USGS
science for a changing world

2011 Minerals Yearbook

AUSTRALIA [ADVANCE RELEASE]

U.S. Department of the Interior
U.S. Geological Survey

December 2012

The Mineral Industry of Australia

By Pui-Kwan Tse

Slow growth in the economies of the Western developed countries in 2011 negatively affected economic growth in many counties of the Asia and the Pacific region. China continued to have rapid economic growth in the first part of the year and helped to sustain demand for Australia's mineral products. By mid-2011, however, China's economic growth had moderated. Also, extreme weather conditions across the States of Queensland, Victoria, and part of New South Wales caused disruptions to regional economic activities in the first quarter of 2011. As a result, Australia's gross domestic product (GDP) increased at a rate of 2.3% during 2011, which was lower than the 2.7% recorded in 2010. The lower annual growth rate was attributed to weaker export growth, including in the mineral sector. 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. With a number of large-scale mining projects underway, investment in the mineral sector increased significantly in 2011 (Reserve Bank of Australia, 2012, p. 33).

Australia's total mineral exploration spending was estimated to be $3.1 billion (A$3.0 billion) in fiscal year 2011, which was an increase of 32% from that of fiscal year 2010 (the Australian fiscal year runs from July 1 to June 30). The increase in exploration spending was the result of an increase in exploration for base metals, coal, gold, and iron ore. About 65% of the country's total exploration expenditure was spent on known deposits, and the remaining 35% was spent on new exploration projects. Western Australia accounted for 54% of the total exploration spending followed by Queensland, 22%; South Australia, 9%, and others, 15%.The increase in exploration spending on coal was in response to higher expectations of coal demand in the world in the medium to longer term. An increase in uranium exploration spending reflected the government of Western Australia's removal of a ban on uranium mining in the State (Geoscience Australia, 2012, p. 1–2).

As a result of the spending on exploration, significant mineral resources were discovered. These included the Boston Shaker gold project near Kalgoorlie, Western Australia; the Carrapateena copper-gold-uranium project near Gawler Craton, South Australia; the Four Eagles gold project near Bendigo, Victoria; the Griffiths Hill copper project near Chillagoe, Queensland; the Mutooroo iron ore project at Broken Hill, New South Wales; the Pilgangoora lithium project near Port Hedland, Western Australia; the Tottenham copper project near Dubbo, Tasmania; and the TUC Resourced Ltd.'s heavy-rare-earth prospect at Stromberg, Northern Territory (Geoscience Australia, 2012).

Minerals in the National Economy

Australia's mineral sector contributed more than $100 billion, or about 8%, to the country's GDP in 2011. The mineral sector employed 205,000 people. 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 (Australian Bureau of Resources and Energy Economics, 2012, p. 12).

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. 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. Each State has a mining act and mining regulations that regulate the ownership of minerals and the operation of mining activities in that State. The States have other laws that deal with occupational health and safety, environment, and planning. All minerals in the land are reserved to the Crown; however, a very small percentage of minerals in Australia are owned by those who were granted titles to the land before enactment of relevant State legislation that excludes mineral ownership. Companies or miners may obtain rights to conduct mining activities on unreserved Crown land where the permission of the landowner has been granted. Royalties on minerals are charged by State and Territorial governments. In most cases, royalties are payable on a percentage of value or a flat rate per unit basis. Each State sets its own rate. Northern Territory's royalties are based on profit where the net value of a mine's production is used to calculate the applicable royalty. The royalty paid by a company is allowed to be deducted from reported income for income tax purposes. The amount of royalty paid can be reduced by deducting the costs incurred in the transportation of the mineral ore, concentrate, or metal.

The Australian Parliament passed the minerals resource rent tax (MRRT) bill in November 2011. A uniform national MRRT was to take effect on July 1, 2012. The MRRT, which applies only to coal and iron ore mining, is intended to target project profits rather than project production and to shift the tax burden from low-profitability projects to more profitable projects. The MRRT would be set at an internationally competitive rate of 22.5% and companies would not be charged the MRRT when the net mining profits are equal to or less than A$75 million (US$77.5 million). Companies would be entitled to have an MRRT offset year if the company's group mining profit for the year is less than A$125 million (US$129.2 million). All Federal and State resource taxes would be credited. The bill passed in November also included an extension of the

petroleum resource rent tax (PRRT) for all Australian onshore and offshore oil and gas projects, including the North West Shelf. The PRRT tax rate would be 40%. The tax value of losses could be transferred only in very limited circumstances. All Federal and State resource taxes would be creditable against the current and future PRRT liabilities from a project. The PRRT was not being extended to projects within the Joint Petroleum Development Area in the Timor Sea, which was governed by the Timor Sea Treaty (Parliament of the Commonwealth of Australia, The, 2012, p. 15–60).

Australia was one of the world's highest per capita carbon dioxide emission countries. The Government decided to impose a carbon tax at a rate of A$23 (US$23.77) per metric ton of carbon dioxide emitted starting on July 1, 2012, and the rate would be increased to A$25.4 (US$26.25) per metric ton in fiscal year 2015. The Australian Trade and Industry Alliance, which included the Australian Chamber of Commerce and Industry, the Australian Coal Assoc., the Minerals Council of Australia, and the Plastics and Chemical Industries Assoc., opposed the carbon tax scheme because it would make Australia's mineral industry less competitive internationally and the Australian carbon tax would be the highest such tax among the industrialized countries. The scheme would allow emissions trading beginning in 2015, at which time polluters and investors would be able to buy overseas carbon offsets, or ultimately trade within Europe and New Zealand and possibly in China and the Republic of Korea. Australian companies urged States and Territories to reduce State-based royalties or to allow them to be deducted from the MRRT to cover the carbon tax costs. The Government estimated that the carbon tax strategy would reduce Australia's emissions to 5% below the level in 2000 by 2020 (Mineral Council of Australia, 2011).

Production

Australia continued to be one of the world's leading producers of such mineral 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 in the Asia and the Pacific region compared with that of China and Japan. Because of its large mineral resources, Australia was virtually self-sufficient in most mineral commodities. Petroleum production, however, supported only about 70% of the country's consumption. Australia was one of the world's leading exporting countries for alumina, coal, iron ore, and uranium. In general, mineral and metal production were about the same in 2011 as in 2010. Commodities for which production decreased in 2011 were diamond, iron and steel, mined lead, and mined tin. Commodities for which reported production increased included mined antimony, mined copper, iron ore, mined and refined nickel, refined silver, titanium concentrates, and zircon. The increase of iron ore output was from record production at mines operated by BHP Billiton Ltd., Fortescue Metals Group Ltd., and Rio Tinto Ltd. BHP Billiton's Olympic Dam returned to its full production in 2011. An increase in mined nickel production reflected increased output from BHP Billiton's Nickel West and Western Areas NL's Spotted Quoll and Forrestania operations (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).

Each State and Territorial 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 Government 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 2011, the value of Australia's total foreign trade of goods was US$637.7 billion (A$607.3 billion), of which the value of exports was US$329.0 billion (A$313.3 billion) and the value of imports was US$308.7 billion (A$294.0 billion). As a result of higher energy and mineral commodity prices and an increase in the volume of exports, Australia's export revenue increased by about 15% to US$190 billion. Mineral and metal exports accounted for about 58% of the total value of exports. Mineral commodities for which the export volume was higher than in 2010 included bauxite, thermal coal, copper, iron ore, lead, manganese ore, nickel, uranium, and zinc. The value of iron ore exports accounted for 31% of the total value of mineral and metal exports followed by coal, 25%; gold, 8%; oil, 6%; and liquefied natural gas, 6%. Australia's mineral and metal exports went mostly to Asian countries. Australia remained one of the world's leading exporters of alumina, coal, diamond (gem, near-gem, and natural industrial), ilmenite, iron ore, mined lead, rutile, and zircon. Crude petroleum and refined petroleum products remained Australia's leading imported fuel and mineral commodity category, followed by gold, iron and steel, potassium fertilizer, and silver (Australian Bureau of Statistics, 2012, p. 29).

Commodity Review

Metals

Aluminum.—Australia was the leading bauxite-producing country in the world. Bauxite was mined at the Gove Mine in the Northern Territory; the Weipa Mine in the northern part of Queensland; and the Huntly, the Willowdale, and the Worsley Mines in Western Australia. Australia was also the leading alumina-producing country in the world. All Australia's alumina refineries were located in close proximity to their bauxite mines and shipping facilities. Western Australia remained the leading bauxite-producing State and accounted for about 60% of the

country's total output of bauxite followed by Queensland, 30%, and Northern Territory, 10%. Australia exported 11.3 million metric tons (Mt) of bauxite compared with 8.0 Mt in 2010. Western Australia was the leading alumina-producing State in Australia and accounted for about 60% of the country's alumina output. The country exported 16.0 Mt of alumina in 2011, which was about 1% less than in 2010. The United Arab Emirates replaced China as the leading destination for exported Australian alumina; it received about 22% of the total exported volume, followed by China and South Africa, 13% each; and other countries, less than 10% each. The consumption of domestic aluminum smelters was less than 20% of the country's total alumina output, and the remainder was exported. In 2011, Australia exported 1.7 Mt of aluminum. Japan was the leading destination for Australian aluminum exports and accounted for 34% of the total, followed by the Republic of Korea, 18%; Taiwan, 12%; and Thailand and Indonesia, 8% each; the remainder went to other countries in the world (Australian Bureau of Resource and Energy Economics, 2012, p. 21; Department of Mines and Petroleum, 2012, p. 9).

Owing to increasing demand for alumina in China in recent years, Australian producers expanded the output capacities of their bauxite mines and alumina refineries. Queensland Bauxite Ltd. received exploration licenses from the Queensland government to explore for bauxite within the eastern Australian bauxite province (which stretches from Queensland to New South Wales). The combined area of the prospective bauxite terrain was about 7,810 square kilometers (km^2). The North Queensland project consisted of four areas—Atherton, Ravenshoe, Ravenshoe East, and South Johnstone. The South Johnstone area, which is located 18 kilometers (km) inland from the Mourilyan Port, was explored by Carpentaria Exploration Pty Ltd. in the 1960s. About 200 to 250 Mt of bauxite containing between 31% and 40% acid-soluble alumina was identified. The South Queensland project consisted of three areas—Childers, Kingaroy, and Pittsworth—which were located in and around the town of Kingaroy and east of the town of Childers. Analytical results of collected samples from these areas indicated that high-grade gibbsite mineralization was present. The company planned to continue exploring in these areas (Queensland Bauxite Ltd., 2012, p. 6–15).

Cape Alumina Ltd. continued exploring in 2,400 km^2 of leased land outside of Rio Tinto Alcan's Weipa deposit. The company's Pisolite Hills deposit was located 50 km northeast of Weipa and between 2.8 and 15 km from the Wenlock River on the western part of Cape York Peninsula. The Pisolite Hills deposit had estimated bauxite resources of about 135 Mt, which could produce up to 7 million metric tons per year (Mt/yr) of dry bauxite product for 15 years. The company completed a feasibility study and prepared a bankable feasibility study and an environmental impact statement for the Pisolite Hills project. Cape Alumina also completed a review of the effect of the declaration of the Wenlock River Basin as a wild river area under the Queensland's Wild Rivers Act (2005). The review indicated that about 45% of the bauxite resources was within the 500-meter (m)-wide high-preservation area. The company planned to discuss access to the high-preservation area with officials of the government of Queensland and the Federal Government. The company decided to maintain its mining lease application and to continue environmental studies of the Pisolite Hills project. In 2010, Cape Alumina discovered new bauxite resources at the Bauxite Hills prospect, which was located about 96 km north of Weipa and about 5 km southeast of the existing port at Skardon River. The company conducted a concept study on the Bauxite Hills deposit in 2011. The plan was to mine a total of 100 Mt of bauxite in 15 years. The beneficiated grade of the dry bauxite was designed to contain between 48% and 52% alumina and 8% and 12% silicon oxide (Cape Alumina Ltd., 2012, p. 16–18).

Rio Tinto Alcan was conducting a feasibility study and an environmental impact study to develop the bauxite resource in an area south of Embley River and the existing Weipa Mine. The new operation would progressively replace depleted resources at the Andoom and the East Weipa mining areas in Weipa. It would extend the mine life in the area by 40 years. The new development would increase output capacity to 50 Mt/yr from the current capacity of 21 Mt/yr in the region south of the Weipa Peninsula. Construction of a bauxite mine was scheduled to begin in 2012, depending on regulatory and internal company approvals. The Weipa expansion could be completed within 3 years of environmental approval. First shipments were expected to be in 2016. In 2011, bauxite production at the Weipa Mine increased by 9% to meet the demand from a third party. The production of alumina decreased by 4% because of abnormally heavy rains in Queensland during the first quarter of 2011. The company decided to accelerate the construction of the Yarwun refinery expansion, which was rescheduled to be put into operation in the second half of 2012 (Rio Tinto plc, 2012, p. 20–21).

Australia's primary aluminum production ranked fourth in the world after China, Russia, and Canada. Aluminum output was produced mainly from Alcoa of Australia'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. Norsk Hydro ASA of Norway decided to curtail the output of aluminum at its Kurri Kurri smelter because of low aluminum prices in the world market and increased production costs. The company planned to close the smelter in 2012 (Norsk Hydro ASA, 2012a, p. 10; 2012b).

Antimony.—Compared with China, Australia was a relatively small antimony producer in the world. Australia's antimony was produced from Mandalay Resources Ltd.'s Costerfield Mine in Victoria and Straits Resources Ltd.'s Hillgrove Mine in New South Wales. Mandalay Resources acquired the Augusta Mine in December 2009 after its operation was suspended in 2008 because of low antimony prices. Mandalay restarted the exploration in 2010 and discovered new reserves deeper on the Augusta E and W lodes. The company discovered additional resources in the Cuffley lode and found new veins in the district and subsequently renamed the Augusta Mine as the Costerfield Mine. At yearend 2011, the mine had ore resources of 361,000 (t) metric tons at an average of grade 9.8 grams per metric ton (g/t) gold and 5.5% antimony. The company planned to perform a feasibility study to develop and mine the Cuffley

lode and to increase antimony production to about 1,800 t in 2012. Straits Resources placed the Hillgrove Mine on care-and-maintenance status (Mandalay Resources Ltd., 2012, p. 16).

Cobalt and 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 the leading State for mined nickel output and accounted for more than 90% of the country's total output. The top five nickel producers accounted for 80% of the total sales. BHP Billiton's Nickel West project was Australia's leading nickel operation. Nickel West included the Leinster and the Mount Keith Mines. A number of smaller sulfide nickel operations were operated by Mincor Resources NL and Xstrata Nickel Australia Pty Ltd. [a subsidiary of Xstrata plc (Xstrata)]. Owing to low nickel prices, OJSC MMC Norilsk Nickel (Nornickel) of Russia shut down its nickel operations in Australia in 2009 and 2010, and most of its nickel operations remained closed in 2011. During 2010, the company tried to enrich its nickel at the Lake Johnston operation, which was located about 500 km east of Perth in Western Australia. In July 2011, the company restarted the production of nickel concentrate at Lake Johnston and produced 1,748 t of nickel in concentrates. It also investigated using its hydrometallurgical technology (Activox® Process) at its processing facility at Cawse to process nickel sulfide ore from Nornickel's deposits in Australia. Nornickel planned to produce a nickel hydroxide solution that would contain about 50% nickel and then refine it into the metal product (OJSC MMC Norilsk Nickel, 2012).

Panoramic Resources Ltd. operated two nickel mines—Lanfranchi and Savannah—in Western Australia. The Lanfranchi operation was located 42 km south of Kambalda. Mined ore from Lanfranchi was shipped to the Kambalda concentrator, which was operated by Nickel West (a subsidiary of BHP Billiton). BHP Billiton had a tolling and concentrate purchase agreement with Panoramic to process up to 350,000 metric tons per year (t/yr) of Lanfranchi ore. The Savannah operation was located 240 km south of Kununurra. Panoramic had a contract agreement with China's Jinchuan Nonferrous Metals Corp. to ship all Savannah's concentrate output to China. Panoramic discovered additional nickel mineralization down plunge from the Helmuth South deposit, and a feasibility study was undertaken on the Cruickshank ore body, which is located 6 km northeast of the Lanfranchi operation (Panoramic Resources Ltd., 2011, p. 3).

In 2008, Fox Resources Ltd. placed the Radio Hill Mine on care-and-maintenance status because of the low price of nickel on the world market. The company decided to use a bacterial heap-leaching process to extract copper and nickel ore that had an average grade of 0.79% copper and 0.59% nickel. The nickel recovery rate was in the range of 80% to 85% and the recovery rate for copper was about 55% in the laboratory. The company believed that the leaching process would reduce production and transportation costs. Fox Resources planned to build a small-scale demonstration plant to evaluate the process. The company continued to undertake the development of the Sholl deposit, which was estimated to have a mineral resource of 8 Mt grading 0.67% copper and 0.54% nickel (Fox Resources Ltd., 2012, p. 3–5).

In 2009, BHP Billiton placed the Ravensthorpe Mine on care-and-maintenance status because of the decrease in the price and demand for nickel on the world markets after the mine officially opened in mid-2008. In December 2009, BHP Billiton decided to sell the Ravensthorpe Mine to First Quantum Minerals Australia (a subsidiary of First Quantum Minerals Ltd. of Canada) for $340 million; the sale was completed in 2010. First Quantum Minerals planned to invest $190 million to modify the hydrometallurgical processing plant, and the plant started production in October 2011. The company planned to produce between 33,000 and 36,000 t of contained nickel in 2012. The company estimated that the Ravensthorpe Mine contained sufficient nickel resources to support a mine life of more than 30 years (First Quantum Minerals Ltd., 2012).

Copper.—Australia's copper resources occur largely at Olympic Dam in South Australia and at Mount Isa in Queensland. Other important copper resources are located at the CSA and the Northparkes deposits in New South Wales; the Ernest Henry, the Mammoth, and the Osborne deposits in Queensland; and the Golden Grove and the Nifty deposits in Western Australia. Australia's mined copper output ranked the country among the top five producers in the world. In 2011, Australia's copper mine production increased slightly from that of 2010. The increase came from the expansion of the DeGrussa and the Prominent Hill Mines and development of the new Kanmantoo Mine. Australia's mined copper production was expected to increase during the next several years. Several new mines were expected to start up, including CuDeco Ltd.'s Rockland Mine, Golden Cross Resources Ltd.'s Copper Hill Mine, and Ivanhoe Australia Ltd.'s Mount Dore Mine. The increase in refined copper production reflected the restart of production at the Lady Annie solvent extraction–electrowinning (SX–EX) operation. South Australia, which accounted for 33% of the country's output, replaced Queensland as the leading State for mined copper production. Queensland's output contributed 31% of the country's total output in 2011, and New South Wales's output accounted for 18%. Western Australia's mined copper decreased to 15% of the total in 2011 from 20% in 2010. Tasmania's mined copper output was mainly from Mount Lyell. In 2011, Australia exported a total of 1.8 Mt of copper concentrates compared with 1.9 Mt in 2010. China retook the lead as the leading destination for exports of Australian copper concentrates and received 35% of the total exported; India, 31%; Japan, 21%; and the Republic of Korea, 11%. Australia increased its refined copper exports to 379,000 t in 2011 from 315,000 t in 2010. China was the leading destination, which received 36% of the total exported; Malaysia, 20%; Taiwan, 15%; and Indonesia, 7% (Australian Bureau of Resources and Energy Economics, 2012, p. 24).

Sandfire Resources NL discovered the high-grade DeGrussa volcanogenic copper-gold deposit in the northeastern part of its Doolgunna tenement area, which is located 900 km northeast of Perth, in 2009. Exploration work continued in 2010. The prefeasibility study indicated that the deposit contained indicated and inferred mineral resources of 10.67 Mt of ore at average grades of 5.6% copper, 15 g/t silver, and 1.9 g/t

gold. The construction of the project started in 2011 and was scheduled to be completed in early 2012. Construction of the processing plant was scheduled to be completed in the third quarter of 2012. The company planned to have two-stage open pit mining in operation in 2 years to mine high-grade direct-shipment ore of 143,000 t/yr at average grades of 25.6% copper and 2.5 g/t gold and 298,000 t/yr of sulfide material at average grades of 6.0% copper and 2.4 g/t gold. Sandfire Resources had secured the sale of 100% of its direct-shipment ore to MRI Trading AG and Yunnan Copper Corporation Ltd. of China in 2011. The nondirect shipment ore would be processed together with underground ore to produce copper concentrate at an average grade of 27% copper for exporting to international customers. The company planned to produce between 60,000 and 70,000 t/yr of copper and about 1.3 t/yr of gold for about 7 years (Sandfire Resources NL, 2011, p. 6; 2012).

In 2010, Ivanhoe Australia Ltd. acquired the Osborne operation, which is located 120 km northeast of Boulia, Queensland, from Barrick Gold Corp. of Canada. The Osborne operation included the Osborne open pit and underground mines and the Houdini and the Kulthor deposits. The operation was on care-and-maintenance status in 2010. Ivanhoe restarted the development of the Osborne operation in 2011, and a road was built to link the Osborne operation to Ivanhoe's Merlin molybdenum and rhenium mine, which was under development. The company invested $30 million to redevelop the Kulthor and the Osborne underground mines. The Osborne operation had measured and indicated mineral resources of 13.1 Mt at grades of 1.4% copper and 0.9 g/t gold and inferred mineral resources of 7.9 Mt at grades of 1.3% copper and 1.0 g/t gold. The renovation of the processing plant started in 2011, and the plant was scheduled to be put into operation in the first quarter of 2012. The plant was designed to have ore throughput of about 5,200 metric tons per day to produce metal concentrates of 21,000 t/yr of copper and 1.0 t/yr of gold (Ivanhoe Australia Ltd., 2011, p. 8).

Ivanhoe's Mount Dore project was located 50 km from its Osborne operation. A scoping study was completed in 2011, and the prefeasibility study began in the same year. Mount Dore was a polymetallic oxide and sulfide deposit. The deposit was estimated to contain 750,000 t of copper, 430,000 t of zinc, 840 t of silver and 14.3 t (460,000 troy ounces) of gold. About 57 Mt of ore at a grade of 0.59% copper was amenable to heap leaching (Ivanhoe Australia Ltd., 2012, p. 22–23).

OZ Minerals Ltd.'s Prominent Hill operation started mining at the Malu open pit in 2009; the operation is located 650 km northwest of Adelaide in South Australia. The operation's processing plant was designed to produce about 100,000 t/yr of copper in concentrates. During the past 2 years, the processing plant achieved throughout of 25% more than its designed capacity. In 2011, the Prominent Hill operation produced 107,744 t of copper in concentrates and 5.0 t (160,007 troy ounces) of gold. The company decided to develop its Ankata underground deposit, which was located about 800 meters from the Malu open pit. The construction of the Ankata underground mine was scheduled to be completed in early 2012, and the underground mine was designed to produce 25,000 t/yr of copper and about 370 kg/yr (12,000 troy ounces per year) of gold. The cost of the development of the Ankata Mine was projected to be $148 million. The Prominent Hill had reserves of 72.3 Mt of ore grading 1.13% copper and 0.64 g/t gold. In 2011, OZ Minerals acquired the Carrapateena copper-gold prospect, which is located 250 km southeast of Prominent Hill, from Rudy Gomez Services Ltd. and its associates for $250 million. The prospect was estimated to have resources of 203 Mt of ore grading 1.31% copper, 6.0 g/t silver, and 0.56 g/t gold. It also contained 270 parts per million (ppm) uranium oxide. The company planned to continue drilling in the area and to perform scoping studies on the prospect and would make a decision on whether to mine at Carrapateena by 2015 (OZ Minerals Ltd., 2012, p. 10–15).

Gold.—Gold mine output in Australia ranked the country among the world's top four producers, together with China, South Africa, and the United States. In 2011, Australia's mined gold output decreased by about 1% from that of 2010, and output of refined gold decreased by about 9%. The decrease in production was attributed to a number of mines taking advantage of high gold prices to target lower ore grades that would have been uneconomic to extract at lower prices. Western Australia remained the leading gold-producing State, with a 69.4% share, followed by New South Wales, 11.6%; Queensland, 6.2%; and Northern Territory, 3.5%; South Australia, Victoria, and Tasmania accounted for the remaining 9.3% share. 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. 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 mine life. In 2011, Australia exported 308 t (compared with 332 t in 2010) of refined gold produced from domestic mines or from imports of gold dore and scrap that were shipped from overseas, refined into gold bullion, and then reexported. Weaker global demand for gold bullion coins and bars had contributed to the decrease of refined gold exports. India, the United Kingdom, and Thailand accounted for 75% of Australia's total gold exports (Australian Bureau of Resources and Energy Economics, 2012, p. 26).

Crocodile Gold Corp. of Canada held a 3,300-km^2 land tenement in the Northern Territory. Crocodile's Burnside project, which is located about 150 km south of Darwin, consisted of several gold deposits, including the Brocks Creek, the Cosmo, and the Howley deposits. In 2009, Crocodile Gold commenced its mining operations at the Brocks Creek Mine (underground) and the Howley Mine (open pit), which was known as the "Chinese operation." Ores were transported to its Union Reefs mill for processing. The Union Reefs mill had a carbon-in-leach processing capacity of 2.4 Mt/yr of ore. The company completed a feasibility study at the Princess Louise open pit mine and the Cosmo underground mine. The construction of the Cosmo Mine was scheduled to be completed in late 2011 and to be put into full operation in 2012. The company planned to process 263,000 metric tons per month (t/mo) of ore to produce about 2.6 t (85,000 troy ounces) of gold from the Cosmo Mine in 2012. Crocodile Gold planned to produce a total of more than 6.2 t (200,000 troy ounces) of gold in 2012. The company's Union Reefs project, which was located

about 15 km north of Pine Creek and 185 km southeast of Darwin, and the Maud Creek project, which was located 285 km south-southeast of Darwin, continued to be explored in 2011. The ore body of the Maud Creek deposit was largely oxidized to a depth of 15 to 20 m and moderately oxidized from 25 to 30 m. It also contained about 2% arsenic. Use of a conventional direct-cyanidation process method might not be possible for treating this ore. The Union Reefs prospect area had been mined since 1880. Acacia Resources Ltd. and Anglo Gold Australia bought the property in 1991 and mined there from 1995 to 2003. About 25 t (800,000 troy ounces) of gold had been produced during that period. Crocodile Gold planned to target high-grade underground resources (Crocodile Gold Corp., 2012, p. 8–15).

Ramelius Resources Ltd. operated two gold mines—Mount Magnet and Wattle Dam—in Western Australia. Ramelius Resources acquired the Mount Magnet Mine from Harmony Gold (Australia) Pty Ltd. in 2010, and the company considered the area to have potential for significant new discoveries. In 2011, the Board of Ramelius Resources approved the redevelopment of the Mount Magnet open pit mine operation and the exploration of gold resources further below the surface that aimed for future underground mining. The company estimated that the Mount Magnet operation area could support the production of about 16.2 t/yr (520,000 troy ounces) of gold for 6 years. The open pit of the Wattle Dam gold mine was commenced in 2006, and the underground development was put into operation in 2009. In fiscal year 2011, the company's processing plant at Burbanks processed 153,060 t of Wattle Dam ore and recovered 3.1 t (100,720 troy ounces) of gold. In 2011, the company's Board approved drilling the deeper areas, and the drilling results indicated that mineralization of Block D was similar to the mining areas of Blocks A and B. The company planned to start mining Block D in late 2011 (Ramelius Resources Ltd., 2011, p. 3–10).

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. Australia's most significant iron ore mines were located in the Pilbara region of Western Australia, which accounted for 97.0% of the country's total iron ore production followed by South Australia, 2.0%; and the Northern Territory and Tasmania, 0.5% each. Owing to its limited domestic demand and production capacities for iron and steel, Australia exported more than 90% of its iron ore output to such Asian countries as China, Japan, the Republic of Korea, and Taiwan. In 2011, Australia's iron ore and pellet exports increased to 439 Mt from 402 Mt in 2010. Australia's iron ore exports to China increased to 306 Mt in 2010 from 274 Mt in 2010. Japan's iron ore imports from Australia decreased to 75 Mt from 76 Mt; the Republic of Korea's imports increased to 45 Mt from 40 Mt; and Taiwan's imports remained the same at 12 Mt (Australian Bureau of Resources and Energy Economics, 2012, p. 27).

China had been the world's leading importer of iron ore during the past several years, and this trend was expected to continue during the next 5 years. Australian iron ore producers expanded their iron ore production facilities to meet its neighboring countries' demand. A number of iron ore projects that would contribute to Australia's exports were at various stages of development. Rio Tinto's iron ore operations were mainly in the Pilbara region and produced a total of about 225 Mt/yr of iron ore from 14 mines. Rio Tinto planned to invest $3.4 billion to expand its Pilbara operations. The company decided to expand the iron ore production at the Brockman 4, the Hope Downs 4, the Marandoo, the Nammuldi, and the Yandicoogina Mines to a total of 283 Mt/yr in 2013 and 353 Mt/yr in 2015. To meet the iron ore handling capacity at the port, the company planned to replace the aging car dumper with a new duel car dumper at Cape Lambert. The company's port facilities at Dampier, including the East Intercourse Island and Parker Point terminals, and Cape Lambert would have the capacity to handle about 353 Mt/yr of iron ore in 2015. Rio Tinto planned to invest $518 million to implement an automated long-distance heavy-haul rail at its 1,500-km rail network. The driverless trains would be launched in 2014 (Rio Tinto Ltd., 2012b, c).

The expansion construction of BHP Billiton's Jimblebar Mine, which is located 40 km east of Newman in Western Australia, was underway in 2011. The expansion of the Jimblebar Mine's output capacity to 35 Mt/yr started in 2010 and was projected to increase BHP Billiton's iron ore production in the Pilbara region to 240 Mt/yr in 2013. An expansion of the loading capacity at the inner harbor at Port Hedland to 220 Mt/yr and work on the duplication of rail tracks were part of the company's Rapid Growth Project 6. The Board of BHP Billiton approved an investment of $698 million for the development of Orebody 24, which is located about 10 km northeast of Newman and would have an output capacity of 17 Mt/yr in 2012. The development of Orebody 24 also included construction of an ore-crushing plant, a train depot facility, and other associated support facilities. The company planned to build a combined-cycle gas turbine at the Yamima Power Station to replace the existing Newman Power Station in Newman in 2014. Owing to weakened demand for iron ore in the Asia and the Pacific region, the company considered delaying the development of the Outer Harbor at Port Hedland, which was a crucial part for BHP Billiton's plan to increase iron ore production to 440 Mt/yr (BHP Billiton Ltd., 2011a, b; 2012b, p. 5).

Australia-based CITIC Pacific Mining Management Pty Ltd. (a subsidiary of Hong Kong-based CITIC Pacific Ltd., which was, in turn, a member of China's state-owned CITIC Group) had invested about $5 billion to develop its Sino iron ore project at Cape Preston, which is located 100 km southwest of Karratha in Western Australia. The company planned to produce about 21 Mt/yr of 67% iron in concentrates and 6 Mt/yr of pellets in 2011. Concentrates would be moved by conveyor belt to barges and then loaded into offshore vessels at Cape Preston and shipped to China. The company signed up with China Metallurgical Corp. (MCC) (a Chinese state-owned company) as the lead contractor on the development of the project. The company had planned to import Chinese labor to build the mine and facilities; however, because of Australia's stringent visa regulations, the company relied on domestic labor to perform the work instead. MCC faced rising labor costs and a shortage of skilled workers in Australia. The construction cost of the Sino iron ore project increased sharply. Domestic analysts estimated that the construction costs increased to about $7 billion in 2011 from the original forecast of $2.5 billion when the project

was approved in 2009. Production and export of concentrate was expected to begin in late 2012 (CITIC Pacific Ltd., 2011, p. 22–31; Garvey, 2012).

Hancock Prospecting Pty Ltd. (a privately owned company) had several iron ore projects ongoing in Australia. The company continued with its joint venture with Rio Tinto to develop the Hope Downs Mine. Hancock also planned to develop the Roy Hill 1 iron ore project, which is located 277 km south of Port Hedland. The company completed the bankable feasibility study for the Roy Hill 1 project in 2010 and planned to invest $10 billion for the construction of the mine and infrastructure. Japan's Marubeni Corp. and the Republic of Korea's Pohang Iron and Steel Corp. and STX Corp. agreed to invest about $3.2 billion in the Roy Hill 1 project. Hancock also signed long-term offtake iron ore agreements with China's Yaxin Steel Co. and Shougang International Co., and held discussions with financial institutions from Australia and overseas, including the Export-Import Bank of the United States, for funding the Roy Hill project. The company estimated that Roy Hill had more than 2 billion metric tons (Gt) of iron ore resources. Hancock reported that the indicated and inferred iron ore resource of Roy Hill 1 was 1.2 Gt at an iron cutoff grade of 55%. The company planned to secure funding approval before yearend of 2012 and to mine 55 Mt/yr of direct-shipping iron ore in 2014 (Hancock Prospecting Pty Ltd., 2012).

Crosslands Resources Ltd. announced that the company completed the 5-year pilot Jack Hills project, which is located in 380 km northeast of Geraldton, Western Australia, in 2011. The company exported a total of 6.8 Mt of direct-shipping iron ore to Asian customers. The operation would be placed on care-and-maintenance status in 2012. Crosslands Resources was in the process of completing a feasibility study on the Jack Hills expansion project. The company planned to produce 20 Mt/yr of direct-shipping ore and iron ore concentrates for 39 years. It needed to build processing facilities to optimize the recovery of iron ore and infrastructure facilities, such as for power and water, for the iron ore operation. Japan's Mitsubishi Development Pty Ltd. acquired a stake in Crosslands Resources and Oakajee Port and Rail from Murchison Metals Ltd. (Crosslands Resources Ltd., 2011, 2012).

Bluescope Steel Ltd. announced that the company shut down the No. 6 blast furnace, No. 4 cokemaking battery, No. 3 steelmaking furnace, and No. 1 slab caster at Port Kembla in New South Wales and the Western Port Strip Mill in Victoria in late 2011. The closing of ironmaking and steelmaking facilities would reduce the company's output capacity by 50%. The company's decision was based on the combination of economic challenges, including the record high Australia dollar, low steel prices, and high raw material costs. The company also faced low domestic steel demand and relied on exports for sustaining its output capacity. The economic conditions for exporting steel products from Australia were unlikely to become favorable in the foreseeable future (Bluescope Steel Ltd., 2011).

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 2011, Australian zinc mine production was higher than in 2010. The increased zinc production came from the resumed production of the Century Mine in Queensland and the Golden Grove Mine in Western Australia. The output of zinc was expected to increase during the next 2 years because Xstrata planned to expand the Black Star Open Cut Deeps at the Mount Isa Mine and the Handle Bar Hill Mine and also to develop the Lady Loretta deposit. The State of Queensland remained the leading lead- and zinc-producing State in Australia. In 2011, Australia exported 428,000 t of lead concentrates compared with 525,000 t in 2010. China remained the leading destination for Australian lead concentrate exports and accounted for 35% of the total, which was a decrease from 57% in 2010. Australia's zinc exports to the Republic of Korea increased to 33% in 2011 from 16% in 2010. Japan accounted for 17% of the total, and the remaining 15% went to other countries in the world. Australia also exported 251,000 t of refined lead, for which Malaysia replaced India as the leading destination, followed by the Republic of Korea, India, Thailand, and Vietnam. In 2011, Australia exported 2.4 Mt of zinc concentrates, which was an increase of 5% from that of 2010. Zinc concentrates went mainly to such East Asian countries as China, 42%; the Republic of Korea, 18%; and Japan, 11%. Zinc metal exports increased by about 13% to 452,000 t and went to such destinations as, in descending order of volume exported, China, Taiwan, Hong Kong, the United States, Malaysia, and Indonesia (Australian Bureau of Resources and Energy Economics, 2012, p. 28, 41).

Xstrata's subsidiary, Xstrata Zinc, operated several lead and zinc mines and a processing plant in Mount Isa, Queensland. The company planned to expand the output capacities of its Black Star open pit mine and George Fisher underground mine. The executive committee of Xstrata approved $246 million to increase the output capacity of the George Fisher Mine. A second hoisting shaft and associated infrastructure to service the northern area of the mine using large-diameter raise boring technology was involved. An existing shaft servicing the northern end of the mine would be lined and extended by 420 m to a depth of 1,140 m. Zinc reserves in the mine had increased to 70 Mt in 2010 from 33 Mt in 2003 when Xstrata acquired the operation. After completion in 2013, the output of the George Fisher underground mine would increase to 4.5 Mt/yr from 3.5 Mt/yr. The company planned to mine ore at a depth of 400 m below the surface, or 100 m below the current design of the Black Star open pit mine, and the life of the mine at the current rate of 4.6 Mt/yr would be extended to 2016. The executive committee of Xstrata also approved $239 million to develop the Lady Loretta lead-silver-zinc deposit in northwestern Queensland. The deposit, which is located 140 km northwest of the Mount Isa operation, had mineral resources of 13.7 Mt grading 17% zinc and 6% lead. The construction of the mine started in 2011 and was scheduled to be completed in 2013. Lady Loretta was designed to produce 1.2 Mt/yr of ore and an average of 141,000 t/yr of zinc in concentrate and 44,000 t/yr lead in concentrate for 10 years. Ore from these mines would be processed at the Mount Isa concentrator. Xstrata also decided to expand the Handlebar Hill Mine's production capacity; the mine is located 20 km north of Mount Isa. Around the Mount Isa

surrounding areas, Xstrata had zinc resources of 600 Mt of ore and 36 Mt of contained zinc (Xstrata Zinc Australia, 2010; 2011; 2012; Xstrata plc, 2012, p. 18).

Owing to declining metal prices in Australia and a series of technical problems, Bass Metals Ltd. decided to shut down its Hellyer operation in Tasmania and placed it on care-and-maintenance status in 2012. The company agreed to sell its wholly owned subsidiary Hellyer Mill Operations Pty Ltd. to LionGold Corp. Ltd. of Singapore for $13.5 million; the transaction was expected to be completed in mid-2012. In 2011, the company produced 29,051 t of zinc concentrates at a grade of 48% zinc and 13,647 t of lead concentrates at a grade of 51% lead. The company also produced various amounts of copper, gold, and silver (Base Metals Ltd., 2011a, p. 1; 2011b, p. 5; 2011c, p. 7; 2012a, p.1; 2012b, p. 7).

Tantalum.—In August 2007, Talison Minerals Pty Ltd. of Canada acquired the Greenbushes and the Wodgina Mines in Western Australia from Sons of Gwalia Ltd. In 2009, Talison Minerals placed its lithium and tantalum operations into two separate companies—Talison Lithium Ltd. and Talison Tantalum Ltd. Talison Minerals had suspended its Wodgina tantalum operation beginning in December 2008 because lower priced tantalum from central Africa, particularly from the Democratic Republic of the Congo [Congo (Kinshasa)], supplied a significant amount of tantalum to the world market. The Greenbushes tantalum underground operation also remained on care-and-maintenance status in 2009. In 2010, Talison Tantalum Ltd. was renamed Global Advanced Metals Pty Ltd., and Global Advanced Metals reopened the Greenbushes and Wodgina operations in 2011. The Wodgina operation had a capacity to produce more than 600 t/yr of tantalum pentoxide from tantalum-bearing pegmatite ore at the Mount Cassiterite and the South Tinstone open cut mines. The Wodgina processing plant produced primary tantalum concentrate grading between 8% and 19% tantalum pentoxide, which was transported to the Greenbushes plant for secondary processing to produce salable tantalum products. Global Advanced Metals signed a 5-year purchase agreement with Galaxy Resources Ltd. for tantalum concentrate from its Mount Cattlin Mine (Global Advanced Metals Pty Ltd., 2011).

Tin.—Compared with other tin-producing countries in the Asia and the Pacific region, Australia was not a significant tin producer. Australia's tin was mined mainly in Tasmania, and to a lesser extent, in Western Australia. Tin production was mainly from Iluka Resources Ltd.'s heavy mineral sand operation in Western Australia, but the company had not released any tin preconcentrate information. In Tasmania, tin was produced from Metal X Ltd.'s tin operations. Tin concentrates were smelted at Global Advanced Metals' Greenbushes smelter, which had been closed in 2007 but was reopened in 2011. No primary refined tin was produced. In 2011, Australia exported 11,049 t of tin concentrates and 19 t of refined tin and imported 676 t of refined tin (Australian Bureau of Resources and Energy Economics, 2012, p. 38).

In 2010, Metals X sold 50% of its interest in its Tasmanian tin assets to Yunnan Tin Group of China. The two parties established a joint-venture company, Bluestone Mines Tasmania Joint Venture Pty Ltd., to manage the assets. The joint venture planned to mine ore from both the North Renison and the South Renison declines at a rate of about 60,000 t/mo in 2012 to replace the depleted tin resources in the Mount Bischoff Mine, which ceased operations at yearend 2010 and was placed on care-and-maintenance status in 2011. The joint venture estimated that the Renison underground mine had mineral resources of 8.35 Mt grading 1.63% tin in 2011. The joint venture planned to reprocess and recover tin from an estimated 18.95 Mt of tailings at the historic Renison site. The tailings contained average grades of 0.44% tin and 0.20% copper. The joint venture planned to process 2 Mt/yr of tailings to produce 5,300 t/yr of tin and 2,000 t/yr of copper. The beneficiated material contained 10% tin and could be smelted to produce a 68% tin fume product. Metal X planned to sell its Collingwood tin operation near Cooktown, Queensland; the Collingwood operation was on care-and-maintenance status in 2011 (Metals X Ltd., 2012, p. 11–16).

Industrial Minerals

Cement.—Australia had three major integrated cement companies (Adelaide Brighton Cement Pty 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. Domestic clinker capacity was about 8 Mt/yr and cement capacity was about 10 Mt/yr. The highly efficient dry precalciner technology accounted for 85% of Australia's cement production. During the past several years, the three integrated cement producers produced about 9 Mt/yr for the domestic market. Small independent producers used imported clinker from Asian countries to produce cement and accounted for about 15% of the domestic supply of cement. The Government implemented a carbon tax in 2011 that affected the cement sector in Australia. Carbon dioxide is emitted as a product of the chemical reaction during clinker production. To reduce carbon dioxide emission, some Australian cement plants were required to technically upgrade their production plants or relocate their operations overseas. In 2007, Cement Australia Pty Ltd. invested $10 million to improve its Kandos plant in New South Wales and stabilize the workforce owing to a shortage of skilled workers. The company decided to shut down its Kandos plant in 2011. The Government planned to introduce a Coastal Trading Bill in 2012 that would increase transshipping costs for dry bulk commodities, such as cement (Cement Australia Pty Ltd., 2011; Cement Industry Federation, 2012, p. 5).

Lithium.—As of March 2011, Talison Lithium's lithium resource at Greenbushes was 31.4 Mt at an average grade of 3.1% lithium oxide, and the estimated life of the Greenbushes Mine was increased to 22 years. The two ore treatment plants at the facility had a combined total output capacity of 600,000 t/yr to produce about 260,000 t/yr of lithium concentrates that contained about 15% lithium carbonate equivalent. In 2010, the company completed the stage 1 expansion to increase the output capacity at the Greenbushes operation to about 315,000 t/yr of lithium concentrate (about 47,000 t/yr of lithium carbonate). In recent years, demand for chemical-grade and technical-grade

lithium concentrates had increased, especially from customers in China. Talison Lithium invested $65 million to double the output capacity to 740,000 t/yr of lithium concentrate (about 110,000 t/yr lithium carbonate). The construction of the stage 2 expansion started in 2011 and was to be completed in the second quarter of 2012. Owing to increased demand for lithium carbonate in the global market, Talison planned to build a minerals conversion plant in the Kwinana Industrial Area, which is located 40 km south of Perth and 200 km northeast of the Greenbushes operation in Western Australia. The company planned to perform an engineering study of a 20,000-t/yr lithium carbonate plant in early 2012. Talison and Japan's Mitsui and Co. Ltd. and Sojitz Corp. had discussed collaborative marketing and distribution of lithium carbonate in Japan on a nonexclusive basis (Talison Lithium Ltd., 2011; 2012, p. 6).

In 2011, Galaxy Resources completed the construction of its Mount Cattlin Mine, which is located 2 km north of Ravensthorpe in Western Australia. The Mount Cattlin Mine had total ore resources (measured, indicated, and inferred) of 17.2 Mt grading 1.09% lithium oxide and 155 ppm tantalum oxide. The mined pegmatite ore was processed onsite to produce a spodumene concentrate and a tantalum byproduct. The processing plant was designed to process 1 Mt/yr of ore to produce about 137,000 t/yr of spodumene concentrate grading 6% lithium oxide and 25 t/yr (56,000 pounds per year) of contained tantalum oxide for 18 years. Galaxy Resources exported its spodumene concentrate to its lithium carbonate plant in China (Galaxy Resources Ltd., 2012, p. 15).

Magnesium.—All Australian magnesite deposits were mined by the open pit method. The Queensland Magnesia Pty Ltd.'s Kunwarara Mine, which is located 70 km northwest of Queenstown in Queensland, was the largest operating magnesite mine in the country. About 3 Mt/yr of ore was mined and processed at Kunwarara. The beneficiated magnesite was transported to the company's Parkhurst plant for calcination to produce the required magnesia products, such as high-grade deadburned, electrofused, and calcined. The Parkhurst plant had a designed capacity of 320,000 t/yr. In recent years, the Parkhurst plant operated at about 30% of its designed capacity. Sibelco Group of Belgium acquired Queensland Magnesia in 2012 (Register of Australian Mining, 2012, p. 201).

Latrobe Magnesium Ltd. completed a feasibility study to build a magnesium plant in Latrobe Valley, Victoria. The company planned to extract magnesium from fly ash from a coal powerplant. Latrobe planned to use the hydromet process, which was developed by Ecoengineers Pty Ltd., to remove the majority of iron, silicon, and sulfur from the ash. The beneficiated material could be used as feedstock in the thermal reduction process. Results from pilot plant operation indicated that the magnesium recovery rate was about 95%. Initial design was to produce 10,000 t/yr of magnesium metal at a cost of $100 million; however, engineering designers recommended that reducing the size of the commercial plant to 5,000 t/yr could reduce capital costs to $35 to $40 million. The demonstration plant was expected to be commissioned in 2014. Australia relied on imported magnesium for its domestic consumption, which was about 10,000 t/yr (Latrobe Magnesium Ltd., 2012a, b).

Rare Earths.—China dominated the production and resources of rare earths in the world. Lynas Corp. Ltd. started construction of an open pit mine and a concentration plant at the Mount Weld deposit in 2007; the deposit was located 35 km south of Laverton, Western Australia, and started mining at the Central Lanthanide pit in 2010. The construction of the concentration plant started in 2010 and the plant was put into operation in 2011 to produce at a target grade of 36% rare-earth oxide (REO) in concentrates; the recovery rate was expected to be 68.7%. The plant was designed to process 121,000 t/yr of ore and to produce 33,000 t/yr of rare-earth concentrate. In 2011, the company reported stockpile ore valued at A$21.2 million (US$22.2 million). The first feed of ore to the concentration plant was to be in May 14, 2011. Lynas planned to double its processing capacity by yearend 2012. Rare-earth concentrates were shipped to Lynas' advanced materials plant in Kuantan, Malaysia. Lynas planned to develop the Duncan deposit, which is located southeast of the central lanthanide deposit. The mineral resource at Duncan was estimated to be 8.9 Mt grading 4.8% rare earth oxide (REO). The Duncan deposit could be exploited using the opencut mining method. The cost of development the Duncan deposit was estimated to be $600 million. Lynas and Sojitz Corp. of Japan formed a strategic alliance and signed an offtake, distribution, and financing agreement to enable Lynas to accelerate the development of the phase 2 operation. Under the agreement, Sojitz was allocated a minimum of 8,500 t/yr of rare-earth products for the Japanese market for 10 years (Lynas Corp. Ltd., 2012a, p. 8–16; 2012b, p. 7).

Arafura Resources Ltd.'s Nolans Bore rare-earth deposit is located about 10 km west of the Stuart Highway near Aileron Roadhouse in the Northern Territory. The company planned to use the sulfation process to recover rare earths and phosphate using its patented preleach process. The Nolans Bore deposit had measured, indicated, and inferred resources of 47 Mt at an average grade of 2.6% REO, 11% phosphorus pentoxide, and 0.41% uranium oxide. The light rare-earth elements (lanthanum, cerium, praseodymium, neodymium, and samarium) accounted for 96.7% of the total. In 2011, the company was preparing a feasibility study for the Nolans Bore project. Arafura Resources planned to mine 7 Mt/yr of ore for the first 8 years of operation and to increase that amount to 15 Mt/yr to produce an average of 1.5 Mt/yr of concentrate. The concentrate would be transported to the Whyalla Rare Earth Complex in South Australia. The designed annual output capacities were 500,000 t of gypsum, 80,000 t of phosphoric acid, 20,000 t of REOs, and 150 t of uranium in 2013. In 2009, Arafura and Jiangsu Eastern China Non-Ferrous Metals Holding Co. (a subsidiary of East China Exploration and Development Bureau) reached a $24 million equity investment agreement. According to the agreement, Jiangsu Eastern China could acquire up to 25% interest in Arafura Resources. The company also signed a strategic offtake agreement with ThyssenKrupp AG of Germany in 2011 and Republic of Korea companies in 2012 (Arafura Resources Ltd., 2012, p. 3–11).

Talc.—In 2001, Rio Tinto (through its subsidiary Luzenac Australia Pty Ltd.) acquired the Three Springs talc operation, which is located in Western Australia, from WMC Resources

Ltd. The mine had an output capacity of 200,000 t/yr of talc. In 2010, Rio Tinto invested $11 million to replace the Three Springs' beneficiation plant. The new plant had the capacity to produce up to 150,000 t/yr of high-specification products. Owing to the global financial crisis, Rio Tinto put its borate and talc business up for sale and received a binding offer from a France-based company, Imerys SA, for its talc business. The European Commission approved the acquisition of Rio Tinto's talc business by Imerys, and the transaction was completed in 2011 (European Commission, 2011; Rio Tinto plc., 2011).

Mineral Fuels and Related Materials

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 more than 95% of the country's total output. In 2011, Australia mined 468 Mt of raw black (bituminous and anthracite) coal, of which 349 Mt was salable coal. Underground coal mines accounted for about 79% of the total output. Queensland's coal output accounted for 52.7% of the country's total output and was mainly 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' coal output accounted for 45.3% of the country's total output and was mined near the eastern and western edges of the large Sydney Gunnedah Basin. Australia exported more than 280.6 Mt of coal (metallurgical coal, 133.0 Mt, and thermal coal, 147.6 Mt) compared with 300.3 Mt in 2010. Japan was the leading destination for Australian metallurgical coal, 30.7%; followed by India, 21.8%; the Republic of Korea, 6.7%; China, 5.3%; and others, 35.5%. Japan was also the leading destination for Australian thermal coal, 44.3%, followed by the Republic of Korea, 20.0%; Taiwan, 12.9%; China, 11.3%; and others, 11.5%. Domestic coal consumption was less than 70 Mt, of which the power sector accounted for about 85%, followed by steel, 6.7%; cement, 1.3%; and other, 7%. Owing to increased demand from its fellow countries in the Asia and the Pacific region, such as China and India, Australia's metallurgical coal exports were expected to increase during the next several years (Australian Bureau of Resources and Energy Economics, 2012, p. 22).

BHP Billiton approved funding for the development of the Caval Ridge project and the expansion of the Peak Downs Mine in the Bowen Basin in Queensland. The total investment was $4.2 billion, of which BHP Billiton's share was $2.1 billion. BHP Billiton's partner, Mitsubishi Development Pty Ltd. of Japan provided the remaining funds. The Caval Ridge Mine would have the capacity to produce 5.5 Mt/yr of metallurgical coal, and the capacity of the Peak Downs Mine would increase by 2.5 Mt for more than 60 years. The Caval Ridge project was one of the four components of the BHP Billiton Mitsubishi Alliance Coal Operations Pty Ltd. in the Bowen Basin coal growth project. The Daunia Mine, which was a new open pit coal mine and coal handling preparation plant, was scheduled to be completed in 2013; the plant would have the capacity to produce 4 Mt/yr of coal for 21 years (BHP Billiton Ltd., 2011b).

In 2010, the Board of Xstrata approved $1.36 billion for the development of the Ravensworth North open pit coal mine in the Upper Hunter Valley of New South Wales. The construction of the mine started in 2011 and was scheduled to be completed in mid-2012. The mine was designed to produce 8 Mt/yr of thermal coal for 26 years. The mine was situated within the existing Cumnock Coal Mine and Ravensworth complex. Xstrata planned to export its coal output (Xstrata Coal, 2010).

Rio Tinto decided to close down it Blair Athol coal mine near Clemont, Queensland, at yearend 2012 after almost 30 years of operation. The decision to close the mine was owing to the drop in coal prices and the increase in production costs (Rio Tinto Ltd., 2012a).

Uranium.—Australia was the third ranked uranium producer in the world after Kazakhstan and Canada. Australia's uranium production was mainly from three mines—the Beverley, the Olympic Dam, and the Ranger. A number of undeveloped deposits also occur in the Northern Territory, Queensland, South Australia, and Western Australia. 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. Australia exported all its uranium output under long-term contracts. High rainfall in the Northern Territory affected the output of the Ranger Mine in 2011. Australia's uranium production was expected to increase during the next several years. The Honeymoon project, which was a joint venture of Uranium One Inc. of Canada (51%) and Mitsui & Co. Ltd. of Japan (49%), is located 75 km northwest of Broken Hill, South Australia. The Honeymoon deposit had indicated resources of 1.2 Mt at an average grade of 0.24% uranium oxide. The company planned to produce 400 t/yr (880,000 pounds per year) of uranium oxide for 6 years. The mine produced 38 t (100,000 pounds) of uranium in 2011. Uranium One planned to add 96 production wells in 2012 to achieve the production target. Mitsui announced that the company decided to withdraw from the joint venture and was waiting for the Australian Government's approval. Other new projects, which were under feasibility study, included Mega Uranium Ltd.'s Lake Maitland project in Western Australia and Marathon Resources Ltd.'s Mount Gee project in South Australia. Owing to rising investment costs and low commodity prices, BHP Billiton decided to delay its $30 billion Olympic Dam expansion plan (BHP Billiton Ltd., 2012a; Uranium One Inc., 2012, p. 22).

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 commodities, 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 are expected to increase owing to higher costs of labor and equipment and global demand for mineral resources in the near future. Production of such mineral commodities as bauxite, copper, iron ore,

natural gas, nickel, and zinc during the next several years was expected to increase much more slowly than in the past several years. Major projects, such as the Yarwun alumina refinery project; BHP Billiton's RGP iron ore project; 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 and Clermont and Kestrel coal projects; and Xstrata's Mangoola coal project, are expected to come onstream within this decade. If the slow economic recovery in the United States and European Union continues, the volume of imports of mineral products from China and other Asia countries to these countries is expected to decline. China also plans to slow down its economic growth to 7% to 8% in the next several years from 10% during the past 10 years, as a result, China's demand for mineral commodities from Australia is expected to decrease, and companies could, therefore, delay their investment in these projects. Western Australia is Australia's leading State for metallic mineral exports and New South Wales and Queensland are its major coal exporting States; however, to sustain export growth, the country's infrastructure would require significant expansion and upgrading so that minerals for export could be transported from inland to port terminals. A carbon tax and mineral resource rent tax would not affect Australian mineral investment significantly. Australia is expected to remain a major mineral and fuel exporting country.

References Cited

Arafura Resources Ltd., 2012, Arafura delivers Nolans project update: Perth, Western Australia, Australia, Arafura Resources Ltd. ASX release, August 7, 63 p.

Australian Bureau of Resources and Energy Economics, 2012, Australian mineral statistics 2011—December quarter 2011: Canberra, Australian Capital Territory, Australia, Australian Bureau of Resources and Energy Economics, March, 41 p.

Australian Bureau of Statistics, 2012, Balance of payments and international investment position: Canberra, Australian Capital Territory, Australia, Australian Bureau of Statistics, 92 p.

Base Metals Ltd., 2011a, June 2011 quarterly report of activities and cashflow: West Perth, Western Australia, Australia, Base Metals Ltd. quarterly report, 31 p.

Base Metals Ltd., 2011b, March 2011 quarterly report of activities and cashflow: West Perth, Western Australia, Australia, Base Metals Ltd. quarterly report, 24 p.

Base Metals Ltd., 2011c, September 2011 quarterly report of activities and cashflow: West Perth, Western Australia, Australia, Base Metals Ltd. quarterly report, 27 p.

Base Metals Ltd., 2012a, June 2012 quarterly report of activities and cashflow: West Perth, Western Australia, Australia, Base Metals Ltd. quarterly report, 14 p.

Base Metals Ltd., 2012b, December 2011 quarterly report of activities and cashflow: West Perth, Western Australia, Australia, Base Metals Ltd. quarterly report, 27 p.

BHP Billiton Ltd., 2011a, New Power Station for Western Australia iron ore: Melbourne, Victoria, Australia, BHP Billiton Ltd. press release, November 16, 1 p.

BHP Billiton Ltd., 2011b, Orebody 24 development in Western Australia: Melbourne, Victoria, Australia, BHP Billiton Ltd. press release, November 16, 1 p.

BHP Billiton Ltd., 2012a, Olympic Dam update: Melbourne, Victoria, Australia, BHP Billiton Ltd. press release, August 22, 1 p.

BHP Billiton Ltd., 2012b, Report for the half year ended 31 December 2011: Melbourne, Victoria, Australia, BHP Billiton Ltd. press release, February 8, 17 p.

Bluescope Steel Ltd., 2011, Bluescope announces major restructure to Australian operations and reinforces commitment to steel production in Australia: Melbourne, Victoria, Australia, Bluescope Steel Ltd. press release, August 11, 4 p.

Bureau of Resources and Energy Economics, 2012, Resources and energy quarterly: Canberra, Australian Capital Territory, Australia, Bureau of Resources and Energy Economics, June quarter, 139 p.

Cape Alumina Ltd., 2012, Annual report 2011: Brisbane, Queensland, Australia, Cape Alumina Pty Ltd., 92 p.

Cement Australia Pty Ltd., 2011, Cement Australia to close Kandos manufacturing facility: Milton, Queensland, Australia, Cement Australia Pty Ltd. press release, July 7, 2 p.

Cement Industry Federation, 2012, Australian cement industry statistics 2011: Forrest, Australian Capital Territory, Australia, Cement Industry Federation, 15 p.

CITIC Pacific Ltd., 2011, Annual report 2010: Hong Kong, China, CITIC Pacific Ltd., 204 p.

Crocodile Gold Corp., 2012, Managements' discussion and analysis for the year ended December 31, 2011: Toronto, Ontario, Canada, Crocodile Gold Corp., 34 p.

Crosslands Resources Ltd., 2011, Stage 1 mining at Jack Hills to cease as focus shifts to expansion: West Perth, Western Australia, Australia, Crosslands Resources Ltd. press release, November 30, 1 p.

Crosslands Resources Ltd., 2012, Ownership restructure delivers greater certainty for Crosslands: West Perth, Western Australia, Australia, Crosslands Resources Ltd. press release, February 20, 1 p.

Department of Mines and Petroleum, 2012, 2011 Western Australian mineral and petroleum statistics digest: East Perth, Western Australia, Australia, Department of Industry and Resources, State of Western Australia, 45 p.

European Commission, 2011, Mergers—Commission clears acquisition of Rio Tinto's talc business by Imerys: Brussels, Belgium, European Commission press release, July 8, 1 p.

First Quantum Minerals Ltd., 2012, Ravensthorpe nickel operation Australia: West Perth, Western Australia, Australia, First Quantum Minerals Ltd. press release, 3 p.

Fox Resources Ltd., 2012, Annual report 2011: Perth, Western Australia, Australia, Fox Resources Ltd., 80 p.

Galaxy Resources Ltd., 2012, 2011 annual report: West Perth, Western Australia, Australia, Galaxy Resources Ltd., 106 p.

Garvey, Paul, 2012, String of disaster dents Chinese iron ore project in the Pilbara: Australian, The, March 12. (Accessed April 14, 2012, at http://www.theaustralian.com.au/business/opinion/string-of-disasters-dents-chinese-iron-ore-project-in-the-pilbara/story-e6frg9if-1226296349103.)

Geoscience Australia, 2012, Australian mineral exploration—A review of exploration for the year 201a: Canberra, Australian Capital Territory, Australia, Geoscience Australia, February, 20 p.

Global Advanced Metals Pty Ltd., 2011, World's largest tantalum producer resume operations: Perth, Western Australia, Australia, Global Advanced Metals Pty Ltd. press release, January 17, 1 p.

Hancock Prospecting Pty Ltd., 2012, Roy Hill 1: West Perth, Western Australia, Australia. (Accessed August 15, 2012, at http://www.hancokprospecting.com.au/go/current-projects/roy-hill.)

Ivanhoe Australia Ltd., 2011, Osborne copper gold project on track to Ivanhoe Australia from explorer to producer: Melbourne, Victoria, Australia, Ivanhoe Australia Ltd., press release, October 28, 12 p.

Ivanhoe Australia Ltd., 2012, Annual report 2011 Melbourne, Victoria, Australia, Ivanhoe Australia Ltd., 68 p.

Latrobe Magnesium Ltd., 2012a, LMG reduces capital costs for Latrobe Valley magnesium plant to $35-40m: Sydney, New South Wales, Australia, Latrobe Magnesium Ltd., 1 p.

Latrobe Magnesium Ltd., 2012b, Quarterly activities report to 31 December 2011: Sydney, New South Wales, Australia, Latrobe Magnesium Ltd., 3 p.

Lynas Corp. Ltd., 2012a, Annual report 2011: Sydney, New South Wales, Australia, Lynas Corp. Ltd., 96 p.

Lynas Corp. Ltd., 2012b, Quarterly report for the period end 30 June 2012: Sydney, New South Wales, Australia, Lynas Corp. Ltd., 14 p.

Mandalay Resources Ltd., 2012, Annual report 2011: Toronto, Ontario, Canada, 21 p.

Metals X Ltd., 2012, Annual report 2011: East Perth, Western Australia, Australia, Metals X Ltd., 121 p.

Mineral Council of Australia, 2011, The economic impact of the carbon pricing scheme: Canberra, Australian Capital Territory, Australia, Mineral Council of Australia, November, 5 p.

Norsk Hydro ASA, 2012a, Annual report 2011: Oslo, Norway, Norsk Hydro ASA, 137 p.

Norsk Hydro ASA, 2012b, Job market to assist Kurri Kurri employees find new careers: Oslo, Norway, Norsk Hydro ASA press release, July 18, 2 p.

OJSC MMC Norilsk Nickel, 2012, MMC Norilsk Nickel announces preliminary consolidated production results for 4th quarter and 12 months 2011 and production outlook for 2012: Moscow, Russia, OJSC MMC Norilsk Nickel press release, January 30, 4 p.
OZ Minerals Ltd., 2012, OZ Minerals business review 2011: Melbourne, Victoria, Australia, OZ Minerals Ltd., 24 p.
Panoramic Resources Ltd., 2011, Annual report 2011: Perth, Western Australia, Australia, Panoramic Resources Ltd., 100 p.
Parliament of the Commonwealth of Australia, The 2012, Minerals resource rent tax bill 2012: Canberra, Australian Capital Territory, Australia, The Parliament of the Commonwealth of Australia, November, 269 p.
Queensland Bauxite Ltd., 2012, Half-year report: Sydney, New South Wales, Australia, Queensland Bauxite Ltd., 27 p.
Ramelius Resources Ltd., 2011, Annual report 2011: Adelaide, South Australia, Australia, Ramelius Resources Ltd., 117 p.
Register of Australian Mining, 2012, Magnesite—Kunwarara: West Perth, Western Australia, Australia, Resource Information Unit, 973 p.
Reserve Bank of Australia, 2012, Statement on monetary policy: Canberra, Australian Capital Territory, Australia, Reserve Bank of Australia, May, 70 p.
Rio Tinto Ltd., 2012a, Blair Athol Mine to finish production: Melbourne, Victoria, Australia, Rio Tinto Ltd. press release, August 8, 3 p.
Rio Tinto Ltd., 2012b, Rio Tinto to invest a further US$3.4 billion in expansion of iron operations in Western Australia: Melbourne, Victoria, Australia, Rio Tinto Ltd. press release, February 8, 2 p.
Rio Tinto Ltd., 2012c, Rio Tinto to invest US$518 million in autonomous trains for Pilbara iron rail network in Western Australia: Melbourne, Victoria, Australia, Rio Tinto Ltd. press release, February 20, 2 p.
Rio Tinto plc, 2011, Rio Tinto completes divestment of talc business: London, United Kingdom, Rio Tinto plc press release, August 1, 3 p.
Rio Tinto plc, 2012, 2011 annual report: London, United Kingdom, Rio Tinto plc, 222 p.
Sandfire Resources NL, 2011, 2011 annual report: West Perth, Western Australia, Australia, Sandfire Resources NL, 67 p.
Sandfire Resources NL, 2012, December 2011 quarterly report highlight: West Perth, Western Australia, Australia, Sandfire Resources NL, 9 p.
Talison Lithium Ltd., 2011, Talison Lithium more than doubles mineral reserves and significantly increases mine life: Perth, Western Australia, Australia, Talison Lithium Ltd. press release, March 4, 6 p.
Talison Lithium Ltd., 2012, Management's discussion and analysis: Perth, Western Australia, Australia, Talison Lithium Ltd. February 9, 27 p.
Uranium One Inc., 2012, 2011 annual report: Toronto, Ontario, Canada, Uranium One Inc., 139 p.
Xstrata Coal, 2010, Xstrata board approves Ravensworth North project: Sydney, New South Wales, Australia, Xstrata Coal press release, December 7, 2 p.
Xstrata plc, 2012, Xstrata plc half yearly results 2012: Zug, Switzerland, Xstrata plc, 81 p.
Xstrata Zinc Australia, 2010, AUD274 expansion of George Fisher mine approved: Brisbane, Queensland, Australia, Xstrata Zinc Australia press release, October 29, 2 p.
Xstrata Zinc Australia, 2011, Xstrata Zinc to develop Lady Loretta deposit in AUD246M project: Brisbane, Queensland, Australia, Xstrata Zinc Australia press release, July 26, 3 p.
Xstrata Zinc Australia, 2012, Lady Loretta and Handlebar Hill mines expanding: Brisbane, Queensland, Australia, Xstrata Zinc Australia press release, May 1, 1 p.

TABLE 1
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless othewise specified)

Commodity		2007	2008	2009	2010	2011
METALS						
Aluminum:						
Bauxite, gross weight	thousand metric tons	62,398	64,038	65,231	68,414	69,976
Alumina	do.	18,844	19,446	19,948	19,956	19,399
Metal:						
Primary	do.	1,957	1,974	1,943	1,928	1,945
Secondary[e]		130,000	130,000	130,000	130,000	130,000
Antimony, Sb content of ores and concentrates[e]		1,010	1,500	1,000	1,106 [r, 2]	1,577 [2]
Cadmium:[e]						
Mine output, Cd content		700	700	460 [r]	-- [r]	--
Metal, smelter, refined		350	330	330	310	390
Chromium, chromite, gross weight		253,400	224,809	119,314	-- [r]	--
Chromite content[e]		103,000	90,000	45,000	-- [r]	--
Cobalt:						
Co content in laterite ore, Ni concentrate, and Zn concentrate[e]		4,730	4,780	4,345 [2]	3,850	4,000
Metal, refined		3,680	3,620	4,050	4,120	4,000 [e]
Copper:						
Mine output, Cu content	thousand metric tons	870	885	859	870 [r]	958
Metal:						
Smelter, primary and secondary	do.	399	447	422	410 [r]	402
Refined, primary	do.	442	503	446	417	477
Gold:						
Mine output, Au content		247	215	224	261	260
Metal, refined:						
Primary		259	244	256	280	271
Secondary		116	117	123	71	48
Iron and steel:						
Iron ore:[e]						
Gross weight	thousand metric tons	299,000	342,000	394,000	433,000	488,000
Fe content	do.	186,000	208,000	228,000	271,000	277,000
Metal:						
Pig iron	do.	6,351	6,409	4,370	6,259	6,400 [e]
Ferroalloys:[e]						
Ferromanganese		115,000	147,000	87,000	138,000 [r]	146,000
Silicomanganese		110,000	125,000	74,000	131,000 [r]	130,000
Total		225,000	272,000	161,000	269,000 [r]	276,000
Steel, crude	thousand metric tons	8,047	7,724	5,135	7,408 [r]	6,538
Semimanufactured products[e]		7,130	10,200	7,530	8,000	8,000
Lead:						
Mine output, Pb content	thousand metric tons	641	645	566	625	621
Metal:						
Bullion	do.	125	167	150	142	139
Refined:						
Primary	do.	202	220	204	178	187
Secondary, excluding remelt	do.	27	24	25	26	26
Manganese ore, metallurgical:						
Gross weight	do.	5,265	4,812	4,451	6,474 [r]	6,963
Mn content	do.	2,540	2,310	2,140	2,650 [r]	2,860
Nickel:						
Mine output, Ni content	do.	160	188	165	170	212
Matte	do.	42	31	28	54	57
Metal, smelter, refined Ni and Ni content of oxide	do.	114	103	131	108	110
Platinum-group metals:[e]						
Palladium, Pd content	kilograms	600	580	800	650	600
Platinum, Pt content	do.	142	120	230	130	130
Total	do.	742	700	1,030	780	730
Silver:						
Mine output, Ag content		1,879	1,926	1,633	1,864	1,725
Metal, refined		625	644	664	735	898

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		2007	2008	2009	2010	2011
METALS—Continued						
Tantalum, tantalite, Ta_2O_5 equivalent		538	680	105	--	--
Tin:						
Mine output, Sn content[3]		2,071	1,783	5,630	6,600 r	6,000 e
Metal, refined:						
Primary		118	170	-- r	-- r	--
Secondary[e]		400	400	400	400	400
Titanium concentrates, gross weight:						
Ilmenite	thousand metric tons	2,340	2,082	1,449	1,492	1,277
Leucoxene[e]		163,000	148,000	162,000	159,000	224,000
Rutile		312,000	325,000	285,000 r	429,000 r	474,000
Tungsten, mine output, W content		7	28	33	16	15
Zinc:						
Mine output, Zn content	thousand metric tons	1,514	1,519	1,290	1,479	1,515
Metal, smelter:						
Primary	do.	502	499	525	499	507
Secondary[e]		6,000	6,000	6,100	6,000	6,000
Zirconium concentrates, gross weight	thousand metric tons	601	514 r	400 r	549 r	762
INDUSTRIAL MINERALS						
Abrasives, natural:						
Beach pebble[e]		2,000	2,000	2,000	2,000	2,000
Garnet		294,007	298,290	275,560	196,839	200,000
Barite[e]		17,000 r	17,000 r	12,000 r	12,000 r	12,000
Cement, hydraulic[e]	thousand metric tons	9,200	9,400	9,200	8,300 r	8,600
Clays:[e]						
Bentonite and bentonitic clay		220,000	220,000	220,000	230,000	230,000
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		22,000	22,000	22,000	22,000	22,000
Fuller's earth, attapulgite		10,000	10,000	10,000	10,000	10,000
Kaolin and ball clay		230,000	230,000	230,000	240,000	240,000
Other	thousand metric tons	2,000	2,000	2,000	2,000	2,000
Diamond:						
Gem	thousand carats	231	273	220	100	86
Industrial	do.	18,960	15,397	10,575	9,900	7,500
Total	do.	19,191	15,670	10,795	10,000	7,586
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[e]	value, $million	40	41	33 r	40 r	40
Gypsum	thousand metric tons	3,896	3,734	3,436 r	3,000 r, e	3,000 e
Kyanite[e]		1,000	1,000	1,000	1,000	1,000
Lime[e]		1,600,000	2,200,000	2,000,000	2,000,000	2,000,000
Lithium, spodumene		192,277	239,528	197,482	295,000	357,543
Magnesite		447,000	126,000	344,000	300,000 e	300,000 e
Nitrogen, N content of ammonia		1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Perlite, crude[e]		6,500	6,500	6,500	7,000	7,000
Phosphate rock:[e]						
Gross weight		2,850,000	2,950,000	2,500,000	2,600,000	2,600,000
P_2O_5 content		655,000	678,000	575,000	600,000	600,000
Rare earths, rare-earth oxide equivalent		--	--	--	--	2,188
Salt[4]	thousand metric tons	10,855	11,160	10,316	11,968	11,744
Soda ash[e]	do.	310	310	310	310	310
Stone and sand and gravel:						
Construction sand	do.	35,530	37,000	34,000 e	35,000 e	35,000 e
Crushed and broken stone[e]	do.	95,000	110,000	115,000	100,000 r	100,000
Dimension stone	do.	190	230 e	180 r, e	170 r, e	170 e

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		2007	2008	2009	2010	2011
INDUSTRIAL MINERALS—Continued						
Stone and sand and gravel—Continued:						
Gravel[e]	thousand metric tons	13,600	12,000	12,000	12,000	12,000
Dolomite[e]	do.	10,000	10,000	10,000	10,000	10,000
Limestone[e]	do.	19,100	18,400	16,800 [r]	17,000 [r]	18,000
Silica in the form of quartz, quartzite, glass sand[e]	do.	5,300	5,500	5,000 [r]	5,100 [r]	5,300
Sulfur, byproduct:[e]						
Metallurgy	do.	880	880	870	800	800
Petroleum	do.	58	60	60	60	60
Total	do.	938	940	930	860	860
Talc, chlorite, pyrophyllite, steatite[e]		125,000	120,000	120,000	120,000	120,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, salable:						
Bituminous and subbituminous	thousand metric tons	320,000	332,000	348,000	449,000	468,000
Lignite[e]	do.	71,000	71,000	74,000 [r]	71,000 [r]	65,000
Total[e]	do.	391,000	403,000	422,000	520,000	533,000
Gas, natural, marketed	million cubic meters	39,960	38,256	42,345	51,868 [r]	51,253
Petroleum:						
Crude, includes condensate	thousand 42-gallon barrels	170,470	168,123	169,211	169,985	143,456
Refinery products	do.	252,443	246,717	241,233	235,971	239,618
Uranium, mine output, U_3O_8 content		10,145	9,989	7,942	7,440	6,942

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.
[1]Table includes data available through August 1, 2012.
[2]Reported figure.
[3]Does not include tin production from heavy mineral sand in Western Australia.
[4]Does not include production from Northern Territory and Victoria.

TABLE 2
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(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 [Pacific Aluminum (Rio Tinto Ltd., 100%)]	15 km southeast of Nhulunbuy, 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 Alcan, 100%)]	Weipa, QLD	21,000
Do.	Willowdale open pit bauxite mine (Alcoa World Alumina Australia, 100%)	130 km south of Perth, WA	8,600
Do.	Boddington-Worsley 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%]}	14 km south of Boddington, WA	13,200
Alumina, refinery	Gladstone alumina refinery [Queensland Alumina Ltd., operator (Rio Tinto Alcan, 80%, and United Company RUSAL 20%)]	Gladstone, QLD	3,850
Do.	Gove alumina refinery {Alcan Gove Pty Ltd. [Pacific Aluminum, 100% (Rio Tinto Ltd., 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	3,500
Do.	Yarwun alumina refinery (Rio Tinto Alcan, 100%)	Gladstone, QLD	1,400
Metal smelter	Bell Bay aluminum smelter [Pacific Aluminum (Rio Tinto Ltd., 100%)]	Bell Bay, TAS	160
Do.	Boyne Island aluminum smelter [Boyne Smelters Ltd., operator [Pacific Aluminum, 64% (Rio Tinto Ltd., 100%); 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 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%; Pacific Aluminum 51.55% (Rio Tinto Ltd., 100%); Hydro Aluminium, 12.40%]}	Tomago, NSW	525
Antimony	Costerfield underground antimony-gold mine [AGD Mining, operator (Mandalay Resources Ltd., 100%)]	50 km east and southeast of Bendigo, VIC	5
Do.	Hillgrove Mine (Straits Resources Ltd., 100%)	25 km east of Armidale, NSW	10
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.	Mantuan Downs (Pacific Enviromin Ltd., 100%)	West of Springsure, QLD	100
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 Pty Ltd. (Hanson Ltd. and Holcim Australia Pty Ltd.)	Brisbane, QLD	1,200
Do.	do.	Gladstone, QLD	1,700
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 (Palmary Enterprises 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 2011

(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.	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 2011

(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 of 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 and 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% of Narama; Iluka Resources Ltd., 50% of 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 km 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 2011

(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%)	30 km from 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	Cawse open pit nickel-cobalt mine (OJSC MMC Norilsk Nickel, 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., 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
Do.	Ravensthorpe open pit mine (BHP Billiton Ltd., 100%)	155 km west of Esperance, WA	1.4
Refinery	Yabulu nickel-cobalt refinery (Nickel Consolidated Pty Ltd., Nickel House Pty, and Nickel Process Pty)	Townsville, QLD	3
Copper:			
Mine, Cu content	Boddington open pit/underground gold mine (Newmont Mining Corp., 100%)	130 km southeast of Perth, WA	35
Do.	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 International AG, 100%)	12 km northwest of Cobar, NSW	30
Do.	Eloise underground copper mine (FMR Investement Pty Ltd., 100%)	60 km southeast of Cloncurry, QLD	70
Do.	Ernest Henry open pit/underground 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 (Bass Metals Ltd., 100%)	80 km south-southwest of Burnie, TAS	1
Do.	Lady Annie copper (solvent extraction-electrowinning) mine (CST Mining Group Ltd., 100%)	100 km north-northwest of Mount Isa, QLD	19
Do.	Leichhardt copper mine (Cape Lambert Resources Ltd., 100%)	110 km northwest of Cloncurry, QLD[3]	10
Do.	Mount Gordon open pit copper (solvent extraction-electrowinning) mine (Aditya Birla Minerals Ltd., 100%)	120 km 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 (solvent extraction-electrowinning) 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 northwest 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 (Ivanhoe Australia Ltd., 100%)	120 km northeast of Boulia, QLD	22
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.	Prominent Hill open pit/underground copper-gold mine (OZ Minerals Ltd., 100%)	650 km northwest of Adelaide, SA	140
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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. Ltd., 100%)]	35 km north of Queenstown, TAS	2
Do.	Tritton underground mine (Straits Resources Ltd., 100%)	Nyngan, NSW	30
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

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Copper—Continued:				
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
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 Mine (includes pipes 4 and 9) (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 (Australia 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
Do.		Cookes Hill Mine (includes Nickol River and Warrawoona) (Haoma Mining NL, 100%)	Near Port Hedland, WA	400
Feldspar		Broken Hill open pit feldspar mine (includes Bakers, Lady Beryl, and Spar Ridge) (Unimin Australia 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., 100%)	130 km southeast of Perth, WA	31,000
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.	Burnside open pit mines (includes Union Reefs, Brocks Creek, North Point, Princess Louise, Rising Tide, Zapopan, Fountain Head) (Crocodile Gold Corp., 100%)	Pine Creek, NT	6,500
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.	Gwalia underground gold mine (St Barbara Ltd., 100%)	3 km south of Leonora, WA	2,600
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	650
Do.	do.	Jundee-Nimary open pit/underground gold mine (Newmont Mining Corp., 100%)	45 km northeast of Wiluna, WA	12,000
Do.	do.	Kalgoorlie open pit/underground gold mine [Kalgoorlie Consolidated Gold Mine Pty Ltd., operator (Barrick Gold Australia, 50%, and Newmont Mining Corp., 50%)]	600 km east Perth, WA	20,000
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) (Ramelins Resources Ltd., 100%)	2 km from Mount Magnet, WA	8,500
Do.	do.	Norseman underground gold mine (Norseman Gold Plc, 100%)	Norseman, WA	3,700

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(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—Continued:				
Mine—Continued	kilograms	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.	Osborne underground copper-gold mine (Ivanhoe Australia Ltd., 100%)	120 km northeast of Boulia, QLD	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	1,500
Do.	do.	Pajingo underground gold mine (includes Vera-Nancy) [North Queensland Metals Ltd. (operator), 60%, and 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.	Prominent Hill open pit copper-gold mine (OZ Minerals Ltd., 100%)	650 km northwest of Adelaide, SA	2,200
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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. Ltd., 100%)]	35 km north of Queenstown, TAS	1,000
Do.	do.	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.	Wattle Dam gold mine (Ramelius Resources Ltd., 100%)	70 km south of Kalgoorlie, WA	3,000
Do.	do.	Wiluna open pit/underground gold mine (Apex Minerals NL, 100%)	7 km south of Wiluna, WA	3,300
Smelter	do.	Gidji Roaster gold smelter (Kalgoorlie Consolidated Gold Mines Pty. Ltd., 100%)	Kalgoorlie, WA	24,300
Refinery	do.	Perth Refinery [AGR Management Services Ltd. (Australian Gold Alliance Pty Ltd., 40%; Western Australian Mint, 40%; 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.		Extension Hill open pit iron ore mine (Mount Gibson Iron Ltd., 100%)	85 km of Perenjori, WA	3,000
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	35,000
Do.		Koolan Island open pit iron ore mine (Mount Gibson Iron Ltd., 100%)	140 north of Derby, WA	4,000
Do.		Koolyanobbing Central open pit iron ore mine (Portman Ltd., 100%)	50 km north-northeast of Southern Cross, WA	6,000

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(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	Mount Goldsworthy mining associates joint venture (includes Area C, Goldsworthy, and Nimingarra) (BHP Billiton Minerals Pty Ltd. (manager), 85%; 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 open pit iron ore mine (includes Mount Whaleback, Orebody 23–25, Orebody 29, and Orebody 30–35) [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 A and 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.	Cloudbreak iron ore mine (includes Chicester Range, Christmas Creek, WhiteKnight, Mount Lewin, Mount Nicholas, and Flinders) (Fortescue Metals Group Ltd., 100%)	Chichester Ranges, East Pilbara, WA	55,000
Do.	Savage River open pit iron ore mine (Stemcor Holdings Ltd., 100%)	100 km southwest of Burnie, TAS	2,400
Do.	Tallering Peak open pit iron ore mine (Mount Gibson Iron Ltd., 100%)	120 northeast of Geraldton, WA	3,000
Do.	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	2,500
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	Anges zinc mine (Terramin Australia Ltd., 100%)	2 km from Strathalbyn, SA	10
Do.	Broken Hill underground silver-zinc-lead mine (Shenzhen Zhongjin Lingnan Nonfemet Co. Ltd., 50.1%, and Perilya Ltd., 49.9%)	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 (Baee Metals Ltd., 100%)	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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. 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) [Queensland Magnesia Pty Ltd. (operator), Sibelco Group, 100%]	70 km northwest of Rockhampton, QLD	3,000
Do.	Thuddungra Mine (Orind Australia Pty Ltd., 100%)	38 km northwest of Young, NSW	80

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
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 Cairns, QLD	120
Nickel:			
Mine, Ni content	Avebury nickel mine (includes Bison, North Avebury, Saxon, and West Viking) [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. Ltd., 100%)]	Near Zeehan, TAS	7
Do.	Black Swan underground nickel mine (includes Silver Swan) (OJSC MMC Norilsk Nickel, 100%)	53 km northeast of Kalgoorlie, WA	10
Do.	Carnilya Hill open pit mine (Mincor Resources NL, 70%, and View Resources Ltd., 30%)	25 km northeast of Kambalda, WA	5
Do.	Cawse open pit nickel-cobalt mine (OJSC MMC Norilsk Nickel, 100%)	50 km northeast of Kalgoorlie, WA	9
Do.	Cosmos open pit nickel mine (Xstrata plc, 100%)	50 km north of Leinster, WA	13
Do.	Flying Fox underground mine (Western Areas NL, 100%)	108 km south of Marvel Loch, WA	15
Do.	Kambalda underground nickel mines (Palmary Enterprises Ltd., 100%)	5 km south of Kambalda, WA	35
Do.	Lake Johnson underground nickel mine (includes Maggie Hays, Maggie Hays Lake, and Emily Ann) (OJSC MMC Norilsk Nickel, 100%)	130 km west of Norseman, WA	12
Do.	Lanfranchi underground mine (includes Deacon, Schmitz, Tramway, and Winner) (Panoramic Resources Ltd., 100%)	42 km south of Kambalda, WA	10
Do.	Leinster open pit/underground nickel mines (BHP Billiton Ltd., 100%)	10 km north of Leinster, WA	44
Do.	Long underground mine (Independence Group NL, 100%)	Near Kambalda East, WA	10
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	34
Do.	Radio Hill underground nickel-cobalt mine (Fox Resources Ltd., 100%)	35 km south of Karratha, WA	4
Do.	Ravensthorpe open pit mine (First Quantum Minerals Ltd., 100%)	155 km west of Esperance, WA[3]	39
Do.	Savannah underground mine (Panoramic Resources Ltd., 100%)	120 km north of Halls Creek, WA	8
Do.	Spotted Quoll nickel mine (includes Tim King and Willy Willy) (Western Areas NL, 100%)	114 km south of Marvel Loch, WA	10
Do.	Waterloo underground nickel mine (includes Amorac) (OJSC MMC Norilsk Nickel, 100%)	90 km north of Leonora, WA	5

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(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—Continued:				
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 (Nickel Consolidated Pty Ltd., Nickel House Pty Ltd., and Nickel Process Pty Ltd.)	Townsville, QLD	40
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., 100%)	Kurnell, NSW	114
Do.	do.	Kwinana Refinery [BP Amoco Refinery (Kwinana) Pty. Ltd., 100%]	Kwinana, WA	138
Do.	do.	Lytton Refinery (Caltex Australia Ltd., 100%)	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
Rare earth, rare-earth oxide		Mount Weld Mine (Lynas Corp. Ltd.)	Mount Weld, WA	1,100
Salt		Dampier solar evaporation salt pans (Dampier Salt Ltd., 100%)	Near Dampier, WA	4,000
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,	kilograms Ag content	Broken Hill underground silver-zinc-lead mine (Shenzhen Zhongjin Lingnan Nonfemet Co. Ltd., 50.1%, and Perilya Ltd., 49.9%)	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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. 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
Do.	do.	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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. Ltd., 100%)]	5 km north of Queenstown, TAS	35,000
Smelter	do.	Port Pirie smelter (Nyrstar Corp., 100%)	do.	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

See footnotes at end of table.

TABLE 2—Continued
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2011

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities[1, 2]	Annual capacity[e]
Spodumene		Greenbushes open pit/underground tantalite-spodumene mine (Talison Lithium Ltd., 100%)	70 km southeast of Bunbury, WA	260
Do.		Mount Cattlin spodumene mine (Galaxy Resources Ltd., 100%)	2 km north of Ravensthorpe, WA	140
Talc		Three Springs open pit talc mine (Imerys SA, 100%)	330 km north of Perth, WA	150
Tantalum, tantalite, Ta_2O_5 content	metric tons	Greenbushes open pit/underground tantalite-spodumene mine (Global Advanced Metals Ltd., 100%)	70 km southeast of Bunbury, WA	550
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 (Global Advanced Metals Ltd., 100%)	70 km southeast of Bunbury, WA[3]	250
Tin:				
Mine, Sn content	metric tons	Collingwood underground tin mine (Metals X Ltd., 100%)	35 km south of Cooktown, QLD[3]	3,000
Do.	do.	Greenbushes open pit/underground tantalite-spodumene mine (Global Advanced Metals Ltd., 100%)	70 km southeast of Bunbury, WA[3]	1,000
Do.	do.	Mount Bischoff open pit mine (Metals X Ltd., 50% and Yunnan Tin Group of China, 50%)	55 km southwest of Burnie, TSA[3]	6,000
Do.	do.	Renison Bell underground tin mine (Metals X Ltd., 50% and Yunnan Tin Group of China, 50%)	136 km south of Burnie, TAS	4,000
Smelter	do.	Greenbushes smelter (Global Advanced Metals Ltd., 100%)	70 km southeast of Bunbury, WA[3]	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 Cairns, 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 content	do.	Windimurra open pit mine vanadium (Precious Metals Australia Ltd., 90%, and Noble Group Ltd., 10%)	100 km east-southeast of Mount Magnet, WA[3]	8
Zinc:				
Mine, Zn content		Anges zinc mine (Terramin Australia Ltd., 100%)	2 km from Strathalbyn, SA	24
Do.		Broken Hill underground silver-zinc-lead mine (Shenzhen Zhongjin Lingnan Nonfemet Co. Ltd., 50.1%, and Perilya Ltd., 49.9%)	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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. Ltd., 100%)]	250 km north of Mount Isa, QLD	500
Do.		Endeavor underground zinc-silver-lead mine (CBH Resources Ltd., a subsidiary of Toho Zinc Co. Ltd. of Japan, 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[3]	130
Do.		Jaguar underground mine (Jabiru Metals Ltd., 100%)	250 km north of Kalgoorlie, WA	420
Do.		McArthur River open pit mine [McArthur River Mining Pty Ltd., operator (Xstrata plc, 100%)]	60 km southwest of Borroloola, NT	143
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 [Minerals and Metals Group Australia Ltd., operator (China Minmetals Nonferrous Metals Co. 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 2011

(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:			
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]Abbreviations for States and Territories in this table include the following: 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]On care-and-maintenance status; expansion project development decision pending.

TABLE 3
AUSTRALIA: RESERVES OF MAJOR MINERAL COMMODITIES IN 2011

Commodity		Reserves[1]
Antinomy, Sb content	thousand metric tons	95
Bauxite	million metric tons	6,000
Coal:		
Black:		
In situ	billion metric tons	56
Recoverable	do.	41
Brown:		
In situ	do.	44
Recoverable	do.	39
Cobalt, Co content	thousand metric tons	1,200
Copper, Cu content	million metric tons	86
Diamond:		
Gem and near gem	million carats	143
Industrial	do.	149
Gold, Au content	metric tons	8,400
Iron ore	billion metric tons	35
Lead, Pb content	million metric tons	35
Lithium, Li content	thousand metric tons	483
Magnesite ($MgCO_3$ content)	million metric tons	330
Manganese ore	do.	178
Mineral sands:		
Ilmenite	do.	200
Rutile	do.	23
Zircon	do.	39
Molybdenum, Mo content	thousand metric tons	324
Nickel, Ni content	million metric tons	21
Niobium (columbium) and tantalum:		
Niobium (columbium), Nb content	thousand metric tons	134
Tantalum, Ta content	do.	53
Platinum-group metals (Pd, Pt)	metric tons	4
Rare earths (REO plus Y_2O_3)	thousand metric tons	1,830
Silver, Ag content	do.	77
Tin, Sn content	do.	358
Tungsten, W content	do.	403
Uranium, U content	do.	1,160
Vanadium, V content	do.	1,760
Zinc, Zn content	million metric tons	65

do. Ditto.
[1]Economic demonstrated resources. Data have been rounded to no more than three significant digits.

Source: Geoscience Australia, 2010, Australia's identified mineral resources 2011: Canberra, Australian Capital Territory, Australia, Geoscience Australia, p. 5.