

S/T 1974

10 DEC 1974

COMMONWEALTH OF AUSTRALIA

Australian Mineral Industry

VOLUME 24 No. 2 DECEMBER 1971

Part 1—Quarterly Review

Issued by the Bureau of Mineral Resources under the authority of the Hon. the Minister for National Development.

Part 2—Quarterly Statistics. *Quarter ended 30 June 1971.*

Prepared under instructions from the Honourable the Treasurer, by J. P. O'Neill, Commonwealth Statistician.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
CANBERRA, A.C.T.

Available from

The Bureau of Mineral Resources, Canberra

The Department of National Development, Melbourne and Sydney

The State Controller, Department of Supply, Brisbane, Adelaide, and Perth

and through Trade Commissioners and

Australian Government representatives abroad

**Part 1—
Quarterly
Review**

Australian Mineral Industry

VOLUME 24 No. 2 DECEMBER 1971

In this issue:

The U.N. Seabed Committee

Commodity Review page 29

Metal and Mineral Prices page 53

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

MINISTER: THE HON. R. W. C. SWARTZ, M.B.E., E.D., M.P.

SECRETARY: L. F. BOTT, D.S.C.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: N. H. FISHER

THIS REVIEW WAS PREPARED IN THE MINERAL RESOURCES BRANCH
ASSISTANT DIRECTOR: L. C. NOAKES

Any articles in this Review may be reproduced in whole or in part, provided due acknowledgement of source is made. Blocks illustrating any article may be obtained on loan by any organisation in Australia.

Information of interest to the mineral industry, corrections to published data, and suggestions will be welcomed.

Contents

VOLUME 24

No. 1

Commodity Review *by Mineral Economics Section* page 1

Some Recent Developments in Industrial Minerals *by A. J. Gourlay* page 12

Metal and Mineral Prices page 25

No. 2

Commodity Review *by Mineral Economics Section* page 29

The U.N. Seabed Committee *by J. B. R. Livermore* page 39

Metal and Mineral Prices page 53

Commodity Review

J. WARD, Z. KALIX, A. J. GOURLAY, R. Z. de FERRANTI, R. PRATT,
G. HILLIER

FUEL

Black Coal. Despite the adverse affects of industrial disputes domestic output of black coal in the first 6 months of 1971 increased to 23.5 million tons marginally higher than production in the same period of 1970.

Exports of black coal in the 9 months to September 1971 were 14.05 million tons compared with 13.26 million tons in the same period of the previous year. Decreased exports to Japan (11.39 million tons from 11.99 million tons) were balanced by increased exports to the Netherlands, Italy, United Kingdom, New Caledonia, and Greece.

Wambo Mining Corporation Pty Ltd plans to produce coal from deposits at Warkworth, N.S.W., at a rate of 2.1 million tons per year by 1976. To achieve this rate of output the company plans to develop at least 4 mines. The first mine is scheduled to produce 332,000 tons in 1972. The company reportedly has concluded a contract to sell one million tons of washed coal to Gollin and Company Ltd for export.

It was announced in September that Thiess Holdings Ltd had reached agreement with the Queensland State Electricity Commission and the Capricornia Regional Electricity Board for the supply of 5 million tons of coal from Thiess Holdings' open-cut mine at Callide to the nearby Calcap power station. The new agreement will include an option for the sale of an additional 10 million tons of coal. This is in addition to an existing contract under which 5 million tons of coal is still to be supplied. If the option is exercised, output at the Callide open-cut mine will be increased from 500,000 tons of coal per year to 1 million tons per year.

According to Japanese sources planned production of coking coal by Central Queensland Coal Associates (Utah Development Co. and Mitsubishi Development Pty Ltd) from deposits at Saraji, Qld is to be 4.5 million tons per year. If a contract is concluded in 1971, output would commence in 1974.

R. P.

METALS

Aluminium. Domestic production of primary metal continued at a high level throughout the first nine months of 1971. According to preliminary statistics, output for the period was 166,809 tons, indicating that production for the calendar year should set a new record. This may well be achieved despite a 15 percent cut in primary production, announced by Alcoa of Australia Ltd in September. Exports of primary shapes during the period January-June were 33,904 tons. Apparent domestic consumption of metal is therefore running at an annual rate of about 150,000 tons.

The high level of alumina production during the first three quarters of 1971 reflects increased output from new capacity commissioned at the two major refineries early in the year. By September 1971, both Gladstone and Kwinana were producing ahead of their rated capacities of 1.275 million tons and 1.25 million tons per year, respectively. Alumina production for the nine months totalled 1,912,437 tons, indicating an output of about 2.6 million tons, for 1971, well above the 1970 production level of 2.1 million tons.

Alcoa of Australia Ltd announced a 15 percent cut in production (from 90,000 tons to 76,000 tons per annum) at its Point Henry smelter effective from mid-September 1971. This decision reflects the current position of over-supply on world markets, the outlet to which recent expansion of Australian metal production has been oriented. For the same reason, the company has reversed its policy of an immediate 10 percent expansion at the Kwinana refinery and of a 19 percent increase in initial output from the Pinjarra alumina refinery. The commissioning of the Pinjarra plant will nevertheless take place on schedule; the first unit of 210,000 tons annual capacity will be completed by April 1972, and the second unit by June 1972.

Alcoa began to introduce natural gas into its Kwinana operations in mid-November. Natural gas, drawn from the 258-mile Dongara-Pinjarra pipeline of West Australian Natural Gas Pty Ltd (WANG), will be progressively phased into most of Alcoa's operations currently operating on fuel oil. Alcoa will be the largest consumer of Dongara natural gas when the Pinjarra alumina refinery is commissioned.

Another expansion project to be affected by the depressed state of world demand for alumina is that of Queensland Alumina Ltd at Gladstone. Industrial troubles resulted in a delay of two months in the commissioning of the plant's additional capacity of 0.375 million tons per annum. According to reports, the possibility of further stoppages and of a continued weakness in world demand, could cause the company to revise its \$125 million expansion programme designed to bring capacity to 2 million tons per annum by late 1972.

The withdrawal of the Vereinigte Aluminium Werke (VAW), of West Germany, from the Kimberley bauxite/alumina venture was attributed to severe over-capacity in the German aluminium industry and a reduction in the anticipated cash flow should market prices continue at their present low level. The equity in the project formerly held by VAW was 5 percent, which has been taken up by Amax in addition to the 12½ percent formerly held by the Anaconda company. The four Japanese partners in the project were awaiting in October the approval of MITI for their 37.5 percent participation in the project. Amax was reported to be still offering a 10 percent participation in the project to Australian interests. Construction work should commence before the end of 1971, and commissioning of the refinery is planned for mid-1975.

Bauxite reserves in the Mount Saddleback area of the Darling Range, W.A., have been defined as about 200 million tons, with an average of 32% Al_2O_3 . Alwest Pty Ltd is proving reserves in areas held jointly with The Broken Hill Proprietary Co. Ltd. A decision on the overseas participation in this bauxite/alumina venture is expected to be reached by May 1972.

In September 1971, the Minister for the Interior invited proposals for further exploration and possible development of bauxite deposits on Marchinbar Island, off Gove Peninsula, N.T. The deposits, which total about 10 million tons, are too small to support the establishment of a major treatment plant. However, they could be beneficiated locally, and used as supplementary raw material for refineries in other areas in Australia. Any proposals to mine the bauxite and export it untreated will also be considered.

Although the Australian producers' price for primary ingot remained at 25.8 cents per pound (\$578 per ton) throughout the period September-November 1971,

prices of most semi-fabricated products were increased by 3 percent, firstly by Alcoa, and later by Aican and Comalco.

The United States domestic quotation for ingot, which had remained at US 29 cents per pound since April 1970, was changed to 23-29 cents per pound as from early October 1971. Consolidated Aluminium Corporation (Conalco), an Alusuisse subsidiary, listed its ingot price at 23 cents during the first week of October, after having officially floated the price for two weeks in an endeavour to ascertain a realistic level. Simultaneously with its announcement of a 6 cents cut in the price of ingot, Conalco announced that prices of semi-fabricated products would be floated for the same reason as in the case of primary metal. Other United States producers continued to quote their official domestic price as US 29 cents per pound. At the time of writing (mid-November), industry authorities considered that other major producers would be slow to follow Conalco's moves; major metal contracts with the automobile industry, and contracts for supplies of alumina and cryolite have been based on an aluminium metal price of 29 cents.

Over the longer term, there appears to be a consensus of opinion among observers that while a major imbalance in the aluminium industry in the non-Communist world is expected for 1971—possibly amounting to a surplus of about 800,000 tons—demand should improve during 1972 and 1973. This improvement will depend on adequate and immediate steps being taken to cut production. Already many producers have taken appropriate action in this regard. In addition, expansion programmes for 1972 and beyond will need revision, if increased over-capacity is to be prevented. It has been estimated that, in order to maintain supply and demand in balance, world smelters will need to operate at no more than 85 percent of total capacity during 1972, rising to about 90 percent of capacity by 1973.

A. J. G.

Copper. According to preliminary statistics mine production of copper during the fiscal year 1970/71 was a record 168,495 tons. Data for the period January-September 1971 indicate that production for the calendar year 1971 will be appreciably higher. Increased output from Mount Isa and Mount Lyell, and to a lesser degree, production from newly-developed mines in South Australia and production of by-product copper from nickel operations in Western Australia largely accounted for the higher Australian total.

Production of primary blister and primary refined copper in 1970/71 were also at high levels—127,905 tons and 107,843 tons, respectively. During the first nine months of 1971, production of primary refined copper was 89,196 tons, and 14,996 tons was refined from purchased scrap. Taking into account exports of refined copper of 37,439 tons, apparent consumption for the period was about 57,000 tons, an annual rate of about 76,000 tons; about the same level as in the preceding two years. There was a notable increase in the level of domestic despatches in the April-June quarter to 32,277 tons, from 26,172 tons in the January-March period, attributable to considerable stocks accumulation by consumers in anticipation of supply difficulties and higher prices, which could result from industrial disputes in the United States at mid-year, when three-year labour contracts were due for renewal. During the September quarter, despatches reverted to a more normal level of 27,358 tons.

Production of copper concentrates began at the Kanmantoo mine, South Australia, early in November 1971. The main shareholders in Kanmantoo Mines Pty Ltd are Broken Hill South Ltd, North Broken Hill Ltd and E.Z. Industries Ltd. The plant was reported to be treating initially about 1,200 tons of ore per day, which is about half of its rated capacity. The concentrates are to be shipped to Japan under contracts which are still under negotiation.

Other matters discussed by the Study Group included long term projections, stock-pile disposals and stimulation of consumption. A further review of scrap as a source of supply was planned.

Recent decisions by the Australian industry reflect producers' views on the different outlooks for lead and for zinc on the world market. On the one hand, during October, Electrolytic Zinc officially commissioned extensions to the Rosebery mine and mill which will double capacity to 600,000 tons of ore per annum. The Rosebery mine is essentially a zinc producer which yields lesser amounts of lead and copper. In July, a new residue treatment plant was commissioned at Risdon as part of a continuing expansion programme which will increase capacity to 210,000 tons of refined zinc per annum by 1973. On the other hand, Mount Isa Mines plans to cut production of crude lead (lead bullion) by a further 10 percent from the current rate of 120,000 tons per year. Production at Mount Isa was initially reduced by about 20,000 tons per annum early in 1971, when the company also announced that some parts of the Hilton mine project would be delayed while available resources would be directed towards increasing copper production.

R. Z. de F.

Nickel. In the 40 weeks ending 12 October 1970, Western Mining Corporation Ltd treated a total of 886,300 tons of nickel ore at the Kambalda mill (equivalent to a treatment rate of 1.126 million tons per annum), to produce 217,000 tons of nickel concentrate containing 22,096 tons of nickel (equivalent to an annual production rate of 31,700 tons of contained nickel). These concentrates also contained 2,152 tons of copper. In addition the company produced 133,000 tons of magnetic concentrates which were stockpiled awaiting further treatment.

The diamond-drilling programme initiated to thoroughly test the Kambalda area has resulted in intersections of nickel ore beyond the previously established limits of economic mineralization associated with the Kambalda Dome. The new area is about 5,000 feet south of the Gellately shoot. The Corporation is also intensifying its exploration activities in the Broad Arrow-Ora Banda area. Although the presence of low-grade nickeliferous laterite is known in these areas the current programme is directed more towards the search for additional deposits of nickel sulphide.

The installation of additional capacity in the metallic nickel handling section of the W.M.C. refinery at Kwinana is proceeding satisfactorily; site preparation at the nickel smelter south of Kalgoorlie is now complete and work has commenced on the construction of the smelter chimney stack.

Great Boulder Mines Ltd treated 65,443 tons of ore during the 26 weeks ending 14 September for the production of 11,157 tons of concentrates containing 1,145 tons of nickel, and 50 tons of copper. Exploration and development work is continuing at the Carr-Boyd Rocks project; work completed during the quarterly period ending 14 September included driving and cross-cutting at the 350 feet level to assist in delineating the orebody. At this depth, indications are that the No. 1 ore shoot is 198 feet long and 29 feet wide with an average grade of 1.84 percent nickel and 0.65 percent copper. At the Scotia mine the depth of the Mitchell shaft has been increased to 816 feet and a skip loading station excavated at the 770 feet level.

Exploration is continuing at the Metals Exploration N.L.-Freeport of Australia Incorporated joint project at Mount Keith where the most significant diamond drilling intersection during the quarter ended 30 September was that in drill hole MKDK52 which is located about 12 miles south of the MKD5 zone. In this hole 610 feet of ore averaging 0.54% Ni was intersected. Investigations including pumping tests have started on the two most promising areas found during the first stage of a groundwater investigation programme.

The partners have recently received further loans amounting to 70 million dollars for the Greenvale project in Queensland where almost all of the projected output

is now covered by long term contracts. All phases of the engineering design work associated with bringing the project to the production stage are proceeding at an accelerated rate.

Western Selcast Pty Ltd reports that indicated ore reserves at its Agnew project total 9 million tons averaging 2 percent nickel with a cut-off grade of 1 percent. These reserves have been calculated within a strike length of 1,400 feet and to a depth of 1,000 feet after disregarding the top 150 feet of oxidised material. The deposit is open in depth; a borehole previously reported as showing 2 percent mineralization at a depth of 2,000 feet will be tested by further drilling. A feasibility study currently in progress will include an investigation of underground water supply being conducted for the company by the State Public Works Department. In the Spargoville area the decline shaft to develop Location 2 orebody has reached an inclined depth of 371 feet from the portal and necessary surface installations have been completed. Difficult ground conditions and water flows in the vertical shaft being sunk at Location 3 have caused progress in the shaft to be slower than expected. Because of these problems at Location 3, ore production may not start until mid-1973, a delay of six months from the date originally proposed for ore production. An agreement has been finalized between Selcast Exploration Ltd, the Selection Trust subsidiary directing operations at Spargoville, and North Kalgurli (1912) Ltd for the use of the North Kalgurli concentrator to treat ore from Locations 2 and 3.

Overseas, the producer price of nickel has remained constant during the first eleven months of the year but the free market price which more accurately reflects the supply-demand position, has fallen slowly from mid-April, when it was almost equal to the producers' price of \$US1.33 per lb, to the mid-November average price of \$US1.21 per lb. In August 1971, International Nickel Company of Canada Ltd announced that it would cut its Canadian nickel production by 7 percent in an attempt to halt the expansion in world production which had occurred during 1970 and 1971. The increased production was not accompanied by a concomitant growth in demand, with the result that the position of overall world shortage at the beginning of 1970 was soon replaced by one of oversupply. Subsequent to this voluntary cut back in production Inco announced that it would make an additional reduction of 15 percent in early 1972. The combined production cut by Inco will be equivalent to a decrease of 50,600 tons in world production. However, the fact that Inco has made no substantial reductions in its exploration and development programmes indicates the company's confidence in the long-term strength of the nickel market.

G. H.

Tin. Domestic mine production of tin which was running at an annual rate of about 8,500 tons of tin-in-concentrates during the early half of 1971, increased sharply in the September quarter, and preliminary statistics indicate that a record output of 9,300 tons will be achieved for the year. Increased mine production is the direct result of expanded output from hard-rock operations at Renison and Wales. Increased production of lode tin will more than compensate for temporary reduced production of alluvial tin resulting from cessation of output by Tableland Tin Dredging N.L. in the Mount Garnet area while dredging operations are transferred from Smith's Creek to the Upper Return Creek area.

Domestic smelter production has also been increased to make substantial quantities of tin available for export markets. Smelter capacity has been expanded progressively to handle about 10,000 tons of tin concentrates per annum (equivalent to about 6,500 tons of refined tin) and further plant extensions are being undertaken to enable the smelter to treat up to 12,500 tons of concentrates per annum. At this capacity, domestic production of primary refined tin could be increased to some 8,000 t.p.a., or about double domestic requirements.

Overseas, the second session of the International Tin Council under the Fourth International Tin Agreement was held in London from 12 to 14 October 1971.

The Council received a report from the Government of the United Kingdom that the conditions of Article 46(c) of the Agreement had been fulfilled on 23 September, 1971, and that, consequently, the Fourth International Tin Agreement definitely came into force on that date. The Council decided that the balance (equivalent to 12,500 tons of tin metal) of the aggregate compulsory contributions not yet called up by the buffer stock manager should be payable in cash. The Executive Chairman was given authority to call up instalments of this balance should he consider it necessary for the efficient operation of the buffer stock.

Meanwhile, world tin markets continued with little if any improvement in demand and the ample supply of tin immediately available was evidenced by a consistent contango in tin prices.

During the latter part of the period under review, market conditions were further affected adversely by the uncertainties of the international monetary and trade situations. The cash price of tin on the London Metal Exchange, quoted at £1,448 per metric ton on 1 July 1971, fell below £1,400 on 1 October (the first time since April 1969) to £1,398. A further abrupt decrease in prices which could have resulted from currency instability and stop-loss selling was averted, possibly by intervention by the Buffer Stock Manager, and by mid-November, cash tin had recovered to £1,417 per metric ton.

J. W.

Tungsten. Domestic production of tungsten concentrates was well maintained during the first three quarters of 1971 at an annual rate of about 2,950 tons (65% WO_3 basis) which compares favourably with the 1970 output of 2,416 tons. The notable increase in production resulted mainly from increased output of scheelite concentrates on King Island. Domestic production of scheelite had decreased sharply in the latter half of 1970 because of a lack of forward mine development in the No. 1 orebody of King Island Scheelite (1947) Ltd, which in turn caused some inflexibility in selection of ore. The ratio of stripping of overburden to ore was subsequently increased from 6:1 to 17:1 to overcome this difficulty, and in the six months to 30 June 1971, production of scheelite concentrates more than doubled the output achieved during the period June-December 1970. Although design of the company's new 450,000 tons per annum concentrator and ancillary facilities was begun, further development has been deferred pending the results of research on synthetic scheelite (chemically precipitated calcium tungstate), and a clearer indication of future world markets for tungsten.

Overseas, the London market for standard grade wolfram concentrates which opened 1971 in the range £28.5-£29.8 per metric ton unit WO_3 reacted to the general slackness in industrial activity as the year progressed, and, notwithstanding the refusal of the United States General Services Administration to accept low-priced bids for its disposal offerings, the *Metal Bulletin* quotation for wolfram had been reduced to the range £16.4-£17.9 per m.t.u. WO_3 by the end of August. At this stage European demand began to show signs of recovery and, despite the impending bi-annual Canton Fair, traditionally a bearish factor in tungsten markets, prices recovered some lost ground to stand at £20-£22 per m.t.u. WO_3 in early November.

J. W.

NON-METALLIC MINERALS

Gypsum. Production of gypsum during the first half of 1971 was 432,585 tons, compared with 387,805 tons for the same period of 1970. The higher level of production was mainly the result of increased export demand; exports of 126,376 tons in the first half of 1971 were about 47 percent higher than the level for the same period of 1970.

Production of plaster of Paris and plaster sheets increased slightly during the first eight months of 1971 and at 198,600 tons and 27.44 million sq yards respectively were 7 percent and 2 percent higher than in the same period of 1971.

Consumption of gypsum in the portland cement industry also increased. An increase of almost 2 percent in portland cement production in Australia during the first eight months of 1971 is equivalent to a 3.6 percent increase in gypsum usage estimated as 240,000 tons in 1970.

Z. K.

Phosphate. Domestic production of phosphate rock is not recorded quarterly. In 1970 domestic production, 14,260 tons was confined to South Australia.

Broken Hill South Ltd has indicated recently that it will proceed with the development of the phosphate rock deposits recently discovered in northwest Queensland despite expansion of world phosphate production. The company had so far proved 450 million tons of reserves of 17 percent P_2O_5 in the Lady Annie and Lady Jane areas. The overall estimate was 2,000 million tons of phosphate reserves for the whole area including deposits near Duchess. Beneficiation tests on samples obtained by shaft sinking had produced concentrates comparable in grade to that traded on world markets. The company is confident of starting production in northwest Queensland in the second half of the 1970's.

Imports of phosphate rock were 1,143,000 tons, valued at \$10,235,000 during the first six months of 1971, almost entirely (over 98 percent) from Nauru, Ocean and Christmas Islands. The comparable figure in 1970 was 1,229,000 tons valued at \$13,002,000.

The continued depressed economic conditions facing primary producers coupled with unfavourable weather conditions in certain parts of Australia led to a sharp decrease in demand for superphosphate during the first six months of 1971 and 1,520,000 tons was the lowest on record since 1962, for the first half of the year.

The British Sulphur Corporation reports that expanding demand for fertilizers has been reflected in a 10 percent increase in phosphate rock exports on world-wide basis, although shipments to certain individual markets have grown at an even faster rate.

Exports account for approximately one-half of world trade in phosphate rock, the balance being represented by domestic deliveries.

Despite this improvement in outlook for phosphate rock sales, there remains considerable over capacity, particularly in terms of medium and lower grade products. This additional production capacity is perhaps the principal reason for continuing weakness in phosphate rock prices; despite the rise in demand for phosphate rock there has been no corresponding firming in prices.

Z. K.

Sulphur. Because of depressed demand for sulphuric acid for superphosphate, domestic output decreased further during the first nine months of 1971. Production was 1,145,000 mono-ton, which represented a 6.5 percent decrease compared with that of the equivalent period in 1970.

Total imports of elemental sulphur (in bulk) in the first half of 1971 were 151,535 tons which is about 25.2 percent lower than that of the corresponding period of 1970.

The impact of the sulphur surplus on prices and the likelihood of continued excess supplies for a number of years are causing growing concern to governments in various major sulphur producing countries. At Canada's invitation an international meeting on sulphur was convened in Montreal in June 1971 and a second national meeting in Vancouver in October 1971. Represented at this meeting were the meeting in Vancouver in October 1971. Represented at this meeting were the Governments of major sulphur producing countries and some of the largest consumers. The agenda included the assessment of long term supply and demand trends, the projected production of sulphur as a result of attempts to reduce pollution, and the possible courses of future action.

The British Sulphur Corporation Ltd reports that during the first half of 1971, elemental sulphur production in the non-Communist world totalled just under 9.1 million tons, an increase of 453,000 tons or 5.3 percent, on the level for the same period in 1970. The increase was wholly attributable to the higher output of recovered sulphur, which in this period rose by about 590,000 tons, of which about one half was due to expansion in Western Canada. Meanwhile, output from all other sources of recovered sulphur also increased, while the production of Frasch sulphur and native sulphur declined.

During the first half of 1971 the c.i.f. price of liquid sulphur has continued substantially unchanged in the range \$US23-26 per metric ton, based on the Sulphur Export Corporation declared price for bright US sulphur of \$US25 per metric ton ex-terminal Rotterdam.

Prices of Canadian sulphur f.o.b. Vancouver remain unchanged, ranging upwards from \$CAN15 per metric ton.

Z. K.

The U.N. Seabed Committee

J. B. R. LIVERMORE*

In recent decades there has been an awakening to the existence of natural resources in the seabed and ocean floor. This prospect of discovering, and more importantly producing, minerals from the seabed appears to offer the potential of expanding the resource base of modern civilization at a time when a growing world population, coupled with rising standards of living, is throwing increased demands on the world's known stock of natural resources.

Initiative by Malta

In October 1967, Malta inscribed an item on the agenda for the 22nd General Assembly concerning the preservation and use, exclusively for peaceful purposes, of the seabed and ocean floor beyond the present limits of national jurisdiction.

In early November 1967, in the course of a three-hour speech, Ambassador Pardo of Malta introduced his subject. Dr Pardo dwelt on the dangers to mankind arising from the possibility of remotely controlled nuclear weapons being placed on the ocean floor. He discussed the provisions of the 1958 Geneva Convention on the Continental Shelf and the events leading up to it—in particular the Truman Declaration of 1945 that the resources of the continental shelf contiguous to the United States were subject to its jurisdiction and control. He pointed out that continental shelf resources—particularly petroleum—had been actively and profitably exploited for twenty years and that technology was advancing rapidly so that the seabed in deeper waters would soon yield up its riches.

He then dwelt on the possible dangers to the world from the dumping of radioactive waste materials on the seabed, as well as from pollution from other sources—industrial wastes, pesticides, and so on.

The Ambassador then stressed the differences in national wealth separating the developed from the developing countries. He argued that the recognition of the resources of the seabed beyond national jurisdiction as the common patrimony of mankind and the use of revenues from resource development in this area to assist developing countries would be a major step in redressing the balance between the developing and the developed countries. He postulated that providing an international agency were established in the year 1970 (it was then 1967), that technology continued to advance, and that production proved to be commensurate with the known resources of the ocean floor, then gross annual income from such production would reach a level of around \$6 billion by 1975.

Ambassador Pardo, in making this estimate, also made the assumption that national jurisdiction would end at 200 metres depth or 12 miles from the nearest coast. But this important qualification was not nearly as eye-catching as \$6 billion annually and, when the subject was taken up again in 1968, countries such as the United States, the Soviet Union, and Australia came in for quite a deal of

* Senior Assistant Secretary, Resources Policy Division, Department of National Development; Member of Australian Delegations to the U.N. Seabed Committee 1968-1971.

criticism, if indeed not outright disbelief when they pointed out just how little was known of the resources of the deep seabed and also something of the problems of bringing those resources to the market places of the world.

But, quite clearly, Malta's initiative started an exhaustive examination of the future use of the deep seabed which has already taken over three years and which will certainly continue until 1973 or even beyond that. It is fair to say that the world stands indebted to Malta for raising the issue when it did—in time for something to be done before the issues become critical.

Basic Terminology—Geological and Legal

It might be convenient here to describe the basic geological terminology which is used in this subject.

From the edge of each continent there stretches into the oceans a continental margin made up of a continental shelf, a continental slope, and (in places) a continental rise. The continental shelf slopes gently outwards from low water mark to a point where a noticeable increase in gradient marks the beginning of the continental slope. The continental rise is an apron of sediments overlapping the bottom of the slope where it merges into the abyssal plain of the ocean floor. These concepts are illustrated in the generalized cross-section appearing on page 41.

Using the term in the geological sense, the width of the continental shelf ranges from less than a mile—for example, north of New Guinea—to as much as 600 miles off Argentina, while the slope is usually 10 to 20 miles wide, although it can be either narrower or wider. The depth at which gradient changes from the shelf to the slope varies considerably—it may be as little as 50 metres, or as much as 500 metres, but is usually taken to be at about 200 metres—hence the adoption of this depth as one of the criteria in the 1958 Convention.

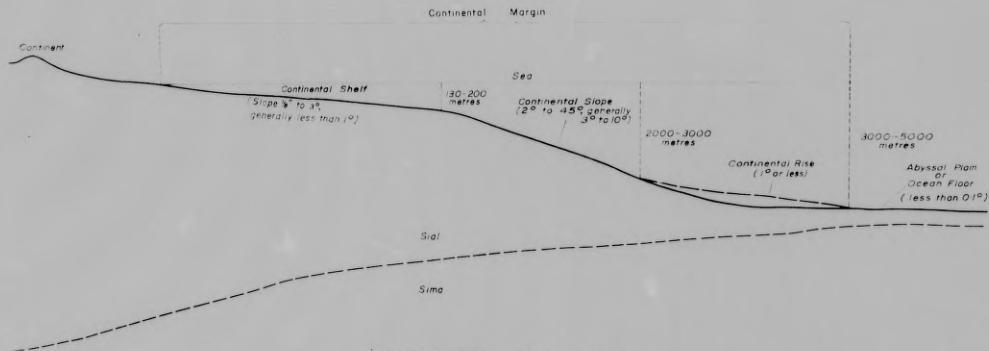
Beyond the continental slope comes the ocean floor or abyssal plain which is a rolling plain from 3,000 to 5,000 metres below the surface of the sea. It is interrupted by submarine ocean ridges like the mid-Atlantic Ridge, and deep trenches such as the Kermadec-Tonga Trench, and is studded with sea mounts.

So much for geological terms—now to delve a little into legal terminology.

Under the Convention on the Continental Shelf signed at Geneva in 1958, a coastal state has sovereign rights for the purposes of exploiting the natural resources of the seabed and the subsoil adjacent to the coast out to a depth of 200 metres or beyond that limit as far as the depth of the superjacent waters admits of exploitation. Thus under the Convention the outer limit of the continental shelf moves farther out as exploitation technology advances.

The open-ended nature of this outer limit to the continental shelf (now using the term in its legal sense) may have seemed somewhat academic in 1958 when the Convention was drafted, but it is highly pertinent today, having in mind the advances in technology of the last ten years and the further developments already confidently predicted. The Seabed Committee, on the advice of those nations whose exploitation technology is most developed—particularly the United States—has foreshadowed that within the first half of this decade petroleum will be produced from depths greater than 200 metres. Already commercial exploratory wells have been drilled in depths of 400-450 metres of water and rigs capable of operating up to 600 metres have been built.

In considering the provisions of the Geneva Convention as to what is continental shelf—namely the dual criteria of depth and exploitability, and the seemingly limitless scope of the latter, it must never be forgotten that the Convention also expressly contains the element of adjacency to the coast. Admittedly, 'adjacent' is an imprecise term, but nation after nation has asserted categorically in the U.N. discussions that in their view this concept of adjacency clearly precludes the carving up of the ocean floor between nations. Australia can't carve up the



GENERALISED CROSS SECTION
SHOWING CONTINENT, CONTINENTAL MARGIN AND OCEAN FLOOR

Indian Ocean between ourselves and Madagascar. It follows that there must be a lot of ocean floor, which by no stretch of the imagination can ever be regarded as 'legal' continental shelf—and remember that the seas and oceans cover about seven-tenths of the world's surface.

A second point of international law which is relevant is the judgment given by the International Court of Justice (I.C.J.) in the North Sea cases. There the I.C.J. emphasized the morphological concept—that the continental shelf is the natural prolongation under the sea of the land mass of the coastal state.

Australia is on public record as interpreting the present law, both conventional and customary, as pointing to the outer edge of the margin as the limit of coastal state rights to the seabed, though it is fair to say that this view is not shared universally.

Why Bother About a Treaty for the Seabed and Ocean Floor?

Let us now consider the question of why the nations of the world bother about this subject of the deep seabed and the ocean floor; why should there be an endeavour to agree on the terms of an international treaty? The reasons are many and complex and different nations are interested or concerned in the subject for different reasons. Clearly, in a short article it is possible to touch only on the most cogent.

First, it is asserted with confidence, and supported by good evidence, that there are resources, certainly minerals—possibly thermal energy—to be found on, or in, the continental slopes of the world's continents and, although much less is known about it, on the abyssal floor. And of course twentieth century civilization has an almost insatiable appetite for raw materials such as minerals.

Secondly, the 'developing countries' of the world, and there are over 90 of them (known as the Group of 77) in the United Nations, have supported the view—and indeed gained a large measure of acceptance for it—that exploitation of resources of the seabed beyond national jurisdiction should be carried out for the benefit of mankind as a whole, taking into account the special interests and needs of the developing countries. With the memory of Ambassador Pardo's estimates in 1967, and the knowledge that already today something over 16 percent of the petroleum production of the world comes from offshore areas, the developing countries hope that production from ocean floor resources can, in comparatively short order, significantly increase the level of funds available to meet their needs and give them access to new technology.

Thirdly, some nations fear that the potential for production from the ocean floor beyond national jurisdiction can offer a serious threat to their own economies. A country whose export income depends to the extent of 75 percent, 80 percent, 90 percent, or even more on one particular mineral, cannot be blamed for being apprehensive at the prospect, or even the possibility, of extensive production of that mineral from the ocean floor.

Fourthly, there was the fear of an uninhibited arms race on the bottom of the oceans. (In this regard the acceptance by the General Assembly in 1970 of a treaty prohibiting the emplacement of nuclear or other weapons of mass destruction on the seabed and ocean floor was a significant step forward.)

Fifthly, there is a real will on the part of most nations to maintain order and to prevent a race for claims by states or their nationals over the seabed and ocean floor. Indeed one of the earlier statements on this point was made by President Johnson in July 1966 when he commissioned the new research ship *Oceanographer*. At that time President Johnson asserted that 'under no circumstances we believe must we ever allow the prospects of rich harvests and mineral wealth to create a new form of colonial competition among the maritime nations. We must be careful to avoid a race to grab and to hold the lands under the high seas.

We must ensure that the deep seas and the ocean bottoms are, and remain, the legacy of all human beings'.

Sixthly, there is universal recognition among the nations of the world of the importance of avoiding pollution and preserving the marine environment and its ecology unharmed for the benefit and enjoyment of this and future generations.

From Australia's point of view all these points are important, but particularly the last three: peaceful uses, prevention of a race for claims, and preservation of the marine environment. It is clearly in our interests, as a country with one of the longest coastlines in the world and a continental shelf of nearly one million square miles (about one-third of the size of our continent) and an extensive continental margin, that the ocean floors should be used for peaceful purposes and that there should be proper order and regularity in exploitation of resources in areas adjacent to our continent, including the avoidance of pollution.

Moreover, there is surely reinforcement for this view in the fact that along our southeastern seaboard, which contains many of our major centres of population, our continental shelf is comparatively narrow—between 25 and 40 or 50 miles wide. Clearly we have a real interest in ensuring that operations adjacent to our coast are adequately controlled. In short, there are good reasons for the world, including Australia, to take this subject seriously.

The Committee's Work in 1968-1970

For the first three years of its existence the Seabed Committee worked mainly through two Sub-committees—one Legal, one Economic and Technical. The Legal Sub-committee set out to draft an agreed set of principles. They had a tough task.

There were widely divergent views and interests to be accommodated, and it was not until the end of 1970 that the Chairman of the main Committee, Ambassador Amerasinghe of Ceylon, basing himself on the work of the Legal Sub-committee, was able to produce a text which, if not ideal, at least commanded a substantial degree of grudging acceptance from the majority of the Committee.

Sir Laurence McIntyre, the Australian representative, noted that the text 'reflected the highest degree of agreement attained at the present time . . . a compromise commanding wide support among members of the Committee . . . a meeting of minds painfully achieved and therefore fully satisfactory to no one'.

This declaration of principles was seen as general guidelines for the establishment of a regime for the seabed and as an earnest of the desire of the great majority of members to have such a regime; but it was not seen by Australia, or by many other countries, as having any binding or mandatory effect upon States in the meantime. It is the Australian view that new binding international obligations cannot be established except by treaty.

In the Economic and Technical Sub-committee there were also problems, but they were not quite as intractable as those of the lawyers. The Sub-committee concluded that mineral resources do exist in the seabed and ocean floor, certainly petroleum and manganese nodules which, for a start, will probably be treated not for their manganese content but for their copper, cobalt, and nickel. It was recognized that as yet very little is known about the nature and extent of these resources; it was accepted that international co-operation is called for in effectively carrying out research over and in the ocean floor. Further, the Sub-committee did some useful work in studying ways and means of promoting the exploitation and use of the resources of the ocean floor.

Very early in the deliberations the Australian delegation put the view that the first criterion of any arrangements to govern the development of seabed resources was that such arrangements should be effective, credible, and impartial. We argued that the arrangements must instil confidence into would-be operators that

rights granted will be, and can be, upheld. We pointed out that impartiality is tremendously important—not only must operators be confident the arrangements will ensure them fair treatment, but, equally, the arrangements must command the confidence of all the nations of the world who create them—developing and developed, socialist and capitalist, large and small, coastal and landlocked.

Consideration of these issues led inevitably to the question of what, if any, administrative machinery would be necessary. This was a subject which provoked diverse opinions among members of the Committee. The majority of members are agreed that some sort of machinery, an international regulatory authority, is necessary. In fact it really seems perfectly clear that an authority will be needed—in just the same way as a Department of Mines is needed on land.

However, even among those delegations who supported the concept of some international organization there were wide divergences of view. Some argued for elaborate and comprehensive machinery which would control all seabed activities including the laying of cables and pipelines, while others have argued for more modest arrangements. This question is still under vigorous debate. Australia has taken a middle position. We have felt that, initially at least, the machinery should concentrate on resources. We have pointed out that such machinery, to be effective, must have access to a wide variety of specialist skills, but at the same time we have argued that a careful balance needs to be kept so as to ensure competence without creating a vast international bureaucracy which could swallow up all direct financial benefits.

One point on which there has been virtual, and possibly complete, unanimity is that any agreed regime and machinery must be such as to ensure the avoidance of unjustifiable interference with other activities on the seabed and the high seas; and must guard effectively against the dangers of pollution and avoid any upset in the natural balance of the ecology of the marine environment.

United States Policies

A major event in the work of the Seabed Committee was an announcement in May 1970 by President Nixon on United States Ocean Policy. The main points covered by President Nixon's statement were—in very staccato fashion—

- First: The stark fact is that the law of the sea is inadequate to meet the needs of modern technology and the concern of the international community.
- Second: All nations should renounce national claims over seabed natural resources beyond 200 metres (thus fixing a boundary between national and international jurisdiction).
- Third: There should be established an internationally agreed regime and machinery to regulate exploration and exploitation of seabed resources.
- Fourth: An interim policy should be adopted so that exploration and exploitation will not be inhibited in any interregnum.
- Fifth: There was a need for a clarification of the breadth of the territorial sea and rights of sea and air transit through international straits.

The United States followed up this Presidential initiative by tabling at the opening of the August session of the Seabed Committee in 1970 a draft treaty of some 78 articles providing for the administration of the resources of the area of the seabed beyond national jurisdiction.

The general reaction of delegations to this working paper was one of admiration for the competent way in which the U.S. experts had tackled this enormously complex problem, but, as was to be expected, no delegation endorsed the proposed provisions in detail. Clearly a great deal of hard negotiation lies ahead—of give and take—of compromise—before a treaty acceptable to the nations of the world generally is devised.

The whole of the draft treaty makes interesting reading, but it is perhaps legitimate to pick out two aspects which came in for particular discussion, both because of their intrinsic interest and also because initial reactions indicate the wide spectrum of opinions which have to be reconciled: first the boundary proposal and secondly the proposal for the composition of a council of an international seabed resource authority.

The main points of the U.S. boundary proposal might be shortly stated as:

- First: The full rights of the coastal state to the resources of the continental shelf should be restricted to within the 200-metre depth line. Beyond the 200-metre line nations should renounce any rights to resources which should be accepted as 'the common heritage of all mankind'.
- Second: The continental margins beyond the 200-metre depth line and including both the continental slope and the continental rise should constitute an international trusteeship zone. Within this trusteeship zone the coastal state should continue to be responsible, subject to the provisions of the new international regime, for licensing and regulating the exploitation of seabed resources and for the disposition of those resources, but it should hold as trustee for the world community the revenues received from that zone, and share them on an agreed basis.
- Third: Beyond the continental margins, the resources of the ocean floor would, under an internationally agreed regime, be the common heritage of mankind under the administration of an international authority.

Reaction in the Seabed Committee to these proposals was mixed. Some nations indicated that they considered the proposals fell short of covering the legitimate interests of the coastal state. Some, including Australia, pointed out that they already enjoyed internationally recognized rights under the Geneva Convention and the customary law. Still others criticized the American scheme trenchantly on the grounds that it gave far too much to the coastal state and far too little to the international community.

The American proposal for a Seabed Council of 24 members drew considerable attention—particularly a provision that out of the 24 members six appointments would be reserved for the most industrially advanced nations—these being defined as the developed nations having the six highest gross national products of the world. There is a further provision, the effect of which is to require that any decisions of the Council shall require approval by a majority of these six industrially advanced countries. So any three of these members would hold a veto over all Council decisions. Indicative of the critical comments made by many delegations was one, milder in tone than most—'The rationale upon which this entrenchment is based is beyond our comprehension'.

An Enlarged Committee

Thus far this article has kept pretty much to the seabed; but the Geneva Conference of 1958 resulted in three other conventions besides that on the Continental Shelf, namely the Convention on the Territorial Sea and the Contiguous Zone, the Convention on the High Seas, and the Convention on Fishing and Conservation of the Living Resources of the High Seas.

Now, although these Conventions represent a significant contribution to the international law of today, they do leave unanswered some rather vital matters. For example, the breadth of the territorial sea—some countries, including Australia, still have a territorial sea of three miles—dating back to the time when that was the distance out to sea that could be controlled by a shore-based cannon. Other countries claim six miles, others twelve, and twenty-five. In the case of South America, there are claims of 200 miles.

For some years, there has been quiet diplomatic activity aimed to resolve this unanswered problem together with associated matters such as the rights of passage through international straits, and fisheries rights in areas of high seas adjacent to the territorial sea.

Last year's General Assembly of the United Nations brought all these things together—the seabed and ocean floor beyond national jurisdiction and the outstanding law of the sea issues to which reference has just been made.

The result was to expand the Sea Bed Committee from 42 to 86 members and to assign them the task of preparing for a comprehensive law of the sea conference, tentatively scheduled for 1973 and hopefully to result in a treaty or a series of treaties which represent an accommodation of the various national interests at stake.

Differing Interests

One speaker at the March meeting in Geneva in 1971 pointed out that it was possible to divide the countries of the world into no less than nine interest groups:

- First: The countries which are coastal and which have extensive continental shelves; e.g. Argentina, Brazil, Australia, Canada, the U.S.S.R., and the U.S.
- Second: The coastal states which have little or no continental shelves but which front the open sea; such as Chile, Peru, Somalia, and many of the African States.
- Third: Land-locked countries, e.g. Austria, Afghanistan.
- Fourth: The shelf-locked countries, that is, countries which, although they face the sea and have a continental shelf, are adjacent or opposite to other countries and have no access to seabed deeper than 200 metres; countries like Belgium, Singapore, and Thailand.
- Fifth: Coastal states whose economies are dependent or substantially dependent on fishing in the waters adjacent to their coastlines; e.g. Peru, Ecuador.
- Sixth: Countries whose economies are dependent or substantially dependent on minerals—particularly those minerals which have now been found in the seabed and ocean floor and have been or can reasonably be expected to be exploited commercially; e.g. countries like Kuwait, 99 percent of whose export income is derived from petroleum, or Chile, about 70 percent dependent on copper exports.
- Seventh: Archipelago states with a special interest in achieving recognition of a territorial sea that encloses all their land mass and surrounding waters; e.g. the Philippines, Indonesia.
- Eighth: The traditional maritime and distant waters fishing nations which are also developed countries; e.g. the U.K., Norway, U.S.S.R., and Japan.
- Ninth: The small group of developed maritime nations which possess an underwater technology—an ability to search for and extract minerals from the deep seabed, particularly the U.S.

It is pretty obvious that these interest groups are not exclusive of one another and that a country can simultaneously belong to several interest groups, that is, it can have different national interests which are not necessarily easily compatible. It is also very clear that neither the developing countries nor the developed countries share a uniformity of interest within their respective overall groupings—for example, both the group of 77 (the developing countries) and the developed countries of the Western and the Eastern groups include both land-locked and coastal states whose interests in these matters are obviously far from identical.

The first half of the session in March 1971 in Geneva was devoted to procedural wrangling, while the second fortnight got down to a general debate on the whole issue. In the course of this debate the interests and aspirations of all the nine interest groups referred to earlier were alluded to—we had over 40 nations speak. Generally, the statements were in rather low key but it is perhaps useful to mention some points of view which were put fairly forcefully.

First, a number of land-locked states made it very clear that they were not interested in extensive rights for coastal states. They wished to see the international area defined so that meaningful production of resources and distribution of revenues would become a reality as soon as possible.

Secondly, the archipelago states of the Philippines and Indonesia strongly asserted the validity of their case to define their territorial limits in a way which included all their myriads of islands and their surrounding seas.

Thirdly, the Latin American countries, particularly those on the west coast, spearheaded by Peru and Chile, argued that there is a geographical, economic, and social link between the sea, the land, and man who inhabits the land which confers on coastal populations a legitimate priority to utilize the natural resources of their marine environment and to establish the limits within which they would exercise their own jurisdiction.

Fourthly, the Soviet Union made a strong statement in support of the traditional freedom of the high seas and of the need to reach agreement on a narrow outer limit within which coastal states would exercise their full territorial sovereignty.

Constructive Second Session in 1971

There was a notable improvement in the atmosphere in which the Sub-committee approached its work at the second session in 1971 in July/August as compared with the March session. The second session was also notable for the presentation of a number of further working papers—some in the form of draft treaties. In August 1970 working papers had been submitted by the United States, United Kingdom, and France—the United States paper as mentioned above being a comprehensive treaty for a regime and the latter two papers being rather in the form of a presentation of concepts as elements for a convention.

In July 1971, Tanzania introduced its draft treaty entitled 'Draft statute for an international seabed authority' at the opening meeting. Later in the session still further working papers were presented:

- (i) by the U.S.S.R.—'Provisional draft articles on a treaty on the use of the seabed for peaceful purposes'.
- (ii) by Poland—a generalized statement, consistent with the U.S.S.R. draft, on the establishment of an international organization to deal with exploration and exploitation.
- (iii) by thirteen Latin American countries (i.e., all Latin American countries represented on the Seabed Committee with the exception of Argentina, Bolivia, and Brazil)—in the form of an outline treaty for a regime for the international seabed area.
- (iv) by the United Kingdom—a revision and amplification of its 1970 paper.
- (v) by Dr Pardo of Malta—a 'Draft Ocean Space Treaty' of over 200 articles designed to cover comprehensively all aspects of the law of the sea.
- (vi) by a group of land-locked and 'shelf-locked' countries—in the form of an outline treaty but concentrating on the question of limits and directed primarily to the interests of states without a significant coastline; and
- (vii) by Canada—a working paper examining how the Declaration of Principles on the International Seabed Area adopted by the General Assembly in 1970 might be reflected in a future treaty establishing a regime.

The United States draft convention and the British paper cover both living and non-living resources of the area (the former resources only briefly); Poland and the land-locked countries specified that they were dealing only with mineral resources; while Tanzania and the sponsors of the Latin American proposals left the question open.

The draft treaties cover a wide spectrum of opinion ranging from the conservative and minimal machinery approach of the U.S.S.R. and Poland, through the somewhat more elaborate procedures envisaged by the United Kingdom and France, the comprehensive machinery envisaged by the United States and Tanzania, to the more far-reaching provisions of the Maltese and Latin American papers. The last-mentioned provides for an 'International Seabed Enterprise' to be responsible, either by itself, or in association with other competent organizations for all seabed operations. No system of 'licensing' of operators would be permitted under the Latin American scheme.

Seabed Limits

The question of fixing with precision the outer limit of the jurisdiction of the coastal state and hence the extent of the area of the seabed and ocean floor beyond national jurisdiction is generally recognized as being both crucial and inextricably linked with final agreement on other aspects of the international regime and the international machinery appropriate for the international seabed area.

The July/August session in 1971 showed a marked re-awakening of interest in national seabed jurisdiction in the sense that the developing countries concentrated their attention noticeably less on the idealism expressed in the concept of 'the common heritage of mankind' and far more on hard-headed and open discussion of the individual interests of states.

Right from the inception of the *ad hoc* Seabed Committee in 1968 most of the Latin American countries, in particular Chile, Ecuador, and Peru, had made clear their views that the limit should be 200 miles from the coast; they already claim that distance for national jurisdiction. For three years, this view had attracted little or no support, and on the contrary, a good deal of opposition—both from the great maritime powers who were concerned at the implications of such claims for the traditional freedoms of the high seas, and from many developing countries who argued that setting national limits of seabed jurisdiction so far from the coast would mean that there was little prospect of meaningful resources in the international area in the foreseeable future.

In its statement in July 1971, the Tanzanian delegation indicated that it had decided to support a simple distance limit. It did not specify any figure but said that 'too narrow a limit might cut across many present-day claims and ignore the special interests of coastal states; but too wide a limit would swallow up all the areas ripe for exploitation and thus prejudice the establishment of the international authority'.

In a forceful statement a few days later the Kenyan delegation argued that the depth and exploitability criteria of the 1958 Convention on the Continental Shelf should be abandoned in favour of a uniformly applied distance limit of 200 nautical miles. Kenya submitted that:

—a depth criterion for national jurisdiction was inequitable as between coastal states, and an additional intermediate or trusteeship zone as proposed by the United States simply compounded the basic inequity of the depth limit and would bring nothing but illusory advantages to the international community;

—coastal states were unlikely to agree to surrender any area of their seabed within 200 metres;

—all coastal states should be accorded national jurisdiction out to 200 nautical miles from the baselines for measuring the territorial sea (200 miles being a distance that would encompass by far the greater part of the 200 metre shelf of all coastal states).

Kenya also proposed to deal with the problem of land-locked states (which had a natural interest in limiting national jurisdiction and expanding the 'common heritage of mankind') by regional arrangements. The Kenyan proposal for a simple distance limit of 200 miles subsequently received support from a number of other African and Asian developing countries, and this support was of course warmly welcomed by the Latin American group.

Austria, Netherlands, and Belgium, and other land-locked and shelf-locked countries (of which there are about 43 in all), continued to argue that the limits of coastal state jurisdiction should be kept narrow. They pointed out that otherwise only a small percentage of the economically valuable part of the seabed would come within the scope of the international regime. Thus only coastal states adjacent to an open sea would continue to benefit from seabed resources and the inequities between such states and the land-locked and shelf-locked states would be perpetuated. In opposing a distance limit of 200 miles, Singapore submitted that the average breadth of the continental shelf of 200 metres (i.e. 40-50 miles) might be more justifiable.

In their working paper referred to earlier the land-locked and shelf-locked countries proposed that the limit of national jurisdiction be set at 200 metres or 40 miles from territorial sea baselines—the coastal state to have a choice of opting for one or the other—such choice to apply to the whole of the coastal state's seabed. Beyond whatever limit was chosen by the coastal state, there would be a further 40 miles of 'coastal state priority zone' in which operations would not be authorized by the international authority without the consent of the coastal state. This latter provision appears to reflect the point made, somewhat reluctantly, during the debate by several of the land-locked and shelf-locked group that the intermediate zone concept might ultimately be the basis of a compromise solution.

The sponsors of the land-locked/shelf-locked working paper did not include representatives from either Latin America or Africa. The absence of the former, at least at this stage, seems to reflect Latin American solidarity and of the latter may point to some success by Kenya in its proposal that the special problems of land-locked states be dealt with regionally. If, at the Conference, the land-locked and shelf-locked states vote as a block they will be a significant voting group. It remains to be seen whether they achieve cohesion.

The United States received little direct support for its detailed proposals for an intermediate or a 'trusteeship' zone in the area between the 200 metre isobath and the outer edge of the continental margin. Early in the session the United Kingdom supported the general concept on the basis of aiming at achieving an equitable compromise between the economic rights and interests of states which have broad continental margins and those which have not. However, the United Kingdom indicated that on a number of aspects of the proposed trusteeship regime it would wish to put forward other proposals. Iraq said it regarded the trusteeship or intermediate zone concept as appropriate, but favoured exclusive coastal state jurisdiction being limited to 40 miles, with a further 20 miles of intermediate zone. A number of other speakers, including some land-locked and shelf-locked states, also referred to the intermediate zone as a possible compromise.

The Australian delegation, in a statement made at the end of July, *inter alia* discussed the advantages and disadvantages of the range of proposals on limits before the Committee. The delegation made it clear that the Australian Government had not made any decision on where, in its view, any new agreed limits of national jurisdiction should be drawn. In the statement we also made the following points:

- any new convention must either reaffirm, or add to, the present limits of national jurisdiction under international and customary international law, or offer persuasive inducement to states to accept a change in the law which would alter their existing rights;
- the present law, conventional and customary, which defined the continental shelf by criteria of depth, adjacency, exploitability and morphology, would continue in operation until lawfully modified;
- the present law recognized unquestionable seabed rights out to the 200 metres depth line and, at the very least, these rights should be maintained in any new settlement;
- an intermediate zone defined by a combination of distance, say 100 miles, with the morphological concept of the outer edge of the margin could perhaps be a more equitable alternative than the proposals of the United States or Iraq;
- the Sub-committee should continue to explore the various possibilities.

Four other statements on seabed limits warrant mention:

- (a) Nigeria proposed a depth and distance combination of 2,500 metres or 200 miles (figures which were later supported by Uruguay);
- (b) Canada re-stated its proposition, first made in March 1971, that, at a specific and preferably early date, every coastal state should make known its continental shelf claims, or alternatively, the maximum limits beyond which it would never claim. (The proposal attracted little support and some criticism);
- (c) Venezuela proposed a compromise of:
 - (i) a territorial sea of 12 miles;
 - (ii) an 'economic zone' or 'patrimonial sea' of 200 miles from territorial sea baselines in which there would be freedom of navigation but with exclusive coastal state rights to all resources of the sea and seabed;
 - (iii) continued continental shelf rights by the coastal state out to 200 metres depth where this occurs beyond 200 miles;
- (d) the United States made a well-balanced reiteration of the advantages it saw in the 'intermediate zone' and indicated some flexibility on:
 - (i) the mixture of coastal state and international rights in such zone, and
 - (ii) the outer boundary of the intermediate zone.

Limits remain a crucial question. A wide range of proposals is before the Sub-committee—some clearly reflecting direct national interests—some with the character of compromise. The debate will be continued in 1972.

International Machinery

The wide range of international organizations being advocated in the Committee has already been referred to when discussing the various working papers. There seems to be unanimity that the machinery should include an Assembly open to all states parties to the new treaty, in which each state party should have one vote.

There was also agreement that there should be a smaller Executive Council or Board, but, on the composition of this council and on its decision-making process, there are wide divergences of view. Some argued for composition by interest groups, e.g., developed countries, land-locked countries, and so on, some by the regional groupings of the United Nations, and others by a combination of both methods.

The Australian delegation argued that the Council should include states with major areas of continental slope. This was supported by Denmark (with Greenland in mind) but otherwise we did not strike any responsive chord on this point.

On the decision-making process, as mentioned earlier the United States treaty contains elaborate provisions which would result in any three of the six 'most industrially advanced' countries of the world holding a veto over council decisions.

The U.S.S.R. proposed that all the questions of substance be decided 'by agreement'. The majority of other speakers so far have argued against any entrenched voting rights for particular states or groups of states, and have proposed that substantial questions should be decided by a two-thirds majority. Australia supported this view.

All speakers recognized the need for a 'secretariat', but there was a division of opinion whether the international authority should also include an international management organ. The Communist countries envisage all operations under the direct control of states who themselves would be responsible for all activities under their control.

Probably the most significant problem to be faced in setting up the international machinery is whether the machinery is to be given the competence to carry out exploration and exploitation operations itself. Here there are three main strands of thought. The major powers, the United States, the U.S.S.R., the United Kingdom, and France, have all strongly opposed the authority ever itself taking part directly in seabed operations. At the other end of the spectrum is the Latin American proposal which envisages the establishment of an 'Enterprise' which would be responsible for all seabed operations in the international area, either by doing the work itself or by production-sharing operations with states, groups of states, or competent commercial entities.

The first group of nations argue that there are legal and economic objections, particularly the difficulty of an international enterprise marshalling finance on the scale needed to take part in exploration and exploitation activities. The second group contends that only through operations under the direct control of an international enterprise can the true spirit of the principle of 'the common heritage of mankind' be realized.

In between these two schools of thought is a fairly widely-held view that it would be reasonable for the treaty to provide that the international authority should have the right to explore and exploit on its own behalf but that these powers would not be exercised until the authority was in a position to finance its operations from within its own resources. Australia took the latter view.

Other Subjects before the Committee

This article has concentrated on seabed matters. But, consistently with its mandate from the General Assembly, the Committee has also been discussing the breadth of the territorial sea (the generally held view being that this should be increased by treaty to 12 miles), the related question of passage through international straits, fisheries, marine pollution, and scientific research in both the sea and the seabed.

In all of these subjects differing national interests are apparent. Each subject is a separate study in itself, and this brief mention is not to be taken that they are of lesser importance to the seabed issues which have been dealt with in greater detail. On the contrary it is only by viewing the range of outstanding Law of the Sea issues as an interlocking whole that a balanced appreciation of the problems facing the Conference to be convoked in 1973 can be obtained.

Is Success Possible?

The work of the Committee is becoming more and more complex and at this stage we must expect this. With all the differing points of view before the Committee it is fair to ask whether there is any chance of reaching an accommodation acceptable to the great majority of the nations of the world—and clearly, to be effective, any accommodation in the form of a new treaty or treaties must have the support of the major powers and particularly the United States, the Soviet Union, and the Peoples Republic of China.

The difficulties are not to be underestimated, and we must expect that it successful, the results will be fully acceptable to no one. On the other hand it is reasonable to take heart from the fact that the issues are being discussed at all, that they are being discussed seriously, and that they are being discussed before, but only just before, the issues are critical. The consequences of failure will surely, in the ultimate, give all countries reason to pause:

First: Failure will almost certainly result in an unchecked unilateral race for national claims on the seabed. The risk of armed conflict is not to be ruled out.

Second: Practically every nation has much to gain from bringing order and control into resource exploitation in the areas of ocean space and in preserving the marine environment for our own and future generations.

Third: The number of issues now under discussion—the breadth of the territorial sea, that is the extent of the exercise of sovereignty by states, fisheries rights, seabed resources, passage through straits, and so on, involve one or more vital interests of a great number of countries.

In the ultimate, some overall package deal providing for a reasonable accommodation of conflicting interests should be possible. The task will call for patience and statesmanship. Success will be a major achievement for the United Nations and the world community.

NOTE. In December 1971 the United Nations General Assembly requested the Seabed Committee to continue its work in 1972. Two sessions of five weeks each will be held. The first in New York in March and the second in Geneva in July/August. The General Assembly also enlarged the Committee by five new members, including the Peoples Republic of China. Membership of the Committee now totals 91 states.

Metal and Mineral Prices

Compiled by J. A. MORRISSEY

MONTHLY AVERAGE BASE METAL PRICES

Australia (per long ton) —	Copper	Lead	Zinc	Tin
September	\$997.92	\$250.00	\$343.00	\$3,263.00
October	\$941.92	\$221.43	\$343.00	\$3,217.62
November	\$937.66	\$220.00	\$343.00	\$3,242.27
U.K. (L.M.E., per metric ton) —				
September	£427.50	£96.681	£125.470	£1,416.36
October	£417.70	£91.940	£134.976	£1,402.02
November	£406.42	£88.778	£137.983	£1,413.14
U.S.A. (US cents per lb) —				
September	52.875	14.25	17.00	166.46
October	52.875	14.25	17.00	167.16
November	52.100	14.25	17.00	175.49

MAXIMUM AND MINIMUM BASE METAL PRICES 1 SEPTEMBER 1971 TO 30 NOVEMBER 1971

Australia (per long ton) —	Copper	Lead	Zinc	Tin
Maximum	\$1,030.40	\$250	\$343	\$3,274
Minimum	\$918.40	\$220	\$343	\$3,209
U.K. (slg. L.M.E., per metric ton) —				
Maximum	£447.75	£100.125	£141.875	£1,433.50
Minimum	£393.75	£84.875	£119.625	£1,398.00
U.S.A. (cents per lb) —				
Maximum	53.00	14.50	17.00	177.25
Minimum	50.25	14.00	17.00	164.25

METAL PRICES AS AT 1 DECEMBER 1971

Metal	Australia	United Kingdom	United States of America
		£ per metric ton (a)	US cents per lb (a)
Aluminium	\$4 per long ton (a)	£257.20 delivered	(c) 29.00
Antimony	(b) \$578		\$0.57
Bismuth	(d) \$1,500	(w) £560.00 per metric ton	(c) 29.00
Cadmium	\$8.00 lb	£3.09 Kg	\$3.50 delivered
Cobalt	(e) \$1.45 lb	(y) £0.60 lb (U.K. & Cwlt)	(r) \$1.50
Copper	(f) \$1.77 lb. (oxide)	£0.8-£0.9 per lb.	(g) \$2.20 per lb
	(h) \$918.40	(i) £400-£401	50.25-50.50 ex-refinery
Gold	(k) \$37.60 fine oz	(j) £401	
Lead	(l) \$220.00	\$43.50 troy oz (U.S.)	\$43.85 seller troy oz
Mercury	Nominal	(i) £87.25-£87.50	14.00-14.50
Nickel	(n) \$1.20 per lb	(m) £212 per flask	\$255-\$260 per flask (20 plus lots)
Pig Iron	(p) \$59.75	£1,246.5 delivered	(o) \$1.33
Platinum		(x) £31.50 per long ton	(q) \$79.50 per long ton
Silver	114.9c troy oz f.o.b.	(r) £48.50-£50.50 troy oz	\$120-\$125 troy oz
Tin	\$3.255	53.1np troy oz	135.0c troy oz
Zinc	(t) \$343	(i) £1,413-£1,414	(s) 176.000
		(j) £139.50-£139.75	(u) 17.00
		(v) £150.00	

(a) Unless otherwise stated. (b) Domestic 1-20K ingots, 99.5% c.i.f. capital cities. (c) U.S. domestic price and Canadian export price delivered U.S. Buyer U.S. currency. (d) 1 ton lots, delivered capital cities. (e) Lots 1 ton and over delivered Melbourne. (f) Delivered Melbourne. (g) Shot, 99% 250-kg drums f.o.b. N.Y. Chicago, per lb. (h) Price electrolytic ex-smelter, Port Kembla. (i) L.M.E. Quotation spot: £ per metric ton. (j) Producers price c.i.f. Europe: £ per metric ton. (k) Australian Gold Producers' Association Price: minimum born, Cathode. (l) Price f.o.b. Port Pirie. (m) Ex-Warehouse. (n) f.o.b. Kwinana. (o) Ex-refinery. (p) Colborne, Cathode. (q) Foundry pig iron c.i.f. State capital city ports. (q) No. 2 Foundry f.o.b. mid-west centres, Adelaide. (u) Prime Western del'd. (v) Straits New York. (r) g.o.b. Delivered Melbourne, Sydney, Port Kembla and regulus, English 99.6% 5 tons d/d U.K. (x) Merchant pig iron, phosphorus 0.7%-1.2% delivered Gt. Britain. (y) 99.95% sticks d/d U.K. (z) Less November rebate of £46.74 to compensate for £ appreciation above former parity of U.S. \$2.40.

ORE AND CONCENTRATE PRICES AS AT 1 DECEMBER, 1971

Note: Some ore and concentrate prices are nominal, the prices quoted being subject to negotiation between the producer and purchaser. The ore and concentrate prices quoted below will also vary according to grade and possible impurities, and in many cases with size of the ore parcel.

Ore or Concentrate	Australia	United Kingdom	United States of America
Antimony	SA Nominal	£ stg. \$7.50 — \$9.50 (U.S.) m.t.u.	SLU.S. \$9.50 — \$11.00 m.t.u. Sb for cons min. 60% Sb, c.i.f.
Beryllium	Nominal	\$b for cons 60% Sb, c.i.f. \$32 — \$35 (U.S.) st.u. BeO for ore, 10% BeO, c.i.f.	Nominal
Bismuth	Nominal	Nominal	Nominal
Chromite	Nominal	\$80 — \$53 Metric Ton Russian, lumpy min. 48% Cr ₂ O ₃ 3.5:1, c.i.f.	Nominal
Columbium		£8.50 — £9.00 L.t.u. (Nb ₂ O ₅ + Ta ₂ O ₅) 65% combined oxides, 10:1 ratio, c.i.f. £0.26 — £0.28 m.t.u. Mn for 48-50% Mn cons max 0.1% P, c.i.f. (nominal)	75c — 85c per lb. of 65% combined oxides, 10:1 ratio, c.i.f. nominal 63c — 68c (nominal) per L.t.u. of contained metal min. 48% Mn c.i.f. U.S. ports Import duty extra \$1.72 per lb. of contained metal cons. 95% MoS ₂ , L.o.b. Climax, Colorado
Manganese	Nominal	£78 — £86 per ton, 60% min. REO + Thoria, c.i.f. (Australian)	\$185 short ton f.o.b. Atlantic ports 96% TiO ₂ delivered within 12 months
Molybdenum	Nominal	£0.72 per lb. of contained metal, cons 85% MoS ₂ L.o.b. Climax, Colorado	\$55 per st.u. cons 65% WO ₃ c.i.f. import duty \$4.758 included per st.u. WO ₃
Monazite	Nominal	£78 — £86 per ton, 60% min. REO + Thoria, c.i.f. (Australian)	As above \$70 per long ton 65% ZrO ₂ c.i.f. Atlantic ports
Tantalum	Nominal	£7.50 — \$8.00 per lb. Ta ₂ O ₅ in ore, min. 60% Ta ₂ O ₅ c.i.f.	
Tin (cassiterite)	\$27.90 per L.t.u. Sn for 70% Sn cons delivered Sydney on 30.11.71	—	
Titanium cons—Ilmenite	\$11 ton f.o.b. Bunbury (nominal)	£9.350 — £11.318 Metric ton 52.54% TiO ₂ (Malayan) c.i.f. £76.768 — £79.720 Metric ton 95.97% TiO ₂ (Australian) c.i.f.	\$20 — \$21 long ton 54% TiO ₂ f.o.b. Atlantic ports, shiploads \$185 short ton f.o.b. Atlantic ports 96% TiO ₂ delivered within 12 months
Rutile	\$145 — \$150 per ton f.o.b. or f.o.r. (nominal) bagged producers' price	£17.50 — £18.75 per m.t.u. WO ₃ cons. c.i.f. Europe. Standard quality (spec. composition) Nominal	
Tungsten cons—Wolfram	\$37.78 — \$40.53 per unit WO ₃ (nominal)	£26.819 — £28.052 per metric ton 66-67% ZrO ₂ c.i.f. £30.510 — £31.986 per metric ton premium quality max. 0.1% TiO ₂	
Scheelite	Nominal		
Zircon	\$35 — \$39 per ton min. 65.2% ZrO ₂ (nominal)		

Copper Ore—
Australia: The price paid for ores is related to the market price of copper, less charges listed below. The basis of price determination is variable; details are obtainable from individual smelters.

Company	Draftage deduction or copper content deduction	Receiving sampling assaying and smelting charge per ton of ore	Converting refining realising charge per unit of copper paid for	Gold refining charge per oz per gold paid for	Silver refining charge per oz of silver paid for
E.R.S. (a)	1.3 unit of copper per ton of ore	10.00	1.00	1.50	0.44
Mount Isa (b)	1.3 unit of copper per ton of ore	10.50	1.50	No payment for gold	0.45
Mount Morgan (c) (d)	1% of weight of ore plus 1.3 units of copper per ton of ore	12.00	2.00	1.70	0.50

(a) The Electrolytic Refining and Smelting Company of Australia Pty Ltd, Port Kembla, New South Wales.
(b) Mount Isa Mines Ltd, Mount Isa, Queensland.
(c) Mount Morgan Ltd, Mount Morgan, Queensland.
(d) Mount Morgan gold and silver deductions—Gold, deductions range from 1 dwt/ton for 10 dwt/ton and lower grade ore to 1 dwt/ton plus 5 percent of the balance for 12 dwt/ton and over ore; silver, 1 oz/ton plus 10 percent of the balance.

Publications

RECENT PUBLICATIONS

BULLETINS

- No. 110—Cambro-Ordovician Conodonts from the Burke River Structural Belt, Queensland; by E. C. Druce and P. J. Jones \$2.25
No. 117—Lower Ordovician Conodonts from the Bonaparte Gulf Basin and the Daly River Basin, Northwestern Australia; by P. J. Jones \$2.50
No. 129—The Stability of magnetization in basic Igneous Rocks; by P. M. Stott \$2.50

REPORTS

- No. 137—Geology of the Charters Towers 1:250,000 Sheet Area, Queensland; by D. W. Wyatt, A. G. L. Paine, D. E. Clarke, C. M. Gregory, and R. R. Harding \$2.50
No. 148—Catalogue of additional type and figured specimens of Protista (Foraminifera, Radiolaria and Tintinnina) in the Commonwealth Palaeontological Collection, Canberra; by Irene Crespin \$2.50

GEOLOGICAL 1:250,000 MAPS AND NOTES

- \$0.75
Bulloo, Qld.
Cunnamulla, Qld.
Longreach, Qld.
Muttaborra, Qld.
Quilpie, Qld.
Toompine, Qld.
Wyandra, Qld.
Cambridge Gulf, W.A.
Prince Regent-Camden Sound.

**Part 2—
Quarterly
Statistics**

Australian Mineral Industry

VOLUME 24 No. 2 QUARTER ENDED 30 JUNE 1971

*Prepared under instructions from the Honourable the Treasurer
by J. P. O'Neill, Commonwealth Statistician*

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS
CANBERRA, AUSTRALIA

Preface

Statistics included in this Part relate to Australian production of and overseas trade in minerals and mineral products. In the main, the data relating to mineral production consist of official statistics of Mines Departments of the several States and the Northern Territory Mines Branch. These statistics have been supplemented as necessary by data obtained from the Fuel Branch of the Department of National Development and the Bureau of Mineral Resources, including information collected by that Bureau from mines and treatment plants.

The presentation of data in this Part is arranged to assemble under the one heading all statistics in respect of each particular mineral. Summary tables showing production of selected major minerals and metals are shown on page 23, and include details where available for the September quarter 1971.

The fundamental concept of Australian mineral production statistics is that quantities and values of individual minerals are reported in terms of the products in the form in which they are dispatched from the locality of each mine. This involves the inclusion in the mining industry of ore-dressing and certain elementary smelting of metallic minerals (e.g., in the case of gold) and miscellaneous treatment of non-metallic minerals where these operations are carried out in an associated plant at or near the mine. For example, in the case of a metal mine, the output is recorded as ore when no treatment is undertaken at the mine or as a concentrate where ore-dressing operation are carried out in an associated plant in the locality of the mine.

The particulars of quantities of minerals produced shown have been compiled on this basis as far as practicable. This has involved some re-arrangement of official statistics published by Mines Departments for certain States. Actual output of the mineral product (as defined in the preceding paragraph) has generally been reported, but in some cases it has been necessary to include dispatches from the mine (or reported sales) as distinct from production in deriving the total for Australia. In addition to the basic quantity data, particulars of contents of metallic minerals are shown and in general represent total contents (as determined by assay) for each metal which is a 'pay metal' or 'refiners' prize' when present in the particular mineral.

The data exclude construction materials (sand, gravel, building stone, etc.) and some particulars for non-metallic minerals which are not at present available. Quarterly value of output statistics are not available because of delays in realization of values of several important minerals. Statistics of the value of output of individual minerals are published in the annual statistical bulletin, 'Mineral Production'—Reference 10.51. In this bulletin figures for 1968-69 and later years relate to a fiscal year, for earlier years the figures relate to a year ended 31 December.

All tables in this publication omit particulars relating to uranium bearing minerals.

I extend my thanks to State Departments of Mines, Statisticians of the several States, and the Department of National Development who have supplied information used in the preparation of this Bulletin.

J. P. O'NEILL
Commonwealth Statistician

Contents

Aluminium	1	Limestone	10
Antimony	2	Lithium	22
Asbestos	2	Magnesite	11
Barite	20	Manganese	11
Beryllium	20	Mercury	22
Bismuth	20	Mica	22
Cadmium	3	Monazite	12
Clays	21	Nickel	12
Coal	3	Petroleum	13
Cobalt	21	Phosphate	14
Copper	4	Platinum	22
Cryolite	21	Potassium	22
Diamonds, industrial	21	Salt	14
Diatomite	21	Sillimanite	14
Dolomite	21	Silver	15
Felspar	22	Sulphur	16
Fluorspar	22	Talc	16
Gems	6	Tantalum and Columbium	22
Gold	6	Tin	17
Gypsum	7	Titanium	17
Iron	8	Tungsten	18
Kyanite	22	Zinc	19
Lead	9	Zirconium	20

Summary Tables: Production of Principal Minerals and Smelter and Refinery Production of Principal Metals 23

(References are to page numbers)

The following terms and symbols, where shown in tables, mean:

long ton: long ton of 2,240 lb.	(—): nil
short ton: ton of 2,000 lb.	(.): less than half the unit shown
unit: 22.4 lb.	(n.a.): not available
f oz: fine content, troy ounce	(n.e.i.): not elsewhere included.
*: subject to revision	

Statistics of smelter and refinery production exclude secondary metal (i.e. metal recovered from scrap) unless otherwise specified.

All import and export values are expressed in Australian currency and are generally f.o.b. port of shipment. A more detailed description of the method of valuation is quoted in the *Overseas Trade Bulletin*.

Any discrepancies between totals and sums of components in the tables are due to rounding.

Other Publications of the Commonwealth Bureau of Census and Statistics
relating to the Australian mineral industry

Reference Title, Frequency and Price

10.18	Minerals and Mineral Products, Annually, Free
10.19	Minerals and Mineral Products, Monthly, Free
10.20	Mining and Quarrying, Annually, Free
10.23	Non-Rural Primary Industries, Annually, \$1.17 Including Postage †
10.40	Minerals and Mineral Products (Preliminary), Annually, Free
10.41	Mineral Exploration, Annually, Free
10.42	Overseas Participation in Australian Mining Industry, Annually, Free
10.48	Mining Establishments (Preliminary Statement), Annually, Free
10.51	Mineral Production, Annually, Free

Enquiries regarding free publications should be made to:
Commonwealth Bureau of Census and Statistics
Box 17, G.P.O.
Canberra, A.C.T. 2600

† The Non-Rural Primary Industries Bulletin may be purchased from either The Assistant Director, Sales and Distribution, Australian Government Publishing Service, P.O. Box 84, Canberra, A.C.T. 2600 or the Office of the Deputy Commonwealth Statistician in each State capital.

ALUMINIUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced	ton	7,796,003	9,110,132	2,665,509	2,561,429	2,476,806	3,074,461
Bauxite	ton	4,211,363	4,894,128	1,435,361	1,367,650	1,315,745	1,642,620
Alumina (Al ₂ O ₃) content	"						
Production States (Al ₂ O ₃ content)	"						
New South Wales	"	4,780	3,710	760	1,197	1,018	314
Victoria	"	2,008	418	—	—	4,050	—
Queensland	"	3,049,917	3,351,200	994,656	907,015	846,315	1,047,313
Western Australia	"	1,154,658	1,538,800	439,945	459,438	464,362	492,400
Northern Territory	"	—	—	—	—	—	102,593
Total contained alumina	"	4,211,363	4,894,128	1,435,361	1,367,650	1,315,745	1,642,620
Smelter and refinery production							
Alumina	ton	1,900,519	2,118,233	555,484	578,664	559,344	654,010
Refined aluminium	ton	124,423	202,355	51,693	52,555	53,484	57,030
IMPORTS (a)							
Aluminium and aluminium base alloys							
Alumina	ton	2,821	3,642	1,115	754	1,099	14,609
Value	\$'000	506	838	267	180	248	1,012
Unworked shapes	ton	1,062	402	85	91	106	41
United Kingdom	"	562	285	34	85	42	26
U.S.A.	"	415	17	9	6	64	1
Other	"	85	100	42	—	—	14
Value	\$'000	726	318	60	94	99	43
Plates, sheets, strips and circles	ton	1,069	686	202	163	232	203
Value	\$'000	1,045	984	334	213	289	276
Pipes and tubes	ton	28	19	6	3	28	9
Value	\$'000	74	43	16	8	24	21
Bars, rods and angles	ton	1,278	1,000	357	290	133	112
Value	\$'000	1,261	863	310	273	137	112
Foil	ton	1,377	1,544	295	411	372	444
Value	\$'000	2,176	2,345	520	573	559	587
Powder	ton	158	197	16	12	6	11
Value	\$'000	122	151	27	14	10	15
Wire, single strand, uncovered	ton	186	132	24	24	16	38
Value	\$'000	282	203	49	43	30	57
Scrap (including re-melt)	ton	754	767	135	141	121	166
Value	\$'000	254	240	43	40	37	59
EXPORTS (a)							
Aluminium and aluminium base alloys							
Unworked shapes	ton	20,198	81,029	22,162	22,937	18,400	15,504
Japan	"	10,983	49,776	12,353	14,730	11,758	11,595
Hong Kong	"	4,112	5,121	1,577	1,291	1,273	1,240
Philippines	"	2,036	1,636	567	497	313	225
New Zealand	"	1,295	4,280	1,441	258	1,149	1,031
Other	"	1,772	21,236	6,224	6,161	3,907	1,413
Value	\$'000	9,505	37,870	10,577	10,459	8,495	6,856
Plates, sheets, strips and circles	ton	150	397	89	140	197	804
Value	\$'000	211	363	78	117	171	642
Pipes and tubes	ton	51	68	24	15	29	7
Value	\$'000	59	99	44	28	46	9
Bars, rods and angles	ton	776	2,961	917	776	285	237
Value	\$'000	521	2,019	577	821	170	182
Foil	ton	752	910	314	239	130	368
Value	\$'000	613	774	249	217	110	314
Powder	ton	1	1	—	—	—	—
Value	\$'000	35	49	18	6	4	38
Wire, single strand, uncovered	ton	57	63	17	8	6	47
Value	\$'000	3,683	1,738	383	378	1,054	549
Scrap (including re-melt)	ton	1,227	346	69	67	202	128
Value	\$'000	—	—	—	—	—	—

(a) Details of imports of bauxite, and exports of bauxite and alumina are not available for publication.

ANTIMONY

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Antimony ore	ton	—	7	—	7	72	—
Antimony content	"	—	2	—	2	20	—
Antimony concentrate	"	218	178	114	64	183	313
Antimony content	"	142	111	69	42	104	186
Antimony content of minerals produced							
Antimony ore	"	—	2	—	2	20	—
Antimony concentrate	"	142	111	69	42	104	186
Lead concentrate	"	749	744	209	173	150	153
Lead-zinc concentrate	"	19	58	9	8	—	—
New South Wales		905	904	287	214	204	261
Victoria		—	—	—	—	20	—
Queensland		5	11	—	11	50	78
Total contained antimony		910	915	287	225	274	339
IMPORTS							
Antimony metal		ton	67	32	—	8	5
Value		\$'000	66	62	—	18	9

ASBESTOS

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Chrysotile	short ton	825	815	235	172	226	194
New South Wales	"	795	815	235	172	169	194
Western Australia	"	30	—	—	—	57	—
IMPORTS							
Chrysotile	short ton	46,656	61,590	16,716	19,037	16,584	6,722
Canada	"	45,975	60,577	15,912	18,972	16,231	6,708
Others	"	681	1,013	804	65	353	14
Value	\$'000	5,944	8,575	2,333	2,429	2,364	1,018
Amosite	short ton	9,779	11,024	2,179	4,204	4,434	1,942
South Africa	"	9,779	9,575	1,805	3,193	1,515	1,792
Others	"	—	1,449	374	1,011	2,919	150
Value	\$'000	1,180	1,394	283	539	727	275
Other types	short ton	2,633	3,010	443	1,586	1,467	2,801
Value	\$'000	247	310	31	194	66	335
EXPORTS							
All types and grades	short ton	527	488	114	129	4	8
Value	\$'000	99	114	21	26	—	1

CADMIUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Cadmium content of minerals produced							
Lead concentrate	ton	49	83	23	19	23	23
Lead-zinc concentrate	"	16	32	4	6	—	—
Zinc concentrate	"	1,595	1,499	400	362	303	296
New South Wales	"	1,248	1,174	330	267	222	229
Queensland	"	322	366	78	106	91	73
Tasmania	"	76	69	17	14	13	16
Northern Territory	"	14	4	2	—	—	—
Total contained cadmium	"	1,660	1,613	427	387	326	318
Refinery production							
Refined cadmium	"	562	605	148	141	131	148
EXPORTS							
Refined cadmium and cadmium alloys—							
Ingot and blocks	ton	42	68	23	24	68	14
Value	\$'000	194	314	111	102	266	51
Bars and rods	ton	382	448	104	51	69	147
Value	\$'000	2,299	2,757	669	305	302	428

COAL

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Black coal							
Semi-anthracite	'000 ton	13	1	1	—	—	—
Bituminous	"	41,635	45,004	12,406	11,274	10,009	11,946
Sub-bituminous	"	3,634	3,428	925	741	737	806
New South Wales	"	33,438	35,333	9,764	8,629	7,813	8,990
Victoria	"	—	—	—	—	—	—
Queensland	"	8,499	9,964	2,730	2,712	2,265	3,052
South Australia	"	2,211	1,827	504	345	375	375
Western Australia	"	1,091	1,198	303	297	267	304
Tasmania	"	116	112	30	31	25	30
Underground	"	35,164	36,132	9,885	9,048	8,370	9,309
Open cut	"	10,191	12,301	3,446	2,966	2,376	3,442
Total	"	45,354	48,434	13,331	12,015	10,747	12,751
Brown coal (lignite)	"	22,906	23,793	6,621	5,068	4,916	6,196
Victoria	"	22,906	23,793	6,621	5,068	4,916	6,196
Coal products							
Metallurgical coke	"	3,787	4,225	1,107	1,126	1,149	1,088
Brown coal briquettes	"	1,464	1,426	368	278	292	438
IMPORTS							
Coal	ton	12,023	9,822	91	89	9,329	1,542
Value	\$'000	284	162	3	3	144	51
Coke	ton	88,844	115,113	38,814	30,947	23,833	33,452
(incl. petroleum coke)	ton	2,173	3,446	1,176	928	798	1,223
Value	\$'000						
EXPORTS							
Coal	'000 ton	15,802	18,017	4,637	4,744	4,293	5,125
Japan	"	15,394	16,205	4,223	4,203	3,537	4,055
Other	"	408	1,812	414	541	756	1,070
Value	\$'000	142,732	177,404	45,445	49,099	45,749	54,361
Coke	ton	333,645	463,391	71,546	211,781	177,224	123,321
Value	\$'000	5,224	8,376	1,558	3,426	2,690	2,383

COPPER

		Quarters— 1970*		1971*		
		1969	1970*	September	December	March June
PRODUCTION						
Mine production						
Minerals produced						
Copper ore (a)	ton	27,122	40,786	9,638	10,652	9,179 9,552
Copper content	ton	1,679	2,492	560	675	545 627
Gold content	1000 loz	87	486	124	126	77 77
Silver content	1000 loz	2	9	1	1	2 1
Copper concentrate	ton	506,010	603,876	138,828	187,072	173,569 160,955
Copper content	1000 loz	118,970	143,100	32,654	44,116	42,679 40,092
Gold content	1000 loz	84,298	93,709	18,887	22,012	22,570 27,295
Silver content	1000 loz	1,070	1,118	261	332	309 259
Lead content	ton	811	885	200	180	249 133
Zinc content	ton	1,687	1,692	396	447	612 33
Copper precipitate	ton	439	293	76	106	43 29
Copper content	ton	259	186	50	68	31 21
Gold content	1000 loz	—	131	44	43	— —
Silver content	1000 loz	—	—	—	—	— —
Copper content of minerals produced						
Bismuth concentrate	ton	138	103	31	19	24 22
Copper ore (a)	ton	1,679	2,492	560	675	545 627
Copper concentrate	ton	118,970	143,100	32,654	44,116	42,679 40,092
Copper precipitate	ton	259	186	50	68	31 21
Copper-iron concentrate	ton	570	763	185	178	196 264
Gold ore	ton	—	—	—	—	— —
Lead concentrate	ton	3,756	3,637	1,016	833	667 723
Lead-copper concentrate	ton	1,378	1,290	337	256	286 336
Lead-zinc concentrate	ton	59	210	30	34	— —
Nickel concentrate	ton	1,241	2,573	634	971	178 286
Zinc concentrate	ton	936	943	253	212	172 194
New South Wales	ton	15,041	14,944	4,154	3,421	3,528 2,663
Victoria	ton	65	45	13	16	7 7
Queensland	ton	85,875	105,584	23,038	35,628	33,466 30,212
South Australia	ton	394	1,505	472	473	346 786
Western Australia	ton	2,149	3,300	791	1,221	192 346
Tasmania	ton	18,685	23,556	5,863	5,201	5,720 7,010
Northern Territory	ton	6,777	6,363	1,419	1,402	1,865 1,551
Total contained copper	ton	128,986	155,297	35,750	47,362	44,778 42,575
Smelter and refinery production						
Blister copper (b)	ton	114,349	109,888	28,706	31,678	32,559 35,482
Refined copper	ton	99,261	102,480	24,754	24,807	29,091 29,573

IMPORTS

Copper—						
Unrefined copper	ton	16	25	10	15	12 5
Value	\$'000	22	36	18	18	11 6
Refinery shapes	ton	47	13	1	—	— 20
New Zealand	ton	22	2	—	—	— 20
U.S.A.	ton	15	11	1	—	— 20
Others	ton	10	—	—	—	— 20
Value	\$'000	64	22	3	—	— 20
Bars, rods, angles and tees	ton	1	50	30	30	1 1
Value	\$'000	4	75	38	37	3 3
Plates, sheets and strips	ton	17	11	—	—	— 1
Value	\$'000	24	29	4	1	6 6
Pipes and tubes	ton	565	598	238	199	164 93
Value	\$'000	974	1,115	442	334	261 147
Wire	ton	19	23	5	9	12 2
Value	\$'000	47	66	12	24	43 5
Powder	ton	312	324	53	143	74 82
Value	\$'000	507	586	100	247	131 119
Scrap	ton	969	1,104	218	129	182 211
Value	\$'000	796	1,130	196	86	155 172
Copper-base alloys—						
Pigs, ingots and blocks	ton	27	64	1	37	21 17
Value	\$'000	31	72	3	37	29 18

COPPER

		Quarters— 1970*		1971*		
		1969	1970*	September	December	March June
IMPORTS (continued)						
Copper-base alloys—Continued						
Rolls, drawn and extruded shapes	ton	672	944	253	401	275 269
Value	\$'000	1,096	1,655	469	657	470 344
Wire	ton	175	171	15	66	31 59
Value	\$'000	315	320	41	97	61 112
Scrap	ton	1,906	1,643	396	295	327 665
Value	\$'000	641	1,236	238	190	209 502
EXPORTS						
Copper—						
Copper concentrate	ton	49,224	102,645	33,095	36,162	43,684 29,061
Japan	ton	45,103	97,772	31,429	33,792	42,456 24,256
Other	ton	4,121	4,873	1,666	2,370	1,228 805
Value	\$'000	9,600	28,049	9,203	9,092	8,021 5,716
Copper precipitate	ton	235	131	—	131	— —
Value	\$'000	150	49	—	49	— —
Copper matte	ton	3,291	7,144	1,500	1,480	— 3,782
Belgium-Luxembourg	ton	2,400	5,417	1,500	739	— 1,982
Other	ton	891	1,727	—	741	— 1,800
Value	\$'000	1,761	4,059	755	633	— 1,297
Copper-lead dross	ton	1,581	4,558	1,207	755	256 256
Value	\$'000	1,547	1,254	356	210	58 63
Slags and residues	ton	402	107	70	—	— 11
Value	\$'000	40	33	27	—	— 4
Blister copper	ton	8,425	6,967	2,328	1,555	1,927 1,052
Japan	ton	8,425	6,967	2,328	1,555	1,927 1,052
Value	\$'000	12,594	11,122	3,490	1,933	2,331 1,441
Refinery shapes	ton	32,208	30,939	2,468	7,573	12,869 12,518
E.E.C.	ton	11,249	16,855	1,968	5,177	8,267 6,317
Value	\$'000	10,030	9,250	491	1,771	2,900 2,463
United Kingdom	ton	10,929	4,834	26	625	1,702 3,744
Other	ton	40,572	41,753	2,852	7,932	11,790 12,947
Value	\$'000	8,192	9,633	2,578	2,166	2,163 2,602
Bars and rods	ton	10,197	13,740	3,710	2,610	2,180 2,722
Value	\$'000	6	9	2	1	2 3
Angles, shapes and sections	ton	6	12	3	1	4 4
Value	\$'000	767	1,058	280	260	230 271
Plates, sheets and strips	ton	1,204	1,929	525	418	336 369
Value	\$'000	809	2,068	591	656	388 345
Tubes and pipes	ton	1,360	4,012	1,175	1,172	710 587
Value	\$'000	162	494	189	71	274 533
Wire	ton	229	746	289	97	278 571
Value	\$'000	—	—	—	—	— —
Scrap	ton	—	—	—	—	— —
Value	\$'000	—	—	—	—	— —
Copper-base alloys—						
Refinery shapes	ton	28	55	—	28	— 2
Value	\$'000	37	72	1	36	— 3
Bars and rods	ton	3,230	3,620	848	758	422 1,016
Value	\$'000	3,005	3,914	837	693	372 859
Angles, shapes and sections	ton	97	149	45	33	19 49
Value	\$'000	99	148	45	30	18 37
Plates, sheets and strips	ton	295	381	119	87	84 73
Value	\$'000	417	598	192	132	122 98
Tubes and pipes	ton	149	21	11	38	12 10
Value	\$'000	35	246	22	75	22 16
Wire	ton	79	93	51	9	3 10
Value	\$'000	108	137	76	16	7 19
Scrap	ton	54	58	—	42	— 66
Value	\$'000	48	50	—	36	— 39
Copper and copper-base alloys—						
Foil	ton	—	1	1	—	— 1
Value	\$'000	—	—	—	—	— —
Powders and flakes	ton	1	4	—	2	— 1
Value	\$'000	—	—	—	—	— —
Copper content of concentrates, matte, etc. exported (c)	ton	11,850	36,374	15,433	9,566	9,969 8,269

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

GEMS

		Quarters—				1971*	
		1970*					
		1969	1970*	September	December	March	June
PRODUCTION							
Opals	\$'000	9,840	11,366	n.a.	n.a.	n.a.	n.a.
New South Wales	"	2,500	3,650	n.a.	n.a.	n.a.	n.a.
Queensland	"	13	16	n.a.	n.a.	n.a.	n.a.
South Australia	"	7,327	7,700	n.a.	n.a.	n.a.	n.a.
Sapphires	"	2,453	3,910	n.a.	n.a.	n.a.	n.a.
New South Wales	"	1,453	2,910	n.a.	n.a.	n.a.	n.a.
Queensland	"	1,000	1,000	n.a.	n.a.	n.a.	n.a.
Other gems	"	114	193	n.a.	n.a.	n.a.	n.a.
New South Wales	"	13	10	n.a.	n.a.	n.a.	n.a.
Queensland	"	85	137	n.a.	n.a.	n.a.	n.a.
South Australia	"	1	1	n.a.	n.a.	n.a.	n.a.
Western Australia	"	15	45	n.a.	n.a.	n.a.	n.a.
Tasmania	"	—	—	n.a.	n.a.	n.a.	n.a.

IMPORTS

Diamonds, gem	metric carat	35,470	44,234	11,276	15,350	14,057	14,059
Value	\$'000	5,292	5,964	1,515	1,599	1,560	1,899

EXPORTS

Opals—	\$'000	8,838	8,011	1,646	2,379	1,222	1,850
Rough, not cut or polished	"	3,568	3,960	1,731	814	909	1,055
Cut and polished	"						
Sapphires—	"	2,692	2,910	697	661	560	1,004
Rough, not cut or polished	"	324	257	50	61	6	3
Other	"						

GOLD

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June

PRODUCTION

Mine production							
Minerals produced							
Gold ore	ton	—	500	—	80	—	—
Gold content	1 oz	—	348	—	56	—	—
Silver content	"	—	—	—	—	—	—
Gold bullion (a)	oz	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gold content	1 oz	555,339	462,069	105,221	116,753	123,931	105,968
Silver content	"	158,950	133,047	31,034	32,727	28,440	25,362
Gold content of minerals produced	"						
Bismuth concentrate	"	22,330	23,049	5,656	6,981	9,848	7,833
Copper ore	"	87	486	124	126	77	77
Copper concentrate	"	84,798	93,709	18,887	20,012	22,570	27,295
Copper precipitate	"	—	—	—	—	—	—
Gold ore	"	—	348	—	56	—	—
Gold bullion (a)	"	555,339	462,069	105,221	116,753	123,931	105,968
Lead concentrate	"	12,210	11,058	3,014	2,755	2,296	2,247
Lead-copper concentrate	"	22,908	24,260	6,113	4,779	4,743	8,481
Lead-zinc concentrate	"	2	—	—	—	—	—
Zinc concentrate	"	4,721	4,943	1,209	1,136	948	982
New South Wales	"	10,564	10,440	2,921	2,407	2,121	2,153
Victoria	"	8,558	9,145	2,397	1,867	371	748
Queensland	"	71,910	83,235	17,475	20,265	18,562	25,078
South Australia	"	391	525	44	100	—	16
Western Australia	"	441,118	350,369	77,647	89,050	96,203	82,451
Tasmania	"	40,240	42,919	10,499	9,197	9,176	13,368
Northern Territory	"	129,106	124,267	29,235	31,672	37,860	29,069
Total contained gold	"	701,895	619,922	140,218	154,578	164,413	152,883
Refinery production							
Newly-won gold	"	586,396	477,406	111,960	130,270	101,059	120,514
Australian origin	"	116,937	107,389	29,317	28,645	26,465	28,038
Overseas origin	"						
Scrap	"	17,810	18,735	5,427	5,416	3,038	6,593
Australian origin	"	731	855	659	217	4	489
Overseas origin	"						
Total	"	721,894	624,985	147,383	164,548	130,546	155,634

GOLD

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June

IMPORTS

Gold							
Refined forms (excl. specie, leaf and foil)	1 oz	63,569	554	133	57	7,849	128
Value	\$'000	2,434	27	8	2	217	4
Unrefined bullion (gold content)	1 oz	117,723	119,457	27,860	26,098	21,384	27,913
Fiji	"	94,457	98,807	22,039	21,308	18,654	22,301
Papua New Guinea	"	23,260	20,613	5,821	4,790	2,730	5,611
Other	"	6	37				
Value	\$'000	4,072	3,808	889	856	714	958

EXPORTS

Refined forms (excl. specie, leaf and foil)	1 oz	587,089	188,441	48,764	25,060	1,650	1,172
Hong Kong	"	444,806	183,818	47,879	23,990		
Singapore	"	147,995					
New Zealand	"	3,949	4,344	885	1,050	1,585	998
Other	"	339	279		20	65	174
Value	\$'000	21,139	5,960	1,545	809	57	40
Gold content of concentrates, blister copper, etc. exported	1 oz	94,004	188,464	26,419	21,647	26,191	84,552

CHANGES IN STOCKS OF GOLD HELD IN AUSTRALIA

Supplies	1 oz	604,937	497,596	118,066	135,903	104,081	127,596
Refinery production (b)	"	181,282	120,011	27,993	26,155	29,233	28,040
Imports	"	786,229	617,607	146,059	162,058	133,314	155,636
Total supplies	"						
Disposals	"	587,089	188,441	48,764	25,060	1,650	1,172
Exports	"	435,482	451,191	101,739	199,050	315,012	218,642
Net industrial consumption	"	1,032,571	669,632	150,503	224,110	316,662	219,814
Total disposals	"						
Apparent change in stocks held in Australia (c)	"	-246,342	-52,025	-4,444	-62,052	-183,348	-64,177

(a) Mine bullion, alluvial, retorted gold, etc. Includes production from antiferrous pyrites. (b) Refinery production from newly-won gold of Australian origin and scrap of domestic and overseas origin. (c) Excludes specie; includes changes in holdings in Australia by Official and Banking Institutions both on their own behalf and that of non-residents.

GYPSUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June

PRODUCTION

Mine production	ton	897,705	832,089	261,443	178,096	192,478	240,107
New South Wales	"	31,637	38,373	11,351	10,950	8,950	8,844
Victoria	"	84,383	46,884	12,495	11,159	8,405	11,649
South Australia	"	717,287	656,845	205,295	148,737	139,292	161,548
Western Australia	"	64,398	89,987	32,302	8,250	35,831	58,066

EXPORTS

Gypsum and anhydrite	ton	229,126	214,964	73,310	55,651	60,529	65,847
New Zealand	"	99,008	103,100	26,971	26,562	18,828	27,108
Philippines	"	42,171	17,051	17,051			
China, Formosa	"	44,930	43,729	7,779	10,090		19,594
Other	"	42,117	51,064	21,509	18,999	41,701	19,145
Value	\$'000	1,006	1,051	320	279	299	333

IRON

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Iron ore and concentrate (a)	'000 tons	37,966	50,380	13,538	14,068	13,503	14,833
Iron content		24,454	32,224	8,652	9,001	8,628	9,457
Production: States, iron content							
South Australia	"	4,440	4,820	1,198	1,251	1,173	1,024
Western Australia	"	18,082	25,335	7,012	7,162	6,904	7,914
Tasmania	"	1,566	1,325	263	381	393	353
Northern Territory	"	566	744	178	207	158	166
Total contained iron	"	24,454	32,224	8,652	9,001	8,628	9,457
Iron and steel							
Iron ore pellets	"	5,778	5,863	1,492	1,680	1,746	1,697
Pig iron	"	6,010	6,051	1,575	1,619	1,496	1,444
Raw steel (b)	"	6,906	6,714	1,728	1,736	1,599	1,625
Blooms and slabs	"	5,951	5,683	1,484	1,446	1,377	1,368
Tinplate	"	277	294	79	79	76	73
IMPORTS							
Iron							
Iron ore	tons	—	520	430	15	35	1,884
South Africa	"	—	419	419	—	10	—
Other	"	—	101	11	15	25	1,884
Value	\$'000	—	15	5	2	5	20
Iron and steel							
Ferro-alloys (excl. powders)	ton	5,877	12,879	3,704	3,129	1,787	1,823
Ferro-chromium	\$'000	1,448	2,722	760	668	538	596
Value	\$'000	6,352	7,691	2,728	1,222	1,467	28,499
Ferro-manganese	ton	1,308	1,700	636	296	343	678
Value	\$'000	131	277	53	60	43	74
Ferro-molybdenum	ton	398	851	165	185	129	194
Value	\$'000	775	3,346	908	374	288	351
Ferro-nickel	ton	514	8,287	2,418	233	189	196
Value	\$'000	7,000	13,388	3,399	4,797	2,294	2,136
Ferro-silicon	ton	1,180	2,272	651	613	481	328
Value	\$'000	2,138	2,514	470	649	1,785	1,141
Other	ton	567	932	240	260	366	534
Value	\$'000	2,593	3,269	779	1,110	4,307	437
Tinplate	ton	511	637	142	250	1,073	80
Value	\$'000						
EXPORTS							
Iron							
Iron ore and pellets	'000 tons	26,257	40,463	10,534	12,032	12,039	13,019
Japan	"	22,468	35,669	9,734	10,246	10,302	11,119
Other	"	3,789	4,794	799	1,786	1,737	1,900
Value	\$'000	229,930	325,216	84,376	93,605	95,824	101,763
Iron and steel							
Pig iron	ton	368,913	305,325	130,570	59,890	76,005	116,416
Japan	"	328,915	271,643	125,295	52,902	42,279	84,975
Philippines	"	14,213	11,156	1,246	3,150	2,867	1,727
New Zealand	"	9,358	5,600	1,104	1,100	1,693	1,304
Czechoslovakia	"	3,045	4,430	451	1,729	508	449
Other	"	13,382	12,406	2,474	1,009	26,658	27,562
Value	\$'000	16,271	18,421	8,058	3,749	3,758	5,957
Ingot, blooms and slabs	ton	536,199	221,987	52,215	14,659	23,015	25,473
Value	\$'000	32,746	18,198	4,372	1,339	1,800	2,085
Scrap	ton	534,899	536,227	148,804	137,280	86,416	88,588
Value	\$'000	14,494	20,587	6,000	5,511	3,181	2,741
Tinplate	ton	57,413	43,494	13,040	9,168	8,794	15,036
Value	\$'000	7,704	6,532	2,043	1,382	1,241	2,378
Iron content of iron ore exported	'000 tons	17,120	25,999	6,860	7,686	7,692	8,370

(a) Iron oxide for metal extraction. (b) Includes recovery from scrap.

LEAD

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Lead ore (a)	ton	41,773	32,953	8,000	7,881	8,211	8,233
Lead content		3,387	1,819	440	434	455	459
Silver content	'000 t oz	69	66	16	16	16	17
Zinc content	ton	2,335	—	—	—	—	—
Lead concentrate	ton	686,534	673,234	170,681	174,280	142,664	133,311
Lead content		420,819	421,099	109,376	106,627	86,681	83,423
Silver content	'000 t oz	20,132	20,746	5,143	5,648	4,170	3,844
Antimony content	ton	749	744	209	173	150	153
Cadmium content	"	49	62	23	19	23	23
Copper content	"	3,756	3,637	1,016	833	667	723
Gold content	t oz	12,210	11,058	3,014	2,735	2,766	2,247
Zinc content	ton	35,206	33,787	8,649	8,812	7,078	6,993
Sulphur content	"	56,028	53,819	15,167	12,477	10,796	11,111
Lead-copper concentrate	"	12,901	11,722	2,817	2,143	2,378	2,827
Lead content	"	4,580	3,961	899	709	658	704
Copper content	"	1,373	1,290	337	256	286	336
Silver content	'000 t oz	1,054	998	270	198	210	247
Gold content	t oz	22,908	24,260	6,113	4,779	4,743	4,881
Zinc content	ton	1,445	1,441	245	310	245	427
Sulphur content	"	3,374	3,097	783	570	636	831
Lead-zinc concentrate (b)	"	16,452	34,903	5,011	5,663	6,980	6,055
Lead content	"	3,545	9,637	1,384	1,563	1,713	2,065
Silver content	"	4,449	6,636	953	1,076	1,701	1,044
Zinc content	"	516	1,287	185	209	179	215
Silver content	'000 t oz	19	59	9	8	—	—
Antimony content	ton	16	32	4	6	—	—
Cadmium content	"	59	210	30	34	—	—
Copper content	"	2	—	—	—	—	—
Gold content	t oz	2,971	5,728	788	1,010	—	—
Sulphur content	ton	—	—	—	—	—	—
Lead content of minerals produced	"	811	885	200	180	249	133
Copper concentrate	"	3,387	1,819	440	434	455	459
Lead ore	"	420,819	421,099	109,376	106,627	86,681	83,423
Lead concentrate	"	4,580	3,961	899	709	658	704
Lead-copper concentrate	"	3,545	9,637	1,384	1,563	1,713	2,065
Lead-zinc concentrate	"	11,757	12,127	2,924	2,922	2,729	2,471
Zinc concentrate	"	—	—	—	—	—	—
New South Wales	"	280,363	274,798	75,721	63,758	55,232	55,768
Queensland	"	147,726	160,365	35,727	45,803	34,586	30,121
South Australia	"	48	4	—	2	—	1
Western Australia	"	652	160	37	63	10	25
Tasmania	"	14,906	13,690	3,494	2,809	2,653	3,240
Northern Territory	"	1,204	609	244	—	4	—
Total contained lead	"	444,899	449,528	115,223	112,435	92,485	89,255
Smelter and refinery production							
Refined lead (c)	"	185,774	177,233	43,131	44,132	40,243	24,984
Lead content of lead bullion for export	"	153,134	168,241	45,943	39,448	40,822	49,722
EXPORTS							
Lead concentrate	ton	101,191	122,030	39,393	17,888	8,420	16,083
U.S.A.	"	39,435	46,934	15,856	1,104	2,305	6,699
Japan	"	36,097	24,337	6,568	8,430	59	4,637
United Kingdom	"	25,559	14,998	7,546	3,193	6,056	—
Germany F.R.	"	—	9,458	—	—	—	—
Other	"	100	26,303	9,423	5,161	—	4,747
Value	\$'000	19,438	23,648	7,637	3,631	1,789	2,477

Continued over page

LEAD

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
EXPORTS (continued)							
Lead bullion	ton	135,605	164,045	39,735	33,485	54,660	49,095
United Kingdom	"	112,798	141,791	33,738	28,226	50,342	30,580
Netherlands	"	12,020	16,255	3,998	4,260	3,518	15,436
Belgium-Luxembourg	"	6,497	—	—	—	—	—
Germany F.R.	"	1,501	5,999	1,999	1,000	800	3,079
Other	"	2,789	—	—	—	—	—
Value	\$'000	45,239	59,110	13,834	11,207	17,160	14,255
Refined lead, unworked	ton	132,566	151,713	22,029	49,539	12,321	37,254
United Kingdom	"	53,647	57,082	6,306	18,504	4,600	18,054
U.S.A.	"	42,019	58,183	8,624	20,886	1,604	7,684
India	"	15,692	16,084	2,745	3,807	3,026	6,540
Philippines	"	4,439	4,051	694	963	1,553	828
Netherlands	"	4,565	320	320	—	—	1,200
New Zealand	"	2,668	3,314	358	1,576	218	460
Italy	"	2,000	2,952	—	984	—	—
Other	"	2,536	9,721	2,986	2,819	1,320	2,488
Value	\$'000	32,318	40,477	5,795	11,881	2,839	6,480
Rolled and extruded shapes	ton	653	799	217	157	156	140
Value	\$'000	211	316	83	68	55	63
Antimonial lead	ton	4,512	4,699	880	880	598	1,021
Value	\$'000	1,367	1,696	270	291	235	304
Scrap	ton	1,924	1,439	463	71	2	305
Value	\$'000	286	355	130	9	1	66
Slags and residues	ton	4,439	4,021	932	1,562	185	297
Value	\$'000	771	993	172	364	17	37
Lead content of concentrates, residues, etc. exported	ton	79,842	89,907	30,150	14,536	6,279	11,881
Lead content of lead bullion exported	"	134,704	162,537	39,466	33,259	54,283	48,786

(a) Includes lead-silver ores. (b) Product of dump re-treatment. (c) Includes lead content of lead alloys from primary sources.

LIMESTONE

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production (a)	'000 tons	9,456	9,838	2,543	2,600	2,409	2,820
New South Wales	"	2,968	3,109	835	801	786	776
Victoria	"	2,025	1,990	423	564	481	582
Queensland	"	(b)	1,222	302	327	247	523
South Australia	"	1,773	1,824	522	454	432	397
Western Australia	"	(b)	1,180	335	291	240	—
Tasmania	"	550	515	120	120	171	102
Cement, Portland	"	4,240	4,526	1,209	1,168	1,043	1,190
IMPORTS							
Limestone and calcareous stone	ton	510,996	503,053	146,900	122,987	127,390	189,570
Japan	"	510,996	503,053	146,900	122,987	127,390	189,570
Other	"	—	—	—	—	—	—
Value	\$'000	713	708	207	189	189	264
Calcium carbide	ton	10,096	7,267	1,518	2,166	3,079	2,124
Norway	"	5,945	2,974	880	529	1,521	1,056
South Africa	"	3,569	3,299	638	1,046	1,012	1,068
Other	"	582	1,094	—	591	546	—
Value	\$'000	799	572	118	167	277	182
Cement, Portland	ton	70,993	99,074	26,123	33,013	23,206	26,864
Japan	"	32,004	52,746	10,688	14,398	9,035	9,548
Okinawa	"	21,591	18,643	2,367	11,690	9,714	4,786
United Kingdom	"	6,697	6,583	812	1,897	1,810	691
Other	"	10,661	21,302	12,256	5,028	2,447	11,839
Value	\$'000	1,380	1,747	404	570	449	434
EXPORTS							
Cement, constructional	ton	4,187	14,236	474	6,705	1,685	4,898
Value	\$'000	94	316	22	125	45	110

(a) Including shell and coral. (b) Not available for publication.

MAGNESITE

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production	ton	23,153	22,106	7,142	4,186	3,504	4,590
New South Wales	"	23,102	19,684	4,836	4,144	3,430	4,511
South Australia	"	51	242	126	42	74	79
Western Australia	"	—	2,180	2,180	—	—	—

IMPORTS							
Magnesite calcined, dead burned	ton	17,944	5,510	16	19	18	—
Value	\$'000	593	324	3	3	3	—
Magnesite calcined, other	ton	143	157	32	48	20	54
Value	\$'000	56	67	19	24	8	23
Magnesite, other	ton	3	—	—	—	—	—
Value	\$'000	1	—	—	—	—	—

EXPORTS							
Magnesite	ton	1,486	1,445	202	819	8	2
Value	\$'000	130	90	21	36	2	—

MANGANESE

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June

PRODUCTION							
Mine production	ton	874,568	738,894	223,579	127,716	259,726	210,400
Minerals produced	"	874,568	738,894	223,579	127,716	259,726	210,400
Metallurgical grade	"	415,743	351,686	107,195	61,718	117,384	99,479
Manganese content	"	—	—	—	—	—	—
Battery grade	"	—	—	—	—	—	—
Manganese dioxide content	"	—	—	—	—	—	—
Other grades	"	673	354	—	40	57	270
Manganese dioxide content	"	457	110	—	13	41	84
Manganese content of minerals produced	"	—	—	—	—	—	—
Manganese contained in:	"	415,743	351,686	107,195	61,718	117,384	99,479
Metallurgical grade ore	"	6,402	6,028	1,714	1,356	1,168	1,174
Zinc concentrate	"	422,145	357,714	108,909	63,074	118,552	100,653
Total contained manganese	"	—	—	—	—	—	—
Production, States: metallurgical grade ore	"	181,378	164,898	53,539	25,698	42,870	20,087
Western Australia	"	693,190	573,996	170,040	102,018	216,856	190,313
Northern Territory	"	874,568	738,894	223,579	127,716	259,726	210,400
Total	"	—	—	—	—	—	—
Manganese dioxide content of minerals produced	"	—	—	—	—	—	—
Manganese dioxide contained in:	"	—	—	—	—	—	—
Battery grade	"	—	—	—	—	—	—
Other grades	"	457	110	—	40	41	84
Total contained manganese dioxide	"	457	110	—	40	41	84
Production, States: battery and other grades	"	—	—	—	—	—	—
New South Wales	"	90	354	—	40	—	270
South Australia	"	583	—	—	—	57	—
Northern Territory	"	673	354	—	40	57	270

IMPORTS (a)							
Battery grade ore	ton	2,000	1,960	980	—	—	—
Value	\$'000	108	108	54	—	—	—
Other grade ore	ton	3,606	4,652	571	1,129	809	970
Value	\$'000	119	123	22	39	30	33
Metal and powder	ton	459	830	219	199	138	121
Value	\$'000	195	381	99	87	65	52

EXPORTS							
Manganese ore	ton	642,760	620,795	103,644	228,892	151,502	221,398
Japan	"	424,514	470,825	73,669	169,970	141,523	145,633
Other	"	218,246	150,170	29,975	58,922	9,979	75,765
Value	\$'000	11,644	11,703	2,013	4,388	2,671	3,729

(a) Imports of ferro-manganese are shown on page 8.

MONAZITE

		Quarters—				1971*	
		1970*	September	December	March	June	
1969		1970*	September	December	March	June	
PRODUCTION							
Mine production							
Monazite concentrate	ton	3,794	4,367	1,201	902	977	928
Monazite content	"	3,420	3,929	1,080	812	879	835
Production: States, monazite content:							
New South Wales (a)	"	332	359	180	—	159	44
Queensland	"	175	52	18	12	9	8
Western Australia	"	2,913	3,518	882	800	711	783
Total contained monazite	"	3,420	3,929	1,080	812	879	835
EXPORTS							
Monazite concentrate							
France	ton	2,681	4,941	962	1,972	1,373	1,325
Netherlands	"	201	963	201	274	101	719
U.S.A.	"	148	1,199	—	200	1,108	—
Other	"	2,203	2,483	756	1,472	—	—
Value	\$ '000	129	296	5	26	164	606
		344	677	128	300	203	216

(a) Lushpaches.

NICKEL

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Nickel concentrate	ton	91,929	255,999	63,100	96,653	66,771	58,257
Nickel content	"	11,004	29,295	7,130	10,963	7,692	6,315
Cobalt content	"	105	344	85	130	56	64
Copper content	"	1,241	2,573	634	971	178	296
IMPORTS (a)							
Nickel—							
Pigs, ingots and blocks	ton	1,255	1,721	693	359	141	454
Value	\$ '000	2,785	5,720	1,813	1,210	386	1,222
Pellets, shot, granulated	ton	196	49	16	10	11	16
Value	\$ '000	503	159	44	26	30	48
Electroplating anodes	ton	111	179	42	66	61	28
Value	\$ '000	464	939	157	248	219	95
Bars, rods, angles, shapes and sections	ton	171	2		2		
Value	\$ '000	389	8		4	2	1
Plates, sheets and strips	ton	17	53	4	4	5	31
Value	\$ '000	126	379	18	20	21	37
Pipes and tubes	ton		1			12	65
Value	\$ '000	6	8	2		71	202
Wire	ton	6	6			1	
Value	\$ '000	28	29	5	2	3	1
Powder	ton	15	16	2	2	2	8
Value	\$ '000	53	74	9	12	13	19
Nickel-base alloys—							
Unworked shapes	ton	189	181	44	49	39	21
Value	\$ '000	447	476	115	141	114	65
Bars, rods, angles, shapes and sections	ton	136	146	43	37	136	60
Value	\$ '000	390	537	164	147	472	232
Plates, sheets and strips	ton	211	193	45	35	97	66
Value	\$ '000	643	710	131	170	411	275
Pipes and tubes	ton	57	67	11	26	26	16
Value	\$ '000	187	238	36	90	110	71
Wire	ton	216	189	45	65	59	63
Value	\$ '000	712	857	192	293	264	253
Powder	ton	36	19	6	2	8	5
Value	\$ '000	310	218	63	29	109	63

(a) Imports of ferro-nickel are shown on page 8.

Note: Details of exports of nickel concentrate are not available for publication.

PETROLEUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION (Source: Fuel Branch, Department of National Development)							
Petroleum production							
Crude oil	'000 bbls	15,765	65,149	19,830	23,412	22,707	27,937
Natural gas	MM cu ft	9,375	53,061	17,002	15,992	15,983	20,297
Refinery operations							
Input of feedstock	'000 bbls	165,937	179,460	44,691	46,073	42,932	46,144
Products							
Refinery gas (a) (b) (c)	"	1,487	1,132	249	272	151	233
Liquefied petroleum gas	"	3,334	3,374	983	837	719	999
Aviation gasoline	"	219	246	45	72	103	102
Motor spirit	"	58,721	62,255	15,815	15,852	15,217	16,879
Power kerosene	"	450	393	62	83	100	112
Aviation turbine fuel	"	6,764	8,753	1,781	2,534	2,437	2,340
Lighting kerosene	"	1,260	1,283	400	382	292	360
Heating oil	"	2,744	2,898	1,118	377	321	1,027
Automotive distillate	"	20,982	22,774	5,354	6,197	6,133	6,457
Industrial diesel fuel	"	8,106	8,371	2,513	2,114	1,612	2,115
Furnace fuel (b)	"	38,913	41,597	10,792	10,266	9,645	8,400
Solvents	"	1,355	1,273	301	331	343	363
Lubricating oil base stock	"	2,258	2,576	656	672	728	687
Bitumen	"	2,692	2,753	529	776	712	713
Other marketable products	"	3,891	4,344	1,219	1,057	1,407	1,632
Refinery fuel—	"	6,050	5,337	1,374	1,305	1,323	1,536
Liquid	"	—	—	—	—	—	—
Gas and coke (a)	"	9,290	9,996	2,403	2,657	2,431	2,399

IMPORTS

Natural crude	'000 bbls	124,027	95,975	22,282	17,362	13,820	12,217
Value	\$'000	176,035	127,054	28,656	22,984	18,982	19,240
Enriched crude and other refinery stock	'000 bbls	25,123	23,937	4,440	5,822	4,684	5,479
Value	\$'000	38,604	34,670	6,499	8,205	7,096	9,653
Gasoline, solvents and other petroleum spirits	'000 bbls	5,442	7,176	1,850	2,065	1,780	1,389
Value	\$'000	18,268	22,832	5,974	6,208	6,016	4,829
Kerosine and aviation turbine fuel	'000 bbls	1,075	858	361	284	329	246
Value	\$'000	3,920	2,893	1,172	952	1,163	896
Automotive distillate, industrial and marine diesel fuels and heavy distillates, n.e.i.	'000 bbls	1,982	2,749	872	793	466	341
Value	\$'000	5,362	7,274	2,320	2,189	1,308	1,075
Residual oils	'000 bbls	7,823	6,903	2,167	1,875	2,483	3,626
Value	\$'000	10,704	9,577	2,931	2,676	4,336	6,349
Lubricating oil	'000 bbls	270	285	110	64	73	116
Value	\$'000	3,361	3,586	1,179	870	977	1,203

EXPORTS

Natural crude	'000 bbls	—	27	—	27	264	729
Value	\$'000	—	39	—	39	491	1,432
Partly refined petroleum	'000 bbls	—	116	116	—	253	127
Value	\$'000	—	158	158	—	423	219
Gasolines, solvents and other petroleum spirits	'000 bbls	1,638	1,824	564	494	505	460
Value	\$'000	6,501	6,709	2,116	1,680	2,153	2,059
Kerosine and aviation turbine fuel	'000 bbls	517	1,447	412	294	572	461
Value	\$'000	2,194	5,355	1,599	1,106	2,079	1,940
Automotive distillate, industrial and marine diesel fuels and heavy distillates n.e.i.	'000 bbls	1,481	2,229	459	586	1,034	938
Value	\$'000	4,500	6,148	1,404	1,564	3,101	2,744
Residual oils	'000 bbls	1,254	3,748	645	567	129	621
Value	\$'000	2,005	4,688	778	838	218	1,236
Lubricating oils	'000 bbls	519	956	224	248	259	275
Value	\$'000	5,956	1,031	2,477	2,669	2,680	3,011

(a) Fuel oil equivalent. (b) Excludes refinery fuel. (c) For sale as fuel.

PHOSPHATE

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Phosphate rock	ton	18,258	14,260	n.a.	n.a.	n.a.	n.a.
South Australia	"	18,258	14,260	n.a.	n.a.	n.a.	n.a.
Production of superphosphate (a)	'000 tons	3,787	3,392	695	893	819	701

IMPORTS

Phosphate rock	'000 tons	2,742	2,337	520	588	544	599
Nauru	"	1,432	1,314	303	308	427	271
Christmas Island (Indian Ocean)	"	773	708	175	187	49	190
U.S.A.	"	151	—	—	—	—	—
Other	"	386	315	42	93	68	138
Value	\$'000	28,295	24,941	5,733	6,206	3,892	6,343

(a) Source: Department of Primary Industry. Includes double and triple superphosphate and ammonium phosphate expressed in term of single superphosphate, i.e. 22% P₂O₅ equivalent.

SALT

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Victoria	ton	1,653,478	3,022,449	n.a.	n.a.	n.a.	n.a.
Queensland	"	(a)	(a)	n.a.	n.a.	n.a.	n.a.
South Australia	"	241,414	346,735	n.a.	n.a.	n.a.	n.a.
Western Australia	"	563,442	543,550	n.a.	n.a.	n.a.	n.a.
Value	\$'000	(a)	(a)	n.a.	n.a.	n.a.	n.a.

IMPORTS

Salt, common	ton	7,728	11,116	944	5,885	1,465	1,586
Value	\$'000	121	146	25	51	25	34

EXPORTS

Salt	ton	761,643	2,279,437	729,586	761,683	671,911	820,203
Value	\$'000	2,703	8,222	2,563	2,839	2,333	2,565

(a) Not available for publication.

SILLIMANITE

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
New South Wales	ton	1,674	1,164	288	344	128	336
South Australia	"	1,113	1,033	237	296	90	153
Value	\$'000	561	131	31	48	38	183
IMPORTS							
Sillimanite	ton	302	8	—	8	—	2
Value	\$'000	16	1	—	1	—	—

SILVER

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June

PRODUCTION

Mine production							
Silver content of minerals produced	'000 t oz	5	7	2	2	2	1
Bismuth concentrate	"	2	9	1	1	2	1
Copper ore	"	1,071	1,118	261	332	106	259
Copper concentrate	"	—	—	—	—	—	—
Gold ore	"	159	133	31	33	28	25
Gold bullion	"	69	66	16	16	16	17
Lead ore	"	20,132	20,746	5,143	5,648	4,170	3,844
Lead-copper concentrate	"	1,054	998	270	198	210	247
Lead-zinc concentrate	"	516	1,287	185	209	179	215
Zinc concentrate	"	1,448	1,628	395	419	368	340
New South Wales	"	10,749	10,908	2,888	2,448	2,176	2,182
Victoria	"	—	—	—	—	—	—
Queensland	"	11,539	13,099	2,880	4,006	2,697	2,289
South Australia	"	1	1	23	27	28	25
Western Australia	"	135	104	455	357	352	421
Tasmania	"	1,714	1,713	455	357	352	421
Northern Territory	"	259	166	58	20	31	33
Total contained silver	"	24,457	25,992	6,304	6,858	5,285	4,949
Refinery production							
Refined silver	"	10,389	9,293	2,259	2,070	2,170	1,820

IMPORTS

Silver	'000 t oz	81	75	16	18	14	12
Silver and alloys	"	35	28	6	5	6	6
Fiji	"	19	26	5	7	6	5
New Zealand	"	33	21	5	6	2	1
Other	"	—	—	—	—	—	—
Value	\$'000	137	119	25	29	22	20

EXPORTS

Silver, refined	'000 t oz	7,490	9,253	2,293	2,455	907	2,240
Mint bullion	"	12,485	15,083	3,586	3,829	1,353	3,366
Value	\$'000	347	519	5	41	18	4
Refined, other	'000 t oz	571	783	10	70	26	8
Value	\$'000	—	—	—	—	—	—
Silver content of concentrate, matte, etc. exported	'000 t oz	3,382	3,317	1,007	425	386	723
Silver content of lead bullion exported	"	9,743	12,093	2,902	2,438	1,612	2,681

SULPHUR

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Pyrite concentrate (a)	ton	117,708	210,325	50,014	63,971	51,091	59,634
Sulphur content	"	51,373	101,411	24,241	30,881	24,341	28,451
Sulphur content of minerals produced							
Lead concentrate	"	56,028	53,819	15,167	12,477	10,796	11,111
Lead-copper concentrate	"	3,374	3,097	763	570	636	831
Lead-zinc concentrate	"	2,971	5,728	788	1,010	—	—
Pyrite concentrate	"	51,373	101,411	24,241	30,881	24,341	28,451
Zinc concentrate	"	270,419	262,418	69,303	62,450	52,886	52,303
New South Wales							
Queensland	"	247,026	233,774	65,745	53,246	43,721	45,156
South Australia	"	55,106	78,316	20,189	21,772	15,790	14,680
Western Australia	"	25,973	30,064	4,829	12,289	9,456	5,924
Tasmania	"	8,236	631	—	—	—	—
Northern Territory	"	46,589	83,208	19,281	20,063	19,689	26,936
Total contained sulphur	"	1,235	480	218	—	3	—
		384,165	426,473	110,262	107,388	88,659	92,696
Sulphuric acid production	'000 tons	1,837	1,655	371	432	414	370
IMPORTS							
Sulphur, elemental	ton	383,886	320,151	55,433	61,933	82,017	69,632
Canada	"	205,829	235,856	26,791	56,563	63,106	40,815
United States	"	51,259	31,459	17,832	5,313	18,891	18,022
Mexico	"	105,825	31,619	—	—	—	—
Other	"	20,973	21,217	10,810	57	20	10,795
Value	\$ '000	12,313	5,306	968	1,231	1,475	1,231

(a) Gold content not recorded separately; included in gold content of gold bullion.

TALC (a)

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production	ton	54,549	126,119	50,568	44,325	13,441	13,185
New South Wales	..	5,984	8,729	2,184	2,499	1,906	1,714
South Australia	..	12,262	14,329		6,734	1,360	3,588
Western Australia	..	36,293	103,061	48,384	35,092	10,175	7,883
IMPORTS							
Talc	ton	1,794	3,387	827	690	921	5,764
China (Mainland)	..	984	1,508	574	443	684	5,070
U.S.A.	..	435	551	127	211	118	360
India	..	310	1,187	98	2		295
Other	..	85	141	28	34	119	39
Value	\$ '000	77	164	47	30	43	130
EXPORTS							
Talc	ton	33,594	30,847	11,349	3,515	8,561	12,464
Netherlands	..	21,885	12,684	3,204	1,520	3,007	2,058
Japan	..	9,818	16,485	7,691	1,625	5,144	10,046
Other	..	1,892	1,778	454	370	410	360
Value	\$ '000	863	799	290	100	222	325

(a) Includes steatite, chlorite and pyrophyllite.

TIN

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced	ton	3,303	3,763	1,027	939	1,036	1,296
Copper-tin concentrate	"	570	763	185	178	196	264
Copper content	"	159	180	54	36	40	41
Tin content	"	—	—	—	—	—	—
Tantalite-tin concentrate	lb	—	—	—	—	—	—
Tin content	ton	13,215	14,849	3,815	3,763	4,233	3,653
Tin concentrate	"	8,018	8,509	2,165	2,197	2,168	2,046
Production: States, tin content	"	1,587	1,822	498	457	435	338
New South Wales	"	9	4	—	—	1	—
Victoria	"	1,144	1,186	241	255	219	272
Queensland	"	502	683	173	216	166	196
Western Australia	"	4,906	4,939	1,292	1,298	1,377	1,271
Tasmania	"	29	55	15	7	10	8
Northern Territory	"	8,177	8,689	2,219	2,233	2,208	2,087
Total contained tin	"	—	—	—	—	—	—
Smelter and refinery production	"	4,156	5,129	1,221	1,424	1,576	1,627
Refined tin	"	—	—	—	—	—	—
IMPORTS (a)							
Refined tin	ton	104	108	27	21	32	32
Value	\$ '000	323	367	88	69	101	17
EXPORTS (a)							
Tin concentrate	ton	5,854	7,276	1,369	1,896	1,234	1,776
Value	\$ '000	8,533	10,456	2,064	2,456	1,503	1,586
Tin and alloys, unworked	ton	642	1,101	191	553	391	333
Value	\$ '000	1,876	3,480	618	1,783	1,198	1,022
Tin content of all concentrates, slags, residues, etc. exported	ton	3,488	3,661	770	876	590	629

(a) Production and overseas trade details for tinplate are shown on page 8.

TITANIUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced	ton	701,172	872,449	211,101	251,864	227,354	203,851
Ilmenite concentrate	"	380,219	470,446	114,818	133,161	120,333	109,960
Titanium dioxide content	"	7,970	10,426	2,292	3,173	3,829	3,572
Leucocane concentrate	"	6,996	9,171	2,016	2,792	3,367	3,141
Titanium dioxide content	"	356,339	365,009	88,411	96,628	86,249	95,613
Rutile concentrate	"	341,986	350,168	84,801	92,699	82,784	91,782
Titanium dioxide content of minerals produced	"						
Titanium dioxide contained in ilmenite concentrate	"	380,219	470,446	114,818	133,161	120,333	109,960
Leucocane concentrate	"	6,996	9,171	2,016	2,792	3,367	3,141
Rutile concentrate	"	341,986	350,168	84,801	92,699	82,784	91,782
Total contained titanium dioxide	"	729,201	829,785	201,635	228,652	206,484	204,883
Production: States							
Ilmenite concentrate (a)	ton	5,174	8,491	1,497	4,651	4,983	974
New South Wales	"	12,121	57,441	7,248	22,645	18,529	7,846
Queensland	"	369,920	413,685	108,089	108,657	100,186	104,281
Western Australia	"	387,215	479,617	116,834	135,953	123,700	113,101
Total	"						
Ilmenite concentrate	ton	217,354	213,748	49,941	56,023	53,731	56,682
New South Wales	"	117,796	126,441	31,793	34,177	27,067	33,000
Queensland	"	1,903	2,955	1,015	931	193	111
Western Australia	"	4,933	7,024	2,052	1,568	1,793	1,97
Tasmania	"	341,986	350,168	84,801	92,699	82,784	91,782
Total	"						

Continued over page

ZINC

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Zinc ore	ton	8,500	250	—	250	—	—
Zinc content		—	2,550	75	—	75	—
Zinc concentrate		861,823	831,431	221,155	198,934	169,999	168,399
Zinc content		454,176	435,880	115,880	104,353	88,823	88,200
Lead concentrate		11,757	12,127	2,924	2,922	2,729	2,470
Silver content	000 1 oz	1,448	1,628	395	419	369	344
Gold content	ton	4,721	4,943	1,269	1,126	948	988
Cadmium content	ton	1,595	1,499	400	362	303	291
Cobalt content		935	118	34	27	22	22
Copper content		136	943	263	212	172	191
Manganese content		6,402	6,028	1,714	1,168	1,168	1,177
Sulphur content		270,419	262,418	69,303	62,450	52,886	52,300
Zinc content of minerals produced							
Copper concentrate		1,687	1,692	396	447	612	330
Lead ore		—	2,335	—	—	—	—
Lead concentrate		35,206	33,787	8,649	8,812	7,078	6,995
Lead-copper concentrate		1,445	1,441	310	245	276	410
Lead-zinc concentrate		4,449	4,636	953	1,076	1,701	1,044
Zinc ore		2,550	75	—	75	—	—
Zinc concentrate		454,176	435,880	115,880	104,353	88,823	88,200
New South Wales		343,480	320,365	90,536	72,712	62,466	63,999
Queensland		104,018	112,599	24,275	32,674	27,280	22,470
South Australia		2,550	75	—	75	—	—
Tasmania		50,207	46,154	11,158	9,547	8,744	10,510
Northern Territory		1,593	518	219	—	—	—
Total contained zinc		501,848	479,511	126,189	115,008	98,490	96,399
Smelter and refinery production							
Refined zinc		242,432	256,475	66,086	61,783	61,958	59,999

EXPORTS

TUNGSTEN

EXPORTS							
Zinc concentrate	ton	363 885	475 799	116 270	105 879	85 242	73 826
United Kingdom		174 809	214 738	70 379	34 161	32 976	37 840
Japan		126 790	167 221	30 331	46 204	23 851	20 336
Norway		19 752	31 074	4 646	17 428	10 984	
Other		40 534	62 766	10 914	8 066	17 431	15 616
Value	\$ '000	25 888	32 728	7 827	5 742	5 035	29 301
Refinery-type shapes	ton	138 547	143 041	34 685	32 831	38 210	9 624
U.S.A.		30 857	28 259	6 053	9 114	1 699	2 434
India		5 049	16 047	6 660	1 305	12 524	1 862
Thailand		10 821	11 528	2 621	2 774	3 110	15 381
Other		91 820	87 207	19 351	19 638	20 877	7 446
Value	\$ '000	33 523	38 071	9 277	9 138	10 053	21 312
Plates, circles and strips	ton	250	433	91	105	44	105
Value	\$ '000	121	200	40	60	27	105
Slags and residues	ton	5 472	5 334	1 500	1 471	1 262	1 568
Value	\$ '000	375	414	127	110	171	113
Zinc content of ores and concentrates, slags, residues, etc. exported	ton	200 108	254 833	64 033	57 361	45 710	40 514

EXPORTS

Scheelite concentrate	ton	1 601	1 213	270	266	324	335
Value	\$'000	4 361	3 061	810	797	966	825
Wolfram concentrate	ton	799	914	214	146	446	180
Value	\$'000	2 412	3 907	1 059	563	1 838	639
<i>Tungstic oxide (WO₃) content of concentrates exported</i>							
	unit	165 012	147 409	33 899	27 556	54 218	35 275
in scheelite concentrate	"	108 923	82 676	18 387	18 071	22 006	22 781
in wolfram concentrate	"	56 089	64 731	15 512	9 785	32 212	12 595

ZIRCONIUM

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
PRODUCTION							
Mine production							
Minerals produced							
Zircon concentrate	ton	369,296	389,107	99,316	108,311	102,779	102,167
Zircon content	lb	356,602	384,130	98,047	106,940	101,427	100,676
Production States, zircon content							
New South Wales		219,062	223,963	56,709	62,329	63,857	63,074
Queensland		81,715	96,954	25,227	28,728	23,997	24,805
Western Australia		49,861	57,241	14,497	15,087	12,609	11,765
Tasmania		9,964	9,572	1,614	796	964	1,053
Total contained zircon	..	356,602	384,130	98,047	106,940	101,427	100,676

EXPORTS

		1969	1970*	September	December	March	June
Zircon concentrate							
Japan	ton	310,910	380,488	99,609	97,237	70,213	100,142
U.S.A.	..	70,907	118,762	25,741	23,327	25,342	22,213
United Kingdom	..	74,256	40,528	27,998	22,722	6,720	18,512
France	..	34,679	25,951	4,985	5,954	9,972	8,063
Other	..	23,507	30,656	1,963	10,564	4,849	7,222
Value	\$ '000	107,574	122,591	44,922	27,660	23,330	44,132
		12,355	14,042	3,565	3,311	2,709	3,710

MINOR MINERALS

		Quarters — 1970*				1971*	
		1969	1970*	September	December	March	June
BARITE							
Mine production	ton	39,562	42,137	7,065	14,730	5,208	6,271
Imports (including witherite)		2,616	1,573	368	203	311	18
Value	\$ '000	101	63	28	7	10	2
Exports	ton	22,060	29,705	11,348	10,541	3,444	3,965
Value	\$ '000	814	1,078	391	367	122	141

BERYLLIUM

		1969	1970*	September	December	March	June
Mine production							
BeO content	ton	7	18	—	16	8	2
	unit	67	205	—	181	86	30
Exports	ton	9	46	28	—	12	18
Value	\$ '000	5	19	11	—	5	6

BISMUTH

		1969	1970*	September	December	March	June
Mine production							
Bismuth concentrate	ton	1,678	1,672	496	348	509	265
Bismuth content	lb	441,205	422,108	134,504	85,641	124,876	128,280
Gold content	1 oz	22,330	23,049	5,650	6,981	9,848	7,833
Copper content	ton	138	103	31	19	24	22
Silver content	0001 oz	5	7	2	1	2	1
Imports							
Bismuth metal	lb	32,189	30,170	15,256	4,816	1,344	11,836
Value	\$ '000	147	207	96	33	7	60

MINOR MINERALS

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
CLAYS							
Mine production							
Brick, clay and shale	'000 tons	7,807	6,698	1,750	1,670	1,604	2,034
Imports							
Bentonite and bentonitic clay	ton	58,155	65,434	15,550	12,201	21,656	24,268
Value	\$ '000	1,123	1,474	397	371	514	464
Clay, ball	ton	18,641	13,745	1,456	5,157	2,940	3,358
Value	\$ '000	448	393	40	158	83	97
Clays and earths, activated	ton	7,251	3,868	707	870	421	662
Value	\$ '000	517	347	71	79	47	60
Clay, white	ton	242,276	41,932	17,623	6,132	8,452	10,598
Value	\$ '000	627	1,065	433	156	284	305
Fireclay	ton	4,749	7,598	222	3,187	1,323	4,186
Value	\$ '000	112	285	10	125	38	144
Clays, n.e.i.	ton	12,969	19,925	7,073	3,100	2,820	2,736
Value	\$ '000	590	686	223	141	170	155
Exports							
Clays (except activated)	ton	5,952	7,157	1,746	2,156	1,618	1,791
Value	\$ '000	182	327	95	76	96	79

COBALT

Mine production							
Cobalt content of minerals produced							
Cobalt contained in Nickel concentrate	ton	105	344	85	130	56	64
Zinc concentrate	..	135	118	34	27	22	23
Total	..	240	462	119	157	78	87
Imports							
Cobalt oxide and hydroxide	ton	4	67	16	28	9	5
Value	\$ '000	14	218	65	50	36	25
Cobalt and cobalt base metal alloys (excl. powder)							
Value	\$ '000	70	62	18	2	23	3
		270	287	86	11	107	15

CRYOLITE, NATURAL

		1969	1970*	September	December	March	June
Imports (including chiolite)							
Value	\$ '000	266	254	79	33	98	95
		59	50	13	8	24	27

DIAMONDS, INDUSTRIAL

		1969	1970*	September	December	March	June
Imports							
Value	carats \$ '000	815,554	916,195	214,135	251,567	134,517	144,583
		3,021	3,778	892	1,059	559	596
Exports (a)							
Value	carats \$ '000	53,837	126,998	15,360	55,560	38,185	27,981
		328	662	86	300	167	123

DIATOMITE

		1969	1970*	September	December	March	June
Mine production							
Value	\$ '000	2,374	2,614	673	597	300	441
		8,300	5,870	1,477	1,419	1,769	1,441
Imports							
Value	\$ '000	505	421	109	105	144	105

DOLOMITE

		1969	1970*	September	December	March	June
Mine production							
Value	\$ '000	291,338	323,180	84,252	72,040	75,729	77,952

(a) Excludes powder and dust

MINOR MINERALS

		Quarters— 1970*				1971*	
		1969	1970*	September	December	March	June
FELSPAR							
Mine production	ton	4 937	3 479	903	743	474	1 462
FLUORSPAR							
Mine production	ton	—	1 261	307	340	190	169
Imports		20 022	26 098	3 449	9 115	10 516	9 811
Value	\$ '000	667	917	127	343	404	502
KYANITE							
Imports	ton	3 240	3 513	141	1 121	142	166
Value	\$ '000	229	246	10	106	9	13
LITHIUM							
Mine production	ton	710	771	336	56	167	168
Lithium ore Li ₂ O content	ton unit	2 982	3 238	1 411	235	701	706
MERCURY							
Refinery production	lb	3 625	2 844	735	430	153	142
Imports	lb	63 192	103 919	21 055	42 257	23 253	10 953
Italy	"	26 222	4 942	—	4 181	3 116	—
Mexico	"	10 220	14 066	—	5 703	—	—
Spain	"	12 854	11 561	761	5 020	8 974	—
U.S.A.	"	3 816	60 090	17 494	19 398	3 422	10 207
Other	"	10 080	13 260	2 800	7 955	7 741	746
Value	\$ '000	381	527	109	179	100	46
MICA							
Imports							
Slab, block or sheet	'000 lb	32	24	2	7	6	3
Value	\$ '000	65	57	6	17	15	7
Splittings (not cut or stamped)	'000 lb	215	168	25	82	29	59
Value	\$ '000	124	75	5	32	16	33
Ground or pulverised	'000 lb	436	581	212	180	212	236
Value	\$ '000	38	76	25	21	22	16
Other	'000 lb	1 244	1 284	234	501	607	112
Value	\$ '000	34	38	7	14	22	6

PLATINUM AND PLATINUM GROUP METALS

Imports							
Ingot, blocks, pigs, etc.	oz	9 655	212 340	192 319	13 492	6 175	5 318
Value	\$ '000	635	1 970	1 321	243	234	144
Powder	oz	6 250	311	88	108	203 896	148
Value	\$ '000	35	10	1	5	81	4
Wire	oz	3 017	2 089	262	721	2 979	459
Value	\$ '000	288	176	32	57	74	60

POTASSIUM

Imports							
Potassium chloride (fertilizer grade)	ton	107 075	115 987	38 709	18 861	23 812	47 680
Value	\$ '000	2 435	2 969	1 002	427	870	1 745
Potassium sulphate (fertilizer grade)	ton	14 594	21 289	9 738	2 993	1 198	2 936
Value	\$ '000	645	910	427	131	58	133

TANTALUM AND COLUMBIUM

Mine production							
Tantalite-columbite concentrate	lb	340 631	221 887	125 297	327	26 589	94 752
Ta ₂ O ₅ + Nb ₂ O ₅ content	"	89 927	95 373	53 856	141	12 231	32 216
Exports							
Tantalite-columbite concentrate	ton	90	110	28	20	29	45
Value	\$ '000	305	498	145	144	111	270

Summary Tables

MINE PRODUCTION OF PRINCIPAL MINERALS: AUSTRALIA

Mineral	Unit of Quantity	Quarters— 1970*				1971*	
		1969	1970*	December	March	June	September
Bauxite	'000 ton	7 796	9 110	2 561	2 477	3 074	3 498
Black coal	"	45 354	48 434	12 015	10 747	12 751	10 573
Brown coal	"	22 906	23 783	5 068	4 916	6 199	6 282
Copper (a)	ton	128 986	155 297	47 362	44 778	42 525	40 973
Gold (a)	'000 foz	702	620	155	164	153	178
Iron ore and concentrate (b)	'000 tons	37 966	50 380	14 068	13 503	14 833	16 626
Lead (a)	ton	444 899	449 528	112 435	92 485	89 255	113 692
Manganese ore, metallurgical	"	874 568	738 894	127 716	259 726	210 400	317 716
Nickel (a)	"	11 004	29 295	10 963	7 692	6 315	8 838
Petroleum—							
Crude oil	'000 bbls	15 765	65 149	23 412	22 707	27 997	30 679
Natural gas	MM cu ft	9 375	53 061	15 992	15 983	20 297	22 673
Silver (a)	'000 foz	24 457	25 992	6 858	5 285	4 949	5 477
Tin (a)	ton	8 177	6 869	2 233	2 208	2 087	2 494
Titanium—							
Ilmenite concentrate (c)	"	701 172	872 449	251 864	227 354	203 851	194 136
Rutile concentrate	"	356 339	365 009	96 626	86 249	95 613	88 238
Tungsten concentrates (d)	unit	171 841	157 043	40 246	55 359	41 880	45 193
Zinc (a)	ton	501 848	479 511	115 008	98 490	96 999	129 150
Zircon concentrate	"	369 296	389 107	108 311	102 779	102 167	99 357

(a) Total metallic content of minerals produced. (b) Excludes iron oxide not intended for metal extraction. (c) Excludes leucocene. (d) Tungstic oxide content.

SMELTER AND REFINERY PRODUCTION OF PRINCIPAL METALS: AUSTRALIA

Mineral	Unit of Quantity	Quarters— 1970*				1971*	
		1969	1970*	December	March	June	September
Alumina	ton	1 900 519	2 118 233	578 664	559 344	654 010	699 083
Aluminium (refined)	"	124 423	202 355	52 555	53 484	57 020	56 295
Cadmium (refined)	"	562	605	141	131	148	137
Copper (bistler) (a)	"	114 349	109 888	31 578	32 559	35 482	37 356
Copper (refined)	"	99 261	102 480	24 807	29 091	29 373	30 732
Gold (refined)—							
Australian origin	'000 foz	586	477	130	101	121	126
Total	"	703	605	159	128	149	155
Lead—							
Refined (b)	ton	185 774	177 233	44 132	40 243	24 984	54 192
Lead content of lead bullion for export	"	153 134	168 241	39 448	40 822	49 722	33 608
Pig iron	'000 tons	6 010	9 051	1 619	1 496	1 444	1 591
Raw steel (c)	"	6 906	6 714	1 736	1 599	1 625	1 750
Silver (refined)	'000 foz	10 389	9 293	2 070	2 170	1 820	2 277
Tin (refined)	ton	4 156	5 129	1 424	1 576	1 627	1 563
Zinc (refined)	"	242 432	256 475	61 783	61 958	59 927	66 929

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

Note: Particulars of crude oil and natural gas were collected by Fuel Branch, Department of National Development and refined aluminium, cadmium, copper, lead, nickel, silver, tin and zinc were collected by the Bureau of Mineral Resources.