

# THE MINERAL INDUSTRY OF

# AUSTRALIA

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In 2000, the Australian mineral industries manifested an upturn as global demand for mineral commodities significantly increased owing to stronger global economic growth as well as the decreased value of the Australian dollar to a record low.<sup>1</sup> Together with record production levels for various mineral commodities, mining companies in several instances had strong profit increases in terms of local currency. In 2000, these achievements were reflected in increased corporate maneuvering, which included the apparent trend of burgeoning acquisitions, consolidations, mergers, and takeovers. In June, for example, Anglo American plc took over the Royal Dutch/Shell Group's Australian coal interests for \$850 million. This was followed by the fierce bidding war for the takeover of Ashton Mining Ltd., which held a 40% interest in the huge Argyle diamond mine in Western Australia; Australia's Rio Tinto Ltd. eventually won out in December. In August, BHP Ltd. and Mitsubishi Development Pty. Ltd. announced an \$894 million takeover of coal mining partner QCT Resources Ltd. by their jointly held company MetCoal Holdings (Qld) Pty. Ltd. Also in August, Rio Tinto completed its takeover bid of North Ltd.; the North acquisition was driven primarily by rationalization and optimization opportunities offered in connection with Hamersley Iron Pty. Ltd.'s adjacent iron mining operations.

Cost-cutting programs continued throughout 2000, especially in exploration initiatives. According to many company agendas, the companies were planning to become large mineral producers while lowering the costs of production. In many instances, one of the main cost-cutting strategies that was implemented was the replacement of permanent, full-time employees with contractors.

In 2000, capital expenditures on new mining projects continued to decrease. Several major projects, however, that were completed or commissioned during the year included Billiton plc's Worsley alumina refinery expansion in Western Australia; Heathgate Resources Pty. Ltd.'s Beverley uranium mine in South Australia; MIM Holdings Ltd.'s George Fisher silver-lead-zinc mine and its Mount Isa copper and lead smelters, all of which are at Mount Isa, Queensland; Onslow Salt Pty. Ltd.'s evaporative salt development in Western Australia; WMC Ltd.'s Saint Ives' heap-leach gold expansion in Western Australia, which added more than 1.5 metric tons per year (t/yr) of gold production from low-grade stockpiled ore; the commissioning of WMC's Phosphate Hill-Duchess phosphate fertilizer project in Queensland; and Port Kembla Copper's new smelter-refinery at Port Kembla, New South Wales. Other projects included the expansion of Normandy

Ltd.'s Vera-Nancy and Normandy's Mount Rawdon gold mines, both of which are in Queensland, and Jubilee Mines NL's Cosmos nickel mine in Western Australia. To meet increasing world coal demand, the Foxleigh Joint Venture's 2- to 3-million-metric-ton-per-year (Mt/yr) Foxleigh Mine in Queensland's Bowen Basin began production in February (Resource Information Unit, 2001, p. 67).

Australia's role as one of the world's leaders in mineral production continued unabated in 2000. Its mineral industry was a leading catalyst in promoting the growth of the economy; growth of the country's real gross domestic product was estimated to be 4% to an estimated \$373.2 billion (U.S. Department of State, Bureau of Economic and Business Affairs, March 2001, 2000 Country Reports on Economic Policy and Trade Practices, Australia—Key economic indicators, accessed July 31, 2001, at URL <http://www.state.gov/documents/organization/1603.pdf>).

The country's mineral wealth was so considerable that it was virtually self-sufficient in most mineral commodities. The only significant mineral resource in which Australia was not self-sufficient was petroleum. Australia nevertheless produced about 80% of its annual crude oil requirements. The country also was endowed with abundant resources of other mineral fuels, which included coal, natural gas, and uranium, and continued to be one of the few market economy countries that was a net exporter of mineral fuels.

All six States and the Northern Territory were flourishing mineral producers. The New South Wales mineral industry was composed of coal, which was its only fuel mineral and was mined at 57 operations in 5 coalfields; metallic minerals, of which antimony, copper, gold, lead, silver, and zinc were major; and industrial minerals, which included diatomite, gemstones (opal and sapphire), limestone, magnesite, mineral sands, silica, and dimension stone. New South Wales was Australia's leading State for minerals processing, which included aluminum, cement manufacturing, copper, lead, electrolytic manganese dioxide, refractories, and steel plants. The State directly employed about 30,000 people in the mineral sector (New South Wales Department of Mineral Resources, [undated], New South Wales minerals industry overview, accessed July 16, 2001, at URL <http://www.minerals.nsw.gov.au/commod/minavail/overview.htm>). The principal legislation relevant to the exploration and mining sectors was the Mining Act 1992 (Australian Geological Survey Organisation, 2001a). Mineral and fuel production in the State in fiscal year 1999 (year ended June 30, 1999; the latest year for which data are available) was valued at about \$3.3 billion (Australian Geological Survey Organisation, 2001a).

Mining, which was the major contributor to the Northern Territory's economy, contributed \$693 million, or about 18%,

<sup>1</sup>Where necessary, values have been converted from Australian dollars (A\$) at the approximate rate of A\$1.00=US\$0.59.

to the gross State product in fiscal year 2000. Including mineral processing and the petroleum industries, the value of production was about \$1,691 million (Northern Territory Department of Mines and Energy, July 2, 2001, Northern Territory minerals industry overview, accessed July 16, 2001, at URL <http://www.dme.nt.gov.au>). Bauxite, copper, gold, lead, manganese, silver, tantalum, tin, and zinc were the most important metals mined in the Northern Territory. Important industrial minerals produced were diamond, limestone, crushed rock, dimension stone, and vermiculite. Energy minerals produced were natural gas, crude petroleum, and uranium. The legislation that governs exploration and mining in the Northern Territory is the Mining Act and its associated regulations, the Mining Regulations. Including value-added processing, the minerals and energy sectors were valued at about \$944 million (Australian Geological Survey Organisation, 2001a).

Queensland's mineral and energy sectors were important contributors to the State's economy. The principal commodities that were produced were bauxite, black coal (bituminous and subbituminous), copper, diatomite, natural gas, gold, lead, limestone, magnesite, mineral sands, crude petroleum, silica, silver, uranium, and zinc. The sector's production valued about \$4,382 million. The principal legislation relevant to mining and mineral exploration is the Mineral Resources Act 1989, the Resources Regulation 1990, and the Mines Regulation Act (Australian Geological Survey Organisation, 2001a).

Although South Australia is relatively underexplored compared with other Australian States, its mineral industry is of major economic importance with a value, excluding fossil fuels, of approximately \$565 million in fiscal year 2000. Black coal, natural gas, and petroleum produced during the same period was valued about \$446 million. The principal minerals produced included black coal, copper, natural gas, gold, iron ore, limestone, opal, peat, crude petroleum, silver, and uranium. The principal legislation relevant to the exploration and mining sectors is the Mining Act 1971 and the Opal Mining Act 1995 (Australian Geological Survey Organisation, 2001a).

Tasmania is Australia's smallest and its only island State. In fiscal year 2000, mineral and fossil fuel production included black coal, gold, iron ore, lead, limestone, silver, and zinc, which were valued at about \$812 million. The legislation relevant to the exploration and mining industry is the Mineral Resources Development Act 1995 (Australian Geological Survey Organisation, 2001a).

The mineral industry of Victoria generated about \$1.75 billion in fiscal year 1999 (the latest year for which data are available). Gold, which was the only metallic mineral produced during the period, was 4.95 metric tons (t). The principal industrial minerals produced included feldspar, gypsum, and kaolin, and the only fossil fuel produced was brown coal (lignite). Victoria has a wide range of legislation relevant to the exploration and mining sectors, of which the principal one is the Mineral Resources Development Act 1990 (Australian Geological Survey Organisation, 2001a).

Western Australia is Australia's largest State in area (about 32% of the country). The State produced fossil fuels and metallic and industrial minerals that were valued at approximately \$16.7 billion in fiscal year 1999 (the latest year for which data are available), although this was a 6% decrease

from that of fiscal year 1998. The principal minerals mined or processed in the State included alumina, bauxite, copper, diamond, liquefied natural gas, natural gas, gold, gypsum, iron ore, lead, nickel, mineral sands, crude petroleum, salt, spodumene, tantalite, and zinc (Australian Geological Survey Organisation, 2001a).

Exploration programs for minerals are the lifeline of Australia's mineral industry and its future, although these continued to decline in 2000, decreasing by almost 29% to \$343.4 million in 2000 from \$481.1 million in 1999 (Resource Information Unit, 2001, p. 21). Notwithstanding the changing international climate, which was opening up more greenfields exploration in Africa, Asia, and South America to new foreign investment and exploration, Australian mineral companies' foreign exploration decreased in 2000, thus ending almost a decade of overseas exploration growth. Within Australia itself, greenfields exploration also was declining as mining companies looked to brownfields exploration and were putting more emphasis on mining lease exploration and development.

Western Australia, which maintained its position as the preeminent State for exploration, accounted for an estimated 60% of all Australian exploration spending. Queensland, with an estimated 12% of exploration expenditures, ranked second, followed by the Northern Territory, New South Wales, Victoria, South Australia, and Tasmania (Australian Geological Survey Organisation, 2001a). Internationally, Australia's share of the world's minerals exploration budget declined by about 2% to approximately a 17.3% share in 2000 from about an 18.7% share of the total funds in 1999. By regions of the world, however, Australia still ranked second behind Latin America as the most favored destination for exploration (Mining Journal, 2000f).

## **Government Policies and Programs**

Australia is governed at a national level by the Commonwealth Parliament and at State and Territory levels by governments whose jurisdiction is restricted to that State or Territory. The powers of the Commonwealth Government are defined in the Australian Constitution, and any power not defined is given to or is the responsibility of the State or Territory, which is similar to the U.S. Constitution. Thus, all matters that relate to mineral resources and mining are State and Territory issues. Except for the Australian Capital Territory (i.e., the capital city of Canberra), all Australian States and Territories have identified mineral resources and established mineral industries.

On July 1, 2000, the Goods and Services Tax (GST) that was passed by the Commonwealth Government in 1999 to replace the wholesale sales tax became effective. The GST was to be levied at 10% of the value added at each point in the production and distribution chain for all goods and services, including imports, with some exceptions; for example, basic foodstuffs, education, health, and charities (U.S. Department of State, Bureau of Economic and Business Affairs, March 2001, Australia—Key economic indicators, 2000 Country Reports on Economic Policy and Trade Practices, accessed July 31, 2001, at URL <http://www.state.gov/documents/organization/1603.pdf>). Australia did not have a retail sales tax; the

Commonwealth, however, levied a wholesale tax at either the manufacturer or the wholesaler level that was passed along to the consumer as part of the retail price (U.S. Embassy, Canberra, Australia, July 2000, Australia—Government role in the economy, fiscal and monetary policy, FY 2001, Country Commercial Guide, accessed July 31, 2001, at URL [http://www.state.gov/www/about\\_state/business/com\\_guides/2001/eap/australia\\_ccg2001.pdf](http://www.state.gov/www/about_state/business/com_guides/2001/eap/australia_ccg2001.pdf)).

Response to the introduction of the GST in July was generally supported by the mineral industry because of the way in which it dealt with a longstanding disagreement—the fuel tax—within the mineral sector. Changes in the fuel tax effectively removed the 12% wholesale sales tax equivalent on eligible activity phased in under the Diesel Fuel Rebate Scheme, which was expected to take the barriers off transport costs in remote and regional Australia, although most of the hoped-for benefits were eliminated by international oil price hikes and the weakness of the Australian dollar.

The Native Title laws continued to be a concern for explorers and miners who criticized the increasing costs that resulted from legislative and common law developments that arose from native title and other indigenous issues. In 2000, the mineral industry spent about \$28 million on these endeavors, which were expected to increase substantially as the backlog of mineral tenement applications are processed and the sector begins to make compensatory payments to the traditional land owners.

## Environmental Issues

Australia is richly endowed with both nonrenewable energy resources (e.g., coal and natural gas) and renewable energy resources (e.g., solar, tidal, and wind power). Energy commodities constitute an important source of export earnings for the country, and their development in a sustainable manner is an important objective of the Commonwealth Government.

At the Kyoto Accords in Japan in 1997, Australia agreed to limit its increases in greenhouse gas emissions to 8% above its 1990 levels by the 2008-2012 time period, which would represent approximately a 30% reduction from that of present-day (2000) greenhouse emissions rate increases. In 1999, Australia enacted the Environmental Protection and Biodiversity Conservation Act, which was a comprehensive effort to define the environmental responsibilities of the Federal Government to coordinate Federal, State, and Territory measures to protect the environment under Federal leadership while still accommodating State and Territory authority. In 2000, the Federal Government was considering amending the Act to enable the Federal Environmental Minister to intervene in State-Territory projects that produce significant greenhouse gas emissions (U.S. Energy Information Agency, May 2000, Australia—Environment, Country Analysis Brief, accessed July 27, 2001, at URL <http://www.eia.doe.gov/emeu/cabs/ausenv.html>).

In March 2000, the Government published the Review of Fuel Quality Requirements for Australian Transport, a report addressing environmental problems associated with automobile usage in such areas as Perth, Queensland, and Sydney (U.S. Energy Information Agency, June 2001, Australia—

Environment, Country Analysis Brief, accessed July 5, 2001, at URL <http://www.eia.doe.gov/cabs/australi.html>).

## Production

In 2000, Australia was the world's dominant producer of alumina, bauxite, chrysoprase, ilmenite, mined lead, opal, rutile, and zircon. The country ranked 2d in world production of iron ore and mined zinc; 3d in mined gold and mined nickel; 4th in mined copper, refined nickel, and refined zinc; 5th in aluminum metal; 6th in refined copper; 7th in black coal; and 10th in refined lead (Resource Information Unit, 2001). Australia's mineral commodities were obtained through the operations of more than 400 individual mines (Resource Information Unit, 2001, p. 4).

Of the more than \$25 billion in mineral and energy production in 2000, metallic minerals contributed an estimated 40%; petroleum and natural gas, 30%; coal and peat, 25%; and industrial minerals, 5%. Australian mine production statistics for various commodities from 1996 through 2000 are presented in table 1.

In 2000, mining, refining, and smelting produced more than 53.8 million metric tons (Mt) of bauxite, 15.7 Mt of alumina, and 1.77 Mt of primary aluminum. Australia's mine production of contained copper in 2000 was 830,000 t; this was a 12% increase compared with that of 1999. Gold production in 2000 decreased by 4% to 296,410 kilograms (kg) compared with that of 1999. Western Australia remained the dominant producer with about 69% (204 t) of Australia's output. In 2000, iron ore production was 171.0 Mt, 97% of which was mined in the Pilbara region of Western Australia, compared with 151.6 Mt in 1999. Australian production of manganese ore, which was predominantly from Groote Eylandt Mining Co. Pty. Ltd. in the Northern Territory, was about 1.6 Mt with a manganese content of about 48.8%. Australia produced about 2.1 Mt of ilmenite, 237,000 t of rutile, and 373,000 t of zirconium concentrates from its mineral sands mining operations. Western Australia produced all Australia's mined nickel, 168,000 t contained in about 926,000 t of nickel concentrates in 2000. Sons of Gwalia Ltd., which was the world's largest producer of tantalum in the form of tantalum concentrates and controlled the world's largest stock of tantalum resources, produced 315 t of tantalum oxide (Ta<sub>2</sub>O<sub>5</sub>) from its Greenbushes operation and a record 190 t from its Wodgina Mine, both of which are in Western Australia (Sons of Gwalia Ltd., 2000, p. 24-25). Production of uranium, which was from the Ranger Mine in the Alligator Rivers region of the Northern Territory and the Olympic Dam Mine in South Australia, was a record-high 7,588 t in 2000.

Australia also produced a wide range of industrial minerals, which included clays, diamond, diatomite, gypsum, limestone, magnesite, phosphate rock, salt, sand and gravel, silica, and dimension stone.

## Trade

To bolster economic growth, Australia continued to rely heavily on the export of the majority of its mineral production. About 78% of the total mineral export value of \$30.56 billion, however, was concentrated in just five commodity groups—oil

and gas (\$7.61 billion), coal (\$5.50 billion), alumina-aluminum-bauxite (\$4.78 billion), iron ore (\$3.22 billion), and gold (\$2.73 billion). The mineral industry, which remained Australia's largest commodity export earner, accounted for an estimated 60% of the total (Resource Information Unit, 2001, p. 12). An estimated 80% of Australia's mineral production was exported. Australia remained the premier exporter of alumina, bauxite, coal, diamond (gem, near gem, and natural industrial), ilmenite, iron ore, refined lead, rutile, and zircon. Export earnings increased to about \$9.46 billion in the fourth quarter of 2000; this was a 42% increase compared with that of the fourth quarter of 1999 (Resource Information Unit, 2001, p. 10). This trend was anticipated to continue into 2001.

Mining-related intellectual property, such as geophysical and mining instrumentation, software, processing chemistry, mine-site rehabilitation, and engineering skills, also ranked as one of Australia's largest exports, which was estimated to be \$800 million in 2000 and ranked about 10th when evaluated with mineral exports per se (Resource Information Unit, 2001, p. 10).

### Structure of the Mineral Industry

The Australian mineral industry included industrial minerals, base metals, ferrous metals, nonferrous metals, precious metals, fuel minerals, and gemstones. Australia was one of the world's principal producers and suppliers of ores, concentrates, and refined metals. It was estimated to rank third in the world in the value of its nonfuel mineral production and eighth in the value of its minerals when fuels were included.

The Australian mining industry was based on a system of free enterprise in which private companies were involved in exploration, mine development, production, mineral processing, and marketing. A number of companies in Australian mineral ventures were affiliates or subsidiaries of U.S. companies. Foreign companies controlled a large part of the mining, smelting, and refining sectors and a significant portion of the petroleum and natural gas sectors.

Many of the mineral industries were fully integrated and produced ores, concentrates, or other intermediate products (e.g., alumina) and refined metal or other end products (e.g., cut and polished gem diamond) within the country.

In 2000, Australia had six alumina refineries and six aluminum 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, one tin refinery, and two secondary tin refineries; two silver refineries; and nine petroleum refineries.

Ownership of the mineral rights in Australia generally was vested in the Crown (i.e., the Government of the relevant State or Territory) or the Commonwealth Government for Commonwealth lands and waters, regardless of ownership or tenure of the surface. Mineral ownership was divided between State ownership in State onshore areas and Commonwealth ownership in Territories and in offshore areas beyond Australia's 4.8-kilometer (km) (3-mile) territorial limit. The Commonwealth's responsibility for minerals, except for uranium, in the Northern Territory was, however, transferred to

the Government of the Northern Territory. Thus, the individual States and Territories administered the mineral industries within their own borders, which included registering land titles; issuing exploration and development permits; overseeing mining operations, which included administration of inspections; assuring compliance with health, safety, and environmental regulations; and levying royalties and taxes.

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

### Commodity Review

#### Metals

**Bauxite, Alumina, and Aluminum.**—Australia again was the unchallenged leader for the 30th consecutive year in the production of bauxite (Plunkert, 2001b), which was mostly from north Queensland (Weipa Mine), the Northern Territory (Gove Mine), and Western Australia (Huntly and Willowdale Mines). The country produced almost 54 Mt in 2000, which represented almost 40% of the world's output. In terms of aluminum metal, Australia's production ranked fifth in the world (Plunkert, 2001a).

In April, Rio Tinto's then 72.4%-owned Comalco Ltd., which became wholly owned by Rio Tinto in June, selected Gladstone, Queensland, as the long-awaited site for its proposed 1.4-Mt/yr-capacity alumina refinery. The site is close to Rio Tinto's 30.3%-owned Boyne Island aluminum smelter and is not too distant from its plentiful bauxite deposits at Weipa in the far north of Queensland; the company also had been considering the Malaysian State of Sarawak as an alternative site (Mining Journal, 2000e). Additionally, the company was committed to using gas from the proposed pipeline from the Central Highlands of Papua New Guinea to Queensland's east coast at Gladstone for the refinery's power supply (Taylor, 2000).

In October, Capral Aluminium Ltd. sold its 170,000-t-capacity Kurri Kurri aluminum smelter just north of Sydney in the Hunter Valley of New South Wales to VAW Australia Pty. Ltd., (a wholly owned subsidiary of the German aluminum group VAW Aluminium AG) for \$274 million. VAW acquired the entire operation with the exception of the 22,000-t/yr scrap-recycling facility. Capral earlier had designated the smelter for a \$148 million 50,000-t/yr expansion, but this was shelved owing, in part, to noncompetitive electricity prices (Mining Journal, 2000c). More than one-half of the smelter's capacity was exported to international markets (New South Wales Department of Mineral Resources, June 10, 2001, Metallic mineral concentrates and metals—Alumina and aluminium, accessed July 16, 2001, at URL <http://www.minerals.nsw.gov.au/commod/minavail/metala.htm>).

On December 12, Billiton announced that its Japanese partners, Kobe Alumina Associates (Australia) Pty. Ltd. and Nissho Iwai Alumina Pty. Ltd., would not take up a portion of the 56% interest in the Worsley alumina refinery in the Darling Ranges of Western Australia that was to be acquired by Billiton through the acquisition of Reynolds Australia Alumina Ltd. from Alcoa Inc. of the United States in January 2001. Following the \$1.49 billion purchase, Billiton would have an

86% interest, and the Japanese partners, a combined 14% share in Worsley (Billiton plc, 2000b). Alcoa had acquired its stake in Worsley as part of its acquisition earlier in the year of Reynolds Metals Co., which was the U.S. parent company of Reynolds Australia Alumina, but was required to sell its interest as a condition of its merger with Reynolds Metals (Engineering and Mining Journal, 2000b; Mining Journal, 2000d).

Commissioning of the expansion of the refinery to 3.1 Mt was completed during the fourth quarter (Billiton plc, 2000a).

CSR Ltd. announced in late December that it was selling its interest in the Gove alumina refinery and bauxite operations in the Northern Territory to Alcan Northern Territory Pty. Ltd. (70%) and Alcan South Pacific Pty. Ltd. (30%) (two subsidiaries of Canada's Alcan Inc.) for \$393 million. Alcan Inc. thus formally preempted Billiton Aluminium Australia Pty. Ltd.'s offer to purchase the interest in Gove. CSR had held its interest through Gove Aluminium Ltd. (Metal Bulletin, 2000l).

**Copper.**—In 2000, Australia ranked as the fourth largest producer in the world of mined copper, following Chile, the United States, and Indonesia (Edelstein, 2001). Copper in Australia was produced from a few large copper mines and several smaller mines, some of which were gold-copper operations. WMC's Olympic Dam underground mine in South Australia was the country's largest copper mine, which was followed by MIM Holdings' Ernest Henry open cut and Mount Isa underground mines in northern Queensland. Other significant mines were Western Metals Ltd.'s Mount Gordon and Placer Dome Asia Pacific Ltd.'s open cuts, both in Queensland, and Rio Tinto's Northparkes combination surface-underground mine in New South Wales.

Following the strong investment in copper mine capacity in recent years, significant increases in copper production were expected for the next few years. During 2001 and 2002, mine production was forecast to increase by about 3%, and primary refined copper production was forecast to increase by 16% (Resource Information Unit, 2001, p. 81).

In June, trials began on the refining stage of the 120,000-t/yr-capacity Port Kembla Smelter-Refinery, which produced 2,500 t of cathode copper between July and September. Majority owner Furukawa Co. Ltd. of Japan expected its facility to produce about 90,000 t of anode copper in 2001, almost all of which was expected to supply the neighboring wire plant of Metal Manufacturers Ltd. (Metal Bulletin, 2000h).

On July 1, commercial mining began at MIM Holdings' Enterprise underground mine at the Mount Isa Complex. The Enterprise operation replaced the Mount Isa ore body as the main source of copper ore for the Complex. The cost for its development, which included an entirely new haulage system consisting of an underground gyratory crusher and conveyor system, a 730-meter (m) internal shaft, a ramp system for providing access to lower levels, ore hoisting infrastructure, and a refrigeration plant, was \$218 million. The Enterprise Mine extended the mine life of the Mount Isa Complex an additional 11 years and increased mining rates from 1.3 Mt/yr of ore to 3.5 Mt/yr (CRU International, 2000, p. 4; Mining Journal, 2000b).

A \$143 million expansion of MIM Holdings' Mount Isa Smelter, which was completed in the second quarter, increased its capacity from 180,000 t/yr of anode copper to 255,000 t/yr.

The upgrade was necessary to accommodate additional concentrates from the Ernest Henry Mine (which increased production from 50 Mt/yr to 55 Mt/yr in 2000 and was scheduled to increase to 70 Mt/yr in 2002) and included installation of a new smelter feed system, two new oxygen plants, modifications to the rotary furnace, addition of a fourth converter, installation of a new anode casting wheel, and conversion of the anode furnaces to natural gas (CRU International, 2000, p. 5-6; Mining Journal, 2000b).

During the third quarter, the Mount Isa Smelter was shut down for a planned 4-week reline after a record-setting 2-year campaign. Copper anode production during the period decreased by 25% to 45,800 t compared with the 61,300 t produced during the comparable period of 1999. Because mining and milling were not interrupted and the smelter operated at an annualized rate of 230,000 t following the rebricking, the backlog was expected to be made up during the financial year. Owing to the lower availability of anodes, production at the company's Townsville Refinery also decreased by 25%, falling to 42,000 t during the quarter. To match the increased anode output from Mount Isa's smelter expansion, refinery capacity at the Townsville facility was increased from 207,000 t/yr to 270,000 t/yr (CRU International, 2000, p. 6; Metal Bulletin, 2000m).

On the heels of completing its \$1.1 billion expansion program at the Olympic Dam copper mine in March 1999, WMC announced on October 16 plans for a further, although more-modest, expansion that would raise its copper capacity by an additional 20%. Under the previous program, copper production was increased to 200,000 t/yr. The newly announced expansion plan was to increase production to 245,000 t/yr of copper at a projected cost, which was to include working capital, of less than \$59 million; increased production was expected to generate an additional pretax profit of more than \$47 million per year and position the project to be among the world's most competitive mineral operations and also the top 10 copper producers in terms of volume. Final approval of the project was expected in early 2001 upon completion of feasibility studies. WMC envisaged that the mine will be operational at its increased copper capacity by 2003. The increased copper capacity also was expected to increase the output of gold, silver, and uranium. Following the completion of the major expansion at the mine in 1999, the annual production rate for these metals was 2,426 kg of gold, 26,438 kg of silver, and 4,600 t of U<sub>3</sub>O<sub>8</sub>. Olympic Dam had State and Federal Government approval to produce up to 350,000 t/yr of copper and associated mineral products (Mining Journal, 2000i).

For the longer term, a key factor in WMC's plans for the Olympic Dam Mine will be a sustainable water supply. Thus far, more than \$59 million has been invested in establishing the infrastructure necessary to obtain water from the Great Artesian Basin to supply the operational needs of the mine and the domestic requirements of Roxby Downs Township (MESA Journal, 2000b).

**Gold.**—Australia remained the world's third largest gold producer after South Africa and the United States, with gold mined in all six States and the Northern Territory (Amey, 2001).

At about 300 t/yr, Australia produces about 10% per year of the world's gold. Western Australia, which remained the premier gold mining State in Australia, produced about 75% of the country's output in 2000, with more than one-half of the State's total produced by fewer than a dozen large gold mines. Gold, which was the second largest export earner after coal, earned almost \$3 billion per year (Resource Information Unit, 2001, p. 23-25).

In June, Perth-based Dominion Mining Ltd. withdrew from the Hellyer Tailings project after spending \$71,000 on a feasibility study that determined it did not meet with the company's commercial or technical expectations to warrant proceeding with a bankable feasibility study. In 1999, Dominion entered into agreement with Western Metals to fund the study for the possible recovery of approximately 31 t of gold, 930 t of silver, and 300,000 t of zinc remaining in the tailings of the Tasmanian mine (Metal Bulletin, 2000f).

In October, the Granny Smith Joint Venture (GSJV) approved the \$88 million development of its Wallaby project, 11 km from the Granny Smith Mine, Western Australia. The decision followed the feasibility study in which an opencut operation that should produce about 10 t of gold during the 6-year life of the mine beginning in 2002 was envisioned. Ore was to be trucked to the Granny Smith plant for processing. The 60-40 GSJV comprised Delta Gold Ltd. and Placer Dome Inc. of North Sydney and Vancouver, respectively, and covered exploration properties within a 35-km radius of the Granny Smith Mine in the Laverton Tectonic Zone, which is a north-south corridor about 10 to 20 km wide and at least 100 km in length. Granny Smith had the second largest annual production among Australian producers during fiscal year 2000 (Australian Journal of Mining, 2000a; Mining Journal, 2000g; Resource Information Unit, 2001, p. 229). Granny Smith has produced more than 93.3 t (3 million troy ounces) during the past 10 years, and Wallaby marks the 11th pit on the property (Placer Dome Inc., 2000).

During the final quarter of 2000, PacMin Mining Corp. Ltd. [a subsidiary of the Teck Cominco Corp. (formerly Teck Corp.) of Vancouver] successfully completed construction of its new Carosue Dam open cut mine, within budget and 2 months ahead of schedule. The commissioning phase was completed and mining began prior to yearend, operating at the design capacity of the stand-alone 1.8- to 2.0-Mt/yr plant. Gold production was scheduled to begin in the first quarter of 2001. Production was planned to be 3.4 to 4.4 t/yr of gold during a mine life of 8 to 10 years. PacMin formally committed to development of the mine in February, and construction began in April (Engineering and Mining Journal, 2001a, p. ww17).

**Iron Ore and Steel.**—Australia's iron ore industry has had a decade (1990-99) of declining prices, which fell an average of 3% per year. Nevertheless, Australia's production in 2000 increased by 13% compared with that of 1999. Exports for the year increased more than 10%, and further increases were expected because Australia's \$2.4 billion iron ore industry was undergoing a renewed investment growth following production increases, favorable exchange rates (ore prices were in U.S. dollars), and the emergence of new ore types. Iron ore, which was Australia's fourth largest minerals earner, accounted for

more than 15% of world production (Kirk, 2001). About 90% of production was shipped to integrated Asian steel markets. To cater to increasing demand, Australia's iron ore production was expected to increase from 171 Mt/yr in 2000 to 181 Mt/yr by 2005 (Resource Information Unit, 2001, p. 22).

Three major iron ore producers operated in the Hamersley Range of the Pilbara region of Western Australia—BHP, Rio Tinto's wholly owned subsidiary Hamersley Iron, and Robe River Iron Associates (a 53%-owned joint venture of Rio Tinto with three Japanese companies). Portman Ltd. and ABM Mining Ltd., which was acquired by Ivanhoe Mines Ltd. in October, were smaller iron ore miners that operated the Cockatoo and the Koolyanobbing Mines in Western Australia and the Savage River Mine in Tasmania, respectively. OneSteel Ltd., which had been created when BHP divested some of its steel assets, operated the Whyalla Mines (formerly the Middleback Ranges Mines), which are about 50 km west of Whyalla and included the Iron Duchess, the Iron Duke, the Iron Knight, and the Iron Knob Mines; the Iron Knob Mine was near depletion at yearend after a century of mining that had been celebrated in November (MESA Journal, 2000a).

Early in the year, BHP Iron Ore Pty. Ltd. announced that it would develop its Mining Area C, about 100 km west of its core iron ore reserves at the Mount Whaleback Mine at Newman, Western Australia, as the next generation of greenfields mines in the central Pilbara iron ore district. With a 4-billion-metric-ton iron ore resource, BHP Iron Ore believed the deposit to be of comparable grade and larger than the competing Marra Mamba-type ore deposits. The Area C project has received quality approval from Japanese steel mills, completed a public environmental review and received environmental approval, conducted Heritage surveys, and initiated the Native Title process. BHP Iron Ore was planning for an initial capacity of 5 Mt/yr of ore throughput with the potential to increase to 20 Mt/yr depending on demand (Australian Journal of Mining, 2000c; Resource Information Unit, 2001).

In the first quarter of 2000, Perth-based Portman began a three-stage dredging program of the Esperance Harbor on the southern coast of Western Australia to allow the full loading of Panamax-size iron ore vessels of 70,000 dead weight tons (dwt) in late 2000 and of Cape-size vessels of up to 180,000 dwt by yearend 2001 as an important component in quadrupling iron ore production to 8 Mt/yr at Portman's Koolyanobbing Mine. During the third quarter, Portman signed a 15-year contract with the Esperance Port Authority that was to underwrite the expansion of iron ore facilities, which was to include construction of a berth for the larger ships, a ship loader, and conveyors. A third ore-train service also was fully incorporated, and a \$52 million Western Australia Government-funded upgrade of the existing 560-km Koolyanobbing-West Kalgoorlie-Esperance rail line was begun, an additional 300,000-t iron ore storage facility at Esperance Port was completed, and 50 more ore cars were added to the rail line. Additionally, lump ore was shipped to a Japanese steel mill and successfully trial tested (Engineering and Mining Journal, 2001a, p. ww20; Metal Bulletin, 2000a).

In mid-June, the Western Australia Government approved Hamersley Iron's plan to expand its Yandicoogina iron ore mine from 15 Mt/yr to 20 Mt/yr to meet the growing market for its

product, low alumina, pisolitic, goethite-hematite fines ore, for use in steel mills (Rio Tinto Ltd., 2000).

In August, Portman resumed production of fines ore on Cockatoo Island in Yampi Sound off the northwestern coast of Western Australia in a 50-50 joint venture with the contracting group Henry Walker Eltin Ltd. The initial shipment was loaded in September. The operation was scheduled to produce 1.2 Mt/yr of remnant premium-grade (68.5% iron) hematite fines during a period of 2 years for delivery to steel mills in China, Japan, and other countries of Asia (Metal Bulletin, 2000b, c). Shipping of beneficiated iron ore obtained from low-grade iron ore stockpiled from earlier mining operations on Cockatoo Island was concluded by Portman with the 64th and final shipment in April to steel mills of China's Angang Group (Mining and Exploration Australian and New Guinea, July 2000, Portman Ltd. (18 July 2000)—Cockatoo Island Iron Ore Project, Quarterly Report for the Period Ended 30 June 2000—Highlights to 18 July 2000, Company News 16-31 July, 2000, accessed September 16, 2000, at URL [http://www.reflections.com.au/MiningandExploration/Companies/NewsJuly00\\_a.html](http://www.reflections.com.au/MiningandExploration/Companies/NewsJuly00_a.html)).

In October, BHP announced plans to increase the capacity of its iron ore rail system by 6% in 2001. The \$6 million to \$12 million investment was expected to reduce operational costs significantly and to lift capacity by 4.5 Mt/yr to a total capacity of 72 Mt/yr (Mining Journal, 2000a).

On October 17, The Broken Hill Pty. Co. Ltd. announced at its annual general meeting that it officially would change the company's name to BHP Ltd. effective October 30. The purpose of the name change, which was the first in the company's 115-year history, was to simplify the parent company name to bring it in line with common usage (Broken Hill Pty. Co. Ltd., 2000).

On December 14, the previously somewhat tense relation between Rio Tinto, which obtained North's 53% share in the Robe River Iron Associates Joint Venture in August for \$2 billion (and, hence, North's interest in the West Angelas iron ore project), and Robe River's Japanese partners Mitsui Iron Ore Development Pty. Ltd., Nippon Steel Australia Pty. Ltd., and Sumitomo Metal Australia Pty. Ltd., which held a combined 47% share in the West Angelas project in Western Australia, worsened. The dynamics of the project changed when Rio Tinto amended the previously agreed upon \$590 million development plan, which, in addition to upgrading the Koolyanobbing Mine and plant infrastructure and developing the West Angelas Mine-Cape Lambert Port facilities (about \$148 million each), provided for a new rail line from the mine at West Angelas to the port at Cape Lambert (\$295 million). Voest-Alpine Materials Handling, (a subsidiary of the Roxon Group) was upgrading the Cape Lambert facility and constructing the West Angelas Mine. The change in the development plan only provided for construction of a rail connection from West Angelas to Rio Tinto's existing iron ore-mining operations at Hamersley rather than construction of a separate line. According to the Japanese partners, development of a new railway line from West Angelas to Cape Lambert initially was agreed upon by all partners, was a significant component of the project, and was in the best interests of all concerned. Because Rio Tinto, however, unilaterally

determined that the rail link was unnecessary and suspended construction work without agreement from the Japanese partners, the dispute was moved to the Victorian Supreme Court for resolution. The fragile relations between the Australian and the Japanese partners initially developed when Rio Tinto's takeover of North was unsuccessfully blocked by the Japanese partners in favor of an offer by Anglo American (International Bulk Journal, 2000; Metal Bulletin, 2000d; Australian Journal of Mining, 2001a; Resources Information Unit, 2001, p. 329).

In December, BHP announced its decision to continue to operate its Western Australian hot briquetted iron plant despite technical and economic encumbrances. Following the completion of a 9-month review of the facility that concluded the operation was economically and technically viable, BHP planned to continue to operate it in the hope that it would become profitable by 2003 and reach full production by 2007 despite its having generated a \$590 million cost overrun, running 5 years behind schedule, and generating a sale price for its output that was less than one-half of production costs (Australian Journal of Mining, 2001a).

OneSteel Ltd. has become one of the leading manufacturers in Australia of various longsteel products. In November, OneSteel and its competitor Smorgon Steel Group Ltd. jointly bid for Email Ltd. with the intent of operating its metal distribution businesses on a joint basis (Resource Information Unit, 2001, p. 575).

In late November, AuIron Energy Ltd. announced that its South Australian Steel and Energy demonstration plant at Whyalla had produced its first pig iron in a trial program to determine the operating parameters of the nearby coal and iron deposits that were to be used in the plant (MESA Journal, 2001a).

**Lead, Silver, and Zinc.**—Australia's lead, silver, and zinc mines were predominantly based on zinc-rich ore bodies with zinc as the major component and lead and silver as coproducts. An exception was BHP's Cannington Mine, which is 200 km southeast of Mount Isa, Queensland. It is based on a lead-silver ore body with zinc as a coproduct.

In 2000, Australia accounted for 23% of the world's lead mine production and 16% of zinc mine production, which made it the world's largest producer of mined lead (Smith, 2001) and second largest producer, after China, of mined zinc (Plachy, 2001).

The refurbishment of MIM's lead smelter at Mount Isa during July and August created a sharp decrease in MIM's lead bullion production to 10,400 t, which was a 69% shortfall from the 33,500 t produced during the corresponding period in 1999. Production of zinc-in-concentrates from the Mount Isa underground mine, however, increased strongly to 41,200 t, which was a 16% increase from the 35,400 t in the previous year (Metal Bulletin, 2000i).

MIM's 70%-owned McArthur River base-metal mine in the Northern Territory had record-setting tonnages of zinc in its bulk concentrate owing to increased mine output and mill throughput that more than offset the lower zinc head grades encountered in the underground mine (Metal Bulletin, 2000m).

In October, MacMin Ltd.'s wholly owned Texas Silver Mines Pty. Ltd. increased its indicated resources at its Twin Hills

property in southern Queensland by 50% from 300 t to 450 t of silver equivalent (silver plus gold). In December, a feasibility study was completed and confirmed that an economic silver mine based on open pit mining and heap-leaching processing could be established. The silver resources were to be developed in four stages. The first three stages were to involve mine development, and the fourth stage was an anticipated new mine development at the known Mount Gunyan resource (Resource Information Unit, 2001, p. 343).

**Manganese.**—Groote Eylandt Mining Co. Pty. Ltd. (GEMCO) mined about 10% of the world's manganese at its 2.4-Mt capacity, 84-square-kilometer Eylandt open cut operations on the northwestern portion of Groote Eylandt, which is off the far northern coast of Australia in the west of the Gulf of Carpentaria, Northern Territory (Jones, 2001). The operations at Groote Eylandt used excavators and 145-t end-dump trucks for removal of overburden and ore mining. The on-site concentrator produced clean lump and fines ore products that were trucked to Milner Port Bay for shipment. GEMCO shipped about 25% per year of its concentrates to the ferromanganese plant operated by Tasmanian Electro Metallurgical Co. Pty. Ltd. (a Billiton wholly owned subsidiary at Bell Bay near Launceston, Tasmania). A smaller percentage was used in an electrolytic manganese dioxide plant at Newcastle, New South Wales, by Australian Manganese Co. Pty. Ltd. (a wholly owned subsidiary of Billiton). The plant produced high-grade material used in long-life batteries. Other GEMCO customers were the makers of ferroalloys and steel in Australia, Canada, China, Europe, Japan, Mexico, Norway, the Republic of Korea, and the United States.

Pilbara Manganese Pty. Ltd. owned and operated the 300,000-t/yr-capacity manganese mine at Woodie Woodie, located 400 km southeast of Port Hedland in Western Australia; the mine also included the adjacent Bells Pit. Ore from Bells, which had been mined during the 1960s and early 1970s, produced high-grade manganese lump and fines that were processed through the Woodie Woodie production facilities. In 2000, a strong demand by manganese alloy producers in Asia and Europe for Woodie Woodie's blending properties and extremely low impurities of phosphorous and iron produced a solid profit for the company. By yearend, sufficient manganese resources had been identified at Woodie Woodie to extend the life of the mine to at least 6 years with real expectations that further exploration would increase the life to 10 years (Metal Bulletin, 2000e, j).

**Mineral Sands.**—Australia is one of the world's leading titanium [ilmenite, leucoxene (a titanium-enhanced alteration product of ilmenite), and rutile] and zirconium (zircon) producers; most of the resources occur in recent beach sands along the country's eastern and western coasts, although ancient beach deposits also are known to occur inland.

Australia has a substantial portion of the world's mineral sand resources—about 29% for ilmenite, 31% for rutile, and 46% for zircon. In 2000, Australian production accounted for about 28% of the world's ilmenite, 55% of the world's rutile, and 42% of the world's zircon (Gambogi, 2001; Hedrick, 2001). The majority of the deposits are located in Western Australia,

although many potentially economic deposits are located in the Murray Basin on Australia's eastern and southern coasts.

In July 2000, the Murray Basin Joint Venture of BeMax Resources NL (75%) and Probo Mining Pty. Ltd. (25%) began a prefeasibility study on the Ginkgo heavy-mineral sands deposit in the northern Murray Basin of New South Wales. Mine design and planning was based on a 12-Mt/yr operation and the mining of the higher grade zone of Ginkgo, which could give it an initial mine life of 10 years. The remainder of the Ginkgo resource and other nearby deposits had the potential to significantly extend the mine life. The prefeasibility study was based on a dredge mining operation feeding a wet concentration plant. The study which was completed in November, concluded that no major impediments would hinder the successful development of the Ginkgo Mine. Production was expected to be about 165,000 t of ilmenite, 100,000 t of leucoxene, 55,000 t of rutile, and 40,000 t of zircon. The project's estimated capital cost was \$167 million. A proposed project commissioning was possible by 2003. A \$3.5 million bankable feasibility study was scheduled to be completed between December 2001 and March 2002 and could lead to project construction by June 2002 and first production by the end of September 2003 (Australia's Paydirt, 2000b; Resource Information Unit, 2001, p. 28, 360).

Beginning in February, the separation plant and dredge at the depleted Tomago rutile-zircon dredging operation in the Hunter Valley of New South Wales were dismantled and moved to the Wemen heavy-mineral sands dredging site in New South Wales' part of the Murray Basin near Mildura. The two-stage Wemen Project was to have a mine life of at least 6 years and was to produce at a rate of 40,000 t/yr of rutile and 10,000 t/yr of zircon (Australia's Paydirt, 2000a).

In September, Southern Titanium NL completed a prefeasibility study that indicated that an open cut mine operating at the rate of 6 Mt/yr of ore could produce about 86,000 t/yr of ilmenite, 1,700 t/yr of rutile, and 37,000 t/yr of zircon from its Mindarie-Mercunda Mine in the western Murray Basin of South Australia. The heavy-mineral concentrate was to be trucked from a mobile wet plant to a fixed dry plant or mineral separation and upgrade plant, possibly sited at the Karoonda railway siding. All products were to be transported by rail to Port Adelaide, South Australia, with 90% of the rutile and ilmenite exported to China (Resource Information Unit, 2001, p. 27).

In October, a new modular 1,000-metric-ton-per-hour Newman concentrator was commissioned at Iluka Resources Ltd.'s Eneabba Mine in Western Australia as part of a \$236 million investment program in new technology and production facilities. The facilities will produce mineral sands for processing at Iluka's plants in Geraldton, also in Western Australia (Iluka Resources Ltd., 2000).

Initial exploration by Queensland-based Zirtanium Pty. Ltd., which included bulk sampling and metallurgical testwork at its Donald and Jackson Prospects in the Wimmera District of Victoria's Southern Murray Basin, indicated that the sites could provide a cost-effective supply of ilmenite-, rutile-, and zircon-rich heavy-mineral sands. The sites together contain an estimated aggregate of 1,700 Mt of indicated resources at 5.7% heavy-mineral sands, which comprise some of the largest undeveloped mineral sands deposits in the world. The Donald



and the Jackson deposits, however, consist of fine-grained sands that are commonly found in the Wimmera District but that previously have been considered subeconomic owing to the limited capabilities of available processing technology. In 1998, CRA Ltd. judged them to be uneconomic owing to their fine-grained nature and walked away from its deposits in the area after spending more than \$20.8 million (Australian Journal of Mining, 2000b).

**Nickel and Cobalt.**—At 168,000 t of nickel in 2000, Australia was the world's third largest nickel producer after Russia and Canada and a significant cobalt miner, ranking second following the Democratic Republic of the Congo. Most of the country's nickel-cobalt mines are in the Kalgoorlie and the Leonora regions of Western Australia. Australia's annual output was expected to increase substantially as development of several new lateritic nickel-cobalt mines ramped up to full production capacities within the next few years. Production of 35,000 t/yr of high-quality nickel metal and 1,300 t/yr of cobalt metal within a cobalt sulfide was planned at Billiton's Ravensthorpe operation west of Esperance, Western Australia. Three other recently started Australian lateritic nickel-cobalt projects have had varying degrees of success owing to financing problems and the use of high-pressure acid-leaching and solvent extraction-electrowinning techniques, which are more commonly associated with the copper industry. Anaconda Nickel Ltd.-Glencore International AG's 60-40 Murrin Murrin joint-venture project (Australia's largest nickel operation) has been running well below its 100,000-t/yr nickel metal target. Preston Resources Ltd. and Centaur Mining and Exploration Ltd. also have operated their Bulong and Cawse Operations, respectively, below their individual design capacities of 9,000-t/yr of nickel (Kuck, 2001; Shedd, 2001).

WMC produced nickel and cobalt from sulfide ores at its older, established mines at the Kambalda and the Leinster nickel operations just north and northwest of their town namesakes, respectively, and at its Mount Keith Mine south of Wiluna. Outokumpu Exploration Ventures Pty. Ltd. produced nickel and cobalt from sulfide ores at the Black Swan Mine north of Kalgoorlie; MacMahon Holdings Ltd., at its Blair Mine southeast of Kalgoorlie; Jubilee Mines, at Cosmos north of Leinster; and Titan Resources NL, at Radio Hill south of Karratha.

By yearend, WMC's Kambalda operations composed only one underground mine. WMC's intent was to outsource ore supply through disposal of its mining operations and enter into long-term purchase agreements with the buyers. The effect would reduce WMC's capital requirements while increasing the amount of ore treated. One of the largest groups of Kambalda leases offered for sale during the year was the Miitel Mine along with 15 other tenements that included the Mariners and the Redross Mines, which were sold to a joint venture led by Mincor Resources NL (76%), Clough Mining Pty. Ltd. (12%), and Donegal Resources Pty. Ltd. (12%) for \$22.4 million. At the Leinster operations, WMC closed its Rocky's Reward underground mine in conjunction with opening its Harmony open cut mine that was operated by contract miner Henry Walker Eltin (WMC Ltd., 2001, p. 16).

In December, LionOre Australia (Nickel) Ltd. announced its

intent to develop fully the Emily Ann nickel sulfide project in Western Australia following completion of financial planning with Inco Ltd. and NM Rothschild and Sons (Australia) Ltd. The underground mine, which was to begin production by yearend 2001, would use an on-site conventional nickel sulfide concentrate plant with a throughput of 250,000 t/yr of ore to produce 6,700 t/yr of nickel (Australian Journal of Mining, 2001b).

At yearend, Preston Resources, after defaulting on its June and December interest payments totaling \$23 million, was examining a refinancing package that would enable it to resume share trading in 2001. Extensive deposits of gypsum within the nickel solvent extraction circuit and nozzle failures in the flash circuit caused by heavy rainfall limited throughput, which caused several unscheduled plant shutdowns so that descaling work could be performed. The resulting lack of cashflow, in turn, prompted the failure of Preston Resources from fulfilling its financial obligations to its bondholders and London's Barclays Bank. Although Preston Resources announced 3 consecutive months through October 2000 of record-high production at Bulong, which was close to an annualized production rate near its 9,000-t/yr capacity and which was sufficient to cover cash operating costs, it was not adequate to clear past financial problems (Metal Bulletin, 2000i).

QNI Pty. Ltd. (a wholly owned subsidiary of Billiton) operated the Yabulu Refinery near Townsville. The refinery produced high-purity nickel and cobalt products that are used in the manufacture of stainless steel, specialty steels, alloys, and chemicals. Feed for the plant was lateritic ore imported from Indonesia, New Caledonia, and the Philippines. QNI, which was the world's seventh largest producer of cobalt, produced about 5% of world demand (Billiton World, 2000).

During 2000, WMC completed a 10% expansion of its Kwinana Refinery to a capacity of 67,000 t/yr of nickel metal (WMC Ltd., 2001, p. 16).

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

**Tin.**—Although Murchison United NL's Renison Bell Mine in Tasmania was Australia's only tin producer, it supplied about 5% of the world's tin (Carlin, 2001). Concentrates from Renison Bell, which began producing in 1966, were sold under contract to Malaysia Smelting Corp. in Penang and Thailand Smelting and Refining Co. Ltd. in Phuket. In February, the Tasmanian Government agreed to fund jointly a \$21.2 million 6-year exploration and development program, which would be the largest ever undertaken at Renison Bell, with Murchison. The Government was to grant a maximum of \$1.8 million per year on the condition that Murchison spend an equal sum. The program was to involve more than 9.3 km of underground development and 163,000 m of diamond drilling, which would

enhance the major development program already started. This program was designed to convert inferred resources to reserves, which would extend the mine life to more than 10 years (Australia's Mining Monthly, 2000; Resource Information Unit, 2001, p. 414).

In November, a mining license (ML) was awarded to Marlborough Resources NL for the old workings of the Ardlethan Mine in New South Wales, which had been one of Australia's major hard-rock tin mines prior to its closure in 1986. In 1998, Marlborough had acquired the tenements surrounding but excluding the Ardlethan Mine. In November, Marlborough obtained an ML for the properties after submitting an environmental impact statement in midyear. The \$2.4 million project was scheduled to begin in January 2001 with the first concentrates to be produced by April. Malaysia Smelting agreed to purchase all the tin concentrate production initially from July 2001 to July 2003. Marlborough estimated production would total about 7,000 t of tin from high-grade alluvial resources during a mine life of 7 years and up to 10,000 t of tin from tailings of proven grade that remain from past operations at the Ardlethan Mine (Metal Bulletin, 2000g; Resource Information Unit, 2001, p. 413).

**Tungsten.**—Tasmania Mines Ltd. and Itochu Corp., with equal interest, produced a small quantity of low- and high-grade scheelite concentrates, as well as a range of iron ore products, from its Kara No. 1 pit, 30 km south of Burnie, Tasmania, for use in the specialty steel industry. The Kara Mine also produced magnetite for use in coal washeries and a limited amount for the Tasmanian market (Resource Information Unit, 2001, p. 324).

**Vanadium.**—In January, Australia's first vanadium project, the \$71.4 million Windimurra Mine, produced its first marketable product, 20 t of 99.5% vanadium pentoxide ( $V_2O_5$ ) in fused flake. In May, the mine was officially opened with its first substantial shipment, which was made only about 6 months after the commissioning process began. In the second quarter, however, a major delay in output was caused by the failure of the fusion furnace to melt the  $V_2O_5$  at a sufficient rate for packaging. The furnace was replaced with one that has twice the capacity and that operates at or above design capacity. The Windimurra Mine, 100 km southeast of Mount Magnet in Western Australia, is owned by Swiss-based Xstrata Windimurra Pty. Ltd. The mine and processing plant have the capability to produce about 7,800 t/yr of  $V_2O_5$ , which is equivalent to about 12% of world production, during a mine life of at least 30 years (Engineering and Mining Journal, 2000a; Metal Bulletin, 2000k; Mining Journal, 2000h; Resource Information Unit, 2001, p. 423).

### **Industrial Minerals**

**Clays.**—In January, the J.M. Huber Corp. of the United States advised Comalco Ltd. that on the basis of the results of its feasibility study, which began in July 1999, it would not purchase the extensive kaolin assets near Comalco's Weipa bauxite mine. Comalco closed its Weipa kaolin operations in 1996 (Comalco Ltd., January 31, 2000, Weipa kaolin, Media

Release, accessed April 25, 2001, at URL [http://www.comalco.com.au/06\\_announce/01\\_00\\_01\\_31.htm](http://www.comalco.com.au/06_announce/01_00_01_31.htm)).

**Diamond.**—Australia's economic diamond resources occur in the large Argyle open cut in the Ellendale diamond province of the western Kimberley region of Western Australia and in the Merlin open cut in the northeastern part of the Northern Territory, about 80 km south of Borroloola and the Gulf of Carpentaria.

Argyle's principal ore body is the AK-1 lamproite pipe, an elongate body almost 2 km long varying in width from 150 m to 500 m and 50 hectares in area. Diamonds were also recovered from alluvial operations in the nearby Smoke and Limestone Creeks, but these were scheduled to close in 2001.

In December, Rio Tinto acquired Ashton Mining's Argyle assets, which increased Rio Tinto's effective interest in Argyle from 60% to 99.8%. The public held the remaining 0.2% through the West Australian Diamond Trust; Rio Tinto was, however, expected to acquire 100% ownership in 2001 (Resource Information Unit, 2001, p. 110).

The lamproite pipe at Argyle contains a large portion of the world's economic diamond resources. It has some of the highest diamond grades in the world and produces nearly twice the amount of diamond than that of any other country. Although Argyle's gem-quality diamond production has been comparable to many of the world's other diamond mines, only about 5% have been of gem quality (40% is of near gem quality and 55% is industrial grade) and its production has been much less than that of other countries (Resource Information Unit, 2001, p. 34).

Late in 2000, Kimberley Diamond Co. NL purchased the Ellendale Field from Argyle Diamond Mines Pty. Ltd. for \$13.7 million and announced plans to build a 750,000-t/yr mining operation (Resource Information Unit, 2001, p. 113).

The Merlin Mine in the Northern Territory was Australia's other hard-rock diamond mine. It also was wholly owned by Rio Tinto through its \$3.6 million takeover of Ashton Mining in December (Resource Information Unit, 2001, p. 108).

**Diatomite.**—Australian Diatomite Mining Pty. Ltd., which has been extracting high-grade diatomite at Barraba, New South Wales, since 1982, was acquired by Supersorb Minerals NL. The Barraba processing plant, about 5 km from the mine, was centered around a coal-fired rotary kiln that dried and partially calcined the diatomite product for use in pet litter products. In the third quarter, the kiln was converted to use liquefied petroleum gas, which caused a temporary production disruption that was offset with an increase in production at Australian Diatomite's plant at Mount Barker in Western Australia. Near yearend, a new fluidized-bed calciner was installed, which was to begin commissioning during the second quarter of 2001.

**Garnet.**—GMA Garnet Pty. Ltd. produced industrial-grade garnet at its Port Gregory Mine, 100 km north of Geraldton, Western Australia. The processed garnet product was used domestically (45%) and exported through the ports of Fremantle and Geraldton to Asia, Europe, and the United States, for use as an abrasive in industrial cleaning and maintenance and as a high-pressure cutting agent.

**Gemstones.**—Australia, which was the leading producer of precious opal in 2000, accounted for a large percentage of world production. About one-half of Australia's annual production was mined in South Australia's three major fields at Andamooka, Coober Pedy, and Mintabie, as well as many smaller fields that stretch from Andamooka to the Northern Territory border along the southwestern margin of the Great Artesian Basin. Most opal was hand mined either from open cuts or underground drifts, and all grades, from milky pinfire through crystal up to high-grade black, were produced. Lambina, which was a newer field, increased its production at the expense of Coober Pedy, although Coober Pedy still produced, in terms of value, almost three times that of Lambina (Primary Industries and Resources South Australia, 2000, p. 19). Opal in New South Wales was mined at Lightning Ridge, which was the world's major source of the highly prized and valuable black opal. A small quantity of opal also was produced in western Queensland.

Australia also continued to be a leading producer of natural sapphire. Commercial sapphire production was 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 supplied as much as 30%, by volume, of the world's rough sapphire output. Most of the uncut gems were exported to Thailand, which was the recognized world leader for cutting and marketing.

Jade was discovered in the form of nephrite, which is one of the two recognized jade minerals (the other being jadeite), near Cowell on the Eyre Peninsula, South Australia. These deposits were the world's largest identified resource of nephrite jade. In 2000, Gemstone Corp. was restricting its Cowell operations to minimal mining and selling of unprocessed jade and to receiving royalty payments (Resource Information Unit, 2001, p. 123). Australia produced most of the world's chrysoprase, which is known as Australian jade outside of Australia.

Australia produced such other gemstones as agate, amethyst, chiastolite, emerald (aquamarine), garnet, rhodonite, topaz, tourmaline, turquoise, and zircon.

**Lithium and Tantalum.**—Gwalia Consolidated Ltd. was the world's largest producer of lithium minerals (spodumene), which were mined from the southern end of the Greenbushes Mine. In 2000, the Greenbushes Mine, 300 km south of Perth, was the world's largest and highest grade spodumene resource. Gwalia Consolidated, which was also the world's largest producer of tantalum, supplied an estimated 25% of the world's annual tantalum requirements. Both commodities were extracted from two separate open cuts that are spaced about 300 m apart within the Greenbushes pegmatite ore body, which is one of the largest zoned rare metal pegmatites in the world. Additionally, Gwalia Consolidated produced tantalum from the Mount Cassiterite ore body at its Wodgina Mine, 100 km south of Port Hedland (Resource Information Unit, 2001, p. 412).

### **Mineral Fuels**

**Coal.**—In 2000, Australia again was the world's largest exporter of coal, as it has been since 1984, thus marking its 16th consecutive year. Coal exports during this period more than

doubled—from 72 Mt to 167 Mt. About 46% Australia's coal production of 366 Mt was exported in 2000; of that, about 70% was shipped to Japan, and the remainder, to other Asian markets (U.S. Energy Information Administration, June 2001, Australia—Coal, Country Analysis Brief, accessed July 5, 2001, at URL <http://www.eia.doe.gov/cabs/australi.html>). Virtually all production for export was based on the mining of black coal in New South Wales and Queensland, although all the Australian States produced coal. The Northern Territory had no coal production. The principal areas of coal production were the Bowen Basin in Queensland; Hunter Valley, Western Coalfield, and South Coast Coalfield in New South Wales; Leigh Creek in South Australia; Fingal in Tasmania; Latrobe Valley Coalfield (all brown coal) in Victoria; and near Bunbury in Western Australia. Coal exports were shipped from 11 terminals at 7 ports along the country's eastern coast.

In December, Rio Tinto acquired all the Australian assets of the Peabody Group of the United States for \$455 million along with assuming \$100 million of debt. The assets purchased from Peabody included the Bengalla Mine (40% share); the Ravensworth (100%)-Narama (50%) Mine; the Warkworth Mine (63.75%), all in New South Wales; and the Maora Mine (55%) in Queensland. These assets were all operated by Rio Tinto's wholly owned Coal and Allied Industries Ltd. (Resource Information Unit, 2001, p. 602). The purchase increased Rio Tinto's share of Australian coal production to about one-quarter of total output (about 92 Mt) (U.S. Energy Information Agency, June 2001, Australia—Coal, Country Analysis Brief, accessed July 5, 2001, at URL <http://www.eia.doe.gov/cabs/australi.html>).

**Petroleum and Natural Gas.**—In 2000, Australia produced about 80% of its crude oil requirements. About 45% of the crude oil and condensate was produced in Bass Strait between Tasmania and Victoria, and about 40% of the production was from the Carnarvon Basin, which was the next largest producer, off the northwestern coast of Western Australia. The Gippsland Basin in Victoria led the way as Australia's largest source of natural gas (about 30%) and liquefied petroleum gas (about 70%), and the North West Shelf Project was the source of Australia's liquefied natural gas (LNG) production. The North West Shelf Project is on the continental shelf, about 140 km offshore of Dampier, Western Australia.

Areas of active Australian oil exploration and development were located within and adjacent to the Zone of Cooperation Area (ZOCA) in the Timor Sea; the ZOCA, which was established in 1989 by the Timor Gap Treaty between Australia and Indonesia, was divided into three regions—one controlled by each country and a third jointly administered. Four major investors were operating in the Timor Gap—Phillips Petroleum Co., BHP Petroleum Pty. Ltd., Santos Ltd., and Shell Co. of Australia Ltd. Production from the Laminaria-Corallina Oilfields was begun in November by Woodside Petroleum Ltd. These fields were in the Timor Sea, about 550 km northwest of Darwin and 160 km south of the Island of Timor. Development of the fields was the first in this part of the Timor Sea, and its floating production, storage, and offloading facility was anticipated to become the primary infrastructure for other projects in the area. The nearest production facility was that of

BHP Petroleum in the Jabiru area, 175 km southwest of Laminaria. In Bass Strait, BHP Petroleum and joint-venture partner Esso Australia Ltd., which was the operator, produced about 200,000 barrels per day (bbl/d) of oil and 15.6 million cubic meters per day of natural gas from the offshore Gippsland Basin (U.S. Energy Information Administration, April 2000, Australia—Oil, Country Analysis Brief, accessed November 1, 2000, at URL <http://www.eia.doe.gov/emeu/cabs/australi.html>).

Australia has nine crude oil refineries with a total production capacity of 812,350 bbl/d. The largest facility was BP Amoco Refinery (Kwinana) Pty. Ltd.'s 138,000-bbl/d Kwinana Refinery. Restructuring Australia's refining industry has been becoming more necessary as a result of increased competition from Asian refineries that have excess capacities. Additionally, environmental standards will require new investment to stay in business. Since 1980, the number of refiners and marketers in Australia has fallen by more than 50%; two refineries have closed (U.S. Energy Information Administration, April 2000, Australia—Refining, Country Analysis Brief, accessed November 1, 2000, at URL <http://www.eia.doe.gov/emeu/cabs/australi.html>).

Australia's major oilfields in 2000 were Bass Strait, Corallina, Laminaria, Roller, Skate, and Wanea-Cossack. The major gasfields included Bass Strait, Cooper Basin, Goodwyn, Gorgon, and North Rankin.

The total number of petroleum exploration and development wells drilled during 2000 (201) was 25 more than that of 1999 (176). The number of onshore exploration wells drilled in 2000 (38) was 6 fewer than that of 1999 (44). During 2000, the number of offshore exploration wells drilled increased to 60 compared with that of 1999 when 51 wells were drilled. The total number of exploration wells drilled in 2000 (98) increased by 3% from the number drilled in 1999 (95). The total number of development wells drilled (103) was 22 more than that of 1999 (81); 79 wells were drilled onshore, which was an increase of 39 wells compared with that of 1999; and 24 were drilled offshore compared with 41 wells drilled in 1999. In 2000, the total meters drilled for exploration and development wells (470,322) was 12% more than that drilled in 1999 (419,999, revised). The 194,143 line kilometers of seismic survey activity during 2000 was about 19% less than that recorded in 1999 (Australian Geological Survey Organisation, 2001b).

A total of 31 oilfields and gasfields were discovered in 2000, which was 9 more than that of 1999. Petroleum discoveries offshore reached a record-level (22), of which 5 were oil, 9 gas, 7 gas plus condensate, and 1 oil and gas. Onshore petroleum discoveries (nine) included eight gas and one gas plus condensate (Australian Geological Survey Organisation, 2001b).

**Uranium.**—In 2000, production of uranium oxide ( $U_3O_8$ ) in Australia was increasing; three mines in or nearing production at yearend. Two mining-milling operations, the Ranger Mine in the Northern Territory and the huge polymetallic (copper-gold-silver-uranium) Olympic Dam Mine in South Australia, were in production throughout the year, and the Beverley Mine in South Australia started commissioning during the last quarter of 2000. Beverley, about 600 km north of Adelaide, was owned and operated by Heathgate Resources (a subsidiary of General

Atomics of the United States). Heathgate Resources was using in situ leach (ISL) technology that consisted of injection and recovery wells similar to common water bores; the ISL plant consisted of the two fundamental sections of capture and recovery (MESA Journal, 2001b).

## Reserves

Australia ranked as one of the leading mineral resource nations. It had the largest economic demonstrated resources (EDR) of lead, mineral sands, nickel, silver, tantalum, uranium, and zinc in the world. Its EDR also ranked in the top six worldwide for bauxite, black coal, brown coal, cobalt, copper, gem and near-gem diamond, gold, iron ore, lithium, manganese ore, rare-earth oxides, and vanadium (table 3; Australian Geological Survey Organisation, 2000, p. 5).

## Infrastructure

The transportation infrastructure of Australia was well developed. Of the 913,000 km of roads, 353,000 km was paved, which included 13,630 km of expressways, and 560,000 km were unpaved. Inland waterways, of which 8,368 km was usable mainly by small, shallow-draft craft, were of little importance to the transportation industry.

The public sector railway system consisted of 33,819 km of track, of which 15,422 km was standard (1.435-m) gauge, 14,506 km was narrow (1.067-m) gauge, 3,719 km was broad (1.600-m) gauge, and 172 km was dual gauge. Australia had 2,540 km of electrified rail. A few hundred kilometers of rail were privately owned; most of this served the iron ore industry in Western Australia. Of the 408 airports, 265 were principal with permanent-surface runways. International shipping ports included Adelaide, Brisbane, Cairns, Darwin, Devonport (Tasmania), Esperance, Fremantle, Geelong, Hobart (Tasmania), Launceston (Tasmania), Mackay, Melbourne, Sydney, and Townsville. The merchant marine fleet included 8 petroleum-oil-lubricant tankers, 4 chemical tankers, 4 liquefied natural gas tankers, and 39 bulk, roll-on/off, cargo-container freighters, and 2 passenger vessels.

Pipelines included 5,600 km for natural gas, 2,500 km for crude oil, and 500 km for refined petroleum products (U.S. Central Intelligence Agency, 2000, Australia—Transportation, World Factbook 2000, accessed July 27, 2001, at URL <http://www.odci.gov/cia/publications/factbook/geos/as.html>).

Electric generating capacity was 37.9 gigawatts, of which 89.3% was thermal (mostly coal) and 10.7% was hydroelectric power (U.S. Energy Information Administration, June 2001, Australia—Electric power, Country Analysis Brief, accessed July 5, 2001, at URL <http://www.eia.doe.gov/cabs/australi.html>).

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Australia, fiscal year.  
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Statistics, Preliminary, monthly.

TABLE 1  
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000	
<b>METALS</b>						
<b>Aluminum:</b>						
Bauxite, gross weight	thousand tons	43,063	44,465	44,553	48,416	53,802
Alumina	do.	13,348	13,385	13,853	14,532	15,680
<b>Metal, refined:</b>						
Primary	do.	1,372	1,495	1,627	1,718	1,769
Secondary		95,500	101,100	104,000	108,400	110,000 e/
Antimony, Sb content of ores and concentrates e/		1,800	1,900	1,800	1,679 r/ 2/	1,511 2/
<b>Cadmium:</b>						
Mine output, Cd content e/		1,900	1,900	1,900	1,900	1,900
Metal, smelter (refined)		639	632	585	462	552
Chromium, chromite, gross weight		7,000	--	80,000	70,000	90,000
<b>Cobalt:</b>						
Co content in laterite ore, Ni concentrate, and Zn concentrate		1,400	1,600	4,000 r/	7,000 r/	5,100
Metal, refined		--	617	1,395	1,700 r/	2,600
Columbium-tantalum concentrate, gross weight		920	1,010	1,150	1,230	1,600
<b>Copper:</b>						
Mine output, Cu content	thousand tons	547	558	607	739 r/	830
<b>Metal:</b>						
Smelter, primary	do.	261	208	236	334	393
<b>Refined:</b>						
Primary	thousand tons	311	271	285	412 r/	488
Secondary e/	do.	24	21	22	36	40
<b>Gold:</b>						
Mine output, Au content	kilograms	289,530	314,500	310,070 r/	310,070	296,410
<b>Metal:</b>						
<b>Refined:</b>						
Primary	do.	329,000	332,700	282,000	376,000 r/	349,000
Secondary	do.	3,620	900	127,000	66,000	7,640
<b>Iron and steel:</b>						
<b>Iron ore:</b>						
Gross weight	thousand tons	147,100	157,766	155,731	151,558 r/	170,999
Fe content	do.	93,000	97,901	99,418	93,807 r/	106,232
<b>Metal:</b>						
Pig iron	do.	7,774	7,884	7,724	7,468 r/	7,000 e/
<b>Ferrous alloys: e/</b>						
Ferromanganese		110,000	95,000	110,000	98,000 r/	115,000
Silicomanganese		95,000	95,000	105,000	116,000 r/	135,000
Total		205,000	190,000	215,000	214,000 r/	250,000
Steel, crude	thousand tons	8,415	8,769	8,886	8,481 r/	7,812
Semimanufactures e/		4,000	5,000	5,000	5,000	5,000
<b>Lead:</b>						
Mine output, Pb content	thousand tons	522	531	619	681	678
<b>Metal:</b>						
<b>Primary:</b>						
Bullion	do.	191	178	164	162 r/	139
Refined	do.	204	204	173	239	223
Total	do.	395	382	337	401 r/	362
Secondary excluding remelt	do.	24	34	33 r/	33 r/	28
<b>Manganese ore (metallurgical):</b>						
Gross weight	do.	2,109	2,136	1,500	1,900 r/	1,613
Mn content	do.	1,023	1,024	729	929 r/	787
<b>Nickel:</b>						
Mine output, Ni content	do.	113	123	144	127 r/	168
Metal, smelter (refined Ni and Ni content of oxide)	do.	74	74	81	83 r/	112
<b>Platinum-group metals: e/</b>						
Palladium, Pd content	kilograms	550 r/	400	800 r/	816 r/ 2/	400
Platinum, Pt content	do.	100	300 r/	150 r/	90 r/ 2/	100
Total	do.	650 r/	700 r/	950 r/	906 r/ 2/	500

See footnotes at end of table.



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

(Metric tons unless otherwise specified)

Commodity	1996	1997	1998	1999	2000
<b>METALS--Continued</b>					
Silver:					
Mine output, Ag content	1,013	1,106	1,474	1,720	2,060
Metal, refined	356	280	319	472	538
Tin:					
Mine output, Sn content	8,828	10,168	10,174	10,011 r/	9,146
Metal, refined:					
Primary	460	605	655	585	775
Secondary e/	300	300	300	300	300
Titanium concentrates, gross weight:					
Ilmenite	2,028	2,233	2,425	1,989	2,156
Leucoxene	33,000	32,000	31,000	31,000	27,000
Rutile	180,000	214,000	243,000	190,000	237,000
Zinc:					
Mine output, Zn content	1,071	1,035	1,066	1,163	1,410
Metal, smelter:					
Primary	326	307	311	344 r/	493
Secondary e/	4,500	11,000	9,000 r/	4,500 r/	4,500
Zirconium concentrates, gross weight	502	416	369	359 r/	373
<b>INDUSTRIAL MINERALS</b>					
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/	12,000	15,000	13,000	18,000 r/	20,000
Cement, hydraulic e/	6,250 r/	6,450 r/	6,850 r/	7,450 r/	7,500
Clays: e/					
Bentonite and bentonitic clay	79,200 r/	73,100 r/	104,000 r/	180,000 r/	180,000
Brick clay and shale	8,000	8,000	8,000	8,000	8,000
Cement clay and shale	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 (attapulgitic)	17,173 r/ 2/	28,262 r/ 2/	15,670 r/ 2/	5,639 r/ 2/	5,600
Kaolin and ball clay	210,000	220,000	180,000 r/	200,000 r/	200,000
Other	1,000	1,000	1,000	1,000	1,000
Diamond:					
Gem					
Gem	18,897	18,079	18,379	16,381 r/	14,656
Industrial	23,096	22,096	22,464	13,403 r/	11,992
Total	41,993	40,175	40,843	29,784 r/	26,648
Diatomite e/					
Diatomite e/	11,000	11,000	20,000	20,000	20,000
Feldspar including nepheline syenite e/					
Feldspar including nepheline syenite e/	65,800 r/	68,800 r/	65,500 r/	49,600 r/	50,000
Gemstones, other than diamond: e/					
Opal	\$100,000	\$110,000	\$126,000	\$150,000	\$152,000
Sapphire	\$50,000	\$60,000	\$40,000	\$50,000	\$40,000
Other	\$1,500	\$12,000	\$14,000	\$15,000	\$16,000
Total	\$151,500	\$182,000	\$180,000	\$215,000	\$208,000
Gypsum e/	1,800 r/	1,800 r/	1,900 r/	2,500 r/	3,800
Kyanite e/	800	800	800	1,000	1,000
Lime e/	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Magnesite	237,707	245,192	360,115	280,505	349,783
Nitrogen, N content of ammonia	446,400	432,400	430,500 r/	430,900	575,500
Perlite, crude e/	5,000	5,000	5,000	5,000	5,000
Phosphate rock e/	600	500 r/	800 r/	1,200 r/	805,000 2/
Salt	7,905	8,801	9,033	10,022 r/	8,798
Sillimanite e/ 3/	100	100	100	300 r/	300
Spodumene, concentrate	117,094	88,399	63,190	75,824	64,983

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		1996	1997	1998	1999	2000
<b>INDUSTRIAL MINERALS--Continued</b>						
Stone, sand and gravel: e/						
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
Limestone:						
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 san	do.	2,500	2,500	2,500	2,500	2,500
Other:						
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
Sulfur, byproduct:						
Metallurgy	do.	327	474	507	441 r/	654
Petroleum e/	do.	35	35	35	34	35
Total e/	do.	362	509	542	475 r/	689
Talc, chlorite, pyrophyllite, steatite e/		175,000 r/	185,000 r/	200,000 r/	190,000 r/	260,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal:						
Bituminous and subbituminous	thousand tons	199,800	216,490	285,000	293,000 r/	301,000
Lignite	do.	53,600	60,100	63,900	66,000 r/	65,000
Total	do.	253,400	276,590	348,900	359,000 r/	366,000
Coke, metallurgical e/	do.	325	325	325	325	325
Fuel briquets e/	do.	750	750	750	750	750
Gas, natural, marketed	million cubic meters	29,798	29,950	30,364	30,743 r/	30,794
Natural gas liquids	thousand 42-gallon barrels	23,379	25,896	26,116	47,097 r/	47,260
Peat e/	do.	15,000	20,000	20,000	20,000	20,000
Petroleum:						
Crude	thousand 42-gallon barrels	198,620	206,965	225,935	226,665	208,422
Refinery products:						
Gasoline:						
Aviation	do.	980	900	1,072	1,069 r/	975
Motor	do.	114,534	116,220	115,159	120,991 r/	113,228
Jet fuel	do.	31,673	34,082	33,277	33,610 r/	35,585
Kerosene	do.	1,882	534	510	704 r/	147
Distillate fuel oil	do.	80,471	84,847	82,947	84,833 r/	80,222
Residual fuel oil	do.	10,572	11,324	10,362	10,190 r/	12,442
Lubricants	do.	4,807	5,321	4,386	4,038 r/	4,284
Liquefied petroleum gas	do.	9,689	10,332	9,456	4,642 r/	10,536
Bitumen	do.	3,932	4,342	4,053	4,000	4,328
Unspecified	do.	6,445	6,512	5,976	6,932 r/	7,574
Total 4/	do.	264,985	274,414	267,198	271,009 r/	269,321
Uranium, mine output, U content		4,945	5,489	4,901	5,992 r/	7,588

e/ Estimated. r/ Revised. -- Zero.

1/ Includes data available through August 14, 2001.

2/ Reported figure.

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

4/ Excludes refinery fuel and losses.

TABLE 2  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/ 2/	Annual capacity e/
Alumina	Queensland Alumina Ltd., operator [Rio Tinto Corp., 30.3%; Kaiser Aluminum and Chemical Corp. (Australia ) Ltd., 28.3%; Alcan South Pacific Pty. Ltd., 21.4%; and Pechiney Australia Pty. Ltd., 20%]	Gladstone Refinery, QLD	3,650
Do.	Alcan Northern Territory Pty. Ltd., 70%; and Alcan South Pacific Pty. Ltd., 30%	Gove Refinery, NT	1,800
Do.	Alcoa World Alumina Australia, 100%	Kwinana Refinery, WA	1,900
Do.	do.	Pinjarra Refinery, WA	3,200
Do.	Alcoa World Alumina Australia, 60%; and Western Mining Corp., 40%	Wagerup Refinery near Waroona, WA	2,200
Do.	Worsley Alumina Pty. Ltd., manager [Billiton Aluminum Australia Pty. Ltd., 86%; Billiton plc, 30%; Kobe Alumina Associates (Australia) Pty. Ltd., 10%; and Nissho Iwai Alumina Pty. Ltd., 4.0%]	Worsley Refinery, 20 km NW of Collie, WA	3,100
Aluminium	Comalco Aluminium (Bell Bay) Ltd., 100%	Bell Bay Smelter, TAS	142
Do.	Boyne Island Smelters Ltd., operator (Rio Tinto Ltd., 64%; Sumitomo Light Metal Industries Ltd., 17%; Ryowa Development Pty. Ltd., 12%; Kobe Steel Ltd., 5%; and Sumitomo Chemical Co. Ltd., 2%)	Boyne Island Smelter, QLD	490
Do.	VAW Australia Pty. Ltd., 100%	Kurri Kurri Smelter, NSW	150
Do.	Alcoa World Alumina Australia, 100%	Point Henry Smelter, VIC	185
Do.	Alcoa World Alumina Australia, 45% and manager (China International Trust Investment Co., a People's Republic of China Government Agency, 22.5%; Marubeni Australia Pty. Ltd., 22.5%; and Eastern Aluminium Ltd., 10%)	Portland Smelter, VIC	345
Do.	Tomago Aluminium Co. Pty. Ltd., operator (Gove Aluminum Finance Ltd., 36%; Pechiney Australia Pty. Ltd., 36%; Australian Mutual Provident Society, 16%; and VAW Australia Pty. Ltd., 12%)	Tomago Smelter, NSW	440
Antimony	New England Antimony Mines NL, 100%	Hillgrove underground mine, 25 km E of Armidale, NSW	4
Bauxite	Alcan Northern Territory Pty. Ltd., 70%; and Alcan South Pacific Pty. Ltd., 30%	Gove open cut mine, Gove Peninsula, NT	7,000
Do.	Alcoa World Alumina Australia, 100%	Huntly open cut mine, 80 km S of Perth, WA	19,000
Do.	Comalco Ltd., operator Rio Tinto, 100%	Weipa-Andoom open cut mine, Weipa, QLD	12,000
Do.	do.	Willowdale open cut mine, 130 km S of Perth, WA	7,400
Do.	Worsley Alumina Pty. Ltd., manager [Billiton plc, 86%; Kobe Alumina Associates (Australia) Pty. Ltd., 10%; Nissho Iwai Alumina Pty. Ltd., 4%]	Worsley open cut mine, 50 km NE of Collie, WA	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 longwall mine, 16 km NW of Lithgow, NSW	2,250
Do.	BHP Steel (AIS) Pty. Ltd., 100%	Appin longwall mine, 40 NW of Wollongong, NSW	2,500
Do.	Oakbridge Pty. Ltd., 95%; and Sumisho Coal Development Pty. Ltd., 5%	Baal Bone longwall mine, 24 km NW of Lithgow, NSW	3,500
Do.	Coal Operations Australia Ltd., 100%	Bayswater open cut mine, 33 km NW of Singleton, 13 km SSW of Muswellbrook, NSW	5,000
Do.	Coal and Allied Industries Ltd., 40% and manager (Wesfarmers Bengalla Ltd., 40%; WCDA Bengalla Investment Pty. Ltd., 10%; and Taipower Bengalla Pty. Ltd., 10%)	Bengalla open cut mine, 5 km W of Muswellbrook, NSW	4,000

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities <sup>1/</sup>	Annual capacity <sup>e/</sup>
Coal, black--Continued:	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Blackwater open cut mine (includes South Blackwater), 195 km W of Rockhamton, QLD	13,500
Do.	Pacific Coal Pty. Ltd., manager [Queensland Coal Pty. Ltd., 57.195%; Leichhardt Coal Pty. Ltd., 31.416%; EPDC (Australia) Pty. Ltd., 7.973%; and Japan Coal Development Co. Ltd., 3.416%]	Blair Athol open cut mine, 110 km N of Emerald, QLD	11,000
Do.	Bloomfield Collieries Pty. Ltd., 100%	Bloomfield open cut mine, 20 km NW of Newcastle, NSW	2,000
Do.	Anglo Coal Australia Pty. Ltd., 100%	Boundary Hill open cut mine (includes Callide), 15 km to 140 km W of Gladstone, QLD	3,500
Do.	Oakbridge Pty. Ltd., 90%, manager, and Nippon Steel Australia Pty. Ltd., 10%	Bulga open cut/longwall mine, 16 km SW of Singleton, NSW (formerly Saxonvale Bulga)	9,000
Do.	RAG Coal International AG, manager (Burton Coal Pty. Ltd., 95%; and Thiess Pty. Ltd., 5%)	Burton open cut mine, 150 km SW of Mackay, QLD	4,000
Do.	Camberwell Coal Pty. Ltd., manager [Toyota Tsusho Mining (Australia) Pty. Ltd., 90%, and Dia Coal Mining (Australia) Pty. Ltd., 10%]	Camberwell open cut mine, 10 km NW of Singleton, NSW	4,000
Do.	Centennial Coal Co. Ltd., 85%, manager; and SK Australia Pty. Ltd., 15%	Clarence underground mine, 10 km E of Lithgow, NSW	2,200
Do.	MIM Holdings Ltd., manager (Collinsville Coal Co. Pty. Ltd., 75%; and Itochu Coal Resources Australia Pty. Ltd., 25%)	Collinsville open cut mine, 160 km WNW of Mackay, QLD	1,750
Do.	Powercoal Pty. Ltd., 100%, manager	Cooranbong underground mine, 35 km SW of Newcastle, NSW	1,600
Do.	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Crinum longwall mine, 45 km NE of Emerald, QLD	4,000
Do.	Cumnock No. 1 Colliery Pty. Ltd., 100%, manager	Cumnock No. 1 open cut/longwall mine, 28 km NW of Singleton, NSW	2,750
Do.	Wesfarmers Coal Ltd., 100%	Curragh open cut mine, 70 km E of Emerald, QLD	6,600
Do.	Anglo Coal Holdings Australia Ltd., 75%, manager [Marubeni Coal Pty. Ltd., 15%; Ssangyong Resources Ltd., 7%; and Showa Coal (NSW) Pty. Ltd., 3%]	Dartbrook longwall mine, 70 km N of Singleton, NSW	3,750
Do.	Anglo Coal Holdings Australia Ltd., 88.2%, manager [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 mine, 35 km NW of Singleton, NSW	5,000
Do.	Apollo Resources Pty. Ltd., manager (Ebenezer Mining Co., 100%)	Ebenezer open cut mine, 40 km SW of Brisbane, QLD	3,000
Do.	Illawarra Coke Co. Pty. Ltd., manager [BHP Steel (AIS) Pty. Ltd., 100%]	Elouera longwall mine, 15 km SW of Wollongong, NSW	2,500
Do.	Anglo Coal Holdings Australia Ltd., 72.81% of German Creek and 75.04% of German Creek East, manager. RAG Coal International AG, 27.19% of German Creek and Marubeni Coal Pty. Ltd., 24.96% of German Creek East	German Creek and German Creek East open cut/longwall mines, 275 km WNW of Rockhampton, QLD	10,000
Do.	BHP Ltd., 50% of Goonyella and 80% of Riverside, manager. Mitsubishi Development Pty. Ltd., 50% of Goonyella, and BHP Mitsui Coal Pty. Ltd., 20% of Riverside	Goonyella-Riverside open cut mines, 140 km SW of Mackay, QLD	11,000
Do.	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Gregory open cut mine, 60 km N of Emerald, QLD	5,500
Do.	Coal and Allied Industries Ltd., 100%, manager	Hunter Valley Operations (includes Howick, Hunter Valley No. 1, and Lemington open cut mines), 10 km W to 25 km N of Singleton, NSW	8,600
Do.	Pacific Coal Pty. Ltd., manager [Queensland Coal Pty. Ltd., 80%; and Mitsui and Co. (Australia) Ltd., 20%]	Kestrel longwall mine (formerly Gordonstone), 40 km NE of Emerald, QLD	3,300

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(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:	NRG Flinders, 100%	Leigh Creek open cut mine, 250 km N of Port Augusta, SA	3,000
Do.	Glencore Coal Australia Pty. Ltd., manager (G and A Coal Pty. Ltd., 33.75%; Gabamine Pty. Ltd., 33.75%; and Mitsui Matushima Australia Pty. Ltd., 32.5%)	Liddell open cut mine, 25 km NW of Singleton, NSW	4,000
Do.	Anglo Coal Australia Pty. Ltd., manager (Anglo Coal Holdings Australia Ltd., 88%; Nippon Steel Australia Pty. Ltd., 5%; Tomen Coal Resources Pty. Ltd., 3.75%; and private interests, 3.75%)	Moranbah North longwall mine, 150 km SW of Mackay, QLD	5,000
Do.	Coal and Allied Industries Ltd., 80%, manager; and Pohang Steel Australia Pty. Ltd., 20%	Mount Thorley open cut mine, 14 km SW of Singleton, NSW	6,500
Do.	Coal and Allied Industries Ltd., 55%, manager; and Mitsui and Co. Ltd. (Australia), 45%	Moura open cut mine, 185 km W of Gladstone, QLD	4,400
Do.	The Griffin Coal Mining Co. Pty. Ltd., 100%	Muja open cut mine, 18 km SE of Collie, WA	2,000
Do.	Apollo Resources Pty. Ltd., manager (Muswellbrook Coal Co. Ltd., 100%)	Muswellbrook No. 2 open cut mine, 4 km NE of Muswellbrook, Hunter Valley, NSW	1,850
Do.	Powercoal Pty. Ltd., 100%, manager	Myuna underground mine, 35 km S of Newcastle, NSW	3,000
Do.	MIM Holdings Ltd., manager (Newlands Coal Pty. Ltd., 75%; and Itochu Coal Resources Australia Pty. Ltd., 25%)	Newlands open cut/longwall Mine (includes Suttor Creek), 130 km W of Mackay, QLD	7,000
Do.	Powercoal Pty. Ltd., 100%, manager	Newstan longwall mine, 30 km SW of Newcastle, NSW	2,700
Do.	Thiess Contractors Pty. Ltd., manager (Thiess Pty. Ltd., 60%; and RAG Coal International AG, 40%)	North Goonyella longwall mine, 180 km W of Mackay, QLD	5,000
Do.	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Norwich Park open cut mine, 85 km NNE of Emerald, QLD	4,000
Do.	MIM Holdings Ltd., manager (Oak Creek Coal Pty. Ltd., 75%; Sumitomo Coal Australia Pty. Ltd., 15%; and Itochu Coal Resources Australia Pty. Ltd., 10%)	Oaky Creek longwall Mine (includes Alliance), 300 km WNW of Rockhampton, QLD	4,300
Do.	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Peak Downs open cut mine, 145 km N of Emerald, QLD	7,500
Do.	Wesfarmers Coal Ltd., 100%	Premier open cut mine, 10 km SE of Collie, WA	3,000
Do.	Coal and Allied Industries Ltd., manager, 100% at Ravensworth, 50% at Narama, and Iluka Resources Ltd., 50% at Narama	Ravensworth-Narama open cut mine (includes Ravensworth East), at Lemington, 20 km NW of Singleton, NSW	6,200
Do.	BHP Queensland Coal, manager (BHP Ltd., 50%; and Mitsubishi Development Pty. Ltd., 50%)	Saraji open cut mine, 125 km N of Emerald, QLD	4,900
Do.	G.C. Springvale Pty. Ltd., 50%, manager, and Samsung Development (Australia) Pty. Ltd., 50%	Springvale longwall mine, 16 km NW of Lithgow, NSW	2,000
Do.	Austral Coal Ltd., 100%, manager	Tahmoor longwall mine (includes Tahmoor North and Bargo), near Picton, about 70 km SW of Sydney, NSW	2,000
Do.	Pacific Coal Pty. Ltd., manager (Queensland Coal Pty. Ltd., 100%)	Tarong-Meandu open cut mine, 85 km N of Toowoomba, QLD	5,500
Do.	Illawarra Coke Co. Pty. Ltd., manager [BHP Steel (AIS) Pty. Ltd., 100%]	Tower longwall mine, 32 km NW of Wollongong, NSW	2,000
Do.	Glencore Coal Australia Pty. Ltd., 90%, manager, and Mitsubishi Development Pty. Ltd., 10%	Ulan open cut/longwall mine, 45 km NW of Mudgee, NSW	5,500
Do.	Wambo Mining Corp. Pty. Ltd., 100%	Wambo longwall mine, 15 km W of Singleton	3,000
Do.	Coal and Allied Industries, Ltd., 63.75%, manager; Mitsubishi Coal Development Pty. Ltd., 22.75%; Nippon Steel Australia Pty. Ltd., 7.5%; and Mitsubishi Corp., 6%	Warkworth open cut mine, 11 km SW of Singleton, NSW	5,000
Do.	Illawarra Coke Co. Pty. Ltd., manager [BHP Steel (AIS) Pty. Ltd., 100%]	West Cliff longwall mine, 43 km NW of Wollongong, NSW	3,000

See footnotes at end of table.

TABLE 2--Continued  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(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:	Glencore Coal Australia Pty. Ltd., manager [Oceanic Coal Australia Ltd., 70%; Marubeni Coal Pty. Ltd., 17%; Ocal Macquarie Pty. Ltd., 10%; and Kokan Kogyo (Australia) Pty. Ltd., 3%]	West Wallsend longwall mine, 25 km SW of Newcastle, NSW	2,400
Do.	Powercoal Pty. Ltd., 100%	Wyee longwall mine, 40 km S of Newcastle, NSW	1,800
Coal, brown	Alcoa World Alumina Australia, 100%	Anglesea open cut mine, 97 km, near Geelong, SW of Melbourne, VIC	1,200
Do.	Hazelwood Power Corp., 100%	Hazelwood open cut mine, at Morwell 150 km SE of Melbourne, VIC	19,500
Do.	Loy Yang Power Ltd., 100%	Loy Yang open cut mine, at Traralgon, 165 km E of Melbourne, VIC	32,000
Do.	Yallourn Energy Pty. Ltd., manager (Auspower Pty. Ltd., 92%; and Deutsche Asset Management, 8%)	Yallourn open cut mine, 140 km SE of Melbourne, VIC	18,500
Cobalt	Preston Resources Ltd., 100%	Bulong open cut mine, 30 km E of Kalgoorlie, WA	1
Do.	Centaur Mining and Exploration Ltd., 100%	Cawse open cut mine, 50 km NW of Kalgoorlie, WA	2
Do.	Jubilee Mines NL, 100%	Cosmos open cut mine, 50 km N of Leinster, WA	1
Do.	Anaconda Nickel Ltd., 60%, manager; and Glencore International AG, 40%	Murrin Murrin open cut mine, 60 km E of Leonora, WA	8
Do.	QNI Ltd., 100%	Yabulu Refinery, Townsville, QLD	2
Copper	Newcrest Mining Ltd., 100%	Cadia Hill open cut mine (includes Cadia East, Cadia Far East, and Cadia Quarry), 21 km SSW of Orange, NSW	7
Do.	Glencore Australia Pty. Ltd., 100%	Cobar underground mine, 10 km NW of Cobar, NSW	30
Do.	MIM Holdings Ltd., 51%, manager; and Westpac Banking Corp., 49%	Ernest Henry open cut mine, 35 km NE of Cloncurry, QLD	55
Do.	Normandy Mining Ltd., manager (Murchison Zinc Co. Pty. Ltd., 100%)	Golden Grove underground mine includes Gossan Hill and Scuddles), 225 km E of Geraldton, WA	6
Do.	Sterlite Industries (India) Ltd., 70%, and BML Holdings Pty. Ltd., 30%, in Highway; Thalanga Copper Mines Pty. Ltd., 68.85%, and Surfboard Ltd., 31.15% in Reward	Highway-Reward open cut mine, 37 km S of Charters Towers, QLD	185
Do.	Matrix Metals Ltd., 100%	Mount Cuthbert open cut mine (includes Mount Watson), 90 km NW of Cloncurry, QLD	8
Do.	Western Metals Ltd., 100%	Mount Gordon open cut mine (formerly Gunpowder; includes Esperanza and Mammoth), 125 kilometers N of Mount Isa, QLD	50
Do.	MIM Holdings Ltd., 100%	Mount Isa underground mines (includes Enterprise, George Fisher, and Hilton mines), at Mount Isa, QLD	250
Do.	do.	Mount Isa Smelter, QLD	255
Do.	Copper Mines of Tasmania Pty. Ltd., 100%	Mount Lyell underground mine, 2 km NE of Queenstown, TAS	25
Do.	Straits (Nifty) Pty. Ltd., 100%	Nifty open cut mine, 200 km SE of Marble Bar, WA	16
Do.	North Ltd., 80%, manager; Sumitomo Metal Mining Oceania Pty. Ltd., 13.3%; and SC Mineral Resources Pty. Ltd., 6.7%	Northparkes open cut/underground mine, 27 km N of Parkes, NSW	55
Do.	WMC Olympic Dam Operations Pty. Ltd., 100%	Olympic Dam underground mine, 80 km N of Woomera, SA	200
Do.	do.	Olympic Dam Refinery, SA	200
Do.	do.	Olympic Dam Smelter, SA	70
Do.	Placer Dome Asia Pacific Ltd., 100%	Osborne underground mine, 195 km SE of Mount Isa, QLD	50

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Copper--Continued:		Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, 8 km S of Cobar, NSW	3
Do.		Furukawa Co. Ltd., 52.5%; Nittetsu Mining Co., 20%; Nissho Iwai Corp. 17.5%; and Itochu Corp., 10%	Port Kembla Smelter, NSW	120
Do.		Pasminco Ltd., 100%	Rosebery underground mine, 35 km N of Queenstown, TAS	4
Do.		Selwyn Mines Australia Ltd., 100%	Selwyn open cut/underground mine, 150 km SE of Mount Isa, QLD	16
Do.		Copper Refineries Pty. Ltd., operator (MIM Holdings Ltd., 100%)	Townsville Refinery, QLD	270
Diamond	thousand carats	Argyle Diamond Mines Pty. Ltd., manager (Rio Tinto Ltd., 95%; and Western Australian Diamont Trust, 5%)	Argyle Mine (AK-1 lamproite pipe and alluvial deposits), 120 km SW of Kununurra, WA	42,000
Do.	do.	Cluff Resources Pacific NL, 100%	Bingara open cut mine, 50 km WSW of Inverell, NSW	1
Do.	do.	Rio Tinto Ltd., 100%	Merlin open cut mine, 80 km S of Borrooloola, NT	180
Diatomite		Australian Diatomite Mining Pty. Ltd., 100%	Barraba open cut mine, 85 km NNW of Tamworth, NSW	205
Garnet		GMA Garnet Pty. Ltd., 100%	Port Gregory open cut mine, 100 km N of Geraldton, WA	200
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 km offshore from Dampier, WA	60
Gas, natural	million cubic meters per day	do.	North West Shelf operations, 130 km offshore from Dampier, WA	20
Gas, liquefied natural	million tons per year	do.	Three-train liquefaction plant, Burrup Peninsula, WA	8
Gold	kilograms	WMC Ltd., 100%	Agnew open cut-underground mine, 23 km W of Leinster, WA	4,000
Do.	do.	New Hampton Goldfields Ltd., 100%	Big Bell Consolidated open cut/under- ground mine (includes Great Fingall and Golden Crown), 30 kilometers NW of Cue (Big Bell) and 7 km S of Cue (Golden Crown), WA	7,000
Do.	do.	Worsley Alumina Pty. Ltd., manager (Normandy Mining Ltd., 44.45%; Anglogold Ltd., 33.33%; and Newcrest Mining Ltd., 22.22%)	Boddington open cut/underground mine (includes Wandoo and Hedges), 150 km SE of Perth, WA	12,000
		Normandy Yandal Operations Ltd., 100%	Bronzewing open cut/underground mine (includes Mount McClure), 65 km NE of Leinster, WA	9,000
Do.	do.	Newcrest Mining Ltd., 100%	Cadia Hill open cut mine (includes Cadia East, Cadia Far East, and Cadia Quarry) 21 km S SW of Orange, NSW	11,000
Do.		MIM Holdings Ltd., 51%, manager, and Westpac Banking Corp., 49%	Ernest Henry open cut mine, 35 km NE of Cloncurry, QLD	4,000
Do.	do.	Normandy NFM Ltd., 100%	Granites-Dead Bullock Soak open cut/ underground mine, 550 km NW of Alice Springs, in the Tanami Desert, NT	7,000
Do.	do.	Placer Dome Asia Pacific Ltd., manager (Placer Dome Inc., 60%; and Delta Gold Ltd., 40%)	Granny Smith open cut mine (includes Sunrise and Wallaby), 20 km S of Laverton, WA	16,000
Do.	do.	Goldfields Ltd., 100%	Henty underground mine, 30 km N of Queenstown, TAS	2,800
Do.	do.	Hill 50 Gold NL, 100%	Hill 50 open cut/underground mine (includes Star, Reno, Titan, Black Cat South, and Milky Way), 2 km from Mount Magnet, WA	4,000
Do.	do.	Normandy Yandal Operations Ltd., 100%	Jundee-Nimary open cut/underground mine, 45 km NE of Wiluna, WA	12,000

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Gold--Continued:	kilograms	Australian Gold Refineries, 100% (State of WA agency)	Kalgoorlie Refinery, WA	46,000
Do.	do.	Delta Gold NL, 100%	Kanowna Belle open cut/underground mine, 18 km NE of Kalgoorlie, WA	10,000
Do.	do.	Kidston Gold Mines Ltd., 100%	Kidston open cut mine, 260 km SW of Cairns, QLD	7,000
Do.	do.	Sons of Gwalia Ltd., 100%	Marvel Loch Operations (formerly Marvel Loch-Southern Cross) open cut/underground mines, 30 km SE of Southern Cross	3,000
Do.	do.	Saint Barbara Mines Ltd., 100%	Meekatharra open cut mine (includes Bluebird), 20 km S of Meekatharra, WA	4,000
Do.	do.	Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager (Homestake Mining Co., 50%; and Normandy Mining Ltd., 50%)	Mount Charlotte underground mine at Kalgoorlie, WA	4,300
Do.	do.	Normandy Mount Leyshon Ltd., 100%	Mount Leyshon open cut mine, 24 km Sof Charters Towers, QLD	9,000
Do.	do.	Central Norseman Gold Corp. Ltd., 100%	Norseman open cut/underground mine at Norseman, WA	3,700
Do.	do.	North Ltd., 80%, manager; Sumitomo Metal Mining Oceania Pty. Ltd., 13.3%; and SC Mineral Resourcers Pty. Ltd., 6.7%	Northparkes open cut/underground mine, 27 km N of Parkes, NSW	3,500
Do.	do.	WMC Olympic Dam Operations Pty. Ltd., 100%	Olympic Dam underground mine, 80 km N of Woomera, SA	1,500
Do.	do.	MIM Holdings Ltd., 100%	Pacific precious metals refinery, NSW	1,900
Do.	do.	Paddington Gold Pty. Ltd., 100%	Paddington open cut mine, 35 km NW of Kalgoorlie, WA	4,100
Do.	do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, 8 km S of Cobar, NSW	4,700
Do.	do.	Australian Gold Refineries, 100% (State of WA agency)	Perth Refinery (Newburn), WA	95,000
Do.	do.	Homestake Mining Co., 100%	Plutonic open cut/underground mine, 180 km NE of Meekatharra, WA	8,000
Do.	do.	Carpentaria Gold Pty. Ltd., 50.1%, manager, and Haoma Mining NL, 49.9%	Ravenswood open cut mine (includes Nolans, Sarsfield, and Mount Wright), 100 km S of Townsville, QLD	2,000
Do.	do.	WMC Ltd., 100%	Saint Ives open cut/underground mine, 75 km SSE of Kalgoorlie, WA	13,000
Do.	do.	Sons of Gwalia Ltd., 100%	Sons of Gwalia open cut mine (includes Red October, Harlech, McGraths, Kailis, and Anchor), 5 km W of Leonora, WA	14,000
Do.	do.	Mining Project Investors Gold Pty. Ltd., 50%; and Pittston Mineral Ventures of Australia Pty. Ltd., 50%	Stawell underground mine, 240 km W of Melbourne, VIC	2,700
Do.	do.	AngloGold Australia Ltd., 100%	Sunrise Dam open cut mine (includes Cleo), 60 km S of Laverton, WA	7,000
Do.	do.	Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager (Homestake Mining Co., 50%; and Normandy Mining Ltd., 50%)	Super Pit (includes Fimiston) open cut operation, at the SE corner of the Kalgoorlie-Boulder Township, WA	22,000
Do.	do.	Otter Gold Mines Ltd., 60%, manager; and AngloGold Ltd., 40%	Tanami open cut mine (includes Central Desert Joint Venture), 650 km NW of Alice Springs, NT	11,000
Do.	do.	PacMin Mining Corp. Ltd., 100%	Tarmoola open cut, 29 km NW of Leonora, WA	8,000
Do.	do.	Newcrest Mining Ltd., 100%	Telfer open cut/underground mine at Telfer, WA	9,000
Do.	do.	Normandy Gold Ltd., 100%	Tennant Creek open cut/underground mines, 25 to 50 km NW of Tennant Creek, NT	4,000
Do.	do.	Wiluna Mines Ltd., 100%	Wiluna open cut/underground mine, 7 km S of Wiluna, WA	3,300
Ilmenite		Iluka Resources Ltd., 100%	Eneabba open cut mine, 270 km N of Perth, WA	600

See footnotes at end of table.



TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Ilmenite--Continued:	Mineral Deposits Ltd., 100%	Hawks Nest Dredge (includes Fullerton and Viney Creek), 50 km NE of Newcastle, NSW	10
Do.	Cable Sands (WA) Pty. Ltd., 100%	Jangardup Dredge, 50 km S of Nannup, WA	100
Do.	Consolidated Rutile Ltd., 100%	North Stradbroke Island Dredge (includes Herring-Enterprise, Ibis, and Yarraman), 35 km E of Brisbane, QLD	200
Do.	Cable Sands (WA) Pty. Ltd., 100%	Sandalwood open cut mine, 30 km NNE of Bunbury, WA	50
Do.	Tiwest Joint Venture, operator (KMCC Western Australia Pty. Ltd., 50%, and Ticolor Resources Pty. Ltd., 50%)	Tiwest Joint Venture (formerly Cooljarloo) Dredge, 180 km N of Perth, WA	480
Do.	do.	Yoganup open cut mine, 7 km E of Capel, WA	645
Iron ore	Hamersley Iron Pty. Ltd., 60%; and China Iron and Steel Industry and Trade Group Corp. (a People's Republic of China Government Agency), 40%	Channar open cut mine, 70 kilometers S of Tom Price, WA	10,000
Do.	Henry Walker Eltin Ltd., operator (BHP Ltd., 100%)	Cockatoo Island Mine and stockpile, 130 km NNE of Derby, WA	750
Do.	Hamersley Iron Pty. Ltd., 100%	Hamersley Operations (includes Brockman No. 2, Marandoo, Mount Tom Price, Nammuldi, Paraburdoo, and Yandicoogina), 30 to 85 km NE, NW, and S of Tom Price, WA	81,000
Do.	BHP Minerals Pty. Ltd., 100%	Jimblebar open cut mine, 40 km E of Newman, WA	6,000
Do.	Portman Iron Ore Ltd., 100%	Koolyanobbing open cut mine, 50 km NNE of Southern Cross, WA	3,500
Do.	BHP Iron Ore Pty. Ltd., 85%, manager; CI Minerals Australia Pty. Ltd., 8%; and Mitsui Iron Ore Corp. Pty. Ltd., 7%	Mount Goldsworthy open cut mine (includes Yarrrie), 180 km E of Port Hedland, WA	8,000
Do.	Saint Barbara Mines Ltd., 100%	Mount Gould open cut mine, 160 km W of Meekatharra, WA	6,000
Do.	BHP Minerals Pty. Ltd., 85%, manager (Mitsui Itochu Iron Ltd., 10%; and CI Minerals Australia Pty. Ltd., 5%)	Mount Newman (includes Mount Whaleback, Orebody 23-25, Orebody 29, and Orebody 30) open cut mines, 13 km within Newman, WA	35,000
Do.	Robe River Iron Associates, manager (Rio Tinto 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-Deeppdale open cut mine (includes Mesa J) 130 kilometer SSW of Dampier, WA	31,000
Do.	ABM Mining Ltd., 100%	Savage River open cut mine (includes Long Plains), 100 km SW of Burnie, TAS	2,400
Do.	OneSteel Ltd., 100%	Whyalla Mines (formerly Middleback Range) open cut mine, 270 km NW of Adelaide, SA	2,600
Do.	BHP 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 mine, 92 km N of Newman, WA	25,000
Lead	Pasminco Broken Hill Mine Pty. Ltd., 100%	Broken Hill open cut/underground mine at Broken Hill, NSW	82
Do.	BHP Minerals Pty. Ltd., 100%	Cannington underground mine, 200 km SE of Mount Isa, QLD	140
Do.	Pasminco Century Mine Ltd., 100%	Century open cut mine, 250 km NW of Mount Isa, QLD	70
Do.	do.	Cockle Creek Smelter, NSW	30
Do.	do.	Elura underground mine, 40 km NW of Cobar, NSW	45
Do.	McArthur River Mining Pty. Ltd., operator (MIM Holdings Ltd., 70%, and ANT Minerals Pty. Ltd., 30%)	McArthur River underground mine, 430 km NNE of Tennant Creek, NT	26

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/	
Lead--Continued:	MIM Holdings Ltd., 100%	Mount Isa underground mines (includes Enterprise, George Fisher, and Hilton mines), at Mount Isa, QLD	150	
Do.	MIM Holdings Ltd., 100%	Mount Isa Smelter, QLD	240	
Do.	Pasminco Ltd., 100%	Port Pirie Refinery-Smelter, SA	250	
Do.	do.	Rosebery underground mine, 35 km N of Queenstown, TAS	15	
Leucoxene	Tiwest Joint Venture, operator (KMCC Western Australia Pty. Ltd., 50%; and Ticom Resources Pty. Ltd., 50%)	Tiwest Joint Venture (formerly Cooljarloo) Dredge, 180 km N of Perth, WA	480	
Do.	do.	Yoganup open cut mine, 7 km E of Capel, WA	10	
Magnesite	Queensland Metals Ltd., 100%	Kunwarara open cut mine (includes QMAG, CEMAG, ENVIROMAG, MAGMETAL, and Marlborough), 70 km NW of Rockhampton, QLD	3,000	
Manganese	Groote Eylandt Mining Co. Pty. Ltd., 100%	Groote Eylandt open cut mine at Groote Eylandt, NT	2,400	
Do.	Pilbara Manganese Pty. Ltd., 100%	Woodie Woodie open cut mine (includes Bells and East Pilbara leases), 400 km SE of Port Hedland, WA	300	
Manganese alloys	Tasmanian Electro Metallurgical Co. Pty. Ltd., 100%	Bell Bay Smelter, TAS	260	
Nickel	Outokumpu Exploration Ventures Pty. Ltd., 100%	Black Swan (includes Silver Swan) underground mine, 53 km NE of Kalgoorlie, WA	21	
Do.	Preston Resources Ltd., 100%	Bulong open cut mine, 30 km E of Kalgoorlie, WA	9	
Do.	Centaur Mining and Exploration Ltd., 100%	Cawse open cut mine, 50 km NW of Kalgoorlie, WA	9	
Do.	WMC Resources Ltd., 100%	Kalgoorlie Smelter, WA	100	
Do.	do.	Kambalda Nickel Operations, 25 km N of Kambalda to 10 km S of Widgiemooltha, WA	35	
Do.	do.	Kwinana Refinery, WA	67	
Do.	do.	Leinster Nickel Operations, 10 km N of Leinster, WA	44	
Do.	do.	Mount Keith Mine, 70 km SSE of Wiluna, WA	42	
Do.	Anaconda Nickel Ltd., 60%, manager; and Glencore International AG, 40%	Murrin Murrin open cut mine, 60 km E of Leonora, WA	100	
Do.	Titan Resources NL, 100%	Radio Hill underground mine (includes Mount Sholl), 35 km S of Karratha, WA	4	
Do.	Billiton (Australia) Pty. Ltd., 100%	Yabulu Refinery, QLD	29	
Opal	Many small producers	Andamooka and Coober Pedy areas, SA; Lightning Ridge area, NSW	NA	
Petroleum thousand 42-gallon barrels per day	Mobile Refining Australia Pty. Ltd., 100%	Altona Refinery, VIC	120	
Do.	do.	BP Amoco Refinery (Bulwer Island) Pty. Ltd., 100%	Bulwer Island Refinery, QLD	69
Do.	do.	Shell Refining (Australia) Pty. Ltd., 100%	Clyde Refinery, NSW	85
Do.	do.	do.	Geelong Refinery, VIC	110
Do.	do.	Caltex Refineries (NSW) Ltd., 100%	Kurnell Refinery, NSW	114
Do.	do.	BP Amoco Refinery (Kwinana) Pty. Ltd., 100%	Kwinana Refinery, WA	138
Do.	do.	Caltex Refineries (QLD) Ltd., 100%	Lytton Refinery, QLD	106
Do.	do.	Mobile Refining Australia Pty. Ltd., 100%	Port Stanvac Refinery, SA	69
Phosphate	WMC Fertilizers Ltd., 100%	Phosphate Hill-Duchess open cut mine 140 km NW of Mount Isa, QLD	2,200	
Rutile	Iluka Resources Ltd., 100%	Eneabba open cut mine, 270 km N of Perth, WA	120	
Do.	Mineral Deposits Ltd., 100%	Hawks Nest Dredge (includes Fullerton and Viney Creek), 50 km NE of Newcastle, NSW	35	

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Rutile--Continued:		Cable Sands (WA) Pty. Ltd., 100%	Jangardup Dredge, 50 km S of Nannup, WA	100
Do.		Consolidated Rutile Ltd., 100%	North Stradbroke Island Dredge (includes Herring-Enterprise, Ibis, and Yarraman), 35 km E of Brisbane, QLD	80
Do.		Cable Sands (WA) Pty. Ltd., 100%	Sandalwood open cut mine, 30 km NNE of Bunbury, WA	50
Do.		Tiwest Joint Venture, operator (KMCC Western Australia Pty. Ltd., 50%, and Tigor Resources Pty. Ltd., 50%)	Tiwest Joint Venture (formerly Cooljarloo) Dredge, 180 km N of Perth, WA	35
Do.		Murray Basin Titanium Pty. Ltd., 100%	Wemen Dredge (includes Jacks Tank, Cylinder, and Twelve Mile- Gift), 210 km SE of Broken Hill, NSW	32
Do.		do.	Yoganup open cut mine, 7 km E of Capel, WA	260
Salt		Cargill Salt Co., 100%	Cargill Salt solar salt fields, at Port Hedland, WA	3,000
Do.		Dampier Salt Ltd., 100%	Dampier and Lake Macleod solar evaporation ponds near Dampier and 65 km N of Carnarvon, WA, respectively	4,500
Silver	kilograms	Pasminco Broken Hill Mine Pty. Ltd., 100%	Broken Hill open cut/underground mine at Broken Hill, NSW	52,000
Do.	do.	BHP Minerals Pty. Ltd., 100%	Cannington underground mine, 200 km SE of Mount Isa, QLD	750,000
Do.	do.	Pasminco Century Mine Ltd., 100%	Century open cut mine, 250 km NW of Mount Isa, QLD	3,000
Do.	do.	do.	Elura underground mine, 40 km NW of Cobar, NSW	35,000
Do.	do.	McArthur River Mining Pty. Ltd., operator (MIM Holdings Ltd., 70%; and ANT Minerals Pty. Ltd., 30%)	McArthur River underground mine, 430 km NNE of Tennant Creek, NT	28,000
Do.		MIM Holdings Ltd., 100%	Mount Isa underground mines (includes Enterprise, George Fisher, and Hilton mines), at Mount Isa, QLD	375,000
Do.	do.	WMC Olympic Dam Operations Pty. Ltd., 100%	Olympic Dam underground mine, 80 km N of Woomera, SA	12,900
Do.	do.	Peak Gold Mines Pty. Ltd., 100%	Peak underground mine, 8 km S of Cobar, NSW	20,000
Do.	do.	Pasminco Ltd., 100%	Rosebery underground mine, 35 km N of Queenstown, TAS	20,000
Spodumene	do.	Gwalia Consolidated Ltd., 100%	Greenbushes open cut mine, 70 km SE of Bunbury, WA	100
Steel		BHP Steel (AIS) Pty. 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 mine, 330 km N of Perth, WA	200
Tantalite	pounds Ta <sub>2</sub> O <sub>5</sub>	Gwalia Consolidated Ltd., 100%	Greenbushes open cut mine, 70 km SE of Bunbury, WA	600,000
Do.	do.	do.	Wodgina open cut mine, 100 km S of Port Hedland, WA	500,000
Tin		do.	Greenbushes open cut mine, 70 km SE of Bunbury, WA	1
Do.		Gwalia Consolidated Ltd., 100%	Greenbushes Smelter, WA	1
Do.		Murchison United NL, 100%	Renison Bell underground mine, 136 km S of Burnie, TAS	6

See footnotes at end of table.

TABLE 2--Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2000

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities 1/	Annual capacity e/
Uranium	tons U <sub>3</sub> O <sub>8</sub> Heathgate Resources Pty. Ltd., 100%	Beverley in situ leach operation, 300 km NE of Port Augusta, SA	900
Do.	do. WMC Olympic Dam Operations Pty. Ltd., 100%	Olympic Dam underground mine, 80 km N of Woomera, SA	1,500
Do.	do. Energy Resources of Australia Ltd., 100%	Ranger open cut mine, 230 km E of Darwin, NT	4,500
Vanadium	tons V <sub>2</sub> O <sub>5</sub> Xstrata Windimurra Pty. Ltd., 100%	Windimurra open cut mine, 100 km ESE of Mount Magnet, WA	8
Zinc	Pasminco Broken Hill Mine Pty. Ltd., 100%	Broken Hill open cut/underground mine at Broken Hill, NSW	350
Do.	BHP Minerals Pty. Ltd., 100%	Cannington underground mine, 200 km SE of Mount Isa, QLD	40
Do.	Pasminco Century Mine Ltd., 100%	Century open cut mine, 250 km NW of Mount Isa, QLD	500
Do.	do.	Cockle Creek Smelter, NSW	85
Do.	do.	Elura underground mine, 40 km NW of Cobar, NSW	125
Do.	Normandy Mining Ltd., manager (Murchison Zinc Co. Pty. Ltd., 100%)	Golden Grove underground mine (includes Gossan Hill and Scuddles), 225 km E of Geraldton, WA	150
Do.	McArthur River Mining Pty. Ltd., operator (MIM Holdings Ltd., 70%; and ANT Minerals Pty. Ltd., 30%)	McArthur River underground mine, 430 km NNE of Tennant Creek, NT	95
Do.	MIM Holdings Ltd., 100%	Mount Isa underground mines (includes Enterprise, George Fisher, and Hilton mines), at Mount Isa, QLD	250
Do.	Pasminco Ltd., 100%	Port Pirie Refinery-Smelter, SA	45
Do.	do.	Ridson Refinery, TAS	220
Do.	do.	Rosebery underground mine, 35 km N of Queenstown, TAS	45
Zircon	Iluka Resources Ltd., 100%	Eneabba open cut mine, 270 km N of Perth, WA	300
Do.	Mineral Deposits Ltd., 100%	Hawks Nest Dredge (includes Fullerton and Viney Creek), 50 km NE of Newcastle, NSW	25
Do.	Tiwest Joint Venture, operator (KMCC Western Australia Pty. Ltd., 50%; and Ticom Resources Pty. Ltd., 50%)	Tiwest Joint Venture (formerly Cooljarloo) Dredge, 180 km N of Perth, WA	35
Do.	Murray Basin Titanium Pty. Ltd., 100%	Wemen Dredge (includes Jacks Tank, Cylinder, and Twelve Mile-Birthday Gift), 210 km SE of Broken Hill, NSW	10
Do.	do.	Yoganup open cut mine, 7 km E of Capel, WA	50

e/ Estimated. NA Not available.

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

2/ Other abbreviations: Km kilometers; N north; NNE north-northeast; NE northeast; E east; SE southeast; SSE south-southeast; S south; SSW south-southwest; SW southwest; WSW west-southwest; W west; WNW west-northwest; NW Northwest; NNW north-northwest.

Table 3  
 AUSTRALIA: RESERVES OF MAJOR MINERAL COMMODITIES IN 1999 1/

Commodity	Reserves
Antimony	78.5
Bauxite	million metric tons 3,764.0
Black coal:	
In situ	billion metric tons 64.9
Recoverable	do. 44.4
Brown coal:	
In situ	do. 41.9
Recoverable	do. 37.7
Cadmium	108.8
Cobalt	878.0
Columbium (niobium)	16.1
Copper	million metric tons 22.2
Diamond:	
Gem and near gem	million carats 82.4
Industrial	do. 85.5
Gold	metric tons 5,018.0
Iron ore	billion metric tons 15.5
Lead	million metric tons 14.6
Lithium	156.0
Magnesite (MgCO <sub>3</sub> )	million metric tons 245.9
Manganese ore	do. 134.3
Mineral sands:	
Ilmenite	do. 180.9
Rutile	do. 19.8
Zircon	do. 26.3
Nickel	do. 10.6
Petroleum, recoverable:	
Condensate	billion liters 192.0
Crude	do. 266.0
Liquefied petroleum gas	do. 184.0
Natural gas	billion cubic meters 1,494.0
Platinum-group metals (Pd, Pt)	metric tons 36.1
Rare earths (REO 2/ plus Y <sub>2</sub> O <sub>3</sub> )	million metric tons 0.8
Silver	31.2
Tantalum	24.7
Tin	100.9
Tungsten	1.0
Uranium, recoverable	571.0
Vanadium	180.0
Zinc	million metric tons 32.0

1/ Latest year for which data are available.

2/ Rare-earth oxides.

Source: Australian Geological Survey Organization, 2000, Australia's Identified Mineral Resources 2000: Canberra, Australian Geological Survey Organization, p. 7.