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The Mineral Industry of Australia

By Pui-Kwan Tse

Australia was one of the world's leading mineral producing countries and ranked among the top 10 countries in the world in the production of bauxite, coal, cobalt, copper, gem and near-gem diamond, gold, iron ore, lithium, manganese ore, tantalum, and uranium. Reflecting an increase in world demand for mineral commodities, the Australian economy grew at a rate of 3.9% during 2007. Owing to anticipated higher prices of mineral commodities in the world markets, the Australian economy continued expanding and, as a result, surplus productive capacity was expected in the future. Owing to an increase in domestic demand and a tightening in the labor market, the consumer price index increased by 4.2% in 2007.

Australia's total mineral exploration spending, excluding petroleum, was $1,751.9 million (A$2,061.1 million) in 2007. Its total petroleum exploration (onshore and offshore) spending was $2,261.6 million (A$2,660.7 million). The percentage of spending on uranium exploration increased by 50% compared with that of the previous year. The total exploration spending for base metals, coal, iron ore, and mineral sands also increased; spending on exploration for diamond, however, decreased by 50%. The State of Western Australia remained the leading destination for exploration and accounted for about 60% of the total exploration expenditure. About 57% of the country's total exploration expenditure was spent on existing deposits and the remaining 43% was spent on new exploration.

As a result of the increased spending on exploration, significant mineral resources were discovered. These included the Gullivers mineral sand deposit in the State of South Australia, the Rocklands copper deposit and the Swan copper-gold-uranium deposit in the State of Queensland, the Saxon nickel deposit in the State of Tasmania, the Tandarra gold deposit in the State of Victoria, and the Tekapo copper-gold deposit in the Northern Territory (Australian Bureau of Statistics, 2008, p. 7, 61; Reserve Bank of Australia, 2008, p. 2).

Minerals in the National Economy

Australia's mining sector contributed more than $82 billion to the country's gross domestic product (GDP), or 7.7% of the GDP. The mining sector employed 104,700 people working directly in mining and an additional 200,000 who were involved in supporting the mining activities. Expectations of sustained levels of global demand for minerals led to increased production of minerals and metals in Australia, and the mineral industry was expected to continue to be a major contributor to the Australian economy in the next several years (Australia Bureau of Agricultural and Resources Economics, 2008e, p. 2; Australian Bureau of Statistics, 2008, p. 10).

Government Policies and Programs

The powers of Australia's Commonwealth Government are defined in the Australian Constitution; powers not defined in the Constitution belong to the States and Territories. All powers that relate to mineral resources and their production belong to the States and Territories. Except for the Australian Capital Territory (that is, the capital city Canberra and its environs), all Australian States and Territories have identified mineral resources and established mineral industries.

The Mineral Council of Australia (MCA) urged the Federal Government to establish a nationwide project approval process that would be consistent across all jurisdictions to reduce regulatory burdens that were affecting the mineral sector. In addition, 10 principal statutes govern occupational health and safety in Australia, and, according to the MCA, this multilayer regulatory regime imposes a significant administrative burden on the mineral sector and adds unnecessary complexity to business operations. The Government planned to introduce the State Work Australia bill to establish an agency to develop uniform occupational health and safety regulations. A single occupational health and safety bill would cover all sectors and jurisdictions. In 2007, the Parliament passed legislation that allows mining rights to be deducted over the effective life of the mine (Minerals Council of Australia, 2008, p. 14).

The Australian Government accepted the findings of the Garnaut Climate Change Review and issued a white paper that explains how the Government plans to reduce the country's carbon pollution. The Government set a target to reduce the emission of carbon pollution by up to 15% below 2000 levels by 2020 and to 60% below 2000 levels by 2050. The Government would provide financial assistance of about A$6 billion per year to households beginning in 2010. The Government would invest A$2.15 billion through a Climate Change Action fund to help the private sector implement low-emission technologies and provide assistance to emission-intensive trade-exposed industries to reduce the risk that these industries would relocate offshore because of competition from countries without carbon constraints. Coal mines were identified as an industry subsector that would not be eligible for other forms of assistance, although the Government would provide up to A$250 million during a period of 5 years to affected coal mining operators to promote emission abatement. The Government would provide an additional A$500 million during the next 5 years as direct assistance to gassy coal mines to assist them while they explore abatement opportunities (Commonwealth of Australia, 2008, p. 2-20).

Production

Australia continued to be one of the world's leading producers of such commodities as bauxite, coal, cobalt, copper, gem and near-gem diamond, gold, iron ore, lithium, manganese ore, tantalum, and uranium. The country's refined metal production capacity was moderate compared with that of China and Japan in the Asia and the Pacific region. Because of its large mineral resources, Australia was virtually self-sufficient in most mineral

commodities. Petroleum production, however, met only about 70% of the country's consumption. Australia was one the leading exporting countries of alumina, coal, iron ore, and uranium in the world. In 2007, production of such commodities as iron ore, leucoxene, manganese, phosphate rock, uranium, zinc, and zirconium increased by more than 10% and production of antimony, diamond, lithium, palladium, platinum, and tin decreased by more than 10% (table 1).

Structure of the Mineral Industry

The Australian mineral industry is characterized by free enterprise in which private companies are involved in exploration, mine development, mineral production, mineral processing, and marketing. A number of Australian mineral companies were affiliates or subsidiaries of European and U.S. companies, which controlled a large part of the mining, smelting, and refining sectors and a significant portion of the mineral fuels sector (table 2).

Ownership of the mineral rights in Australia generally are vested in the government of the relevant State or Territory or the Commonwealth Government for Federal lands and waters, regardless of ownership or tenure of the surface area. Mineral ownership is divided between State ownership in the State onshore areas and Commonwealth ownership in the Territories and in offshore areas beyond Australia's 4.8-kilometer (km) territorial limit. Each State and Territory government administers the mineral industries within its own borders, which includes registering land titles; issuing exploration and development permits; conducting inspections and assuring compliance with health, safety, and environmental regulations; and levying royalties and taxes. Because the Commonwealth may restrict mineral exports for the good of the country, however, it effectively has control over most mineral production.

Mineral Trade

Australia continued to rely heavily on exports of the majority of its mineral production to sustain the country's mineral industry development. In 2007, the value of Australia's total foreign trade was $392.0 billion (A$461.2 billion), of which the value of exports was $186.4 billion (A$219.3 billion) and the value of imports was $205.6 billion (A$241.9 billion). Mineral and metal exports accounted for 40.0% of the total value of exports. About 50%, or more than $31.5 billion (A$42 billion), was concentrated in the following commodity groups: coal, coke and briquettes, $17.7 billion (A$20.9 billion); iron ore, $13.8 billion (A$16.3 billion); mineral fuels, $13.6 billion (A$16.0 billion); alumina, $5.3 billion (A$6.2 billion); and aluminum, $4.8 (A$5.7 billion). Australia's mineral and metal exports went mostly to Asian countries. Australia remained the world's leading exporter of alumina, coal, diamond (gem, near-gem, and natural industrial), ilmenite, iron ore, mined lead, rutile, and zircon (Australian Bureau of Statistics, 2008, p. 27-30).

Commodity Review

Metals

Aluminum.—Australia was the leading bauxite producing country in the world. Bauxite came from the Gove Mine in the Northern Territory; the Weipa Mine in the northern part of the State of Queensland; and the Huntly, the Willowdale, and the Worsley Mines in the State of Western Australia. Australia was also the leading alumina producing country in the world. All Australia's alumina refineries are located within close proximity to their bauxite mines and shipping facilities. Aluminum refineries in Western Australia produced about two-thirds of the country's total output. The consumption of domestic aluminum smelters accounted for about 20% of the country's total alumina output, and the remaining was exported. China was the leading destination for exported Australian alumina followed by Bahrain, South Africa, the United Arab Emirates, and Mozambique. During the past several years, China expanded its alumina output capacity and, as a result, China's imports of alumina were expected to decrease in the next several years; however, owing to a shortage of bauxite resources, China's bauxite imports were expected to increase. Owing to the financial crisis in the United States, Australia's bauxite and alumina production was expected to increase to 63 million metric tons (Mt) and 20 Mt, respectively, in 2009 (Department of Industry and Resources, 2008, p. 28).

In 2007, Rio Tinto Ltd. acquired Alcan Inc. of Canada, and the two companies' existing aluminum assets were combined. Aluminum operations from Alcan and Rio Tinto Aluminium Group were placed under the new company, Rio Tinto Alcan. As the result of the commissioning of a second shiploader in late 2006, the production capacity of the company's Weipa Mine increased to 18.2 Mt from 16.5 Mt of beneficiated bauxite. The assets of Alcan's Ely Mine, which is located next to the Weipa Mine, were included in the reserves and resources figures for the Weipa Mine. At yearend 2007, the Weipa Mine contained reserves of 1.2 billion metric tons (Gt) and resources of 2.2 Gt of bauxite. The company invested $30 million to expand the Weipa Mine's output capacity by 3.5 million metric tons per year (Mt/yr); the expansion was scheduled to be completed by late 2009 (Rio Tinto plc, 2008b, p. 20).

Owing to increasing demand for alumina in recent years, Australian alumina producers planned to expand their refineries' output capacity. The output capacity expansion at Rio Tinto Alcan's Gove refinery in Nhulunbuy, Northern Territory, to 3.8 Mt/yr from 2.0 Mt/yr was expected to be fully operational at the end of 2008. The new design and technology (low-temperature digestion unit) was expected to improve the recovery efficiency of alumina by 10%. In 2007, Rio Tinto approved a $1.8 billion expansion plan for the Yarwun refinery, which was located in Gladstone, Queensland. The refinery output capacity would be increased to 3.4 Mt/yr from 1.4 Mt/yr and was scheduled to be completed in 2011. The equipment at the new Yarwun plant was designed to reduce the refinery's greenhouse emissions. Flue gas desulfurization equipment would be installed at the coal-fired boiler to reduce total site sulfur dioxide emissions by 10%, in spite of the 140% increase

in the alumina output capacity. A gas turbine with a heat recovery steam generator was included in the expansion plan (Rio Tinto plc, 2008b, p. 21).

The government of the State of Western Australia approved Alcoa World Alumina Australia's $1.5 billion expansion of its Wagerup alumina refinery, which was located south of Perth. The Wagerup expansion plan included a third production unit at the refinery and upgrading of the existing plant to improve efficiency and environmental compliance. The output capacity of alumina would increase to 4.7 Mt/yr from 2.6 Mt/yr. Approval for the refinery expansion included conditions that required Alcoa to fund air quality testing and health surveys in addition to purchasing land. Alcoa was also required to upgrade the existing equipment with advanced technology and to install a new emissions control system at its Pinjarra refinery, where 660,000 metric tons per year (t/yr) of alumina production capacity was to be added to the existing plant. BHP Billiton Ltd. approved $1.9 billion for its Worsley aluminum refinery expansion project. After the project's completion in 2011, the refinery's output capacity would increase to 4.6 Mt/yr from 3.5 Mt/yr in 2007 (Department of Industry and Resources, 2008, p. 29).

Aluminum Corp. of China Ltd. through its subsidiary CHALCO Australia planned to develop the Aurukun bauxite resource project, which is located 10 km northeast of Aurukun and 50 km south of Weipa in the Western Cape Region of Queensland. The company planned to mine 10 Mt/yr of bauxite ore and to produce 6.5 Mt/yr of beneficiated ore with an average aluminum oxide content of 65%. The project also included a plan to build a 2.1-Mt/yr-capacity alumina refinery and associated facilities at Abbot Point, which is located northwest of Bowen, Queensland. The beneficiated ore was expected to be transported by an overland conveyor to the port facility, which is located about 1.5 km south of Boyd Point. A feasibility study and environmental impact statement were underway. The decision on whether to proceed with the mine and refinery would be made at the end of 2009 (CHALCO Australia, 2008).

In 2007, United Minerals Corp. signed a memorandum of understanding with Norsk Hydro of Norway through its subsidiary Norsk Aluminum AS to form a joint venture to assess the feasibility of developing an integrated bauxite mine and aluminum refinery in the Kimberley region of Western Australia. The venture would continue exploring in the area to demonstrate the existence of enough bauxite to support the development of an aluminum refinery. The expenditure for the exploration work would be split 75/25 between Hydro and United, respectively. Hydro would fund 90% of the bankable feasibility study for a bauxite mine and 94% of the bankable feasibility study for an associated aluminum refinery. Hydro and United would jointly finance the development of the mine and refinery in a 75/25 equity split. During the operational phase, Hydro would provide the full offtake purchase of United's share of alumina production. Hydro was expected to fund a $7.4 million exploration drilling program through the end of 2009. United held a more-than-7,000-square-kilometers (km^2) lease in the region (United Minerals Corp., 2007).

Cape Alumina Pty Ltd. held 100% interest in 2,400 km^2 of leased land outside of Rio Tinto Alcan's Weipa deposit. Since 2004, the company had invested more than $8 million to explore the leased area and discovered 101 Mt of bauxite resources at an average washed grade of 53.5% Al_2O_3 and 12.2% SiO_2 at Pisolite Hills, which is located 50 km northeast of Weipa on the western part of Cape York Peninsula. The company commenced a feasibility study and prepared an environmental impact statement for the Pisolite Hills project. The project would involve the development of a greenfield bauxite mine that would produce 8 Mt/yr to 12 Mt/yr of run-of-mine bauxite ore. The mined ore would be crushed and washed. As a result of beneficiation, about 7 Mt/yr of washed bauxite would be exported. The bankable feasibility study was planned to be completed in 2009, and production was expected to begin in 2012. Metallica Minerals Ltd. held 40% equity interest in the Cape Alumina project and Chiping Xinfa Huayu Alumina Co. Ltd. of China held 17.5% equity interest in Cape Alumina. Xinfa had signed a 5-year, 1-Mt/yr bauxite offtake agreement with Cape Alumina (Cape Alumina Pty Ltd., 2008).

Australia's primary aluminum production ranked fifth in the world after China, Russia, Canada, and the United States. Aluminum output was produced mainly from Alcoa's Point Henry and Portland smelters in Victoria, Hydro Aluminium Kurri Kurri Pty. Ltd.'s Kurri Kurri smelter in New South Wales, and Rio Tinto Alcan's Bell Bay smelter in Tasmania, as well as the Boyne Island smelter in Queensland and the Tomago smelter in New South Wales. Australia's aluminum production was expected to remain unchanged during the next several years. No output capacity expansion announcement for primary aluminum was released in 2007.

Copper.—Australia's copper resources occur largely at Olympic Dam in the State of South Australia and at Mount Isa in the State of Queensland. Other important copper resources are located at the CSA and the Northparkes deposits in the State of New South Wales; the Ernest Henry, the Mammoth, and the Osborne deposits in Queensland; and the Golden Grove and the Nifty deposits in the State of Western Australia. Australia's mined copper output ranked fifth in the world behind Chile, the United States, Peru, and Indonesia. In 2007, Australia copper mine production remained relatively unchanged. The startup production from the Lady Annie and the Leichardt Mines was offset by lower production at the Northparkes and the Olympic Dam Mines. Australia's mined copper production was expected to increase during the next 2 years because a number of new projects—the Cloncurry, the Copper Hill, the Einasleigh, the Kanmantoo, the Mutooroo, the Prominent Hill, and the Roseby—would be commissioned, and recently commenced projects would approach full capacity. In 2007, Australia exported 1.5 Mt of copper concentrates and 290,000 metric tons (t) of copper metal mainly to other countries in the Asia and the Pacific region (Australia Bureau of Agricultural and Resources Economics, 2008d).

CopperCo Ltd.'s Lady Annie copper deposit is located 100 km north-northwest of Mount Isa, Queensland. The company completed construction of the mine in 2007. The copper oxide ore was located near the surface with copper resources of about 11.3 Mt at an average grade of 1.0% copper. The ore was processed through a solvent extraction and electrowinning process on site. The full copper production rate of 19,000 t/yr of copper cathode was expected to be achieved

in early 2008. A project to expand the output capacity to 30,000 t/yr was scheduled to begin in 2008 and to be completed in 2009. The increased capacity would allow the company to reduce unit operating costs. Drilling continued at a depth of 100 meters (m) below the surface in 2007, and the company expected to find copper sulfide ore below 100 m. The company also explored in the southeastern portion of the Lady Annie deposit and in an area about 70 km from Mount Isa (CopperCo. Ltd., 2008, p. 3-11).

The bankable feasibility study of the Copper Strike Ltd.'s Einasleigh project, which is located 70 km southeast of Georgetown, Queensland, was expected to be completed in late 2008. The company's plan for the development of this project was based on the Einasleigh underground and open-cut Kaiser Bill copper deposits followed by open cuts from the lead, silver, and zinc deposits at Chloe and Jackson, which are located to the south of the Einasleigh and Kaiser Bill copper deposits. The company planned to have open-cut production from Kaiser Bill at a rate of between 0.8 and 1.6 Mt/yr of copper ore in 2010 and to mine about 80,000 t/yr of copper ore from the high-grade Einasleigh deposit in 2011. Indicated and inferred resources at Einasleigh were 825,000 t at grades of 3% copper, 0.17 gram per metric ton (g/t) gold, and 14 g/t silver; those for Kaiser Bill were 13.4 Mt at grades of 0.83% copper, 0.13 g/t gold, and 6 g/t silver. The design capacity of the processing plant at Kaiser Bill was 15,000 t/yr of copper concentrates. The concentrates would be shipped to Townsville, which is located about 300 km from the plant, for export. Environmental studies had been completed for the Kaiser Bill site and were awaiting Government approval. The company also planned to mine at the Chloe and the Jackson sites in 2012 (Copper Strike Ltd., 2008, p. 6).

North Queensland Metals Ltd. planned to develop its Baal Gammon deposit, which is located 7 km west of Herberton and 11 km east of Jumna Mill. The company reported that the deposit contained about 3.1 Mt of ore at grades of 0.96% copper, 0.22% tin, 34.2 g/t silver, and 29.6 g/t indium. The deposit had been explored previously by Newmont Mining Corp. of the United States and was reported to have 5.4 Mt of ore at a grade of 0.8% copper. North Queensland reviewed the result of the feasibility study and planned to mine and process about 500,000 t/yr for 7 years and to produce 20,000 t/yr of concentrates. The company submitted plans for the development of the Baal Gammon deposit to the Government for approval; construction was scheduled to begin in late 2008, and mining was to start in 2009 (North Queensland Metals Ltd., 2007).

The Board of Hillgrove Resources Ltd. approved $110 million to develop the Kanmantoo copper gold project, which is located in the Cambrian Kanmantoo Trough 55 km southeast of Adelaide, South Australia. According to the feasibility study report, the Kanmantoo deposit contained total indicated and inferred resources of 31.8 Mt of ore at average grades of 0.9% copper, 3.1 g/t silver, and 0.2 g/t gold. The deposit would be developed as two open pits that would have an operational life of 6.5 years and considerably longer if underground operations took place. The processing plant was designed to have a throughput of 2 Mt/yr of ore with the potential to expand to 2.5 Mt/yr to produce 56,000 to 76,000 t/yr of concentrates containing 25% copper, 66 g/t silver, and 3.5 g/t gold. The company planned to export most of its concentrates to countries in north Asia in 2009 (Hillgrove Resources Ltd., 2007).

Universal Resources Ltd. announced a plan to develop its Roseby copper project, which is located near Mount Isa, Queensland. The mineralization comprises stratabound native copper in the oxide zone, which forms a number of deposits, including the Blackard and the Scanlon deposits, and hydrothermal copper sulfide, including the Lady Clayre and the Little Eva deposits. The overall resource across all deposits was estimated to be 123 Mt of ore at grades of 0.73% copper and 0.06 g/t gold. The company planned to divide the project into two phases. Initially, a 4-Mt/yr throughput mill would be built to produce 20,000 t/yr of copper in concentrates. A decision to expand the operation to about 8 Mt/yr with production of about 40,000 t/yr of copper in concentrates would be made approximately 1 year after commissioning of the first phase of the operation. The phase 1 operation was expected to have a mine life of 13 to 15 years, if no expansion occurred. Expansion to phase 2 throughput of 8 Mt/yr, which would be accomplished 2 to 3 years after phase 1 commissioning, would reduce the mine life to 8 to 9 years. The initial capital requirement for phase 1 was estimated to be about $166 million. The Roseby deposit was one of the largest undeveloped open-cut projects in Australia; it had a copper resource of about 1 Mt. The company was expected to receive a mining lease and approval from the Government in 2008 to allow the construction of the mine to begin in 2008 (Universal Resources Ltd., 2007).

Gold.—Australia's gold mine output ranked third in the world after China and South Africa. The country's gold resources occur and are mined in all States, as well as in the Northern Territory, and much of the gold was produced from large open pit mines. In 2007, mined gold production was the same as that of 2006. Owing to higher prices of gold in the world markets, gold operators could afford to reduce the grade of ore fed into their processing plants in order to extend the mine life. Australia gold production was expected to be lower in 2008 because of delayed project-approval procedures, rising labor and input costs, and decreased output from established mines. Gold production in the State of Western Australia, where large gold mines are located, accounted for two-thirds of Australia's total output. In 2007, Australia exported 411 t of refined gold. India remained Australia's top gold export destination, accounting for 34% of total exports, followed by the United Kingdom, 24%; Switzerland, 14%; the United Arab Emirates, 10%; and others, 18%. India was the leading gold consuming country in the world. London was a gold market trading center and many gold transactions were being conducted in London (Australia Bureau of Agricultural and Resources Economics, 2008c, p. 32).

AngloGold Ashanti Ltd. had two gold operations—the Boddington and the Sunrise Dam Mines—in Western Australia. The Sunrise Dam Mine is located 220 km northeast of Kalgoorlie and 55 km south of Laverton. The mine was composed of open pit and underground operations. The underground mine began production in 2003. The development of the Mega Pit at a final depth of 440 m was scheduled to be completed in 2008, and a cutback of the north wall of the open pit began in October and was scheduled to be completed in 2010. The Boddington Mine is located approximately 100 km

southeast of Perth. AngloGold Ashanti held a 33.33% share and Newmont Mining had a 66.67% share in the Boddington project, which included the Wandoo North and Wandoo South properties. Originally, Boddington was predominantly an oxide open pit operation that was closed in 2001. In 2006, the government of the State of Western Australia approved the Boddington expansion plan to increase gold production from between 10.0 and 10.9 t/yr (320,000 and 350,000 troy ounces per year) and about 20,000 t/yr of copper in concentrates during the first 5 years. The construction of the underground mine and a 35.2-Mt/yr processing plant were underway in 2006 and were expected to be completed in late 2008 or early 2009 (AngloGold Ashanti Ltd., 2008, p. 74-77).

The prefeasibility study of the Tropicana joint-venture project between AngloGold Ashanti (70%) and Independence Group NL (30%) was begun in 2007 and was scheduled to be completed in 2008. The Tropicana deposit is located 330 km east-northeast of Kalgoorlie, Western Australia. In 2007, the total indicated and inferred resource was estimated to be 62.8 Mt at a grade of 2.01 g/t gold. The metallurgical study indicated that the ore could be treated with a conventional carbon-in-leach circuit. Pit design was underway. The project could cost up to $1 billion to develop. Subject to the State government's approval, construction could begin in 2009 (AngloGold Ashanti Ltd., 2008, p. 74-77).

Avoca Resources Ltd. completed a feasibility study of its Trident gold project, which is located within the mining center of Higginsville midway between Kambalda and Norseman in the Eastern Goldfields of Western Australia. The study indicated that the Trident deposit contained 11.7 Mt of ore at a grade of 3.6 g/t gold. The company awarded the underground mining construction contract to ACM Pty Ltd. and a 1-Mt/yr processing plant construction contract to GRES Pty Ltd. Construction began in 2006 and was scheduled to be completed in 2008. Production was expected at the annual rate of 4.9 t (160,000 troy ounces) to 5.9 t (190,000 troy ounces) of gold for 10 years of mine life. Avoca also had a 100% interest in the Mount Fisher gold-nickel project, which was located 420 km north of Kalgoorilie and 80 km east of the Jundee Gold Mine. Preliminary exploration data indicated that significant intercepts of gold were discovered, and the company continued exploring in the area (Avoca Resources Ltd., 2008).

The transfer of ownership of the Wiluna underground mine from Oxiana Ltd. to Apex Minerals NL was completed in 2007. Refurbishments at the Wiluna Mine were scheduled to be completed at the end of 2008. The Wiluna acquisition included a 1-Mt/yr processing plant and a BIOX bacterial oxidation plant. Apex expected that the initial rate of production would be 3.1 t/yr (100,000 troy ounces per year) of gold from the Wiluna underground and the East Pit (open pit) Mines and would increase to 4.6 t/yr (150,000 troy ounces per year) of gold when the Wilson project at Gidgee begins operation. The company also planned to develop the Youanmi deposit, which is located 480 km northeast of Perth, in the future. Concentrates from the Wilson and the Youanmi Mines would be trucked to the Wiluna plant for oxidation. The final production from the Wilson mill would be 6.2 t/yr (200,000 troy ounces per year) of gold in 2010. The Youanmi deposit had indicated and inferred resources of 2.4 Mt at a grade of 8.5 g/t gold (Apex Minerals NL, 2008).

Iron and Steel.—Australia was among the top three iron ore producers (in terms of iron content) in the world, along with Brazil and China. Owing to its limited iron and steel output capacity, Australia exported about 90% of its iron ore output to such Asian countries as China, Japan, the Republic of Korea, and Taiwan. China received 58% of Australia's iron ore exports followed by Japan, 26%; the Republic of Korea, 11%; and Taiwan, 4%. Since 2003, negotiated benchmark iron ore prices have more than doubled. High prices and increased demand for iron ore in Asian countries, especially China, stimulated substantial investment in new iron ore projects in Australia and other iron-ore-rich countries. Australia's most significant iron ore mines are located in the Pilbara region of the State of Western Australia, which accounts for 98% of the country's total iron ore production. Mines operated by BHP Billiton and Rio Tinto dominated the Pilbara area's output. In 2007, Australia's iron ore and pellet exports increased to 267 Mt, which was an increase of 8.0% compared with those of 2006. Australia's iron ore and pellet exports were expected to continue to increase to 306 Mt in 2008 and 315 Mt in 2009 owing to increased demand for iron ore in Asian countries (Australia Bureau of Agricultural and Resources Economics, 2008a, p. 559).

The expected increase in Australian iron ore exports in 2008 and 2009 was owing to the expected startup of several iron ore projects in the Pilbara region of Western Australia. BHP Billiton's rapid growth project (RGP), the Fortescue Metals Group Ltd.'s Pilbara project, and Rio Tinto's Hope Downs and Yandicoogina projects were scheduled to commence in late 2007 and 2008. During the past 4 decades, iron ore mined in Western Australia has been hematite ore; however, Western Australia also has significant magnetite ore resources. The advantage of hematite ore is that it does not have to undergo costly concentration to make it salable. During the past several years, China's iron and steel producers formed joint ventures with Australian companies to develop magnetite ore resources in Australia. Although China was one of the top three iron ore producing countries, it imported more than 50% of the amount needed to meet the demand of its steelmaking operations. Chinese iron and steel companies also were making an effort to secure iron ore resources and reduce input costs for steelmaking in China (Australia Bureau of Agricultural and Resources Economics, 2008d, p. 13).

BHP Billiton had seven iron ore mining operations and port facilities in the Pilbara region of Western Australia. The port facilities of Nelson Point and Finucane Island are located within the town of Port Hedland. The Nelson Point facility handled iron ore from the Area C, the Jimbledar, the Newman (Satellite Ore Bodies 8, 23/25, and 29), the Whaleback, and the Yandi Mines; the Finucane Island facility handled iron ore from the Area C, the Nimingarra, and the Yarrie Mines. These port facilities could handle a total of 105 Mt/yr of iron ore shipments. BHP Billiton's RGP, which was set up in 2003, was a multiphase expansion project to help handle the increased demand for iron ore in the world. The RGP was expected to increase iron ore handling capacity to 165 Mt/yr through the development of four new port berths. The RGP 1 was completed

in 2004 and the RGP 2 was completed in 2006; as a result, the Port's handling capacity was increased to 118 Mt/yr. The RGP 3 mine rail and port expansion, which was projected to cost $1.3 billion, was begun in 2006 and was scheduled to be completed in 2008; the expansion would increase the Port's handling capacity to 129 Mt/yr. The Area C iron ore mine output capacity would be increased by 20 Mt/yr to 42 Mt/yr. In March 2008, BHP Billiton approved $1.85 billion in funding for the RGP 4, which would be focused on expanding the Newman iron ore operation. A 26-Mt/yr iron ore output capacity would be added to the company's Pilbara region. After completion of the first four phases of the RGP in 2012, BHP Billiton would have the capability to produce 155 Mt/yr of iron ore in Western Australia and would have increased its Port capacity to 155 Mt/yr. In the final stage, RGP 5, the construction of new lump rescreening plants at Nelson Port and Finucane Island would increase the Port's total handling capacity to 165 Mt/yr; the board of directors intended to approve funding for this $1.2 billion expansion proposal in 2008. The expansion work would include the addition of two new berths and shiploading facilities at Harriet Point. It would also increase the rail capacity to 300 Mt/yr between the Yandi Mine and Port Hedland. The RGP 5 work was scheduled to be completed by mid-2010 (BHP Billiton Ltd., 2008, p. 35; Prospect, 2008).

Hamersley Iron Pty. Ltd., which is a wholly owned subsidiary of Rio Tinto, operated eight iron ore mines—the Brockman, the Channar, the Eastern Range, the Marandoo, the Tom Price, the Nammuldi, the Paraburdoo, and the Yandicoogina Mines near Perth, Western Australia. The Channar mine was a joint venture between Hamersley (60%) and a subsidiary of China Iron and Steel Industry and Trade Group Corp (40%); the Eastern Range Mine was a joint venture between Hamersley (54%) and Shanghai Baosteel Group Corp. (46%). Other iron ore mines were fully owned by Hamersley. Rio Tinto also approved $860 million for the expansion of the iron ore handling capacity at Cape Lambert Port, of which Rio Tinto held a 53% share, to 80 Mt/yr from 55 Mt/yr. The Port expansion was projected to be completed by the end of 2008 and would be fully operational in the first half of 2009. In 2003, Rio Tinto approved a $685 million expansion of the iron ore handling capacity at Dampier Port to 120 Mt/yr from 74 Mt/yr in phase A, and then to 145 Mt/yr in phase B. The phase B expansion was scheduled to be completed by the end of 2008. Rio Tinto also planned to expand the Pilbara Port facilities to a total of 320 Mt/yr of handling capacity. This would involve construction of a new terminal in Cape Lambert West that would be capable of berthing four capsize ships. That terminal would be extended to accommodate four more berths to increase the handling capacity to 420 Mt/yr (Rio Tinto plc, 2008a).

The government of the State of Western Australia approved the 50-50 joint venture between Hancock Prospecting Pty Ltd. and Rio Tinto to develop the Hope Downs iron ore project in 2006. The property, which comprised the Hope Downs 1, 2, and 3 deposits and the Hope Downs 4, 5, and 6 deposits (formerly the East Angelas 1, 2, and 3, deposits), is located 75 km northwest of Newman in Western Australia. Rio Tinto was to manage the development and operation of the $1.5 billion project, including construction of the iron ore mine and a 58-km Lang Hancock railway between the mine and Rio Tinto's existing railway and port infrastructure. In April 2006, Rio Tinto approved $1 billion for the development of the project. Phase 1, which was begun in 2006, was to involve the construction of the Hope Downs 1 mining area and railway; this phase was scheduled to be completed in 2008. The Hope Downs 1 deposit had an iron ore reserve of 346 Mt at an average grade of 61.6% iron, and production from this deposit was projected to reach 30 Mt/yr by 2013 (Rio Tinto plc, 2007a, 2008b, p. 43).

Rio Tinto planned to invest $2.4 billion to develop two new mines—the Brockman 4 and the Mesa A/Warramboo Mines—in the Pilbara region. The Mesa A/Warramboo Mine is located about 50 km from Pannawonica. Initial production would be 20 Mt/yr in 2010 and would increase to 25 Mt/yr by 2011. Current production from the Mesa J Mine was near the end of its mine life and its output was expected to decrease to 7 Mt/yr in 2011. The total combined output capacity in the Robe Valley area would be 35 Mt. A 49-km rail extension would be built to connect the Mesa A to the Rio Tinto rail network. The mine had iron ore reserves of 249 Mt. The Brockman 4 Mine is located about 60 km northwest of the Tom Price Mine. Initial iron ore output capacity would be 22 Mt/yr in 2010 and would increase to 36 Mt/yr in 2012. A 35-km rail track would be constructed to connect the Brockman 4 Mine to the Pilbara Iron Rail network. The Brockman 4 deposit contained 573 Mt of high-grade (iron content greater than 60%) reserves and 597 Mt of blending and lower-grade (iron content between 50% and 60%) resources. The low-grade resources would be stockpiled for future processing (Rio Tinto plc, 2007b).

In 2006, the Hong Kong-listed company CITIC Pacific Ltd., a member of China's state-owned CITIC Group, through its subsidiary, CITIC Pacific Mining Management Pty Ltd. in Australia acquired two Australian iron ore mining companies—Baimoral Iron Pty Ltd. and Sino-Iron Pty Ltd.—from Mineralogy Pty Ltd. for $415 million. The two companies held magnetite iron ore resources at Cape Preston, which was located 100 km southwest of Karratha in Western Australia. Australia-based CITIC would invest $4.2 billion to develop the magnetite iron ore resources. The Sino-Iron development project included the construction of an open pit mine, a magnetite concentrator, pellet plant, port facilities, a power station, and infrastructure. The company planned to export 27.6 Mt/yr of beneficiated iron ore for 25 years, mainly to China. In addition to the initial 2 Gt of magnetite iron ore resources from Mineralogy, CITIC had the option to acquire an additional 4 Gt of magnetite iron ore resources, and it would increase the export of beneficiated iron ore to 70 Mt/yr. Construction of the mine was awarded to China Metallurgical Group Corp. (a state-owned company), which held 20% equity in the project. Production was scheduled to start in early 2009 (CITIC Pacific Mining Management Pty Ltd., 2007).

Atlas Iron Ltd. planned to develop two iron ore projects—the Abydos and the Pardoo projects—in the Pilbara region of Western Australia. The Pardoo project is located 50 km east of Port Hedland. The project area was explored for iron ore by BHP Goldsworthy Ltd. until 1994. During that time, several areas of surface enrichment were identified. Atlas has focused exploration work on those areas and has conducted drilling, mapping, and rock chip sampling. In 2007, the company

completed the feasibility study of the Pardoo direct-shipping ore study, which the iron ore deposit had 24.05 Mt at a grade of 56.0% iron and a probable resource of 7.38 Mt at a grade of 57.3% iron. During the same period, the company received a permit from the Government to develop the Pardoo project and began construction. The company planned to commence production in late 2008 and targeted to export 1 Mt of iron ore in its first year of operation and 3 Mt/yr by 2010. The Abydos project is located 100 km south of Port Hedland. The company identified iron ore resources of 15.1 Mt at a grade of 56.9% iron and planned to construct a mine to produce 3 Mt/yr of direct-shipping ore in late 2009. Atlas also discovered about 1.8 Gt of magnetite iron ore with between 36% and 37% iron content, which was located about 75 km from Port Hedland. A prefeasibility study for development of the Pardoo Ridey magnetite project was expected to be completed in 2008; the project hoped to produce 15 Mt/yr of beneficiated iron ore for export (Atlas Iron Ltd., 2008, p. 9-15).

In 2007, Cape Lambert Iron Ore Ltd. reported that the company had discovered a magnetite iron ore resource located 7 km southwest of Wickham, Western Australia. The deposit contained 1.56 Gt of iron ore at a grade of 31.2% iron. Cape Lambert sold the deposit for A$400 million to MCC Mining (Western Australia) Pty Ltd., which was a wholly owned Australian subsidiary of China Metallurgical Group Corp. Before completion of the sale, Cape Lambert had performed the preliminary environmental surveys, engineering, infrastructure, and mining studies of the area that was sold. Cape Lambert would guide and assist MCC in obtaining the permits and mining approvals needed for the granting of a mining lease and related construction approvals. Cape Lambert retained the exploration area of license E47/1493, which was located south of the sold area, and drilling in the area was scheduled to begin in late 2008 (Cape Lambert Iron Ore Ltd., 2008, p. 4-5).

Australia's pig iron was produced from the Hismelt pig iron plant and two integrated plants—Blue Scope Steel Ltd.'s Port Kembla plant and OneSteel Ltd.'s Whyalla plant. Ferrowest Ltd. also planned to build a 500,000-t/yr ironmaking (direct-reduced iron) plant that would employ Midrex technology at Eradu, Western Australia. An engineering study was scheduled to be completed in 2008 and the plant was expected to be operating at full capacity in 2011 (Geoscience Australia, 2007, p. 39).

Lead, Silver, and Zinc.—Australia's lead, silver, and zinc mines were predominantly based on ore bodies with zinc as the major component and lead and silver as byproducts. An exception was BHP Billiton's Cannington underground mine in the State of Queensland where lead and silver were major components and zinc was a minor component. In 2007, Australian zinc mine production was higher than in 2006. The increased zinc production came from such existing mines as Cannington and Century in Queensland, the reopened Hellyer Mine in the State of Tasmania, and the Jaguar Mine in the State of Western Australia.

In 2007, Jabiru Metals Ltd. commenced operations at its Jaguar underground mine, which is located 250 km north of Kalgoorlie, Western Australia. The mine's processing plant had a designed output capacity of 420,000 t/yr. The mine had proven and probable ore reserves of 1.15 Mt at grades of 8.0% zinc, 2.8% copper, and 90 g/t silver in 2007. The zinc concentrate contained 48% zinc, and the copper concentrate contained 23% to 25% copper. The company continued to explore the surrounding area. Jabiru signed a market and product-shipping agreement with OZ Minerals Ltd. from the Geraldton Port (Jabiru Metal Ltd., 2008, p. 7).

Teck Cominco Ltd. and Xstrata Zinc Australia jointly announced that the Lennard Shelf Pilbara Mine would cease operation in mid-2008. The Pilbara Mine had become uneconomic to continue operations owing to a decline in lead and zinc prices. High energy and labor costs were the main reasons for the shutdown. The Lennard Shelf smelter had begun operating in 2006 and produced 42,000 t of zinc metal and 12,400 t of lead in 2007. The smelter would be placed on care-and-maintenance status until a decision was made regarding the long-term future of the assets (Teck Cominco Ltd. and Xstrata Zinc Australia, 2008).

Terramin Australia Ltd. planned to commence operations at its Angas zinc mine, which is located 2 km outside of Strathalbyn and 60 km southeast of Adelaide in the State of South Australia, in 2008. The Angas zinc mine contained 3.04 Mt of ore grading 11.1% lead-zinc, 34 g/t silver, and 0.5 g/t gold. The company had invested $70 million in infrastructure development. A 400,000-t/yr processing plant would be commissioned in June 2008 to produce 60,000 t/yr of zinc concentrate and 24,000 t/yr of copper-lead concentrate. Zinc concentrates would be exported through Port Adelaide, and copper-lead concentrates would be trucked to the Port Pirie lead smelter for smelting. The company signed a zinc offtake agreement with Sempra Metals and Concentrates LLC for the life of the mine, which was estimated to be 7 years. The company also had a joint venture with Zinifex Australia Ltd. to explore the Menninnie Dam deposit, which is located 160 km from the Port Pirie lead smelter. The Menninnie Dam deposit had an ore resource of 3.8 Mt at grades of 4.0% zinc, 3.2% lead, and 34 g/t silver. The company planned to continue drilling work in that area in 2008 (Terramin Australia Ltd., 2008, p. 4).

Manganese.—Australian manganese was produced by three major companies—Groote Eylandt Mining Co. Pty. Ltd. (GEMCO), OM (Manganese) Ltd., and Pilbara Manganese Pty. Ltd. In 2007, Australia produced 5.3 Mt of beneficiated manganese product and exported 4.9 Mt. In 2006, GEMCO signed an agreement with the Anindilyakwa Land Council to secure a continuous mining operation on Groote Eylandt. GEMCO committed to abide by existing environmental regulations, which included rehabilitation of the site, employment of Anindilyakwa people, and the provision of financial incentives to the Aboriginal community. The company planned to invest $150 million to debottleneck the processing plant, which, in turn, would increase the processing capacity to 4.1 Mt/yr from 3.1 Mt/yr and reduce operating costs (Groote Eylandt Mining Co. Pty. Ltd., 2007).

OM Holdings Ltd.'s subsidiary OM Manganese Ltd. commenced operations at its Bootu Creek mining operation in November 2005. The processing plant was designed to process 600,000 t/yr of manganese ore containing 43% to 44% manganese. The beneficiated manganese product was transported by road to the Muckaty railway system, loaded

onto trains, and transported an additional 800 km to the Port at Darwin. The company continued to explore in the area in 2007 and discovered additional manganese resources. By yearend 2007, the Bootu Creek mining area was known to contain 10.3 Mt of ore reserves at a grade of 24.5% manganese. The additional ore resources led the company to expand the mine's output capacity to 700,000 t/yr (OM Holdings Ltd., 2008, p. 5).

Molybdenum and Tungsten.—In 2007, no molybdenum production was recorded in Australia, and production of tungsten ore was from the Kara Mine in the State of Tasmania. The scheelite concentrates contained an average of 55% tungsten trioxide. Thor Mining PLC completed the feasibility study on the Molyhil tungsten-molybdenum project, which is located 220 km north of Alice Springs, Northern Territory. In 2007, the company signed a Native Title Mining agreement with representatives of the Eastern Arrente indigenous people that would enable Molyhil to obtain a mining lease. The Central Land Council approved the mine infrastructure development. The Molyhil had an ore resource of 2.21 Mt at an average grade of 0.47% tungsten trioxide and 0.21% molybdenum sulfide. The operation would be based on open pit mining and a 400,000-t/yr-capacity processing plant. The capital cost for developing the deposit was estimated to be $39 million, and the life of the mine was projected to be 5 years. Thor Mining signed an offtake agreement with CITIC Australia Commodity Trading Pty Ltd. (a subsidiary of China's state-owned CITIC Group in Australia) to take 100% of the molybdenum and tungsten concentrates produced from the Molyhil project. The Department of Primary Industries, Fishing, and Mining in the Northern Territory approved the company's mining management plan (Thor Mining PLC, 2008, p. 2-7).

In 2007, Queensland Ores Ltd. started construction of its Wolfram Camp Mine, which is located 85 km west of Caims in the State of Queensland. The mine contained 598,200 t of measured resources at average grades of 0.42% tungsten trioxide, 0.17% molybdenum sulfide, and 0.03% bismuth. The processing plant was designed to process 150,000 t/yr of ore and to produce tungsten concentrates containing 65% tungsten oxide, molybdenum concentrates containing 50% molybdenum, and bismuthinite concentrate assaying 40.4% bismuth. The construction of a processing plant was scheduled to be completed in mid-2008. The company had signed an offtake agreement with CITIC Australia Commodity Trading for a period of 1 year with an option (on mutually agreed terms) to extend the agreement for another 3 years (Queensland Ores Ltd., 2008).

Moly Mines Ltd.'s subsidiary, Moly Metals Australia Pty Ltd., planned to begin the construction of its Spinifex Ridge molybdenum mine, which is located 50 km northeast of Marble Bar in the Pilbara region of the State of Western Australia in 2008. The Spinifex Ridge had proven and probable mineral reserves of 450 Mt at average grades of 0.05% molybdenum, 0.08% copper, and 1.3 g/t silver. In 2007, the company completed a Land Access Deed with representatives of the Njamal People of the east Pilbara and submitted the environmental impact assessment to the government of the State of Western Australian for approval. The company also applied for a mining permit to the Western Australia Department of Industry and Resources for the development and operation of the planned mine at the Spinifex Ridge site. Moly Mines planned to develop and operate a 20-Mt/yr open pit mining operation and processing plant for 23 years. An average of 11,800 t/yr of copper concentrates and 10,400 t/yr of molybdenum concentrates would be produced. The capital cost for the development of the Spinifex Ridge project was estimated to be $1 billion. The company signed a 5-year molybdenum toll-roasting agreement with Molybdenum y Metales SA of Chile. Moly Mines also signed a 10-year offtake agreement with ThyssenKrupp Metallurgie GmBH of Germany for all the molybdenum production, such as molybdenum oxide and ferromolybdenum, from its Spinifex Ridge. The construction of the mine and processing plant was scheduled to be completed in 2009 (Moly Mines Ltd., 2008, p. 8-12).

Nickel.—Australia's main nickel ores were primary sulfides of nickel, which occur as lodes within mafic and ultramafic (iron- and magnesium-rich) igneous rocks that have a volcanic and subvolcanic origin. Western Australia was Australia's only nickel-mining State in 2007. The top five nickel producers accounted for 80% of the total sales. BHP Billiton's Nickel West was Australia's leading nickel operation. Nickel West included Leinster and Mount Keith, which are located between 645 and 720 km northeast of Perth; each produced between 35,000 and 40,000 t of nickel in concentrates. Kambalda Nickel Concentrator is located 60 km south of Kalgoorlie and produced between 35,000 and 40,000 t of nickel in concentrates from third-party raw materials. Concentrates from the Kambalda concentrator contained about 13% nickel. Concentrates from the Nickel West operations and the Kambalda operation were shipped to the Kalgoorlie smelter in Kalgoorlie to produce nickel matte, which contained about 68% nickel, 2% to 3% copper, and 1% cobalt; the smelter had an output capacity of 110,000 t/yr of nickel matte. Nickel matte was railed to the Kwinana refinery, which was located about 40 km south of Perth. The refinery had an output capacity of about 67,000 t/yr of nickel metal, which contained 99.8% nickel.

The Ravensthorpe nickel project included an open-cut mine and a hydrometallurgical processing plant, which were put into operation in 2007. The mine and processing plant, which are located near the town of Ravensthorpe, Western Australia, could produce 200,000 t/yr of a mixed nickel and cobalt hydroxide intermediate product containing up to 50,000 t of nickel and 1,400 t of cobalt. The mine had ore resources of 396 Mt at a grade of 0.62% nickel, and the mine life was expected to be 27 years based on the existing level of output.

The Yabulu refinery, which was located at Townsville in the State of Queensland, was a lateritic nickel and cobalt ores processing plant that processed ores from Indonesia, New Caledonia, and the Philippines. The Yabulu smelter had a nickel metal refining capacity of 72,000 t/yr and a cobalt metal output capacity of 3,200 t/yr. The refinery also smelted concentrates from the Ravensthorpe operation. In 2007, BHP Billiton approved $139 million to develop the Cliffs project, which was located in the northern goldfields of Western Australia. The ore from Cliffs would be shipped to the Leinster operation for processing. The project was expected to produce about 8,500 t/yr of nickel in ore for 10 years (BHP Billiton Ltd., 2008, p. 31-33).

In 2007, OJSC MMC Norilsk Nickel of Russia acquired nickel operations from LionOre Mining International Ltd. and OM Group. Norilsk Nickel became the second ranked nickel producer in Australia and its operations in Western Australia included the Black Swan, the Cawse, the Lake Johnson, and the Waterloo Mines. Black Swan, Lake Johnson, and Waterloo were nickel sulfide deposits and Cawse was a laterite nickel deposit. The company used high-pressure acid leaching to process the laterite nickel, which contained 0.66% nickel and 0.038% cobalt. As a result, a filtrated mix of nickel-cobalt hydroxide reacted with ammonium carbonate to produce nickel-cobalt carbonate, which was then shipped to Norilsk Nickel's Harjavalta plant in Finland for further processing. The production costs of the Cawse operation were higher than those of a conventional operation. Norilsk Nickel was considering placing the Cawse operation on care-and-maintenance status if the price of nickel continued to decrease in the international market (OJSC MMC Norilsk Nickel, 2007).

In 2007, Xstrata plc through its subsidiary Xstrata Nickel Australia Pty Ltd. acquired all shares of the Jubilee Mines NL. Jubilee operated the Bannockburn project near Leonora in East Goldfields, Western Australia, which is located about 100 km south of Xstrata's Cosmos nickel operation. The new discoveries, named the Skye and the Stirling prospects, are located about 700 m south of the Sinclair deposit. The Skye prospect lies 400 m directly beneath the near-surface Stirling prospect. The discovery of these new zones indicated the presence of a significant body of high-grade nickel in close proximity to the company's existing mining operation. Nickel resources were produced from the company's Alec Mairs complex, the Cosmos Deeps, and the Tapinos deposits. The Cosmos Deeps ore body was completely mined out and the initial mining at the Alec Mairs complex and the Tapinos deposits started in 2006. During the transition period, the average grade of mined nickel was 3.9%, which was significantly below the average grade of 5.55% nickel that was extracted in 2005. The output of nickel was expected to increase when thicker zones and higher-grade ores were mined at Alec Mairs and Tapinos in 2008 (Xstrata plc, 2007).

Western Areas NL commenced construction of its Flying Fox Mine, which was part of the company's Forrestania nickel project. The Forrestania project was located 130 km south of Southern Cross, Western Australia. More than 25 nickel occurrences had been identified. The Flying Fox deposit contained an ore resource of 1.5 Mt at an average grade of 6.1% nickel. A 300,000-t/yr processing plant at Cosmic Boy was under construction and was scheduled to be completed in 2009. Before completion of the processing plant, mined ore would be toll treatment at Norilsk's Lake Johnson plant. Western Areas planned to develop five mines at the Forrestania project by 2011 to produce a total of 35,000 t/yr of nickel. The company had applied for a mining permit to develop the Spotted Quoll deposit, which is located 6 km south of the Flying Fox Mine. The Spotted Quoll deposit had an ore resource of 2.0 Mt at an average grade of 6.2% nickel to a depth of 640 m below the surface. The company planned to expand the capacity of the processing plant at Cosmic Boy to 900,000 t/yr (Western Areas NL, 2008).

Tantalum and Lithium.—The State of Western Australia had two tantalum producers: Haddington Resources Ltd. and Sons of Gwalia Ltd. (SOG). Haddington reassessed the feasibility of the Bald Hill Mine and Bald Hill extended area and decided that the mineralization would be uneconomical given the current market for tantalum. The Bald Hill Mine remained on care-and-maintenance status in 2007 (Haddington Resources Ltd., 2008, p. 14).

Owing to debt problems, SOG went into voluntary administration in 2004; since that time, the demand for tantalite continued to decline and the price of tantalite was low. SOG operated the Greenbushes and the Wodgina Mines in the State of Western Australia. In August 2007, Talison Minerals Pty Ltd. acquired the properties from SOG. The Wodgina's processing plant had a design capacity of 3.2 Mt/yr and produced tantalum concentrates at a grade of between 8% and 10% tantalum oxide. The concentrates were shipped to the Greenbushes operation for secondary processing. About 550 t/yr of tantalum oxide was produced. The Greenbushes tantalum underground operation remained on care-and-maintenance status in 2007. The mine had an annual capacity of 454 t of tantalum oxide. The company continued producing spodumene concentrate at Greenbushes, which contained a 35.5-Mt resource at an average grade of 3.31% lithium oxide. Talison had a spodumene capacity of 150,000 t/yr (Resource Information Unit, 2008, p. 424).

Galaxy Resources Ltd. completed a definitive feasibility study at its Mount Cattlin lithium-tantalum project, which is located 3 km north of Ravensthorpe, Western Australia. The Mount Cattlin deposit contained a 24.8 Mt resource at an average grade of 8.2% spodumene (or 0.56% lithium oxide) and 120 parts per million tantalum oxide. The company planned to construct a 1-Mt/yr open pit mining and processing operation that was expected to remain productive for 15 years. The operation was expected to produce 120,000 t/yr of concentrate containing 7,200 t lithium oxide and 350 t tantalum oxide. The company also planned to convert to value-added lithium carbonate. The bankable feasibility study for the project was underway and production could begin in late 2009 or early 2010 (Galaxy Resources Ltd., 2008, p. 2-4).

Tin.—Australia was not a globally significant tin producer; however, the country mined tin in the State of Tasmania, and, to a lesser extent, in the State of Western Australia. In 2007, with the opening of Metal X Ltd.'s Collingwood tin project in 2006, Australia's mined tin production increased significantly compared with that of 2006. The Collingwood tin mine was located 35 km south of Cooktown in the State of Queensland. The Collingwood operation was the leading tin producing facility in Australia and produced at a rate about 5,700 t/yr of tin concentrate at a grade of 60% tin. The Collingwood Mine had ore reserves of 953,900 t at an average grade of 1.19% tin. The company reported that mining had shown that the greisen tin zones were more erratic in shape and grade distribution than had been predicted by resource drilling. Metal X planned to mine out the remainder of its fully developed lodes and then to place the mine on care-and-maintenance status in mid-2008 (Metal X Ltd., 2008, p. 8).

In 2007, Metal X's subsidiary Bluestone Mines Tasmania Pty Ltd. planned to reopen the Mount Bischoff and the Renison

Mines in Tasmania. The Mount Bischoff and the Renison Mines have been the two leading tin producing mines in Australia during the past century. When tin prices fell below $6,000 per metric ton in 2005, Metal X placed the mines on care-and-maintenance status. The Renison Bell underground mine, which is located 15 km northeast of Zeehan on Tasmania's west coast, had a remaining identified mineral resource of 4.37 Mt at a grade of 2.01% tin. The tin concentrator had an output capacity of 700,000 t/yr. The company planned to recommission the tin mine and concentrator in 2008. The Mount Bischoff open pit mine, which is located 80 km north of the Renison Bell Mine, had been worked from the 1880s until World War II. Bluestone planned to resume mining at Mount Bischoff as a satellite ore source for the Renison tin concentrator so that the concentrator could operate at maximum capacity and efficiency and a viable and sustainable project could be achieved. Bluestone estimated that Mount Bischoff had ore reserves of 778,000 t at a grade of 1.17% tin from pit optimization studies. Bluestone planned to mine 250,000 t/yr of ore for 3 years. The company also planned to reprocess and recover copper and tin tailings from the Renison Bell Mine site. The 18.2-Mt of tailings contained an average grade of 0.42% tin and 0.20% copper. The prefeasibility study indicated that a combination of sulfate flotation and tin flotation separation techniques could produce a low-grade concentrate, which could be fumed to produce a salable tin product. The bankable feasibility study was expected to be completed in 2008. Metal X planned to wind down its tin operations in the State of Queensland and to focus on its Tasmanian operations (Metal X Ltd., 2008, p. 7).

Industrial Minerals

Cement.—Australia has three major integrated cement companies (Adelaide Brighton Cement Ltd., Blue Circle Southern Cement Ltd., and Cement Australia Pty Ltd.) and a number of small independent companies. The three major cement companies accounted for all integrated production of clinker and cement in Australia. Cement production in Australia increased to more than 9 Mt/yr of cement, mainly for domestic consumption. During the past several years, owing to strong domestic demand for cement, Australia imported from Asian countries about 1 Mt/yr of clinker. Owing to environmental concerns and price competition from Asian cement producers, Australian cement producers were reluctant to expand their output capacity. Domestic analysts estimated that cement demand in Australia was expected to increase by 1.25% per year. The cement industry aimed to enhance the long-term sustainability of the industry and was focusing on such issues as energy efficiency, greenhouse emissions, regulatory reform, and transport costs (Department of Resources, Energy, and Tourism, 2008).

Diamond.—Australia was one of the leading diamond producing countries in the world. Diamond production was mainly from the Argyle Mine in the State of Western Australia. In 2005, Rio Tinto had invested $760 million to develop an underground block-caving operation; bringing the underground mine into full operation was expected to take 3 years. The capital cost was revised to $1.5 billion. The construction of major underground infrastructure was scheduled to begin in 2008, and full operation was expected to begin in 2010. Output from the underground operation would account for 60% of Argyle's total output. The life of the mine would be extended to 2018. The open pit operation was scheduled to be shut down in 2008. The diamond output from the Argyle Mine was expected to decline as the open pit operation was winding down and the underground production was ramping up during the next 5 years (Rio Tinto plc, 2008b, p. 34).

In December 2007, London-based Gem Diamonds Ltd. acquired a controlling interest in Kimberley Diamond Co., which owned the Ellendale Mine near Derby in Western Australia, for $249 million. The Ellendale Mine had a resource of 105 Mt at an average grade of 5 carats per hundred metric tons. Diamond from the mine was fancy and vivid yellow, and demand for this kind of diamond had grown rapidly during the past decade. Gem Diamonds planned to increase the production and processing rate of the Ellendale Mine to 8.5 Mt in 2008 and 10.5 Mt in 2009. The life of the mine was expected to be shortened to 8 years. Ellendale's rough diamond was sold at an average price of $207 per carat (Gem Diamonds Ltd., 2008, p. 4-5).

Phosphate Rock.—Australian phosphate rock production was mainly from the Phosphate Hill-Duchess Mine in the State of Queensland, the phosphate mine on Christmas Island, and several small operations near Bendleby in the State of South Australia. Legend International Holdings, Inc. planned to develop its Lady Annie and Lady Jane deposits in the Georgina Basin, Queensland. The deposits were discovered by BH South Ltd. in 1967 and had 486 Mt of resources at a grade of 17% phosphorus pentoxide. A 100-metric-ton-per-day pilot plant was built in 1973 and produced beneficiated phosphate rock containing an average grade of 34% phosphorus pentoxide. Legend reevaluated past feasibility studies conducted by BH South and decided to construct a 10-Mt/yr phosphate rock mine and a 5-Mt/yr beneficiation plant. The company planned to transport 5 Mt of phosphate rock slurry by a 300-km pipeline to a port facility in the Gulf of Carpentaria and to export to Indian Farmers Fertilizer Cooperative Ltd. under an offtake agreement. The mining was scheduled to commence in 2009 (Legend International Holdings, Inc., 2008).

Rare Earths.—Globally, the production and resources of rare earths was dominated by China. In 2007, there was no recorded production of rare earths in Australia. Lynas Corp. Ltd. planned to develop the rare-earth deposits at Mount Weld, which was located 35 km south of Laverton, Western Australia. A feasibility study had been completed and the company received Government approval to develop the Mount Weld rare-earth project. The feasibility study indicated that the Mount Weld deposit contained 12.24 Mt of resources (measured, indicated, and inferred) at an average grade of 9.7% rare-earth oxide (REO) at a cutoff of 2.5% REO. The construction of the open pit mine began in 2007. Initially, the company had planned to ship ore to Malaysia for concentration, where the company planned to build a concentration plant in the Gebeng III Industrial area in the State of Pahang, Malaysia. Owing to transportation costs and material safety issues, however, the company decided to build a 21,000-t/yr concentration plant at Mount Weld instead. Construction of the plant was scheduled to begin in 2008 and to be completed in 2009 (Lynas Corp. Ltd., 2008, p. 8).

Coal.—Australia ranked behind China and India in the Asia and the Pacific region in coal output; the country, however, was the world's leading exporter of coal. Queensland and New South Wales were Australia's leading coal producing states and accounted for about 97% of the country's total output. Queensland's coal was from the Bowen Basin, which extends south from Collinsville to Blackwater and Moura, and from mines at Blair Athol, Newlands, and near Brisbane. New South Wales's coal was mined near the eastern and western edges of the large Sydney Gunnedah Basin. In 2007, Australia exported more than 250 Mt of coal (metallurgical coal, 138 Mt, and thermal coal, 112 Mt). China, the European Union, India, Japan, the Republic of Korea, and Taiwan received about 90% of the total exports. Domestic coal consumption was about 70 Mt, of which the power sector accounted for about 85%; followed by steel, 6.7%; cement, 1.3%; and other, 7% (Australia Bureau of Agricultural and Resources Economics, 2008b, p. 19).

During the past several years, significant investment had been proposed to provide expansions in the transport and handling infrastructure in Australia. The infrastructure bottlenecks held back Australia's mineral exports, especially coal. In late 2006, the State government of Queensland committed $3.4 billion to expand the coal transport infrastructure, including state-owned railways and ports and privately owned coal terminals. The total coal-export capacity of rail and port systems would increase to 200 Mt/yr by the end of 2008 and to 242 Mt/yr in 2010. The coal handling capacity of the Abbot Point, Brisbane, Gladstone, and Hay Point coal export terminals would be increased to 230 Mt in 2008 and then to 340 Mt if the State government of Queensland deemed it necessary (Department of Mines and Energy, 2007, p. 31).

Rio Tinto and its partners announced a significant new investment in their coal production capacity in Australia. Rio Tinto approved $750 million for the development of the Clermont coal mine, which is located 15 km southeast of the Blair Athol Mine in Queensland. The 190-Mt mine was designed to produce 12.2 Mt of thermal coal at full capacity in 2013. The construction of the mine began in 2007 and coal production was expected to begin in 2010; the life of the mine was expected to be 17 years. The mine would be brought into production to replace Blair Athol, which would be closed in 2015. In 2007, the company approved $991 million to expand the Kestrel Mine production capacity by an average of 5.7 Mt/yr for 20 years. The extension enabled the company to tap into 112 Mt of coal reserves. Rio Tinto started a feasibility study of the Mount Pleasant coal mine project, which is located in Hunter Valley, New South Wales. The Mount Pleasant Mine had coal resources of 699 Mt (Rio Tinto plc, 2008b, p. 40).

In 2007, Xstrata Coal Pty Ltd. (a subsidiary of Xstrata plc) acquired the Anvil Hill coal project for A$425 million from Centennial Coal Co. Ltd. The Anvil Hill property was located west of Muswellbrook in Hunter Valley, New South Wales. Xstrata changed the name of Anvil Hill to Mangoola and reported that the proven coal reserve was 146.6 Mt and that the inferred coal resource was 314 Mt. Xstrata established Xstrata Mangoola Pty Ltd. to manage the Mangoola mine. The State government of New South Wales approved Centennial's plan to construct an open pit coal mine to extract and process up to 10.5 Mt/yr of coal for 21 years. Xstrata planned to begin construction of the mine in 2008, and the mine was scheduled to be completed in 2011. The capital cost was projected to be $1.1 billion (Xstrata plc, 2009).

Natural Gas and Petroleum.—The States of Western Australia and Victoria accounted for most of Australia's oil and condensate and liquefied natural gas (LNG) production. The Carnarvon Basin, which is located off the coast of Western Australia, accounted for 63% of the country's total production. Production from the Carnarvon Basin was mostly exported, and production from the Gippsland Basin, which is located off the coast of Victoria in southeastern Australia, was used mainly to feed local refineries. In 2007, Australia's oil production increased slightly compared with that of 2006. During late 2006, a severe cyclone season in northwestern Australia and a decline in production from mature oilfields resulted in a decrease in oil production during that period. The growth was largely driven by the startup of a number of new projects in the second half of 2006, including the Cliff Head project, which is located in the Perth Basin; the Enfield project, which is located in the Carnarvon Basin; and the Stybarrow project, which is located off the northwest coast of Australia. Australia was a net importer of oil and refinery products. In 2007, the country's net imports of crude oil and condensate totaled 72.83 million barrels (Mbbl) (11,578 million liters) and imported petroleum products totaled 83.15 Mbbl (13,219 million liters) (Australia Bureau of Agricultural and Resources Economics, 2008b, p. 29-30).

Australia has substantial natural gas resources. The country's main natural gas producing areas were the Carnarvon Basin; the onshore Cooper Basin, which is located in the northeastern part of the State of South Australia; and the Gippsland Basin. The Northwest Shelf Venture, a consortium of six companies led by Woodside Petroleum, operated three offshore LNG trains. During the past decade, natural gas production in Australia had increased steadily. Australia consumed about 25 billion cubic meters per year of natural gas and exported its surplus. With the expected increase in production from the Casino and the Darwin fields, Australia's natural gas output was expected to increase for the next several years. A fourth LNG train was put into operation in September 2004 that increased the LNG exporting capacity to 12 Mt/yr for the North West Shelf gasfield, which is located off the coast of Western Australia. A fifth LNG train was under construction; it had a 4.4-Mt/yr capacity and was expected to be ready for the first deliveries in 2008. Australia's LNG exports were expected to increase to 16.9 Mt in 2009. With such countries as China, Japan, and the Republic of Korea looking to secure sources of cleaner fuel for power generation, demand for Australian LNG exports was expected to increase. The Australian Government was committed to expanding the LNG sector in the next decade and to increasing its share of LNG on the Asian market to 30% in 2020 from about 10% in 2004 (Australia Bureau of Agricultural and Resources Economics, 2008d, p. 25).

Uranium.—Australia was the second ranked uranium producer in the world after Canada. Australia's uranium production was mainly from three mines—the Beverley, the

Olympic Dam, and the Ranger Mines. A number of undeveloped deposits in the Northern Territory and the States of Queensland, South Australia, and Western Australia also exist. The Australian Government permits uranium mining, provided that all the relevant environmental safeguards and health requirements are met. Regulation of Australia's uranium mines is mainly a State and Territorial government responsibility. Among the States and Territories, only the governments of the Northern Territory and South Australia permit uranium mining. The State of Western Australia had considered lifting the ban on uranium mining in the State. If the ban were to be lifted, Energy and Minerals Australia Ltd. planned to develop its Mulga Rock uranium project, which is located 250 km east-northeast of Kalgoorlie, Western Australia. Owing to financial problems, Uranium One Inc. suspended the construction of the Honeymoon project in South Australia, which was scheduled to start production in 2008. Alliance Resources Ltd. and Quasar Resources Resources Pty Ltd. planned to develop their joint Four Mile project, which is located 550 km north of Adelaide, South Australia. The Four Mile project was discovered in 2005 and was made up of two deposits—Four Mile East and Four Mile West. The Four Mile East deposit had uranium oxide resources of between 13,620 t (30 million pounds) and 21,338 t (47 million pounds). The company planned to use an in situ recovery method to extract uranium (Gold and Minerals Gazette, 2008).

All Australia's uranium production was exported under long-term contracts to electric utilities in Belgium, Finland, France, Germany, Japan, the Republic of Korea, Spain, Sweden, the United Kingdom, and the United States. The Governments of Australia and China signed a Nuclear Transfer Agreement and a Nuclear Cooperation Agreement. These agreements established strict safeguards to regulate the conditions under which uranium could be exported from Australia to China. China was expected to import up to about 20,000 t of uranium from Australia in 2010.

Outlook

Australia is a natural resource-rich country with significant resources of metallic, nonmetallic, and fuel minerals. Mineral and energy commodity exports are an important part of the country's economy. Reflecting strong world demand for mineral resources, especially in the Asia and the Pacific region, the Australian economy is expected to continue to benefit from higher commodity export earnings. Expenditures on mineral and energy exploration in Australia is expected to increase owing to higher costs of labor and equipment and global demand for natural resources in the future. Owing to global financial problems, the increase in the rate of production of such commodities as bauxite, copper, iron ore, natural gas, nickel, and zinc is expected to slow down during the next several years. Major projects, such as the Yarwun alumina refinery project; BHP Billiton's RGP for iron ore; Hamersley Iron's Yandicoogina iron ore expansion; Fortescue Metals' iron ore project; Rio Tinto's Brockman 4, Hope Downs, and Mesa A iron ore projects; BHP Billiton's Ravensthorpe nickel project; and OZ Minerals' lead and zinc expansion project are expected to come onstream within this decade. Western Australia is Australia's leading State for metallic mineral exports and New South Wales and Queensland are major coal exporting States; to sustain export growth, however, the country's infrastructure requires significant expansion and upgrading so that minerals for export can be transported from inland to port terminals. Australia is expected to remain a major mineral and fuel exporting country.

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TABLE 1
AUSTRALIA: PRODUCTION OF MINEAL COMMODITIES[1]

(Metric tons unless othewise specified)

Commodity		2003	2004	2005	2006	2007
METALS						
Aluminum:						
Bauxite, gross weight	thousand metric tons	55,602	43,993	59,959	61,780 r	62,398
Alumina	do.	16,529	16,525	17,704	18,312	18,844
Metal, refined:						
Primary	do.	1,857	1,894	1,903	1,932	1,957
Secondary[e]		127,000	127,000	127,000	130,000	130,000
Antimony, Sb content of ores and concentrates[e]		900	120	120	1,600	1,010
Cadmium:[e]						
Mine output, Cd content		700 r	700 r	700 r	700 r	700
Metal, smelter, refined		506 r, 2	350 r	360 r	330 r	350
Chromium, chromite, gross weight		163,012	243,221	241,756	252,867	234,083
Chromite content		67,271	104,317	90,260	107,103	99,147
Cobalt:						
Co content in laterite ore, Ni concentrate, and Zn concentrate[e]		6,000 r	5,600 r	5,600 r	6,000 r	5,900
Metal, refined		3,840	3,880	3,150	3,700 r	3,680
Copper:						
Mine output, Cu content	thousand metric tons	830	875	930	879	880
Metal:						
Smelter, primary and secondary	do.	418	440	412	377	399
Refined, primary	do.	484	498	461	429	442
Gold:						
Mine output, Au content		283	258	263	246 r	245
Metal, refined:						
Primary		331	313	291	266	259
Secondary		80	58	50	112	116
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	212,981 r	233,994 r	261,855 r	275,098 r	298,974
Fe content	do.	116,355	143,980	162,527	170,933	185,363
Metal:						
Pig iron	do.	6,116	5,735	6,203	6,433 r	6,351
Ferroalloys:[e]						
Ferromanganese		115,000	115,000	120,000	125,000	125,000
Silicomanganese		135,000	135,000	135,000	140,000	140,000
Total		250,000	250,000	255,000	265,000	265,000
Steel, crude	thousand metric tons	9,678	8,353	7,788	7,937	8,047
Semimanufactured products		7,458	6,671	6,920	7,000 e	7,200 e
Lead:						
Mine output, Pb content	thousand metric tons	688	674	767	686	641
Metal:						
Bullion	do.	169	140	159	118	125
Refined:						
Primary	do.	270	232	230	233	202
Secondary excluding remelt	do.	25	36	33	27	27
Manganese ore, metallurgical:						
Gross weight	do.	2,564	3,431	3,830	4,567	5,290
Mn content	do.	1,247	1,570	1,908	2,192	2,539
Nickel:						
Mine output, Ni content	do.	191	187	189	185	184
Matte	do.	108	107	115	95	95 e
Metal, smelter, refined Ni and Ni content of oxide	do.	129	122	126	119 r	114
Platinum-group metals:[e]						
Palladium, Pd content	kilograms	820	800	550	750 r	600
Platinum, Pt content	do.	225	200	111	209 r	142
Total	do.	1,050	1,000	661	959 r	742

See footnotes at end of table.

TABLE 1—Continued
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
METALS—Continued						
Silver:						
Mine output, Ag content		1,868	2,224	2,417	1,727	1,879
Metal, refined		649	650	727	634	625
Tantalum, tantalite, Ta_2O_5 equivalent		973	985	1,043	584	435
Tin:						
Mine output, Sn content		3,864	1,196	2,819	1,478	2,071
Metal, refined:						
Primary		597	467	594	572	118
Secondary[e]		400	400	400	400	400
Titanium concentrates, gross weight:						
Ilmenite	thousand metric tons	2,006	1,921	2,030	2,377	2,326
Leucoxene		57,000	44,000	46,000	131,000	169,000
Rutile		173,000	163,000	177,000	232,000	313,000
Zinc:						
Mine output, Zn content	thousand metric tons	1,479	1,334	1,367	1,362	1,514
Metal, smelter:						
Primary	do.	553	470	457	463	502
Secondary[e]		6,000	6,500 [r]	7,500 [r]	8,500 [r]	8,200
Zirconium concentrates, gross weight	thousand metric tons	462	441	427	491	605
INDUSTRIAL MINERALS						
Abrasives, natural:						
Beach pebble[e]		2,000	2,000	2,000	2,000	2,000
Garnet		127,975	125,404	246,128	278,233 [r]	294,007
Barite[e]		20,000	20,000	20,000	21,000	21,000
Cement, hydraulic[e]	thousand metric tons	8,000	8,000	8,475 [2]	9,000	9,500
Clays:[e]						
Bentonite and bentonitic clay		145,000	265,000	223,000	220,000	220,000
Brick clay and shale	thousand metric tons	8,000	8,000	8,000	8,000	8,000
Cement clay and shale	do.	500	500	500	500	500
Damourite clay		100	100	100	100	100
Fire clay		25,000	25,000	25,000	25,000	22,000
Fuller's earth, attapulgite		11,000	10,000	9,800	10,000	10,000
Kaolin and ball clay		280,000	285,000	230,000	250,000	230,000
Other	thousand metric tons	2,000	2,000	2,000	2,000	2,000
Diamond:						
Gem	thousand carats	13,981	6,008	8,577	7,305	231
Industrial	do.	17,087	18,172	25,730	21,915	18,960
Total	do.	31,068	24,180	34,307	29,220	19,191
Diatomite[e]		20,000	20,000	20,000	20,000	20,000
Feldspar, including nepheline syenite[e]		50,000	50,000	50,000	50,000	50,000
Gemstones, opal	value, $million	50	36	40 [e]	50	40
Gypsum	thousand metric tons	4,066	4,325	3,857	4,265 [r]	3,896
Kyanite[e]		1,000	1,000	1,000	1,000	1,000
Lime[e]		1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Lithium, spodumene		124,410	118,451	173,635	222,101	192,277
Magnesite		472,668	473,983	474,000 [e]	446,000	447,000
Nitrogen, N content of ammonia		786,800	790,000	790,000	1,200,000	1,200,000
Perlite, crude[e]		5,000	5,000	6,000	6,500	6,500
Phosphate rock:						
Gross weight		2,100,000 [e]	2,200,000	2,080,000	2,145,000	2,850,000
P_2O_5 content		483,000	506,000	478,000	493,000	655,000
Salt[3]	thousand metric tons	10,256	11,088	12,444	11,424	10,855
Stone and sand and gravel:						
Construction sand	do.	28,825	27,995	30,438	30,000 [e]	30,000 [e]
Crushed and broken stone	do.	75,649	75,262	81,072	80,000 [e]	80,000 [e]
Dimension stone	do.	147	266	237	200 [r, e]	210 [e]
Gravel	do.	12,718	18,850	20,000 [e]	20,000	20,000
Dolomite[e]	do.	10,000	10,000	10,000	10,000	10,000

See footnotes at end of table.

TABLE 1—Continued
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2003	2004	2005	2006	2007
INDUSTRIAL MINERALS—Continued						
Stone and sand and gravel—Continued:						
Limestone	thousand metric tons	17,076	18,360	18,280	18,200 e	18,200 e
Silica in the form of quartz, quartzite, glass sand	do.	4,181	4,142	5,169	5,200 e	5,200 e
Sulfur, byproduct:						
Metallurgy	do.	863	870	880	880 e	880 e
Petroleum e	do.	60	60	60	58	58
Total e	do.	923	930	940	938	938
Talc, chlorite, pyrophyllite, steatite		123,080	150,923	155,000 e	130,000 e	125,000 e
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous and subbituminous	thousand metric tons	280,700	298,000	303,000	309,000	320,000
Lignite e	do.	66,000	67,000	67,000	71,000	71,000
Total e	do.	347,000	365,000	370,000	380,000	391,000
Gas, natural, marketed	million cubic meters	37,410	41,680	42,630	44,100	39,960
Petroleum:						
Crude	thousand 42-gallon barrels	193,216	171,781	155,320	163,900	168,080
Refinery products	do.	273,518	280,242	255,863	229,748	252,443
Uranium, mine output, U_3O_8 content		8,912	10,600	11,218	8,970	10,145

eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. rRevised. do. Ditto.

[1]Table includes data available through December 20, 2008.

[2]Reported figure.

[3]Does not include production from the Northern Territory and the State of Victoria.

TABLE 2
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Aluminum:			
Bauxite	Gove open pit bauxite mine (Rio Tinto Alcan, 100%)	Gove Peninsula, NT	8,000
Do.	Huntly open pit bauxite mine (Alcoa World Alumina Australia, 100%)	80 km south of Perth, WA	20,000
Do.	Weipa-Andoom open pit bauxite mine [Comalco Ltd., operator (Rio Tinto plc, 100%)]	Weipa, QLD	18,200
Do.	Willowdale open pit bauxite mine [Comalco Ltd., operator (Rio Tinto plc, 100%)]	130 km south of Perth, WA	8,600
Do.	Baddington open pit bauxite mine {Worsley Alumina Pty. Ltd., manager [BHP Billiton Ltd., 86%; Japan Alumina Associates (Australia) Pty. Ltd., 10%; Sojitz Alumina Pty. Ltd., 4%]}	50 km northeast of Collie, WA	13,200
Alumina refinery	Gladstone alumina refinery [Queensland Alumina Ltd., operator (Rio Tinto Alcan, 80%, and Rusal, 20%)]	Gladstone, QLD	3,850
Do.	Gove alumina refinery [Alcan Gove Pty Ltd. (Rio Tinto Alcan, 100%)]	Nhulunbuy, Gove, NT	3,800
Do.	Kwinana alumina refinery (Alcoa World Alumina Australia, 100%)	Kwinana, WA	2,100
Do.	Pinjarra alumina refinery (Alcoa World Alumina Australia, 100%)	Pinjarra, WA	4,200
Do.	Wagerup alumina refinery (Alcoa World Alumina Australia, 60%, and Western Mining Corp., 40%)	Waroona, WA	2,600
Do.	Worsley alumina refinery [Worsley Alumina Pty. Ltd., manager (BHP Billiton Ltd., 86%, and Japan Alumina Associates (Australia) Pty Ltd., 10%]	20 km northwest of Collie, WA	3,700
Do.	Yarwun alumina refinery (Rio Tinto Alcan, 100%)	Gladstone, QLD	1,400
Metal smelter	Bell Bay aluminum smelter (Rio Tinto Alcan, 100%)	Bell Bay, TAS	160
Do.	Kurri Kurri aluminum smelter (Hydro Aluminium Kurri Kurri Pty. Ltd., 100%)	Kurri Kurri, near Newcastle, NSW	165
Do.	Boyne Island aluminum smelter [Boyne Smelters Ltd., operator (Rio Tinto Alcan, 64%; Sumitomo Light Metal Industries Ltd., 17%; Ryowa Development Pty. Ltd., 12%; Kobe Steel Ltd., 5%; Sumitomo Chemical Co. Ltd., 2%)	Boyne Island, QLD	550
Do.	Point Henry aluminum smelter (Alcoa of Australia, 100%)	Point Henry, VIC	185
Do.	Portland aluminum smelter [Alcoa of Australia, 55%, manager; China International Trust Investment Co. (China's state-owned company), 22.5%; Marubeni Australia Pty. Ltd., 22.5%]	Portland, VIC	345
Do.	Tomago aluminum smelter [Tomago Aluminium Co. Pty. Ltd., operator (Gove Aluminium Finance Ltd., 36.05%; Rio Tinto Alcan, 51.55%; Hydro Aluminium, 12.40%)]	Tomago, NSW	525
Antimony	Augusta underground antimony-gold mine [AGD Mining operator (Cambrian Mining Plc, 100%)]	50 km east and southeast of Bendigo, VIC	5
Do.	Hillgrove Mine (Straits Resources Ltd., 100%)	25 km east of Armidale, NSW	5
Bentonite	Arumpo open pit bentonite mine (Arumpo Bentonite Pty. Ltd., 100%)	95 km northeast of Mildura, NSW	10
Do.	Cedars open pit bentonite mine (PCP Douglass Pty. Ltd., 100%)	10 km southwest of Yarraman, QLD	20
Do.	Cressfield open pit bentonite mine (Unimin Australia Ltd., 100%)	20 km north of Scone, NSW	12
Do.	Miles open pit bentonite mine (Unimin Australia Ltd., 100%)	350 km west of Brisbane, QLD	100
Cement, plant	Adelaide Brighton Cement Pty Ltd., 100%	Angaston, SA	250
Do.	do.	Birkenhead, SA	1,200
Do.	do.	Geelong, VIC	800
Do.	do.	Munster, SA	590
Do.	Blue Circle Southern Cement Ltd., 100%	Berrima, NSW	1,200
Do.	do.	Maldon, NSW	700
Do.	do.	Waurn Ponds, VIC	250
Do.	Cement Australia Ltd., 100%	Brisbane, QLD	1,200
Do.	do.	Gladstone, QLD	1,600
Do.	do.	Kandos, NSW	450
Do.	do.	Railton, TAS	1,000
Do.	Cockburn Cement Ltd., 100%	Munster, 30 km south of Perth, WA	700
Chromite	Coobina open pit chromite mine (Consolidated Minerals Ltd., 100%)	80 km southeast of Newman, WA	250

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Coal	Angus Place longwall coal mine (Centennial Coal Co. Ltd., 50%, and SK Corp., 50%)	16 km northwest of Lithgow, NSW	3,000
Do.	Appin longwall coal mine [Illawarra Coal Holdings Pty Ltd., operator (BHP Billiton Ltd., 100%)]	40 northwest of Wollongong, NSW	8,800
Do.	Ashton open pit/underground coal mine (Felix Resources Ltd., 60%; Chu Corp., 10%; private, 30%)	14 km northwest of Singleton, NSW	4,000
Do.	Awaba underground coal mine [Powercoal Pty. Ltd., operator (Centennial Coal Co. Ltd., 100%)]	30 km southwest of Newcastle, NSW	2,000
Do.	Baal Bone coal mine [Oakbridge Pty. Ltd., 74.1% (Xstrata plc, 100%); Sumitomo Corp., 5%; Toyota Tsusho Mining (Australia) Pty Ltd. 4.75%; private, 14.44%]	24 km northwest of Lithgow, NSW	2,500
Do.	Bengalla open pit coal mine [Coal and Allied Industries Ltd., 40%, manager; Wesfarmers Bengalla Ltd., 40%; MCDA Bengalla Investment Pty. Ltd., 10%; Taipower Bengalla Pty. Ltd., 10%]	5 km west of Muswellbrook, NSW	6,600
Do.	Blackwater open pit coal mine (includes South Blackwater) [BHP Billiton Mitsubishi Alliance, manager (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)]	195 km west of Rockhampton, QLD	14,000
Do.	Blair Athol open pit coal mine [Rio Tinto Ltd., 57.2%, manager; J-Power (Australia) Pty Ltd., 8%; private, 34.8%]	25 km northwest of Clermont, QLD	13,000
Do.	Broadmeadow open pit/underground coal mine [BHP Billiton Mitsubishi Alliance, manager (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)]	30 km north of Moranbah, QLD[3]	3,000
Do.	Bulga open pit coal mine [Oakbridge Pty Ltd., manager (Xstrata plc, 68.25%; Nippon Steel Australia Pty. Ltd., 12.5%; Toyota Tsusho Mining (Australia) Pty Ltd., 4.38%; private 13.3%]	16 km southwest of Singleton, NSW	10,000
Do.	Burton open pit coal mine (Peabody Energy Corp., 95%, and Thiess Pty. Ltd., 5%)	150 km southwest of Mackay, QLD	5,800
Do.	Callide coal mine (Anglo Coal Pty Ltd., 100%)	120 km southwest of the Port of Gladstone, QLD	10,700
Do.	Camberwell open pit coal mine [Camberwell Coal Pty. Ltd., manager [Toyota Tsusho Mining (Australia) Pty. Ltd., 90%, and Dia Coal Mining (Australia) Pty Ltd., 10%]	10 km northwest of Singleton, NSW	4,000
Do.	Clarence underground coal mine (Centennial Coal Co. Ltd., 85%, manager; and SK Australia Pty. Ltd., 15%)	10 km east of Lithgow, NSW	2,500
Do.	Commodore open pit coal mine Roche Mining Pty. Ltd., operator [Intergen (Australia) Pty Ltd., 100%]	80 km southwest of Toowoomba, QLD	3,600
Do.	Coppabella open pit coal mine (Macarthur Coal Ltd., 73.3%, and others, 26.7%)	140 km southwest of Mackay, QLD	4,000
Do.	Cumnock No. 1 open pit coal mine (Cumnock Coal. Ltd., 100%)	28 km northwest of Singleton, NSW	3,000
Do.	Curragh open pit coal mine (Wesfarmers Ltd., 100%)	70 km east of Emerald, QLD	9,000
Do.	Dartbrook coal mine (Anglo Coal Holdings Australia Ltd., 77.3%)	70 km north of Singleton, NSW[3]	3,750
Do.	Dawson coal complex (includes Moura, Theodore, and Taroom) [Anglo American Plc, 51%, and Mitsui & Co. (Australia) Ltd., 49%]	230 km west of Bundaberg, QLD	7,000
Do.	Dendrobium underground coal mine (BHP Billiton Ltd., 100%)	15 km southwest of Wollongong, NSW	5,200
Do.	Donaldson open pit coal mine (Donaldson Coal Pty Ltd., 100%)	5 km southeast of Maitland, NSW	2,500
Do.	Drayton open pit coal mine [Anglo Coal Holdings Australia Ltd., 88.2%, manager; Mitsui Coal Development Australia Pty. Ltd., 3.8%; Mitsui Mining (Australia) Pty. Ltd., 3%; others, 5%]	35 km northwest of Singleton, NSW	5,000
Do.	Duralie open pit coal mine (Gloucester Coal Ltd., 100%)	110 km of Newcastle, NSW	2,000
Do.	Elouera underground coal mine (Gujarat NRE Resources NL, 100%)	15 km southwest of Wollongong, NSW	2,000
Do.	Ensham-Yongala open pit coal mine [Idemitsu Kosan Co. Ltd., 85%; J-Power (Australia) Pty. Ltd., 10%; LG International (Australia) Pty Ltd., 5%]	40 km northeast of Emerald, QLD	9,000
Do.	Ewington II open pit coal mine (Griffin Coal Mining Co. Pty. Ltd., 100%)	8 km east of Collie, WA	1,000
Do.	Foxleigh open pit coal mine (Foxleigh Mining Pty Ltd., 100%)	Bowen Basin, QLD	3,600
Do.	German Creek and German Creek East open pit/underground coal mines [Anglo American Plc, 70%, and Mitsui & Co. (Australia) Ltd., 30%]	275 km west-northwest of Rockhampton, QLD	6,000

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Coal—Continued	Glennies Creek longwall coal mine (CVRD INCO Ltd., 85%; Nippon Steel Australia Pty Ltd., 5%; POSCO Australia Pty Ltd., 5%; private, 5%)	12 km north of Singleton, NSW	2,800
Do.	Goonyella-Riverside-Broadmeadow open pit coal mines (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)	140 km southwest of Mackay, QLD	16,000
Do.	Gregory Crinum open pit/underground coal mine [BHP Billiton Mitsubishi Alliance, manager (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)	60 km north Emerald, QLD	5,500
Do.	Hunter Valley Operations (includes Carrington Chestnut, Howick, Hunter Valley No. 1, Lemington, Riverview open pit coal mines) (Coal and Allied Industries Ltd., 100%)	10 km west to 25 km north of Singleton, NSW	15,000
Do.	Hail Creek open pit coal mine (Rio Tinto Ltd., 82%; Nippon Steel Australia Pty Ltd., 8%; Marubeni Coal Pty. Ltd., 6.66%)	100 km west of Mackay, QLD	8,000
Do.	Hazelwood open pit coal mine (International Power Hazelwood, 100%)	150 km southeast of Melbourne, VIC	20,000
Do.	Jellinbah East open pit coal mine (Queensland Coal Mine Management Pty. Ltd., 70%; Marubeni Coal Pty. Ltd., 15%; Sojitz Australia Ltd., 15%)	90 km east of Emerald, QLD	4,000
Do.	Kestrel underground coal mine [Rio Tinto Ltd., 80%, and Mitsui & Co. (Australia) Ltd., 20%]	40 km north-northeast of Emerald, QLD	5,500
Do.	Liddell open pit coal mine (Xstrata Coal Australia Pty. Ltd., 67.5%, and Mitsui Matushima Australia Pty. Ltd., 32.5%)	25 km northwest of Singleton, NSW	4,000
Do.	Loy Yang open pit coal mine (Loy Yang Power Ltd., 100%)	165 km east of Melbourne, VIC	30,000
Do.	Mondalong underground coal mine (Centennial Coal Co. Ltd., 100%)	35 km southwest of Newcastle, NSW	4,500
Do.	Moorvale open pit coal mine (Macarthur Coal Ltd., 73.3%; CITIC Resources Australia Pty Ltd., 7%; Sojtz Australia Ltd., 7%; Nippon Steel Australia Pty Ltd., 2%)	10 km south of Coppabella, QLD	3,400
Do.	Moranbah North longwall coal mine (Anglo American Plc., 88%, and Nippon Steel Australia Pty. Ltd., 5%)	150 km southwest of Mackay, QLD	5,800
Do.	Mount Arthur open pit coal mine (BHP Billiton Ltd., 100%)	5 km southwest of Muswellbrook, NSW	15,000
Do.	Mount Owen open pit coal mine (Xstrata plc, 100%)	20 km northwest of Singleton, NSW	7,700
Do.	Mount Thorley open pit coal mine (Coal and Allied Industries Ltd., 80%, and POSCO Australia Pty. Ltd., 20%)	14 km southwest of Singleton, NSW	12,000
Do.	Muja open pit coal mine (The Griffin Coal Mining Co. Pty. Ltd., 100%)	18 km southeast of Collie, WA	2,000
Do.	Muswellbrook No. 2 open pit coal mine (Muswellbrook Coal Co., 100%)	4 km northeast of Muswellbrook, NSW	1,700
Do.	Myuna underground coal mine (Centennial Coal Co. Ltd., 100%)	35 km south of Newcastle, NSW	1,500
Do.	New Acland open pit coal mine (New Hope Corp. Ltd., 100%)	35 km northwest of Toowoomba, QLD	3,750
Do.	Newlands-Collinsville-Abbot Point open pit coal mine (Xstrata plc, 55%; Itochu Corp., 35%; Sumitomo Corp., 10%)	130 km west of Mackay, QLD	15,000
Do.	Newstan longwall coal mine (Centennial Coal Co. Ltd., 100%)	30 km southwest of Newcastle, NSW	4,000
Do.	North Goonyella underground coal mine (Peabody Energy Corp., 100%)	40 km north Moranbah, QLD	3,000
Do.	Norwich Park open pit coal mine (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)	85 km north-northeast of Emerald, QLD	5,000
Do.	Oaky Creek longwall and Alliance open pit coal mines (Xstrata plc, 55%; Sumitomo Coal Australia Pty. Ltd., 25%; Itocho Corp., 20%)	300 km west-northwest of Rockhampton, QLD	9,500
Do.	Peak Downs open pit coal mine (BHP Billiton Ltd., 50%, and Mitsubishi Development Pty. Ltd., 50%)	145 km north of Emerald, QLD	9,000
Do.	Premier open pit coal mine (Wesfarmers Premier Coal Ltd., 100%)	10 km southeast of Collie, WA	4,000
Do.	Ravensworth-Narama open pit coal mine (includes Ravensworth East) (Xstrata Coal Australia Pty. Ltd., 100% of Ravensworth and 50% at Narama; Iluka Resources Ltd., 50% at Narama)	20 km northwest of Singleton, NSW	3,500
Do.	Rixs Creek open pit coal mine (Bloomfield Colliers Pty. Ltd., 100%)	5 km northwest of Singleton, NSW	2,000
Do.	Rolleston open pit coal mine (Xstrata plc, 75%; Itochu Corp., 12.5%; Sumitomo Corp., 12.5%)	90 south-southeast of Emerald, QLD	8,000
Do.	Saraji open pit coal mine (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)	125 km north of Emerald, QLD	6,500
Do.	South Walker Creek open pit/underground coal mine (BHP Mitsui Coal Pty. Ltd., 100%)	90 km southwest of Mackay, QLD	4,300
Do.	Springvale underground coal mine (Centennial Coal Co. Ltd. 50%; SK Corp., 25%; Korea Resource Corp. Australia, 25%)	16 km northwest of Lithgow, NSW	3,000

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Coal—Continued	Tahmoor longwall coal mine (includes Tahmoor North and Bargo) (Centennial Coal Co. Ltd., 85.79%, and private, 14.21%)	70 km southwest of Sydney, NSW	2,500
Do.	Tarong-Meandu open pit coal mine (Rio Tinto Ltd., 100%)	85 km north of Toowoomba, QLD	7,000
Do.	Ulan underground coal mine (Xstrata plc, 90%, and Mitsubishi Corp., 10%)	45 km northwest of Mudgee, NSW	5,000
Do.	United Collieries underground coal mine (Xstrata plc., 95%, and private, 5%)	15 km west of Singleton, NSW	3,000
Do.	Wambo open pit/underground coal mine (Peabody Energy Corp., 100%)	15 km west of Singleton, NSW	6,000
Do.	West Cliff longwall coal mine (BHP Billiton Ltd., 100%)	43 km northwest of Wollongong, NSW	2,300
Do.	West Wallsend longwall coal mine (Xstrata plc, 70%; Marubeni Coal Pty Ltd., 17%; private 13%)	25 km southwest of Newcastle, NSW	2,500
Do.	Yallourn open pit lignite mine (CLP Power Asia Ltd., 100%)	140 km southeast of Melbourne, VIC	18,000
Cobalt:			
Mine	Bulong open pit nickel-cobalt mine (Preston Resources Ltd., 100%)	30 km east of Kalgoorlie, WA	0.1
Do.	Cawse open pit nickel-cobalt mine (Norilsk Nickel Mining and Metallurgical Co., 100%)	50 km northwest of Kalgoorlie, WA	0.2
Do.	Murrin Murrin open pit nickel-cobalt mine (Minara Resources Ltd., 60%, and Glencore Australia Pty. Ltd. International AG, 40%)	60 km east of Leonora, WA	2.0
Do.	Radio Hill underground nickel-cobalt mine (Fox Resources Ltd., 100%)	35 km south of Karratha, WA	0.2
Refinery	Yabulu nickel-cobalt refinery (BHP Billiton Ltd., 100%)	Townsville, QLD	3
Copper:			
Mine, Cu content	Cadia Hill open pit gold-copper mine (Newcrest Mining Ltd., 100%)	21 km south-southwest of Orange, NSW	25
Do.	Cobar underground copper mine (Glencore Australia Pty. Ltd., 100%)	10 km northwest of Cobar, NSW	30
Do.	Eloise underground copper mine (Barminco Ply Ltd., 100%)	60 km southeast of Cloncurry, QLD	70
Do.	Ernest Henry open pit copper-gold mine (Xstrata plc, 100%)	35 km northeast of Cloncurry, QLD	115
Do.	Golden Grove underground zinc-copper mine (Oxiana Ltd., 100%)	225 km east of Geraldton, WA	20
Do.	Hellyer underground zinc-lead-copper-silver mine (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	1
Do.	Lady Annie copper (SW-EX) mine (CopperCo Ltd., 100%)	100 km north-northwest of Mount Isa, QLD	19
Do.	Leichhardt copper mine (Matrix Metals Ltd., 100%)	110 km northwest of Cloncurry, QLD	10
Do.	Mount Gordon open pit copper (SW-EX) mine (Aditya Birla Minerals Ltd., 100%)	120 kilometers north of Mount Isa, QLD	50
Do.	Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	190
Do.	Mount Lyell underground copper-gold mine [Sterlite Industries (India) Ltd., 100%]	2 km northeast of Queenstown, TAS	35
Do.	Nifty open pit copper (SX-EX) mine (Aditya Birla Minerals Ltd., 100%)	200 km southeast of Marble Bar, WA	25
Do.	Northparkes open pit/underground copper-gold mine (Rio Tinto Ltd., 80%; Sumitomo Metal Mining Oceania Pty. Ltd., 13.3%; SC Mineral Resources Pty. Ltd., 6.7%)	30 km north of Parkes, NSW	90
Do.	Olympic Dam underground copper-silver-gold-uranium mine [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	235
Do.	Osborne underground copper-gold mine (Barrick Gold Corp., 100%)	195 km southeast of Mount Isa, QLD	50
Do.	Peak underground gold-zinc-lead-copper-silver underground mine (includes New Cobar, New Occidental, and Perseverance), (GoldCorp Inc., 100%)	8 km south of Cobar, NSW	3
Do.	Ridgeway underground gold-copper mine (Newcrest Mining Ltd., 100%)	5 km south of Orange, NSW	30
Do.	Rosebery underground zinc-lead-silver-copper-gold mine (OZ Minerals Ltd., 100%)	35 km north of Queenstown, TAS	2
Do.	Selwyn underground copper-gold mine (Barrick Gold Corp., 100%)	160 km southeast of Mount Isa, QLD	17
Smelter	Mount Isa copper smelter (Xstrata plc, 100%)	Mount Isa, QLD	250
Do.	Olympic Dam copper smelter [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	70
Do.	Port Kembla copper smelter (Furukawa Co. Ltd., 52.5%; Nittetsu Mining Co., 20%; NisshoIwai Corp., 17.5%; Itochu Corp., 10%)	Port Kambla, NSW	120
Refinery	Olympic Dam copper refinery [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	235
Do.	Port Kembla copper refinery (Furukawa Co. Ltd., 52.5%; Nittetsu Mining Co., 20%; NisshoIwai Corp., 17.5%; Itochu Corp., 10%)	Port Kambla, NSW	120
Do.	Townsville copper refinery (Xstrata plc, 100%)	Townsville, QLD	300

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Diamond	thousand carats	Argyle Mine (AK-1 lamproite pipe and alluvial diamond mines) (Rio Tinto plc, 100%)	120 km southwest of Kununurra, WA	30,000
Do.	do.	Ellendale Mining Lease (Gem Diamond Ltd., 100%)	130 east southeast of Derby, WA	700
Do.	do.	Ellendale 9 North Mine (Blina Diamond NL, 100%)	140 east of Derby, WA	500
Diatomite		Barraba open pit Diatomite Mine (Australian Diatomite Mining Pty. Ltd., 100%)	85 km north-northwest of Tamworth, NSW	25
Dolomite		Ardrossan metallurgical dolomite quarry (OneSteel Ltd., 100%)	Northern York Peninsula, SA	650
Feldspar		Triple Chance open pit feldspar mine (includes Bakers, Lady Beryl, and Spar Ridge) (Minerals Corp. Ltd., 100%)	42 km southwest of Broken Hill, NSW	15
Garnet		Port Gregory open pit industrial garnet mine (GMA Garnet Pty. Ltd., 100%)	100 km north of Geraldton, WA	250
Gas:				
Condensate	thousand 42-gallon barrels per day	North West Shelf gas operations {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]}	130 km offshore Dampier, WA	60
Natural	million cubic meters per day	do.	do.	20
Liquefied natural	million metric tons	do.	Four-train liquefaction plant, Burrup Peninsula, WA	12
Gold:				
Mine	kilograms	Agnew open pit/underground gold mine (Gold Fields Ltd., 100%)	23 km west of Leinster, WA	5,600
Do.	do.	Boddington open pit/underground gold mine (Newmont Mining Corp., 66.67%, and AngloGold Ashanti Ltd., 33.33)	100 km southeast of Perth, WA[3]	12,000
Do.	do.	Bronzewing underground gold mine (includes Mount McClure, Venus, Success, Cockburn, Corboys, Mount Joel) (Audax Resources Ltd., 100%)	65 km northeast of Leinster, WA	9,000
Do.	do.	Cadia Hill open pit gold-copper mine (Newcrest Mining Ltd., 100%)	21 km south-southeast of Orange, NSW	11,000
Do.	do.	Ernest Henry open pit copper-gold mine (Xstrata plc, 100%)	35 km northeast of Cloncurry, QLD	3,000
Do.	do.	Granny Smith open pit gold mine (includes Wallaby) (Barrick Gold Corp., 100%)	20 km south of Laverton, WA	16,000
Do.	do.	Henty underground gold-silver mine (Barrick Gold Ltd., 100%)	30 km north of Queenstown, TAS	3,700
Do.	do.	Hillgrove Mine (Straits Resources Ltd., 100%)	25 km east of Armidale, NSW	1,000
Do.	do.	Jundee-Nimary open pit/underground gold mine (Newmont Mining Corp., 100%)	45 km northeast of Wiluna, WA	12,000
Do.	do.	Kanowna Belle underground gold mine (Barrick Gold Corp., 100%)	18 km northeast of Kalgoorlie, WA	7,000
Do.	do.	Lawlers underground gold mine (Barrick Gold Corp., 100%)	30 km southwest of Leinster, WA	3,000
Do.	do.	Mount Lyell underground copper-gold mine (Sterlite Industries (India) Ltd., 100%)	2 km northeast of Queenstown, TAS	1,000
Do.	do.	Mount Magnet open pit/underground gold mine (includes Hill 50 and Star) (Harmony Gold Mining Co. Ltd., 100%)	2 km from Mount Magnet, WA	8,500
Do.	do.	Norseman underground gold mine (Norseman Gold Plc, 100%)	Norseman, WA	3,700
Do.	do.	Northparkes open pit/underground copper-gold mine (Rio Tinto Ltd., 80%, and Sumitomo Metal Mining Oceania Pty. Ltd., 20%)	30 km north of Parkes, NSW	155,000
Do.	do.	Olympic Dam underground copper-silver-gold-uranium mine [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	1,500
Do.	do.	Pajingo underground gold mine (includes Vera-Nancy) [North Queensland Metals Ltd. (operator), 60%; Heemskirk Consolidated Ltd., 40%]	60 km south-southeast of Charters Towers, QLD	6,400
Do.	do.	Plutonic open pit/underground gold mine (Barrick Gold Corp., 100%)	180 km northeast of Meekatharra, WA	8,000
Do.	do.	Ravenswood open pit mine (includes Nolans, Sarsfield, and Mount Wright) (Resolute Mining Ltd., 100%)	100 km south of Townsville, QLD	3,000
Do.	do.	Ridgeway underground gold-copper mine (Newcrest Mining Ltd., 100%)	25 km south of Orange, NSW	10,800
Do.	do.	Rosebery underground zinc-lead-silver-copper-gold mine (OZ Minerals Ltd., 100%)	35 km north of Queenstown, TAS	1,000

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Gold, mine— Continued	kilograms	Saint Ives open pit/underground gold mine (Gold Fields Ltd., 100%)	75 km south-southeast of Kalgoorlie, WA	15,000
Do.	do.	Selwyn underground copper-gold mine (Barrick Gold Corp., 100%)	160 km southeast of Mount Isa, QLD	700
Do.	do.	Stawell underground gold mine (Perseverance Corp. Ltd., 100%)	250 km west of Melbourne, VIC	3,000
Do.	do.	Sunrise Dam open pit mine gold (includes Cleo) (AngloGold Ashanti Ltd., 100%)	55 km south of Laverton, WA	15,000
Do.	do.	Super Pit open pit gold mine (includes Fimiston) [Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager (Barrick Gold Corp., 50%, and Newmont Mining Corp., 50%)]	Southeast corner of the Kalgoorlie-Boulder Township, WA	25,000
Do.	do.	Tanami open pit gold mine (includes Central Desert Joint Venture) (Newmont Gold Corp., 100%)	650 km northwest of Alice Springs, NT	15,000
Do.	do.	Telfer copper and gold mine (Newcrest Mining Ltd., 100%)	400 km east southeast of Port Hedland, WA	15,000
Do.	do.	Thunderbox gold mine (Lionore Mining International Ltd., 100%)	90 km northeast of Leonora, WA	5,000
Do.	do.	Trident gold mine (Avoca Resources Ltd., 100%)	Higginsville, WA	5,000
Do.	do.	Wiluna open pit/underground gold mine (Apex Minerals NL, 100%)	7 km south of Wiluna, WA	3,300
Smelter	do.	Kalgoorlie Consolidated Gold Mines Pty. Ltd., 100%	Gidji Roaster gold smelter, Kalgoorlie, WA	24,300
Refinery	do.	Perth Refinery [AGR Management Services Ltd. (Astralian Gold Alliance Pty Ltd., 40%; Western Australian Mint, 40%; and Johnson Matthey (Australian) Ltd., 20%]	Newburn, WA	300,000
Gypsum		Gypsum Resources Australia Pty. Ltd., 100%	Lake MacDonnell open pit gypsum mine, near Point Thevenard, SA	1,400
Do.		Dampier Salt Ltd., 100%	Lake MacLeod salt and gypsum solar	900
Iron and steel:				
Iron ore		Channar open pit iron ore mine [Hamersley Iron Pty. Ltd., 60% (Rio Tinto Ltd., 100%) and China Iron and Steel Industry & Trade Group Corp. (SINOSTEEL) (a China state-owned company), 40%]	70 km south of Tom Price, WA	11,000
Do.		Cockatoo Island open pit iron ore mine (BHP Billiton Ltd., 100%)	130 km north northeast of Derby, WA	1,500
Do.		Eastern Range open pit iron ore mine [Hamersley Iron Pty. Ltd., 54% (Rio Tinto Ltd., 100%), and Shanghai Baosteel Group Corp., 46%]	10 km east of Paraburdoo, WA	10,000
Do.		Hamersley Operations (includes Brockman No. 2, Marandoo, Mount Tom Price, Nammuldi, Paraburdoo, and Yandicoogina open pit iron ore mines) [Hamersley Iron Pty. Ltd., 100% (Rio Tinto Ltd., 100%)]	30 km to 85 km northeast, northwest, and south of Tom Price, WA	90,000
Do.		Hope Downs mine [Hope Downs Iron Ore Pty Ltd. (Hancock Prospecting Pty Ltd. 100%), 50% and Rio Tinto Ltd., 50%]	75 km northwest of Newman, WA	30,000
Do.		Jimblebar open pit iron ore mine {[(BHP Iron Ore (Jimblebar), 85% (BHP Billiton Ltd., 100%]; [Mitsui Itochu Iron Pty Ltd., 10% (Mitsui & Co. (Australia) Ltd. 100%]; [CI Minerals Australia Pty Ltd., 5% (Itochu Corp., 100%)]}	40 km east of Newman, WA	8,000
Do.		Koolyanobbing Central open pit iron ore mine (Portman Ltd., 100%)	50 km north-northeast of Southern Cross, WA	6,000
Do.		Mount Goldsworthy mining associates joint venture (includes Area C, Goldsworthy, and Nimingarra) (BHP Billiton Minerals Pty Ltd., 85%, manager; ITOCHU Minerals & Energy of Australia Pty Ltd., 8%; Mitsui Iron Ore Corp. Pty. Ltd., 7%)	180 km east of Port Hedland, WA	42,000
Do.		Mount Gould open pit iron ore mine (Unimin Australia Ltd., 100%)	160 km west of Meekatharra, WA	6,000
Do.		Mount Newman (includes Mount Whaleback, Orebody 23-25, Orebody 29, and Orebody 30-35) open pit iron ore mine [BHP Billiton Minerals Pty Ltd., 85% (BHP Billiton Ltd., 100%); Mitsui Itochu Iron Pty Ltd., 10% (Mitsui & Co. (Australia) Ltd., 100%); CI Minerals Australia Pty Ltd., 5% (Itochu Corp., 100%)]	Within 13 km of Newman, WA	30,000
Do.		Pannawonica (includes Mesa J) open pit iron ore mine [Robe River Iron Associates, manager (Rio Tinto Ltd., 53%; Mitsui & Co. (Australia) Ltd., 33%; Nippon Steel Australia Pty. Ltd., 10.5%; Sumitomo Metal Australia Pty. Ltd., 3.5%]	130 km south-southwest of Dampier, WA	32,000
Do.		Pilbara (includes Chicester Range, Christmas Creek, Cloud Break, White Knight, Mount Lewin, Mount Nicholas, and Flinders) (Fortescue Metals Group Ltd., 100%)	East Pilbara, WA	55,000
Do.		Savage River open pit iron ore mine (Stemcor Holding Ltd., 100%)	100 km southwest of Burnie, TAS	2,400

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Iron and steel—Continued:			
Iron ore—Continued	Whyalla open pit iron ore mines (OneSteel Ltd., 100%)	270 km northwest of Adelaide, SA	2,600
Do.	Yandi open pit iron ore mine (BHP Billiton Minerals Pty Ltd., 85%, manager; ITOCHU Minerals & Energy of Australia Pty Ltd., 8%; Mitsui Iron Ore Corp. Pty. Ltd., 7%)	92 km north of Newman, WA	42,000
Pig iron	Hismelt pig iron plant [Hismelt Corp. Pty Ltd. (Rio Tinto Ltd., 60%; Nucor Corp., 25%; Mitsubishi Corp., 10%; and Shougang Corp., 5%]	Kwinana, WA	800
Steel	OneSteel Whyalla steelworks (OneSteel Ltd., 100%)	Whyalla, SA	1,200
Do.	Port Kembla steelworks (Blue Scope Steel Ltd., 100%)	Port Kembla, NSW	5,000
Do.	Smorgon Steel Group Ltd.	Laverton, Melbourne, VIC	700
Do.	do.	Waratch, NSW	285
Kaolin	Axedale Clays open pit kaolin mine (E Clay Pty Ltd., 100%)	18 km east of Bendigo, VIC	50
Do.	Pittong open pit kaolin mine (Imerys Minerals Australia Pty Ltd., 100%)	35 km southwest of Ballarat, VIC	110
Do.	Skardon River open pit kaolin mine (Queensland Kaolin Pty. Ltd., 96.6%, and private, 3.4%)	85 km north of Weipa, QLD	150
Lead:			
Mine, lead content	Broken Hill underground silver-zinc-lead mine (Perilya Ltd., 100%)	Broken Hill, NSW	90
Do.	Cannington underground silver-lead-zinc mine (BHP Billiton Ltd., 100%)	85 km southwest of McKinlay, QLD	265
Do.	Century open pit zinc-silver-lead mine (Zinifex Ltd., 100%)	250 km north of Mount Isa, QLD	90
Do.	Endeavor underground zinc-silver-lead mine (CBH Resources Ltd., 100%)	40 km northwest of Cobar, NSW	45
Do.	Hellyer underground zinc-lead-copper-silver mine (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	44
Do.	Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	150
Do.	Rosebery underground zinc-lead-silver-copper-gold mine (OZ Minerals Ltd., 100%)	5 km north of Queenstown, TAS	25
Smelter	Mount Isa smelter (Xstrata plc, 100%)	Mount Isa, QLD	240
Do.	Port Pirie smelter (Nyrstar Corp., 100%)	5 km north of Queenstown, TAS	235
Magnesite	Kunwarara open pit magnesite mine (includes Marlborough) (private interest, 100%)	70 km northwest of Rockhampton, QLD	3,000
Manganese:			
Mine, concentrate	Bootu Creek open pit manganese mine (OM Holding Ltd., 100%)	110 km north of Tennant Creek, NT	600
Do.	Groote Eylandt open pit manganese mine [Groote Eylandt Mining Co., operator (BHP Billiton Ltd., 60%, and Anglo American Corp., 40%)]	Groote Eylandt, NT	3,100
Do.	Woodie Woodie open pit manganese mine (includes Bells and East Pilbara leases) [Pilbara Manganese Pty Ltd., operator (Consolidated Minerals Ltd., 100%)]	400 southeast of Port Hedland, WA	1,000
Alloys	Bell Bay Smelter [Tasmanian Electro Metallurgical Co. Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Bell Bay, TAS	250
Mineral sands	Eneabba open pit heavy-mineral sands mine (Iluka Resources Ltd., 100%)	260 km north of Perth, WA	NA
Do.	Hawks Nest heavy-mineral sands dredge (Mineral Deposits Ltd., 100%)	50 km northeast of Newcastle, NSW	NA
Do.	Jangardup heavy-mineral sands dredge (Cable Sands (WA) Pty. Ltd., 100%)	50 km south of Nannup, WA	NA
Do.	North Capel open pit heavy-mineral sands mine (Iluka Resources Ltd., 100%)	7 km north of Capel, WA	NA
Do.	North Stradbroke Island heavy-mineral sands dredge (Stradbroke Rutile Pty. Ltd., 100%)	35 km east of Brisbane, QLD	NA
Do.	Tiwest Joint Venture heavy-mineral sands dredge (KMCC Western Australia Pty. Ltd., 50%, and Ticor Resources Pty. Ltd., 50%)	180 km north of Perth, WA	NA
Do.	Wemen heavy-mineral sands dredge (Murray Basin Titanium Pty. Ltd., 100%)	80 km southeast of Mildura, VIC	NA
Molybdenum metric tons	Wolfram Camp molybdenum-tungsten mine (Queensland Ore Ltd., 85%, and private, 15%)	85 km west of Caims, QLD	120

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Nickel:				
Mine, Ni content		Black Swan underground nickel mine (includes Silver Swan) (Norilsk Nickel Mining and Metallurgical Co., 100%)	53 km northeast of Kalgoorlie, WA	10
Do.		Cawse open pit nickel-cobalt mine (Norilsk Nickel Mining and Metallurgical Co., 100%)	50 km northeast of Kalgoorlie, WA	9
Do.		Cosmos open pit nickel mine (Jubilee Mines NL, 100%)	50 km north of Leinster, WA	13
Do.		Kambalda underground nickel mines (BHP Billiton Ltd., 100%)	25 km north of Kambalda to 10 km south of Widgiemooltha, WA	35
Do.		Lake Johnson underground nickel mine (includes Maggie Hays, Maggie Hays Lake and Emily Ann) (Norilsk Nickel Mining and Metallurgical Co., 100%)	130 km west of Norseman, WA	12
Do.		Leinster open pit/underground nickel mines (BHP Billiton Ltd., 100%)	10 km north of Leinster, WA	44
Do.		Miitel underground nickel mine (includes Redross and Mariners) (Mincor Resources NL, 100%)	70 km south of Kambalda, WA	10
Do.		Mount Keith open pit nickel mine (includes Cliffs and Yakabindie) (BHP Billiton Ltd., 100%)	70 km south-southeast of Wiluna, WA	40
Do.		Murrin Murrin open pit nickel-cobalt mine (Minara Resources Ltd., 60%, and Glencore International AG, 40%)	60 km east of Leonora, WA	100
Do.		Radio Hill underground nickel-cobalt mine (Fox Resources Ltd., 100%)	100 km east-southeast of Karratha, WA	4
Do.		Waterloo underground nickel mine (includes Amorac) (Norilsk Nickel Mining and Metallurgical Co., 100%)	90 km north of Leonora, WA	5
Smelter		Kalgoorlie nickel smelter (BHP Billiton Ltd., 100%)	Kalgoorlie, WA	100
Refinery		Kwinana nickel refinery (BHP Billiton Ltd., 100%)	Kwinana, WA	67
Do.		Murrin Murrin nickel refinery (Minara Resources Ltd., 60%, and Glencore International AG, 40%)	Murrin Murrin, WA	45
Do.		Yabulu nickel-cobalt refinery (BHP Billiton Ltd., 100%)	Townsville, QLD	72
Opal		Many small producers	Andamooka and Coober Pedy areas, SA; Lightning Ridge area, NSW	NA
Petroleum	thousand 42-gallon barrels per day	Exxon Mobil Corp., 100%	Altona Refinery, VIC	120
Do.	do.	Bulwer Island Refinery [BP Amoco Refinery (Bulwer Island) Pty. Ltd., 100%]	Bulwer Island, QLD	69.3
Do.	do.	Clyde Refinery [Shell Refining (Australia) Pty. Ltd., 100%]	Clyde, NSW	85
Do.	do.	Geelong Refinery [Shell Refining (Australia) Pty. Ltd., 100%]	Geelong, VIC	110
Do.	do.	Kurnell Refinery (Caltex Australia Ltd.)	Kurnell, NSW	114
Do.	do.	Kwinana Refinery [BP Amoco Refinery (Kwinana) Pty. Ltd., 100%]	Kwinana, WA	138
Do.	do.	Lytton Refinery (Caltex Australia Ltd.)	Lytton, QLD	106
Do.	do.	Port Stanvac Refinery (Exxon Mobil Corp., 100%)	Port Stanvac, SA	69
Phosphate rock		Phosphate Hill-Duchess open pit phosphate mine (Incitec Pivot Ltd., 100%)	140 km northwest of Mount Isa, QLD	2,200
Salt		Dampier solar evaporation salt pans (Dampier Salt Ltd., 100%)	65 km north of Carnarvon, WA	5,000
Do.		Lake MacLeod solar salt and gypsum evaporation pans (Dampier Salt Ltd., 100%)	65 km north of Carnarvon, WA	900
Do.		Port Hedland solar salt fields (Dampier Salt Ltd., 100%)	Port Hedland, WA	3,000
Silica		Itochu Corp., 50%, and Tochu Corp., 50%	Kemerton silica sands dredge, 25 km northeast of Bunbury, WA	450
Silver:				
Mine, Ag content	kilograms	Broken Hill underground silver-zinc-lead mine (Perilya Ltd., 100%)	Broken Hill, NSW	81,200
Do.	do.	Cannington underground silver-lead-zinc mine (BHP Billiton Ltd., 100%)	85 km southwest of McKinlay, QLD	700,000
Do.	do.	Century open pit zinc-silver-lead mine (OZ Minerals Ltd., 100%)	250 km north of Mount Isa, QLD	3,000
Do.	do.	Pasminco Ltd., 100%	Cockle Creek silver smelter, NSW	85,000
Do.	do.	Endeavor underground zinc-silver-lead mine (CBH Resources Ltd., 100%)	40 km northwest of Cobar, NSW	35,000
Do.	do.	Hellyer underground zinc-lead-copper-silver mine (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	60,000
Do.	do.	Henty underground gold-silver mine (Barrick Gold Ltd., 100%)	30 km north of Queenstown, TAS	1,100

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Silver—Continued:				
Mine, kilograms Ag content		Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	375,000
Do.	do.	Olympic Dam underground copper-silver-gold-uranium mine [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	27,000
Do.	do.	Peak underground gold-zinc-lead-copper-silver underground mine (includes New Cobar, New Occidental, and Perseverance), (GoldCorp Inc., 100%)	8 km south of Cobar, NSW	6,000
Do.	do.	Rosebery underground zinc-lead-silver-copper-gold mine (OZ Minerals Ltd., 100%)	5 km north of Queenstown, TAS	35,000
Smelter	do.	Port Pirie smelter (Nyrstar Corp., 100%)	5 km north of Queenstown, TAS	450,000
Refinery	do.	Perth Refinery [AGR Management Services Ltd. (Australian Gold Alliance Pty Ltd., 40%; Western Australian Mint, 40%; and Johnson Matthey (Australian) Ltd., 20%]	Newburn, WA	81,000
Spodumene		Greenbushes open pit/underground tantalite-spodumene mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA	150
Talc		Three Springs open pit talc mine (Rio Tinto Ltd., 100%)	330 km north of Perth, WA	150
Tantalum, metric tons tantalite, Ta_2O_5		Greenbushes open pit/underground tantalite-spodumene mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA[3]	454
Do.	do.	Bald Hill tantalite mine (Haddington Resources Ltd., 100%)	60 km southeast of Kambalda, WA[3]	100
Do.	do.	Wodgina open pit tantalite mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA[3]	250
Tin:				
Mine, Sn content	do.	Collingwood underground tin mine (Metals X Ltd., 100%)	35 km south of Cooktown, QLD	3,000
Do.	do.	Greenbushes open pit/underground tantalite-spodumene mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA[3]	1,000
Do.	do.	Renison Bell underground tin mine (Metals X Ltd., 100%)	136 km south of Burnie, TAS[3]	4,000
Smelter	do.	Greenbushes Smelter (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA	1,000
Tungsten, W content	do.	Kara magnetite and scheelite mine (Itochu Corp., 50%, and Tasmania Mines Ltd., 50%)	30 km south of Burnie, TAS	50
Do.	do.	Wolfram Camp molybdenum-tungsten mine (Queensland Ore Ltd., 85%, and private, 15%)	85 km west of Caims, QLD	500
Uranium, U_3O_8 content	do.	Beverley in situ leach uranium operation (Heathgate Resources Pty. Ltd., 100%)	300 km northeast of Port Augusta, SA	1,000
Do.	do.	Olympic Dam underground copper-silver-gold-uranium mine [Olympic Dam Operations Pty. Ltd., operator (BHP Billiton Ltd., 100%)]	Roxby Downs 80 km north of Woomera, SA	4,400
Do.	do.	Ranger open pit uranium mine (Energy Resources of Australia Ltd., 100%)	230 km east of Darwin, NT	5,000
Vanadium, V_2O_5	do.	Windimurra open pit mine vanadium (Precious Metals Australia Ltd., 90%, and Noble Group Ltd., 10%)	100 km east-southeast of Mount Magnet, WA	8
Zinc:				
Mine, Zn content		Broken Hill underground silver-zinc-lead mine (Perilya Ltd., 100%)	Broken Hill, NSW	360
Do.		Cannington underground silver-lead-zinc mine (BHP Billiton Ltd., 100%)	85 km southwest of McKinlay, QLD	100
Do.		Century open pit zinc-silver-lead mine (OZ Minerals Ltd., 100%)	250 km north of Mount Isa, QLD	500
Do.		Endeavor underground zinc-silver-lead mine (CBH Resources Ltd., 100%)	40 km northwest of Cobar, NSW	125
Do.		Golden Grove underground zinc-copper mine (OZ Minerals Ltd., 100%)	225 km east of Geraldton, WA	150
Do.		Hellyer underground zinc-lead-copper-silver mine (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	130
Do.		Jaguar underground mine (Jabiru Metals Ltd., 100%)	250 km north of Kalgoorlie, WA	420
Do.		Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	175
Do.		Peak underground gold-zinc-lead-copper-silver underground mine (includes New Cobar, New Occidental, and Perseverance), (GoldCorp Inc., 100%)	8 km south of Cobar, NSW	8
Do.		Rosebery underground zinc-lead-silver-copper-gold mine (OZ Minerals Ltd., 100%)	35 km north of Queenstown, TAS	100

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Zinc—Continued:			
Smelter	Port Pirie smelter (Nyrstar Corp., 100%)	5 km north of Queenstown, TAS	45
Do.	Hobart smelter (OZ Minerals Ltd., 100%)	Hobart, TAS	320
Refinery	Sun Metals zinc refinery [Sun Metals Corp. Pty. Ltd., operator (Korea Zinc Co., 100%)]	Townsville, QLD	170

[e]Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. 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]Abbreviation(s) used for unit(s) of measure in this table include the following: km--kilometer.
[3]Care and maintenance; expansion project development decision pending.

TABLE 3
AUSTRALIA: RESERVES OF MAJOR MINERAL COMMODITIES IN 2007

Commodity		Reserves
Antinomy, Sb content	thousand metric tons	136
Bauxite	million metric tons	6,200
Cadmium, Cd content	thousand metric tons	61
Coal:		
Black:		
In situ	billion metric tons	57
Recoverable	do.	39
Brown:		
In situ	do.	41
Recoverable	do.	37
Cobalt, Co content	thousand metric tons	1,520
Copper, Cu content	million metric tons	59
Diamond:		
Gem and near gem	million carats	97
Industrial	do.	101
Gold, Au content	metric tons	5,840
Iron ore	billion metric tons	20
Lead, Pb content	million metric tons	23
Lithium, Li content	thousand metric tons	170
Magnesite ($MgCO_3$ content)	million metric tons	344
Manganese ore	do.	164
Mineral sands:		
Ilmenite	do.	221
Rutile	do.	23
Zircon	do.	39
Molybdenum, Mo content	thousand metric tons	198
Nickel, Ni content	million metric tons	26
Niobium (columbium) and tantalum:		
Niobium (columbium), Nb content	thousand metric tons	40
Tantalum, Ta content	do.	41
Petroleum, recoverable:		
Condensate	billion liters	300
Crude	do.	158
Liquefied petroleum gas	do.	214
Natural gas	billion cubic meters	2,590
Platinum-group metals (Pd, Pt)	metric tons	19
Rare earths (REO plus Y_2O_3)	thousand metric tons	1,130
Silver, Ag content	do.	50
Tin, Sn content	do.	247
Tungsten, W content	do.	87
Uranium, U content	do.	983
Vanadium	do.	898
Zinc	million metric tons	42

do. Ditto.

Source: Geoscience Australia, 2008, Australia's identified mineral resources 2007: Canberra, Australia, Geoscience Australia, p. 3. (Data have been rounded to no more than three significant digits.)