacred sites in the Northern Territory.¹⁷⁵ The Committee understands that on 3 July 1986, Mr Davis accompanied a small group of Jawoyn senior custodians to a sacred 'bula' site some 50 kilometres from Coronation Hill. The 'bula' is a powerful and feared ancestral creator figure who dwells deep within the earth and who will, if disturbed, bring on an apocalypse which, Aboriginal people fear, will destroy the earth.¹⁷⁶ Mr Davis formed the impression in the course of this visit that this area was a genuine 'bula' site, and that Coronation Hill had no sacred significance and was nothing more than a 'named locality'.¹⁷⁷ This evidence seemed to cast some doubt on the validity of the original decision to include Coronation Hill within a registered sacred site.

141. This conclusion, and the evidence on which it is based, was strongly contested by the Aboriginal Sacred Sites Authority which cited both anthropological sources and the Jawoyn request for registration in support of its position. The Authority agreed that the area visited by Mr Davis has major 'bula' significance (and had registered the site in 1980) and also agreed that the significance of Coronation Hill does not derive from its role in the bula cycle. The Authority contended, nevertheless, that the Upper South Alligator Bula Complex including Coronation Hill has an important place within traditional Jawoyn myth and ritual and is quite appropriately registered as a sacred site.

142. Evidence given to the Committee by the Aboriginal Sacred Sites Authority indicated that three of the senior custodians, Peter Jatbula, Shorty Jalong and Willy Martin, considered Coronation Hill to be a sacred site.¹⁷⁸ This view was supported when in May 1988 the Committee held an informal meeting with Mr Jatbula and Mr Fordimail, another senior Jawoyn custodian. Mr David Cooper of the Sacred Sites Authority and Mr Michael Dodson

of the Northern Land Council were also present. A video entitled 'Bulajang: Sickness Country', which had been prepared by the Aboriginal Sacred Sites Authority on behalf of the senior Jawoyn custodians was viewed during the meeting. The video outlined the main concerns of the Jawoyn custodians about exploration and mining activities within the Bula sickness country. At the meeting Mr Jatbula and Mr Fordimail both expressed the view that mining companies should not be allowed to operate in the sickness country, which includes Coronation Hill. They emphasised that in protecting the sickness country the custodians had heavy responsibilities to other tribal groups as, if the Bula was disturbed, these groups would also be at risk.

143. A report written in August 1987 by the Aboriginal Sacred Sites Authority and adopted by the Jawoyn custodians states that the custodians consider it is inappropriate to conduct exploration or mining activities within that part of the conservation zone lying within the 'sickness country'. This covers the whole of Coronation Hill and almost the whole of the Conservation Zone. Despite the views of the Jawoyn custodians, Jawoyn people have been working at Coronation Hill since 1986 when four Jawoyn were employed following the implementation of an employment and training program for Aboriginals by BHP. The number employed on site is now ten.

144. The Committee acknowledges that three of the senior custodians have declared that Coronation Hill is a sacred site.¹⁷⁹ The Committee is also aware of the view that permission for mining exploration may have been granted on a sequential basis with the custodians not fully aware of the likely extent of interference with the sites.¹⁸⁰ It believes, however, that the problems which have arisen may have stemmed in large measure from difficulties in inter-cultural communication, a point which was stressed by Dr K. Palmer from the Australian Institute of Aboriginal Studies in evidence before the Committee. In Dr Palmer's view, the notion of a 'sacred site' may itself give

rise to confusion and misunderstanding to members of Western societies if it is not appreciated in terms of traditional Aboriginal religious belief. In particular, he commented, it is misleading to think in terms of a clear distinction between sites which are 'sacred' and those which are not. Aboriginal people, Dr Palmer explained, believe that mythological ancestors moved around the countryside following a particular path. At places along that path, these beings performed various tasks and the importance of the place depends on the nature of the task:

[y]ou have a kind of sliding scale but it is very difficult to ask Aboriginal people: 'Is this a really important site or only just a very unimportant site?' In their understanding they would probably say: 'That is the place where Bula was'. Maybe if you understand the culture, rituals and myths associated with it, it may be possible to say that this is a really important site and this is just an open plain, there is nothing much there. These very complex cultural attributes of what we call an Aboriginal site are very easily confused and misunderstood by people who perhaps have not been exposed to or who have not had the formal training to understand specifically the complexities of Aboriginal religious belief and practice in relation to sites on the land.¹⁸¹

145. Dr Palmer recommended that the best course to adopt now in relation to Coronation Hill, would be to allow the Jawoyn a 'breathing space' in which they could clarify for themselves the status of the site and the importance they wish to attach to it. This would require a moratorium on all mineral activity for at least two years during which further anthropological research work could be done to establish the extent and significance of the site. More detailed information could also be collected on which people have traditional custodianship. Dr Palmer acknowledged that the mining companies concerned may not consider such a moratorium to be an acceptable option.

146. The Coronation Hill Joint Venture has already undertaken a substantial exploration program on the basis of the permit issued to it in July 1986. The Joint Venture is hoping to commence mining in 1988¹⁸² and has clearly been proceeding on the basis that an application to commence would be considered without lengthy delays. This is a reasonable expectation given that an established mechanism exists, in the form of the Aboriginal Sacred Sites Authority, for the consideration of applications to carry out activities such as mining on registered sacred site areas. The Committee's view is that, in addition to the requirement for a satisfactory environmental impact statement, the procedures of applying for a permit through the Aboriginal Sacred Sites Authority should operate. The Committee has, however, formed the opinion that there should be a cooling off period of at least one month before any final action by the Sacred Sites Authority is formalised, in order to allow for a review of the information it uses for this purpose.

Recommendation

The Committee recommends that a period of at least one month should be allowed for a review of information provided to the Sacred Sites Authority before it formalises any action following from the provision of such information.

147. The Committee believes, nonetheless, that every effort should be made to avoid the recurrence of such problems in the course of the five-year exploration program planned for the Conservation Zone. As indicated earlier, it is likely that mining companies will show strong interest in the area, and there is the possibility that some of the locations targeted may coincide with

sites of religious significance to the Jawoyn. The Committee believes that the events surrounding the granting of an exploration permit for Coronation Hill have caused considerable stress to the Jawoyn community, and that measures should be taken to avoid the possibility of this occurring again. The agency with primary responsibility in this field is the Aboriginal Sacred Sites Authority and the Committee believes that in order to clarify lines of communication and reduce pressure on the Aboriginal people, the Authority's role in dealing with these matters should be reaffirmed.

Recommendation

The Committee recommends that all Companies seeking to undertake exploration or mining activity in the Conservation Zone should be made fully aware of the role and responsibilities of the Sacred Sites Authority and of the boundaries of sacred sites within the Zone.

1. Evidence p. 1653
2. Evidence p. 1636
3. Evidence p. 1636
4. Ranger Uranium Environmental Inquiry (RUEI) Second Report 1977
AGPS p. 36
5. RUEI p. 322
6. *ibid* p. 290
7. *ibid* p. 331
8. Peko-Wallsend Limited and Others v the Minister for Arts,
Heritage and Environment and others 70 ALR p. 523
9. Minister for Arts, Heritage and Environment v Peko Wallsend
Limited 75 ALR p. 218
10. Evidence p. 10
11. Evidence p. 1636
12. Evidence p. 1640
13. Bureau of Mineral Resources, Geology and Geophysics, 1987.
Australian Uranium Resources. Resource Report 1, AGPS p. 26
14. Peko-Wallsend Operations Ltd, Electrolytic Zinc Company of
Australasia. Information Portfolio. Ranger 68 An Ore Deposit
in the Alligator Rivers Region of the Northern Territory. p. 5
15. Evidence p. 1140
16. Evidence p. 2618
17. Evidence p. 1644
18. Evidence p. 785
19. Letter from Dr T Gardner, Ranger Uranium Mines Pty Ltd to
Chairman, dated 18 November 1987
20. Evidence p. 1070
21. Letter from Mr R J Carter, BHP Gold at Mines Limited to the
Chairman dated 15 March 1988, p. 3
22. Evidence p. 2648
23. Letter from Mr R J Carter *op cit* p. 4
24. The Koongarra Project, prepared by Denison Australia Pty Ltd for
the Standing Committee on the Environment March 8, 1988 p. 1
25. Evidence p. 1644
26. Letter from Mr R J Carter, BHP Gold Mines Limited to Chairman
dated 15 March 1988 p. 3
27. Evidence p. 1644
28. Letter from Mr R J Carter BHP Gold Mines Limited to Chairman
dated 15 March 1988 p. 4
29. Evidence p. 1645
30. Evidence p. 263
31. Evidence p. 1139
32. Letter from Mr R J Carter BHP Gold Mines Limited, to Chairman
dated 15 March 1988 p. 2
33. Evidence p. 265
34. Evidence p. 281
35. Letter from Dr T Gardner, Ranger Uranium Mines Pty Ltd to
Chairman, dated 18 November 1987
36. Letter from Mr R J Thomas, Department of Primary Industries and
Energy, to Committee Chairman dated 9 March 1988
37. Evidence p. 1229
38. Dr C. O'Faircheallaigh 1986, The Impact of the Ranger Mine on
the Northern Territory and Australian Economics. A report
to the Ranger Uranium Mines Pty Ltd Australian National
University, North Australia Research Unit. p. iii
39. *ibid* p. 34
40. *ibid* p. iv
41. *ibid* p. iv

42. *ibid* p. ii
43. Evidence p. 1642
44. Evidence p. 408
45. The Koongarra Project. Prepared by Denison Australia Pty Limited for the Senate Standing Committee on the Environment, March 8, 1988
46. Letter from Mr R. J. Carter, BHP Gold Mines Limited, to Chairman, dated 15 March 1988 p. 5
47. *ibid* p. 6
48. *ibid* p. 6
49. *ibid* p. 7
50. *ibid* p. 1
51. Western Australian Government submission number 43 p. 1
52. *ibid* p. 1
53. *ibid* p. i
54. Evidence p. 2469
55. Evidence p. 2608
56. Evidence p. 1719
57. Evidence p. 1708
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59. Evidence p. 1700
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66. *ibid* p. 25
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69. Evidence p. 2491
70. Evidence p. 2194
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77. Evidence p. 1274
78. Evidence p. 1269
79. Evidence p. 28
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82. ANPWS *op cit* p. 9
83. Evidence p. 1708
84. Evidence p. 117
85. Evidence p. 1907
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87. Evidence p. 1270

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91. Evidence p. 686
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93. Evidence p. 811
94. Evidence p. 788
95. Evidence p. 473
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100. Supervising Scientist for the Alligator Rivers Region, Alligator Rivers Region Research Institute Annual Research Summary 1986-87 p. 46
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103. Evidence p. 435
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106. Evidence p. 1501
107. Evidence p. 1503
108. Evidence p. 1487
109. Evidence p. 1500
110. Evidence p. 1674
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112. Evidence p. 201
113. Evidence p. 135
114. Evidence p. 183
115. Evidence p. 663
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117. ibid p. 5
118. Evidence p. 409
119. Evidence p. 424
120. Evidence p. 424
121. Evidence p. 419
122. Evidence p. 1499
123. Evidence p. 1498
124. Evidence p. 2678
125. Evidence p. 2686
126. Evidence p. 2698
127. Evidence p. 2699
128. Evidence p. 2654
129. Evidence p. 2653
130. Evidence p. 2654
131. Evidence p. 2677

132. Evidence p. 2680
133. Evidence p. 2680
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135. Evidence p. 2684
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143. Evidence p. 1592
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154. Evidence p. 1612
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157. Evidence p. 2733
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160. Evidence p. 1597
161. Letter from Dr T Gardner, Ranger Uranium Mines Pty Ltd to Committee Chairman dated 18 November 1987 p. 1
162. The Koongarra Project. Prepared by Denison Australia Pty Limited for the Senate Standing Committee on the Environment 8 March 1988 p. 7
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164. Evidence p. 411
165. Evidence p. 411
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167. Evidence p. 2225
168. Evidence p. 1483
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170. Examination of Mr S. Davis' responses to answers supplied by the Aboriginal Sacred Sites Authority on questions concerning Coronation Hill p. 13
171. Evidence p. 2374
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179. Evidence p. 2373
180. Informal discussion at Canberra 18 May 1988
181. Evidence p. 2745
182. Evidence p. 2648