BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD

RECORD 1988/26

MINERAL SANDS: WILL AUSTRALIA RETAIN ITS IMPORTANCE?

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ABSTRACT
The mineral sands industry continues to be a shining light in the Australian mining industry. This paper present a synopsis of the year 1987 for both mining and further processing together with a brief look at Australia's resources of mineral sands and their location. Some thoughts on the outlook for Australia for the period 1988-1990 are also outlined.

THE YEAR THAT WAS AND CURRENT POSITION

The minerals sands industry which, in the context of this paper involve the mining of rutile, ilmenite, zircon and monazite, is experiencing strong market conditions with prices of rutile, ilmenite and zircon increasing in real terms. The healthy state of this industry, in which Australia still dominates the world supply, is clearly demonstrated by values of export statistics which are shown in Table 1.

While the export tonnage may not have risen dramatically as shown in Figure 1 , their values have! Table 1 shows that the value of rutile exports has increased by about 27%, and ilmenite by 12%. Zircon export values increased by 28% but the value of monazite exports declined by about 9%.

The improved demand for titaniferous materials is the result of continuing strong demand for TiO2 pigment. During 1987 pigment producers operated in excess of their rated capacities. Over 95% of the titaniferous material produced is used in the production of TiO2 pigment for consumption in the paint, paper and plastic industries.

The demand for zircon by the refractory and ceramic industries has also been strong -- both producers' and end-users' stocks were at very low levels during the year. Indeed in 1987, for the first time in 50 years Australia imported zircon-rich material from which zircon concentrates were extracted for export.

Because of increasing environmental controls worldwide new pigment capacity, either announced or for which construction was begun in 1987, was for chloride-route plants requiring high TiO2 feedstock. In response to this growing environmental pressure, together with further moves in Australia towards "adding value" to our minerals, two syntheti rutile plants were commissioned, both in Western Australia -- Renison Goldfields Consolidated's plant at Geraldton (capacity 112 000 t/year synthetic rutile (SR)) and Westralian Sands Ltd's plant at Capel (capacity 100 000 t/year SR). Australia's SR capacity is now about 270 000 t/year, making it the world's leading producer of synthetic rutile

In 1987, Australia produced some 160 000 t of SR; about half of which was exported.

Not to be outdone by these developments on the west coast, Consolidated Rutile Ltd (CRL) commenced production of a low-chrome ilmenite concentrate suitable for upgrading to synthetic rutile. Previously, east coast natural ilmenite, because of its high chromium content, was regarded as unsuitable for use as feedstock for the production of TiO2 pigment. CRL's work has greatly increased the value of east coast ilmenite resources which previously were either stockpiled ,sold for blast furnace metallurgical application in Japan, or were used for sand blasting.

Australia remains the world's leading producer of mineral sands althoug its percentage of world market is falling. Briefly, the major developments in the world titanium industry in 1987 were :

- the commissioning of a 200 000 t/year slag plant in Norway
- a 30% increase in slag capacity and mining output in South Africa;
- a 20% increase in rutile output from Sierra Leone,and
- plans by QIT to expand Canada's slag capacity by 18% to over 1 Mt/year of 80% TiO2 slag .

In Australia, company exploration for new resources arrested the decrease in Australia's identified resources of mineral sands.In 1987 BMR estimated that the combined economic demonstrated resources (EDR) o ilmenite, rutile, zircon, and monazite increased by 10% -- the result o outlining new resources in the Cooljarloo, Scott River, and Yogannup districts in Western Australia (Figure 2). A breakup of these resource is given in Table 2.

Exploration work in Eastern Australia delineated substantial mineral sands resources at Bayfield, Qld, and at Horsham,Vic. (Figure 3). At Bayfield, some 2.4 billion tonnes of sand containing 1.14% heavy minerals has been outlined. A breakup of these resources is not available. At Horsham, CRA's discovery has increased Australia's demonstrated resources of rutile, ilmenite, and zircon by about one third, and of monazite nearly three-fold. CRA is carrying out detailed feasibility studies with the aim to be in production in the early 1990s

Some 50% of Australia's east coast EDR resources of mineral sands remai unavailable for mining because of environmental considerations.

Apart from its alluvial deposits, Australia also has extensive resource of titanium in hardrock titaniferous magnetite deposits. Estimates by Roger Pratt of BMR indicates a resource of about 50 Mt of contained titanium, most of it in the subeconomic inferred category.

Several hardrock deposits are also potential sources of rare earths which could succeed placer monazite. These include Olympic Dam copper-uranium-gold deposits which contain bastnaesite and florencite, several uranium deposits in the Mary Kathleen area in Queensland, the igneous hard-rock deposits at Brockman,WA and the Mount Weld,WA phosphate deposit (Figure 4).

At present, Australia has no known alternative resources of zircon. As previously stated, the mineral sands industry is being directed towards further processing. Apart from the synthetic rutile plants,both Australia's pigment producers are on schedule to increase their plant capacities. One of the companies, SCM Chemicals Ltd, is also convertin from the sulphate method of pigment production to the chloride method. When these expansions are completed Australia's rate of pigment output should increase by some 80% to 120 000 t/year by 1990. Australia's first zirconia plant at Rockingham, WA is under construction. In the field of rare earths, two companies, Rhone-Poulenc and Deckhand Pty Ltd have both submitted Environmental Impact Statements to the appropriate State Government seeking approval for the construction of plants to extract rare earth oxides from monazite concentrates.

FUTURE OUTLOOK

There is an atmosphere of optimism concerning the short to medium term outlook for Australia's mineral sands industry. The possible construction of about 6 new TiO2 pigment plants worldwide over the next 4 to 5 years, contributing an additional 300 000 t/year of pigment capacity, should ensure continued strong demand for high grade feedstock. Australia is well placed to provide a substantial amount of this material via its two synthetic rutile plants, and through the development of the Cooljarloo deposit in Western Australia, which is planned to start in late 1989 -- producing about 30 000 t/year of rutile. Other new mine developments are also being considered.

Production of rutile in the short term is likely to be of the order of 270 000 t/year and production of synthetic rutile is expected to reach 220 000 t/year.

With the expansion of dry plant capacities, together with the development of the Cooljarloo deposit, production of ilmenite is likely to increase to about 1.5 Mt/year. Exports of ilmenite should continue around the current level of 1.1 Mt/year despite the increasing use of ilmenite for the production of synthetic rutile.

Output of zircon is expected to be about 470 000 t/year through increased output from Western Australia.

Monazite production will be about 12 000 t/year increasing to 14 000 t/year in 1990 when Cooljarloo comes on-stream.

CONCLUSION

Many new mineral sands deposits overseas are presently under investigation e.g. Malagasy Republic, USA, and Mozambique. Expansions

of several current operations are also being undertaken e.g. in Sierra Leone, South Africa, and Canada. However, the discovery of large new resources of mineral sands in Australia will ensure that Australia will continue to be an important source of mineral sands concentrates for the foreseeable future. The expansion in further processing capacities, particularly for synthetic rutile and pigment, will add value to Australia's production of mineral sands and ensure increased export earnings from the minerals sands sector. The combination of new discoveries plus the expansion in further processing will ensure that Australia retains its importance as a mineral sands producing nation.

TABLE 1 MINERALS SANDS: SALIENT STATISTICS

		1985	1986	1987(e)
Production of rutile	(t)	211 615	215 774	257 000
Exports of rutile	(t)	211 723	229 665	250 000
	($Mill)	83.5	116.4	147.1
Production of ilmenite	(t)	1 418 867	1 237 694	1 380 000
Exports of ilmenite	(t)	1 151 921	1 034 209	1 043 000
	($Mill)	39.7	48.5	54.9
Production of leucoxene	(t)	13 809	14 143	12 200
Exports of leucoxene	(t)	16 779	13 474	11 700
	($Mill)	4.5	5.2	4.5
Imports of TiO2 pigment	($Mill)	2.3	2.8	2.8
Production of zircon	(t)	501 440	451 824	439 000
Exports of zircon	(t)	495 891	445 690	456 000
	($Mill)	63.9	74.5	96.1
Production of monazite	(t)	18 735	14 822	12 700
Exports of monazite	(t)	18 024	14 100	11 400
	($Mill)	9.2	9.2	8.4
Total value of exports	($Mill)	200.8	253.8	311.0

TABLE 2 RESOURCES OF MINERAL SANDS

	DEMONSTRATED RESOURCES		INFERRED RESOURCES	
	Economic	Subeconomic Paramarginal	Economic	Subeconomic
Ilmenite (Mt)	49.89	19.73	4.25	6.18
Monazite (Kt)	237.8	784.3	2.3	27.3
Rutile (Mt)	9.12	3.84	0.24	1.27
Zircon (Mt)	13.62	6.13	0.26	1.82

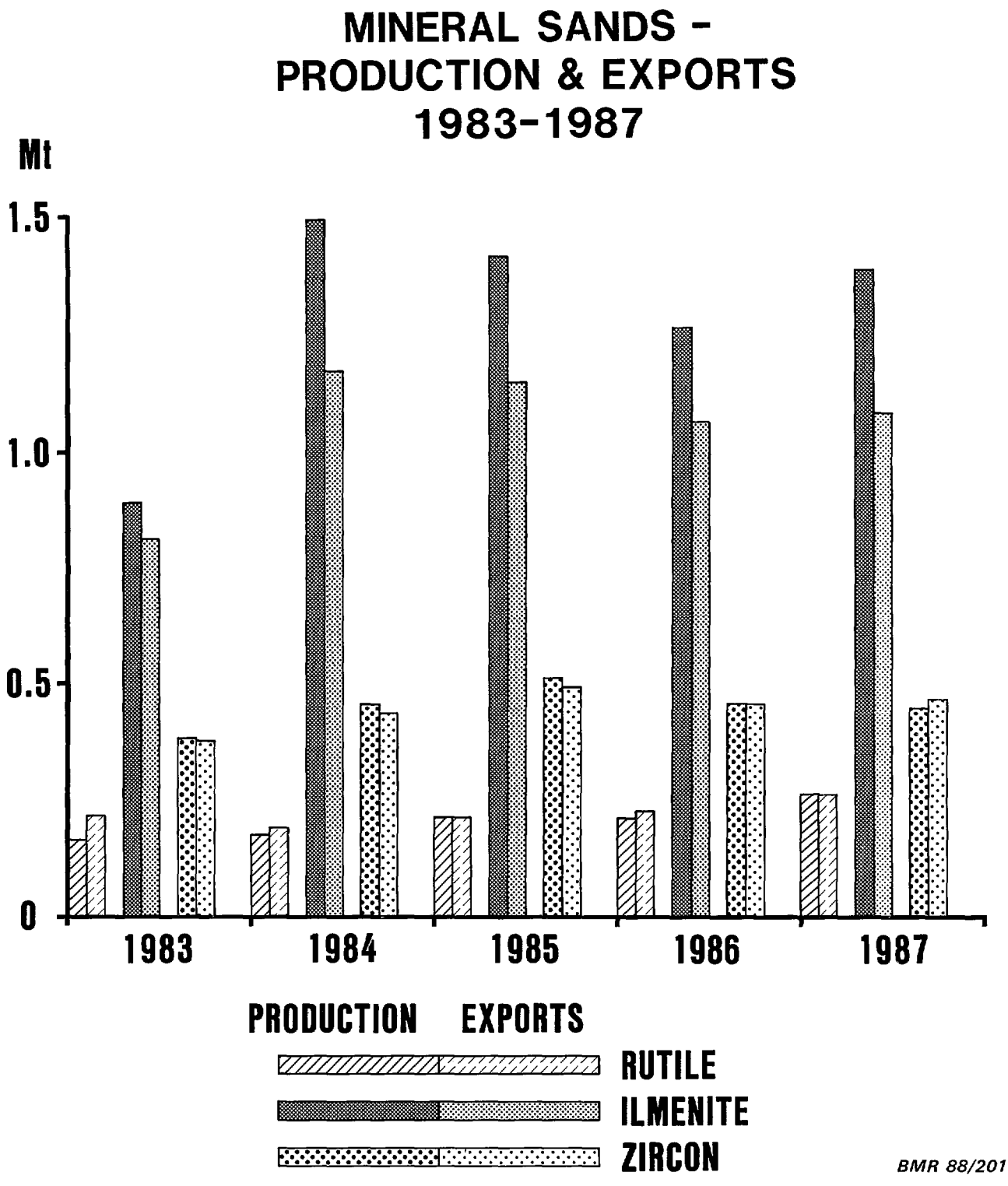
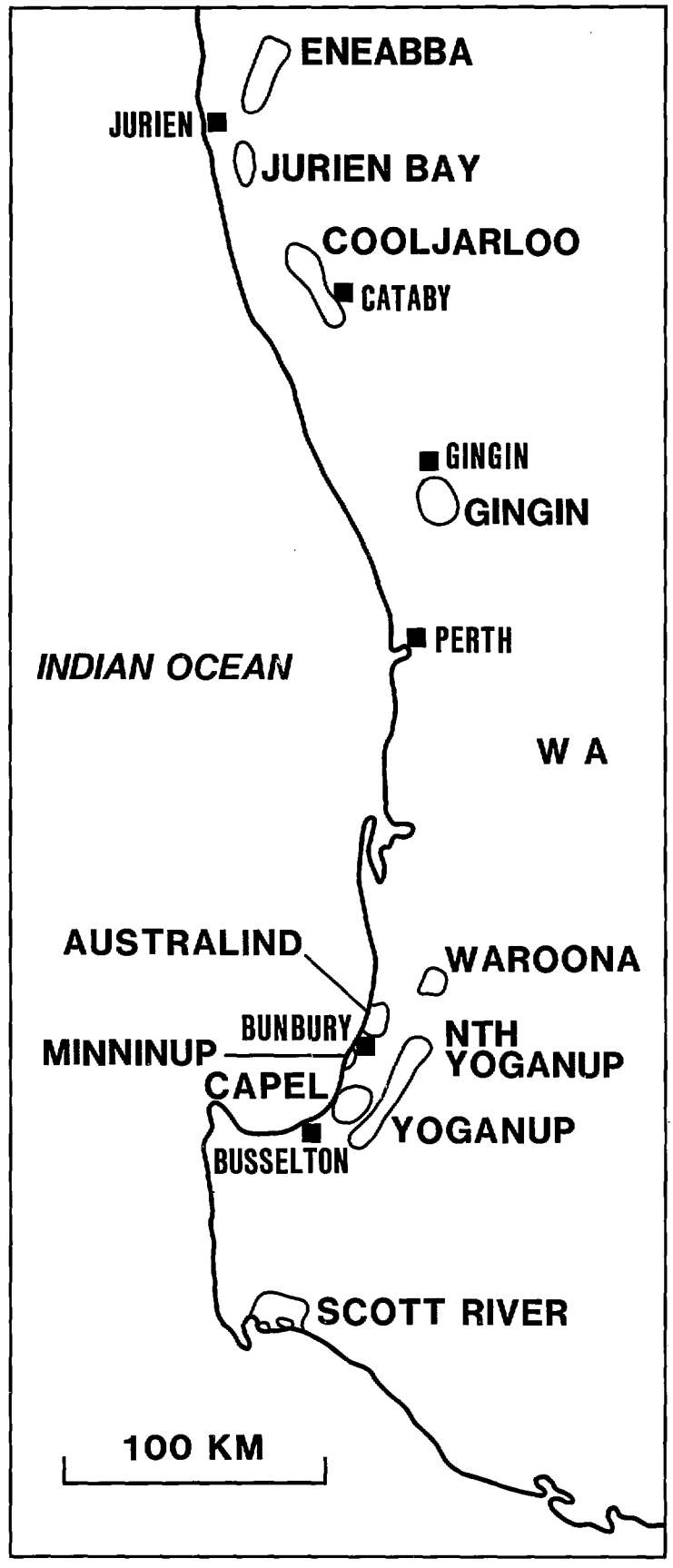
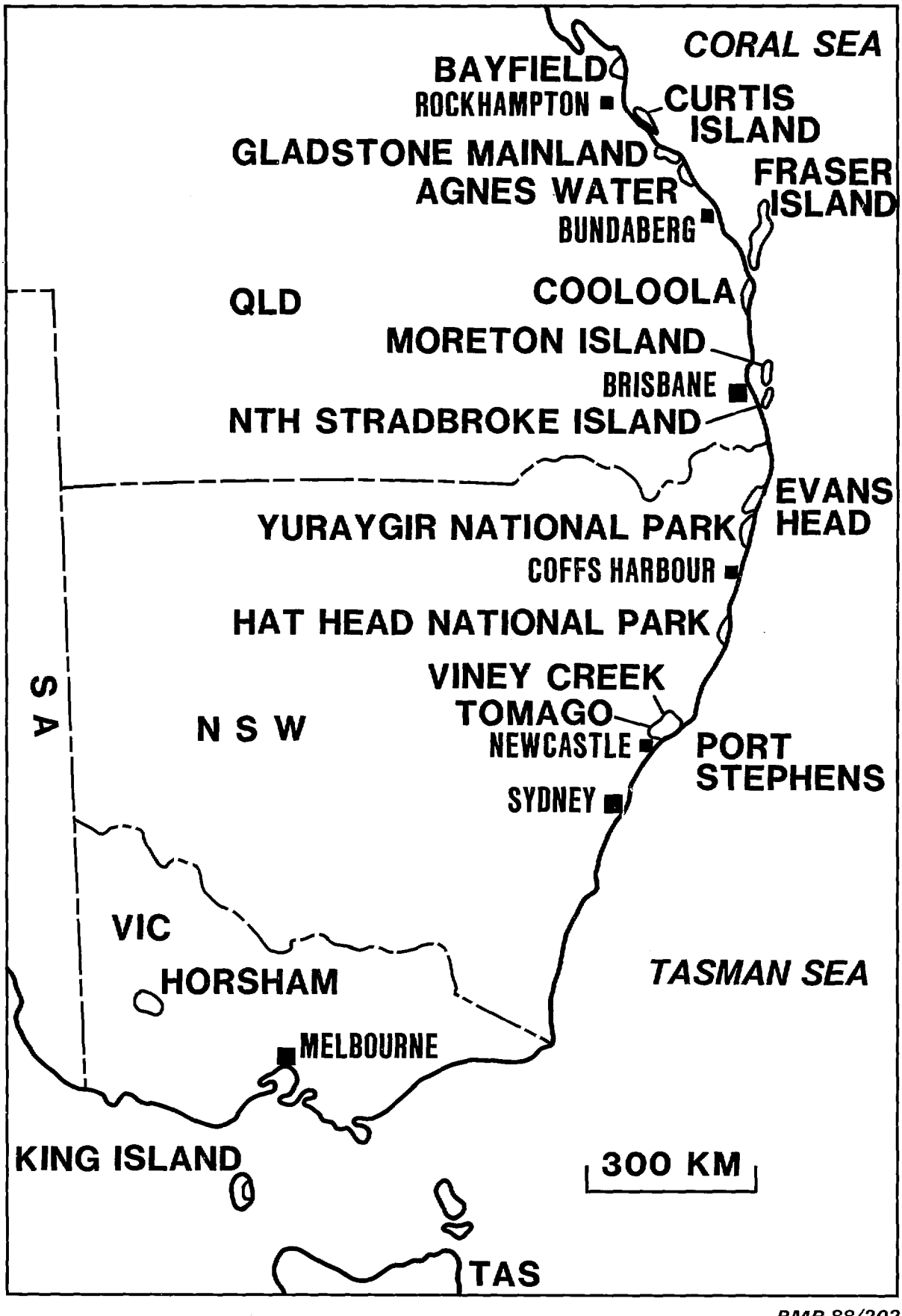

MINERAL SANDS -
PRODUCTION & EXPORTS
1983-1987
Mt
1.5
1.0
0.5
0
1983
1984
1985
1986
1987
PRODUCTION
EXPORTS
RUTILE
ILMENITE
ZIRCON
BMR 88/201

FIGURE 1



MINERAL SAND DEPOSIT BMR 88/208

FIGURE 2


CORAL SEA
BAYFIELD
ROCKHAMPTON
CURTIS ISLAND
GLADSTONE MAINLAND
AGNES WATER
FRASER ISLAND
BUNDABERG
QLD
COOLOOLA
MORETON ISLAND
BRISBANE
NTH STRADBROKE ISLAND
EVANS HEAD
YURAYGIR NATIONAL PARK
COFFS HARBOUR
HAT HEAD NATIONAL PARK
VINEY CREEK
TOMAGO
SA
N S W
NEWCASTLE
PORT STEPHENS
SYDNEY
VIC
HORSHAM
TASMAN SEA
MELBOURNE
KING ISLAND
300 KM
TAS
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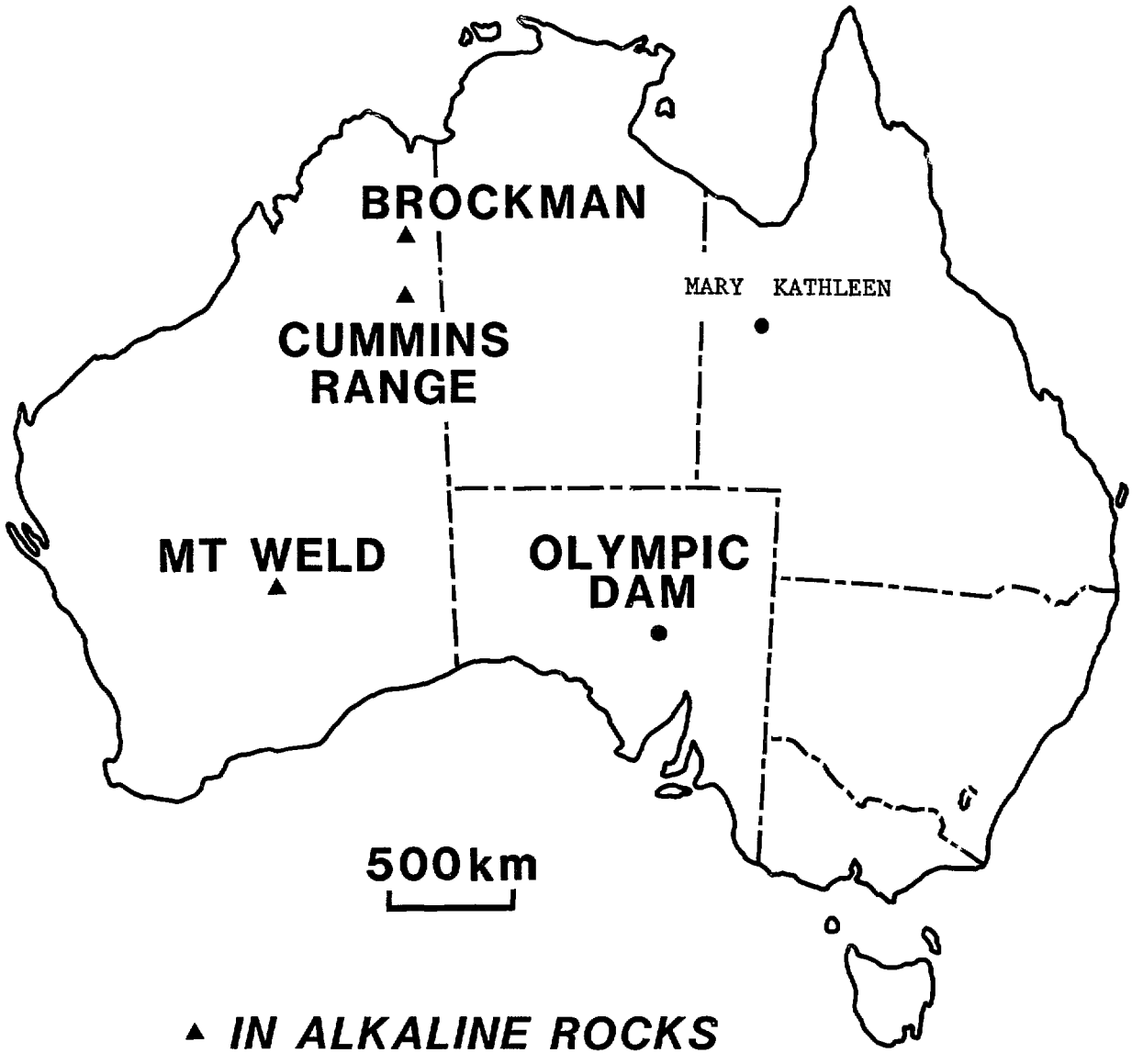
MINERAL SAND DEPOSIT

FIGURE 3



▲ *IN ALKALINE ROCKS*

• *URANIUM ASSOCIATED*

HARD-ROCK RARE EARTH DEPOSITS

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FIGURE 4