



# 2009 Minerals Yearbook

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## AUSTRALIA

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# THE MINERAL INDUSTRY OF AUSTRALIA

By Pui-Kwan Tse

The structure of the Australian economy has gradually shifted away from agriculture and manufacturing towards services, and the mining sector has grown to become an important factor in the country's economic development. Mineral export revenue accounted for about one-half of the country's export income. The mining sector employed a relatively small proportion of the workforce directly; however, the demand for services to support the development of the mining sector increased rapidly during the past decade.

In 2009, Australia's economy continued to recover after a mild slowdown in late 2008. The gross domestic product (GDP) increased by 0.2% and 1.1% in the third and fourth quarters of the year, respectively. Overall, Australia's economy grew at a rate of 2.7% during 2009. 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. After falling considerably in late 2008 and in early 2009, commodity prices for many energy and mineral products recovered slowly in late 2009. Owing to the strength of economic growth in China and other emerging countries, the demand for energy and mineral commodities was expected to grow in the next several years. Australia's energy and mineral export earnings were expected to recover, and the production of these commodities was expected to increase (Reserve Bank of Australia, 2010, p. 30).

Australia's total mineral exploration spending was estimated to be US\$4.4 billion (A\$5.5 billion) in fiscal year 2009-10, which was a decline of 11% from that of fiscal year 2008-09 (the Australian fiscal year runs from July 1 to June 30). The decline in exploration spending was the result of decreases in spending for base metals, iron ore, and petroleum. Exploration spending for coal, uranium, and other commodities increased. About 60% of the country's total exploration expenditure was spent on known deposits, and the remaining 40% was spent on new exploration. Low exploration spending reflected low commodity prices during the past 2 years and companies delayed some exploration activities until the global economy recovered completely. The increase in exploration spending on coal was in response to higher expectations of coal demand in the world for the medium to longer term. The increase in uranium exploration spending reflected the Government of Western Australia's removal of a ban on uranium mining in the State. According to the Australian Bureau of Statistics (ABS), new capital spending in the mining sector was expected to be US\$33.0 billion (A\$41.3 billion) in fiscal year 2009-10, which was about 6% higher than in fiscal year 2008-09. The ABS projected that capital spending in the mining sector would increase to about US\$39 billion (A\$49 billion) in the next fiscal year (Australian Bureau of Agricultural and Resource Economics, 2010c, p. 2-5; Geoscience Australia, 2010; Industrial Minerals, 2010).

As a result of the spending on exploration, significant mineral resources were discovered. These included the Brockman iron

project in the Pilbara region of Western Australia, the Copper Hill copper deposit at Molong in New South Wales, the Firetail iron ore deposit in the Solomon area in Western Australia, the Merlin molybdenum and rhenium deposit in northwest Queensland, the Nolans rare-earth deposit near Alice Springs in Northern Territory, and the Wingelina nickel and cobalt deposit in Western Australia (Australian Bureau of Agricultural and Resource Economics, 2010c; Geoscience Australia, 2010).

## Minerals in the National Economy

Australia's mining sector contributed more than \$117 billion, or 8%, to the country's GDP during fiscal year 2008-09. In that fiscal year, the mining sector employed 135,000 people, of which Western Australia employed 56,000 followed by Queensland, 37,000; and New South Wales, 24,000. 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 Statistics, 2010b).

## 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 Territory 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 (Australian Government Publishing Services, 1991, p. 7-22; Kay, 1993).

In 2009, the Government amended the Foreign Acquisitions and Takeovers Act 1975 and the foreign acquisitions and

takeovers regulations 1989. The new regulations allow private foreign (excluding the United States) investment of less than A\$219 million in nonsensitive sectors to proceed without review (for U.S. investors, the limit is A\$953 million). A new unified adjustment will be reviewed on January 1 every year to keep pace with inflation. This is also intended to prevent foreign investment screening from becoming a more restrictive requirement over time as inflation increases. The new regulations abolish the requirement that private investors must notify the Government when the companies establish a new business in Australia valued above A\$10 million. Foreign investors must notify the Government before acquiring an interest of 15% or more in an Australian business or corporation that is valued at more than A\$231 million. The Australian Government prefers diversity of ownership within Australian industries and sectors to promote healthy competition (Ministry of Treasury, 2009e, f; Parliament of the Commonwealth of Australia, 2009).

The Federal Government drafted a tax proposal to scrap State royalty taxes on mining projects and to replace them with a uniform national resource rent tax or a resource super profits tax (RSPT) beginning on July 1, 2012. The RSPT would be up to 40% on coal, copper, iron ore, zinc, and other minerals mined in all existing and future mining projects. The intention of the proposed tax was to target project profits rather than project production and to shift the tax burden from low profitability projects to more profitable projects. The RSPT was calculated as assessable revenue less deductible expenses, including an allowance for capital expenditure. All existing projects, which were subject to State-based royalties, would be taxed under the RSPT. State royalties would be continued but would be creditable under the RSPT. Existing projects that were subject to the petroleum resource rent tax would not automatically be subject to the RSPT; rather, a company would instead be able to elect to have the RSPT apply. The intention of the Federal Government was to reform the tax system to deal with the demographic, economic, environmental, and social challenges of the 21st century and not to discourage investment. The RSPT would encourage greater investment and employment in the mineral resource sector. Some projects that were not viable under the existing royalty arrangement would be viable under the RSPT, as costs would be recognized. The RSPT liability would not arise until profits were generated. The Government planned to publish a final detail of the RSPT regime in late 2010. Draft legislation was targeted to be introduced into the Parliament in 2011. The mining sector, however, was concerned that the RSPT could erode Australia's competitiveness, severely curtail investment, and limit job growth (Ministry of Treasury, 2009a, p. 47-50; b; f, p. 217-246).

## Production

Australia continued to be one of the world's leading producers of such commodities as bauxite, coal, cobalt, copper, gem and near-gem diamond, gold, iron ore, lithium, manganese ore, tantalum, and uranium. The country's refined metal production capacity was moderate 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, met only about 70% of the country's consumption. Australia was one of the leading exporting countries for alumina, coal, iron ore, and uranium in the world. In general, mineral and metal production was lower in 2009 than in 2008 because of lower prices for many commodities and mine closures. Commodities that recorded a significant decline in 2009 were refined copper, diamond, iron and steel, mined nickel, mined silver, spodumene, titanium concentrates, uranium, mined zinc, and zirconium. Commodities for which reported production increased included coal, iron ore, natural gas, refined nickel, and mined and refined tin. An increase of refined tin output was a result of increased production at the Renison tin mine in Tasmania. Increased coal and iron ore outputs reflected the strong demand for these commodities from China. The commissioning of the iron ore operations of BHP Billiton Ltd., Fortescue Metals Group Ltd., and Rio Tinto Ltd. contributed to an increase in iron ore production (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 Territory government administers the mineral industries within its own borders, which includes registering land titles; issuing exploration and development permits; conducting inspections and assuring compliance with health, safety, and environmental regulations; and levying royalties and taxes. Because the Commonwealth 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 2009, the value of Australia's total foreign trade was \$317.8 billion (A\$397.2 billion), of which the value of exports was \$160.5 billion (A\$200.6 billion) and the value of imports was \$157.3 billion (A\$196.6 billion). Mineral and metal exports accounted for about 50% of the total value of exports. Export volumes that were higher than in 2008 included bauxite, coking coal, ilmenite, iron ore, manganese ore, and zinc. The value of coal exports accounted for 31% of the total value of mineral and metal exports followed by iron ore, 20%; gold, 10%; oil, 7%; 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 its refined products remained Australia's leading

imported fuel and mineral commodity, followed by gold, iron and steel, potassium fertilizer, and silver (Australian Bureau of Statistics, 2010a).

## Commodity Review

### Metals

**Aluminum.**—Australia was the leading bauxite producing country in the world. Bauxite came from the Gove Mine in the Northern Territory; the Weipa Mine in the northern part of 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. In 2009, Western Australia was the leading bauxite producing State and accounted for 64.1% of the country's total output of bauxite followed by Queensland, 25.6%, and the Northern Territory, 13.3%. Australia exported 6.4 million metric tons (Mt) of bauxite. Western Australia accounted for 62% of the country's alumina output. The country exported 16.6 Mt of alumina. China, which accounted for about 27% of the total exported volume, was the leading destination for exported Australian alumina followed by South Africa, 14%; the United Arab Emirates, 13%; Bahrain, 12%; and other countries, less than 10% each. Aluminum refineries in Western Australia produced about two-thirds of the country's total output. The consumption of domestic aluminum smelters was less than 20% of the country's total alumina output, and the remainder was exported. In 2009, Australia exported 1.67 Mt of aluminum. The Republic of Korea replaced Japan as the leading destination of Australian aluminum exports and accounted for 25% of the total, followed by Japan, 22%; Taiwan, 11%; Thailand, 10%; and Malaysia, 8%; the remainder went to other countries in the world (Australian Bureau of Agricultural and Resource Economics, 2010a, p. 16; Department of Mines and Petroleum, 2010, p. 9).

Owing to increasing demand for alumina in recent years, Australian producers planned to expand their bauxite mines' and refineries' output capacity. Bauxite Resources Ltd. continued to explore in the North Darling Range area, including at Bindoon, New Norcia, and Toodyay and in the South Darling Range area around Brunswick Junction in Western Australia. To facilitate exploration and development work, Bauxite Resources discussed access rights with tenement owners. The company received approval from the local council to mine 2 million metric tons per year (Mt/yr) of bauxite from 10 properties located north of Bindoon in the Darling Range that would be accessed through private landowner agreements. Bauxite Resources planned to ship a total of about 130,000 metric tons (t) of run-of-mine bauxite, which contained an average of 49% alumina and 2.3% silica, from North Bindoon to China's refineries for test purposes in 2009 and 2010. Initial testing indicated that it took about 2.6 t of bauxite to produce 1 t of alumina (Bauxite Resources Ltd., 2010a, p. 10).

The Australian Government approved China's Shandong Provincial Bureau of Geology and Resources' acquisition of a 15% share of Bauxite Resources. Additionally, Shandong

agreed to pay all tenement and exploration costs for 1,000 square kilometers (km<sup>2</sup>) of Bauxite Resources' tenements and Bauxite Resources would purchase the exploration equipment. If the exploration program resulted in a mining operation, Bauxite Resources and Shandong agreed to allocate the costs and benefits at a ratio of 40:60, respectively. The Australian Government also approved Bauxite Resources to sign a Heads of Agreement with China's Yankuang Group Corp. to jointly build an alumina refinery in Western Australia. The partners would undertake studies to obtain a bankable feasibility study for the development of a 1.1-Mt/yr alumina refinery. The construction of the refinery would commence within 5 years subject to a bankable feasibility study, site selection, and environmental and regulatory approvals. Yankuang would pay 91% of the refinery construction cost and would receive 70% of the alumina output. Yankuang agreed to offtake 50% of Bauxite Resources' 30% share of the alumina output for the first 10 years. Yankuang would pay 70% of the past and future bauxite exploration costs on the Darling Range tenements. Any direct shipping of bauxite or calcined bauxite that commenced within the next 3 years would be shared between Bauxite Resources, 51%, and Yankuang, 49%. Most of the company's bauxite output would be destined for China, mainly Shandong Province. During the past several years, China had expanded its alumina refinery output capacity. Owing to a shortage of bauxite resources within China, the country's demand for bauxite imports increased. Chinese refineries were seeking reliable long-term bauxite suppliers in politically secure countries. Australia is geographically close to China and is the leading destination for China's mineral investment (Bauxite Resources Ltd., 2010b, c).

In 2004, the State Government of Queensland invalidated the permit for the bauxite deposit near Aurukun that had been awarded to Pechiney S.A., and Aluminum Corp. of China Ltd. (CHALCO) was awarded a permit to mine the bauxite deposit at Aurukun on the condition that the company would also build a refinery in the area. In 2007, CHALCO, through its subsidiary CHALCO Australia, planned to invest US\$2.2 billion to develop the Aurukun bauxite resource project, which is located 10 kilometers (km) northeast of Aurukun and 50 km south of Weipa in the Western Cape region of Queensland. The project would mine 10 Mt/yr of bauxite ore and produce 6.5 Mt/yr of beneficiated ore with an average aluminum oxide content of 65%. The project also included a plan to build a 2.1-Mt/yr-capacity alumina refinery and associated facilities at Abbot Point, which is located northwest of Bowen, Queensland. CHALCO concluded that under economic conditions, the company would have difficulty implementing the project in accordance with the development agreement between the company and the State government of Queensland (Aluminum Corporation of China Ltd., 2010).

In 2008, Rio Tinto Alcan approved a \$30 million expenditure for a feasibility study to develop a new bauxite operation to the south of the existing Weipa Mine and port. The expansion of the Weipa operation would include two new bauxite processing plants, roads, barges, ferry facilities, and a new port to be built south of Boyd Point. The new development would eventually replace the existing east Weipa Mine and its capacity would be increased to 50 Mt/yr from the current capacity of 21 Mt/yr in

the region south of the Weipa Peninsula. The Weipa expansion could be completed within 3 years of environmental approval. First shipments were expected to be in 2016. In 2009, because of the weak demand for alumina in the world market, Rio Tinto Alcan decided to slow the construction of the Yarwun alumina refinery expansion in Gladstone and to reduce the output of bauxite at the Weipa Mine. The completion of the expansion of the Yarwun refinery was rescheduled until the second half of 2012. Aluminum Corp. of China (Chinalco) had previously agreed to buy a 30% share of Rio Tinto's Weipa project but the deal did not go through in 2009. Because Chinalco's subsidiary, CHALCO, pulled out of the development of the Aurukun project, many analysts predicted that Chinalco might discuss with Rio Tinto a plan to develop the Aurukun and the Weipa bauxite projects jointly (Rio Tinto Ltd., 2009; Murphy, 2010).

Cape Alumina Ltd. held 100% interest in 2,400 km<sup>2</sup> of leased land outside of Rio Tinto Alcan's Weipa deposit. The company had invested more than \$8 million to explore the leased area and discovered 130 Mt of bauxite resources at an average washed grade of 53.1% Al<sub>2</sub>O<sub>3</sub> and 12.4% SiO<sub>2</sub> at Pisolite Hills, which is located 50 km northeast of Weipa on the western part of Cape York Peninsula. The company completed a feasibility study and prepared a bankable feasibility study and an environmental impact statement for the Pisolite Hills project. The project would involve the development of a greenfield bauxite mine that would produce between 8 and 12 Mt/yr of run-of-mine bauxite ore. The mined ore would be crushed and washed. As a result of beneficiation, about 7 Mt/yr of washed bauxite would be exported. The bankable feasibility study was planned to be completed in 2010, and production was expected to begin in 2013. The State Government of Queensland declared the Wenlock River Basin as a wild river area and environmental buffer zone under the State's wild river legislation. The decision has had a significant effect on the development of the Pisolite Hills bauxite deposit. The 500-meter (m)-wide buffer zone would represent about a 38% reduction in the total available ore resources of the deposit. The company considered that the 500-m-wide buffer zone would make bauxite mining unviable. The State Government of Queensland allowed Cape Alumina to extend the submission of the environmental impact statement until 2011 (Cape Alumina Ltd., 2010).

**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. In 2007, Straits Resources decided to redevelop the historic Hillgrove Mine, and the construction of a demonstration processing plant was completed in the first half of 2008. The designed output capacity was for 10,000 metric tons per year (t/yr) of antimony, 30 t of tungsten, and 622 kilograms (20,000 troy ounces) of gold. The mine contained recoverable resources of 40,000 t of antimony, 100 t of tungsten, and 6.9 t (222,000 troy ounces) of gold. In 2008, the company produced 222 t of antimony. Production, however, was hampered by a number of technical problems, including process water treatment management and the interface between the leaching and electrowinning sections of the plant. As a result, the operation was unable to meet its production

target. The company suspended plant operations in August 2009 to resolve technical issues at the plant. In 2009, the company produced 752 t of antimony before suspension and planned to restart the production of antimony and gold concentrates to offtake partners in 2010. The development of an underground mine and exploration at the mine site area continued during the suspension period (Straits Resources Ltd., 2010a, p. 19).

Mandalay Resources Corp. of Canada purchased the Costerfield antimony and gold deposit from AGD Mining Pty Ltd. in 2009. The Costerfield deposit, which is located 50 km east of the city of Bendigo in the State of Victoria, had been mined extensively during the late 18th and early 19th centuries. Extensive exploration was conducted in the late 1990s; as a result, the development of the Augusta underground mine was put into operation in 2006. The company reported that the Costerfield deposit had proven reserves of 20,100 t of ore at an average grade of 9.7% antimony and 16.9 grams per metric ton (g/t) gold and probable resources of 45,400 t of ore at average grade 5.8% antimony and 11.4 g/t gold. The company's Brunswick concentrator produced at a rate of 500 to 600 metric tons per month (t/mo) of antimony-gold concentrate that contained about 52% antimony and 60 g/t gold. The company signed a concentrate offtake agreement with Zhongnan Antimony and Tungsten Trading Co. of China for all antimony-gold concentrate produced at Costerfield. The company also recovered gold from the historic tailings through cyanide leaching and carbon recovery (Mandalay Resources Corp., 2010a, b).

In 2009, Anchor Resources Ltd. continued to explore for antimony resources at the old Wild Cattle Creek antimony mine site, which is located in the northeastern part of New South Wales. Drillings at the mine site area confirmed a significant amount of antimony and associated gold and tungsten at 35 m to the north of the Wild Cattle Creek main breccia zone. Initial data indicated that the area contained 880,000 t of ore grading 2% antimony. The company planned to continue exploring in the area in 2010 (Anchor Resources Ltd., 2010, p. 4).

**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's mined nickel output 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). As a result of a rapid decline in world nickel prices in 2008 and 2009, a number of Australian nickel producers reduced their output or placed their mines on care-and-maintenance status. Most cuts in production took place at smaller operations that produced less than 6,000 t/yr of nickel in ore and concentrates. A total of about 100,000 t of Australia's mine capacity was shut down in late 2008 and early 2009. These mines included China Minmetals Corp.'s Avebury Mine; Fox Resources Ltd.'s Radio Hill Mine; OJSC MMC Norilsk Nickel's Cawse, Silver Swan, and Waterloo Mines; and Palmary Enterprises Ltd.'s Kambalda

Mine. The majority of these mines had not resumed production in 2009. The production decrease from these mines had been partially offset by increased production from mines owned by BHP Billiton and Xstrata. Australia's mined nickel output was expected to recover slowly in 2011. In 2009, Australia's mined nickel was mainly from Western Australia; Australia exported a combined 215,000 t of nickel in concentrates, intermediate products, and metal (Australian Bureau of Agricultural and Resource Economics, 2010a, p. 26).

BHP Billiton was an integrated Australian nickel company that operated mines, concentrators, a smelter, and a refinery. The company mined nickel-bearing sulfide ores at its Cliffs, Mount Keith, and Leinster Mines at the Nickel West nickel operation. The company's Kambalda nickel concentrator was located 60 km south of Kalgoorlie and produced between 35,000 and 40,000 t of nickel in concentrates from raw materials supplied by third parties in the Kambalda region. Concentrates from the Kambalda concentrator contained about 13% nickel. Concentrates from BHP Billiton's Mount Keith and Leinster operations and the Kambalda operation were shipped to the Kalgoorlie smelter to produce nickel matte, which contained about 68% nickel, 2% to 3% copper, and 1% cobalt; the smelter had an output capacity of 110,000 t/yr of nickel matte, which contained 66% nickel. Nickel matte was shipped to the Kwinana nickel refinery, which is located 30 km south of Perth. The refinery used the Sherritt-Gordon ammonia leaching process to convert nickel matte into London Metal Exchange-grade nickel products. The refinery also produced intermediate products, such as ammonium sulfate, cobalt-nickel sulfide, and copper sulfide. In 2009, BHP Billiton exported about 43% of its nickel matte output. Owing to the decrease in nickel demand on the world market, BHP Billiton decided to shut down its newly commenced Ravensthorpe nickel operation in January 2009. The Yabulu refinery produced a mixed nickel-cobalt hydroxide product from the Ravensthorpe operation and processed laterite ore purchased from third-party mines in Indonesia, New Caledonia, and the Philippines. In 2009, BHP Billiton decided to sell its Ravensthorpe nickel operation to First Quantum Minerals Australia Pty Ltd., which was a wholly owned subsidiary of First Quantum Minerals Ltd., for \$340 million and the Yabulu refinery to a local investor in Queensland for an undisclosed amount (BHP Billiton Ltd., 2009b, c).

Western Areas NL's Forresteria nickel project is located 400 km east of Perth, Western Australia. More than 25 nickel occurrences had been identified. The first developed mine of the project was the Flying Fox underground nickel mine, which is located about 108 km south of Marvel Loch. The total mineral resource at Flying Fox was about 2 Mt at an average grade of 4.6% nickel. The Flying Fox's main decline was to a depth of 1,000 m below surface and consisted of a number of zones of mineralization that were labeled from T zero and extended vertically to a depth of 820 m below the surface at the T7 zone. The operation activity was concentrated at the T1 and T2 ore bodies during the first year of operation. In 2009, Kagara Ltd. and Western Areas signed a heads of agreement to allow Western Areas to mine Kagara's Lounge Lizard nickel deposit using access from Western Areas' Flying Fox decline. The

combined nickel resource was more than 2.5 Mt at an average grade of 5.5% nickel. Western Areas would receive a staged refund of its capital costs for developing the Flying Fox decline, including an initial nonrefundable \$20 million payment from Kagara. Western Areas would mine a minimum of 50,000 t/yr of ore from the Lounge Lizard deposit. If Kagara wanted to sell its nickel interest at Lounge Lizard, Western Areas would have the right of first refusal to match any offers from third parties. The Spotted Quoll deposit is located 114 km south of Marvel Loch and is part of the Forresteria nickel project. Western Areas commenced mining at the Spotted Quoll's Tim King open pit in October 2009. The probable ore resource at Spotted Quoll, including the Tim King pit, was 2.1 Mt at an average grade of 4.3% nickel. The company planned to produce 10,000 t of nickel in 2011. Western Areas' Cosmic Boy concentrator began operating in 2009, and ores from the Flying Fox and the Spotted Quoll were carted to the Cosmic Boy mill. Western Areas planned to upgrade the Cosmic Boy concentrator to 550,000 t in 2010 from 300,000 t (Western Areas NL, 2009b, 2010, p. 8-10).

Western Areas signed a new nickel offtake contract with BHP Billiton to increase the sales to 12,000 t/yr from 10,000 t/yr of nickel in concentrates up to a total of 75,000 t of nickel from the Forresteria nickel project. Under the new contract, Western Areas would supply a maximum of 15,000 t/yr of nickel to BHP Billiton. Western Areas also signed an offtake contract with China's Jinchuan Group Ltd. to supply up to 25,000 t of nickel in concentrates in 2010 and 2011. The balance of the company's nickel output that was not sold to BHP Billiton during 2010 and 2011 would be sold to Jinchuan. Western Areas exercised its option to acquire 100% of the BioHeap bacterial leaching technology from Pacific Ore Ltd. of Australia. The BioHeap bacterial heap-leaching technology could leach low-grade sulfide ores to produce intermediate products that could be sold directly to nickel refineries. Initial test results indicated that the application of BioHeap technology to low-grade ore from Forresteria produced commercial-grade nickel intermediate products (Western Areas NL, 2009a).

Panoramic Resources Ltd. operated two nickel projects—the Lanfranchi and the Savannah—in Western Australia. Ore from the Lanfranchi mining operation was shipped to BHP Billiton's Kambalda nickel concentrator for processing. Panoramic and BHP Billiton agreed to extend the ore tolling concentrate purchase agreement until February 2019. Under the agreement, the volume of ore that BHP Billiton could purchase from the Lanfranchi operation was increased to 435,000 t/yr from 350,000 t/yr. Panoramic planned to maintain mine production from Lanfranchi at about 400,000 t/yr in 2010. The majority of output would be from the Deacon ore body. Ore reserves at Lanfranchi operation were about 2.8 Mt at an average grade of 2.53% nickel. Ore from the Savannah operation was processed at the mining area. The processing plant was designed to have a throughput of 750,000 t/yr but it could increase up to 950,000 t/yr. The Savannah concentrates had an average 7% to 8% nickel, 3% to 4% copper, and 0.4% to 0.8% cobalt. Panoramic signed a concentrate offtake contract with Jinchuan until March 2010. In 2009, Jinchuan, Panoramic, and Sino Nickel Pty Ltd., which was a joint venture between Jinchuan and Sino Mining International Ltd. (a resource investment and

trading company controlled by China Minmetals Group), signed a 10-year extension agreement for offtake of Savannah concentrate on April 1, 2010. Panoramic would ship about 100,000 t/yr of concentrate to China. The price of the concentrate was based on the agreed-upon percentage of the London Metal Exchange (LME) cash price for nickel and copper and the agreed-upon percentage of the Metal Bulletin cobalt price (Panoramic Resources Ltd., 2009a; b, p. 13-18).

**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 it among the top five producers in the world, which also included China, Chile, Peru, and the United States. In 2009, Australia's copper mine production decreased slightly compared with that of 2008 because of the mechanical failure in the main haulage shift of the Olympic Dam. Owing to an increase in output from the OZ Minerals Ltd.'s Prominent Hill and the return to full production capacity at Olympic Dam, the output of copper concentrates was expected to increase during the next 2 years. Queensland continued to be the leading State for mined copper production, largely from the Mount Isa region, which accounted for 31% of the country's output. South Australia's output increased to 29% of the total and New South Wales's output accounted for 19% (largely from the Cadia-Ridgeway, the Northparkes, and the Tritton Mines). Western Australia's mined copper increased to 17% of the country's total output, mainly from the Golden Grove and the Nifty Mines. Tasmania's mined copper output was mainly from Mount Lyell. In 2009, Australia exported a total of 1.8 Mt of copper concentrates to such countries as China, which accounted for 36% of the total exported; India, 27%; Japan, 22%; and the Republic of Korea, 7%. Australia exported 316,000 t of refined copper to China, which accounted for 43% of the total exported; Malaysia, 16%; Vietnam, 10%; and the Republic of Korea, 9% (Australian Bureau of Agricultural and Resource Economics, 2010a, p. 20).

OZ Minerals completed the construction of its Prominent Hill copper-gold mine in 2008 and put it into operation in February 2009. The open pit mine was designed to produce between 85,000 and 100,000 t/yr of contained copper and between 1.87 t/yr (60,000 troy ounces per year) and 2.18 t/yr (70,000 troy ounces per year) of gold in concentrates. In 2009, the mine produced 96,310 t of copper in concentrates and 2.3 t (75,535 troy ounces) of gold, which was more than the designed capacity. The company continued its drilling program at the Western Copper deposit, which is located 800 m to the west of the Prominent Hill Mine. Owing to lower metal prices in the world and the global financial crisis, OZ Minerals decided to refinance or sell off part of its facilities in mid-2008. OZ Minerals entered an agreement with China Minmetals Nonferrous Metals Co. Ltd. to acquire all outstanding shares in OZ Minerals, including the Prominent Hill Mine. Owing to concerns about Australia's national security interests, the Australia Government did not approve the transaction because Prominent Hill is located in the Woomera prohibited

weapons testing area. OZ Minerals and Minmetals agreed to exclude Prominent Hill Mine in their agreement. The Australia Government approved OZ Minerals' sale of all its assets other than the Prominent Hill Mine and projects in Cambodia, Indonesia, and Thailand to Minmetals, and the \$1.35 billion transaction was completed in June 2009 (OZ Minerals Ltd., 2009; 2010, p. 4).

CopperCo Ltd.'s Lady Annie copper deposit is located 100 km north-northwest of Mount Isa, Queensland. The company completed construction of the mine and started production in 2007. The copper oxide ore was located near the surface and has copper resources of about 11.3 Mt at an average grade of 1.0% copper. The ore was processed through a solvent extraction and electrowinning (SX-EW) process on site. Full copper production of 19,000 t/yr of copper cathode was achieved in early 2008 and the expansion of the output capacity to 30,000 t/yr began in 2008. Owing to lower prices of copper, financial difficulties, and heavy rainfall in December 2008 that had a significant effect on production, the company decided to suspend the mine's operations. After the company was unable to retire its debt, CopperCo was placed in administration in late 2008. CopperCo sold the Lady Annie operation to Cape Lambert Resources Ltd. (formerly Cape Lambert Iron Ore Ltd.) in 2009. The Lady Annie operation was kept on care-and-maintenance status, and about 927 t of copper cathode was recovered from inventory. Cape Lambert decided to sell the operation to CST Mining Group Ltd. (formerly China Sci-Tech Holding Ltd.), which was incorporated in the Cayman Islands [United Kingdom] and listed on the Hong Kong Stock Exchange, for about \$140 million. CST planned to restart the Lady Annie operation in 2010 (Cape Lambert Resources Ltd., 2010, p. 2; CST Mining Group Ltd., 2010, p. 3).

In 2009, Straits Resources operated two copper mines—Tritton in New South Wales and Whim Creek in Western Australia—and a SX-EW plant in Western Australia. The Whim Creek copper mine had been mined for more than 100 years. Owing to depleted resources, Straits Resources decided to shut down the mine at the end of 2009. The company agreed to sell all the Whim Creek assets, excluding the SX-EW plant but including the Balla Balla and the Salt Creek copper-zinc projects and associated tenements, to Venturex Resources for shares of that company in August. In December, Straits Resources sold the Whim Creek SX-EW plant to Finders Resources Ltd. The Whim Creek SX-EW plant was capable of producing 18,000 t/yr of copper cathode and would be used by Finders' Wetar copper project in Indonesia. The shutdown of the Whim Creek SX-EW plant was expected to lower Australia's refined copper production during the next 2 years. The Tritton underground copper mine, which is located near Nyngan, began production in 2005. The Tritton operation had a conventional crushing and flotation plant, which had throughput of 1 Mt/yr. In 2007, the company discovered more copper resources at Larsens/North East and Murrawombie and decided to upgrade the processing plant to 1.4 Mt/yr. Owing to the worldwide financial crisis in 2008, the company suspended the underground mine and processing plant expansions. The company planned to resume the development of the North East Mine and to increase the plant's processing capacity in 2010. The company set a target

to produce 30,000 t of copper in concentrates in 2011. In 2009, the average copper content in concentrates was 24.95%; silver, 53.24 g/t; and gold, 0.89 g/t. The recovery rate was 94.11%. Most of its concentrates were shipped to smelters in the Asia and the Pacific region (Straits Resources Ltd., 2009, 2010b).

The Australian Government approved the bid by Zijin Mining Group (a copper and gold producer in China) for the assets of Indophil Resources NL. At a price of A\$1.28 per share, the value of the sale was about A\$545 million. Indophil had a 37.5% share in the A\$5.2 billion Tampakan copper and gold project in the Philippines, in which Xstrata was the major shareholder. Xstrata agreed to sell 19.99% of its share in Indophil to Zijin. The acquisition would give the Chinese company a stake in one of Southeast Asia's large untapped copper and gold deposits, which had a copper resource of 2.4 billion metric tons (Gt) at an average grade of 0.6% copper. Xstrata planned to complete the feasibility study of the Tampakan project in 2010. The transaction required the Chinese Government's approval (Indophil Resources NL, 2010).

Australia's mined copper output was expected to increase during the next several years as a result of a number of new projects that were scheduled to start production. Copper Strike Ltd.'s Einasleigh project was scheduled to be completed in 2011. Havilah Resources Ltd.'s Kalkaroo project was targeted to be put into operation in 2010. Exco Resources Ltd.'s Cloncurry project and Universal Resources Ltd.'s Roseby project would begin to be put into operation in 2012. Brownfield projects, such as Rio Tinto's Northparkes project (E48 development) and Xstrata's Ernest Henry project were projected to complete their expansions between 2010 and 2013 (Australian Bureau of Agricultural and Resource Economics, 2010c).

**Gold.**—Australia's gold mine output ranked in the world's top four together with China, South Africa, and the United States. In 2009, Australia's mined gold output increased slightly from that of 2008; however, it remained about 15% less than that of 2005. Western Australia remained the leading gold-producing State with a 68.4% share, followed by New South Wales, 11.2%; Queensland, 7.1%; Northern Territory, 4.4%; South Australia and Victoria, 3.6% each; and Tasmania, 1.7%. 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 the mine life. Australia's gold production was expected to be higher during the next several years because a number of new projects—Navigator Resources Ltd.'s Leonora project, Crocodile Gold Corp.'s Northern Territory project, and YTC Resources Ltd.'s Hera project—were expected to increase production as they approached their full production potential, which was expected to offset the projected production declines at numerous mines that were nearing the end of their estimated mine life. In 2009, Australia exported 362 t (compared with 415 t in 2008) of refined gold produced from imports of gold doré 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 and the United Kingdom accounted

for 86% of Australia's total gold exports. India was the leading gold consuming country in the world. Because London was a gold market trading center, many of Australia's gold transactions were being conducted in London (Australian Bureau of Agricultural and Resource Economics, 2010b, p. 22).

Newmont Mining Corp. of the United States had three gold mines—Boddington, Jundee, and Kalgoorlie—in Western Australia. The Boddington open-cut mining operation was started up in 1987 by Normandy Mining Ltd., Acacia Resources Ltd., and Newcrest Mining Ltd. After the oxide resource at the Hovea ore body was depleted and an expansion project was delayed when ownership changed hands, the mine was placed in care-and-maintenance status in 2001. Construction on the expansion project began in 2006. After spending more than 7 years incrementally acquiring the shares of the mine, Newmont became the sole owner of the Boddington operation in 2009. The expansion project was completed in late 2009. The Boddington operation was expected to produce an average of 35,000 t of copper and 31 t (1 million troy ounces) of gold for the full 5 years of operation; the projected mine life was 20 years. The Jundee Mine was an open pit and underground operation. Currently, the Jundee operation produced gold from a number of very thin high-grade ore veins below the surface. At yearend 2009, the mine had proven and probable reserves of about 37 t (1.2 million troy ounces) of gold. The Kalgoorlie operation was a joint partnership between Newmont and Barrick Gold Australia Ltd. The Kalgoorlie operation comprised the Fimiston open pit (commonly referred to as the Supper pit) and the Mount Charlotte underground mine. At yearend 2009, the mine had proven and probable reserves of about 130 t (4.2 million troy ounces) of gold (Newmont Mining Corp., 2010, p. 3-25).

Saracen Mineral Holding Ltd. explored for gold at south Laverton in Western Australia. The company started construction of the Carosue Dam gold operation, which was scheduled to be put into operation in mid-2010. The Carosue Dam was initially developed by Pacmin Mining Corp. in 2001. Saracen acquired the Carosue Dam operation in 2005 and consolidated its holdings in the area by purchasing the operation's gold prospects and tenements in 2007. The Carosue Dam operation was located about 120 km northeast of Kalgoorlie and contained a large number of known gold deposits within four separate districts—Carosue Dam, Porphyry, Red October, and Safari Bore. Initial gold output would be from two open pit mines—Porphyry in the Porphyry district and Whirling Dervish in Carosue Dam district. The Carosue Dam processing plant had throughput of 2.4 Mt/yr to produce about 3.7 t (120,000 troy ounces) of gold in 2011. After the completion of the development of two deposits—the Karai in Carosue Dam, the Safari in Safari Bore—and expansions of three deposits—the Porphyry, the Red October, and the Whirling Dervish—in 2011, gold output would be increased to about 5.0 t (160,000 troy ounces) in 2015. The operation area had total (measured, indicated, and inferred) gold resources of 42 Mt at an average grade of 1.7 g/t (Martin Place Securities Pty Ltd., 2009; Saracen Mineral Holding Ltd., 2010, p. 7).

In 2009, Crescent Gold Ltd. commenced its Laverton gold project, which is located 250 km north-northeast of Kalgoorlie, Western Australia. Crescent signed an ore purchase agreement



with Barrick Gold Corp. to process its ore through Barrick Gold's Granny Smith Mill in Laverton, which had a throughput capacity of 3.5 Mt/yr. Crescent planned to produce about 3.7 t/yr (120,000 troy ounces per year) of gold. The majority of Crescent's exploration had been achieved through relatively shallow drilling to develop open pit mining. The company planned to explore mineralization at depth and along the known deposit corridors. The company had discovered 27 gold deposits within the Laverton gold project, which contained total (measured, indicated, and inferred) resources of 30.5 Mt at an average grade of 2.1 g/t gold. The company estimated that the discovered resources would allow the company to continue mining until the end of 2016 (Crescent Gold Ltd., 2010a, p. 16-18; 2010b).

**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 are located in the Pilbara region of Western Australia, which accounts for 96.7% of the country's total iron ore production followed by South Australia, 2.0%; Northern Territory, 0.7%; and, Tasmania, 0.6%. Owing to its limited iron and steel output capacity, Australia exported more than 90% of its iron ore output to such Asian countries as China, Japan, the Republic of Korea, and Taiwan. In 2009, Australia's iron ore and pellet exports increased to 363 Mt from 309 Mt in 2008. The percentage of Australia's iron ore exports to China increased to 73.5% in 2009 from 59.2% in 2008. Japan's iron ore imports from Australia decreased to 13.5% from 24.8%; the Republic of Korea, to 7.7% from 10.8%; and Taiwan, to 2.3% from 3.2%. The decline in iron ore imports from these three nations took place in the first two quarters of 2009 because of weak domestic demand for iron and steel during that period. Increased demand for iron ore in Asian countries, especially China, stimulated substantial investment in new iron ore projects in Australia and other iron-ore-rich countries. Mines operated by BHP Billiton and Rio Tinto dominated the Pilbara area's output. China was the world's leading iron ore importing country and accounted for about 50% of the world iron ore trade. China's iron and steel industry was expected to continue to grow during the next several years. Because China had only a limited domestic supply of high-grade iron ore, China's iron and steel producers increasingly relied on imported iron ore to meet their demand. Australia's iron ore production was expected to increase to more than 550 Mt, and the country was expected to continue exporting more than 90% of its iron ore and pellet output in 2015 (Australian Bureau of Agricultural and Resource Economics, 2010b, p. 23).

China was the leading iron ore consumer in the world. To sustain the development of its iron and steel industry, China's iron and steel producers looked for investment in countries that had rich iron ore resources. In 2009, the Australian Government approved Anshan Iron and Steel Group Corp. to take a 50% share in Gindalbie Metals Ltd.'s Karara project; China Metallurgical Investment Co. to hold a 50% stake in Emergent Resources Ltd.'s Beyondie project; Sichuan Hanlong Group Co. Ltd. to acquire majority control of Moly Mines Ltd.; and China's Wuhan Iron and Steel (Group) Corp. to take a 15% stake in Centrex Metals Ltd. (Ministry of Treasury, 2009c, d).

In 2009, BHP Billiton and Rio Tinto signed a binding agreement to establish an iron ore production joint venture that would combine the operation and management of their respective current and future iron ore production operations in Western Australia, including exploration, infrastructure, leases, mines, ports, and rail lines. The joint venture would not include BHP Billiton's iron plant or Rio Tinto's HISMelt plant. The binding agreement would be subject to the satisfaction of antitrust requirements and obtaining Australian foreign investment clearance from the Government (including the taxation office) and the State revenue authorities. The agreement would also require the approval of both companies' shareholders. The agreement would be terminated if these conditions were not satisfied by December 31, 2010 (Rio Tinto plc, 2010, p. 20).

Rio Tinto's Pannawonica operation was operated by the Robe River Iron Association. Production at the Mesa J iron ore mining operation was expected to begin to decline in 2008 and to be depleted by 2010. The operating company planned to continue to process about 7 Mt/yr of subgrade ore through the existing scrubber plants until 2015. The Mesa A/Warramboe deposit was identified to be a replacement. The Mesa A deposit is located about 38 km northwest of the existing Mesa J Mine site and 245 km by rail from the Cape Lambert Port. The construction of the Mesa A Mine began in 2007 and was expected to cost about \$901 million. The open-cut iron ore mine was designed to produce 25 Mt/yr for 11 years and was scheduled to be put into operation in 2010. In addition to the Mesa A project, Rio Tinto also started the construction of its Brockman 4 Mine in 2007. The Brockman 4 site is located about 60 km northwest of the Tom Price Mine in the Pilbara region in Western Australia. The Brockman 4 ore body had about 600 Mt of ore with an iron content greater than 60% and 450 Mt of lower grade ore that had iron content between 50% and 60%. The Brockman 4 Mine would have an initial output of 22 Mt/yr of high-grade iron ore. The operation's design would allow output to increase to 36 Mt/yr. The company planned to commence the Brockman 4 operation in 2010. The low-grade iron ore would be stockpiled for future processing. The construction cost was about \$1.5 billion. Rio Tinto announced that the company would invest \$1.6 billion to develop the Hope Downs 4 iron ore project. The Hope Downs 4 project is located 30 km north of Newman in the Pilbara region. The construction of the mine would begin in 2010 and was scheduled to be completed in 2013. The designed capacity was 15 Mt/yr. Rio Tinto planned to increase its iron ore production in the Pilbara region to 330 Mt/yr in 2015 from the current level of 220 Mt/yr (Rio Tinto Ltd., 2010a, b).

Australia's second ranked iron ore producer, BHP Billiton, completed the Newman Mining Hub as part of its Rapid Growth Project (RGP) 4 construction in 2009. The Newman hub consisted of primary and secondary plants with a total capacity of 58 Mt/yr, a heavy media beneficiation plant, a stockyard blending facility, and a single-cell rotary car dumper. The completion of the Newman Mining Hub increased BHP Billiton's installed mining capacity to 155 Mt/yr in Western Australia. BHP Billiton and its partners committed an additional \$1.73 billion to the ongoing development of port, rail, and Jimblebar Mine infrastructure. The RGP 5

development in 2011 would be the next step for the company and would increase its mining capacity to 205 Mt/yr (BHP Billiton Ltd., 2009a).

Fortescue, which was the third ranked iron ore producer in Australia, decided to delay its \$9 billion investment at Solomom Hub and \$6 billion development plan for the Western Hub because of the proposed resource super profit tax. The expansion of its existing Chichester Hub project to 55 Mt/yr from 45 Mt/yr remained on track. The expansion of the Chichester Hub operation included the extension of the company's railway line from Cloudbreak to Christmas Creek, the expansion of the mining operation at Christmas Creek, and the construction of an ore processing facility there. Construction of the ore processing facility at Christmas Creek was scheduled to be completed in March 2011, and the ore production capacity would increase to 55 Mt/yr. Mining operations across the Chichester Hub produced about 41 Mt of iron ore during past 2 years. The operation costs were about \$30 per metric ton, and the costs to remove overburden were expected to increase in later years. Fortescue intended to develop the Solomon Hub, which had iron ore resources of 2.7 Gt so that the company could produce a total of 155 Mt/yr from two areas in 2014. The company sold most of its iron ore products to iron and steel producers in China (Fortescue Metals Group Ltd., 2010a, b).

BC Iron Ltd.'s Nullagine iron ore project in the eastern Pilbara region started trial mining a test pit at the Outcamp deposit in 2009. The Nullagine project was located 140 km north of Newman near Fortescue's Chichester operation. The company had entered into a joint-venture agreement with Fortescue, in which BC Iron could earn up to 50% of the project by providing port and rail infrastructure access for the life of the mining operation. The Nullagine iron ore project had direct shipping ore with a probable reserve of 36 Mt at an average grade of 57% iron and a total mineral resource of 89 Mt at an average grade of 54.1% iron. The company planned to construct a mine that would have an output capacity of 3 Mt/yr. The construction cost was estimated to be \$51.5 million. The company signed an offtake agreement for a total of 20 Mt of iron ore for 8.5 years with Hong Kong-based Henghou Industries (Hong Kong) Ltd. The Hong Kong-based company would provide \$50 million in prepayments to be used to finance the project. The company planned to start the construction of the mine in 2010 and to begin production in 2011 (BC Iron Ltd., 2009a, b).

The construction of Moly Mines Ltd.'s Spinifex Ridge iron ore project was underway in 2009. The Spinifex Ridge iron ore project is located 50 km northeast of Marble Bar in Western Australia and is about 500 m to the east of the company's Spinifex Ridge molybdenum-copper resource. Three areas of iron ore mineralization had been identified and were named Auton, Dalek, and Gallifrey. According to diamond drilling results, the areas had iron ore resources of 7.3 Mt at an average grade of 59% iron. The mine was designed to produce 1 Mt/yr for a minimum of 5 years beginning at yearend 2010. Ore would be delivered to a conventional semimobile contract crushing and screening plant that would produce iron ore fine products of less than 10 millimeters (mm) and lump products of 8 to 32 mm; these products would be transported to an export facility at Utah Point in Port Hedland. The pre-royalty operation cost was

estimated to be A\$45 per metric ton. The Foreign Investment Review Board approved Hanlong Mining Investment Pty Ltd.'s (a subsidiary of the Sichuan Hanlong Group of China) proposal to invest \$200 million in Moly Mines. Under the subscription agreement, Hanlong agreed to purchase 207.1 million shares in Moly Mines for \$140 million and to provide Moly Mines with an interest-bearing \$60 million 10-year project loan. Hanlong also agreed to arrange debt financing for up to \$500 million for the Spinifex Ridge molybdenum-copper project (Moly Mines Ltd., 2009a, p. 7; b).

In 2007, IronClad Mining Ltd. entered into a joint-venture agreement with Trafford Resources Ltd. to develop the Wilcherry Hill iron project, which is located about 30 km north of the township of Kimba on the northern Eyre Peninsula of South Australia. Since then, IronClad had earned 80% interest in the iron rights to four tenements—Eurilla Dam, Peterlumbo, Valley Dam, and Wilcherry Hill—from Trafford Resources. The Wilcherry Hill iron ore deposit contained coarse crystalline magnetite and low silica content, which the company believed could be efficiently produced as concentrates containing more than 70% iron with very low impurity levels. The deposit had 44 Mt of iron ore resources at an average grade of 36.4% iron and could have the potential to host 300 to 600 Mt of iron ore resources. The prefeasibility study and metallurgical test results indicated that it could commence production of 2 Mt/yr of greater than 60% iron in concentrates in 2012. IronClad signed a memorandum of understanding with Linzhou Iron and Steel Co. Ltd. of China for the sale of a minimum of 1 Mt/yr of iron ore from the Wilcherry Hill Mine (IronClad Mining Ltd., 2010a, p. 4-7; b).

**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 2009, Australian zinc mine production was lower than in 2008. The decreased zinc production came from such existing mines as Broken Hill Mine in New South Wales and Golden Grove Mine in Western Australia. Owing to concentrator problems, the operation of Century Mine was suspended; it reopened during the last quarter of 2009. The output of zinc was expected to increase during the next 2 years because CBH Resources Ltd. and Xstrata planned to increase zinc output from their Endeavor Mine and Mount Isa Mine, respectively, in 2010. In 2009, Australia exported 427,000 t of lead concentrates. China replaced the Republic of Korea to become the leading destination for Australian lead concentrate exports and accounted for 45% of the total followed by the Republic of Korea, 28%, and Japan, 16%; the remaining 11% went to other countries in the world. Australia also exported 247,000 t of refined lead, for which India was the leading destination followed by the Republic of Korea, Indonesia, and Thailand. In 2009, Australia exported 2.1 Mt of zinc concentrates mainly to such East Asian countries as China, 58%; Japan, 13%; and the Republic of Korea, 12%. Zinc metal exports increased by about 10% to 456,000 t and went to such destinations as, in descending order of volume exported, Taiwan, Hong Kong,

Malaysia, and Indonesia (Australian Bureau of Agricultural and Resource Economics, 2010b, p. 37).

Terramin Australia Ltd. commenced operations at its Angus Zinc Mine, which is located near Strathalbyn in South Australia, in 2008. The mine reached its designed production capacity in 2009. The mine was designed to have throughput of 400,000 t/yr of ore, and the processing plant was designed to produce about 46,500 t/yr of zinc concentrates with a zinc content of 51%, and 20,000 t/yr of lead-copper-gold-silver concentrates with a lead content of 53%; copper, 4.0%; silver, 475 g/t; and gold, 7.5 g/t. The mine had ore reserves of 2.15 Mt grading 10.46% lead and zinc, 0.24% copper, 31 g/t silver, and 0.5 g/t gold. The company had a life-of-mine offtake agreement with J.P. Morgan Metals and Concentrates LLC for all zinc concentrate production and a 5-year agreement with Nyrstar Port Pirie Pty Ltd. for the lead concentrate production. The zinc concentrates were exported to overseas markets and the lead concentrates were refined at Nyrstar's lead smelter (Terramin Australia Ltd., 2009).

CBH Resources Ltd. received Government approval for the development of the Rasp Mine, which is located within Broken Hill City in New South Wales. The mine area had been mined in the 1880s and had substantial tonnage of unmined resources at the mine site. The company planned to focus on underground development in the Main Lode ore body. Drilling results indicated that the ore body contained total indicated and inferred resources of 5.5 Mt at an average grade of 10.1% zinc, 9.9% lead, and 195 g/t silver. The company was preparing a bankable feasibility study and planned to start the construction of an underground mine and a 750,000-t/yr processing plant in 2011. Currently, CBH operated the Endeavor underground mine near Cobar in New South Wales. Nyrstar NV of Belgium and Toho Zinc Co. Ltd. of Japan were bidding to take control of CBH Resources (CBH Resources Ltd., 2010).

### *Industrial Minerals*

**Cement.**—Australia has 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. 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% the domestic supply of cement. In 2009, CEMEX D.A.B. de C.V. agreed to sell its Australia operations to Holcim Corp. for about \$1.7 billion. The acquisition of Cemex Australia included 83 Australia sites to process building materials and 265 concrete plants. Holcim's share in Cement Australia Pty Ltd. increased by 25%, which made Holcim the majority shareholder (CEMEX D.A.B. de C.V., 2009).

**Lithium.**—In August 2007, Talison Minerals Pty Ltd. acquired the Greenbushes and the Wodgina Mines in Western Australia from Sons of Gwalia Ltd. Owing to a collapse in global demand and falling metal prices, Talison Minerals

suspended its Wodgina tantalum operation in December 2008. 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. A decision to reopen the Wodgina tantalum mine would depend on market conditions. The Greenbushes tantalum underground operation remained on care-and-maintenance status in 2009. The company continued producing spodumene concentrate at Greenbushes. In 2009, Talison Minerals placed its lithium and tantalum operations into two separate companies—Talison Lithium Ltd. and Talison Tantalum Ltd. Talison Lithium was listed on both the Australian Stock Exchange and the Toronto Stock Exchange. The Greenbushes had a lithium resource of 19.1 Mt at an average grade of 3.9% lithium oxide. The two ore treatment plants had a total output capacity 600,000 t/yr to produce about 260,000 t/yr of lithium concentrates. The technical-grade plant produced low iron lithium concentrates, which would be used in the manufacture of ceramics, glass, and heat-proof cookware. The chemical-grade plant produced higher levels of iron lithium concentrates, which would be used to produce lithium chemicals for the manufacturing of lithium-ion batteries, mobile phones, and electric bicycles and automobiles. In recent years, demand for chemical-grade and technical-grade lithium concentrates increased, especially from customers in China. Talison Lithium planned to invest \$2.5 million to expand the output capacity of chemical-grade concentrates by 50,000 t/yr (Behre Dolbear Australia Pty Ltd., 2010, p. 75; Talison Lithium Ltd., 2010, p. 3-7).

Galaxy Resources Ltd. started the construction of the Mount Cattlin spodumene open pit mine in 2009; development of the mine was scheduled to be completed in 2010. The mine had ore reserves of 11.4 Mt at an average grade of 1.05% Li<sub>2</sub>O. The processing plant had a designed capacity to treat 1 Mt/yr of ore at an average grade of 1.1% Li<sub>2</sub>O and to produce about 137,000 t/yr of spodumene concentrate grading 6.0% Li<sub>2</sub>O and 25 t/yr of contained tantalum oxide in concentrate. The spodumene concentrate would be shipped through the Port of Esperance to its Jiangsu Lithium Carbonate Plant in China, which had the capacity to produce 17,000 t/yr of battery-grade lithium carbonate. Creat Group Co. Ltd. of China agreed to purchase 19.9% of Galaxy's shares. Creat provided a A\$130 million fund for Galaxy to use to develop its lithium operations in Australia and China. Galaxy signed lithium carbonate offtake agreements with 13 Chinese companies and Mitsubishi Corp. of Japan. As a result of these agreements, Galaxy's full 17,000 t/yr of lithium carbonate output was committed (Galaxy Resources Ltd., 2009, 2010).

**Rare Earths.**—Globally, the production and resources of rare earths were dominated by China. In 2009, there was no recorded production of rare earths in Australia. During the year, however, Lynas Corp. Ltd. completed a feasibility study and received Government approval to develop the Mount Weld rare-earth project. The feasibility study indicated that the Mount Weld deposit contained 12.24 Mt of resources (measured, indicated, and inferred) at an average grade of 9.7% rare-earth oxide (REO) at a cutoff of 2.5% REO. Lynas 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. Owing to the global financial crisis, Lynas had difficulty securing funding to continue in 2008, and the project was suspended in 2009. Lynas was looking for investors to participate in the development of the Mount Weld project. China Nonferrous Metal Mining (Group) Co. Ltd. was willing to arrange funding to support the Mount Weld project and to become a major shareholder in Lynas. The Australian Government did not approve the Chinese company's bid to acquire a majority share in Lynas. The company turned to the stock market to raise funds and succeeded in raising \$450 million from the equity markets in November 2009. The company resumed the construction of its concentration plant in Australia and the advanced material plant in Malaysia. The concentration plant was scheduled to be completed at yearend 2010 and to be put into operation in 2011 to produce at a target grade of 40% REO concentrates (Lynas Corp. Ltd., 2010, p. 4-5).

Arafura Resources Ltd. completed a laboratory-scale operation to produce REOs from its Nolans Bore rare-earth deposit in the Northern Territory. The deposit is located about 10 km west of the Stuart Highway near Aileron Roadhouse. The company planned to use the sulfation process to recover rare earths and phosphate using its patented pre-leach process. The Nolans Bore deposit had measured, indicated, and inferred resources of 30.3 Mt at an average grade of 2.8% REO, 12.9% phosphorus pentoxide, and 0.44% uranium oxide. The company planned to produce 700,000 t/yr of mineral concentrates near the mine site and to transport concentrates to the Whyalla Rare Earth Complex in South Australia. The designed annual output capacities were 500,000 t of gypsum, 80,000 t 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 (Arafura Resources Ltd., 2009; 2010, p. 8-11).

### ***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 2009, Australia mined 452 Mt of raw black (bituminous and anthracite) coal, of which 348 Mt was salable coal. Queensland's coal output accounted for 56.0% 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 41.1% of the country's total output and was mined near the eastern and western edges of the large Sydney Gunnedah Basin. In 2009, Australia exported more than 274.2 Mt of coal (including 135.0 Mt of metallurgical coal and 139.2 Mt of thermal coal) compared with 261.2 Mt in 2008. Japan was the leading destination for Australian metallurgical coal (30.1%) followed

by India (19.9%), China (14.1%), the European Union (7.9%), the Republic of Korea (4.2%), and others (23.9%). Japan also was the leading destination for Australian thermal coal (43.6%) followed by the Republic of Korea (21.0%), Taiwan (14.3%), and others (21.1%). 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%. The Australian Government projected that Australian production of salable coal would increase to 404 Mt and that exports would increase to 325 Mt in 2014 (Australian Bureau of Agricultural and Resource Economics, 2010b, p. 18).

The infrastructure bottlenecks held back Australia's mineral exports, especially coal, while a number of new infrastructure projects were underway. An additional 90 Mt/yr of new coal terminal port capacity was scheduled to come online in 2014. At Newcastle, New South Wales, Port Waratah Coal Services expanded its Kooragang Terminal capacity by 13 Mt/yr to 102 Mt/yr and planned a further increase to 113 Mt/yr in 2014. The Newcastle Coal Infrastructure Group planned to add a 30-Mt/yr terminal in 2010. The combined coal-handling capacity of Queensland's Abbot Point, Brisbane, Gladstone, and Hay Point coal export terminals would be increased to 230 Mt in 2009 and then to 340 Mt if the State government of Queensland deemed it necessary. The total combined coal terminal capacity in the States of New South Wales and Queensland would be 448 Mt/yr. A number of investments in rail infrastructure capacity were either underway or were planned to complement these coal terminal projects (Ball, 2010).

**Uranium.**—Australia was the second ranked uranium producer in the world after Canada. Australia's uranium production was mainly from three mines—the Beverley, the Olympic Dam, and the Ranger. A number of undeveloped deposits in the Northern Territory, Queensland, South Australia, and Western Australia also exist. The Australian Government permits uranium mining, provided that all the relevant environmental safeguards and health requirements are met. Regulation of Australia's uranium mines is mainly a State and Territorial government responsibility. Among the States and Territories, only the governments of the Northern Territory and South Australia permitted uranium mining before 2008. Western Australia lifted the ban on uranium mining in the State in 2008.

The final environmental impact statement for BHP Billiton's Olympic Dam expansion was underway. The current Olympic Dam operation produced about 4,000 t/yr of uranium oxide and the proposed expansion would increase the mine's capacity to 19,000 t/yr of uranium oxide. Uranium One Inc. suspended the construction of the Honeymoon project in South Australia but restarted construction after Japan's Alliance Resources Ltd. and Mitsui & Co. Ltd. purchased a 49% equity share in the project. Production in 2010 was expected to produce about 400 t/yr of uranium oxide (Geoscience Australia, 2009, p. 81).

### **Outlook**

Australia is a natural-resource-rich country with significant resources of metallic, nonmetallic, and fuel minerals. Mineral and energy commodity exports are an important part of the country's economy. Reflecting strong world demand for mineral

resources, especially in the Asia and the Pacific region, the Australian economy is expected to continue to benefit from higher commodity export earnings. Expenditures on mineral and energy exploration in Australia are expected to increase owing to higher costs of labor and equipment and global demand for natural resources in the future. The production of such commodities as bauxite, copper, iron ore, natural gas, nickel, and zinc slowed down during the past 2 years and is expected to recover during the next several years. Major projects, such as the Yarwun alumina refinery project; BHP Billiton's RGP for iron ore; Hamersley Iron's Yandicoogina iron ore expansion; Fortescue Metals' iron ore project; Rio Tinto's Brockman 4, Hope Downs, and Mesa A iron ore projects and Clermont and Kestrel coal projects; and Xstrata's Mangoola coal project are expected to come onstream within this decade. Western Australia is Australia's leading State for metallic mineral exports and New South Wales and Queensland are major coal exporting States; 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. Australia is expected to remain a major mineral and fuel exporting country.

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TABLE 1  
AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009	
<b>METALS</b>						
<b>Aluminum:</b>						
Bauxite, gross weight						
	thousand metric tons	59,959	61,780	62,398	64,038	65,231
Alumina	do.	17,704	18,312	18,844	19,446	19,948
<b>Metal, refined:</b>						
Primary	do.	1,903	1,932	1,957	1,974	1,943
Secondary <sup>e</sup>		127,000	130,000	130,000	130,000	130,000
Antimony, Sb content of ores and concentrates <sup>e</sup>		120	1,600	1,010	1,500	1,000
<b>Cadmium:<sup>e</sup></b>						
Mine output, Cd content		700	700	700	700	650
Metal, smelter, refined		360	330	350	330	330
Chromium, chromite, gross weight		241,865	258,087	253,400	224,809	220,000 <sup>e</sup>
Chromite content <sup>e</sup>		97,000	103,000	103,000	90,000	90,000
<b>Cobalt:</b>						
Co content in laterite ore, Ni concentrate, and Zn concentrate <sup>e</sup>		5,600	6,000	5,900	5,500	5,700
Metal, refined		3,150	3,700	3,680	3,620 <sup>r</sup>	4,050
<b>Copper:</b>						
Mine output, Cu content	thousand metric tons	930	879	870	885	859
<b>Metal:</b>						
Smelter, primary and secondary	do.	412	377	399	447	422
Refined, primary	do.	461	429	442	503	446
<b>Gold:</b>						
Mine output, Au content		263	246	247	215	222
<b>Metal, refined:</b>						
Primary		291	266	259	244	256
Secondary		50	112	116	117	123
<b>Iron and steel:</b>						
<b>Iron ore:<sup>e</sup></b>						
Gross weight	thousand metric tons	262,000	275,000	299,000	342,000	394,000
Fe content	do.	163,000	171,000	186,000	208,000	228,000

See footnotes at end of table.

TABLE 1—Continued  
 AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009	
METALS—Continued						
Iron and steel—Continued:						
Metal:						
Pig iron	thousand metric tons	6,203	6,433	6,351	6,409	4,400
Ferroalloys: <sup>c</sup>						
Ferromanganese		120,000	125,000	125,000	125,000	100,000
Silicomanganese		135,000	140,000	140,000	140,000	110,000
Total		255,000	265,000	265,000	265,000	210,000
Steel, crude	thousand metric tons	7,788	7,937	8,047	7,724	5,135
Semimanufactured products		6,920	7,000	7,200 <sup>e</sup>	7,000 <sup>e</sup>	6,000 <sup>e</sup>
Lead:						
Mine output, Pb content	thousand metric tons	767	686	641	645	566
Metal:						
Bullion	do.	159	118	125	167	150
Refined:						
Primary	do.	230	233	202	220	204
Secondary, excluding remelt	do.	33	27	27	24	25
Manganese ore, metallurgical:						
Gross weight	do.	3,830	4,549	5,265	4,812	4,451
Mn content	do.	1,908	2,190	2,540	2,310	2,140
Nickel:						
Mine output, Ni content	do.	192	175	160	188	165
Matte	do.	44	39	42	31	28
Metal, smelter, refined Ni and Ni content of oxide	do.	126	119	114	103	131
Platinum-group metals: <sup>c</sup>						
Palladium, Pd content	kilograms	550	750	600	580 <sup>r</sup>	590
Platinum, Pt content	do.	111	209	142	120 <sup>r</sup>	130
Total	do.	661	959	742	700	720
Silver:						
Mine output, Ag content		2,417	1,727	1,879	1,926	1,635
Metal, refined		727	634	625	644	762
Tantalum, tantalite, Ta <sub>2</sub> O <sub>5</sub> equivalent		1,043	584	538	680	105
Tin:						
Mine output, Sn content		2,819	1,478	2,071	1,783	13,269
Metal, refined:						
Primary		594	572	118	--	100 <sup>e</sup>
Secondary <sup>e</sup>		400	400	400	400	400
Titanium concentrates, gross weight:						
Ilmenite	thousand metric tons	2,030	2,377	2,340	2,082	1,449
Leucoxene <sup>e</sup>		46,000	131,000	163,000	148,000	162,000
Rutile		177,000	232,000	312,000	325,000	281,000
Tungsten, mine output, W content		7	15	7	28	33
Zinc:						
Mine output, Zn content	thousand metric tons	1,367	1,362	1,514	1,519	1,290
Metal, smelter:						
Primary	do.	457	463	502	499	525
Secondary <sup>e</sup>		6,000	6,000	6,000	6,000	6,100
Zirconium concentrates, gross weight	thousand metric tons	427	491	601	550	474
INDUSTRIAL MINERALS						
Abrasives, natural:						
Beach pebble <sup>e</sup>		2,000	2,000	2,000	2,000	2,000
Garnet		246,128	278,233	294,007	298,290 <sup>r</sup>	275,560
Barite <sup>e</sup>		20,000	21,000	21,000	21,000	21,000
Cement, hydraulic <sup>e</sup>	thousand metric tons	8,475 <sup>2</sup>	9,000	9,200 <sup>r</sup>	9,400	9,200
Clays: <sup>e</sup>						
Bentonite and bentonitic clay		223,000	220,000	220,000	220,000	220,000
Brick clay and shale	thousand metric tons	8,000	8,000	8,000	8,000	8,000
Cement clay and shale	do.	500	500	500	500	500

See footnotes at end of table.

TABLE 1—Continued  
 AUSTRALIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009	
<b>INDUSTRIAL MINERALS—Continued</b>						
Clays—Continued: <sup>e</sup>						
Damourite clay	100	100	100	100	100	
Fire clay	25,000	25,000	22,000	22,000	22,000	
Fuller's earth, attapulgite	9,800	10,000	10,000	10,000	10,000	
Kaolin and ball clay	230,000	250,000	230,000	230,000	230,000	
Other	thousand metric tons	2,000	2,000	2,000	2,000	
Diamond:						
Gem	thousand carats	8,577	7,305	231	273	220
Industrial	do.	25,730	21,915	18,960	15,397	10,575
Total	do.	34,307	29,220	19,191	15,670	10,795
Diatomite <sup>e</sup>		20,000	20,000	20,000	20,000	20,000
Feldspar, including nepheline syenite <sup>e</sup>		50,000	50,000	50,000	50,000	50,000
Gemstones, opal	value, \$million	40	50	40	41	20 <sup>e</sup>
Gypsum	thousand metric tons	3,857	4,265	3,896	3,500 <sup>c</sup>	3,500 <sup>c</sup>
Kyanite <sup>e</sup>		1,000	1,000	1,000	1,000	1,000
Lime <sup>e</sup>		1,500,000	1,600,000	1,600,000	1,600,000	1,600,000
Lithium, spodumene		173,635	222,101	192,277	239,528	197,482
Magnesite		474,000	446,000	447,000	126,000	125,000 <sup>e</sup>
Nitrogen, N content of ammonia		790,000	1,200,000	1,200,000	1,200,000	1,200,000
Perlite, crude <sup>e</sup>		6,000	6,500	6,500	6,500	6,500
Phosphate rock: <sup>e</sup>						
Gross weight		2,080,000	2,140,000	2,850,000	2,950,000	2,800,000
P <sub>2</sub> O <sub>5</sub> content		478,000	493,000	655,000	678,000	650,000
Salt <sup>3</sup>	thousand metric tons	12,444	11,424	10,855	11,160	10,316
Soda ash <sup>e</sup>	do.	300	310	310	310	310
Stone and sand and gravel:						
Construction sand	do.	30,438	30,540	35,530	34,000 <sup>c</sup>	34,000 <sup>e</sup>
Crushed and broken stone <sup>e</sup>	do.	75,000 <sup>r</sup>	81,000	95,000	80,000	80,000
Dimension stone	do.	237	200	190	230 <sup>c</sup>	230 <sup>e</sup>
Gravel <sup>e</sup>	do.	14,000 <sup>r</sup>	13,500	13,600	12,000	12,000
Dolomite <sup>e</sup>	do.	10,000	10,000	10,000	10,000	10,000
Limestone <sup>e</sup>	do.	18,400 <sup>r</sup>	18,300	19,100	19,000	19,000
Silica in the form of quartz, quartzite, glass sand <sup>e</sup>	do.	5,169 <sup>2</sup>	5,200	5,200	5,200	5,200
Sulfur, byproduct: <sup>e</sup>						
Metallurgy	thousand metric tons	880	880	880	880	870
Petroleum	do.	60	58	58	60	60
Total	do.	940	938	938	940	930
Talc, chlorite, pyrophyllite, steatite <sup>e</sup>		155,000	130,000	125,000	120,000	120,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
Coal, salable:						
Bituminous and subbituminous	thousand metric tons	303,000	309,000	320,000	332,000	348,000
Lignite <sup>e</sup>	do.	67,000	71,000	71,000	71,000	71,000
Total <sup>e</sup>	do.	370,000	380,000	391,000	403,000	419,000
Gas, natural, marketed	million cubic meters	42,630	44,100	39,960	38,256	42,345
Petroleum:						
Crude, includes condensate	thousand 42-gallon barrels	155,320	163,900	170,470	168,123	169,211
Refinery products	do.	255,863	229,748	252,443	246,717	241,233
Uranium, mine output, U <sub>3</sub> O <sub>8</sub> content		11,218	8,970	10,145	9,989	7,942

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through October 5, 2010.

<sup>2</sup>Reported figure.

<sup>3</sup>Does not include production from the Northern Territory and the State of Victoria.



TABLE 2  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
<b>Aluminum:</b>			
Bauxite	Gove open pit bauxite mine (Rio Tinto Alcan, 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. (Rio Tinto Alcan, 100%)]	Nhulunbuy, Gove, NT	3,800
Do.	Kwinana alumina refinery (Alcoa World Alumina Australia, 100%)	Kwinana, WA	2,100
Do.	Pinjarra alumina refinery (Alcoa World Alumina Australia, 100%)	Pinjarra, WA	4,200
Do.	Wagerup alumina refinery (Alcoa World Alumina Australia, 60%, and Western Mining Corp., 40%)	Waroona, WA	2,600
Do.	Worsley alumina refinery {Worsley Alumina Pty. Ltd., manager [BHP Billiton Ltd., 86%, and Japan Alumina Associates (Australia) Pty Ltd., 10%]}	20 km northwest of Collie, WA	3,500
Do.	Yarwun alumina refinery (Rio Tinto Alcan, 100%)	Gladstone, QLD	1,400
Metal smelter	Bell Bay aluminum smelter (Rio Tinto Alcan, 100%)	Bell Bay, TAS	160
Do.	Kurri Kurri aluminum smelter (Hydro Aluminium Kurri Kurri Pty. Ltd., 100%)	Kurri Kurri, near Newcastle, NSW	165
Do.	Boyne Island aluminum smelter [Boyne Smelters Ltd., operator (Rio Tinto Alcan, 64%; Sumitomo Light Metal Industries Ltd., 17%; Ryowa Development Pty. Ltd., 12%; Kobe Steel Ltd., 5%; Sumitomo Chemical Co. Ltd., 2%)]	Boyne Island, QLD	550
Do.	Point Henry aluminum smelter (Alcoa of Australia, 100%)	Point Henry, VIC	185
Do.	Portland aluminum smelter [Alcoa of Australia, 55%, manager; China International Trust Investment Co. (China state-owned company), 22.5%; Marubeni Australia Pty. Ltd., 22.5%]	Portland, VIC	345
Do.	Tomago aluminum smelter [Tomago Aluminium Co. Pty. Ltd., operator (Gove Aluminium Finance Ltd., 36.05%; Rio Tinto Alcan, 51.55%; Hydro Aluminium, 12.40%)]	Tomago, NSW	525
Antimony	Augusta underground antimony-gold mine [AGD Mining operator (Cambrian Mining Plc, 100%)]	50 km east and southeast of Bendigo, VIC	5
Do.	Hillgrove Mine (Straits Resources Ltd., 100%)	25 km east of Armidale, NSW	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.	Waurm Ponds, VIC	250
Do.	Cement Australia Pty Ltd. (Hanson Ltd. and Holcim Australia Pty Ltd.)	Brisbane, QLD	1,200
Do.	do.	Gladstone, QLD	1,600
Do.	do.	Kandos, NSW	450
Do.	do.	Railton, TAS	1,000
Do.	Cockburn Cement Ltd., 100%	Munster, 30 km south of Perth, WA	700
Chromite	Coobina open pit chromite mine (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 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
Coal	Angus Place longwall coal mine (Centennial Coal Co. Ltd., 50%, and SK Corp., 50%)	16 km northwest of Lithgow, NSW	3,000
Do.	Appin longwall coal mine [Illawarra Coal Holdings Pty Ltd., operator (BHP Billiton Ltd., 100%)]	40 northwest of Wollongong, NSW	8,800
Do.	Ashton open pit/underground coal mine (Felix Resources Ltd., 60%; Chu Corp., 10%; private, 30%)	14 km northwest of Singleton, NSW	4,000
Do.	Awaba underground coal mine [Powercoal Pty. Ltd., operator (Centennial Coal Co. Ltd., 100%)]	30 km southwest of Newcastle, NSW	2,000
Do.	Baal Bone coal mine [Oakbridge Pty. Ltd., 74.1% (Xstrata plc, 100%); Sumitomo Corp., 5%; Toyota Tsusho Mining (Australia) Pty Ltd. 4.75%; private, 14.44%]	24 km northwest of Lithgow, NSW	2,500
Do.	Bengalla open pit coal mine [Coal and Allied Industries Ltd., 40%, manager; Wesfarmers Bengalla Ltd., 40%; MCDA Bengalla Investment Pty. Ltd., 10%; Taipower Bengalla Pty. Ltd., 10%]	5 km west of Muswellbrook, NSW	6,600
Do.	Blackwater open pit coal mine (includes South Blackwater) [BHP Billiton Mitsubishi Alliance, manager (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)]	195 km west of Rockhampton, QLD	14,000
Do.	Blair Athol open pit coal mine [Rio Tinto Ltd., 57.2%, manager; J-Power (Australia) Pty Ltd., 8%; private, 34.8%]	25 km northwest of Clermont, QLD	13,000
Do.	Broadmeadow open pit/underground coal mine [BHP Billiton Mitsubishi Alliance, manager (BHP Billiton Ltd., 50%, and Mitsubishi Corp., 50%)]	30 km north of Moranbah. QLD <sup>3</sup>	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 <sup>3</sup>	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 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
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%; Sojitz 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.	Ravensthorpe-Narama open pit coal mine (includes Ravensthorpe East) (Xstrata Coal Australia Pty. Ltd., 100% of Ravensthorpe 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 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 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
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
<b>Cobalt:</b>			
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
<b>Copper:</b>			
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 Investment 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 (Cape Lambert Resources Ltd., 100%)	100 km north-northwest of Mount Isa, QLD	19
Do.	Leichhardt copper mine (Matrix Metals Ltd., 100%)	110 km northwest of Cloncurry, QLD	10
Do.	Mount Gordon open pit copper (solvent extraction-electrowinning) mine (Aditya Birla Minerals Ltd., 100%)	120 kilometers north of Mount Isa, QLD	50
Do.	Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	190
Do.	Mount Lyell underground copper-gold mine [Sterlite Industries (India) Ltd., 100%]	2 km northeast of Queenstown, TAS	35
Do.	Nifty open pit copper (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 (Barrick Gold Corp., 100%)	120 km northeast of Boulia, QLD	50
Do.	Peak underground gold-zinc-lead-copper-silver underground mine (includes New Cobar, New Occidental, and Perseverance) (GoldCorp Inc., 100%)	8 km south of Cobar, NSW	3
Do.	Prominent Hill open pit copper-gold mine (OZ Minerals Ltd., 100%)	650 km northwest of Adelaide, SA	100
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%; Nissholwai Corp., 17.5%; Itochu Corp., 10%)	Port Kembla, NSW	120

See footnotes at end of table.

TABLE 2—Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
<b>Copper—Continued:</b>				
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%; Nissholwai Corp., 17.5%; Itochu Corp., 10%)	Port Kembla, 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
<b>Gas:</b>				
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
<b>Gold:</b>				
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.	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 of 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) (Harmony Gold Mining Co. Ltd., 100%)	2 km from Mount Magnet, WA	8,500
Do.	do.	Norseman underground gold mine (Norseman Gold Plc, 100%)	Norseman, WA	3,700
Do.	do.	Northparkes open pit/underground copper-gold mine (Rio Tinto Ltd., 80%, and Sumitomo Metal Mining Oceania Pty. Ltd., 20%)	30 km north of Parkes, NSW	155,000

See footnotes at end of table.

TABLE 2—Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>c</sup>
<b>Gold—Continued:</b>				
Mine— Continued	kilograms	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.		Saint Ives open pit/underground gold mine (Gold Fields Ltd., 100%)	75 km south-southeast of Kalgoorlie, WA	15,000
Do.	do.	Selwyn underground copper-gold mine (Barrick Gold Corp., 100%)	160 km southeast of Mount Isa, QLD	700
Do.	do.	Stawell underground gold mine (Perseverance Corp. Ltd., 100%)	250 km west of Melbourne, VIC	3,000
Do.	do.	Sunrise Dam open pit mine gold (includes Cleo) (AngloGold Ashanti Ltd., 100%)	55 km south of Laverton, WA	15,000
Do.	do.	Super Pit open pit gold mine (includes Fimiston) [Kalgoorlie Consolidated Gold Mines Pty. Ltd., manager (Barrick Gold Corp., 50%, and Newmont Mining Corp., 50%)]	Southeast corner of the Kalgoorlie-Boulder Township, WA	25,000
Do.	do.	Tanami open pit gold mine (includes Central Desert Joint Venture) (Newmont Gold Corp., 100%)	650 km northwest of Alice Springs, NT	15,000
Do.	do.	Telfer copper and gold mine (Newcrest Mining Ltd., 100%)	400 km east-southeast of Port Hedland, WA	15,000
Do.	do.	Thunderbox gold mine (Lionore Mining International Ltd., 100%)	90 km northeast of Leonora, WA	5,000
Do.	do.	Trident gold mine (Avoca Resources Ltd., 100%)	Higginsville, WA	5,000
Do.	do.	Wiluna open pit/underground gold mine (Apex Minerals NL, 100%)	7 km south of Wiluna, WA	3,300
Smelter	do.	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
<b>Iron and steel:</b>				
Iron ore		Channar open pit iron ore mine [Hammersley 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 [Hammersley Iron Pty. Ltd., 54% (Rio Tinto Ltd., 100%), and Shanghai Baosteel Group Corp., 46%]	10 km east of Paraburdoo, WA	10,000
Do.		Hammersley Operations (includes Brockman No. 2, Marandoo, Mount Tom Price, Nammuldi, Paraburdoo, and Yandicoogina open pit iron ore mines) [Hammersley Iron Pty. Ltd., 100% (Rio Tinto Ltd., 100%)]	30 km to 85 km northeast, northwest, and south of Tom Price, WA	90,000
Do.		Hope Downs Mine [Hope Downs Iron Ore Pty Ltd. (Hancock Prospecting Pty Ltd. 100%), 50%, and Rio Tinto Ltd., 50%]	75 km northwest of Newman, WA	30,000
Do.		Jimblebar open pit iron ore mine {[BHP Iron Ore (Jimblebar), 85% (BHP Billiton Ltd., 100%)]}; [Mitsui Itochu Iron Pty Ltd., 10% (Mitsui & Co. (Australia) Ltd. 100%)]}; [CI Minerals Australia Pty Ltd., 5% (Itochu Corp., 100%)]}	40 km east of Newman, WA	8,000
Do.		Koolyanobbing Central open pit iron ore mine (Portman Ltd., 100%)	50 km north-northeast of Southern Cross, WA	6,000
Do.		Mount Goldsworthy mining associates joint venture (includes Area C, Goldsworthy, and Nimingarra) (BHP Billiton Minerals Pty Ltd., 85%, manager; ITOCHU Minerals & Energy of Australia Pty Ltd., 8%; Mitsui Iron Ore Corp. Pty. Ltd., 7%)	180 km east of Port Hedland, WA	42,000

See footnotes at end of table.

TABLE 2—Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
<b>Iron and steel—Continued:</b>			
<b>Iron ore—Continued</b>			
	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.	Whyalla open pit iron ore mines (OneSteel Ltd., 100%)	270 km northwest of Adelaide, SA	2,600
Do.	Yandi open pit iron ore mine (BHP Billiton Minerals Pty Ltd., 85%, manager; ITOCHU Minerals & Energy of Australia Pty Ltd., 8%; Mitsui Iron Ore Corp. Pty. Ltd., 7%)	92 km north of Newman, WA	42,000
Pig iron	Hismelt pig iron plant [Hismelt Corp. Pty Ltd. (Rio Tinto Ltd., 60%; Nucor Corp., 25%; Mitsubishi Corp., 10%; and Shougang Corp., 5%)]	Kwinana, WA	800
Steel	OneSteel Whyalla steelworks (OneSteel Ltd., 100%)	Whyalla, SA	1,200
Do.	Port Kembla steelworks (Blue Scope Steel Ltd., 100%)	Port Kembla, NSW	5,000
Do.	Smorgon Steel Group Ltd.	Laverton, Melbourne, VIC	700
Do.	do.	Waratch, NSW	285
Kaolin	Axedale Clays open pit kaolin mine (E Clay Pty Ltd., 100%)	18 km east of Bendigo, VIC	50
Do.	Pittong open pit kaolin mine (Imerys Minerals Australia Pty Ltd., 100%)	35 km southwest of Ballarat, VIC	110
Do.	Skardon River open pit kaolin mine (Queensland Kaolin Pty. Ltd., 96.6%, and private, 3.4%)	85 km north of Weipa, QLD	150
<b>Lead:</b>			
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 (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	44
Do.	Mount Isa underground copper-lead-zinc-silver mine (also includes Enterprise, George Fisher, and Hilton Mines) (Xstrata plc, 100%)	Mount Isa, QLD	150
Do.	Rosebery underground zinc-lead-silver-copper-gold mine [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) (private interest, 100%)	70 km northwest of Rockhampton, QLD	3,000
<b>Manganese:</b>			
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

See footnotes at end of table.

TABLE 2—Continued  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
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	100
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	50
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
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, and Nickel Process Pty)	Townsville, QLD	40
Opal	Many small producers	Andamooka and Coober Pedy areas, SA; Lightning Ridge area, NSW	NA

See footnotes at end of table.



TABLE 2—Continued  
AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>3</sup>
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
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
<b>Silver:</b>				
Mine, Ag content	kilograms	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%)	5 km north of Queenstown, TAS	450,000
Refinery	do.	Perth Refinery {AGR Management Services Ltd. [Australian Gold Alliance Pty Ltd., 40%; Western Australian Mint, 40%; and Johnson Matthey (Australian) Ltd., 20%]}	Newburn, WA	81,000
Spodumene		Greenbushes open pit/underground tantalite-spodumene mine (Talison 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 (Rio Tinto Ltd., 100%)	330 km north of Perth, WA	150
Tantalum, tantalite, Ta <sub>2</sub> O <sub>5</sub> content	metric tons	Greenbushes open pit/underground tantalite-spodumene mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA <sup>3</sup>	550
Do.	do.	Bald Hill tantalite mine (Haddington Resources Ltd., 100%)	60 km southeast of Kambalda, WA <sup>3</sup>	100
Do.	do.	Wodgina open pit tantalite mine (Talison Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA <sup>3</sup>	250

See footnotes at end of table.

TABLE 2—Continued  
 AUSTRALIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2009

(Thousand metric tons unless otherwise specified)

Commodity		Facilities, major operating companies, and major equity owners	Location of main facilities <sup>1,2</sup>	Annual capacity <sup>c</sup>
<b>Tin:</b>				
Mine, Sn content	metric tons	Collingwood underground tin mine (Metals X Ltd., 100%)	35 km south of Cooktown, QLD	3,000
Do.	do.	Greenbushes open pit/underground tantalite-spodumene mine (Talisson Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA <sup>3</sup>	1,000
Do.	do.	Renison Bell underground tin mine (Metals X Ltd., 100%)	136 km south of Burnie, TAS <sup>3</sup>	4,000
Smelter	do.	Greenbushes Smelter (Talisson Minerals Pty Ltd., 100%)	70 km southeast of Bunbury, WA	1,000
<b>Tungsten, W content</b>				
Do.	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
<b>Uranium, U<sub>3</sub>O<sub>8</sub> content</b>				
Do.	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
<b>Vanadium, V<sub>2</sub>O<sub>5</sub> content</b>				
Do.	do.	Windimurra open pit mine vanadium (Precious Metals Australia Ltd., 90%, and Noble Group Ltd., 10%)	100 km east-southeast of Mount Magnet, WA <sup>3</sup>	8
<b>Zinc:</b>				
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 Nonfermet 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.		Endeavour underground zinc-silver-lead mine (CBH Resources Ltd., 100%)	40 km northwest of Cobar, NSW	125
Do.		Golden Grove underground zinc-copper mine (OZ Minerals Ltd., 100%)	225 km east of Geraldton, WA	150
Do.		Hellyer underground zinc-lead-copper-silver mine (Intec Ltd., 50%, and Polymetals Mining Services Pty Ltd., 50%)	80 km south-southwest of Burnie, TAS	130
Do.		Jaguar underground mine (Jabiru Metals Ltd., 100%)	250 km north of Kalgoorlie, WA	420
Do.		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
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

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

<sup>1</sup>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.

<sup>2</sup>Abbreviation(s) used for unit(s) of measure in this table include the following: km—kilometer.

<sup>3</sup>On care-and-maintenance status; expansion project development decision pending.

TABLE 3  
AUSTRALIA: RESERVES OF MAJOR MINERAL COMMODITIES IN 2009

Commodity		Reserves <sup>1</sup>
Antimony, Sb content	thousand metric tons	138
Bauxite	million metric tons	6,200
Cadmium, Cd content	thousand metric tons	61
Coal:		
Black:		
In situ	billion metric tons	61
Recoverable	do.	44
Brown:		
In situ	do.	41
Recoverable	do.	37
Cobalt, Co content	thousand metric tons	1,400
Copper, Cu content	million metric tons	80
Diamond:		
Gem and near gem	million carats	105
Industrial	do.	109
Gold, Au content	metric tons	7,400
Iron ore	billion metric tons	28
Lead, Pb content	million metric tons	29
Lithium, Li content	thousand metric tons	607
Magnesite (MgCO <sub>3</sub> content)	million metric tons	330
Manganese ore	do.	181
Mineral sands:		
Ilmenite	do.	200
Rutile	do.	23
Zircon	do.	40
Molybdenum, Mo content	thousand metric tons	276
Nickel, Ni content	million metric tons	24
Niobium (columbium) and tantalum:		
Niobium (columbium), Nb content	thousand metric tons	115
Tantalum, Ta content	do.	51
Petroleum, recoverable:		
Condensate	million barrels	2,750
Crude	do.	1,430
Liquefied petroleum gas	do.	1,470
Natural gas	billion cubic meters	4,650
Platinum-group metals (Pd, Pt)	metric tons	5
Rare earths (REO plus Y <sub>2</sub> O <sub>3</sub> )	thousand metric tons	1,650
Silver, Ag content	do.	69
Tin, Sn content	do.	176
Tungsten, W content	do.	195
Uranium, U content	do.	1,200
Vanadium	do.	2,700
Zinc	million metric tons	56

do. Ditto.

<sup>1</sup>Economic Demonstrated Resources.

Source: Geoscience Australia, 2010, Australia's identified mineral resources 2010: Canberra, Australia, Geoscience Australia, p. 5. (Data have been rounded to no more than three significant digits.)