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AUSTRALIAN MINERAL INDUSTRY QUARTERLY

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Quarter ended 30 September 1983

Summary tables: statistics of production of principal metals and minerals

Metal, ore, and concentrate prices

Quarter ended 30 June 1983

Detailed tables: statistics of production and trade



The *Australian Mineral Industry Quarterly* is prepared jointly by the Bureau of Mineral Resources (BMR) and the Australian Bureau of Statistics (ABS). It is produced in BMR's Resource Assessment Division, Canberra (First Assistant Director: L.C. Ranford). Enquiries on mineral-commodity economics and resources should be directed to J. Ward, Assistant Director, Minerals Branch, telephone (062) 499 553. Enquiries on detailed mineral statistics should be directed to L. Jakimow, ABS's Statistical Officer (Mining) outposted to BMR, telephone (062) 499 556. Please address enquiries on subscriptions (requests for order forms, etc.) to: Mail Order Sales, Sales & Distribution Section, Australian Government Publishing Service, GPO Box 84, Canberra 2601, telephone (062) 954 615.

Abbreviations

BMR	Bureau of Mineral Resources, Geology and Geophysics	cons	concentrates
ABS	Australian Bureau of Statistics	(e)	estimated
DRE	Department of Resources & Energy	(p)	preliminary
WMS	<i>World Metal Statistics</i> , published by World Bureau of Metal Statistics	n.a.	not available
USBM	United States Bureau of Mines	n.a.p.	not available for publication
c.&f.	cost and freight	n.y.a.	not yet available
c.i.f.	cost, insurance, and freight	n.e.i.	not elsewhere included
f.a.s.	free alongside ship	n.e.s.	not elsewhere specified
f.i.d.	free into container depot	n.e.c.	not elsewhere classified
f.i.s.	free in store	n.r.	not recorded
f.o.b.	free on board	n.r.s.	not recorded separately
f.o.r.	free on rail	—	nil
f.o.t.	free on truck	*	subject to amendment
g.o.b.	good ordinary brand	..	less than half the unit shown

Units and conversion factors

	Metric unit	Symbol	Imperial unit	Multiply Imperial by:	Multiply metric by:
Length	centimetre	cm	inch	2.54	0.3937
	metre	m	foot	0.3048	3.28084
Area	kilometre	km	mile	1.609344	0.621371
	square metre	m ²	square foot	0.092903	10.7639
Mass	square metre	m ²	square yard	0.836127	1.19599
	gram	g	carat	5.0	0.2
	gram	g	troz (fine)		
			ounce (oz.)	31.1035	0.0321507
	kilogram	kg	pound (lb)	0.453592	2.20462
	tonne	t	long ton (2240 lbs)	1.01605	0.984207
	tonne	t	short ton (2000 lbs)	0.907185	1.10231
	metric-ton unit (10 kg)	mtu	long-ton unit (1tu) (22.4 lbs)	1.01605	0.984207
	metric-ton unit	mtu	short-ton unit (stu) (20 lbs)	0.907185	1.10231
				0.907185	1.10231
Volume	cubic metre	m ³	cubic foot	0.0283168	35.3147
	cubic metre	m ³	cubic yard	0.7645549	1.30795
	cubic metre	m ³	barrel (34.973 Imp. gals)	0.158987	6.28981
				4.54609	0.2199692
	litre	L	gallon (Imperial)	3.785412	0.264172
	litre	L	gallon (US)		
Energy	kilojoule	kJ	British Thermal Unit (Btu)	1.05506	0.9478133

AUSTRALIAN MINERAL INDUSTRY QUARTERLY

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS
and AUSTRALIAN BUREAU OF STATISTICS

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BMR refines its mineral resource classification system

Summary

In the light of experience it has been decided to refine the resource classification system adopted by BMR in 1975 for use in the presentation of regional and national assessments of petroleum and mineral resources. The changes do not affect the basis or framework of the system. However, some changes to definitions are proposed and it has been decided to avoid the use of the term 'reserves' for the purposes of national or regional mineral resource assessments to eliminate the misunderstanding to which the term has been prone; otherwise the terminology is unaffected. In addition, a set of guidelines has been prepared to facilitate consistent interpretation and application of the definitions used by BMR.

Introduction

Australia's mineral resources are an important component of its wealth, and knowledge of the location, quantity and quality of such resources, including estimates of resources yet to be discovered, is an essential pre-requisite to formulating sound policies on their use and conservation. Results of resource assessment can be used also to set priorities for mineral exploration and research to indicate mineral potential where alternative land uses are being considered.

Until the early 1970's BMR resource assessment work was largely qualitative. With increased community interest in mineral resources and an increasing demand for information about resources for use in cost benefit analysis in relation to alternative land uses, there was need for a suitable classification system and a requirement for BMR to put more emphasis on quantitative assessments. In 1975 BMR adopted, with minor changes (BMR 1976), the McKelvey resource classification system used by the US Bureau of Mines and US Geological Survey (USBM/USGS 1976).

The principal use of a resource classification system is to convey information accurately and in a form appropriate to the need. BMR experience indicated that the principles embodied in the McKelvey system were suitable to BMR's need but some problems arose in the practical application of the system. In particular, the inadequate statement of the assumptions underlying some of the definitions meant that it was not clear how definitions should be applied in different cases. Some informal guidelines for using the definitions were developed and used by BMR for several years, until it was decided that the whole system and its application should be reviewed in the light of accumulated experience.

This paper reports the outcome of that review. The principles of the McKelvey system, which now are used widely internationally, have been retained, as have most of the definitions formerly used by BMR, although relatively minor changes have been made to some. In addition, guidelines on applying the system

have been formally established, and are published in this paper. It has been decided that the term 'reserves' will not be used for regional or national aggregates of resources, so as to avoid the confusion arising from its use with different meanings in other contexts; otherwise the basic terminology is unchanged from that proposed in 1976. The BMR mineral resource classification system is shown diagrammatically in Figure 1.

The results of three other major reviews of resource classification systems were taken into consideration in the review. In 1979, the Committee on Natural Resources of the United Nations Economic and Social Council endorsed the recommendations of a group of experts for a resource classification system to facilitate uniform reporting and aggregation of national resources totals (Anon, 1979; Schanz, 1980); the USBM and USGS revised the scheme which they had been using (USBM/USGS, 1980); and the Joint Committee of the Australasian Institute of Mining and Metallurgy and the Australian Mining Industry Council on Ore Reserves was reconvened and published a report (Anon, 1981). The paper by King et al (1982) on ore reserve estimation also provided useful background information on the practical application of the concepts and procedures involved in mineral resource estimation.

Classification principles

BMR classifies known (identified) mineral resources according to two parameters: degree of assurance of occurrence (degree of geological assurance) and degree of economic feasibility of exploitation. The former takes account of information on quantity (tonnage) and chemical composition (grade); the latter takes account of changing economic factors such as commodity prices, operating costs, capital costs, and discount rates.

Resources are classified in accordance with circumstances at the time of classification. Resources which are not available for development at the time of classification because of legal and/or land-use factors are classified without regard to such factors;

TOTAL RESOURCES							
Decreasing degree of geological assurance →							
		IDENTIFIED			UNDISCOVERED		
		DEMONSTRATED		INFERRED	HYPOTHETICAL	SPECULATIVE	
		MEASURED	INDICATED				
Decreasing degree of economic feasibility ↓	ECONOMIC						
	SUB-ECONOMIC	PARA-MARGINAL					
		SUBMARGINAL					

Figure 1. BMR resource classification system

however, the amount of resource thus affected will, wherever possible, be stated for each classification category.

The classification framework is designed to accommodate all naturally-occurring metals, non-metals, and fossil fuels, and to provide a means of comparing data on different resources which may have a similar end use (eg petroleum, coal and uranium as energy sources).

Terminology and definitions

RESOURCE — A concentration of naturally-occurring solid, liquid, or gaseous materials in or on the earth's crust and in such form that its economic extraction is presently or potentially (within a 20–25 year timeframe) feasible (see guideline i).

Categories of resources based on degree of assurance of occurrence

IDENTIFIED RESOURCES — Specific bodies of mineral-bearing material whose location, quantity, and quality are known from specific measurements or estimated from geological evidence. Identified resources include economic and subeconomic components. To reflect degrees of geological assurance, identified resources can be subdivided into the following categories:

MEASURED — Resources for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes, and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely, and the geological character is so well defined that size, shape, and mineral content are well established.

INDICATED — Resources for which tonnage and grade are computed from information similar to that used for measured resources, but the sites for inspection, sampling and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than for resources in the measured category, is high enough to assume continuity between points of observation.

DEMONSTRATED — A collective term for the sum of measured and indicated resources.

INFERRED — Resources for which quantitative estimates are based largely on broad knowledge of the geological character of the deposit and for which there are few, if any, samples or measurements. The estimates are based on an assumed continuity or repetition, of which there is geological evidence. This evidence may include comparison with deposits of similar type. Bodies that are completely concealed may be included if there is specific geological evidence of their presence. Estimates of inferred resources should be stated

separately and not combined in a single total with measured or indicated resources (see guideline ii).

UNDISCOVERED RESOURCES — Unspecified bodies of mineral-bearing material surmised to exist on the basis of broad geological knowledge and theory. Undiscovered resources include the following categories:

HYPOTHETICAL — Resources which may reasonably be expected to exist in a known mining district or mineral province under known geological conditions. As exploration confirms their existence and reveals information about tonnage and grade, such resources would be reclassified in the appropriate subdivision of identified resources.

SPECULATIVE — Resources which may occur either in known types of deposits in a favourable geological setting where no discoveries have previously been made, or in as yet unknown types of deposits which remain to be recognised. As exploration confirms their existence and reveals information about tonnage and grade, such resources would be reclassified in the appropriate subdivision of identified resources.

Categories of resources based on economic considerations

ECONOMIC — This term implies that, at the time of determination, profitable extraction or production under defined investment assumptions has been established, analytically demonstrated or assumed with reasonable certainty (see guideline iii).

SUBECONOMIC — This term refers to those resources which do not meet the criteria of economic; subeconomic resources include paramarginal and submarginal categories.

PARAMARGINAL — That part of subeconomic resources which, at the time of determination, almost satisfies the criteria for economic. The main characteristics of this category are economic uncertainty and/or failure (albeit just) to meet the criteria which define economic. Included are resources which would be producible given postulated changes in economic or technologic factors.

SUBMARGINAL — That part of subeconomic resources that would require a substantially higher commodity price or some major cost-reducing advance in technology, to render them economic.

BMR guidelines for classifying mineral resources

- (i) Use of the term 'resources' is restricted to material, the extraction of which is generally judged to be potentially economically viable in an arbitrary timeframe of about 20 to 25 years. The term includes, where appropriate, material such as tailings and slags. The definition does not intend to imply that exploitation of any such

material will take place in that time span, but only that its possibility might reasonably be considered. This guideline attempts to establish a lower limit to what is worth assessing. It should be applied on a commodity by commodity basis to take account of prevailing and prospective technologies. Material falling outside the category of resources should be referred to as "occurrences". Unless otherwise stated, the classification system refers to in-situ resources. However, as is the case with the United Nations' system, it is possible and in fact desirable to also show recoverable quantities of resources in each category.

- (ii) By definition, inferred resources are classified as such for want of adequate knowledge and therefore it may not be feasible to differentiate between economic and subeconomic inferred resources. Where inferred resources are shown as 'undifferentiated', the amount known or judged to be economic may be indicated. Such judgements must take careful account of the commodity being assessed and its mode of occurrence as these factors will have a bearing on the reliability of estimates made. Specifically, grade estimates can be more reliably made for concordant sedimentary and biological deposits than for discordant epigenetic deposits (King, H.F., et al 1982, p.8).

- (iii) The definition of 'economic' is based on the important assumption that markets exist for the commodity concerned. All deposits which are judged to be exploitable economically at the time of assessment, whether or not exploitation is commercially practical, are included in the economic resources category. It is also assumed that producers or potential producers will operate at optimum rates of output, and will receive the 'going market price' for their production. The classification is therefore based on the concept of what is judged to be *economic* rather than what is considered to be *commercial* at any particular time.

The information required to make detailed assessments of economic viability of a particular deposit is commercially sensitive (eg a company's costs and required internal rate of return), and these data may not be available to organisations such as BMR. Furthermore, as corporate strategies are likely to be different, individual companies will have different criteria for what is considered to be 'economic'. Thus to standardise the approach for national or regional resource assessments, the following mineral deposits/situations are accepted by BMR, as a general guide, to be *economic*:

- (a) the resources (published or unpublished) of operating enterprises, whether or not such

operations are sustained by long or short term, direct or indirect, government subsidies;

- (b) resources in a deposit which is being developed for production (ie where there is a corporate commitment to production);
- (c) undeveloped resources which are judged to be economic on the basis of a financial analysis using actual, estimated or assumed variables, viz: the tax rate, capital and operating costs, discount rate (such as reflects the long-term bond rate), commodity prices, and depreciation schedules; the values for the economic variables used in an assessment must be realistic for the circumstances prevailing at the time of the assessment;
- (d) resources at mines on care-and-maintenance meeting the criteria outlined in (c) above.
- (iv) The term 'recoverable' is considered to make allowance for mining as well as processing losses. Where a finer distinction needs to be made, *mineable* is used to take account of mining losses and *metallurgically recoverable* (*saleable* for coal) is used to take account of processing losses.
- (v) Some minerals derive their economic viability from their co-product or by-product relationships with other minerals. Such relationships and assumptions must be clearly explained in footnotes or in accompanying text.
- (vi) National aggregates of resource estimates should be rounded to the appropriate last significant digit so as not to create false impressions of accuracy.

Comparison between classification systems

It is obviously important that BMR's classification system remains, or indeed, is made even more compatible with, the various other national and international resource classification systems to facilitate the translation of data from one system to another. The main classification systems with which BMR is presently concerned are the traditional petroleum industry classification, the International Atomic Energy Agency's classification for uranium and thorium resources, the AusIMM/AMIC classification for mineral resources and the United Nations system, which has been devised to accommodate national aggregates and to provide global-scale information on all mineral resources.

The demonstrated economic resource category in the BMR system is comparable to appropriate categories in several other national resource classification systems including those used in the United

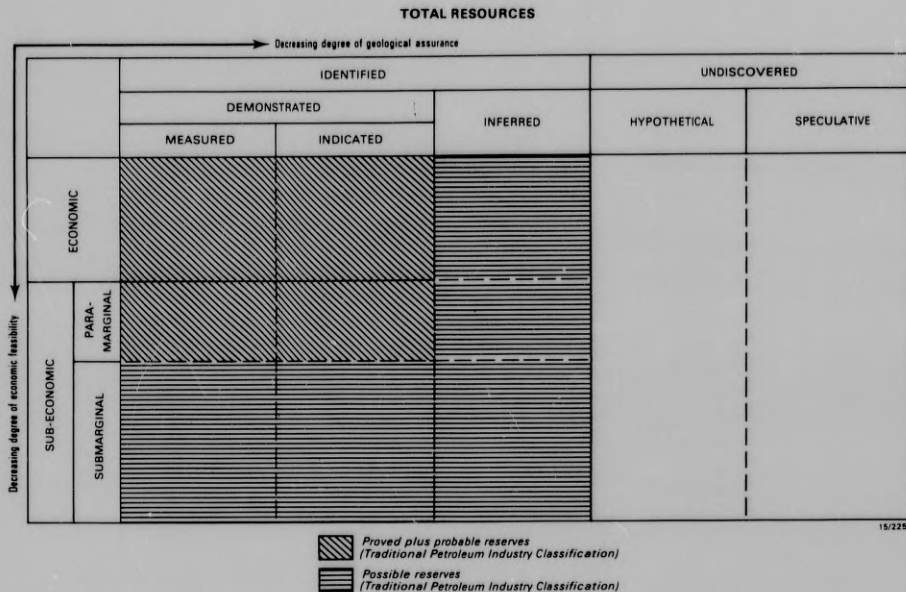


Figure 2. Relationship between BMR classification and the traditional petroleum industry classification of known resources

States, the United Kingdom, Canada, and USSR. The other categories used by BMR are broadly comparable with the categories used for national aggregates in the UK and USA and (although to a lesser extent) those in the Canadian and USSR systems.

The traditional classification used in the petroleum industry subdivides identified petroleum resources into proved, probable and possible reserves on the basis of what is considered to be recoverable from each deposit with current technology. BMR has used the petroleum industry classification system to report estimates of Australia's proved plus probable petroleum reserves for many years and these reserves have been subdivided into Category 1 which includes those deposits which have been declared commercial and Category 2 for those reserves in deposits not yet declared commercial. Proved plus probable reserves as used in the petroleum industry are considered to be equivalent to demonstrated economic recoverable resources plus part of the demonstrated subeconomic recoverable resources as defined in the BMR System outlined in this paper. The possible reserves category in the traditional petroleum classification can include material equivalent to both inferred recoverable resources and part of the demonstrated subeconomic recoverable resources as defined in the BMR system. These relationships are illustrated in Figure 2.

The International Atomic Energy Agency resource classification system (OECD/IAEA, 1982, pp.13-16), which is used for classification of uranium and thorium resources is, like the BMR system, a two-parameter classification involving the degree of assurance of occurrence and an indication of the degree of economic viability. The IAEA system refers to recoverable resources (ie allowance is made for mining and milling losses) whereas the BMR classification, unless specifically stated, refers to in-situ resources. Nevertheless, although the actual definitions differ, the IAEA categories for assurance of occurrence are comparable with those in the BMR system (Fig. 3) — ie Reasonably Assured Resources (RAR) can be regarded as equivalent to BMR's demonstrated resources; Estimated Additional Resources I (EAR-I) to inferred resources; Estimated Additional Resources II (EAR-II) to hypothetical resources; and Speculative Resources (SR) to BMR's speculative resources.

The IAEA also classifies resources in terms of cost of production, with three categories — recoverable at a cost of less than US\$80/kgU; recoverable at a cost between US\$80-130/kgU; and recoverable at a cost between US\$130-260/kgU. The International Atomic Energy Agency has changed its cost categories at times to take account of long-term uranium price changes and the three categories can be considered to be broadly comparable to BMR's economic, paramarginal, and submarginal categories respectively.

However, because the IAEA classification is based on extraction costs, rather than uranium prices, a deposit near the margin of one or other of the economic categories may be classified differently in the IAEA and BMR systems.

The Australasian Institute of Mining and Metallurgy/Australian Mining Industry Council (AusIMM/AMIC) classification is intended for reporting estimates of material in individual mineral deposits whereas the BMR classification is designed for presenting national or regional aggregates. Nevertheless, the two are compatible (Fig. 4): the proved, probable and possible categories in the AusIMM/AMIC system are equivalent to the measured, indicated and inferred categories in the BMR system. More specifically, proved reserves, probable reserves and possible ore in the AusIMM/AMIC system would be classified as measured resources, indicated resources and inferred resources, respectively in the BMR system.

The BMR system is also compatible with the United Nations system, recommended for international use. Thus BMR's demonstrated category is equivalent to R-1 in the United Nations system, inferred to R-2, undiscovered to R-3 (Fig. 5). The definitions of these terms in both systems specify in-situ quantities although the United Nations system offers optional use of r-1, r-2, and r-3 to denote recoverable resources. Although the United Nations system gives only a very brief definition of what is meant by economic, it would seem that BMR's economic category is comparable to the United Nations' category denoted by the letter E, BMR's subeconomic to the United Nations' S and BMR's paramarginal to the United Nations' M.

Conclusion

Review of the resource classification system used by BMR for presentation of regional or national resource assessments for the last 8 years has shown that the principles embodied in the system and the concepts underlying the definitions of each category are appropriate to BMR's present and likely future needs.

The revised classification system presented in this paper is essentially the same as the one used by BMR since 1975 although some definitions have been modified and it has been decided to discontinue the use of the term 'reserves' for regional or national aggregate data. The changes are really only refinements introduced in the light of experience gained during BMR's use of the classification system over the last 8 years.

A set of guidelines has been established by BMR to facilitate consistent application of the classification. It is expected that with further use of the classification system additional clarification and refinements will be required and BMR proposes to review the system as the need arises.

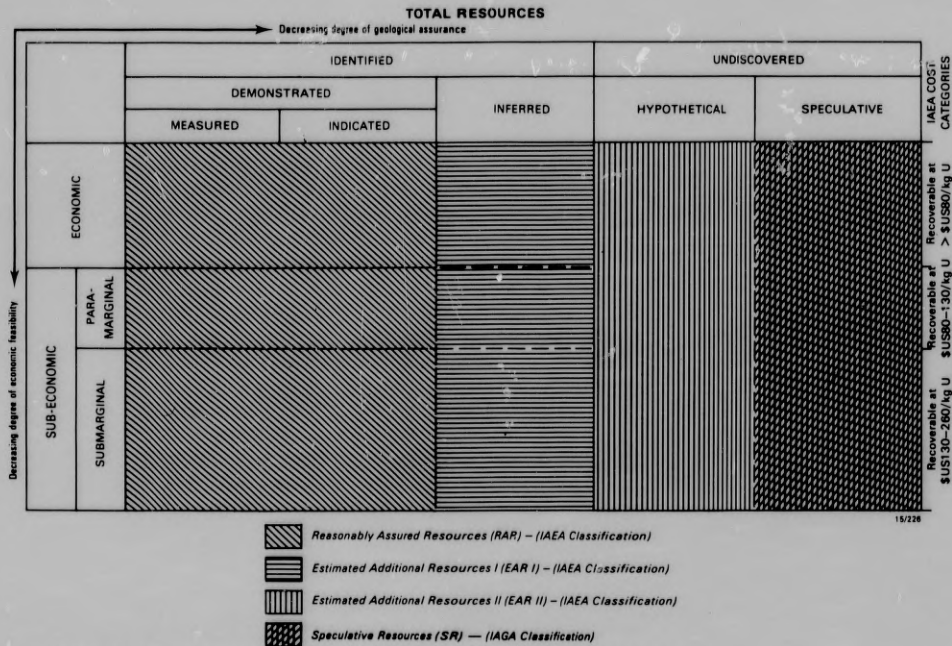


Figure 3. Relationship between BMR classification and the IAEA classification system for uranium and thorium resources

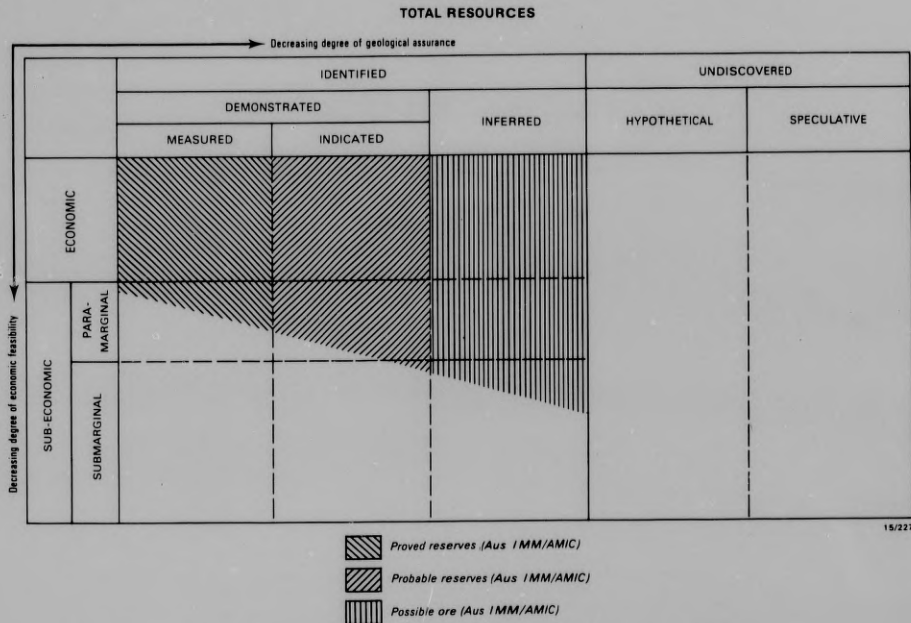


Figure 4. Relationship between BMR classification and the system recommended by AusIMM/AMIC for individual deposits

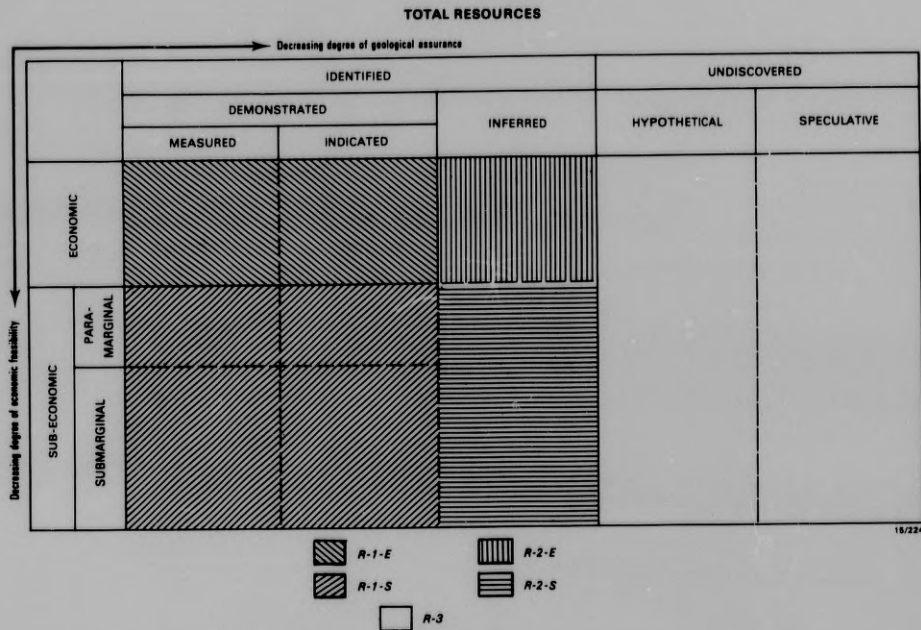


Figure 5. Relationship between United Nations and BMR resource categories

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MINERAL INDUSTRY STATISTICS

Quarterly statistics on the Australian mineral industry are presented in detail for the quarter ended June 1983 and in summary form for the quarter ended September 1983. The statistics are based largely on data provided to BMR by the State mines departments or their equivalents, the Australian Bureau of Statistics, and the Domestic Energy Policy Branch of the Department of Resources & Energy. Annual aggregates are compiled on a calendar-year basis in accord with international publications on the world industry, in contrast with the fiscal-year basis generally favoured for Australian official statistical publications.

Quantities of minerals produced are reported in terms of the product in which they leave each minesite. This includes various stages of ore-dressing, processing, and elementary smelting where these operations are carried out in an associated plant at, or near, the mine. It may include working, screening, concentrating by physical means, sun drying, calcining, upgrading by leaching in stockpiles, and milling. Consequently, the output is recorded as ore when no treatment is undertaken at the mine, or as a concentrate when ore-dressing operations are carried out.

Compilation of quantity data on a consistent basis has involved some rearrangement of official statistics published by the State mines departments and their equivalents for certain States. In addition, while actual output of the mineral product has generally been used, this information is not available in some cases and it has been necessary to use despatches or sales data in deriving Australian totals.

In addition to the basic gross weight data, particulars of metal content (as determined by assay) are also shown for each metal which is a 'pay metal' component of any mine product.

Quarterly data are not available for construction materials (sand, gravel, building stone, etc.) and certain other non-metallic minerals; annual data for such products are published in the *Australian Mineral Industry Annual Review*. Fiscal-year data are also published by the Australian Bureau of Statistics in *Mineral Production, Australia* (catalogue No. 8405.0).

BMR thanks the State mines departments and their equivalents, the State Offices of the ABS, and the Domestic Energy Policy Branch of the Department of Resources & Energy for supplying information used in the preparation of these tables.

QUARTER ENDED 30 SEPTEMBER 1983

Summary Tables

AUSTRALIA'S MINE PRODUCTION OF PRINCIPAL MINERALS

	Unit of Quantity	1981	1982	1982	1983*		
				December	March	June	September
Bauxite	'000 t	25 441	23 625	5 864	5 194	5 769	6 200
Black coal (a)	..	100 596	107 329	27 673	24 231	26 216	31 391
Brown coal	..	32 959	37 811	7 787	7 322	9 102	9 514
Copper (b)	t	231 339	245 322	50 801	54 176	66 262	81 340
Gold (b)	kg	18 374	26 961	7 884	6 701	7 306	8 471
Iron ore and concentrate (c)	'000 t	84 661	87 694	18 525	21 156	17 714	12 564
Lead (b)	t	388 122	455 338	101 694	110 515	127 722	135 417
Manganese ore, metallurgical	..	1 410 563	1 123 019	289 448	377 396	194 352	443 564
Nickel (b)	..	74 355	87 552	22 199	20 767	19 224	19 741
Petroleum							
Crude oil	10'm ³	22 842	21 668	5 930	5 406	5 989	6 066
Natural gas	10'm ³	11 268	11 595	2 645	2 507	3 202	3 383
Silver (b)	kg	743 557	906 863	209 943	234 786	287 739	284 210
Tin (b)	t	12 267	12 126	2 695	2 411	2 100	2 266
Titanium							
Ilmenite concentrate (d)	..	1 321 137	1 149 212	252 233	209 149	217 826	224 442
Rutile concentrate	..	230 817	220 697	53 683	44 680	40 135	35 153
Tungsten concentrate (f)	mtu	443 502	330 035	58 940	80 842	46 818	68 541
Uranium (U ₃₀)	t	3 446	5 215	1 075	1 061	1 042	979
Zinc (b)	..	518 297	664 800	163 912	165 003	181 733	185 169
Zircon concentrate	..	434 246	462 476	109 895	86 153	92 971	101 750

(a) Comprises saleable coal for Queensland and raw coal for all other States. (b) Total metallic content of minerals produced. (c) Excludes iron oxide not intended for metal extraction. (d) Excludes leucosene. (f) Tungstic oxide content.

AUSTRALIA'S SMELTER AND REFINERY PRODUCTION OF PRINCIPAL METALS

	Unit of Quantity	1981	1982	1982	1983*		
				December	March	June	September
Alumina	'000 t	7 079	6 631	1 668	1 613	1 698	1 901
Aluminium (refined)	t	379 427	380 796	98 377	101 647	108 578	121 133
Cadmium (refined)	..	1 031	1 010	263	233	341	245
Copper (blister) (a)	..	172 181	175 536	42 587	37 360	44 795	47 516
Copper (refined)	..	164 241	160 195	42 854	44 367	42 313	41 239
Gold (refined) (b)							
Australian origin	kg	13 372	23 292	6 762	6 763	6 186	7 673
Total	..	14 991	25 711	7 285	7 222	6 570	8 391
Lead							
Refined (c)	t	207 669	218 812	56 080	46 336	50 933	51 636
Lead content of lead bullion for export	..	162 564	181 592	41 430	41 210	48 003	47 494
Pig iron	'000 t	6 828	5 956	1 130	1 137	1 235	1 336
Raw steel (d)	..	7 635	6 371	1 199	1 218	1 354	1 540
Silver (refined)	kg	373 101	348 019	75 575	76 114	64 064	83 537
Tin (refined)	t	4 286	3 105	674	650	797	700
Zinc (refined)	..	295 852	291 390	71 694	69 223	74 518	77 011

(a) Total production for refining in Australia and overseas. (b) Newly-won gold. (c) Includes lead content of lead alloys from primary sources. (d) Includes recovery from scrap.

Note: Data for petroleum collected by the Domestic Energy Policy Branch, DRE; data for refined aluminium, cadmium, copper, gold, lead, silver, tin, and zinc collected by BMR.

Metal, Ore, and Concentrate Prices

compiled by R.M. Weber

BMR's Mineral Commodity Section collects, monitors, and publishes prices of ores, concentrates, and metals as an integral part of its mineral industry studies. This *Quarterly* contains metal, ore, and concentrate prices extant at the end of the quarter covered by the summary Mineral Industry Statistics. Also shown are monthly maximum, minimum, and average prices of those major commodities whose price is subject to daily change — i.e. copper, tin, zinc, lead, aluminium, nickel, gold, and silver*.

All European metal prices and US prices for copper, tin, lead, and zinc metal are obtained from the London *Metal Bulletin*. Other US metal prices are selected from *Metals Week* and *American Metal Market*. European and US prices for ores and concentrates are obtained from the London *Metal Bulletin*, *Metals Week*, *American Metal Market*, and *Industrial Minerals*.

The London Metal Exchange (LME) daily prices and LME contract quality specifications are the basis for many transactions involving spot, forward, and contract sales of base metals and base-metal ores and concentrates; adjustments in price may be made where there are variations in product quality, freight differentials, exchange rates, quantity sold, etc.

Leading producers also quote prices for their metal product. Prices for aluminium, nickel, platinum, and zinc are generally established in this way, but in recent years there has been increasing use of LME prices as a point of reference for producer pricing.

Australian metal prices are generally based on overseas market prices such as the LME or major producer price, although there are variations on the pricing formulas adopted in each case. For example, lead, copper, and silver metal prices quoted by major Australian producers are related to the LME price and to variations in currency exchange rates. In contrast, the Australian price for gold, as quoted by the Perth Mint, is the Australian equivalent of the Hong Kong market opening quote.

Ore and concentrate prices in Australia, Europe, and USA are generally subject to negotiation between producer and buyer and vary according to grade, impurities, and in many cases the size of the parcel. Some metallic ores and concentrates pro-

duced in Australia are supplied by vertically integrated producers. Generally, such products have few or, in some cases, no other domestic consumers, in which case a domestic market may not exist or, at best, be limited to a small number of transactions, and it is often difficult or impossible to obtain a representative market quotation.

Some larger Australian producers of ores and concentrates buy-in small parcels of ore. The basis for determining the price paid varies between buyers but is generally related to the market price of the contained pay metal(s) less treatment charges and penalties for impurities. Current treatment charges for copper ores are given at the end of the Prices Section. Details of charges for other ores and concentrates may be obtained from individual buyers.

Some Australian products are used as a reference point for world prices, even where no Australian domestic price is quoted. For example, there is no Australian quotation for monazite, zircon, rutile, and ilmenite; Australian prices are listed as 'nominal', being subject to negotiation between individual buyer and seller. However, the London *Metal Bulletin* provides spot quotations for mineral-sand concentrates on an 'f.o.b., f.i.d. Australia' basis.

No world price is recognised for certain bulk mineral products such as iron ore, coal, and bauxite. Sales are generally by contract and prices are subject to negotiation between suppliers and individual customers. In some cases, these products are supplied by vertically integrated producers, and transfer prices are generally not available or are unrepresentative of the market.

Exact prices for industrial minerals are not readily available. Variation in product quality, even between products from the same mine or quarry, makes it difficult to determine a representative market price. Generally a price range is quoted, the price levels depending mainly on grade and quality.

* BMR also issues a *Monthly Bulletin of Metal, Ore, & Concentrate Prices* — see page 112.

MONTHLY AVERAGE METAL PRICES

	Copper	Tin	Zinc	Lead	Aluminium	Nickel	Gold	Silver
Australia	(\$/t)	(\$/t)	(\$/t)	(\$/t)	(\$/t)		(\$/troy oz.)	(\$/kg)
July 1983	1 979	16 475	926	600	1 595	n.a.	484	444
August 1983	1 934	16 148	972	600	1 650	n.a.	475	444
September 1983	1 835	15 927	1 009	600	1 722	n.a.	466	438
UK	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(US\$/troy oz.)	(pence/troy oz.)
July 1983	1 116	8 638	484	264	995	3 145	423	788
August 1983	1 091	8 533	538	265	1 068	3 233	416	802
September 1983	1 041	8 511	559	270	1 077	3 278	412	798
USA	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/troy oz.)	(¢/troy oz.)
July 1983	80	610	41	21	72	3.25	423	1 209
August 1983	78	595	43	21	77	3.25	416	1 210
September 1983	75	593	46	22	77	3.25	411	1 191

MAXIMUM AND MINIMUM METAL PRICES, 1 JULY TO 30 SEPTEMBER 1983

	Copper	Tin	Zinc	Lead	Aluminium	Nickel	Gold	Silver
Australia	(\$/t)	(\$/t)	(\$/t)	(\$/t)	(\$/t)		(\$/troy oz.)	(\$/kg)
	1 980	16 785	1 009	600	1 825	n.a.	493	465
	1 760	15 689	926	600	1 545	n.a.	454	421
UK	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(LME, £/t)	(US\$/troy oz.)	(pence/troy oz.)
	1 131	8 860	580	287	1 113	3 390	430	827
	988	8 396	466	258	967	3 070	404	743
USA	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/lb)	(US\$/troy oz.)	(¢/troy oz.)
	83	627	46	25	80	3.29	430	1 275
	71	583	40	19	70	3.20	402	1 123

METAL PRICES AS AT END OF SEPTEMBER 1983

Prices shown are for the last trading day of the month; where prices are not set daily, the date of latest change is shown. Some prices are nominal, being subject to negotiation between producer and purchaser. Commonwealth Trading Bank currency exchange (telegraphic transfer buying) rate \$A1.00 = US\$0.8989.

Aluminium

Australia	..	\$1825/t (20.9.83)
	..	Ingot 99.5% f.i.s. main cities
Europe	..	\$1050/t (12.8.83)
	..	UK producer, 99.5%, delivered
USA	..	75.50-77.00 cents/lb (29.9.83)
	..	Metals Week, US market

Antimony

Australia	..	No sales
Europe	..	\$1940-1970/t (29.9.83)
	..	European free-market, 99.6%, warehouse
USA	..	82-86 cents/lb (29.9.83)
	..	Metals Week, New York dealer, 99.5-99.6% metal, c.i.f. port

Bismuth

Australia	..	\$4.41-4.59/kg (22.9.83)
	..	Based on European free-market price
	..	\$4.66-4.78/kg (22.9.83)
	..	Based on Metals Week, New York dealer price
Europe	..	US\$1.80-1.87/lb (22.9.83)
	..	European free-market, 1-ton lots in warehouse
USA	..	\$1.90-1.95/lb (22.9.83)
	..	Metals Week, New York dealer, 99.9% min.

Cadmium

Australia	..	\$2.75/kg (1.4.83)
	..	Minimum 1-4 lots, delivered Melbourne

Europe	..	US\$0.90-0.97/lb (22.9.83)
	..	European free-market, c.i.f., sticks
USA	..	\$0.90-0.97/lb (22.9.83)
	..	Metals Week, New York dealer, 99.95% min.

Cobalt

Australia	..	\$15.00/kg
	..	Ceramic oxide 70% Co, delivered Melbourne
Europe	..	US\$5.70-5.80/lb (29.9.83)
	..	European free-market, 99.5% in warehouse
USA	..	\$5.70-5.80/lb (8.9.83)
	..	Metals Week, spot, cathode

Copper

Australia	..	\$1760.00/t (30.9.83)
	..	Mount Isa Mines Ltd price; electrolytic wirebar basis; c.i.f. main Australian ports
Europe	..	£968.50/t (30.9.83)
	..	LME, cash, midday, higher-grade cathode
USA	..	71.50-73 cents/lb (29.9.83)
	..	Cathodes, delivered

Gold

Australia	..	\$454.15/troy oz, \$14.60/g (30.9.83)
	..	Perth Mint selling price, min. 400-oz bars
Europe	..	US\$404.00/troy oz (30.9.83)
	..	LME, morning
USA	..	\$405.00/troy oz (30.9.83)
	..	Metals Week, Handy & Harman sellers' price, 400-oz bars, 99.95%

Lead

Australia	..	\$609.00/t (15.6.82)
	..	99.97%-99.99% f.o.b., f.o.r., Port Pirie
Europe	..	£276.00/t (30.9.83)
	..	LME, cash, midday
USA	..	25 cents/lb (26.9.83)
	..	New York

Mercury	
Australia	nominal
Europe	US\$310.00-325.00/flask (29.9.83) European free-market, c.i.f., \$/flask, min. 99.99%
USA	\$310.00-320.00/flask (29.9.83) <i>Metals Week</i> , New York dealer, 20-plus flasks

Nickel	
Australia	\$7.85-8.07/kg (30.9.83) Australian currency equivalent of major producer's cathode price, last trading day of month
Europe	US\$2.05-2.15/lb (29.9.83) European free-market, c.i.f., Europe
USA	\$3.20-3.29/lb (25.11.81) <i>Metals Week</i> , major producer, cathode, 99.9% f.o.b.

Pig iron	
Australia	\$201.50/t (29.4.83) Foundry, f.o.r., f.o.t. steelworks of origin or f.o.t. designated terminals
Europe	£116.00/t (2.1.83) Foundry, phosphorus 0.12-1.00%, ex-basing points, UK
USA	\$235.00/short ton f.o.b., No. 2 Foundry (Birmingham)

Platinum	
Australia	nominal
Europe	£294.00/roy oz (6.1.83) UK refined delivered
USA	\$475.00/roy oz (28.8.80) <i>Metals Week</i> , major producer, f.o.b. refinery

Selenium	
Australia	—
Europe	US\$4.15-4.80/lb (29.9.83) European free-market, c.i.f.
USA	\$4.20-4.50/lb (11.8.83) <i>Metals Week</i> , New York dealer price, commercial-grade, 99.5% min.

Silver	
Australia	\$442.72/kg (1.9.83) Minimum lots 320 kg, f.o.b., f.o.t. Port Pirie
Europe	751.10 pence/roy oz (30.9.83) London spot
USA	1123 cents/roy oz (30.9.83) <i>Metals Week</i> , Handy & Harman, commercial bar form, 99.9% min.

Steel	
Australia	\$434.00/t (29.4.83) Billets — commercial finish, 162 mm x 162 mm; f.o.r., f.o.t., steelworks of origin or f.o.t. designated terminals.
Europe	\$165.00/t Billets, grade 11, rimmed, 0.09-0.15% carbon, ex-basing points
USA	\$394.63/t Billets, carbon, re-rolling, f.o.b. Midwestern Mills

Tin	
Australia	\$15 689.00/t (30.9.83) Spot, minimum 2 t, ex-smelter
Europe	£2440.00/t (30.9.83) LME, cash, midday
USA	\$84-588 cents/lb (30.9.83) New York
Penang	M\$29.80/kg (30.9.83) Ex-smelter

Zinc	
Australia	\$1009.00/t (1.9.83) EZ Industries, Prime Western, 98.5%, 15 t and over
Europe	£551.00/t (30.9.83) LME, cash, midday

USA	46 cents/lb (25.8.83) High-grade, delivered
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ORE AND CONCENTRATE PRICES AS AT END OF SEPTEMBER 1983

Prices shown are for the last trading day of the month; where prices are not set daily, the date of latest change is shown. Some prices are nominal, being subject to negotiation between producer and purchaser. Prices quoted will vary according to grade and possible impurities, and in many cases with the size of the parcel.

Antimony	
Australia	nominal
Europe	US\$14.75-16.10/mtu Lump sulphide ore, 60% Sb, c.i.f.
USA	—

Beryl	
Australia	nominal
Europe	US\$100.00-130.00/mtu Cobbed lump, minimum 10% BeO, c.i.f.
USA	\$100.00-120.00/mtu (28.7.83) 10-12% Be, imported c.i.f. Philadelphia

Chromite	
Australia	nominal
Europe	US\$88.00-100.00/t Turkish lump, minimum 48% Cr ₂ O ₃ , 3:1, f.o.b.
USA	\$110.00/t (1.6.79) Turkish lump, minimum 48% Cr ₂ O ₃ , 3:1, f.o.b.

Manganese	
Australia	nominal
Europe	US\$1.27-1.31/mtu Metallurgical, minimum 48-50% Mn, maximum 0.1% P, c.i.f.
USA	\$1.44-1.47/mtu (2.6.83) Min. 48% Mn, low impurities, c.i.f. US ports

Molybdenum	
Australia	nominal
Europe	US\$7.90/lb (3.8.81) Mo in MoS ₂ concentrate, f.o.b. Climax, minimum 85%
USA	—

Monazite	
Australia	nominal
Europe	\$A410.00-450.00/t Min. 55% REO, f.o.b. Australia, Industrial Minerals
USA	nominal

Niobium (columbium)	
Australia	nominal
Europe	US\$1.50-2.50/lb Columbite, minimum 65% combined Nb ₂ O ₅ +Ta ₂ O ₅ , 10:1, c.i.f., \$/lb of pentoxide content
USA	\$5.00-7.00/lb (22.12.82) 10:1 Nb ₂ O ₅ :Ta ₂ O ₅ , Dealer and producer quotation priced on basis of combined pentoxide content, c.i.f. US ports

Tantalum	
Australia	nominal
Europe	US\$31.00-35.00/lb Ore min. 60% Ta ₂ O ₅ , c.i.f.
USA	\$23.00-27.00/lb (21.4.83) Dealer quotation: about 60% combined Nb ₂ O ₅ , depending on grade and size of lot

Tin (cassiterite)	
Australia	\$125.63/mtu (30.9.83) Concentrate, 70%, delivered Sydney
Europe	Returning charge/t £140-240 , 70-75% Sn (including deduction) £250-325 , 30-65% Sn (including deduction) £335-475 , 20-30% Sn (including deduction)

USA	—
Titanium cons — ilmenite	
Australia	nominal
Europe	\$A33.00-37.00/t Bulk concentrate, Australia, min. 54% TiO ₂ , f.o.b., <i>Industrial Minerals</i>
USA	\$70.00-75.00/long ton (30.4.81) 54% TiO ₂ , imported f.o.b. Atlantic ports, ship-load quantities
Titanium cons — rutile	
Australia	nominal
Europe	\$A270.00-290.00/t Bulk, min. 95-97% TiO ₂ , f.o.b., f.i.d. Australia, <i>Industrial Minerals</i> \$A290.00-310.00/t Bagged, min. 95-97% TiO ₂ , f.o.b., f.i.d. Australia, <i>Industrial Minerals</i>
USA	\$400.00-430.00/short ton (19.5.83) 96% TiO ₂ , f.o.b. cars Atlantic and Great Lakes ports
Tungsten cons — wolframite	
Australia	\$89.00-91.22/mtu WO₃ Based on LMB price, minimum 65% WO ₃ c.i.f.
Europe	US\$80.00-82.00/mtu WO₃ Standard, min. 65% WO ₃ , c.i.f.
USA	\$74.84/stu (29.9.83) GSA domestic, based on units of WO ₃ \$74.69/stu (17.3.83) GSA export, based on units of WO ₃
International Tungsten Indicator	US\$78.48/mtu (September 1983) Weighted average
Titanium — oxide	
Australia	—
Europe	US\$24.00/lb Nuexco exchange value at end of month (<i>Metal Bulletin</i>)
USA	\$24.00/lb (31.7.83) Nuexco exchange value at end of month (<i>American Metal Market</i>)
Zircon	
Australia	nominal
Europe	\$A105.00-115.00/t Standard (foundry) grade, min. 65% ZrO ₂ , f.o.b. Australia, <i>Industrial Minerals</i>

\$A115.00-125.00/t
Intermediate-grade, 65.5-66% ZrO₂, 0.06-0.1% Fe₂O₃, f.o.b. Australia, *Industrial Minerals*
\$A130.00-135.00/t
Premium-grade, min. 66% ZrO₂, max. 0.05% Fe₂O₃, f.o.b. Australia, *Industrial Minerals*
\$A175.00/short ton (20.8.81)
Ore, Australia, 65% ZrO₂, bulk, c.i.f. Atlantic ports

USA

Copper ore (Australia)

The price paid for ores is related to the market price for copper, less charges listed below. The basis of price determination is variable: details are obtainable from the two smelters — The Electrolytic Refining & Smelting Company of Australia Pty Ltd, Port Kembla, NSW, and Mount Isa Mines Ltd, Mount Isa, Qld.

	ERS	Mount Isa
Metal deduction or copper content deduction	1.3 units of copper/tonne of ore (a)	1.3 units of copper/dry tonne of ore
Receiving, sampling, assaying, smelting charge/tonne	\$30.00 (material natural state)	\$11.30 (dry ore)
Converting, refining, realising charge/unit of copper paid for	\$2.50	\$1.70
Gold refining charge/gram of gold paid for	8 cents (b)	5 cents (c)
Silver refining charge/gram of silver paid for	2 cents (d)	1.45 cents (e)
(a) Payment at 96% of the ERS refined copper price, after metal deduction.		
(b) ERS gold deduction: 0.002 kg gold/dry tonne of material, and 2.5% of the balance of gold metal contained in material.		
(c) Mount Isa gold deduction: from the gold content of each parcel of ore delivered, 2 g gold/tonne of ore will be deducted; payment for 97.5% of the excess is based on the Australian Gold Producers' Association monthly average price.		
(d) ERS silver deduction: 0.03 kg silver/tonne of material and 8% of the balance of silver metal contained in material.		
(e) Mount Isa silver deduction: from the silver content of each parcel of ore delivered, 60 g silver/tonne of ore will be deducted; payment for excess is based on average London Bullion Brokers' cash price for silver.		

QUARTER ENDED 30 JUNE 1983

Detailed Tables

ALUMINIUM

		1982				1983*	
		1981	1982	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Bauxite	 t	25 441	23 625	6 045	5 864	5 194	5 769
Alumina (Al ₂ O ₃) content	 %	10 853	9 926	2 531	2 429	2 139	2 419
Production: States (Al₂O₃) content							
New South Wales	 %	1	1	..	..	—	—
Victoria	 %	4	5	1	1	2	2
Queensland	 %	4 695	3 780	972	804	716	837
Western Australia	 %	3 943	3 867	1 002	1 007	914	941
Northern Territory	 %	2 211	2 274	556	616	507	640
Total contained alumina	 %	10 853	9 926	2 531	2 429	2 139	2 419
Smelter and refinery production							
Alumina	 t	7 079	6 631	1 722	1 668	1 613	1 698
Refined aluminium	 t	379 427	380 796	95 315	98 377	101 647	108 578
IMPORTS							
Bauxite	 t	12 801	4 319	1 925	2 381	423	4 152
Value	 \$'000	1 306	657	354	296	83	607
Alumina	 t	3 619	3 663	393	599	393	524
Value	 \$'000	2 051	2 221	268	356	349	370
Aluminium and aluminium-base alloys							
Unworked shapes	 t	9 261	13 922	2 954	4 054	4 747	125 411
New Zealand	 %	—	237	—	50	—	—
UK	 %	603	542	71	61	187	82
USA	 %	1 907	212	—	2	..	1
Other	 %	6 751	12 931	2 883	3 941	4 560	41
Value	 \$'000	14 304	18 221	3 591	5 455	6 512	416
Plates, sheets, strips and circles	 t	3 689	2 051	472	255	310	246
Value	 \$'000	8 264	5 612	1 229	979	1 145	1 053
Pipes and tubes	 t	391	247	87	61	59	75
Value	 \$'000	1 281	1 032	437	219	215	332
Bars, rods and angles	 t	7 149	5 911	1 623	444	576	373
Value	 \$'000	13 719	12 531	3 548	1 175	1 393	1 198
Foil	 t	2 964	3 166	744	814	701	612
Value	 \$'000	10 629	11 068	2 448	3 267	2 607	2 564
Powder	 t	676	320	63	8	84	48
Value	 \$'000	1 445	779	152	42	146	131
Wire, single-strand, uncovered	 t	574	542	164	72	167	39
Value	 \$'000	2 125	1 943	552	306	613	170
Scrap (including re-melt)	 t	3 008	2 433	775	544	633	519
Value	 \$'000	3 955	2 973	946	653	758	621
EXPORTS (a)							
Alumina (b)	 t	6 509	5 951	1 453	1 484	1 232	1 565
Value	 \$'000	1 081 942	1 103 255	269 931	283 085	220 184	300 356
Aluminium and aluminium-base alloys							
Unworked shapes (b)	 t	79 174	156 068	46 030	29 298	62 292	59 415
Value	 \$'000	96 619	168 253	46 746	32 580	70 830	76 499
Plates, sheets, strips and circles	 t	23 019	29 048	6 714	7 610	6 702	10 157
Value	 \$'000	42 680	55 509	12 125	14 477	14 175	20 517
Pipes and tubes	 t	134	160	32	83	7	28
Value	 \$'000	358	366	53	216	21	57
Bars, rods and angles	 t	105	894	651	35	294	119
Value	 \$'000	427	1 658	917	158	435	327
Foil	 t	2 664	3 114	885	574	718	698
Value	 \$'000	5 916	6 690	1 840	1 299	1 422	1 500
Powder	 t	118	39	16	5	5	26
Value	 \$'000	235	88	37	9	11	87

ALUMINIUM (continued)

		1982				1983*	
		1981	1982	September	December	March	June
EXPORTS (a) (continued)							
Wire, single-strand, uncovered	t	51	46	12	17	3	15
Value	\$'000	174	167	48	65	32	27
Scrap (including re-melt)	t	14 647	26 973	5 995	7 287	4 870	8 470
Value	\$'000	11 334	18 138	3 735	4 860	3 049	7 283

(a) Details of exports of bauxite are not available for publication. (b) Country details are not available for publication.

ANTIMONY

PRODUCTION

Mine production							
Minerals produced							
Antimony concentrate	t	948	1 029	264	233	—	—
Antimony content	..	637	685	177	155	—	—
Antimony content of minerals produced							
Antimony concentrate	..	637	685	177	155	—	—
Lead concentrate	..	482	418	123	100	92	111
Lead-zinc concentrate	..	7	43	14	12	8	8
New South Wales	..	1 126	1 146	314	267	100	119
Total contained antimony	..	1 126	1 146	314	267	100	119

IMPORTS

Antimony metal	t	50	29	8	8	8	7
Value	\$'000	149	77	18	29	17	15

EXPORTS (a)

Antimony ores and cons	t	1 159	1 558	705	262	452	—
Value	\$'000	1 490	1 775	801	261	603	—

(a) Exports of antimonial lead alloy are included with refined lead on page 101.

ASBESTOS

PRODUCTION

Mine production							
Chrysotile	t	45 494	18 587	3 942	4 471	3 723	—
New South Wales	..	45 494	18 587	3 942	4 471	3 723	—

IMPORTS

Chrysotile	t	16 460	16 971	4 460	5 515	2 174	1 694
Canada	..	15 371	16 324	4 422	5 515	2 172	1 673
Other	..	1 089	647	38	—	2	20
Value	\$'000	9 225	12 675	3 355	4 445	1 722	1 410
Amosite	t	1 408	3 786	1 211	1 111	—	60
South Africa	..	1 408	3 786	1 211	1 111	—	60
Value	\$'000	754	2 499	802	789	—	49
Other types	t	3 092	96	1	..	..	—
Value	\$'000	2 134	12	..	..	1	—

EXPORTS

All types and grades	t	38 576	15 578	4 176	2 704	3 263	1 179
Value	\$'000	13 699	6 467	1 763	1 121	1 434	569

BARITE

		1982				1983*	
		1981	1982	September	December	March	June
Mine production	1	41 266	28 064	4 855	7 172	2 886	3 125
Imports (including witherite)	''	1 112	3 227	194	372	265	142
Value	\$'000	122	413	27	49	38	19
Exports	1	1 903	581	95	285	400	118
Value	\$'000	223	91	20	33	149	17

BISMUTH (a)

Imports								
Bismuth metal	 t	14	11	2	2	1	2	
Value	 \$'000	70	41	7	7	2	5	

(a) Details of mine production are not available for publication.

CADMIUM

PRODUCTION

Mine production								
Cadmium content of minerals produced								
Lead concentrate	 t	95	175	27	20	17	20	
Lead-zinc concentrate	 t	14	68	17	17	15	15	
Zinc concentrate	 t	1 644	1 950	548	498	493	555	
New South Wales	 t	1 144	1 431	401	330	296	383	
Queensland	 t	428	565	144	160	167	150	
Tasmania	 t	181	197	47	45	62	57	
Total contained cadmium	 t	1 753	2 193	592	535	525	590	
Refinery production								
Refined cadmium	 t	1 031	1 010	273	263	233	341	

EXPORTS

Cadmium and cadmium alloys								
Worked shapes and sections	 t	21	1	20	—	8		
Value	 \$'000	3	116	67	31	—	17	
Unwrought and waste and scrap	 t	988	662	118	178	239	280	
Value	 \$'000	2 932	1 387	217	340	368	463	

CLAYS

Mine production								
Brick clay and shale	 '000 t	7 910	8 210	2 171	1 748	1 283	1 745	
Imports								
Andalusite, mullite, Dinas earth,								
kyanite and sillimanite	 t	658	342	92	37	34	17	
Value	 \$'000	88	48	11	6	4	3	
Bentonite and bentonitic clay	 t	43 034	32 571	23 847	185	470	16 723	
Value	 \$'000	1 828	2 067	1 206	191	354	808	
Ball clay	 t	443	2 953	141	47	126	64	
Value	 \$'000	76	247	25	8	20	11	
Clays and earths, activated	 t	4 325	5 216	1 404	1 389	1 121	1 154	
Value	 \$'000	1 128	1 578	434	451	361	382	
China clay, incl. kaolin	 t	11 294	12 714	399	5 246	4 653	251	
Value	 \$'000	1 037	1 495	92	653	660	93	
Fireclay	 t	1 430	1 247	84	50	30	84	
Value	 \$'000	116	150	16	23	8	17	
Clays, n.e.i.	 t	36 658	8 649	1 407	1 074	648	3 355	
Value	 \$'000	2 720	1 836	387	358	160	416	
Exports								
Clays (except activated)	 t	3 027	4 941	772	3 373	1 631	2 468	
Value	 \$'000	364	948	147	621	207	261	

COAL

		1982				1983*	
		1981	1982	September	December	March	June
PRODUCTION							
Mine production							
Black coal							
Bituminous	 '000 t	93 376	99 109	27 074	25 505	22 100	23 903
Sub-bituminous	 "	7 190	7 992	2 329	2 122	2 075	2 282
Semi-anthracite	 "	29	227	65	45	56	31
New South Wales	 "	50 749	64 877	18 177	17 661	14 848	15 932
Queensland (a)	 "	34 682	36 784	9 610	8 573	8 103	8 794
South Australia	 "	1 564	1 451	501	287	321	330
Western Australia	 "	3 254	3 702	1 032	997	844	1 030
Tasmania	 "	346	515	149	156	115	129
Underground	 "	50 524	50 929	14 307	13 256	11 081	12 170
Open-cut	 "	50 071	56 400	15 161	14 417	13 150	14 046
Total	 "	100 596	107 329	29 468	27 673	24 231	26 216
Brown coal (lignite)	 "	32 959	37 811	10 476	7 787	7 322	9 102
Victoria	 "	32 959	37 811	10 476	7 787	7 322	9 102
Coal products							
Metallurgical coke	 "	4 403	3 761	977	741	681	735
Brown coal briquettes	 "	1 008	879	230	218	158	148

IMPORTS

Coal	 t	1 781	12 183	276	11 610	1 112	16 688
Value	 \$'000	434	963	31	857	315	1 347
Coke (incl. petroleum coke)	 t	187 721	157 149	38 226	22 043	71 128	41 097
Value	 \$'000	28 859	28 878	6 918	4 219	10 207	6 108

EXPORTS

Black coal																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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(a) Saleable coal: excludes washery rejects. All other States raw coal.

COBALT

Mine production

Cobalt content of minerals produced							
Nickel ore	 t	2 219	2 518	640	566	657	385
Nickel concentrate	 "	609	534	266	257	240	252
Zinc concentrate	 "	74	68	23	17	20	23
Total contained cobalt	 "	2 902	3 132	929	840	917	660
Imports							
Cobalt oxide and hydroxide	 t	39	25	6	5	6	8
Value	 \$'000	902	457	91	82	71	142
Cobalt and cobalt-base metal alloys (excl. powder)							
Value	 \$'000	413	125	34	22	19	11

COPPER

			1982		1983*	
	1981	1982	September	December	March	June
PRODUCTION						
Mine production						
Minerals produced						
Copper ore (a)	t	27 489	16 123	—	—	—
Copper content	''	8 576	5 648	—	—	—
Silver content	kg	770	382	—	—	—
Copper concentrate	t	804 368	855 592	216 561	177 446	199 204
Copper content	''	203 652	219 295	57 305	46 784	50 482
Gold content	kg	2 716	1 249	226	186	164
Silver content	''	47 243	65 462	17 481	15 531	15 696
Lead content	t	2 436	3 222	812	765	720
Zinc content	''	3 570	5 075	1 861	1 817	1 295
Copper precipitate	''	2 245	2 286	—	—	—
Copper content	''	1 809	1 926	—	—	—
Copper content of minerals produced						
Bismuth concentrate	t	2 159	1 400	n.a.p.	n.a.p.	n.a.p.
Copper ore (a)	''	8 576	5 648	—	—	—
Copper concentrate	''	203 652	219 295	57 305	46 784	50 482
Copper precipitate	''	1 809	1 926	—	—	—
Copper-tin concentrate	''	566	602	141	104	88
Gold ore	''	7	—	—	—	—
Lead concentrate	''	5 422	5 711	1 207	1 046	952
Lead-copper concentrate	''	3 460	3 540	776	698	785
Lead-zinc concentrate	''	108	274	82	74	39
Nickel concentrate	''	3 276	4 178	1 025	1 022	890
Zinc concentrate	''	2 304	2 748	n.a.p.	n.a.p.	n.a.p.
New South Wales	''	18 474	25 886	6 837	6 751	5 979
Queensland	''	147 225	160 896	39 887	28 341	33 367
South Australia	''	19 886	13 701	n.a.p.	n.a.p.	n.a.p.
Western Australia	''	5 784	15 213	4 607	4 561	3 962
Tasmania	''	22 402	20 906	4 360	4 491	6 428
Northern Territory	''	17 568	8 720	n.a.p.	n.a.p.	n.a.p.
Total contained copper	''	231 339	245 322	61 868	50 801	54 176
Smelter and refinery production						
Blister copper (b)	''	172 181	175 536	47 421	42 587	37 360
Refined copper	''	164 241	160 195	42 922	42 854	44 367
IMPORTS						
Copper						
Unrefined copper	t	2 037	2 175	420	750	4 426
Value	\$'000	5 999	8 071	1 305	3 159	3 110
Refinery shapes	t	22	1	—	—	—
UK	''	—	—	—	—	—
Other	''	22	1	—	—	—
Value	\$'000	10	7	—	—	27
Bars, rods, angles and tees	t	29	15	2	3	—
Value	\$'000	73	74	16	11	4
Plates, sheets and strips	t	299	87	11	31	35
Value	\$'000	653	253	60	78	92
Pipes and tubes	t	167	856	58	160	23
Value	\$'000	753	2 420	207	453	96
Wire	t	4	20	14	2	5
Value	\$'000	29	55	23	8	12
Powder	t	137	54	10	6	6
Value	\$'000	448	208	39	20	18
Scrap	t	1 623	1 495	401	536	170
Value	\$'000	897	775	182	234	116
Copper-base alloys						
Pigs, ingots and blocks	t	37	97	20	23	—
Value	\$'000	72	209	64	59	—
Rolled, drawn and extruded shapes	t	4 248	4 699	1 349	929	582
Value	\$'000	12 275	12 353	3 783	2 389	1 786
Wire	t	381	373	112	53	64
Value	\$'000	1 518	1 359	357	218	247
Scrap	t	6 125	648	307	39	205
Value	\$'000	362	386	130	34	151

COPPER (continued)

			1982				1983*	
			1981	1982	September	December	March	June
EXPORTS								
Copper								
Copper concentrate	.....	t	113 625	159 980	47 693	37 142	75 398	65 036
Japan	.....	"	108 822	133 154	46 505	23 021	62 783	63 883
Other	.....	"	4 803	26 826	1 188	14 121	12 615	1 153
Value	.....	\$'000	59 460	60 249	15 026	15 664	25 291	27 584
Copper matte	.....	t	4 444	13 910	2 281	2 337	1 491	496
Value	.....	\$'000	3 035	6 878	1 430	1 487	1 141	513
Copper-lead dross	.....	t	4 761	7 348	2 300	1 350	1 438	1 480
Value	.....	\$'000	4 053	4 669	1 265	1 055	1 303	1 441
Slags and residues	.....	t	236	348	17	137	10	122
Value	.....	\$'000	172	237	17	98	..	91
Blister copper	.....	t	18 773	7 213	3 829	2 091	3 121	962
Germany, F.R.	.....	"	2 581	400	—	—	—	—
Japan	.....	"	12 979	6 480	3 829	2 091	3 121	962
USA	.....	"	2 358	—	—	—	—	—
Other	.....	"	855	333	—	—	—	—
Value	.....	\$'000	51 579	18 888	9 467	5 480	8 154	2 804
Refinery shapes	.....	t	55 548	45 235	10 147	15 576	23 865	21 247
EC (c)	.....	"	29 701	27 195	6 015	10 370	17 022	10 024
UK	.....	"	13 642	9 132	2 170	3 236	6 325	11 137
Other	.....	"	12 205	8 908	1 962	1 970	518	86
Value	.....	\$'000	83 036	65 351	14 497	22 935	36 640	39 961
Bars and rods	.....	t	24 920	26 828	6 708	6 561	5 693	4 823
Value	.....	\$'000	40 554	41 544	9 952	10 520	9 675	9 562
Angles, shapes and sections	.....	t	120	239	74	75	56	15
Value	.....	\$'000	358	639	197	195	105	46
Plates, sheets and strips	.....	t	3 544	2 992	946	673	338	798
Value	.....	\$'000	6 703	6 494	2 118	1 587	810	2 107
Tubes and pipes	.....	t	1 724	1 283	517	289	277	201
Value	.....	\$'000	4 630	3 329	1 308	769	661	501
Wire	.....	t	1 454	546	81	98	106	144
Value	.....	\$'000	2 611	902	138	165	186	300
Scrap	.....	t	64	7	—	—	—	14
Value	.....	\$'000	96	32	—	—	—	14
Copper-base alloys								
Refinery shapes	.....	t	565	539	109	99	8	43
Value	.....	\$'000	969	962	215	165	31	103
Bars and rods	.....	t	3 049	2 554	731	520	449	377
Value	.....	\$'000	4 642	4 240	1 215	995	849	819
Angles, shapes and sections	.....	t	356	419	72	86	45	16
Value	.....	\$'000	761	908	171	202	107	39
Plates, sheets and strips	.....	t	654	522	122	128	55	196
Value	.....	\$'000	1 639	1 306	300	319	124	474
Tubes and pipes	.....	t	80	61	22	8	6	53
Value	.....	\$'000	286	208	63	26	15	140
Wire	.....	t	142	15	8	—	1	8
Value	.....	\$'000	378	43	22	—	2	22
Scrap	.....	t	152	404	206	122	100	145
Value	.....	\$'000	228	461	168	58	64	222
Copper and copper-base alloys								
Foil	.....	t	1	—	—	—	4	..
Value	.....	\$'000	1	—	—	—	14	1
Powders and flakes	.....	t	544	782	339	264	159	314
Value	.....	\$'000	711	1 070	435	337	206	524
Copper content of concentrates, matte, etc. exported (d)	.....	t	43 291	63 282	14 968	14 765	21 679	16 950

(a) Includes cuprous ore for fertilizer. (b) Total production for refining in Australia and overseas. (c) Excludes UK. (d) Excludes copper in blister.

CRYOLITE, NATURAL

Imports (including chiolite)	.....	t	194	145	34	5	10	1 025
Value	.....	\$'000	103	82	25	4	8	664

DIAMONDS

DIAMONDS			1982				1983*	
			1981	1982	September	December	March	June
PRODUCTION								
Mine production	.....	carat	—	—	—	—	641 924	1 646 193
Western Australia	.....	**	—	—	—	—	641 924	1 646 193
IMPORTS								
Gem diamonds								
Rough, unsorted	.....	carat	516	331	—	319	—	—
Value	.....	\$'000	50	41	—	38	—	—
Rough, sorted	.....	carat	2 035	327	292	79	78	—
Value	.....	\$'000	671	122	114	20	13	—
Cut and polished	.....	carat	76 007	75 143	19 519	18 101	21 604	12 887
Value	.....	\$'000	37 528	32 425	8 376	6 875	8 659	5 940
Industrial diamonds	.....	carat	1 267 602	1 024 470	185 185	230 859	166 251	270 086
Value	.....	\$'000	7 901	4 910	351	693	557	911

EXPORTS

Gem diamonds								
Rough, unsorted	.....	carat	246	434	—	434	4 099	569 855
Value	.....	\$'000	369	133	—	133	221	6 841
Rough, sorted	.....	carat	293	136	41	20	101	1
Value	.....	\$'000	50	185	141	21	93	..
Cut and polished	.....	carat	8 257	45 704	34 873	4 803	3 228	4 071
Value	.....	\$'000	10 742	11 617	2 809	3 941	1 808	3 167
Industrial diamonds (a)								
Value	.....	\$'000	272 322	269 526	111 200	58 212	348 811	46 110
	.....		3 252	3 073	1 130	705	5 286	443

(a) Excludes dust and powder.

DIATOMITE

Mine production	.....	t	2 073	1 561	523	641	1 134	2 334
Imports	.....	**	12 312	11 477	1 986	3 106	2 628	2 224
Value		\$'000	2 570	2 634	444	794	623	601

DOLOMITE

Mine production		t	756 568	602 271	143 544	146 466	106 597	105 474
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FELSPAR

Mine production		t	3 868	4 335	788	132	346	1 355
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FLUORSPAR

Imports		t	26 275	20 331	4 048	196	6 233	416
Value		\$'000	1 837	1 693	455	28	709	75

GEMS, other than diamonds

PRODUCTION

Opals		\$'000	48 666	39 079	}	n.a.	n.a.	n.a.
New South Wales	.....	**	13 604	9 445				
Queensland	.....	**	842	874				
South Australia	.....	**	34 220	28 760				
Sapphires	.....	**	19 689	23 807				
New South Wales		**	4 689	8 807	}	n.a.	n.a.	n.a.
Queensland	.....	**	15 000	15 000				
Other gems	.....	**	368	206				
New South Wales	.....	**	4	4				
Queensland	.....	**	327	119				
South Australia	.....	**	4	43				
Western Australia	.....	**	7	40				
Northern Territory	.....	**	26	—				

GEMS (continued)

		1982				1983*		
		1981	1982	September	December	March	June	
EXPORTS								
Opals								
Rough, not cut or polished		\$'000	3 662	2 377	228	730	807	1 193
Cut and polished (a)		"	20 032	14 357	2 289	4 094	1 683	6 039
Sapphires								
Rough, not cut or polished		"	11 148	11 216	3 157	2 004	2 482	3 024
Other		"	3 420	3 248	442	858	463	485

(a) Includes black opals.

GOLD

PRODUCTION

Mine production								
Minerals produced								
Gold bullion	kg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gold content	"	12 786	22 874	6 662	7 187	5 928	6 391	
Silver content	"	1 842	3 117	674	847	641	530	
Gold content of minerals produced								
Alluvial gold	"	270	417	—	—	—	—	
Bismuth concentrate	"	246	248	71	44	44	60	
Copper concentrate	"	2 716	1 249	225	186	164	305	
Copper ore	"	1	1	—	—	—	—	
Gold ore	"	194	166	28	40	—	—	
Gold bullion	"	12 786	22 874	6 662	7 187	5 928	6 391	
Lead ore	"	2	—	—	—	—	—	
Lead concentrate	"	348	376	95	84	105	113	
Lead-copper concentrate	"	1 292	1 109	279	265	354	333	
Lead-zinc concentrate	"	2	22	5	5	5	4	
Nickel concentrate	"	219	188	—	—	—	—	
Zinc concentrate	"	299	311	76	73	102	99	
New South Wales								
Victoria	"	587	610	143	143	101	127	
Queensland	"	75	100	30	22	17	25	
South Australia	"	1 510	579	—	—	—	—	
Western Australia	"	32	10	—	—	—	—	
Tasmania	"	11 724	20 603	5 749	6 485	5 311	5 537	
Northern Territory	"	1 950	1 737	411	405	587	552	
Total contained gold	"	2 495	3 322	1 108	829	686	1 064	
Refinery production		18 374	26 961	7 441	7 884	6 701	7 306	
Newly-won gold								
Australian origin	"	13 372	23 292	6 073	6 762	6 763	6 186	
Overseas origin	"	1 619	2 419	638	523	459	384	
Scrap								
Australian origin	"	8 065	2 987	709	1 201	857	454	
Overseas origin	"	421	172	12	61	28	29	
Total	"	23 471	28 870	7 432	8 547	8 107	7 052	

IMPORTS

Gold								
Refined forms (excl. specie, leaf and foil)	kg	4	25	—	17	—	40	
Value	\$'000	87	350	—	259	—	565	
Unrefined bullion (gold content)	kg	393	2 206	886	761	863	848	
Fiji	"	—	1 152	532	516	529	581	
Papua New Guinea	"	240	523	244	177	269	197	
Other	"	153	531	110	68	65	70	
Value	\$'000	5 595	15 046	5 973	6 116	8 092	6 795	

EXPORTS

Refined forms (excl. specie, leaf and foil)	kg	3 912	9 794	2 514	2 946	2 354	5 561	
Hong Kong	"	2 231	4 936	661	—	4	9	
Japan	"	2	1	1	—	—	—	
Singapore	"	1	311	—	311	321	—	
New Zealand	"	106	25	—	4	4	—	
UK	"	1 453	4 482	1 851	2 630	2 008	5 536	

GOLD (continued)

		1982				1983*	
		1981	1982	September	December	March	June
Other	''	119	40	1	1	16	16
Value	\$'000	54 606	135 801	36 115	42 869	36 534	83 663
Gold content of concentrates, blister copper, etc. exported	kg	3 474	3 283	881	1 186	1 272	508

GYPSUM

PRODUCTION

Mine production	t	1 752 266	1 863 719	432 237	360 321	303 345	330 418
New South Wales	..	20 206	17 350	4 159	3 703	2 841	2 505
Victoria	..	282 828	235 872	19 577	18 150	22 441	22 455
South Australia	..	1 017 192	1 159 289	277 264	248 860	216 261	250 052
Western Australia	..	432 040	451 208	131 237	89 608	61 802	55 406

EXPORTS

Gypsum and anhydrite	t	647 002	606 891	161 016	119 137	164 344	139 980
China, Taiwan Province only	..	68 687	84 154	14 091	15 502	33 224	19 000
Indonesia	..	183 165	173 695	30 126	55 398	29 918	39 742
New Zealand	..	104 592	124 507	48 562	12 021	15 702	20 962
Singapore	..	68 025	89 523	34 530	11 331	23 933	6 358
Other	..	222 533	135 012	33 707	24 885	61 567	53 918
Value	\$'000	7 048	8 245	2 364	1 824	2 482	2 069

IRON

PRODUCTION

Mine production							
Minerals produced							
Iron ore and concentrate (a)(b)	'000 t	84 661	87 694	23 524	18 525	21 156	17 714
Iron content	..	53 361	55 566	14 915	11 768	14 102	11 305
Production: States, iron content							
South Australia	..	1 559	1 128	259	206	215	249
Western Australia	..	50 258	52 996	14 243	11 164	13 464	10 714
Tasmania	..	1 544	1 442	413	397	422	342
Total contained iron	..	53 361	55 566	14 915	11 768	14 102	11 305
Iron and steel							
Iron ore pellets	..	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Pig iron	..	6 828	5 956	1 391	1 130	1 137	1 235
Raw steel (c)	..	7 635	6 371	1 535	1 199	1 218	1 354
Blooms and slabs	..	5 896	4 576	1 076	831	759	917
Tinplate	..	343	344	83	84	84	84

IMPORTS

Iron							
Iron ore	t	46 912	90 956	17 522	22 331	6 390	6 209
Canada	..	46 887	90 940	17 506	22 331	6 388	6 207
Other	..	25	16	16	..	2	2
Value	\$'000	1 150	2 425	526	634	188	198
Iron and steel							
Ferrous alloys, excl. powders							
Ferrochromium	t	7 189	2 521	767	154	252	299
Value	\$'000	4 721	1 685	514	111	189	259
Ferromanganese	t	3 674	1 676	34	184	150	96
Value	\$'000	2 374	1 098	25	144	124	79
Ferromolybdenum	t	171	175	34	45	76	9
Value	\$'000	2 155	1 389	334	402	162	64
Ferrosilicon	t	1 637	106	105	..	..	..
Value	\$'000	2 406	616	612	..	..	..
Ferrosilicon	t	9 736	10 761	1 883	3 300	1 629	1 832
Value	\$'000	4 675	6 222	1 234	1 793	899	1 097
Other	t	7 528	1 608	377	263	127	104
Value	\$'000	6 128	2 650	725	545	355	131
Tinplate (d)	t	575	649	208	57	127	102
Value	\$'000	329	367	130	40	86	76

IRON (continued)

						1982		1983*				
						1981	1982	September	December	March	June	
EXPORTS												
Iron												
Iron ore and pellets						'000 t	71 146	72 710	17 887	17 724	16 611	14 539
Japan						"	53 862	51 349	13 327	13 453	11 224	9 581
Other						"	17 284	21 361	4 560	4 271	5 387	4 958
Value						\$'000	1 123 141	1 432 005	387 794	399 480	370 511	329 689
Iron and steel												
Pig iron						t	158 262	101 399	72 529	28 735	160 538	105 504
China, Taiwan Province only						"	60 646	15 006	15 006	—	—	—
Japan						"	47 717	80 223	52 590	27 633	134 414	79 592
New Zealand						"	440	335	161	39	79	67
Singapore						"	25 220	160	53	53	26 042	25 845
Other						"	24 239	5 729	4 719	1 010	3	—
Value						\$'000	17 631	7 383	5 222	2 133	10 614	8 547
Ingots, blooms and slabs						t	378 418	217 713	76 902	38 769	78 016	121 824
Value						\$'000	68 207	37 935	13 421	6 983	13 124	22 140
Scrap (f)						t	665 067	749 106	173 289	189 480	140 450	128 635
Value						\$'000	64 943	44 698	12 173	12 873	8 433	10 761
Tinplate, excl. waste						t	75 880	127 066	35 350	29 214	21 828	38 002
Value						\$'000	45 214	67 321	20 433	17 093	12 864	20 632
Iron content of iron ore and pellets exported						'000 t	44 834	45 605	11 175	11 083	10 447	9 138

(a) Iron oxide for metal extraction. (b) Includes iron ore for pelletising. (c) Includes recovery from scrap. (d) Includes template. (f) Includes tinplate waste.

LEAD

PRODUCTION

Mine production										
Minerals produced										
Lead ore (a)(b)	....	....	....	t	27 379	24 731	—	—	—	—
Lead content	....	....	....	"	1 509	1 360	—	—	—	—
Silver content	....	....	....	kg	1 650	1 489	—	—	—	—
Lead concentrate	....	....	....	t	643 930	708 715	168 077	170 932	180 027	202 839
Lead content	....	....	....	"	350 121	403 931	101 429	90 372	98 248	114 825
Silver content	....	....	....	kg	553 242	664 482	166 961	153 214	174 442	225 001
Antimony content	....	....	....	t	482	418	123	100	92	111
Cadmium content	....	....	....	"	95	175	27	20	17	20
Copper content	....	....	....	"	5 422	5 711	1 207	1 046	952	1 114
Gold content	....	....	....	kg	348	376	95	84	105	113
Zinc content	....	....	....	t	45 636	48 355	11 574	11 468	12 616	14 120
Sulphur content	....	....	....	"	63 413	63 059	17 289	14 103	14 924	17 925
Lead-copper concentrate	....	....	....	"	28 084	29 891	6 691	5 610	6 258	6 410
Lead content	....	....	....	"	7 860	7 560	1 868	1 245	1 707	1 569
Copper content	....	....	....	"	3 460	3 540	776	698	785	767
Silver content	....	....	....	kg	49 733	52 502	13 155	10 300	11 889	12 105
Gold content	....	....	....	"	1 292	1 109	279	265	354	333
Zinc content	....	....	....	t	3 543	3 570	823	773	751	817
Sulphur content	....	....	....	"	7 695	8 450	1 856	1 575	1 643	1 766
Lead content of minerals produced										
Copper concentrate	....	....	....	"	2 436	3 222	812	765	720	994
Lead ore (a)(b)	....	....	....	"	1 509	1 360	—	—	—	—
Lead concentrate	....	....	....	"	350 121	403 931	101 429	90 372	98 248	114 825
Lead-copper concentrate	....	....	....	"	7 860	7 560	1 868	1 245	1 707	1 569
Lead-zinc concentrate	....	....	....	"	2 041	11 247	2 726	2 761	2 631	2 622
Zinc concentrate	....	....	....	"	24 155	28 018	6 828	6 551	7 209	7 712
Refined lead										
New South Wales	....	....	....	"	221 045	245 124	66 146	54 640	54 338	62 611
Queensland	....	....	....	"	141 529	179 531	40 050	39 980	45 415	56 111
South Australia	....	....	....	"	8	12	—	—	—	—
Tasmania	....	....	....	"	25 527	30 621	7 467	7 074	10 762	9 000
Northern Territory	....	....	....	"	13	50	—	—	—	—
Total contained lead (b)	....	....	....	"	388 122	455 338	113 663	101 694	110 515	127 722
Smelter and refinery production										
Refined lead (c)	....	....	....	"	207 669	218 808	58 827	56 080	46 336	50 933
Lead content of lead bullion for export	....	....	....	"	162 564	181 592	48 377	41 430	41 210	48 003

LEAD (continued)

			1981	1982	September	December	1983*	March	June
EXPORTS									
Lead concentrate	t		63 233	91 312	8 684	29 240	12 676	14 342	
Belgium-Luxembourg	"		18 484	—	—	—	—	—	
Japan	"		10 201	10 274	—	10 274	5 297	5 454	
UK	"		20 817	28 764	—	5 998	—	—	
USA	"		9 278	38 469	4 994	12 968	7 379	8 888	
Other	"		4 453	13 805	3 690	—	—	—	
Value	\$'000		33 728	36 635	3 572	11 636	8 918	8 366	
Lead bullion	t		137 727	166 459	52 083	35 381	31 792	50 788	
Germany, F.R.	"		1 999	3 501	2 482	—	1 492	5 042	
Italy	"		2 710	6 016	—	3 381	—	—	
UK	"		133 000	156 408	49 601	32 000	26 601	38 376	
Other	"		18	534	—	—	3 699	7 370	
Value	\$'000		168 309	176 266	57 096	42 127	41 580	75 849	
Refined lead, unworked (incl. antimonial lead)	t		170 534	194 784	51 193	44 409	46 392	52 141	
China, excl. Taiwan Province	"		17 492	7 996	1 496	3 500	—	—	
India	"		31 254	54 928	12 648	11 408	13 041	8 312	
Indonesia	"		8 222	10 385	2 749	2 743	2 312	3 060	
Iran	"		10 819	16 348	9 348	—	—	15 998	
Italy	"		12 083	9 005	2 853	2 200	—	—	
Japan	"		16 974	19 621	4 348	4 500	4 372	4 375	
UK	"		12 954	9 964	1 664	2 189	3 457	4 406	
USA	"		10 883	10 883	3 628	3 628	3 628	—	
Other	"		49 853	55 654	12 459	14 241	19 582	15 990	
Value	\$'000		113 168	121 429	30 716	26 645	27 835	31 285	
Rolled and extruded shapes	t		11 026	208	90	29	101	27	
Value	\$'000		6 621	185	58	37	81	22	
Scrap	t		5 299	1 986	583	456	353	928	
Value	\$'000		1 828	738	206	164	122	248	
Slags and residues	t		10 661	3 661	741	734	763	255	
Value	\$'000		4 800	1 810	207	290	283	390	
Lead content of concentrates, residues, etc., exported	t		36 815	52 438	7 728	18 298	11 354	14 550	
Lead content of lead bullion exported	"		136 593	165 433	51 766	35 162	31 413	50 463	

LIMESTONE

PRODUCTION

Mine production (a)	 '000 t	11 983	12 698	(b) 2 711	(b) 2 615	(b) 1 975	(b) 2 434
New South Wales	 "	3 620	3 417	885	815	661	724
Victoria	 "	2 249	2 303	607	510	470	535
Queensland	 "	1 842	2 235	486	486	324	444
South Australia	 "	2 119	2 061	481	608	429	479
Western Australia	 "	1 382	1 762	n.a.	n.a.	n.a.	n.a.
Tasmania	 "	771	910	252	197	92	251
Northern Territory	 "	—	10	n.a.	n.a.	n.a.	n.a.
Cement, Portland	 "	5 946	5 744	1 476	1 356	1 086	1 158

IMPORTS

Limestone and calcareous stone	 t	1 323 361	976 887	247 799	199 454	193 330	181 774
Japan	 "	1 274 966	946 088	247 799	199 454	193 330	181 774
Other	 "	48 395	30 799	—	—	—	—
Value	 \$'000	6 345	4 344	1 092	888	918	964
Calcium carbide	 t	5 029	15 621	2 218	5 308	2 928	2 531
Philippines	 "	4 029	8 918	730	2 731	684	899
Other	 "	1 000	6 703	1 488	2 577	2 244	1 632
Value	 \$'000	1 558	5 152	779	1 786	968	854
Cement, Portland grey	 "	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cement, Portland white	 t	11 537	9 359	1 912	2 335	1 842	1 277
Denmark	 "	2 540	2 242	394	568	623	263
Japan	 "	6 113	5 015	1 188	1 294	1 074	695
UK	 "	328	—	—	—	—	—
Other	 "	2 550	2 102	330	473	145	319
Value	 \$'000	1 420	1 245	257	312	251	175
Cement, Portland, other	 t	678	3 330	3	1 036	174	1
Value	 \$'000	104	347	1	229	40	5

LIMESTONE (continued)

		1982		1983*			
		September	December	March	June		
EXPORTS							
Cement, constructional	t	197 107	293 897	56 570	79 043	46 525	42 129
Value	\$'000	7 325	11 324	2 683	3 472	1 812	1 157

(a) Including shell and coral. (b) Excludes Western Australia.

MAGNESITE

PRODUCTION

Mine production	t	26 445	29 671	8 057	6 765	3 302	6 466
New South Wales	"	25 047	24 903	7 862	4 462	2 349	4 647
Queensland	"	778	3 814	195	195	953	954
South Australia	"	620	954	—	2 108	—	865

IMPORTS

Magnesite, calcined, deadburned	t	21 016	11 235	285	5 508	453	2 094
Value	\$'000	5 796	3 993	707	1 493	190	790
Magnesium oxide (a)							
Electrically fused	t	504	120	19	5	30	19
Value	\$'000	443	168	33	6	45	35
Other	t	317	408	160	57	13	82
Value	\$'000	239	213	49	34	15	43

EXPORTS

Magnesite and magnesium oxide	t	2 617	2 830	1 427	174	103	605
Value	\$'000	785	930	450	51	34	165

(a) Predominantly seawater magnesite and seawater dead-burned magnesite.

MANGANESE

PRODUCTION

Mine production							
Minerals produced							
Metallurgical-grade	t	1 410 563	1 123 019	280 779	289 448	377 396	194 352
Manganese content	"	683 995	539 038	137 599	142 187	186 235	99 723
Manganese content of minerals produced							
Metallurgical-grade ore	"	683 995	539 038	137 599	142 187	186 235	99 723
Other-grade ore	"	17 286	1 830	n.a.	n.a.	n.a.	n.a.
Zinc concentrate	"	4 709	5 645	1 505	1 123	1 358	1 563
Total contained manganese	"	705 990	546 513	139 104	143 310	187 593	101 286
Production: States, metallurgical-grade ore:							
Northern Territory	"	1 409 367	1 122 945	280 779	289 448	377 396	194 352
Western Australia	"	1 196	74	—	—	—	—
Total	"	1 410 563	1 123 019	280 779	289 448	377 396	194 352

IMPORTS (a) (b)

Battery-grade ore	t	2 040	193	88	105	229	139
Value	\$'000	417	76	28	48	133	53
Other-grade ore	t	99	258	17	85	3	56
Value	\$'000	22	86	4	24	—	24
Unalloyed powders and flakes	t	1 693	567	168	177	270	111
Value	\$'000	2 091	740	230	245	357	188

(a) Imports of ferromanganese are shown on page 99. (b) Details of exports of manganese ore are not available for publication.

MERCURY

Imports	kg	57 791	35 033	12 081	5 184	6 041	10 827
China, excl. Taiwan Province	"	26 508	25 913	8 625	5 175	1 898	3 968
Japan	"	6 211	2	—	—	—	—
New Zealand	"	13 317	400	—	4	—	15
Spain	"	8 280	6 900	3 450	—	—	—
Other	"	3 475	1 818	6	5	4 143	6 844
Value	\$'000	485	382	133	58	64	121

MICA

		1982				1983*	
		1981	1982	September	December	March	June
Imports	t	805	475	32	70	20	53
Value	\$'000	180	161	32	25	39	41

MONAZITE

PRODUCTION

Mine production							
Monazite concentrate	t	13 282	9 562	2 461	2 115	2 119	4 734
Monazite content	''	12 337	8 889	2 287	1 968	1 960	4 284
Production: States, monazite content:							
New South Wales (a)	''	576	179	49	—	137	49
Queensland	''	—	—	—	—	10	173
Western Australia	''	11 761	8 710	2 238	1 968	1 813	4 062
Total contained monazite	''	12 337	8 889	2 287	1 968	1 960	4 284

EXPORTS

Monazite concentrate	t	14 028	15 251	2 643	3 180	6 835	2 179
France	''	4 623	5 588	324	1 458	4 324	971
UK	''	2 477	1 641	433	108	—	—
USA	''	6 871	6 594	1 886	1 326	2 485	1 190
Other	''	57	1 428	—	288	26	18
Value	\$'000	5 346	6 161	1 084	1 291	2 806	884

(a) Despatches.

NICKEL

PRODUCTION

Mine production							
Nickel ore	t	1 998 957	2 152 145	547 045	483 390	513 430	300 727
Nickel content	''	26 586	30 006	7 626	6 739	7 290	4 270
Cobalt content	''	2 219	2 518	640	566	657	385
Nickel concentrate	''	416 012	464 778	129 492	126 577	112 357	127 511
Nickel content	''	47 769	57 546	16 331	15 460	13 477	14 954
Cobalt content	''	609	534	266	257	240	252
Copper content	''	3 276	4 178	1 025	1 022	890	977
Total contained nickel	''	74 355	87 552	23 957	22 199	20 767	19 224

IMPORTS (a)

Pigs, ingots and blocks	t	829	1 152	19	65	38	52
Value	\$'000	4 734	6 650	99	401	144	271
Pellets, shot granulated	t	46	109	—	—	14	—
Value	\$'000	252	649	—	—	101	—
Electroplating anodes	t	6	46	19	1	18	18
Value	\$'000	49	332	122	8	102	118
Bars, rods, angles, shapes and sections	t	33	19	—	—	—	18
Value	\$'000	272	155	—	—	—	81
Plates, sheets and strips	t	5	5	—	3	—	—
Value	\$'000	48	65	—	38	—	—
Pipes and tubes	t	—	1	—	—	—	—
Value	\$'000	13	21	2	4	1	1
Wire	t	—	4	—	—	1	—
Value	\$'000	22	46	4	9	13	—
Powder	t	10	7	4	—	—	—
Value	\$'000	71	63	45	9	4	3
Nickel-base alloys							
Unworked shapes	t	646	682	12	7	3	1
Value	\$'000	3 422	3 887	18	46	29	6
Bars, rods, angles, shapes and sections	t	102	55	32	11	10	18
Value	\$'000	1 111	584	260	119	131	356
Plates, sheets and strips	t	824	328	124	33	27	16
Value	\$'000	4 672	2 879	940	364	258	176
Pipes and tubes	t	53	19	3	6	3	2
Value	\$'000	826	308	68	120	45	60
Wire	t	278	248	121	20	3	11
Value	\$'000	2 880	2 620	955	280	83	161
Powder	t	26	37	7	11	7	10
Value	\$'000	353	434	99	119	57	115

NICKEL (continued)

		1982				1983*	
		1981	1982	September	December	March	June
EXPORTS (b)							
Nickel							
Concentrate	****		\$'000	—	—	—	145
Metal, unwrought	****	127 213	131 398	46 147	32 943	29 897	40 453
Matte and speiss	****	260 844	260 357	77 610	57 121	45 865	49 066
Powder	****	1 686	1 295	385	362	62	94

(a) Imports of ferro-nickel are shown on page 99. (b) Details of the quantities exported of nickel metal unwrought, nickel matte and speiss, and nickel powder are not available for publication.

PEAT

Mine production	.....	t	13 760	10 101	(a) 921	(a) 1 184	(a) 900	(a) 305
Imports	.....	"	7 305	7 886	1 891	1 946	2 373	1 728
Value	.....	\$'000	1 070	1 227	296	285	364	287

(a) Excludes Western Australia.

PETROLEUM

PRODUCTION (Source: Domestic Energy Policy Branch, Department of Resources & Energy)

Petroleum production								
Crude oil	.....	ML	22 842	21 668	4 734	5 930	5 406	5 989
Liquefied petroleum gas (LPG), naturally occurring	.....	"	3 036	2 903	679	739	663	826
Natural gas, other	.....	10 ⁶ m ³	11 268	11 595	3 301	2 645	2 507	3 202
Refinery operations								
Input of feedstock	.....	ML	34 236	34 211	7 550	9 134	8 160	8 106
Products								
Refinery gas (a)(b)(c)	.....	"	54	48	14	14	16	6
LPG	.....	"	708	684	148	167	151	153
Aviation gasoline	.....	"	144	161	31	45	48	34
Automotive gasoline	.....	"	14 656	15 164	3 487	4 079	3 654	3 748
Power kerosene	.....	"	18	14	4	5	3	7
Aviation turbine fuel	.....	"	2 395	2 459	540	721	568	554
Lighting kerosene	.....	"	142	162	52	34	26	48
Heating oil	.....	"	322	276	93	35	45	99
Automotive diesel oil	.....	"	7 530	8 022	1 790	2 185	1 907	1 828
Industrial and marine diesel fuel	.....	"	762	569	137	174	107	101
Fuel oil (b)	.....	"	3 466	3 328	760	763	819	696
Solvents	.....	"	98	99	29	30	25	23
Lubricating oil base stock	.....	"	534	586	121	155	126	126
Bitumen	.....	"	457	528	103	155	125	109
Other marketable products	.....	"	1 221	1 042	264	268	304	359
Refinery fuel								
Liquid	.....	"	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gas and coke (a)	.....	"	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

IMPORTS

Natural crude	.....	ML	8 479	10 409	2 731	2 632	1 914	1 607
Value	.....	\$'000	1 550 964	2 140 032	566 110	593 053	398 521	334 312
Enriched crude and other refinery feedstock	.....	ML	2 570	3 448	603	872	921	451
Value	.....	\$'000	460 358	668 047	115 174	178 195	186 288	88 172
Gasoline, solvents, and other petroleum								
spirits	.....	ML	721	367	31	179	150	278
Value	.....	\$'000	133 195	92 826	9 265	43 790	35 233	65 689
Kerosene and aviation turbine fuel	.....	ML	94	111	38	25	32	13
Value	.....	\$'000	23 174	30 531	10 195	7 066	9 268	3 798
Automotive distillate, industrial and marine diesel fuels, and heavy								
distillates, n.e.i.	.....	ML	557	561	110	185	131	72
Value	.....	\$'000	132 635	144 367	29 297	49 307	34 874	18 808
Fuel oil	.....	ML	1 779	1 215	278	346	324	232
Value	.....	\$'000	368 834	208 866	48 354	60 741	56 941	41 797
Lubricating oil	.....	ML	47	36	3	13	7	14
Value	.....	\$'000	18 842	16 698	1 712	6 188	3 627	6 537

PETROLEUM (continued)

		1981	1982	1982 September	1982 December	1983* March	1983* June
EXPORTS (d)							
Natural crude	ML	—	—	—	—	—	—
Value	\$'000	—	—	—	—	—	27
Partly refined petroleum	ML	61	97	53	—	—	8
Value	\$'000	12 013	17 738	10 149	10	6	1 592
Gasoline, solvents and other petroleum spirits	ML	424	461	131	183	197	69
Value	\$'000	118 478	137 229	37 267	58 242	56 977	23 623
Kerosene and aviation turbine fuel	ML	337	584	199	228	216	208
Value	\$'000	91 183	164 946	55 305	66 687	63 843	62 016
Automotive distillate, industrial and marine diesel fuels and heavy distillates, n.e.i.	ML	849	872	203	330	346	255
Value	\$'000	197 705	233 681	53 742	96 475	96 354	69 647
Fuel oil	ML	195	998	359	378	347	293
Value	\$'000	34 494	195 706	68 554	77 306	67 484	61 095
Lubricating oils	ML	166	248	49	71	54	51
Value	\$'000	70 797	115 100	25 634	32 917	25 768	26 451
LPG	t	n.a. p.	1 367 290	358 769	343 423	347 982	309 928
Value	\$'000	n.a. p.	327 969	63 817	89 461	91 566	98 256

(a) Fuel-oil equivalent. (b) Excludes refinery fuel. (c) For sale as fuel. (d) From July 1982 ABS export statistics include shipments of petroleum products previously classified to "ships' and aircraft stores".

PHOSPHATE

PRODUCTION

Mine production							
Phosphate rock	t	21 997	211 463	n.a.	n.a.	n.a.	n.a.
Queensland	"	17 060	203 794	n.a.	n.a.	n.a.	n.a.
South Australia	"	4 937	7 669	—	3 794	—	1 873
Production of superphosphate (a)	'000 t	3 665	3 246	543	741	768	753

IMPORTS

Phosphate rock	'000 t	1 962	1 975	560	316	600	672
Christmas Island (Indian Ocean)	"	740	837	293	200	132	111
Nauru	"	1 017	837	144	80	341	425
Other	"	205	301	123	37	127	136
Value	\$'000	98 396	102 676	27 296	14 721	31 744	35 309

(a) Includes double and triple superphosphate and ammonium phosphate expressed in terms of single superphosphate, i.e. 22% P₂O₅ equivalent.

PLATINUM AND PLATINUM-GROUP METALS

Imports

Ingots, blocks, pigs, etc.	kg	19 513	1 065	135	199	59	150
Value	\$'000	2 386	2 172	676	589	528	594
Powder	kg	3 855	2 631	930	1 141	574	—
Value	\$'000	197	565	106	109	89	—
Wire	kg	54	135	23	15	12	—
Value	\$'000	588	685	186	179	194	42

POTASSIUM

Imports

Potassium chloride (fertiliser grade)	t	178 467	227 844	55 456	49 372	29 525	57 835
Value	\$'000	19 496	21 682	5 234	4 503	2 726	5 288
Potassium sulphate (fertiliser grade)	t	22 172	7 613	4 548	2 442	255	3 552
Value	\$'000	3 053	1 954	1 233	580	56	1 041

SALT

		1982				1983*	
		1981	1982	September	December	March	June
PRODUCTION							
Mine production	 '000 t	6 716	4 811	n.a.	n.a.	n.a.	n.a.
Victoria	 "	86	127	n.a.	n.a.	n.a.	n.a.
Queensland	 "	211	215	n.a.	n.a.	n.a.	n.a.
South Australia	 "	755	685	—	348	—	366
Western Australia	 "	5 664	3 784	1 098	1 140	874	1 044

IMPORTS

Salt, common	 t	7 321	6 584	(a) 1 538	(a) 2 023	(a) 1 156	(a) 978
Value	 \$'000	617	562	130	193	118	107

EXPORTS

Salt	 '000 t	3 962	4 143	1 074	1 187	944	653
Value	 \$'000	43 530	54 799	14 797	16 805	13 297	10 199

(a) All grades.

SILLIMANITE (a)

PRODUCTION

Mine production	 t	331	783	144	169	52	46
South Australia	 "	331	783	144	169	52	46

(a) Imports not available separately — included under clays.

SILVER

PRODUCTION

Mine production							
Silver content of minerals produced							
Bismuth concentrate	 kg	284	197	46	34	27	36
Copper ore	 "	770	382	—	—	—	—
Copper concentrate	 "	47 283	65 462	17 481	15 531	15 696	16 969
Gold bullion	 "	1 842	3 117	674	847	641	530
Silver-gold concentrate	 "	32	28	8	6	—	—
Lead ore (a)	 "	1 650	1 489	—	—	—	—
Lead concentrate	 "	553 242	664 482	166 961	153 214	174 442	225 001
Lead-copper concentrate	 "	49 733	52 502	13 155	10 300	11 889	12 105
Lead-zinc concentrate	 "	7 302	24 222	6 797	6 784	6 240	5 845
Nickel concentrate	 "	297	270	—	—	—	—
Silver ore	 "	521	—	—	—	—	—
Zinc concentrate	 "	80 601	94 712	22 704	23 227	25 851	27 253
New South Wales	 kg	279 410	303 235	83 055	70 539	77 040	93 767
Queensland	 "	366 614	481 368	114 269	111 540	123 940	161 279
Victoria	 "	6	7	3	2	2	3
South Australia	 "	8	7	—	—	—	—
Western Australia	 "	17 813	36 890	9 907	9 796	9 963	9 170
Tasmania	 "	78 177	84 697	20 447	17 957	23 785	23 397
Northern Territory	 "	1 529	659	145	109	56	123
Total contained silver	 "	743 557	906 863	227 826	209 943	234 786	287 739
Refinery production							
Refined silver	 "	373 101	348 019	88 136	75 575	76 114	64 064

IMPORTS

Silver							
Silver and alloys	 kg	1 307	149	37	26	321	109
New Zealand	 "	137	37	2	—	307	107
UK	 "	1 149	33	17	7	—	—
USA	 "	19	78	18	19	1	1
Other	 "	2	1	—	—	13	—
Value	 \$'000	486	61	20	17	125	127

EXPORTS

Silver, refined							
Mint bullion	 kg	5 297	142 130	26 049	115 306	46 224	49 030
Value	 \$'000	1 907	40 754	5 305	35 252	17 723	24 510

SILVER (continued)

		1982				1983*	
		1981	1982	September	December	March	June
Refined, other	kg	84 931	92 338	5	2 711	8 223	5 752
Value	\$'000	30 296	22 328	2	731	2 895	2 591
Silver content of concentrate, matte, etc. exported	kg	109 664	171 069	34 022	55 644	46 702	49 481
Silver content of lead bullion exported	"	333 498	432 711	143 845	92 671	78 087	126 759

(a) Includes lead-silver ores.

SULPHUR

PRODUCTION

Mine production

Sulphur content of minerals produced

Lead concentrate	t	63 413	63 059	17 289	14 103	14 924	17 925
Lead-copper concentrate	"	7 695	8 450	1 856	1 575	1 643	1 766
Lead-zinc concentrate	"	2 544	10 887	2 611	2 257	2 230	2 262
Zinc concentrate	"	282 192	347 795	93 614	90 317	87 154	97 939
New South Wales	"	234 562	280 182	78 026	69 650	61 326	79 218
Queensland	"	67 599	90 434	23 005	25 523	26 710	24 019
Tasmania	"	53 683	59 575	14 339	13 079	17 915	16 655
Total contained sulphur	"	355 844	430 191	115 370	108 252	105 951	119 892
Sulphuric acid production	'000 t	2 002	1 916	412	432	486	452

IMPORTS

Sulphur, elemental	t	555 517	458 936	138 136	71 110	113 543	145 388
Canada	"	551 600	458 718	138 103	71 089	92 392	145 265
USA	"	3 884	138	33	18	21 133	33
Other	"	33	80	—	3	18	90
Value	\$'000	42 807	39 038	12 143	6 769	10 329	12 658

TALC (a)

PRODUCTION

Mine production	t	82 986	152 792	43 597	28 562	33 321	27 230
New South Wales	"	8 222	9 467	2 814	1 628	2 346	1 273
South Australia	"	21 046	20 497	4 873	6 143	1 409	5 616
Western Australia	"	53 718	122 828	35 910	20 791	29 566	20 341

IMPORTS

Talc	t	329	253	20	73	28	56
China, excl. Taiwan Province	"	1	1	—	1	1	—
USA	"	228	151	12	37	2	35
Other	"	100	102	8	36	25	21
Value	\$'000	105	94	10	21	17	26

EXPORTS

Talc	t	82 641	80 270	15 106	22 735	17 357	44 385
Japan	"	60 406	51 096	10 914	15 623	13 821	26 831
Netherlands	"	6 213	10 063	—	2 843	3 100	8 398
Other	"	16 022	19 111	4 192	4 269	436	9 156
Value	\$'000	5 529	5 422	994	1 578	1 097	2 875

(a) Includes steatite, chlorite, and pyrophyllite.

TANTALUM AND NIOBIUM (COLUMBIUM) (a)

Exports							
Tantalite-columbite concentrate	t	158	183	55	76	50	65
Value	\$'000	9 204	4 390	1 066	1 634	1 204	1 763

(a) Details of mine production are not available.

TIN

		1982				1983*	
		1981	1982	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Copper-tin concentrate	t	2 736	2 673	623	480	325	527
Copper content	..	566	602	141	104	88	113
Tin content	..	34	33	8	6	11	6
Tin concentrate	..	23 616	23 134	5 536	5 091	4 551	4 145
Tin content	..	12 233	12 093	3 007	2 689	2 400	2 094
Production: States, tin content							
New South Wales	t	1 883	1 564	423	360	362	319
Queensland	..	2 697	1 861	492	445	309	454
Western Australia	..	553	671	106	104	148	143
Tasmania	..	7 057	8 009	1 975	1 767	1 587	1 179
Northern Territory	..	77	21	19	19	5	5
Total contained tin	..	12 267	12 126	3 015	2 695	2 411	2 100
Smelter and refinery production							
Refined tin	..	4 286	3 105	777	674	650	797
IMPORTS (a)							
Refined tin	t	102	64	17	13	21	17
Value	\$'000	1 223	850	218	178	283	261
EXPORTS (a)							
Tin concentrate	t	14 979	14 306	3 589	2 479	2 827	(e) 2 860
Value	\$'000	80 110	84 431	21 931	15 494	17 276	(e) 18 000
Tin, unworked							
Refined	t	1 269	665	145	104	176	104
Value	\$'000	16 061	7 993	1 674	1 314	2 297	1 560
Alloys	t	189	13	2	2	6	8
Value	\$'000	2 110	106	15	25	42	129
Tin content of all concentrates, slags, residues, etc. exported	t	7 353	7 114	1 910	1 261	1 442	(e) 1 500

(a) Production and overseas trade details for tinplate are shown on page 99 and 100.

TITANIUM

PRODUCTION

Mine production							
Minerals produced							
Ilmenite concentrate	t	1 321 137	1 149 212	282 131	252 233	209 149	217 826
Titanium dioxide content	..	764 273	662 793	164 126	143 960	120 017	123 999
Leucocene concentrate	..	19 261	19 739	4 928	3 524	3 040	2 877
Titanium dioxide content	..	17 396	17 965	4 483	3 196	2 744	2 605
Rutile concentrate	..	230 817	220 697	56 898	53 683	44 680	40 135
Titanium dioxide content	..	220 882	211 004	54 621	51 538	42 873	38 539
Titanium dioxide content of minerals produced							
Titanium dioxide contained in:							
Ilmenite concentrate	..	764 273	662 793	164 126	143 960	120 017	123 999
Leucocene concentrate	..	17 396	17 965	4 483	3 196	2 744	2 605
Rutile concentrate	..	220 882	211 004	54 621	51 538	42 873	38 539
Total contained titanium dioxide	..	1 002 551	891 762	223 230	198 694	165 634	165 143
Production: States, titanium dioxide content							
Ilmenite concentrate (a)							
New South Wales	..	11 877	14 178	3 413	3 747	1 905	1 967
Queensland	..	2 885	12 035	3 001	7 938	2 176	1 843
Western Australia	..	766 907	654 545	162 195	135 471	118 680	122 794
Total	..	781 669	680 758	168 609	147 156	112 761	126 604
Rutile concentrate							
New South Wales	..	64 276	45 763	10 658	9 362	8 310	8 382
Queensland	..	81 066	84 680	21 224	20 254	20 384	19 300
Western Australia	..	75 540	80 561	22 739	21 922	14 179	10 857
Total	..	220 882	211 004	54 621	51 538	42 873	38 539

TITANIUM (continued)

		1982				1983*	
		1981	1982	September	December	March	June
IMPORTS							
Titanium oxide							
Anatase	t	11	12	6	1	20	4
Value	\$'000	12	22	8	3	25	11
Rutile	t	648	987	174	202	102	244
Value	\$'000	747	1 278	221	275	197	374
Titanium white pigment	t	23	96	44	17	23	11
Value	\$'000	41	154	60	28	45	33
EXPORTS							
Ilmenite concentrate (a)							
Brazil	t	922 865	893 333	201 656	229 150	205 304	154 340
France	**	69 408	59 510	28 010	—	21 000	5
Japan	**	53 020	54 953	24 515	12 000	23 563	—
Spain	**	39 454	61 398	6 008	23 478	2 555	34 512
UK	**	87 543	80 466	19 350	18 305	24 094	20 221
USA	**	176 408	161 524	21 937	50 674	—	41 917
USSR	**	262 038	329 486	61 855	83 822	110 542	21 590
Other	**	84 467	79 627	18 272	40 809	—	19 664
Value	\$'000	150 527	52 708	21 709	72	23 550	16 581
Rutile concentrate	t	24 554	22 370	5 378	6 674	5 624	4 516
Canada	**	216 048	199 296	71 904	32 546	47 241	64 718
Japan	**	1 005	459	71	104	—	—
Netherlands	**	31 063	29 083	5 656	3 351	4 991	3 853
UK	**	13 423	7 757	3 152	3 001	6 737	2 003
USA	**	41 728	59 441	15 018	18 711	15 027	25 025
Other	**	83 637	71 200	37 879	—	10 101	19 202
Value	\$'000	45 192	31 356	10 128	7 379	10 385	14 635
		64 084	51 326	18 741	8 528	11 677	16 160

(a) Includes leucocene concentrate.

TUNGSTEN

			1982		1983*			
		1981	1982	September	December	March	June	
PRODUCTION								
Mine production								
Minerals produced								
Scheelite concentrate		t	3 787	2 786	819	472	593	306
Tungstic oxide (WO ₃) content		mtu	290 956	200 978	59 513	34 082	43 125	20 587
Wolframite concentrate		t	2 230	1 847	338	373	556	378
Tungstic oxide (WO ₃) content		mtu	152 546	129 057	23 446	24 858	37 717	26 231
Tungstic oxide (WO ₃) content of minerals produced								
Scheelite concentrate								
Queensland		"	7 256	7 919	1 873	1 410	874	218
Tasmania		"	282 400	193 059	57 640	32 672	42 251	20 369
Northern Territory		"	1 300	—	—	—	—	—
Total contained in scheelite		"	290 956	200 978	59 513	34 082	43 125	20 587
Wolframite concentrate								
New South Wales		"	1 300	400	—	—	—	—
Queensland		"	135 346	124 258	23 388	24 858	37 717	26 231
Tasmania		"	15 900	4 399	58	—	—	—
Total contained in wolframite		"	152 546	129 057	23 446	24 858	37 717	26 231
Total contained in tungsten minerals		"	443 502	330 035	82 959	58 940	80 842	46 818
EXPORTS								
Scheelite concentrate								
Value		\$'000	4 254	3 189	829	401	531	707
Wolframite concentrate		t	33 822	23 564	6 569	2 871	3 253	3 675
Value		\$'000	2 093	1 750	388	266	437	219
Tungstic oxide (WO ₃) content of concentrates exported		mtu	16 167	11 519	2 739	1 654	2 184	1 059
In scheelite concentrate		"	433 441	341 410	83 970	43 977	65 043	62 662
In wolframite concentrate		"	289 105	222 585	58 034	27 800	36 601	48 960
		"	144 336	118 825	25 936	16 177	28 442	13 701

URANIUM

		1982				1983*	
		1981	1982	September	December	March	June
PRODUCTION							
Mine production							
Uranium oxide (U ₃ O ₈)	 t	3 446	5 215	1 407	1 075	1 061	1 042
Uranium content	 %	2 922	4 422	1 194	912	900	884

EXPORTS

Uranium oxide (U ₃ O ₈)	....	....	1 625	5 459	1 893	1 431	518	589
Value	....	....	\$'000	120 044	415 047	143 131	113 846	46 326
								50 611

ZINC

PRODUCTION

Mine production								
Minerals produced								
Zinc concentrate	....	....	918 549	1 173 904	309 189	294 497	291 020	330 618
Zinc content	....	....	462 198	593 874	156 851	147 155	147 430	162 373
Lead content	....	....	24 155	28 018	6 828	6 551	7 209	7 712
Silver content	....	....	80 601	94 712	22 704	23 227	25 851	27 253
Gold content	....	....	299	311	76	73	102	99
Cadmium content	....	....	1 644	1 950	548	498	493	555
Cobalt content	....	....	74	80	23	17	20	23
Copper content	....	....	2 304	2 748	n.a.	n.a.	n.a.	n.a.
Manganese content	....	....	4 709	5 645	1 503	1 123	1 358	1 563
Sulphur content	....	....	282 192	347 795	93 614	90 317	87 154	97 939
Zinc content of minerals produced								
Copper concentrate	....	....	3 570	5 075	1 861	1 817	1 295	1 481
Lead concentrate	....	....	45 636	48 355	11 574	11 468	12 616	14 120
Lead-copper concentrate	....	....	3 543	3 570	823	773	751	817
Lead-zinc concentrate	....	....	3 350	13 926	3 179	2 699	2 911	2 942
Zinc concentrate	....	....	462 198	593 874	156 851	147 155	147 430	162 373
By country								
New South Wales	....	....	306 610	371 671	103 693	85 063	81 256	105 369
Queensland	....	....	124 302	173 610	41 747	46 050	48 776	45 501
South Australia	....	....	—	4 249	—	4 249	—	—
Western Australia	....	....	12 972	35 777	9 977	10 406	9 867	8 238
Tasmania	....	....	74 413	79 493	18 871	18 144	25 104	22 625
Total contained zinc	....	....	518 297	664 880	174 288	163 912	165 083	181 733
Smelter and refinery production								
Refined zinc	....	....	295 852	291 390	72 815	71 694	69 223	74 518

EXPORTS

Zinc concentrate	....	....	461 032	569 054	127 750	173 392	174 608	207 266
Belgium-Luxembourg	....	....	27 532	23 594	—	—	23 377	27 489
Finland	....	....	—	24 130	9 900	14 230	—	—
India	....	....	—	44 906	11 034	—	—	17 812
Japan	....	....	262 026	324 828	54 499	130 967	70 298	132 773
Korea, Rep.	....	....	66 352	63 915	23 018	11 379	34 783	29 192
UK	....	....	66 067	52 849	16 288	—	24 807	—
Other	....	....	39 055	34 832	13 011	16 816	21 343	—
Value	....	....	\$'000	96 553	126 081	30 436	38 137	43 519
Refinery-type shapes	....	....	176 091	231 682	62 214	57 742	58 120	65 123
China, excl. Taiwan Province	....	....	2 196	39 665	16 248	14 997	9 097	3 240
China, Taiwan Province only	....	....	24 410	21 918	3 995	5 231	6 370	9 053
India	....	....	7 375	16 155	4 873	1 164	352	1 436
Indonesia	....	....	45 664	56 864	12 379	12 609	13 145	15 063
New Zealand	....	....	10 719	16 501	4 517	1 101	3 371	4 132
Thailand	....	....	21 774	18 947	4 543	4 474	6 350	7 712
UK	....	....	—	4 080	2 831	1 249	1 278	816
USA	....	....	26 143	26 066	6 712	6 938	9 532	11 569
Other	....	....	37 810	31 486	6 116	9 979	8 625	12 102
Value	....	....	\$'000	138 868	196 508	51 119	50 255	59 870
Plates, circles, and strips	....	....	26	17	—	3	—	—
Value	....	....	\$'000	46	13	1	—	—
Slags and residues	....	....	7 150	6 172	1 208	1 718	884	1 821
Value	....	....	\$'000	2 984	2 799	524	812	928
Zinc content of ores and concentrates, slags, residues, etc. exported								
	....	....	240 830	302 034	68 107	90 851	91 665	107 021

ZIRCONIUM

		1981	1982	September	December	1983*	
						March	June
PRODUCTION							
Mine production							
Minerals produced							
Zircon concentrate	 t	434 246	462 476	111 010	109 895	86 153	92 971
Zircon content	 %	340 041	352 246	83 909	82 696	66 698	72 145
Production: States, zircon content							
New South Wales	 %	83 950	65 356	14 108	13 792	12 190	15 350
Queensland	 %	73 882	72 567	17 274	16 201	17 071	16 705
Western Australia	 %	182 209	214 323	52 527	52 703	37 437	40 090
Total contained zircon	 %	340 041	352 246	83 909	82 696	66 698	72 145
EXPORTS							
Zircon concentrate	 t	444 186	405 215	117 332	64 172	91 882	71 136
France	 %	34 588	17 120	5 021	1 556	3 028	6 303
Italy	 %	56 836	59 291	14 008	4	15 355	11 158
Japan	 %	155 536	160 878	41 470	27 001	46 417	19 378
Netherlands	 %	53 257	37 997	17 468	9 184	12 417	8 006
Spain	 %	24 759	16 213	3 503	3 003	3 003	3 003
UK	 %	20 532	16 348	9 026	2 005	—	11 085
USA	 %	63 597	60 793	19 822	8 157	4 103	105
USSR	 %	3 999	10 071	2 000	6 071	—	—
Other	 %	31 082	26 504	5 014	7 191	7 559	12 098
Value	 \$'000	36 994	43 064	13 365	7 891	10 550	8 390

Other BMR and ABS publications on the mineral industry

BUREAU OF MINERAL RESOURCES

The *Australian Mineral Industry Annual Review* is BMR's annual record of the performance and development of the mineral industry, based on the calendar year (see rear cover). In order to issue available information as soon as possible, preliminary annual summaries for the major commodities are issued about two months after the close of the calendar year, containing preliminary or estimated trade statistics; and separate preprints of the major chapters in the *Review* are made available as soon as possible after they have been written, beginning late in the following calendar year (e.g. in late 1984 for the 1983 *Review*).

In addition to its main mineral-industry statistical periodicals (*Australian Mineral Industry Annual Review* and *Australian Mineral Industry Quarterly*) BMR issues the following Mineral Industry statistical information sheets:

- *Bulletin of Metal, Ore & Concentrate Prices* (monthly);
- *Summary of Principal Mineral Statistics* (annually);
- *Sulphur/Sulphuric Acid & Superphosphate Statistics* (annually);
- *Bulletin of Mineral Sand Statistics* (quarterly);
- *Bulletin of Copper, Lead, & Zinc Statistics* (quarterly);
- *Bulletin of Tin Statistics* (quarterly);
- *Information Bulletin on Australia's Uranium Resources* (annually).

Current BMR publications on Petroleum include:

- *PETROLEUM EXPLORATION & DEVELOPMENT IN AUSTRALIA, 1982 — ACTIVITY & RESULTS* (an illustrated booklet);
- *THE PETROLEUM NEWSLETTER* (quarterly; detailed tabular information on petroleum exploration activity in Australia);
- *PETROLEUM EXPLORATION & DEVELOPMENT TITLES MAP AND KEY* (six-monthly);
- *PETROLEUM & MINERALS RESOURCE & INDUSTRY INFORMATION SHEETS*
 - *Australia's Petroleum Reserves & Resources* (six-monthly)
 - *Australian Petroleum Exploration & Development Statistics* (quarterly)

Enquiries concerning mineral industry statistical information sheets should be directed to: L. Jakimow, Statistical Officer (Mining), Canberra (062) 499556. Enquiries concerning Petroleum information sheets, and the Petroleum Newsletter, should be directed to: B.A. McKay, Industry & Statistics Sub-section, Petroleum Branch, Canberra (062) 499554. Enquiries about other publications should be directed to: BMR Publication Sales, Canberra (062) 499519.

Some more general information on BMR publications is contained on the rear cover.

AUSTRALIAN BUREAU OF STATISTICS

Other ABS publications relating to the mineral industry include:

Catalogue No.

- 8412.0 *Mineral Exploration* (quarterly)
- 8407.0 *Mineral Exploration* (annually)
- 8405.0 *Mineral Production* (annually)
- 8402.0 *Mining Establishments (Details of Operations)* (annually)
- 8401.0 *Mining Establishments (Summary of Operations, Australia) (Preliminary)* (annually)

Enquiries about ABS publications should be made to:

Australian Bureau of Statistics
PO Box 10
BELCONNEN ACT 2616

numbers and are not available for sale or exchange. Those available freely for reference at Open File centres are listed in the *BMR Quarterly List of Publications*. Photocopies of Records can be bought from the Government Printer Copy Service (see below). Two recent Records: *Potential for platinum-group mineralisation in Australia — a review* (1984/1) and *Geology of the Arunta Block in the southern part of the Hukitta 1:250 000 Sheet area, central Australia — preliminary data, 1980 survey* (1984/3).

PRICES AND AVAILABILITY

The price of the *Australian Mineral Industry Annual Review* is \$20.00. One year's subscription to the *BMR Journal* costs \$25.00 (or \$8.25/issue; includes surface postage). *BMR Earth Science Atlas* maps (with commentaries) cost \$5.00 each and the cover of the atlas costs \$6.25. Other publications are priced individually. BMR publications and maps are listed in *Publications of the Bureau of Mineral Resources, Geology & Geophysics (Part I: Publications other than maps; Part II: Maps)*, which is available free of charge from: BMR Publication Sales, GPO Box 378, Canberra, ACT 2601 (phone 062-499519). A *Quarterly List of Publications* showing current releases of all publications and unpublished data is also available free of charge, together with detailed information on prices and

postage costs, from BMR Publication Sales. All publications can be bought at the Publication Sales counter, BMR building, cnr Constitution Avenue and Anzac Parade, Parkes, ACT. Further information on the availability of preliminary data may be obtained from the Information Section, phone 062-499620. Orders for publications must be accompanied by payment in advance. Cheques, postal orders, etc., should be made payable to: Receiver of Public Moneys, Department of Resources & Energy. Payment from overseas should be made by bank draft or international money order.

GOVERNMENT PRINTER COPY SERVICE

Photoscale geological compilation sheets and the results of recent geophysical surveys, particularly airborne, are released as dyelines and transparencies through the Australian Government Printer Copy Service. Some other documents, including Records and preprints of the major chapters of the *Australian Mineral Industry Annual Review*, are also released through the Copy Service. Orders should be sent to Copy Service, Australian Government Printer (Production), GPO Box 84, Canberra, ACT 2601 (Wentworth Avenue, Kingston, ACT), or phone (062) 954560 (lists of Copy Service releases are available from Information Section, BMR — address above).

Other BMR publications

AUSTRALIAN MINERAL INDUSTRY ANNUAL REVIEW

The *Australian Mineral Industry Annual Review* is a comprehensive record of the development and performance of the mineral industry, based on annual statistics. The text is written and compiled by a team of mineral commodity specialists in BMR's Resource Assessment Division. The major part of the volume is a descriptive commentary on (currently) 63 individual mineral commodities (including fuels), from 'Abrasives' to 'Zirconium', supported by location maps, flow charts, graphs, and several hundred statistical tables. Topics covered for each commodity include Production, Consumption, Treatment, Trade, Prices, New Developments, Exploration, Resources, and World Review. The latest edition covers the calendar year 1981. The edition covering 1982 is due to be published in October 1984; however, preprints of the 12 major chapters (Aluminium, Black Coal, Copper, Gold, Iron Ore, Lead, Nickel, Petroleum, Tin, Titanium, Uranium, and Zinc) and of Part I ('General Review') are now available through the Government Printer Copy Service — see below.

BMR's statistical information sheets on minerals and petroleum are listed on page 112.

BULLETINS AND REPORTS

The full results of many BMR surveys and research projects are published as individual monographs in the *Bulletin* and *Report* series. Two recent Bulletins: *Guide to the geology of Australia* (Bulletin 181), and *Superficial sediments of the Tasmanian continental shelf and part of Bass Strait* (Bulletin 218). Two recent Reports: *Geochemical and organic microscopy data from Australia's petroleum source rocks* (Report 240), and *Physical property measurements on mineralised and unmineralised samples from the Cleveland Mine, Tasmania* (Report 245).

BMR JOURNAL OF AUSTRALIAN GEOLOGY & GEOPHYSICS

The 'BMR Journal' is a major publication outlet for BMR's research results. Volume 8 No. 4 was issued in March 1984 and Volume 9 No. 1 is due out in July 1984. Some recent papers: *The search for a more realistic metallogenic map format, with reference to the Pine Creek Geosyncline*, 8(4); *A heavy-mineral survey of the Forsyth area, northeast Queensland*, 8(4); *The age of the diamond-bearing pipes and associated leucite lamproites of the West Kimberley region, WA*, 9(1).

BMR EARTH SCIENCE ATLAS OF AUSTRALIA

Thirteen maps and accompanying commentaries (+ vinyl cover) for this large-format, loose-leaf atlas are available so far, generally at a scale of 1:10 000 000 — General Geology, Solid Geology, Major Structural Elements, Sedimentary Sequences, Plate Tectonics, Surface Drainage & Continental Margin, Earthquakes, Free-Air Gravity, Bouguer Gravity Anomaly, Petroleum & Oil Shale, Coal, Cainozoic Cover & Weathering, and Phanerozoic Palaeogeography (3 sheets). The atlas is intended to be a first reference to the geology and geophysics of Australia.

BMR YEARBOOK

Now written for a specialist audience (principally the immediate users of BMR's research results) the latest BMR Yearbook, *BMR 83*, contains a summary of progress of all BMR projects. Published in April 1984, *BMR 83* (and future Yearbooks) is based on the financial year ending 30 June. In addition to a comprehensive list of all publications and data made available in the twelve months ending 30 June 1983, *BMR 83* contains the abstracts of all papers and monographs published in that period.

PETROLEUM EXPLORATION & DEVELOPMENT TITLES MAP & KEY

Published six-monthly. Shows the status of titles both onshore and offshore at 1 January and 1 July.

GEOLOGICAL, GEOPHYSICAL, AND GEOCHEMICAL MAPS

BMR has published a large number of 1:250 000 scale-geological maps, with 'Explanatory Notes' booklets, covering quadrangles mainly in northern Australia. 1:100 000-scale geological maps and accompanying commentary booklets are also available. Many smaller-scale geological maps covering various regions have also been published, often in conjunction with geological Bulletins. BMR publishes stream-sediment geochemistry, radiometric, gravity (new series), and total-magnetic-intensity maps at various scales. The results of most regional geophysical surveys are made available as preliminary maps and sections. A brochure illustrating the extent of coverage of Australia by BMR surveys can be obtained from: Information Section, Bureau of Mineral Resources, G.P.O. Box 378, Canberra, ACT 2601, phone (062) 499620.

RECORDS

Preliminary results, results of limited interest, and other appropriate manuscripts are published in the Records series. Records are produced in limited

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