

# THE MINERAL INDUSTRY OF AUSTRALIA

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Australia is estimated to be the third largest producer of minerals and metals, excluding coal and petroleum, in the world, and its mineral industry is a leading catalyst in promoting the growth of the economy. In 1996, Australia was the world's leading producer of alumina, bauxite, diamond, ilmenite, lead, monazite, opal, rutile, sapphire, and zircon; the third largest producer of gold and zinc; the fourth largest producer of cobalt, iron ore, and uranium; and the fifth largest producer of coal and nickel. It was the premier exporter of alumina, coal, ilmenite, iron ore, refined lead, monazite, rutile, and zircon. The country's mineral wealth is so extraordinary that it is virtually self-sufficient in most mineral commodities. The only significant mineral resource in which Australia is not self-sufficient is petroleum. Nevertheless, Australia still produces about 75% of its crude oil requirements domestically. The country, is, however, endowed with abundant resources of other mineral fuels, including coal, natural gas, liquefied petroleum gas, and uranium, and continues to be one of the few market economy countries that is a net exporter of mineral fuels.

Although the Australian mineral industry dates back to coal and copper mining that began shortly after the first European settlers arrived in 1788, the country's mining industry did not come into its own until the gold rushes in New South Wales, Queensland, Victoria, and Western Australia during the 1850's; the lead-silver-zinc discoveries at Broken Hill, New South Wales, in 1883; and the Mount Isa, Queensland, lead-silver-zinc and copper finds in 1933. Further discoveries followed, and since the mid-1960's, Australia has become a major world producer of a number of minerals.

The mineral industry, the largest primary sector of the economy, remains heavily export-oriented, with about 80% of the value of its mineral production destined for international markets. Mineral exports are heavily concentrated into just four commodity groups—alumina, aluminum, and bauxite; coal; gold; and iron ore.

## Government Policies and Programs

In August, Australia's Department of Foreign Affairs and Trade released a report in which Australia's trade and investment relations with the United States were analyzed. The report, entitled *Australia-United States Trade and Investment Review: A Partnership in Transition*, examines the nature of the Australia-U. S. bilateral trade relation, the effects of U.S. trade policy as a whole on Australia, and the nature of market access concerns that Australia and the United States have with each other. The report criticizes a large number of perceived

U.S. trade barriers to Australian exports, yet attributes Australia's large trade deficit with the United States mainly to structural differences (U.S. Embassy, Canberra, Australia, 1996a).

In September, Australia gave notice to the Association of Tin Producing Countries (ATPC) at the annual meeting in Singapore that it would withdraw from the association effective December 10. The decision was made following ATPC's decision in June to stop imposing production quotas. The withdrawal also was in line with the Australian Government's policy of removing unnecessary Government involvement in the mineral industry, which has included the removal of export controls on all minerals except uranium (Metal Bulletin, 1996b).

In October, the Government announced proposed legislative amendments to its 3-year-old Native Title Act that would reduce the amount of time mining companies must negotiate with Aboriginal groups concerning Native Title claims, allowing mining companies to proceed with exploration and prospecting expeditiously. The amendments also would give increased power to the Minister for Aboriginal Affairs to intervene in Native Title claims (U.S. Embassy, Canberra, Australia, 1996e).

The Government extended the foreign investment rules applying to Australia's mining industry to include the uranium mining sector. Prior to the Liberal-National Government coming to power in March, the country had no foreign investment policy relating to uranium. This, along with the former administration's "three mines policy," effectively discouraged foreign investment in the sector. Under the new policy, the establishment of any new mine involving the investment of A\$10 million or more or the acquisition of a substantial interest in an existing uranium mining business valued at A\$5 million or more will require prior approval; no proposal will, however, be considered to be contrary to the national interest. Additionally, the export controls on uranium will continue (Mining Journal, 1996f).

## Environmental Issues

The first cooperative agreements between Australia's Federal Government and industry to reduce greenhouse gas emissions as part of the joint Government-industry "Greenhouse Challenge" program were signed in Melbourne, Victoria, in June (Australian Institute of Petroleum Ltd., 1996).

In December, the Minerals Council of Australia launched the Australian Minerals Industry Code for Environmental

Management. The initiative followed lengthy consultations with the mineral industry, State and Federal Government agencies, and nongovernmental organizations, including conservation groups, overseas aid organizations, and Aboriginal interests. The code presents a set of principles and processes as a framework that will enhance environmental management by facilitating continual improvement and periodic performance reviews. Those companies that are signatories to the code will have to prepare annual environmental reports that will be available to the public and that will document their performance and implementation of the code. Adopting the code is voluntary, and registration is open to all Australian mining and minerals companies. Although the code does not prescribe specific environmental practices, the key principles are designed to aid companies in improving their environmental performances progressively. Consequently, no minimum performance standards are required prior to becoming a signatory, although a participating company will have to publish its initial annual environmental report within 2 years. By yearend, 18 companies, including all the major Australian mining houses, had become signatories to the code (Mining Journal, 1997b).

## Production

The value of minerals produced in Australia in fiscal year 1995-96 (July-June) is estimated to have increased about 5%, to A\$29.6 billion from the A\$28.2 billion of fiscal year 1994-95. Metallic mineral production contributed an estimated 40% of the total, followed by petroleum (crude oil, natural gas, and natural gas liquids) production, 30%; coal production, 25%; and industrial minerals production, including clays, construction materials, dimension stone, peat, and salt, 5%. The value of downstream production, including smelting and refining, also was estimated to have increased about 5% in fiscal year 1995-96 from that of fiscal year 1994-95.

Australia remained the world's leading producer of alumina, bauxite, chrysoprase, diamond, ilmenite, monazite, opal, rutile, sapphire, and zircon. The country also continued to rank among the world's top producers of aluminum, antimony, coal, cobalt, copper, gold, iron ore, lead, manganese, nickel, salt, silver, tin, uranium, and zinc. (See table 1.)

## Trade

Australia continues to rely heavily on the export of the majority of its mineral production to bolster economic growth. The Australian Bureau of Agriculture and Resource Economics (ABARE) estimates that the value of Australian energy and mineral exports in fiscal year 1995-96 reached a record-high A\$33.6 billion, an increase of 7.5% from the A\$31.3 billion of the previous fiscal year. ABARE's preliminary estimate of the value of the energy and mineral exports for fiscal year 1996-97 increased 7.0%, to A\$36.0 billion from that of fiscal year 1995-96 (Mining Journal, 1997a). The mineral industry remains Australia's largest export earner, accounting for about 60% of commodity export earnings. An estimated 80% of Australia's mineral production is exported. Australia remains the premier

exporter of alumina, coal, ilmenite, iron ore, refined lead, monazite, rutile, and zircon. By using its plentiful resources of energy minerals (coal, liquefied natural gas, and uranium), Australia also continues to be a net exporter of mineral fuels, thus enabling the country to retain a favorable balance of trade in energy products.

Coal remained Australia's largest mineral export earner for fiscal year 1995-96, followed, in order of importance, by gold, iron ore, and bauxite. Australia's annual exports are about 70% of its coal production, accounting for about 30% of world coal trade; more than 90% of the gold it produces; about 90% of its iron ore production, also representing about 30% of world trade; and 80% of its aluminum production, composing about 10% of world trade. The richness and diversity of the Australian minerals sector provides a significant portion of the country's gross domestic product.

In 1996, the U.S. trade surplus with Australia was \$8.2 billion, an increase of \$667 million from the surplus of \$7.5 billion in 1995. U.S. merchandise exports to Australia in 1996 were nearly \$12.0 billion, an increase of more than \$1.2 billion (11.1%) from that of 1995. Australia was the United States' 14th largest export market. U.S. imports from Australia were nearly \$3.9 billion in 1996, an increase of \$535 million (15.9%) over that of 1995 (U.S. Trade Representative, 1997).

## Structure of the Mineral Industry

The Australian mineral industry covers nearly the whole spectrum of minerals—major industrial minerals (ilmenite, rutile, and zircon), base metals (copper, lead, and zinc), ferrous metals (iron ore, manganese, and nickel), nonferrous metals (aluminum and tin), precious metals (gold and silver), fuel minerals (coal and uranium), and gemstones (diamond, opal, and sapphire). Australia is one of the world's principal producers and suppliers of ores, concentrates, and refined metals. Australia is estimated to rank third in the world in the value of its nonfuel mineral production. The value of its mineral production, including the fuels, is estimated to rank eighth in the world.

The Australian mining industry is based on a system of free enterprise, with private companies involved in exploration, mine development, production, mineral processing, and marketing. A number of foreign companies in Australian mineral ventures are affiliates or subsidiaries of U.S. companies. Foreign companies control a majority of the mining, smelting, and refining sectors and a significant portion of the petroleum and natural gas sectors.

Many of Australia's mineral industries are fully integrated, producing ores, concentrates and other intermediate products (for example, alumina) and refined metal or other end products (for example, cut-and-polished gem diamond) within the country. In 1996, there were six alumina refineries and six smelters, three principal copper smelters and three principal refineries, one principal gold refinery, four principal lead-zinc smelters and/or refineries, one manganese ferroalloy plant, one nickel smelter and two nickel refineries, three principal crude steel plants, one primary tin smelter and one refinery and two

secondary tin refineries, two silver refineries, and eight principal petroleum refineries.

Ownership of mineral rights in Australia is divided between State ownership in State onshore areas and Commonwealth, or Federal, ownership in Territories and in offshore areas beyond Australia's territorial limit. The Commonwealth's responsibility for minerals in the Northern Territory, except for uranium, has, however, been transferred to the Government of the Northern Territory. Thus, the individual States and Territories administer the mineral industries within their own borders, including registering of land titles; issuing exploration and development permits; overseeing mining operations, including administration of inspections; assuring compliance with health, safety, and environmental regulations; and levying royalties and taxes.

The Federal Government may restrict mineral exports for the good of the country and, therefore, has de facto control over most mineral production. (*See table 2.*)

## Commodity Review

### Metals

**Bauxite, Alumina, and Aluminum.**—Australia was again the unchallenged world leader in bauxite production for the 26th consecutive year, producing about 45% of the production of market economy countries. All mining is from the open-cut operations at Weipa on the western flank of the Cape York Peninsula in the far north of Queensland; the Gove operation across the Gulf of Carpentaria in northeastern Arnhem Land, Northern Territory; and the mines south of Perth in the Darling Ranges, Western Australia. Although substantial bauxite deposits also border Admiralty Gulf at Cape Bougainville and are in the nearby Mitchell Plateau area of the Kimberley region of northern Western Australia, their remoteness from energy supplies and infrastructure continues to impede development.

Australia also is dominant in the world alumina market, producing more than one-third of world production from six refineries. Four refineries are in Western Australia, and one each is in the Northern Territory and Queensland.

Australia is a significant supplier of aluminum. Aluminum is produced at six smelters, two each operating in New South Wales and Victoria and one each operating in Queensland and Tasmania.

To improve competitiveness, Comalco Minerals and Alumina Ltd., a subsidiary of Comalco Ltd., is planning a significant restructuring of its Weipa bauxite operation that will probably reduce the workforce from the current 650 employees to between 300 and 400 over the next 2 to 3 years. The current mining capacity of about 11 million metric tons per year (Mt/yr) of bauxite is expected to be maintained with the introduction of fewer but much larger trucks to replace the present haul fleet and the extension of the railway system to reduce haulage distances. The on-site power station is to be overhauled, and the beneficiation plant is to be either upgraded or rebuilt; the final decision was expected in early 1997. Additionally, the management teams at Weipa, as well as at Comalco's corporate office in Brisbane, are to be rationalized, ultimately reducing the

size of the managerial staff by about 50% (Metal Bulletin, 1996c).

Comalco is continuing to analyze its options for locating a new alumina refinery based on using bauxite from its Weipa deposit. Although Comalco reportedly prefers Queensland for the proposed greenfield refinery, negotiations with the Malaysian Government on a possible site in that country were still ongoing at yearend (Mining Journal, 1996d).

Queensland Alumina Ltd., a 30.3%-owned Comalco subsidiary, was planning to reduce the 1,200 person workforce by 10% at its Gladstone alumina refinery in Queensland near yearend because of declining market conditions in the aluminum industry (Mining Journal, 1996o).

Gove Aluminium Finance Ltd., manager of the Tomago aluminum smelter in the Hunter Valley of New South Wales, was considering a 20,000-metric-ton (t) expansion of the smelter from the present 380,000 t (Mining Journal, 1996o).

Reportedly, construction of the 219,000-t third potline at Comalco's majority-owned Boyne Island aluminum smelter south of Gladstone was ahead of schedule, and production was expected to begin in June 1997, 3 months early (Mining Journal, 1996c).

**Antimony.**—Antimony is mined by Hillgrove Gold Ltd. at its Hillgrove gold-antimony underground mine, about 35 kilometers (km) northeast of Armidale in the New England district of New South Wales. An agreement between Hillgrove and Quelar Chemicals allows a patented electrowinning process to be used to recover the metal from the combined gold-antimony operations. This is expected to produce about 1,300 metric tons per year (t/yr) of antimony (Mining Annual Review, 1997).

**Chromium.**—Dragon Mining NL continues its feasibility study for mining high-iron chromite from Australia's largest known chromium deposit, the chromiferous laterite resource at Range Well in Western Australia. If given the go-ahead, the project will mine 40,000 t/yr of ore for the manufacture of 20,000 t/yr of 12% chrome-iron grinding balls for use in the mining and the processing industries (Western Australia Department of Resources Development, 1997).

Valiant Consolidated Ltd. formed a joint venture with Danelagh Resources Pty. Ltd. to mine chromite from the Coobina deposit in Western Australia on a trial basis. Danelagh is smelting satisfactorily its ore in China (Valiant Consolidated Ltd., 1996).

**Cobalt.**—Australia is the fourth largest producer of cobalt in the world, with output produced as a byproduct of nickel mining and processing. The sole cobalt processor is QNI Ltd., processing lateritic nickel-cobalt ores at its Yabulu Refinery near Townsville, Queensland, for the production of nickel-cobalt sulfides. All QNI's cobalt products are sold to OMG Kokkola Chemicals Oy in Finland for the manufacture of cobalt chemicals and salts. The refinery's feedstock is ore imported from P.T. Aneka Tambang's mine on Gebe Island, in Indonesia, and four suppliers on La Grande Terre, the main island of New

Caledonia—Nickel Mining Corp., Société des Mines de la Tontouta, Société Minière du Sud Pacifique, and J.C. Berton Mines.

Rehabilitation of QNI's Brolga and Greenvale mine sites in northern Queensland was completed during the year, with the mining leases surrendered to the Queensland Government's Department of Mines and Energy. QNI also relinquished certain low-priority exploration permits near the Brolga Mine. The Brolga and the Greenvale Mines formerly supplied ore for blending with imported material.

QNI made a number of investments and improvements at or in support of its Yabulu refinery site during the year—a new unloading facility at the port of Townsville was commissioned; 2 new roasters and an accompanying electrostatic precipitator were added to the original bank of 10 roasters and 2 precipitators; and a new bank of aerators was erected to enhance cobalt metal recovery rates.

Construction of QNI's cobalt plant to manufacture pure cobalt oxide hydroxide was nearing completion at yearend, and commissioning trials were expected to begin in early 1997. With commencement of the cobalt plant, production of cobalt sulfide will be gradually reduced; sales of smaller tonnages of cobalt sulfide were expected to continue until production terminated in June 1997 (QNI Ltd., 1996).

WMC Ltd. and Finland's Outokumpu Mining Australia Pty. Ltd. also mined byproduct cobalt from their nickel sulfide mines in Western Australia.

**Copper.**—Mine production of copper in Australia is either as the primary product or as a coproduct mainly from mines that produce other metals. The most notable copper-producing operations in Australia are at Mount Isa (Hilton copper-lead-zinc mine) and Roxby Downs Station, South Australia (Olympic Dam copper-gold-uranium mine).

MIM Ltd. plans to spend A\$50 million on the expansion and modernization of its copper refinery at Townsville to accommodate the increased output of its Mount Isa operations, which also are undergoing a substantial expansion. The refinery's capacity will be increased from 210,000 to 255,000 t/yr. The expansion is expected to take 2 years and will focus the refinery's output on the production of copper cathode; output of copper rod was scheduled to stop at yearend, resulting in the loss of 60 jobs (Mining Journal, 1996r).

MIM's expansion at its Mount Isa mining-smelting complex includes the development of a new copper mine, the Enterprise, and upgrading the existing copper smelter. The cost of developing the Enterprise Mine, which will have a capacity of 3.5 Mt/yr of ore and will become the dominant copper producer in the Mount Isa area, has been estimated to be A\$290 million. The copper smelter will be upgraded progressively from a capacity of 175,000 to 250,000 t/yr over a 3-year period. The smelter will treat ore from the Enterprise and the Ernest Henry Mines; the latter is a new development, 120 km east of Mount Isa and due to start production of copper (and gold) concentrate in late 1997, in addition to treating ore from the present 1100 Orebody workings at Mount Isa (Mining Magazine, 1996c).

Aberfoyle Ltd. plans to increase production to the equivalent

of 40,000 to 45,000 t/yr of cathode copper in early 1998 at its Gunpowder-Mammoth Mine, 125 north of Mount Isa. During the year, exploration at the Esperanza ore body delineated an indicated resource of about 4.7 million metric tons (Mt) of ore at an average grade of 6.7%, about 315,000 t of copper. The underground solvent extraction-electrowinning (SX-EW) operation originally was developed by Gunpowder Copper Ltd., a subsidiary of Adelaide Brighton Cement Ltd. (Metal Bulletin, 1996a). Aberfoyle acquired the operation in June.

Copper Mines of Tasmania Pty. Ltd., a wholly owned subsidiary of Gold Mines of Australia Ltd., consigned its first shipment of copper concentrate from its Mount Lyell Mine in Tasmania to Japan in March, passing a milestone in the mine's successful recommissioning. Production at the mine, which reopened in November 1995, less than 12 months following its closure by RGC Ltd. (formerly Renison Goldfields Consolidated Ltd.), is expected to increase from 2 to about 3.5 Mt/yr over a 3-year period. This will increase copper production from 24,000 to 39,000 t/yr. Under a 10-year agreement, all copper concentrate from the Mount Lyell Mine must be sold to the Swiss-based international commodity trading house, Glencore International AG, formerly Marc Rich (Mining Journal, 1996k).

Niugini Mining Ltd. ceased production in June at its 5,000-t/yr Red Dome open-pit mine in the Chillagoe region of Queensland; it had been open since 1986. Niugini Mining is considering development of a limited underground mine accessed from the lower levels of the pit (ICSG Copper Bulletin, 1996, p. 43).

In July, WMC announced plans to more than double the capacity of its Olympic Dam polymetallic operation at Roxby Downs Station, including building a new flash furnace over a 5-year period at a cost of A\$1,250 million. Copper production is expected to increase from 85,000 to 200,000 t/yr. The production increase was to be progressive over a 4-year construction period, reaching the intermediate level of 150,000 t/yr by 1999. Expansion beyond the 150,000-t/yr level hinges upon obtaining certain regulatory and environmental approvals (Mining Magazine, 1996c). Olympic Dam is the sixth largest copper ore body in the world (Minerals Gazette, 1996b). The existing 90,000-t/yr smelter will be closed but retained for use as a flash converter when a two-stage smelting process becomes necessary (ICSG Copper Bulletin, 1996, p. 44).

The Benambra copper-zinc mine, Victoria's only base metal mine, was placed on care-and-maintenance at the end of July, primarily owing to the continuously diminishing grade of the copper ore since the mine opened in 1992 but also to a reduction of profits caused by adverse exchange rates (Minerals Gazette, 1996a).

Production of copper by heap leach/SX-EW began in December at the Mount Cuthbert project, Queensland, a joint venture of Murchison United NL (60%) and Brancote Australia NL (40%), from 90,000 t of ore mined and placed under leach. The joint venture plans to increase production by 50%, to 8,250 t/yr, through the addition of modular units to the SX-EW circuit in 1997. The project has an initial mine life of 5 years (Mining Journal, 1996j).

In December, a consortium led by Furukawa Co. Ltd. of

Japan acquired the idled Port Kembla copper smelter near Wollongong, New South Wales, from Southern Copper Ltd., a wholly-owned subsidiary of CRA Ltd. The consortium is basically Japanese-owned—Furukawa with a 50% interest; Nittetsu Mining Co., 20%; Nissho Iwai Corp., 17.5%; and Itochu Corp., 10%; the balance is held by an unnamed Australian company. Furukawa and Nissho Iwai sold their previous interests of 30% and 10%, respectively, in the smelter to Southern Copper in June 1995; in late 1994, the smelter had been closed for renovation to meet stricter environmental regulations that required the collection and disposal of the plant's sulfur dioxide emissions. The joint-venture partners plan to increase production capacity at the smelter by 50%, to 120,000 t/yr of copper, and to begin its recommissioning during the last half of 1998 (Nikkei Weekly, 1996).

Mineral Commodities NL was considering building a new copper smelter in Queensland, probably in the Mount Isa area, to provide additional smelting capacity to producers other than MIM, owner-operator of the Mount Isa mining-smelting complex. The proposed smelter would produce about 55,000 t/yr of copper from about 200,000 t/yr of concentrate feed. The sulfur dioxide produced by the plant is planned to be converted into sulfuric acid and sold to WMC Fertilizers Ltd. for use at its planned Phosphate Hill phosphate project about 150 km distant (Mining Journal, 1997d).

**Gold.**—Gold is mined in all States and the Northern Territory. Australia remained the world's third largest gold producer, and Western Australia remained the premier Australian gold mining State, producing almost 70% of the country's output. At A\$4.2 billion, gold is the second largest export earner after coal (Mining Journal, 1997c). Kalgoorlie's Super Pit in Western Australia was the largest single producer, producing more than 19,300 kilograms (kg) of gold.

In April, the New South Wales Government blocked the development of North Ltd.'s A\$180 million Lake Cowal gold mine on environmental grounds. The rejection followed an earlier approval of the project from a Federal Government-appointed commission of inquiry. The State Government believed that insufficient environmental safeguards had been put in place. The Lake Cowal project had been scheduled to produce about 7,000 kilograms per year (kg/yr) of gold for the first 7 years of production and then about 3,000 kg/yr for the next 4 years (Mining Journal, 1996h). North continued exploration on the property throughout the year, and the matter still was being discussed with the State at yearend (Mining Annual Review, 1997).

In June, Niugini Mining ceased operations as planned at its Red Dome open-pit mine. Since its opening in 1986, the mine produced almost 3,500 kg of gold. Production is expected to continue from stockpiled ore for another year. Niugini Mining also is considering development of a limited underground mine accessed from the lower levels of the pit (Mining Journal, 1996s).

In midyear, Goldfields Ltd. opened the Henty gold mine in Tasmania, the first new gold mine to open in the State during the 20th century. The Henty Mine is scheduled to produce about

2,800 kg/yr of gold from high-grade ore extracted from an underground reserve sufficient for a mine life of 4.5 years (Mining Magazine, 1996e).

Byproduct gold production will increase from less than 1,000 to more than 2,300 kg/yr at the Olympic Dam Mine when the 4-year expansion, announced by WMC in July, is completed (U.S. Embassy, Canberra, Australia, 1996d).

Development of the Cadia Hill Mine in New South Wales was given official approval by the State Government in September. Construction of the open-pit mine began in October, and initial production is scheduled for September 1998. Sole-owner Newcrest Mining Ltd. allocated A\$441 million for the mine's development, which will include a 17-Mt/yr ore-treatment plant. Newcrest expects to recover more than 9,000 kg/yr of gold over the mine's 13-year life (Newcrest Mining Ltd., 1996).

At yearend, WMC approved an A\$157 million program to construct a new gold-processing plant at its St. Ives operation in Western Australia. The new facility will have an initial capacity of 5 Mt/yr, ultimately increasing to 7 Mt/yr when completed in 1998, and will increase gold production from about 17,000 to 21,800 kg/yr (Mining Magazine, 1997).

**Iron Ore and Steel.**—Australia was the world's largest exporter of iron ore for the sixth consecutive year, with shipments totaling 134 Mt and valued at about A\$3 billion. As a world producer, Australia ranks fourth behind China, Brazil, and the former Soviet Union. Iron ore production continues to be heavily concentrated in the Hamersley Range of the Pilbara region, Western Australia, which accounts for more than 97% of the country's production. Iron ore also is produced by BHP Steel Pty. Ltd. at its Iron Baron, Iron Duke, and Iron Knob Mines in the Middleback Range near Whyalla, South Australia.

BHP Iron Ore Pty. Ltd. is Australia's largest producer of iron ore, with major mines at Goldsworthy, Jimblebar, Mount Newman, and Yandi, all in the Pilbara region. Iron ore from BHP's mines is railed to Nelson Point and Finucane Island, on opposite sides of the harbor at Port Hedland, Western Australia. BHP Iron Ore shipped a record-high 60 Mt of iron ore in 1996 and has begun a project to increase its rail and port capacities to 70 Mt/yr (Bachman, 1997, p.33).

Hamersley Iron Pty. Ltd., a part of the international mining giant RTZ Corp. PLC.-CRA Ltd. Group, operates mines at Mount Tom Price, Paraburdoo, Channar (60% Hamersley), Marandoo, and Brockman No. 2 Detrital in the Hamersley region of the Pilbara. The company, Australia's second largest iron ore producer, owned and operated railway links from Paraburdoo through Tom Price to the port of Dampier, Western Australia, 386 km away, where Hamersley ships to steel mills in China, Japan, the Republic of Korea, Taiwan, and Europe. Spur lines connect the Brockman No. 2 (44 km) and the Marandoo (59 km) Mines; the Channar Mine is linked to Paraburdoo by overland conveyor. Hamersley is planning to develop a new mine at Yandicoogina, 150 km east of Mount Tom Price. The mine, planned to be in production in 1999, will have production of 15 Mt/yr. The Yandicoogina Mine, with a life of more than 30 years, will be linked to Hamersley's existing

rail and port facilities (Bachman, 1997, p. 35).

Hamersley loaded its 1-billionth ton of iron ore at its port of Dampier on August 6, 30 years after it began export shipments (RTZ Corp. PLC.-CRA Ltd. Group, 1996).

Robe River Iron Associates, with a capacity of 27 Mt/yr, is Australia's third largest iron ore producer and the fourth largest in the world. The principal iron ore deposits are located in mesas stretching about 100 km along the Robe River valley near the company town of Pannawonica in Western Australia. Robe River's processing and port facilities are at Cape Lambert, Western Australia, about 200 km to the northeast. The Mesa J iron ore deposit is the company's production base, providing sinter fines for export (Bachman, 1997, p. 30).

Koolyanobbing Iron Pty. Ltd., a 60-40 joint venture of Portman Mining Ltd. and the People's Republic of China's Anshan Iron and Steel Corp., operates the Koolyanobbing iron ore mine, 50 km north of Southern Cross, Western Australia. The mine produces lump and fines ore in about equal quantities. All fines are shipped from Koolyanobbing Iron's port at Esperance on the southern coast of Western Australia to Anshan Iron under a 20-year sales contract approved in 1994. The lump ore is shipped to Anshan Iron and other Chinese steelmakers, as well as to Japanese integrated steelmakers. Koolyanobbing Iron also operates the iron ore-beneficiation plant on Cockatoo Island off the northern coast of Western Australia, 140 km north of Derby (Bachman, 1997, p. 32).

The contribution of BHP Steel, the only integrated steel producer in Australia, to total world steel output, however, is small, having just three steelworks that produce about 1% of world production. The plants are at Newcastle, Port Kembla, and Whyalla.

The proposed South Australian Steel and Energy (SASE) project to develop coal and iron ore deposits in the State's far north took a significant step in April with the announcement that two Indonesian companies would join the venture. PT Maritosa Coalindo, a private company in the resource sector, signed a memorandum of understanding to subscribe \$5 million for a 10% equity in the project, and, in a separate agreement, the Indonesian Government-owned PT Krakatau Steel Group agreed to provide engineers and technical experts to work with Ausmelt Ltd. in the establishment and operation of a demonstration pig iron plant. Prior to these agreements, the SASE partners were Meekatharra Minerals Ltd. (40%), Ausmelt (40%), and the South Australian Government (20%) (South-East Asia Mining Letter, 1996).

Meekatharra Minerals signed a strategic alliance agreement with Ausmelt in which Meekatharra Minerals will make available an exclusive supply of low-ash coal under a long-term contract to future licensees of Ausmelt technology. The coal will be mined from Meekatharra Minerals' Arckaringa and Phillipson leases in South Australia. The new agreement expands upon existing agreements between the two companies that relate to the production of pig iron from the SASE project. SASE will have a design production capacity of 2.5 Mt/yr of pig iron by using Ausmelt top-submerged lancing furnace technology. Direct operating costs are expected to be around A\$70 per ton of pig iron, ex-plant, making it one of the world's

lowest cost producers (Mining Journal, 1996i).

Brisbane-based Goldamere Pty. Ltd., trading as Australian Bulk Minerals (ABM), plans to reopen the Savage River iron ore mine and pellet plant in Tasmania in mid-1997; the mine had been closed in March by the former owner-operator, Pickands Mather and Co. International of the United States, after almost 30 years of production. Farther into the future, ABM will produce 500,000 t/yr of pig iron by using new technology, such as the Ausmelt top-submerged lance smelting process. Following the beginning of pig iron production, ABM is planning to construct a mini-steelworks (Metal Bulletin, 1996e).

The privately owned Australian United Steel consortium expected to begin construction of its direct-reduced iron plant at Cape Lambert in the first half of 1997. The 2.4-Mt/yr plant will be capable of expanding to 3.6 Mt/yr if market demand warrants. The project is expected to cost \$750 million (Mining Journal, 1996t).

**Lead and Zinc.**—Most lead and zinc mined in Australia is from operations that produce both because the two metals commonly occur in the same deposits. Zinc, however, is the main product in most of Australia's lead-zinc mining operations.

In 1996, Australia ranked first in the production of lead concentrates and third in the production of zinc concentrates, producing about 17% and 14%, respectively, of the world's total. In refined production, Australia is estimated to rank eighth in lead and seventh in zinc.

Victoria's only base metal producer, the Benambra copper-zinc mine, was closed and placed on care-and-maintenance in July by Denehurst Ltd. Denehurst, originally an equal partner with Macquarie Resources Ltd. when the mine opened in 1992, purchased Macquarie's share in June 1995. The mine closed because of low zinc prices, metallurgical problems in treating the ore, and poor exchange rates (Minerals Gazette, 1996a).

Pasminco Ltd. and Mancala Pty. Ltd., a mine management and contracting company, formed a partnership in August to reopen the Hercules zinc mine at Williamsford, Tasmania. The mine had been closed in 1986. Under the arrangement, Mancala will be responsible for the mining operations, including associated capital investment, and Pasminco will purchase all the mine's production according to agreed targets. Initially, production is to be 50,000 t/yr of ore, rising to 80,000 t/yr during the second year. Concentrates from Hercules will be sent to Pasminco's Risdon zinc smelter (Mining Journal, 1996m).

Pasminco plans to increase lead production at its smelter at Port Pirie in South Australia by more than 13%, from 220,000 to 250,000 t/yr by 2000 (Mining Journal, 1996l).

In December, MIM announced its plans to reduce the amount of ore mined from its Hilton lead-zinc mine in Queensland. MIM will reduce ore output from 1.3 Mt/yr to 900,000 t/yr. This will reduce the mine's production of zinc concentrate, but will not affect the output of lead bullion because the company will use existing stockpiles. (Mining Journal, 1996g).

At yearend, Korea Zinc Co. Ltd. of the Republic of Korea still was awaiting approval from Australia's Foreign Investment Review Board to proceed with the two-phase construction of its planned zinc smelting plant at Townsville. Construction of a

170,000-t/yr capacity smelter is expected to start in February, with commissioning beginning in late 1998. The second phase of the project, beginning almost immediately after startup, will double the plant's capacity to about 340,000 t/yr (Metal Bulletin, 1996d).

**Manganese.**—Groote Eylandt Mining Co. Pty. Ltd.'s (GEMCO) open-cut manganese mine on the northwest portion of Groote Eylandt, off the far north coast of Australia in the west of the Gulf of Carpentaria, is the second largest mining operation in the Northern Territory, after the Gove bauxite mine, and is the world's third largest manganese producer, representing about 10% of production. GEMCO ships about 25% per year of its approximate 2 Mt of concentrate to the ferromanganese plant operated by Tasmanian Electro Metallurgical Co. Pty. Ltd. (TEMCO) at Bell Bay, Tasmania. GEMCO and TEMCO are wholly owned subsidiaries of BHP Minerals Ltd. Smaller quantities are used in Australian Manganese Co. Pty. Ltd.'s electrolytic manganese dioxide plant at Newcastle for the production of high-grade material used in long-life batteries. Australian Manganese also is a wholly owned subsidiary of BHP Minerals.

In July, Portman Mining sold its Woodie Woodie open-cut mine 390 km southeast of Port Hedland to Valiant Manganese Pty. Ltd., a subsidiary of Valiant Consolidated (Portman Mining, 1996).

**Mineral Sands.**—Australia's mineral sands industry comprises the mining and processing of high concentrations of such titanium minerals as ilmenite, leucoxene, and rutile; monazite, a rare-earth phosphate; and zircon, an ore of zirconium. Australia is the world's leading producer and exporter of mineral sands. The mineral sands industry produces about 40% of the world's ilmenite, 35% of the rutile, 50% of the zircon, and a substantial portion of the monazite.

U.S.-based SCM Chemicals Inc. was planning an A\$470 million expansion of its Kemerton titanium dioxide plant in Western Australia that would more than double output to 190,000 t/yr in early 1999. The expansion will involve the construction of a second 111,000-t/yr capacity chloride treatment facility at the site near Bunbury, south of Perth, to complement the existing 79,000-t/yr capacity plant. When completed, the operation will be the largest titanium dioxide production facility outside the United States (Mining Journal, 1996q).

In October, BHP Minerals began commissioning its 6,000-horsepower dredge, the largest of its type in the world, at the Beenup titanium minerals project in Western Australia. The dredge will process more than 27 Mt/yr of mineral sands (Mining Journal, 1996b).

Consolidated Rutile Ltd. planned to begin production of heavy minerals from its Ibis-Alpha ore body on North Stradbroke Island, Queensland, in January 1997. Ibis-Alpha has an expected life of 9 years, during which time 180 Mt of sand will be processed to recover about 1 Mt of heavy minerals (Mining Journal, 1996e).

**Nickel.**—The Australian nickel mining industry consists of several mines operating near the communities of Forrestania, Kambalda, Leinster, and Mount Keith in Western Australia. Downstream processing occurs at the Kalgoorlie Smelter and at refineries at Kwinana, Western Australia, and Yabulu. Australia is the world's fifth largest producer of mined nickel, behind Russia, Canada, New Caledonia, and Indonesia. It is the world's fourth largest producer of nickel metal, trailing Russia, Japan, and Canada. WMC is the country's dominant nickel miner and main nickel metal producer with mining and processing operations in Western Australia.

In midyear, Outokumpu and Mining Project Investors Pty. decided to go ahead with construction of the joint venture's 50-50 underground Silver Swan nickel mine in Western Australia. Construction is expected to begin in mid-1997. The mine will yield 128,000 t/yr of ore, resulting in 12,000 t/yr of nickel in concentrates for 5 years. The concentrates will provide feed for Outokumpu's Harjavalta nickel smelter in Finland (Mining Magazine, 1996b).

Toward yearend, Perth-based Rolute Samantha NL was planning to develop its Bulong open-pit nickel project, 35 km east of Kalgoorlie. Production at the rate of 9,000 t/yr of nickel is expected to begin during the first half of 1998, with an expansion increasing nickel recovery to 22,000 t/yr following shortly thereafter (Mining Magazine, 1996a).

Calliope Metals Corp. was planning to construct a nickel-cobalt refinery near Gladstone on the basis of ore being imported from New Caledonia beginning in late 1998. Nickel production is projected to be 32,000 t/yr from about 1 Mt of ore (Mining Magazine, 1996d).

**Platinum-Group Metals.**—No Australian mines are primary producers of platinum-group metals (PGM), although minor production continues in Western Australia's Eastern Goldfields at Kalgoorlie-Boulder and Kambalda as a byproduct of the nickel operations. PGM, mainly platinum and palladium, are recovered at the Port Kembla refinery-smelter complex from byproduct copper sulfide residue produced at the Kwinana nickel refinery. PGM also are contained in nickel matte produced for export at the Kalgoorlie smelter.

**Silver.**—Australia is a major silver producer, ranking sixth in the world. Most of the country's production, however, is a byproduct of copper-gold, gold, or lead-zinc mining.

Production of byproduct silver from the Olympic Dam Mine will increase from about 12,500 to about 30,000 kg/yr as a result of a 4-year progressive expansion program announced by WMC in July (U.S. Embassy, Canberra, Australia, 1996d).

In November, Pasmaenco announced plans to expand and modernize its smelter at Port Pirie. Silver production is to more than double, increasing from 220 to 450 t/yr. Construction will begin in April 1997 and be completed in October 1998 (Pasmaenco Ltd., 1996).

**Tin.**—RGC Ltd.'s Renison Bell Mine near Zeehan, Tasmania, is the world's largest hard-rock underground tin mine and Australia's main tin producer. Gwalia Consolidated Ltd.'s

Greenbushes Mine in southwestern Western Australia also produces tin as a coproduct of its spodumene and tantalite mining.

At the annual Association of Tin Producing Countries (ATPC) meeting in Singapore in September, Australia gave notice that it would withdraw its membership effective December 10, 1996. The ATPC had been established in 1983 to stabilize the international tin market and to promote tin research; Australia has, however, never imposed tin quotas, and the ATPC's role in research ended with the privatization of the International Tin Research Institute in 1995 (Metal Bulletin, 1996b).

### **Industrial Minerals**

**Cement.**—Five industrial conglomerates account for most of the country's cement capacity. They hold large-share percentages of a multitude of plants around the country. Adelaide Brighton Cement Ltd. holds the most capacity, about 2.1 Mt/yr, or 29%; Blue Circle Southern Cement Ltd., 2 Mt/yr, or 28%; Australian Cement Holdings Ltd., about 1.4 Mt/yr, or 20%; Queensland Cement Ltd., about 1.3 Mt/yr, or 18%; and Cockburn Cement Ltd., 0.3 Mt, or about 4% of Australia's annual capacity (McCaffrey, 1995).

**Diamond.**—Since 1986, Australia has been the world's largest producer of natural diamond in terms of carats recovered. Because only a small portion of its output is of gem quality, the country ranks fifth in terms of value of world diamond production (Cockle, 1996). Since the closure of the Bow River Mine in December 1995, the only commercial production of diamond is from the AK-1 lamproite pipe and alluvial operations at the mammoth Argyle Mine in the Kimberley region of Western Australia; for the eleventh consecutive year, it was the world's largest single-mine producer of diamond, with an output equivalent to about 40% of world production. About 5% of production is of gem quality, including a small proportion of the highly valued intensely pink stones that generate about 50% of revenues; 45% is near-gem quality, producing about 45% of revenues; and 50% is industrial grade that contributes just 5% of revenues (Gemstone Forecaster, 1996).

Argyle Diamond Mines Pty. Ltd. (RTZ-CRA Group, 59.9%, and Ashton Mining Ltd., 40.1%) is the management company and operator of Argyle Diamond Mines Joint Venture's (ADMJV) Argyle Mine; the ADMJV comprises RTZ-CRA, 56.8%; Ashton Mining, 38.2%; and Western Australian Diamond Trust, 5%. The ADMJV sold most of its gem and 78% of its near-gem quality white diamonds to De Beer's Central Selling Organization (CSO) through Argyle Diamond Sales Pty. Ltd. (ADS) until June 30, 1996, when the ADMJV decided not to renew its 5-year marketing contract with CSO and began marketing its output directly through its expanded European Sales Office (ESO) in Antwerp, Belgium. The ADMJV continues to sell, as it has since Argyle's startup, the few handfuls of the very rare, intensely pink *Argyle Pink* diamonds unique to the Argyle Mine, as well as the more

common yellow-to-brown stones, which are marketed as *Argyle Champagne* or *Argyle Cognac*, depending upon the specific color. These diamonds are cut and polished by using traditional techniques and automated laser cutting machines at ADS's small facility in West Perth, as are about 5% of other Argyle gem-quality diamonds. The remaining diamonds are still cut and polished in India prior to being sold through ESO (Mining Journal, 1996a).

**Gemstones.**—Australia is again the world's leading producer of precious opal, accounting for about 90% of production. About one-half is produced from fields at Andamooka, Coober Pedy, and Mintabie in South Australia. Most is hand-mined, either from an open-cut or an underground drive. Mostly, opal in New South Wales is mined at Lightning Ridge, the world's major source of the highly prized and valuable black opal, although a small amount still is produced at White Cliffs, the site of opal discovery in 1889. A small quantity of opal also is produced in western Queensland.

Redfire Resources NL continues to conduct exploratory drilling on its New South Wales licenses in search of large opal deposits suitable for mining by using earthmoving equipment.

Australia also continues to be the world's leading producer of natural sapphire. The commercial sapphire production is mined from alluvial deposits in the Inverell-Glen Innes (New England) region of northern New South Wales and the Rubyvale-Anakie region of central Queensland. Australia is supplying as much as 30% by volume of the world's rough sapphire output. Most of the uncut gems are exported to Thailand, the recognized world leader for cutting and marketing.

Australia produces most of the world's chrysoprase from the Marlborough, Queensland, deposit and has the world's largest known resource of nephrite jade at Cowell on the Eyre Peninsula in South Australia. In addition, Australia produces other gemstones, including agate, amethyst, chiastolite, emerald (aquamarine), garnet, rhodonite, topaz, tourmaline, turquoise, and zircon.

**Gypsum.**—Dampier Salt (Operations) Pty. Ltd., 64.9% owned by RTZ-CRA, has plans to develop a gypsum project at its Lake MacLeod deposit near Carnarvon, Western Australia. Dampier Salt has delineated a body of 25 Mt of gypsum of uniform particle size and chemical quality by drilling and sampling (Fetherston and others, 1997, p. 70).

**Lithium and Tantalum.**—Gwalia Consolidated is the world's largest producer of lithium minerals (spodumene), which are mined from the southern end of the Greenbushes Mine, the world's largest, highest grade spodumene resource, 300 km south of Perth. Gwalia Consolidated also is the world's largest producer of tantalum concentrates from tantalite ore. Both commodities are extracted from two separate pits, spaced about 300 meters (m) apart, within the Greenbushes pegmatite ore body, one of the largest mineralized, zoned, rare-metal pegmatites in the world. Gwalia Consolidated also produces tantalum from its Mount Cassiterite Mine, 100 km south of Port Hedland, and from its Wodgina Mine, the world's second largest



hard rock tantalum mine (Greenbushes is the largest), 100 km inland from Port Hedland. Gwalia Consolidated was considering a further capacity increase at the lithium minerals plant to a throughput of 400,000 t/yr of spodumene ore for a production of 170,000 t/yr of product, including lithium carbonate plant feed (Gwalia Consolidated Ltd., 1996).

**Magnesia.**—In midyear, Queensland Metals Corp. (QMC) bought from its joint-venture partner Pancontinental Resources (Kunwarara) Pty. Ltd. the remaining 40% of the Queensland Magnesia Project (QMAG) at Kunwarara, Queensland. QMAG is a low-iron magnesite enterprise about 60 km northwest of Rockhampton, Queensland, engaged in mining cryptocrystalline magnesite and producing electrofused and dead-burned magnesia. QMC plans to undertake an A\$28 million investment program for the installation of ore sorting facilities at the Kunwarara Mine. QMC also will expand production capacities for electrofused magnesia by 33%, to 40,000 t/yr, and for deadburned magnesia by 50%, to 120,000 t/yr (Industrial Minerals, 1996).

**Phosphate Rock.**—WMC Fertilizers Ltd., a wholly owned subsidiary of WMC, plans to invest \$513 million to develop a phosphate fertilizer plant to produce monoammonium and diammonium phosphate (MAP-DAP) from the Phosphate Hill phosphate rock deposit, 150 km southeast of Mount Isa. Construction of the plant is scheduled to begin in early 1997 (Mining Journal, 1996u). WMC Fertilizers' production will significantly reduce Australia's current DAP and MAP imports of more than 1 Mt/yr soon after production begins in late 1999 (Chemical Week, 1997). Natural gas will be supplied to the site for ammonia, and an agreement with MIM will enable the use of sulfur dioxide from the processing plant at the Mount Isa Mine for the production process. Mining at the Phosphate Hill deposit, formerly done by another WMC subsidiary, Queensland Phosphate Ltd., ceased in 1983 for economic reasons.

**Salt.**—Australia ranks sixth in world salt production, most of which is produced from solar salt plants. Significant quantities also are produced from salt in inland lakes, coastal lagoons, and ancient buried evaporites.

Dampier Salt continues to supply more than one-half of Australia's annual salt production from its solar operations at Dampier Field on Mistaken Island near Dampier in the Pilbara area and Lake MacLeod Field near Carnarvon. The Dampier Field has twice the annual production capacity, about 3 Mt, as that of the Lake MacLeod Field.

Salt from the Dampier Field is produced by evaporation of seawater; the evaporating ponds cover more than 9,000 hectares (ha). At Lake MacLeod, natural brine is recovered from the subsurface aquifer (Lake MacLeod) through shallow wells from depths of 4 to 6 m and circulated by gravity through an evaporating pan system, where salt crystals are grown for harvest and processing. Dampier Salt produces mainly industrial grade salt for chemical and industrial uses, but the product also is approved as a food-grade salt.

Dampier Salt supplies more than one-half of Australia's salt

exports. The main export markets are Indonesia, Japan, the Republic of Korea, and Taiwan, with smaller markets in other Southeast Asian countries and Africa.

The Leslie salt project at Port Hedland, owned by Cargill Australia Ltd., a subsidiary of Cargill Inc. of the United States, is the second largest Australian solar salt producer. Salt is produced by a process of evaporation and concentration, which is pumped into a series of concentration and crystallizer ponds covering an area of about 8,000 ha. Cargill's Leslie operation has a capacity of about 2.75 Mt/yr. Cargill exports high-quality salt, mainly to the chemical industry, throughout Asia, including Indonesia, Japan, the Republic of Korea, and Taiwan (Fetherston and others, 1997, p.67).

### *Mineral Fuels*

**Coal.**—Australia is the world's fifth largest producer of coal (all grades) in the world. New South Wales and Queensland together account for more than 98% of the country's black coal production and virtually all its exports. Coal exports are shipped from nine terminals at seven ports along the eastern coast of the country.

The principal areas of coal production are from the Bowen Basin, Queensland; Hunter Valley, Western Coalfield, and South Coast Coalfield, New South Wales; Leigh Creek, South Australia; Fingal, Tasmania; Latrobe Valley Coalfield (all brown coal), Victoria; and near Bunbury, Western Australia. The Northern Territory has no coal production.

Australia retains its position as the world's largest exporter of coal, a position it has held since 1984, shipping more than 140 Mt, an increase of about 3% over the previous record high of more than 136 Mt set in 1995. Australia controls an estimated 35% to 40% of the world's seaborne coal trade by exporting almost 70% of its salable coal production of 200 Mt. Australian coal is exported to more than 30 countries around the world. The major markets are Japan and other Asian countries, which accounted for about 80% of Australia's exports. Significant amounts of coal also are exported to Europe, the Indian subcontinent, the Middle East, and South America.

The coal industry is Australia's largest foreign-exchange earner, accounting for an estimated 25% of export revenues from the minerals sector and about 15% of the country's export earnings.

A consortium led by Britain's National Power PLC purchased the Hazelwood Power Corp., operator of an integrated brown coal mine and coal-fired power station, and Energy Brix Australia Corp., maker and marketer of brown coal briquets for \$1.8 billion from the State of Victoria. National Power has a 52% stake in the Hazelwood Power partnership. Other partners are U.S.-based Destec Energy Inc., 20%; PacifiCorp., 19.9%; the Commonwealth Financial Services, 6.1%; and the Commonwealth Bank of Australia, 2% (Coal Age, 1996).

A joint venture managed by Peabody Resources Ltd. will proceed with the development of a \$400 million open-cast mine at Bengalla near Muswellbrook in the Hunter Valley area. Work is expected to begin in early 1997, with the first deliveries

of coal in 1999. The mine is expected to produce 7 Mt/yr of raw coal, yielding 6 Mt/yr of saleable steaming coal, during a mine life of 21 years (Mining Journal, 1996n).

**Petroleum and Natural Gas.**—Australia produces as much as 85% of its crude oil requirements, with about 90% of total production coming from offshore wells. About 44% of the oil and gas condensate is produced in the Gippsland Shelf fields in the Bass Strait between Victoria and Tasmania. The Carnarvon Basin off the northwestern coast of Western Australia is Australia's next largest producer, having about 41% of total production. The Gippsland Basin in Victoria is the largest producer of natural gas (a 33% share) and liquefied petroleum gas (69%). The North West Shelf Project (NWSP) on the continental shelf about 140 km offshore of Dampier, Western Australia, is the source of the country's liquid natural gas (LNG) production (Australian Institute of Petroleum Ltd., 1997).

Mobil Exploration and Producing Australia (MEPA), the Australian subsidiary of Mobil Oil Corp. of the United States, clinched its takeover of Ampolex Ltd., Australia's largest oil and gas company, after increasing its takeover offer by 11% in May. By December, MEPA had secured virtually all Ampolex's shares and announced plans to move all offices to Perth. The move will include Ampolex's headquarters from Sydney, New South Wales, and MEPA's offices from Melbourne, Victoria. Ampolex already has an office in Perth. MEPA's aim was to amalgamate all operations in the one location by early 1997 (Petroleum Gazette, 1997b).

The Australian Government backed away from its proposal to revoke the mining industry's entitlement to a diesel fuel rebate. The proposal was a means of giving a rebate to farmers, miners, and other selected businesses for the fuel excise tax paid for vehicles used for off-road purposes. The Government had been planning to eliminate the mineral industry's partial refund, totaling about \$530 million per year, while retaining the farmers' full refund, about \$418 million per year, in an attempt to cut expenditures from the fiscal year 1996-97 budget (U.S. Embassy, Canberra, Australia, 1996b).

In October, BP Refinery (Bulwer Island) Pty. Ltd. increased the capacity at its Brisbane refinery on Bulwer Island by 30% to 74,000 barrels per day. The 39-day, \$58 million project increased energy efficiency at the facility, reduced emissions, and provided greater flexibility with feedstock materials (Petroleum Gazette, 1997a).

In October, the partners in the NWSP announced plans for a \$4.6 billion expansion to double the LNG output, from 7.5 to 15 Mt/yr, at the Burrup Peninsula, Western Australia, treatment facilities. Two LNG trains will be added adjacent to the three existing units (Petroleum Gazette, 1997c). The joint-venture participants in the NWSP are Woodside Petroleum Pty. Ltd., BP Australia Holdings Ltd., Chevron Asiatic Ltd., Shell Development (Australia) Pty. Ltd., BHP Petroleum Pty. Ltd., and Japan Australia LNG (MiMi) Pty. Ltd. Each has a 16.67% share in the NWSP.

The 1,380-km "Gas to the Goldfields" pipeline was commissioned in October, when gas was delivered to Kalgoorlie. The pipeline connects the gold and nickel mines

and associated facilities at Kalgoorlie, Kambalda, Leinster, and Mount Keith with competitive, secure, long-term supplies of natural gas for power generation. The pipeline will provide service to the participants of the Goldfields Gas Transmission Joint Venture (GGTJV), as well as other users in the region. The GGTJV partners are WMC, Normandy Mining Corp., and BHP Minerals (Bachman, 1997, p. 47).

The total number of petroleum exploration and development wells drilled during 1996 (232) was 19 more than the revised number drilled during 1995 (213). The number of onshore exploration wells drilled in 1996 (96) was 4 more than that of 1995 (92). The number of offshore exploration wells drilled decreased during 1996 to 47 wells compared with the previous year when 56 wells were drilled. The total number of exploration wells drilled in 1996 (143) decreased slightly from the number drilled in 1995 (148). The total number of development wells drilled (89) was 24 more than the revised 1995 figure (65); 69 wells were drilled onshore and 20 were drilled offshore compared with 30 and 35 (revised) wells, respectively, drilled in 1995. The total meters (510,702) drilled for exploration and development wells in 1996 was about 7% more than that drilled in 1995 [476,297 (revised)]. The level of seismic survey activity during 1996 was the highest ever achieved, easily surpassing the 1992 record of 254,198 line kilometers). This high level of line kilometer acquisition occurred offshore; onshore seismic survey acquisition remained within approximately the same levels as those recorded over the last few years. The total number of line kilometers recorded during 1996 was 390,147 compared with the 161,174 (revised) recorded in 1995 (Bureau of Resource Sciences, 1997).

**Uranium.**—The existence of uranium in Australia has been known since the 1890's. In the 1930's, ores were mined at Radium Hill in South Australia to recover minute amounts of radium for medical purposes. A few hundred kilograms of uranium also were mined and used as a bright-yellow pigment in glass and ceramics. Uranium ores as such were mined and treated in Australia beginning in the 1950's and were intended mainly for export to the United Kingdom and the United States for use in weapons programs. Australia has about 40% of the western world's uranium resources (Minerals Gazette, 1996c).

In 1996, with a newly elected Government, the policy of restricting uranium production to three specific sites, the "three mines policy," was eliminated; uranium mining is to be treated the same as any other mining, and other uranium ore bodies can be developed. The only distinction is that export controls will remain as before to ensure that uranium exported from Australia is used for peaceful purposes only and not diverted for military purposes or used in a way that adds to the proliferation of nuclear weapons (Uranium Information Centre, 1996).

Following the reversal of the three mines policy, the Government completed a study in which 18 major uranium deposits suitable for development in the short to medium term were identified. The four uranium deposits considered to be the most likely to be developed in the short term were the North Ranger, formerly known as Jabiluka, in the Northern Territory, owned by Energy Resources of Australia Ltd. (ERA); Koongarra

in the Northern Territory, owned by Denison Australia Pty. Ltd. (70%) and Cogema Australia Pty. Ltd. (30%); Kintyre in Western Australia, owned by RTZ-CRA; and Teelirrie in Western Australia, owned by WMC. Estimated development costs for the four projects are A\$625 million (U.S. Embassy, Canberra, Australia, 1997).

In June, an A\$37.5 million program was initiated at ERA's Ranger Mine in the Northern Territory to increase milling capacity by 50%, to almost 2 Mt/yr of ore, to produce 5,000 t of uranium oxide, or yellow cake, per year. The capacity is being expanded to accommodate ore from the Ranger No. 3 ore body and will be operational by mid-1997. Mining at the No. 3 ore body received Government approval in May, and production was scheduled to begin in July 1997. This ore body was included in the initial environmental approvals for the Ranger Mine (Mining Journal, 1996p).

In mid-1996, WMC announced an A\$1.25 billion program that will more than double annual production, to 3,700 t of uranium concentrate, at its Olympic Dam underground mine by 2001 (Uranium Information Centre, 1997). Olympic Dam is the world's largest single uranium ore body, with proved and probable ore reserves of 580 Mt (Minerals Gazette, 1996b).

Although expansion plans for the Ranger and the Olympic Dam Mines are pending, strong world uranium markets enabled development of the Jabiluka, Kintyre, and the Koongarra deposits to be proposed (Uranium Information Centre, 1996).

On October 21, the Government lifted its ban on new uranium supply contracts with France following the French Government's decision to sign the Comprehensive Test Ban Treaty (U.S. Embassy, Canberra, Australia, 1996c).

## Reserves

Australia has a significant resource base of a diverse range of minerals and is self-sufficient in most minerals of economic importance. In spite of extensive exploration, however, the country still appears to be deficient (import reliant) in chromite, mercury, mica, platinum group metals, and sulfur. Major minerals with reserves adequate for domestic demand and exports included bauxite, clays, coal, copper, diamond, gold, iron ore, lead, manganese, mineral sands, natural gas, nickel, salt, silver, tin, uranium, and zinc. (See table 3.)

## Infrastructure

The transportation infrastructure of Australia is well developed. There are 810,264 km of roads, including 283,592 km paved (1,200 km are expressways) and 526,672 km unpaved. Inland waterways, of which there are about 8,368 km usable for mainly small, shallow-draft craft, are of little importance to the transportation industry.

The Government-owned railway system consists of 38,563 km of track, of which 16,752 km is standard (1.435-m) gauge, 15,728 km is narrow (1.067-m) gauge, and 6,083 km is broad (1.600-m) gauge. There are 2,914 km of electrified rail. A few hundred kilometers of rail is privately owned, most of which serves the iron ore industry in Western Australia. Of 442

airports, 274 are principal with permanent-surface runways. International shipping ports include Adelaide, Brisbane, Cairns, Darwin, Devonport, Fremantle, Geelong, Hobart, Launceston, Mackay, Melbourne, Sydney, and Townsville. The merchant marine fleet includes 18 petroleum, oils, and lubricant tankers; 3 chemical tankers; 6 liquefied gas tankers; 1 combination ore-oil tanker; and 30 bulk ore freighters.

Pipelines include 5,600 km for natural gas, 2,500 km for crude oil, and 500 km for refined oil products. Electric generating capacity is 34.54 gigawatts (U.S. Central Intelligence Agency, 1996).

In remote areas where mines, mills, and smelters are usually located, an individual mining company must provide its own infrastructure, such as housing, roads, railways, port facilities, electric power and water facilities, and various community services, including schools, shopping centers, and recreation facilities.

## Outlook

Because of a growing worldwide need for mineral and energy supplies, with particular demand for those mineral commodities in which Australia is abundantly endowed and for which Australia is among the world leaders in world supply—bauxite for aluminum production, coal, copper, diamond, gold, iron ore, lead, manganese, mineral sands, natural gas, and zinc—Australia probably will continue to be a significant world mineral supplier well into the 21st century.

## References Cited

- Australian Institute of Petroleum Ltd., 1996, First Greenhouse Challenge cooperative agreements signed in Melbourne: AIP News—Newsletter of the Australian Institute of Petroleum Ltd., May-June, p. 8.
- 1997, Education—FAQ and E-mail: Australian Institute of Petroleum Ltd., 1997. (Accessed June 3, 1997, on the World Wide Web at URL <http://www.aip.com.au/education/faq.html>)
- Bachman, David, 1997, Western Australian iron ore industry review—An overview of iron ore industry developments: Perth, Western Australia Department of Resources Development, 64 p.
- Bureau of Resource Sciences, 1997, Australia Petroleum Exploration and Development Activity: Canberra, Bureau of Resource Sciences, 4 p.
- Chemical Week, 1997, Australia—Phosphate project gets the go-ahead: Chemical Week, v. 159, no. 2, January 15, p. 21.
- Coal Age, 1996, Australia: Coal Age, v. 101, no. 10, p. 15.
- Cockle, Mark, 1996, In the pink: Review, no. 40, p. 9.
- Fetherston, J.M., Abeyasinghe, P.B., and Preston, W.A., 1997, Western Australia's industrial minerals—Quality is the key: Industrial Minerals, no. 354, March.
- Gemstone Forecaster, 1996, Australian pinks: Gemstone Forecaster, v. 14, no. 3, pt. 2, fall 1996 (Accessed June 9, 1997, on the World Wide Web at URL <http://www.primenet.com/~rgenis/gffall96two.html>)
- Gwalia Consolidated Ltd., 1996, Annual report: Perth, Western Australia, p. 10-15.
- ICSG Copper Bulletin, 1996, Mine projects and expansions: ICSG Copper Bulletin, v. 3, no. 9, 45 p.
- Industrial Minerals, 1996, Australia—QMC to control 100% of QMAG: Industrial Minerals, no. 343, June, p. 8.
- McCaffrey, Robert, 1995, International report—Antipodean: International Cement Review, February, p. 16-22.
- Metal Bulletin, 1996a, Aberfoyle plans 45,000 tpy mine at Gunpowder: Metal Bulletin, no. 8134, December 9, p. 11.
- 1996b, Australia and Thailand quit ATPC: Metal Bulletin, no. 8114, September 23, p. 5.

- 1996c, Comalco to revamp Weipa operations: *Metal Bulletin*, no. 8132, December 2, p. 7.
- 1996d, Korea Zinc expects smelter approval soon: *Metal Bulletin*, no. 8134, December 9, p. 7.
- 1996e, New lease of life for Tasmania's Savage River mine: *Metal Bulletin*, no. 8133, December 5, p. 29.
- Minerals Gazette, 1996a, Benambra to shut up shop: *Minerals Gazette*, v. 1, no. 89, June, p. 5.
- 1996b, The monster to get bigger: *Minerals Gazette*, v. 1, no. 91, August, p. 7.
- 1996c, Uranium coming in from the cold: *Minerals Gazette*, v. 1, no. 86, March, p. 8.
- Mining Annual Review, in press, Australia: *Mining Annual Review 1997*.
- Mining Journal, 1996a, Argyle confident: *Mining Journal*, v. 327, no. 8394, September 6, p. 188.
- 1996b, Beenup commissioning: *Mining Journal*, v. 327, no. 8400, October 18, p. 305.
- 1996c, Boyne ahead of schedule: *Mining Journal*, v. 327, no. 8394, September 6, p. 183.
- 1996d, Comalco prefers Queensland: *Mining Journal*, v. 327, no. 8406, November 29, p. 434.
- 1996e, CRL looks to the future: *Mining Journal*, v. 327, no. 8402, November 1, p. 345-346.
- 1996f, Federal investment rules extended: *Mining Journal*, v. 327, no. 8405, November 22, p. 414-415.
- 1996g, Hilton reduction: *Mining Journal*, v. 327, no. 8408, December 13, p. 478.
- 1996h, Lake Cowal blocked: *Mining Journal*, v. 326, no. 8373, April 12, p. 273.
- 1996i, Meekatharra agreement: *Mining Journal*, v. 326, no. 8384, June 28, p. 503.
- 1996j, Mount Cuthbert start-up: *Mining Journal*, v. 327, no. 8408, December 13, p. 478.
- 1996k, Mount Lyell ships first concentrate: *Mining Journal*, v. 326, no. 8371, March 29, p. 234.
- 1996l, Pasmenco lead output: *Mining Journal*, v. 327, no. 8403, November 8, p. 375.
- 1996m, Pasmenco's Herculean plan: *Mining Journal*, v. 327, no. 8392, August 23, p. 141.
- 1996n, Peabody to develop mine in N.S.W.: *Mining Journal*, v. 327, no. 8396, September 20, p. 218.
- 1996o, Queensland alumina lay-offs: *Mining Journal*, v. 327, no. 8404, November 15, p. 395.
- 1996p, Ranger expansion: *Mining Journal*, v. 327, no. 8385, July 5, p. 6.
- 1996q, TiO<sub>2</sub> boost for W.A.: *Mining Journal*, v. 326, no. 8379, May 24, p. 397.
- 1996r, Townsville expansion: *Mining Journal*, v. 327, no. 8400, October 18, p. 305.
- 1996s, Underground operation for Red Dome: *Mining Journal*, v. 327, no. 8389, August 2, p. 90.
- 1996t, Western Australia iron: *Mining Journal*, v. 327, no. 8398, October 4, p. 266.
- 1996u, WMC phosphates go-ahead: *Mining Journal*, v. 327, no. 8409, December 20-27, p. 498.
- 1997a, ...exports to rise: *Mining Journal*, v. 328, no. 8415, February 7, p. 108.
- 1997b, Green blueprint: *Mining Journal*, v. 328, no. 8412, January 17, p. 43.
- 1997c, Record Australia Gold Output: *Mining Journal*, v. 328, no. 8417, February 21, p. 150.
- 1997d, Smelter decision pending: *Mining Journal*, v. 328, no. 8413, January 24, p. 58.
- Mining Magazine, 1996a, Bulong go-ahead: *Mining Magazine*, v. 174, no. 5, p. 305.
- 1996b, Construction to start at Silver Swan: *Mining Magazine*, v. 175, no. 2, p. 114.
- 1996c, Expansion planned for Olympic Dam: *Mining Magazine*, v. 175, no. 3, p. 171.
- 1996d, Federal backing for Calliope: *Mining Magazine*, v. 174, no. 6, p. 369.
- 1996e, Henty gold mine, Tasmania, opened: *Mining Magazine*, v. 175, no. 2, p. 114.
- 1997, St. Eves approval...: *Mining Magazine*, v. 176, no. 1, p. 72.
- Newcrest Mining Ltd., 1996, Annual report: Melbourne, Victoria, p. 22-23.
- Nikkei Weekly, 1996, Copper maker revives Australian plant: *Nikkei Weekly*, v. 34, no. 1752, December 9, p. 20.
- Pasmenco Ltd., 1996, \$33 million expansion and modernization for Pasmenco-BHAS smelter, Port Pirie: Melbourne, Australia, Pasmenco Ltd. press release, November 21, 1996, 1 p.
- Petroleum Gazette, 1997a, The quarter at a glance—Bulwer turnaround: *Petroleum Gazette*, v. 32, no. 1, first quarter 1997, p. 52.
- 1997b, The quarter at a glance—Mobil move: *Petroleum Gazette*, v. 32, no. 1, first quarter 1997, p. 54.
- 1997c, The quarter at a glance—NW Shelf expansion: *Petroleum Gazette*, v. 32, no. 1, first quarter 1997, p. 52.
- Portman Mining Ltd., 1996, Sale of Pilbara manganese project: Perth, Australia, Portman Mining Ltd. press release, July 1, 1996, 2 p.
- QNI Ltd., 1996, Annual report: Brisbane, Queensland, 57 p.
- RTZ Corp. PLC.—CRA Ltd. Group, 1996, The billionth tonne: *Review*, no. 40, December, p. 11.
- South-East Asia Mining Letter, 1996, Indonesians invest in South Australia: *South-East Asia Mining Letter*, v. 8, no. 9, May 17, p. 2.
- Uranium Information Centre, 1996, Australia's uranium: Uranium Information Centre, Melbourne, Australia, 1996. (Accessed June 4, 1997, on the World Wide Web at URL <http://www.uic.com.au/ozuran.htm>)
- 1997, Australia's uranium mines: Uranium Information Centre, Melbourne, Australia. (Accessed June 4, 1997, on the World Wide Web at URL <http://www.uic.com.au/emine.htm>)
- U.S. Central Intelligence Agency, 1996, The world factbook 1996: Central Intelligence Agency, 8 p. (Accessed July 17, 1997, on the World Wide Web at URL <http://www.odci.gov/cia/publications/nsolo/factbook/as.htm>)
- U.S. Embassy, Canberra, Australia, 1996a, Australian Government report into Australia-United States trade relations: U.S. State Department telegram 003676 (August 20, 1996), 10 p.
- 1996b, Budget—Diesel fuel rebate retained: U.S. State Department telegram 003633 (August 16, 1996), p. 3.
- 1996c, Mining—Australia to resume uranium sales to France: U.S. State Department telegram 004724 (October 25, 1996), p. 4-5.
- 1996d, Mining—Western Mining announces expansion of Olympic Dam Mine: U.S. State Department telegram 003244 (July 19, 1996), p. 4.
- 1996e, Native title—Government announces proposed amendments to Native Title Act: U.S. State Department telegram 004544 (October 11, 1996), p. 2.
- 1997, Uranium developments: U.S. State Department telegram 000079 (January 8, 1997), p. 8-9.
- U.S. Trade Representative, 1997, Foreign trade barriers—Australia: U.S. Trade Representative, 1997. (Accessed April 29, 1997, on the World Wide Web at URL <http://www.ustr.gov/reports/nte/1997/contents.html>)
- Valiant Consolidated Ltd., 1996, Annual report: Perth, Western Australia, p. 9-10.
- Western Australia Department of Resources Development, 1997, Chrome/iron—Range Well chromium: Western Australia Department of Resources Development, 1997. (Accessed July 15, 1997, on the World Wide Web at URL <http://www.drd.wa.au/punder.htm>)

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### **Major Publications**

Australian Bureau of Agricultural and Resource Economics,  
Canberra: Quarterly Mineral Statistics, quarterly.  
Australian Bureau of Statistics, Belconnen: Mineral Production,  
Australia, fiscal year.  
Australian Bureau of Statistics, Belconnen: Production  
Statistics, Preliminary, monthly.

TABLE 1  
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/	
<b>METALS</b>						
<b>Aluminum:</b>						
Bauxite, gross weight	thousand tons	39,746	41,320	41,733	42,655	43,100 2/
Alumina	do.	11,783	12,598	12,892	13,147	13,318 2/
<b>Metal, refined:</b>						
Primary	do.	1,245	1,381	1,317	1,293 r/	1,371 2/
Secondary		40,000	34,800	55,000	55,000	55,000
Antimony, Sb content of ores and concentrates e/		1,701 2/	1,700	1,700	900 r/ 2/	1,300 2/
<b>Cadmium:</b>						
Mine output, Cd content		2,516	2,375	2,275	1,900 r/ e/	1,900 2/
Metal, smelter (refined)		1,001	951	910	680 r/ e/	682 2/
<b>Cobalt: e/</b>						
<b>Mine output, analytic content of:</b>						
Nickel ore		700	500	250	94 r/ 2/	106 2/
Nickel concentrate		500	750	950	654 r/ 2/	735 2/
Zinc concentrate		70	70	70	52 r/ 2/	59 2/
Total		1,270	1,320	1,270	800 r/ 2/	900 2/
Recovered cobalt, including that from imported source material e/		1,600	1,800	2,200	2,200 r/	2,300
Columbium-tantalum concentrate, gross weight		656	495	700	900	920 2/
<b>Copper:</b>						
Mine output, Cu content	thousand tons	371	402 r/	415 r/	420 r/	525 2/
<b>Metal:</b>						
<b>Smelter:</b>						
Primary	do.	304	323	315	215 r/	289 2/
Secondary e/		10,000	10,000	9,600 r/	1,200 r/	1,200
<b>Refined:</b>						
Primary	thousand tons	271	285	312	242 r/	314 2/
Secondary e/		32,000	24,000	24,000	18,000 r/	--
<b>Gold:</b>						
Mine output, Au content	kilograms	243,400 e/	247,196	256,188	253,504	288,880 2/
<b>Metal:</b>						
<b>Refined:</b>						
Primary	do.	250,000 e/	283,726	302,612	289,004	329,000 2/
Secondary	do.	8,000 e/	8,345	8,500 e/	8,747	3,620 2/
<b>Iron and steel:</b>						
<b>Iron ore:</b>						
Gross weight	thousand tons	112,101	120,534	128,493	142,936	147,100 2/
Fe content	do.	69,761	74,767	80,900 e/	88,653	93,000 2/
<b>Metal:</b>						
Pig iron	do.	6,384	7,414	7,466	7,476 r/	7,381 2/
<b>Ferrous alloys: e/</b>						
Ferromanganese		55,000	75,000	100,000	110,000 r/	110,000
Ferrosilicon		17,000	--	--	--	--
Silicomanganese		75,000	75,000	100,000	100,000 r/	95,000
Total		147,000	150,000	200,000	210,000	205,000
Steel, crude	thousand tons	6,803	7,853	8,424	8,447 r/	8,295 2/
Semimanufactures e/		3,000	1,788 2/	4,000	4,000	4,000
<b>Lead:</b>						
Mine output, Pb content	thousand tons	577	519	537	455	522 2/
<b>Metal:</b>						
<b>Primary:</b>						
Bullion, for export	do.	231	224	197	164 r/	191 2/
Refined	do.	215	221	212	215	204 2/
Total	do.	446	445	409	379 r/	395 2/
Secondary excluding remelt	do.	17	22	21 r/	20 r/	20
<b>Manganese ore (metallurgical):</b>						
Gross weight	do.	1,251	2,092	1,924	2,176	2,109 2/
Mn content e/	do.	596	1,043	944	1,066	1,023
<b>Nickel:</b>						
Mine output, Ni content	do.	58	65	79	98 r/	113 2/
Metal, smelter (refined Ni and Ni content of oxide)	do.	57	55	67	77 r/	74 2/

See footnotes at end of table.

TABLE 1--Continued  
 AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995	1996 e/	
METALS--Continued						
Platinum-group metals: e/						
Palladium, Pd content	kilograms	400	400	400	400	400
Platinum, Pt content	do.	100	100	100	100	100
Total	do.	500	500	500	500	500
Rare-earth metals, monazite concentrate: e/						
Gross weight		6,000	3,000	--	200 r/	--
Monazite content		3,300	1,650	--	110 r/	--
Silver:						
Mine output, Ag content		1,218	1,092	1,045	939 r/	1,020 2/
Metal, refined		400 e/	345	362	346	356 2/
Tin:						
Mine output, Sn content 3/		6,609	8,057	7,100	8,656 r/	8,828 2/
Metal, refined:						
Primary		240	222	315	570	460 2/
Secondary e/		360	250	260	300	300
Titanium concentrates, gross weight:						
Ilmenite	thousand tons	1,786	1,804	1,782	1,980 r/	2,028 2/
Leucoxene		20,000	21,000	35,000	31,000	30,000 2/
Rutile		183,000	186,000	233,000	195,000 r/	180,000 2/
Tungsten, mine output, W content		159	23	11 e/	-- r/	--
Zinc:						
Mine output, Zn content	thousand tons	1,025	1,010	995	937 r/	1,071 2/
Metal, smelter:						
Primary	do.	328	316	323	320 r/	326 2/
Secondary e/		4,500	4,500	4,975 2/	4,500	4,500
Zirconium concentrates, gross weight	thousand tons	355	414	502	505 r/	462 2/
INDUSTRIAL MINERALS						
Abrasives, natural: e/						
Beach pebble		2,000	2,000	2,000	2,000	2,000
Garnet		25,000	25,000	25,000	25,000	25,000
Barite e/		11,000	11,000	11,000	11,000	11,000
Cement, hydraulic e/	thousand tons	5,412 2/	5,500	6,500	6,500	6,500
Clays: e/						
Bentonite and bentonitic clay		35,000	35,000	35,000	35,000	35,000
Brick clay and shale	thousand tons	8,000	8,000	8,000	8,000	8,000
Cement clay and shale	do.	500	500	500	500	500
Damourite clay		100	100	100	100	100
Fire clay		25,000	25,000	25,000	25,000	25,000
Fuller's earth (attapulgite)		15,000	15,000	15,000	15,000	15,000
Kaolin and ball clay		180,000	180,000	200,000	210,000	210,000
Other	thousand tons	1,000	1,000	1,000	1,000	1,000
Diamond:						
Gem	thousand carats	18,078	18,844	19,485	18,312	18,897 2/
Industrial	do.	22,095	23,032	23,815	22,381	23,096 2/
Total	do.	40,173	41,876	43,300	40,693	41,993 2/
Diatomite e/		11,000	11,000	11,000	11,000	11,000
Feldspar including nepheline syenite e/		15,000	15,000	16,000	16,000	17,000
Gemstones, other than diamond: e/						
Opal	value, thousands	\$85,000	\$90,000	\$100,000	\$100,000	\$100,000
Sapphire	do.	\$40,000	\$40,000	\$50,000	\$50,000	\$50,000
Other	do.	\$900	\$1,000	\$1,500	\$1,500	\$1,500
Total	do.	\$125,900	\$131,000	\$151,500	\$151,500	\$151,500
Gypsum e/	thousand tons	2,000	2,000	2,000	2,000	2,000
Kyanite e/		800	800	800	800	800
Lime e/		1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Magnesite		262,000 e/	260,600 e/	285,610	263,249 r/	310,000 2/
Nitrogen, N content of ammonia		391,900	398,000	412,600	432,900	432,900
Perlite, crude e/		5,000	5,000	5,000	5,000	5,000
Phosphate rock e/		1,500	1,700	1,500	5,000 r/	10,000
Salt	thousand tons	7,693	7,737	7,685	8,148 r/	7,905 2/
Sillimanite e/ 4/		100	100	100	100	100
Spodumene, concentrate		42,516	52,900 r/ e/	45,987	81,841	117,094 2/

See footnotes at end of table.



TABLE 1--Continued  
 AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995	1996 e/
<b>INDUSTRIAL MINERALS--Continued</b>						
<b>Stone, sand and gravel: e/</b>						
Construction sand	thousand tons	30,000	30,000	30,000	30,000	30,000
Gravel	do.	15,000	15,000	15,000	15,000	15,000
Dolomite	do.	10,000	10,000	10,000	10,000	10,000
<b>Limestone:</b>						
For cement	do.	6,000	6,000	6,000	6,000	6,000
For other uses	do.	6,000	6,000	6,000	6,000	6,000
Silica in the form of quartz, quartzite, glass sand	do.	2,000	2,000	2,500	2,500	2,500
<b>Other:</b>						
Crushed and broken stone	do.	65,000	65,000	65,000	65,000	65,000
Dimension stone	do.	100	100	100	100	100
Unspecified	do.	30,000	30,000	30,000	30,000	30,000
<b>Sulfur, byproduct:</b>						
Metallurgy	do.	295	299	275	263 r/	327 r/
Petroleum	do.	75	85	115	27 r/	27 r/
Total	do.	370	384	390	290	354
Talc, chlorite, pyrophyllite, steatite e/		215,000	215,000	215,000	215,000	215,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
<b>Coal:</b>						
Bituminous and subbituminous	thousand tons	223,602	226,330	227,772	193,500 r/	199,800 2/
Lignite	do.	50,228	48,458	48,582	50,700 r/	53,600 2/
Total	do.	273,830	274,788	276,354	244,200 r/	253,400 2/
Coke, metallurgical e/	do.	300	300	300	322	325
Fuel briquets e/	do.	750	750	750	750	750
Gas, natural, marketed	million cubic meters	23,463	24,519	28,146	29,798 r/	29,802 2/
Natural gas liquids	thousand 42-gallon barrels	23,411	23,050	23,342	56,614 r/	63,062 2/
Peat e/		11,000	11,000	15,000 r/	15,000 r/	15,000
<b>Petroleum:</b>						
Crude	thousand 42-gallon barrels	195,316	181,387	196,539	152,035 r/	158,960 2/
<b>Refinery products:</b>						
<b>Gasoline:</b>						
Aviation	do.	1,076	1,011	955	944 r/	981 2/
Motor	do.	108,486	112,408	112,877	113,115 r/	114,550 2/
Jet fuel	do.	24,728	27,225	27,008	29,502 r/	31,679 2/
Kerosene	do.	688	282	514	169 r/	338 2/
Distillate fuel oil	do.	65,894	71,263	72,155	74,291 r/	78,983 2/
Residual fuel oil	do.	15,770	14,890	14,022	15,594 r/	10,574 2/
Lubricants	do.	4,384	4,261	4,903	4,881	4,806 2/
Liquefied petroleum gas	do.	5,862	6,287	7,162	8,083 r/	9,687 2/
Bitumen	do.	3,561	4,252	4,129	3,818	3,938 2/
Unspecified	do.	5,787	6,125	5,976	7,146 r/	6,441 2/
Refinery fuel and losses	do.	6,887	8,946	6,242	13,713 r/	13,638 2/
Total	do.	243,123	256,950	255,943	271,256 r/	275,615 2/
Uranium, mine output, U content		2,335	2,256	2,208	3,712	4,945 2/

e/ Estimated. r/ Revised.

1/ Includes data available through July 25, 1997.

2/ Reported figure.

3/ Excludes tin content of copper-tin and tin-tungsten concentrates.

4/ In addition, about 7,000 metric tons of sillimanite clay, also known as kaolinized sillimanite, is produced, containing 40% to 48% aluminum oxide.

TABLE 2  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Alumina	Queensland Alumina Ltd., operator. [Comalco Ltd., 30.3%; Kaiser Aluminum and Chemical Corp. (Australia) Ltd., 28.3%; Alcan Australia Ltd., 21.4%; and Pechiney Australia Pty. Ltd., 20%]	Gladstone Refinery, QLD	3,000
Do.	Nabalco Pty. Ltd., operator. (Swiss Aluminium Australia Ltd., 70%; and Gove Aluminium Ltd., 30%)	Gove Refinery, NT	1,600
Do.	Alcoa of Australia Ltd., 100%	Kwinana Refinery, WA	1,900
Do.	do.	Pinjarra Refinery, WA	3,100
Do.	do.	Wagerup Refinery, WA	1,700
Do.	Worsley Alumina Pty. Ltd., operator. [Reynolds Australia Alumina Ltd., 56%; Billiton Australia Pty. Ltd., 30%; Kobe Alumina Associates (Australia) Pty. Ltd., 10%; and Nissho Iwai Alumina, 4.0%]	Worsley Refinery, WA	1,600
Aluminium	Comalco Aluminium (Bell Bay) Ltd., 100%	Bell Bay Smelter, TAS	120
Do.	Boyne Island Smelters Ltd., operator. (Comalco Ltd., 59.25%; Marubeni Corp., Sumitomo Corp., and Light Metal Industries, 17% collectively; Mitsubishi Corp. and Mitsubishi Materials Corp., 14.25% jointly; and Yoshida Kogyo KK, 9.5%)	Boyne Island Smelter, QLD	230
Do.	Capral Aluminium Ltd., 100%	Kurri Kurri Smelter, NSW	150
Do.	Alcoa of Australia Ltd., 100%	Point Henry Smelter, VIC	182
Do.	Alcoa of Australia Ltd., 45% and manager; ALUVIC (State of VIC agency), 25%; First National Resources Trust, 10%; China International Trust Investment Co., 10%; and Marubeni, 10%	Portland Island Smelter, VIC	327
Do.	Tomago Aluminium Co. Pty. Ltd., operator. (Gove Aluminium Finance Ltd., 35%; Pechiney Australia Pty. Ltd., 35%; Australian Mutual Provident Society, 15%; VAW Australia Pty. Ltd., 12%; and Hunter Douglas Ltd., 3%)	Tomago Smelter, NSW	380
Antimony	Hillgrove Gold Ltd., 100%	Hillgrove open-cut/underground mine, NSW	4
Bauxite	Nabalco Pty. Ltd., operator. (Swiss Aluminium Australia Ltd., 70%; and Gove Aluminium Ltd., 30%)	Gove surface mine, NT	7,000
Do.	Alcoa of Australia Ltd., 100%	Huntly, Jarrahdale, and Williwdale surface mines, WA	22,000
Do.	Worsley Alumina Pty. Ltd., operator. [Reynolds Australia Alumina Ltd., 56%; Billiton Australia Pty. Ltd., 30%; Kobe Alumina Associates (Australia) Pty. Ltd., 10%; and Nissho Iwai Alumina, 4.0%]	Mount Saddleback and Worsley surface mines, WA	5,000
Do.	Comalco Minerals and Alumina Ltd., 100%	Weipa surface mine, QLD	11,000
Cement	Blue Circle Southern Cement Ltd., 100%	Berrima Plant, NSW	1,200
Do.	Adelaide Brighton Cement Ltd., 100%	Birkenhead Plant, SA	1,000
Do.	Queensland Cement Ltd., 100%	Darra Plant, QLD	700
Do.	Adelaide Brighton Cement Ltd., 100%	Geelong Plant, VIC	800
Do.	Goliath Cement Holdings Ltd., 100%	Railton Plant, TAS	1,000
Do.	Cockburn Cement Ltd., 100%	South Coogee Plant, WA	1,000
Coal, black	Powercoal Pty. Ltd., 100%	Angus Place underground mine, NSW	2,000
Do.	BHP Coal Pty. Ltd., 100%	Appin underground mine, NSW	2,400
Do.	Coalex Pty. Ltd., 95% and manager; and Sumitomo Corp., 5%	Baal Bone underground mine, NSW	3,500
Do.	Coal Operations Australia Ltd., 78.3% and manager; Nippon Oil (Australia) Pty. Ltd., 8.7%; Nippon Steel Australia Pty. Ltd., 8%; and KEPCO Resources Australia Pty. Ltd., 5%	Baywater No. 2 open cut, NSW	4,000
Do.	do.	Baywater No. 3 open cut, NSW	4,000
Do.	Central Queensland Coal Associates, 100%. (BHP Coal Pty. Ltd., 47.62%; QCT Resources Ltd., 29.58%; Mitsubishi Development Pty. Ltd., 14.19%; and AMP Society Ltd., 8.61%)	Blackwater open cut, QLD	5,000
Do.	Queensland Coal Pty. Ltd., 57.195% and manager; ARCO Coal Australia Inc., 17.527%; ARCO Resources Ltd., 13.89%; EPDC (Australia) Pty. Ltd., 7.972%; and Japan Coal Development Co. Ltd., 3.416%	Blair Athol open cut, QLD	8,500
Do.	Bloomfield Collieries Pty. Ltd., 100%	Bloomfield open cut, NSW	2,000
Do.	Callide Coalfields Pty. Ltd., operator. (Shell Australia Ltd., 66.7%; and AMP Society Ltd., 33.3%)	Boundary Hill open cut, QLD	3,500
Do.	do.	Callide open cut, QLD	3,500
Do.	Camberwell Coal Pty. Ltd., operator. [Navidale Pty. Ltd., 50% Toyota Tsusho Mining (Australia), 40%; and Dia Coal Mining (Australia) Pty. Ltd., 10%]	Camberwell open cut, NSW	4,000
Do.	Coalex Pty. Ltd., 80% and manager; Japan Energy (Australia) Pty. Ltd., 10%; and Yukong Ltd. (Republic of Korea), 10%	Clarence underground mine, NSW	2,500

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Coal, black--Continued:	Collinsville Coal Co. Pty. Ltd., 75% and manager; and Itochu Corp., 25%	Collinsville open-cut/underground mine, QLD	2,000
Do.	Powercoal Pty. Ltd., 100%	Cooranbong underground mine, NSW	1,600
Do.	BHP Coal Pty. Ltd., 100%	Cordeaux underground mine, NSW	2,800
Do.	Cumnock No. 1 Colliery Pty. Ltd., 100%	Cumnock No. 1 underground mine, NSW	2,500
Do.	ARCO Coal Australia Inc., 87% and manager; and Mitsui Mitsui Coal Development Australia Pty. Ltd., 13%	Curragh open cut, QLD	6,600
Do.	Shell Australia Ltd., 74.8% and manager; AMP Society Ltd., 13.4%; Mitsui Coal Development Australia Pty. Ltd., 3.8%; Mitsui Mining (Australia) Pty. Ltd., 3%; Daesung (Australia) Pty. Ltd., 2.5%; and Hyundai (Australia) Pty. Ltd., 2.5%	Drayton open cut, NSW	4,000
Do.	Ebenezer Mining Co., 100%	Ebenezer open cut, QLD	3,000
Do.	BHP Coal Pty. Ltd., 100%	Elouera underground mine, NSW	2,500
Do.	Capricorn Coal Management Pty. Ltd., 100%. (Shell Australia Ltd., 46.75%; Ticon Ltd., 26.06%; British Coal Corp., 14.81%; and Ruhrkohle Australia Pty. Ltd., 12.38%)	German Creek open-cut/underground mine, QLD	3,500
Do.	German Creek East Joint Venture, 100%. (Shell Australia Ltd., 59.47%; Ticon Energy Pty. Ltd., 31.14%; and Marubeni Coal Pty. Ltd., 9.39%)	German Creek East open-cut/underground mine, QLD	3,500
Do.	Central Queensland Coal Associates, 100%. (BHP Coal Pty. Ltd., 47.62%; QCT Resources Ltd., 29.58%; Mitsubishi Development Pty. Ltd., 14.19%; and AMP Society Ltd., 8.61%)	Goonyella open cut, QLD	9,250
Do.	Gordonstone Coal Management Pty. Ltd., 100%. (ARCO Coal Australia Inc., 50%; ARCO Resources Ltd., 30%; Mitsui Gordonstone Investment Pty. Ltd., 15%; and MCL Coal Investment Pty. Ltd., 5%)	Gordonstone underground mine, QLD	4,600
Do.	BHP Coal Pty. Ltd., 58.62% and manager; QCT Resources Ltd., 29.58%; AMP Society Ltd., 8.61%; Mitsubishi Development Pty. Ltd., 3.19%	Gregory open cut, QLD	3,500
Do.	Newcastle Wallsend Coal Co. Pty. Ltd., 100%	Gretley underground mine, NSW	1,500
Do.	Novacoal Australia Pty. Ltd., manager. (RTZ Corp. PLC.-CRA Ltd. Group, 60%, and Mitsubishi Development Pty. Ltd., 40%)	Howick open cut, NSW	5,000
Do.	Coal and Allied Industries Ltd., 100%	Hunter Valley open cut, NSW	6,300
Do.	SA Generation Corp., 100%	Leigh Creek open cut, SA	3,000
Do.	Exxon Coal and Minerals Australia Ltd., 100%	Lemington open cut, NSW	4,000
Do.	Liddell Coal Operations Pty. Ltd., manager. (Savage Resources Ltd., 67.5%; and Mitsui Matsushima Australia Pty. Ltd., 32.5%)	Liddell open cut, NSW	4,000
Do.	Coal and Allied Industries Ltd., 80% and manager; and Pohang Iron and Steel Co., 20%	Mount Thorley open cut, NSW	6,500
Do.	BHP Mitsui Coal Pty. Ltd., 100%. (BHP Coal Pty. Ltd., 80%; and Mitsui and Co. Ltd., 20%)	Moura open cut, QLD	5,000
Do.	Muswellbrook Coal Co. Ltd., 100%	Muswellbrook No. 2 open-cut/underground mine, NSW	1,850
Do.	Griffin Coal Mining Co. Pty. Ltd., 100%	Muja open cut, WA	2,500
Do.	Powercoal Pty. Ltd., 100%	Myuna underground mine, NSW	1,500
Do.	Newlands Coal Pty. Ltd., 75% and manager; and Itochu Corp., 25%	Newlands open-cut/underground mine, QLD	5,000
Do.	Powercoal Pty. Ltd., 100%	Newstan underground mine, NSW	2,500
Do.	White Mining Ltd., 51% and manager; and Sumitomo Corp., 49%	North Goonyella underground mine, QLD	3,000
Do.	Central Queensland Coal Associates, 100%. (BHP Coal Pty. Ltd., 47.62%; QCT Resources Ltd., 29.58%; Mitsubishi Development Pty. Ltd., 14.19%; and AMP Society Ltd., 8.61%)	Norwich Park open cut, QLD	4,500
Do.	Oaky Creek Coal Pty. Ltd., 100%	Oaky Creek open-cut/underground mine, QLD	3,500
Do.	Central Queensland Coal Associates, 100%. (BHP Coal Pty. Ltd., 47.62%; QCT Resources Ltd., 29.58%; Mitsubishi Development Pty. Ltd., 14.19%; and AMP Society Ltd., 8.61%)	Peak Downs open cut, QLD	7,000
Do.	Western Collieries Ltd., 100%	Premier open cut, WA	3,000
Do.	Pacific Power, 100%, at Ravensworth. Peabody Resources Ltd., 50%, and RGC Ltd., 50%, at Narama	Ravensworth-Narama open cut, NSW	6,200
Do.	BHP Mitsui Coal Pty. Ltd., 100%. (BHP Coal Pty. Ltd., 80%; and Mitsui and Co. Ltd., 20%)	Riverside open cut, QLD	6,000
Do.	Central Queensland Coal Associates, 100%. (BHP Coal Pty. Ltd., 47.62%; QCT Resources Ltd., 29.58%; Mitsubishi Development Pty. Ltd., 14.19%; and AMP Society Ltd., 8.61%)	Saraji open cut, QLD	5,000
Do.	Bulga Coal Management Pty. Ltd., manager. (Oakbridge Pty. Ltd., 90%; and Nippon Steel Australia Pty. Ltd., 10%)	Saxonville-Bulga open-cut/underground mine, NSW	9,000

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Coal, black--Continued:	Cyprus Springvale Ltd., manager. [Cyprus Australia Coal Co., 50%; and Samsung Development (Australia) Pty. Ltd., 50%	Springvale underground mine, NSW	2,000
Do.	Austral Coal Ltd., 100%	Tahmoor underground mine, NSW	4,100
Do.	Oceanic Coal Australia Ltd., 70% and manager; Marubeni Coal Pty. Ltd., 14%; Taiheiyō Australia Pty. Ltd., 10%; Chelsea Coal Pty. Ltd., 3%; and Kokan Kogyo (Australia) Pty. Ltd., 3%	Teralba underground mine, NSW	1,700
Do.	BHP Coal Pty. Ltd., 100%	Tower underground mine, NSW	1,600
Do.	Ulan Coal Mines Ltd., manager. (Mitsubishi Development Pty. Ltd., 49%; Exxon Coal Australia Ltd., 36%; and Axiom Funds Management, 15%)	Ulan open cut-underground mine, NSW	5,500
Do.	Wambo Mining Corp. Pty. Ltd., 100%	Wambo open-cut/underground mine, NSW	4,000
Do.	Warkworth Mining Ltd., 28.75% and manager; Mitsubishi Development Pty. Ltd., 22.75%; Tigor Energy Pty. Ltd., 20%; Peabody Australia Pty. Ltd., 15%; Nippon Steel Australia Pty. Ltd., 7.5%; and Mitsubishi Materials (Australia) Pty. Ltd., 6%	Warkworth open cut, NSW	5,000
Do.	Kembla Coal and Coke Pty. Ltd., 100%	West Cliff underground mine, NSW	3,000
Do.	Oceanic Coal Australia Ltd., 70% and manager; Marubeni Coal Pty. Ltd., 14%; Taiheiyō Australia Pty. Ltd., 10%; Chelsea Coal Pty. Ltd., 3%; and Kokan Kogyo (Australia) Pty. Ltd., 3%	West Wallsend underground mine, NSW	2,400
Do.	Powercoal Pty. Ltd., 100%	Wye underground mine, NSW	1,800
Coal, brown	Hazelwood Power Corp., 100%	Hazelwood open cut, VIC	13,000
Do.	Loy Yang Power Ltd., 100%	Loy Yang open cut, VIC	27,000
Do.	Yallourn Energy Pty. Ltd., manager. (Powergen International, 49.9%; AMP Society Ltd., 26%; Itochu Corp., 10.4%; Axiom Funds Management, 8%; and Hastings Fund Management, 5.7%)	Yallourn open cut, VIC	18,000
Cobalt	QNI Ltd., 100%	Yabulu Refinery, QLD	1
Copper	Poseidon Gold Ltd., manager, 40%; Billiton Australia Gold Pty. Ltd., 30%; Newcrest Mining Ltd., 20%; and Kobe Alumina Associates (Australia) Pty. Ltd., 10%	Boddington open-cut/underground mine, WA	10
Do.	Cobar Mines Pty. Ltd., 100%	Cobar (GSM) underground mine, NSW	115
Do.	Poseidon Gold Ltd., 100%	Gecko open-cut/underground mine, NT	17
Do.	Straits Resources Ltd., 60% and manager; and Nord Pacific Resources Ltd., 40%	Girilambone open cut, NSW	15
Do.	Aberfoyle Ltd., 100%	Gunpowder-Mammoth open cut mine, QLD	45
Do.	do.	Hellyer underground mine, TAS	4
Do.	Mount Isa Mines Ltd., 100%	Hilton underground mine, QLD	180
Do.	Murchison United NL, 60% and manager; and Brancote Australia NL, 40%	Mount Cuthbert open cut mine, QLD	8
Do.	Mount Isa Mines Ltd., 100%	Mount Isa underground mine, QLD	150
Do.	do.	Mount Isa Smelter, QLD	175
Do.	Copper Mines of Tasmania Pty. Ltd., 100%	Mount Lyell underground mine, TAS	20
Do.	WMC Ltd., 100%	Nifty open cut, WA	10
Do.	North Ltd., 80% and operator; SC Mineral Resources Pty. Ltd., 20%	Northparkes open-cut/underground mine, NSW	40
Do.	Olympic Dam Operations Pty. Ltd., manager. (WMC Ltd., 100%)	Olympic Dam underground mine, SA	85
Do.	do.	Olympic Dam Refinery, SA	50
Do.	do.	Olympic Dam Smelter, SA	70
Do.	Placer Pacific Ltd., 100%	Osborne underground mine, QLD	50
Do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, NSW	3
Do.	Furukawa Co. Ltd., 50%; Nittetsu Mining Co., 20%; Nissho Iwai Corp., 17.5%; Itochu Corp., 10%; and an Australian firm, 22.5%	Port Kembla Refinery, NSW	80
Do.	Furukawa Co. Ltd., 50%; Nittetsu Mining Co., 20%; Nissho Iwai Corp., 17.5%; Itochu Corp., 10%; and an Australian firm, 22.5%	Port Kembla Smelter, NSW	80
Do.	Pasminco Ltd., 100%	Rosebery underground mine, TAS	4
Do.	Normandy Mining Ltd., manager. (Murchison Zinc Co. Pty. Ltd., 100%)	Scuddles (includes Golden Grove and Gossan Hill) underground mine	50
Do.	Australian Resources Ltd., 100%	Selwyn open-cut/underground mine, QLD	16
Do.	Normandy Mining Ltd., manager. PosGold Ltd., 100%	Tennant Creek open-cut/underground mine, NT	16
Do.	RGC Ltd., 100%	Thalanga underground mine, QLD	28
Do.	Copper Refineries Pty. Ltd., operator. (MIM Ltd., 100%)	Townsville Refinery, QLD	175
Do.	Denehurst Ltd., 100%	Woodlawn underground mine, NSW	8
Diamond	Argyle Diamond Mines Pty. Ltd., manager. (RTZ Corp. PLC.-CRA Ltd. Group, 59.9%; and Ashton Mining Ltd., 40.1%)	Argyle Mine (AK-1 lamproite pipe and alluvial deposits), WA	42,000

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Gas, condensate thousand 42-gallon barrels per day	Woodside Petroleum Pty. Ltd., manager. [BHP Petroleum Pty. Ltd.; BP Australia Holdings Ltd.; Chevron Asiatic Ltd.; Japan Australia LNG (MIMI) Pty. Ltd.; Shell Development (Australia) Pty. Ltd.; and Woodside Petroleum Ltd., 16.67% each]	North West Shelf operations, 130 kilometers offshore from Dampier, WA	60
Gas, natural million cubic meters per day	do.	North West Shelf operations, 130 kilometers offshore from Dampier, WA	20
Gold kilograms	WMC Ltd., 100%	Agnew open cut-underground mine, WA	4,000
Do.	Big Bell Mines Pty. Ltd., manager. (PosGold Ltd., 70%; and Saint Barbara Mines Ltd., 30%)	Big Bell Consolidated (includes former Golden Crown) open-cut/underground mine, WA	7,000
Do.	Saint Barbara Mines Ltd., 100%	Bluebird open cut, WA	4,000
Do.	Normandy Mining Ltd., 44.45% and manager; Acacia Resources Ltd., 33.33%; and Newcrest Mining Ltd., 22.22%	Boddington open-cut/underground mine, WA	12,000
Do.	Great Central Mines Ltd., 100%	Bronzewing open-cut/underground mine, WA	6,200
Do.	Herald Resources Ltd., 100%	Coolgardie open-cut/underground operations, WA	4,000
Do.	North Flinders Mines Ltd., 100%	Granites, The-Dead Bullock Soak open-cut/underground mines, NT	7,000
Do.	Placer (Granny Smith) Pty. Ltd., manager. (Placer Pacific Ltd., 60%; and Delta Gold NL, 40%)	Granny Smith open cut, WA	4,800
Do.	Hedges Gold Pty. Ltd., 100%	Hedges open cut, WA	4,900
Do.	Goldfields Ltd., 100%	Henty underground mine, TAS	2,800
Do.	Hill 50 Gold Mine NL, 100%	Hill 50 open-cut/underground mine, WA	4,000
Do.	Great Central Mines Ltd., 100%	Jundee open cut, WA	6,600
Do.	Australian Gold Refineries, 100% (State of WA agency)	Kalgoorlie Refinery, WA	46,000
Do.	North Ltd., manager, 50%; and Delta Gold NL, 50%	Kanowna Belle open-cut/underground mine, WA	5,300
Do.	Kidston Gold Mines Ltd., 100%	Kidston open cut, QLD	6,500
Do.	Sons of Gwalia Ltd., 100%	Marvel Loch-Southern Cross open-cut/underground mines, WA	3,000
Do.	Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager. (Homestake Mining Corp., 50%; and Normandy Mining Ltd., 50%)	Mount Charlotte underground mine, WA	4,300
Do.	Mount Leyshon Gold Mines Ltd., 100%	Mount Leyshon open cut, QLD	7,500
Do.	Australian Resources Ltd., 63.35% and manager; and Forrestania Resources Ltd., 36.65%	Mount McClure open-cut/underground mine, WA	3,100
Do.	Eagle Mining Corp. NL, 100%	Nimary open cut, WA	3,600
Do.	Central Norseman Gold Corp. Ltd., 100%	Norseman open-cut/underground mine, WA	3,700
Do.	North Ltd., 80% and operator; SC Mineral Resources Pty. Ltd., 20%	Northparkes open-cut/underground mine, NSW	2,500
Do.	Olympic Dam Operations Pty. Ltd., manager. (WMC Ltd., 100%)	Olympic Dam underground mine, SA	1,500
Do.	MIM Ltd., 100%	Pacific precious metals refinery, NSW	1,900
Do.	Goldfields Ltd., 100%	Paddington open cut, WA	4,100
Do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, NSW	4,700
Do.	Australian Gold Refineries, 100% (State of WA agency)	Perth Refinery (Newburn), WA	95,000
Do.	Plutonic Resources Ltd., 100%	Plutonic open-cut/underground mine, WA	5,800
Do.	Carpentaria Gold Pty. Ltd., 50.1% and manager; and Haoma Mining NL, 49.9%	Ravenswood open cut, QLD	
Do.	WMC Ltd., 100%	Saint Ives open-cut/underground mine, WA	7,500
Do.	Sons of Gwalia Ltd., 100%	Sons of Gwalia open cut, WA	4,000
Do.	Stawell Gold Mines Pty. Ltd., manager. (MPI Gold Pty. Ltd., 50%; and Pittston Mineral Ventures of Australia, 50%)	Stawell underground mine, VIC	2,700
Do.	Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager. (Homestake Mining Corp., 50%; and Normandy Mining Ltd., 50%)	Super Pit (Fimiston) operation, WA	
Do.	Otter Gold Mines Ltd., 60% and manager; and Acacia Resources Ltd., 40%	Tanami open cut, NT	4,000
Do.	Newcrest Mining Ltd., 100%	Telfer open-cut/underground mine, WA	12,000
Do.	Normandy Mining Ltd., manager. PosGold Ltd., 100%	Tennant Creek open-cut/underground mine, NT	4,000
Do.	Wiluna Mines Ltd., 100%	Wiluna open-cut/underground mine, WA	3,300
Do.	Sons of Gwalia Ltd., 70% and manager; Coeur D'alene Mines Corp. 25%; and Gemini Mining NL, 5%	Yilgarn Star open-cut/underground mine, WA	3,400
Ilmenite	BHP Titanium Minerals Pty. Ltd., 100%	Beenup Dredge, WA	600
Do.	RGC Mineral Sands Ltd., 100%	Capel South Dredge, WA	450

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Ilmenite--Continued:	Tiwest Joint Venture, operator. (Kerr-McGee Chemical Chemical Corp. Western Australia Pty. Ltd., 50%, and Tigor Resources Pty. Ltd., 50%)	Cooljarloo Dredge, WA	480
Do.	RGC Mineral Sands Ltd., 100%	Eneabba Dredge, WA	600
Do.	BHP Titanium Minerals Pty. Ltd., 100%	Hawks Nest (Fullerton, Viney Creek, and Stockton) Dredges, NSW	10
Do.	Cable Sands (WA) Pty. Ltd., 100%	Jangardup Dredge, WA	100
Do.	do.	Maidment Dredge, WA	50
Do.	Westralian Sands Ltd., 100%	North Capel, Yoganup Extended, and Yoganup North Dredges, WA	300
Do.	Consolidated Rutile Ltd., 100%	North Stradbroke Island (Amity, Bayside, and Gordon) Dredges, QLD	200
Iron ore	Hamersley Iron Pty. Ltd., 100%	Brockman No. 2 Detrital open cut, WA	4,500
Do.	Hamersley Iron Pty. Ltd., 60% and manager, and China Iron and Steel Industry and Trade Group Corp., 40%, a People's Republic of China Government Agency	Channar open cut, WA	8,000
Do.	BHP Iron Ore Pty. Ltd., 85% and manager; CI Minerals Australia Pty. Ltd., 8%; and Mitsui Iron Ore Corp. Pty. Ltd., 7%	Goldworthy open cut (formerly Nimingarra, Shay Gap, and Sunrise Hill), WA	8,000
Do.	BHP Iron Ore Pty. Ltd., 100%	Jimblebar open cut, WA	3,000
Do.	Koolyanobbing Iron Pty. Ltd., manager. (Portman Mining Ltd., 60%, and Angang Australia Pty. Ltd., 40%)	Koolyanobbing open cut, WA	2,000
Do.	Hamersley Iron Pty. Ltd., 100%	Marandoo open cut, WA	12,000
Do.	BHP Iron Ore Pty. Ltd., 55% and manager; Pilbara Iron Pty. Ltd., 30%; Mitsui Itochu Pty. Ltd., 10%; and CI Minerals Australia Pty. Ltd., 5%	Mount Newman (includes Whaleback, Orebody 23-25, Orebody 29, and Yarrie) open cut, WA	35,000
Do.	Hamersley Iron Pty. Ltd., 100%	Mount Tom Price open cut, WA	28,000
Do.	Robe River Iron Associates, manager. (Robe River Mining Co. Ltd., 53%; Mitsui Iron Ore Development Pty. Ltd., 33%; Nippon Steel Australia Pty. Ltd., 10.5%; and Sumitomo Metal Australia Pty. Ltd., 3.5%)	Pannawonica-Deepdale (includes Mesa J) open cut, WA	32,000
Do.	Hamersley Iron Pty. Ltd., 100%	Paraburdoo open cut, WA	15,000
Do.	Goldamere Pty. Ltd., 100%	Savage River open cut, TAS	1,500
Do.	BHP Iron Ore Pty. Ltd., manager. (BHP Minerals Pty. Ltd., 55%; Pilbara Iron Pty. Ltd., 30%; CI Minerals Australia Pty. Ltd., 8%; and Mitsui Iron Ore Corp. Pty. Ltd., 7%)	Yandi open cut, WA	25,000
Lead	Pasminco Ltd., 100%	Broken Hill open-cut/underground (South) mine, NSW	200
Do.	Western Metals Ltd., 100%	Cadjebut underground mine, WA	105
Do.	Cobar Mines Pty. Ltd., 100%	Cobar (GSM) underground mine, NSW	4
Do.	Pasminco Ltd., 100%	Cockle Creek Smelter, NSW	30
Do.	Pasminco Ltd., 100%	Elura underground mine, NSW	85
Do.	Aberfoyle Ltd., 100%	Hellyer underground mine, TAS	50
Do.	McArthur River Mining Pty. Ltd., operator. (Mount Isa Mines Ltd., 70%; and ANT Minerals Pty. Ltd. holding the combined Japanese interests of Nippon Mining and Metals Co. Ltd., 15%; Mitsubishi Materials Corp., 5%; Mitsui & Co. Ltd., 5%; and Marubeni Corp., 5%)	McArthur River underground mine, NT	15
Do.	Mount Isa Mines Ltd., 100%	Mount Isa underground mine, QLD	190
Do.	do.	Mount Isa Smelter, QLD	240
Do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, NSW	4
Do.	Pasminco Ltd., 100%	Port Pirie Refinery-Smelter, SA	220
Do.	do.	Rosebery underground mine, TAS	15
Do.	RGC Ltd., 100%	Thalanga underground mine, QLD	25
Do.	Normandy Mining Co. Ltd., 100%	Woodcutters underground mine, NT	10
Do.	Denehurst Ltd., 100%	Woodlawn underground mine, NSW	30
Leucoxene	Tiwest Joint Venture, operator. (Kerr-McGee Chemical Chemical Corp. Western Australia Pty. Ltd., 50%, and Tigor Resources Pty. Ltd., 50%)	Cooljarloo Dredge, WA	10
Manganese	Groote Eylandt Mining Co. Pty. Ltd., 100%	Groote Eylandt open cut, NT	2,300
Do.	Valiant Manganese Pty. Ltd., 100%	Woodie Woodie open cut, WA	400
Manganese alloys	Tasmanian Electro Metallurgical Co. Pty. Ltd., 100%	Bell Bay Smelter, TAS	260
Nickel	Outokumpu Mining Australia Pty. Ltd., 100%	Forrestania underground mines (2), 375 kilometers southeast of Perth, WA	10
Do.	WMC Ltd., 100%	Kalgoorlie Smelter, WA	80
Do.	do.	Kambalda Nickel Operations, WA	35
Do.	do.	Kwinana Refinery, WA	42
Do.	do.	Leinster Nickel Operations, WA	30
Do.	do.	Mount Keith Mine, WA	37

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Nickel--Continued:		QNI Ltd., 100%	Yabulu Refinery, QLD	30
Opal		Many small producers	Andamooka and Coober Pedy areas, SA; Lightning Ridge area, NSW	NA
Petroleum		Petroleum Refineries (Australia) Pty. Ltd., manager. (Mobile Refining Australia Pty. Ltd., 100%)	Altona Refinery, VIC	108
	thousand 42-gallon barrels per day			
Do.	do.	BP Refinery (Bulwer Island) Pty. Ltd., 100%	Bulwer Island Refinery, QLD	74
Do.	do.	Shell Refining (Australia) Pty. Ltd., 100%	Clyde Refinery, NSW	80
Do.	do.	do.	Geelong Refinery, VIC	110
Do.	do.	Caltex Refining Co. Pty. Ltd., 100%	Kurnell Refinery, NSW	110
Do.	do.	BP Refinery (Kwinana) Pty. Ltd., 100%	Kwinana Refinery, WA	120
Do.	do.	Mobile Refining Australia Pty. Ltd., 100%	Lytton Refinery, QLD	85
Do.	do.	Petroleum Refineries (Australia) Pty. Ltd., manager. (Mobile Refining Australia Pty. Ltd., 100%)	Port Stanvac Refinery, SA	72
Rutile		RGC Mineral Sands Ltd., 100%	Capel South Dredge, WA	120
Do.		Tiwest Joint Venture, operator. (Kerr-McGee Chemical Chemical Corp. Western Australia Pty. Ltd., 50%, and Tigor Resources Pty. Ltd., 50%)	Cooljarloo Dredge, WA	35
Do.		RGC Mineral Sands Ltd., 100%	Eneabba Dredge, WA	120
Do.		BHP Titanium Minerals Pty. Ltd., 100%	Hawks Nest (Fullerton, Viney Creek, and Stockton) Dredges, NSW	35
Do.		Cable Sands (WA) Pty. Ltd., 100%	Jangardup Dredge, WA	100
Do.		do.	Maidment Dredge, WA	50
Do.		Consolidated Rutile Ltd., 100%	North Stradbroke Island (Amity, Bayside, and Gordon) Dredges, QLD	80
Do.		RZM Pty. Ltd., 100%]	Tomago Dredge, NSW	35
Salt		Dampier Salt (Operations) Pty. Ltd., 100%	Dampier and Lake Macleod salt fields, WA	4,500
Do.		Leslie Salt Division, Cargill Australia Ltd., 100%	Leslie Salt operations, WA	2,750
Silver	kilograms	Pasminco Ltd., 100%	Broken Hill open-cut/underground (South) mine, NSW	120,000
Do.	do.	Cobar Mines Pty. Ltd., 100%	Cobar (GSM) underground mine, NSW	15,000
Do.	do.	Pasminco Ltd., 100%	Elura underground mine, NSW	45,000
Do.	do.	McArthur River Mining Pty. Ltd., operator. (Mount Isa Mines Ltd., 70%; and ANT Minerals Pty. Ltd. holding the combined Japanese interests of Nippon Mining and Metals Co. Ltd., 15%; Mitsubishi Materials Corp., 5%; Mitsui & Co. Ltd., 5%; and Marubeni Corp., 5%)	McArthur River underground mine, NT	18,000
Do.	do.	Mount Isa Mines Ltd., 100%	Mount Isa underground mine, QLD	375,000
Do.	do.	Olympic Dam Operations Pty. Ltd., manager. (WMC Ltd., 100%)	Olympic Dam underground mine, SA	12,900
Do.	do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, NSW	20,000
Do.	do.	Pasminco Ltd., 100%	Rosebery underground mine, TAS	20,000
Do.	do.	Normandy Mining Co. Ltd., 100%	Woodcutters underground mine, NT	55,000
Do.	do.	Denehurst Ltd., 100%	Woodlawn underground mine, NSW	4,500
Spodumene		Gwalia Consolidated Ltd., 100%	Greenbushes open cut, WA	100
Steel		BHP Steel Ltd., 100%	Newcastle steelworks, NSW	1,800
Do.		do.	Port Kembla steelworks, NSW	4,000
Do.		do.	Sydney (Rooty Hill) minimill, NSW	250
Do.		do.	Whyalla steelworks, SA	1,200
Talc		Three Springs Talc Pty. Ltd., 100%	Three Springs open cut, WA	200
Tantalite	pounds Ta <sub>2</sub> O <sub>5</sub>	Gwalia Consolidated Ltd., 100%	Greenbushes open cut, WA	600,000
Tin		do.	Greenbushes open cut, WA	1
Do.		do.	Greenbushes Smelter, WA	1
Do.		RGC Ltd., 100%	Renison Bell underground mine, TAS	6
Uranium	tons U <sub>3</sub> O <sub>8</sub>	Olympic Dam Operations Pty. Ltd., manager. (WMC Ltd., 100%)	Olympic Dam underground mine, SA	1,500
Do.	do.	Energy Resources of Australia Ltd., 100%	Ranger open cut, NT	4,500
Zinc		Pasminco Ltd., 100%	Broken Hill open-cut/underground (South) mine, NSW	350
Do.		Western Metals Ltd., 100%	Cadjebut underground mine, WA	25
Do.		Pasminco Ltd., 100%	Cockle Creek Refinery-Smelter, NSW	85
Do.		do.	Elura underground mine, NSW	125
Do.		Aberfoyle Ltd., 100%	Hellyer underground mine, TAS	250
Do.		McArthur River Mining Pty. Ltd., operator. (Mount Isa Mines Ltd., 70%; and ANT Minerals Pty. Ltd. holding the combined Japanese interests of Nippon Mining and Metals Co. Ltd., 15%; Mitsubishi Materials Corp., 5%; Mitsui & Co. Ltd., 5%; and Marubeni Corp., 5%)	McArthur River underground mine, NT	60
Do.		Mount Isa Mines Ltd., 100%	Mount Isa underground mine, QLD	250
Do.		Pasminco Ltd., 100%	Port Pirie Refinery-Smelter, SA	45
Do.		do.	Ridson Refinery, TAS	220

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Zinc--Continued:	Pasminco Ltd., 100%	Rosebery underground mine, TAS	45
Do.	Normandy Mining Ltd., manager. (Murchison Zinc Co. Pty. Ltd., 100%)	Scuddles (includes Golden Grove and Gossan Hill) underground mine	150
Do.	RGC Ltd., 100%	Thalanga underground mine, QLD	75
Do.	Normandy Mining Co. Ltd., 100%	Woodcutters underground mine, NT	45
Do.	Denehurst Ltd., 100%	Woodlawn underground mine, NSW	55
Zircon	RGC Mineral Sands Ltd., 100%	Capel South Dredge, WA	300
Do.	Tiwest Joint Venture, operator. (Kerr-McGee Chemical Chemical Corp. Western Australia Pty. Ltd., 50%, and Ticor Resources Pty. Ltd., 50%)	Cooljarloo Dredge, WA	67
Do.	RGC Mineral Sands Ltd., 100%	Eneabba Dredge, WA	300
Do.	BHP Titanium Minerals Pty. Ltd., 100%	Hawks Nest (Fullerton, Viney Creek, and Stockton) Dredges, NSW	25
Do.	Westralian Sands Ltd., 100%	North Capel, Yoganup Extended, and Yoganup North Dredges, WA	60
Do.	Consolidated Rutile Ltd., 100%	North Stradbroke Island (Amity, Bayside, and Gordon) Dredges, QLD	50
Do.	RZM Pty. Ltd., 100%	Tomago Dredge, NSW	30

e/ Estimated. NA Not available.

1/ NSW New South Wales; NT Northern Territory; QLD Queensland; SA South Australia; TAS Tasmania; VIC Victoria; WA Western Australia.



TABLE 3  
AUSTRALIA: RESERVES OF MAJOR MINERAL COMMODITIES

(Thousand metric tons unless otherwise specified)

Commodity	Reserves
Antimony	97.9
Bauxite	million metric tons 2,540.0
Black coal:	
In situ	billion metric tons 68.0
Recoverable	do. 49.0
Brown coal:	
In situ	do. 46.0
Recoverable	do. 41.0
Cadmium	140.7
Cobalt	274.0
Columbium	3.4
Copper	million metric tons 24.0
Diamond:	
Gem and near gem	million carats 101.0
Industrial	do. 128.0
Gold	metric tons 4,263.0
Iron ore	billion metric tons 17.8
Lead	million metric tons 18.2
Lithium	152.0
Magnesite (MgCO <sub>3</sub> )	million metric tons 241.3
Manganese ore	do. 121.2
Mineral sands:	
Ilmenite	do. 135.8
Rutile	do. 15.0
Zircon	do. 22.5
Nickel	do. 3.7
Petroleum, recoverable:	
Condensate	billion liters 156.0
Crude	do. 297.0
Liquefied petroleum gas	do. 154.0
Natural gas	billion cubic meters 1,292.0
Platinum-group metals (Pd, Pt)	metric tons 17.2
Rare earths (REO plus Y <sub>2</sub> O <sub>3</sub> )	1,000.0
Silver	41.5
Tantalum	6.2
Tin	136.2
Tungsten	1.0
Uranium, recoverable	629.0
Vanadium	15.0
Zinc	million metric tons 38.8

REO: Rare-Earth Oxides.

Source: Mineral Resources Branch, Bureau of Resource Sciences, Canberra, Australia.