



2012 Minerals Yearbook

CHILE

THE MINERAL INDUSTRY OF CHILE

By Steven T. Anderson

Chile is the only country in South America that is a member of the Organization of Economic Cooperation and Development (OECD), and its position in the world mineral economy was as a leading supplier of many minerals in crude form, especially metals associated with the mining of copper and industrial minerals (such as lithium carbonate and potash) obtained from mining the salars and arid areas in the country. In 2012, Chile remained the world's leading producer of copper, accounting for 32% of world mine production; iodine, 61%¹ of world mine production; rhenium, 52%; and lithium (Li content), about 35%.¹ The country was estimated to have been the world's second-ranked producer of arsenic, accounting for an estimated 23% of world production; (total) refined copper, about 14%; and mined boron (ulexite), about 10%.¹ It was the world's third-ranked producer of molybdenum (about 13% of world production), the fifth-ranked producer of pumicite (5%), and the sixth-ranked producer of silver (mine output) (4.7%), and refined selenium (4.5%¹). Chile was estimated to have accounted for about 3% of the world's mine output of potash (K₂O equivalent) and salt (NaCl); 2% of gold (mine output) and sulfur, and slightly greater than 1% of global production of diatomite (table 1; Apodaca, 2013; Comisión Chilena del Cobre, 2013a, p. 136–137, 140–141, 143–145; Crangle, 2013a–c; Edelstein, 2013a; George, 2013b; Jasinski, 2013; Jaskula, 2013; Kostick, 2013; Polyak, 2013a–c; U.S. Energy Information Administration, 2013).

Minerals in the National Economy

In 2012, total mine production accounted for 13% (about \$35 billion²) of the country's gross domestic product (GDP) compared with 15% (a revised value of about \$37 billion) in 2011, mostly because the value of copper mine production decreased to \$31 billion from about \$33 billion in 2011. In addition, the value of manufacturing production of industrial mineral products (including cement) and processed or refined metals (including steel) contributed \$2.2 billion to the GDP in 2012 compared with \$2 billion in 2011. In real terms,³ the total value of mine production actually increased by about 4.3% compared with that of 2011 owing to an increase of 4.9% in the real value of the country's copper mine production, so the nominal decrease in the value of production in the (copper) mining sector appeared to be owing mostly to a decrease in prices during this timeframe. In 2012, the average annual price of refined copper on the London Metal Exchange decreased to about \$3.61 per pound from about \$4 per pound in 2011

(Banco Central de Chile, 2013a; Comisión Chilena del Cobre, 2013a, p. 66–67, 150; International Monetary Fund, 2013).

The mineral trade balance of Chile (including crude petroleum and natural gas) decreased to about \$24.8 billion from a revised balance of about \$27.7 billion in 2011. The value of the country's exports of nonfuel mineral products decreased to \$48.2 billion from a revised value of \$50.7 billion in 2011, led by a decrease in the value of its exports of nonferrous metals (the leading mineral export sector) to \$26.6 billion from a slightly revised value of \$30.6 billion in 2011; the value of the country's imports of mineral fuels and related materials increased slightly to about \$18.1 billion from a revised value of \$18 billion in 2011, led by an increase in the value of its imports of crude petroleum and petroleum refinery products (the leading mineral import sector) to \$14.7 billion from a revised value of \$14.4 billion in 2011. In 2012, Chile's consumption of energy ranked fifth in South America, but the country was only a minor producer of mineral fuels and related materials. Thus, Chile was heavily dependent on imports of mineral fuels and related materials, and this had a strong negative effect on the country's mineral trade balance (Banco Central de Chile, 2013b, p. 31, 61; U.S. Energy Information Administration, 2013).

For most of the time from at least 2010 and through 2012, Chile had been experiencing a drought, and this was of greatest concern in the arid northern regions of the country, where many of the leading mining operations are located. The issues of greatest concern to investors in the mineral industry appeared to be the cost of securing consistent supplies of energy and the cost and availability of sufficient water. Part of a solution to the water scarcity problem that is being tried in Chile is to increase the country's seawater desalination capacity. Because this solution requires a substantial amount of costly energy (including for the transportation of the water to the interior of the country), desalination projects that used as much solar power as possible were being considered. The mining sector reportedly accounted for about 9% of total water use in the country, and several mining companies in the country (mostly in the north) were investing in their own desalination projects and other projects to use seawater in order to enhance the consistency and sustainability of their water supplies. At least partially because of the high energy costs of desalination projects, the Government was also considering construction of one or more water pipelines from the southern regions of the country to the north, but some analysts thought that this solution would be even more costly than enacting the current proposals for an array of both private and public desalination projects (Abarca, 2012a, b; Coquelet, 2012; Henriquez, 2012a, f; Lenton, 2012; Setterfield, 2012a, b; Superneau, 2012b).

At current prices, labor costs in the mineral industry continued to increase during 2012. According to the change in a nominal wage index for Chile, the total wage bill for all mining and the extraction of crude petroleum increased by

¹Excludes production by the United States.

²Where necessary, nominal values have been converted from Chilean pesos (Ch\$) to U.S. dollars (US\$) at an annual average exchange rate of about Ch\$483.67=US\$1.00 for 2011 and Ch\$486.49=US\$1.00 for 2012. All values are nominal, at current prices, unless otherwise stated.

³Real values are adjusted for inflation using constant 2008 prices and chain-weighted from 2003.

about 8.5% in 2012 compared with that of 2011 and by about 8% in 2011 compared with that of 2010. According to Chile's Comisión Chilena del Cobre (COCHILCO), mining and the extraction of crude petroleum employed 71,279 workers compared with 68,372 workers in 2011; of the total number of workers directly employed in mining and the extraction of crude petroleum, about 77% were employed in copper mining; and workers directly employed in mining and the extraction of crude petroleum accounted for about 1% of all employees in Chile. COCHILCO's reported data on employment in mining and the extraction of crude petroleum does not appear to include, however, the large number of workers who provided necessary services for these mineral extraction sectors (such as administrative, consulting, legal, marketing, security, and transportation services), those who were employed in domestically producing downstream mineral-based products from raw minerals extracted in Chile, and those whose jobs otherwise critically depended on the extraction of minerals in the country. The country's Servicio Nacional de Geología y Minería (SERNAGEOMIN) reported that the number of workers employed in the mining sector increased to 197,197 in 2012 from 191,043 in 2011, and these data could include the annual average number of contractual workers in addition to the number of permanent employees. Based on data from Chile's National Institute of Statistics, the country's mining council estimated that the average number of workers directly employed in the sector increased to 248,000 in 2012 from 220,000 in 2011, the number of indirect employees in the sector increased to 669,000 from 593,000 in 2011 (estimating about 2.7 indirect employees per every direct employee, on average), and that the combined number of employees in the sector accounted for 12% of the total number of employees in Chile in 2012 compared with about 11% in 2011 (Servicio Nacional de Geología y Minería, 2012, p. 161; 2013, p. 156; Comisión Chilena del Cobre, 2013a, p. 71, 75; Consejo Minero, 2013a, p. 26).

The cost issues in Chile's mineral industry and their expected resolution were scrutinized by (potential) investors, and there was some concern that increasing energy costs (in particular) could reduce the competitiveness of the country's mining sector relative to other countries that compete for market share in sales of the same mineral commodities that Chile produces, including copper. In 2012, total investment in the mining and quarrying sector of Chile increased to \$11.3 billion compared with a slightly revised value of investment of \$8.2 billion in 2011. This increase was owing mostly to an increase in the combined investment by state-owned mining and mineral processing companies Corporación Nacional del Cobre (CODELCO) and Empresa Nacional de Minería (ENAMI) to \$3.7 billion from about \$2.3 billion in 2011. In 2012, foreign direct investment (FDI) into the sector increased to about \$2.8 billion compared with a revised value of FDI of \$2.6 billion in 2011. In 2012, total inflows of FDI into the Chilean economy increased to \$8.2 billion from about \$4.3 billion in 2011, so the flow of FDI into the mining and quarrying sector accounted for only about 34% of total inflows of FDI into the country compared with about 60% in 2011. Of the inflows of FDI into the mining and quarrying sector of Chile in 2012, Japan accounted for 81%, Canada accounted for about 16%, the United States accounted

for about 1.6%, and no other country accounted for greater than 1%. In 2011, Japan accounted for a revised share of about 56%, Canada accounted for a revised share of 36%, the Republic of Korea accounted for a revised share of 6%, and no other country accounted for greater than 1% (Bourke, 2012; Business News Americas Ltda., 2012a; Comisión Chilena del Cobre, 2013a, p. 68–69, 124; Comité de Inversiones Extranjeras, undated a, b).

Government Policies and Programs

On June 16, 2005, the Government had approved Law 20.026 to establish a mining-specific tax (royalty), which modified both the applicable Mining Code (Law 18.248, which was approved on September 26, 1983) and the 1974 foreign investment statute, known as Decree Law 600 (D.L. 600). The tax, which is assessed on a per-company basis, took effect at the beginning of 2006 and applies only if the total value of mine production by a single company exceeds the average value of 12,000 metric tons (t) of copper during the year. The royalty rates that mining companies were estimated to be paying in 2010 were between 4% and 5%. On October 21, 2010, the Government enacted amendments to the mining royalty law to help finance reconstruction costs following an earthquake in northern Chile on February 27. In January 2011, it was estimated that between 80% and 90% of mining companies in the country had adopted the new tax scheme for earthquake reconstruction, which was supposed to extend through 2012. In 2011, the earthquake-reconstruction tax could have expanded the effective mining-specific tax rate for the companies that adopted it to between 4% and 9%. Acceptance of the temporary earthquake-reconstruction tax by mining companies was voluntary, but the Government offered to extend existing tax-rate stability agreements (to be reinstated after 2012) up to 6 more years (until 2018) for those that adopted the new flexible-rate tax scheme. After expiration of any tax-rate stability agreements, however, mining companies with annual sales that exceed the average value of 50,000 t of copper during the year will pay a progressive mining-specific tax rate of between 5% and 14%. Before passage of the mining-specific tax law in 2005, the most recent significant modifications of the Mining Code had been through approval of a Mining Safety Act on December 30, 2002 (Rojas and others, 2006, p. 360–362; Economist, The, 2010; PricewaterhouseCoopers LLP, 2010; 2012, p. 11–13, 21; Cambero and Soto, 2011; London Stock Exchange plc, 2011; Servicio de Impuestos Internos, 2011; Trucco, 2011; Gravelle, 2012, p. 11–13; PKF International Ltd., 2012, p. 1).

The main environmental law was Decree Law 19.300, which was approved on March 9, 1994, and was supplemented on December 7, 2002, by approval of Decreto Supremo 95, which is a Government decree that requires environmental impact statements for any new investment projects that involve either exploration for or extraction of the country's natural resources (including minerals). In July 2011, the Chilean Congress approved Law 20.551 to regulate the closure and environmental remediation of mine sites and installations. On November 11, 2011, this new law was officially published, and it entered into force on November 11, 2012. On May 29, 2012, the Council of Ministers for Sustainability reportedly approved

some text for new regulation of Chile's System for Evaluating Environmental Impacts (SEEI), but a new Government decree or law regarding regulation of the SEEI did not appear to have been published by yearend. On June 18, 2012, the Chilean Congress approved Law 20.600, which established three new environmental courts charged with the resolution of any complaints relating to emissions, decontamination plans, environmental damage remediation measures, and environmental disputes. The first of these new environmental courts was scheduled to open on December 28, 2012, and the other two on June 28, 2013. On July 3, 2012, the Ministry of the Environment published a proposal for stricter limits on emissions of arsenic, mercury, particulates, and sulfur dioxide by current and future emission sources for which Government permits are issued, including copper smelters. The draft of this legislation appeared to be still open for public consultation through the end of the year, and was not expected to enter into force until sometime in 2013, with a grace period for current emitters to come into compliance with the new regulation until 2017 (Biblioteca del Congreso Nacional de Chile, 2008; Economist, *The*, 2010; Berner, 2012; Consejo Minero, 2012, p. 5, 16, 57–58; 2013b, p. 5, 50–55; Superneau, 2012a; EcoMetales Ltd., 2013, p. 24–26).

In 2006, the Government passed the Fiscal Responsibility Law (FRL) that created two funds to manage increased revenues from mining royalty payments and from the state-owned mining company CODELCO. The FRL extends the commitment of the Government to a structural fiscal surplus rule that was established in 2000 to help insulate the economy from fluctuations in mineral commodity prices. During a boom period (as during 2007), this rule allows the Government to spend only the portion of the surplus revenue that is considered permanent and to save the transitory portion. (Transitory Government surpluses from the copper sector have been termed copper “windfall” revenues.) As part of the FRL, a panel of six members was selected to form a financial advisory council to advise the Minister of Finance concerning investment guidelines and other matters related to the two funds, including helping to determine what portion of the surplus mining revenues was permanent and what portion was transitory. The first fund is called the Economic and Social Stabilization Fund (ESSF) and was established with an initial investment of about \$6 billion in 2006, mostly from the closure of the old Copper Stabilization Fund (established in 1985); the second fund is called the Pension Reserve Fund and was established with an initial investment of \$600 million. At the end of 2012, the two funds contained \$15 billion and \$5.9 billion in assets, respectively, compared with \$13 billion and \$4.4 billion, respectively, at yearend 2011 (International Monetary Fund, 2009, p. 60; Kumhof and Laxton, 2009, p. 25; Ministerio de Hacienda, 2013, p. 8).

The Government, through the Ministerio de Minería, exercises control of the mineral industry through three state-owned companies and four regulatory agencies. The state-owned companies that are significant to the mineral industry include CODELCO, some subsidiaries of Corporación de Fomento de la Producción (CORFO), and ENAMI. The specific subsidiaries of CORFO that are significant to the mineral industry include

Cía. Chilena de Electricidad S.A., Empresa Nacional del Carbón S.A. (ENACAR), and Empresa Nacional del Petróleo (ENAP). The four regulatory agencies are COCHILCO, the Comisión Nacional del Medio Ambiente (CONAMA), Comité de Inversiones Extranjeras (CIE), and SERNAGEOMIN.

Production

In 2012, copper smelter production decreased by about 12% compared with that of 2011 owing to unscheduled maintenance of the smelter at CODELCO's Chuquicamata Mine, possible decreases in production at other CODELCO copper smelters, and unscheduled maintenance at Xstrata plc of Switzerland's Altonorte smelter. Production of other primary refined copper decreased by 18% owing to closure of the fire-refinery in CODELCO's El Teniente division by the end of 2011 and to decreases in production of electrically refined copper [not from a solvent-extraction/electrowinning (SX-EW) process] at other refineries in the country. Production of gold increased by about 11% owing mostly to increased production by primarily gold mining companies and partially to increased production of gold as a byproduct of copper mining by large-scale copper mining companies. In 2012, production of iron ore (Fe content) increased by about 22%, owing mostly to a full year of production at the Bellavista Mine (JSW Steel Ltd. of India, 70%, and Minera Santa Fe SCM, 30%) and at Minera Santa Fe's Carmen Mine in response to a continuation of strong demand in China (the leading destination for Chile's exports of iron ore, although Chile reportedly supplies only slightly greater than 1% of China's total imports of iron ore). Information concerning the causes of the changes in the estimated production of ferroalloys in 2012 compared with that of 2011 was not available (table 1; Henriquez, 2011b; Kumar, 2011; De la Jara and Esposito, 2012; Even and Jaramillo, 2012; JSW Steel Ltd., 2012, p. 33–34; 2013, p. 42; Vidal and González, 2012, p. 22, 51; 2013, p. 6, 8, 23, 62–63; CAP S.A., 2013, p. 4–5, 30–31; Comisión Chilena del Cobre, 2013a, p. 21, 26; Corporación Nacional del Cobre, 2013, p. 13–14, 71–73; Servicio Nacional de Geología y Minería, 2013, p. 49; Xstrata plc, 2013a, p. 20–22; Minera Santa Fe SCM, undated).

Production of mined lead and zinc were estimated to have decreased by 51% and 27%, respectively, compared with that of 2011. These decreases were owing mostly to Nyrstar NV of Belgium's mining plan to produce more gold in concentrates and less lead and zinc in concentrates at the company's El Toqui Mine. It appeared that the 14% decrease in mine output of molybdenum in the country was owing primarily to decreased production of molybdenum (as a byproduct of copper mining) at CODELCO's Chuquicamata Mine and at the Collahuasi Mine, where production of molybdenum decreased to 6,318 t of molybdenum in concentrates from 11,314 t in 2011 and to 1,953 t from 6,659 t in 2011, respectively. The decrease in the production of molybdenum at Chuquicamata Mine corresponded to a decrease in production of copper by about 87,500 t (Cu content) during this timeframe as CODELCO continued to deplete the existing reserves of the open pit mine before the company planned to transfer all production at the Chuquicamata Mine to an underground operation in 2020. Information was not available concerning total production of mercury in Chile or

the main cause of the 43% decrease in estimated U.S. imports of mercury from Chile compared with that of 2011 (table 1; Comisión Chilena del Cobre, 2013a, p. 17, 19; Corporación Nacional del Cobre, 2013, p. 70, 90; Nyrstar NV, 2013, p. 2, 33; Servicio Nacional de Geología y Minería, 2013, p. 51–53).

In 2012, the real value of production by Chile's construction sector increased by about 8% compared with that of 2011, and production of cement increased accordingly (by 7%). The year-on-year changes in the production of other construction materials and minerals used intensively in the construction sector differed substantially, however. Production of calcined gypsum decreased by 33% compared with that of 2011; dimension marble stone, about 29%; and crude gypsum, 13%. Detailed information was not available regarding the significant to substantial decreases in the production of many industrial minerals during this timeframe. Production of bauxitic clays decreased by 87%, possibly owing to decreased demand for its use in the manufacturing of refractory bricks (which was reported as its primary use) or substitution of imports; production of other clays (including ball and plastic clays) decreased by about 79% compared with that of 2011; bentonite, by 29%; copper sulfate, 21%; feldspar and quartz (unspecified), 15%; and lime, 13%. The decrease in the production of quartz could be primarily owing to decreased demand for use in smelters, and the decrease in the production of feldspar could be owing to a decrease in demand for its use in ceramics. Production of salt decreased by 19% owing primarily to a supplier response to decreased demand for deicing salt products in important export markets for Chilean salt, including in the United States (table 1; Banco Central de Chile, 2013a; 2013b, p. 54, 141; K+S Aktiengesellschaft, 2013, p. 111; Servicio Nacional de Geología y Minería, 2013, p. 12–14, 58–62, 69, 84, 89–91, 95–99, 103).

Production of most minerals and raw materials used intensively in fertilizers decreased. Production of peat decreased 64% compared with that of 2011; phosphate rock (apatite), by 40%; guano, 22%; and nitrates, about 11%. An important exception to this trend in decreased production of raw materials for fertilizers was the production of potash, which increased owing mostly to production of potash by Sociedad Química y Minera de Chile S.A. (SQM) as a result of an ongoing project to expand the company's production of potassium-based products in the Salar de Atacama. No information was available concerning the substantial percentage increases in the production of boric acid, phosphate rock, phosphorite, pyrophyllite, and zeolites in 2012 compared with those of 2011, but these large percentage increases did not involve very large volumes of production owing to the small base of (or zero) production of these mineral commodities in Chile in 2011. Production of silica sand increased by 11.5% compared with that of 2011, and the increase was most likely owing to an increase in domestic demand for its use in the manufacturing of glass (table 1; Servicio Nacional de Geología y Minería, 2013, p. 12–14, 72–74, 85, 87, 89–94, 102, 105; Sociedad Química y Minera de Chile S.A., 2013, p. 16–17, 26, 38–39, 50–51; Syrett, 2013).

The country's production of crude petroleum increased by 30% and that of natural gas decreased by 16%. These changes in production were owing to GeoPark Chile Ltd.'s substantial

increase in the production of crude petroleum but its slight decrease in the production of natural gas, and to ENAP's decrease in the production of crude petroleum by 4.1% and production of natural gas by 12.7% compared with levels of production in 2011. In 2012, Chile's production of methanol decreased by 41% because of the decreased availability of Chilean natural gas as feedstock for Methanex Corp. of Canada to process into methanol and insufficient imports of natural gas for the company to be able to utilize much of the methanol production capacity at its facilities in Cabo Negro (tables 1, 2; Empresa Nacional del Petróleo, 2013, p. 90; GeoPark Holdings Ltd., 2013, p. 6–7, 13, 36–37; Methanex Corp., 2013a, p. 7–11; Servicio Nacional de Geología y Minería, 2013, p. 12, 107–109).

Structure of the Mineral Industry

In 2012, many of the world's leading private mining companies were deeply invested in the mining sector of Chile. These companies included Anglo American plc and Antofagasta plc of the United Kingdom, Barrick Gold Corp. and Teck Cominco Ltd. of Canada, BHP Billiton Ltd. and BHP Billiton plc of Australia and the United Kingdom (BHP Billiton), Freeport-McMoRan Copper & Gold Inc. of the United States, K+S Aktiengesellschaft (K+S AG) of Germany, Rio Tinto Ltd. and Rio Tinto plc of Australia and the United Kingdom (Rio Tinto), and Xstrata plc of Switzerland (table 2).

The leading Chilean-owned companies in the mineral industry were CAP, CODELCO, Molibdenos y Metales S.A. (MOLYMET), and SQM; CAP, MOLYMET and SQM were privately owned. CAP controlled most of the production of ferrous metals in the country; state-owned CODELCO was the leading copper mining company in the world; SQM was reportedly the leading producer of iodine, lithium carbonate, and potassium nitrate in the world; and MOLYMET was the world's leading processor of molybdenum and producer of rhenium (table 2; CAP S.A., 2013, p. 6, 28–29, 32–34; Corporación Nacional del Cobre, 2013, p. 9–14; Molibdenos y Metales S.A., 2013, p. 7–10, 14, 32; Sociedad Química y Minera de Chile S.A., 2013, p. 18–22, 29).

In November 2011, Mitsubishi Corp. of Japan acquired 24.5% of Anglo American Sur S.A. (owned 100% by Anglo American at the time), which holds a significant portfolio of copper assets in Chile, including Los Bronces Mine, El Soldado Mine, the Chagres smelter, and a number of exploration properties. In August 2012, Mitsubishi agreed to sell back a 4.1% share in Anglo American Sur to Anglo American, so that Anglo American could sell a 29.5% share of Anglo American Sur to Inversiones Mineras Acrux SpA (owned 83% by CODELCO and 17% by Mitsui & Co., Ltd. of Japan) and still maintain a majority ownership interest in Anglo American Sur. By the end of August 2012, Anglo American owned 50.1% of Anglo American Sur; Inversiones Mineras Acrux, 29.5%; and Mitsubishi, 20.4%. In October 2012, CODELCO and Mitsui agreed to complete the financing of this acquisition through Mitsui purchasing an additional 15.25% share in Inversiones Mineras Acrux, which equated to Mitsui acquiring an additional 4.5% ownership share in Anglo American Sur. Following this final transaction between CODELCO and Mitsui, CODELCO owned 20% of Anglo American Sur and Mitsui, 9.5%;

Anglo American plc's and Mitsubishi's shares remained the same as after the deal in August. By the end of 2012, Anglo American Sur had completed ramping up production at Los Bronces Mine as part of an expansion project to be able to produce an estimated 450,000 metric tons per year (t/yr) of copper (Cu content) in 2013 at the mine compared with a production capacity of about 221,000 t/yr of copper at Los Bronces Mine at the beginning of 2011 (table 2; Mitsubishi Corp., 2011, 2012; Anglo American plc, 2013, p. 10, 43, 70–71, 158, 187, 232; Corporación Nacional del Cobre, 2013, p. 6–7, 43, 92, 103–104, 176–179).

In 2010, the CODELCO Norte Division was divided into the Chuquicamata Division and the Radomiro Tomic Division. In June 2010, construction work on the Radomiro Tomic Copper Sulfide Mining Project—Phase I was completed, and this project reportedly ramped up to full production by the end of 2011. The expansion included installation of an ore crushing and transportation system to be able to transfer about 100,000 metric tons per day of copper sulfide ore from the Radomiro Tomic Mine to the concentrator plant at the Chuquicamata Mine, so that the Chuquicamata concentrator would be able to operate efficiently (at closer to full capacity) during the period of transition from the Chuquicamata open pit mine to an underground mine. Only about 8 kilometers separate the Chuquicamata and Radomiro Tomic Mines. In 2012, CODELCO reported that copper production at its Chuquicamata Division decreased to 356,000 t of Cu content from about 443,000 t in 2011 and about 528,000 t in 2010 owing to the mining of lower ore grades as the company proceeded to mine out the reserves in the open pit before transferring the Chuquicamata Mine underground. Production of copper at the company's Radomiro Tomic Division decreased to about 428,000 t of copper (Cu content) in 2012 after increasing to about 470,000 t in 2011 from about 375,000 t in 2010. Reported copper production capacities for these two new CODELCO divisions were not available. It appeared, however, that the expansion of copper production capacity at the Radomiro Tomic Division in 2011 was enough to more than compensate for the decrease in production at the Chuquicamata Division that year, but this phase I expansion may not have been sufficient to compensate for subsequent decreases in production at Chuquicamata. This production information was used to (re) estimate the 2012 production capacities in table 2 for these two divisions of CODELCO (table 2; Corporación Nacional del Cobre, 2013, p. 8, 12, 48, 70–71, 90–91).

Assuming an average copper metal content of copper concentrates of 30%, the estimated copper production capacity for the Minera Escondida Ltda. (57.5% owned by BHP Billiton) was adjusted in table 2 to agree with BHP Billiton's reported nominal capacity to produce copper concentrates (gross weight) and copper cathodes at the Escondida Mine. In 2012, the Collahuasi Mine decreased production to about 282,000 t of copper (Cu content) from about 453,000 t in 2011 reportedly owing to the planned mining of lower ore grades, adverse weather conditions, stoppages for safety reasons, and the failure of a ball mill. Xstrata reported that it expected Collahuasi's production to increase to about 400,000 t/yr of copper in 2013, and this information was used to revise the estimate of the

mine's production capacity listed in table 2 (BHP Billiton Ltd., 2012, p. 44; 2013a, p. 45; Xstrata plc, 2013b, p. 3, 5).

From 2010 through 2012, SQM continued to increase its capacity to produce potassium-based products [including potash (potassium chloride and potassium sulfate), potassium nitrate, and others]; the company reported that it had increased its capacity to be able to produce more than 2.6 million metric tons per year (Mt/yr) of potassium-based products by the end of 2012. Complete information was not available concerning what the allocation of the total production capacity between the different potassium-based products was, however. In 2011, SQM completed construction of a new production facility in Coya Sur that increased the company's production capacity by 300,000 t/yr of potassium nitrate to achieve a total production capacity of 950,000 t/yr of potassium nitrate at its Coya Sur complex. In 2012, Rockwood Holdings Inc. of the United States changed the name of some of the company's subsidiaries that it owned through its acquisition of Chemetall GmbH of Germany in 2004, including changing the name of Sociedad Chilena de Litio Ltda. to Rockwood Lithium Ltda. Sociedad Minera Punta de Lobos S.A. (a subsidiary of K+S AG) expected to complete the 1.5-Mt/yr salt production capacity expansion at its mine in the Salar Grande de Tarapaca by the end of 2012 but later reported that it would not be completed until mid-2013. Consequently, the company's production capacity continues to be listed as 6.5 Mt/yr of salt in table 2; the expected capacity by yearend 2013 is 8.0 Mt/yr (table 2; Rockwood Holdings Inc., 2012a, b; K+S Aktiengesellschaft, 2013, p. 59; Sociedad Química y Minera de Chile S.A., 2013, p. 16, 31, 37–40).

By the end of 2012, the merger of Glencore International plc and Xstrata plc to form Glencore Xstrata plc had been approved, but it was not finalized until May 2, 2013. The effect of this merger on the names of the Xstrata subsidiaries that owned or partially owned the Altonorte copper smelter, the Collahuasi Mine, and the Lomas Bayas Mine was not known at the end of 2012, so the ownership information remains unchanged in table 2. In August 2012, CODELCO inaugurated the company's new EcoMetales arsenic disposal plant, and the new plant has the capacity to recover about 25,000 t/yr of copper from acid leaching of residual material (copper flue dust and copper refinery effluents) and to convert about 10,000 t/yr of the arsenic in those copper production residues to a stabilized waste product for disposal (table 2; EcoMetales Ltd., 2012; 2013, p. 6, 31–38; Corporación Nacional del Cobre, 2013, p. 131–132; Glencore Xstrata plc, 2013, p. 4–7; Xstrata plc, 2013a, p. 1–3).

Commodity Review

Metals

Copper.—BHP Billiton reported that the Escondida Mine produced about 1.1 million metric tons (Mt) of copper (Cu content) in 2012 compared with slightly less than 820,000 t in 2011, and the company expected Escondida to produce about the same amount of copper in 2013 as in 2012. The primary reason for the increased production in 2012 at the Escondida Mine was planned mining of higher grade ore following completion of the Escondida Ore Access project in June 2012, and somewhat to additional copper ore processing capacity

provided by the completion of a debottlenecking project at the Laguna Seca concentration plant during the year. In February 2012, BHP Billiton approved Organic Growth Project I (OGP 1) for the Escondida Mine, which will replace Los Colorados concentration plant with a new one that will be located closer to higher grade ore and allow Minera Escondida to increase production of copper in concentrates to about 1.3 Mt/yr of copper by sometime during the second half of 2014 (table 2; BHP Billiton Ltd., 2012, p. 48; 2013a, p. 49; Comisión Chilena del Cobre, 2013a, p. 17).

On March 23, 2011, the Ventanas Division of CODELCO suspended production at the Ventanas copper smelter and refinery immediately after detecting a brief release of gasses containing sulfur dioxide. During 2012, CODELCO reported that it invested about \$35 million in improving gas emissions capture and treatment processes and in reducing emissions (both gasses and particulates) at Ventanas. In June 2012, CODELCO announced that it planned to invest about \$170 million to achieve a 33% reduction in smelter emissions at Ventanas by 2015. On October 19, 2012, the Ventanas Division also announced that it would stop production of refined gold (bars) and silver metal (granules) at the noble metals plant at Ventanas during the first quarter of 2013. During this closure, the barrels of copper anodic slimes produced by CODELCO that could be processed to recover gold, silver, and other valuable metals at the noble metals plant at Ventanas were expected to be added to the company's volume of copper anodic slimes already being sold to third parties for processing and (precious) metals recovery (Corporación Nacional del Cobre, 2011, p. 31–40; 2012a, b; 2013, p. 14, 74, 90, 131, 312; DKL Engineering Inc., 2011; Henríquez, 2011a; Business News Americas Ltda., 2012b).

Gold and Silver.—In 2012, Barrick experienced unexpected cost overruns and delays in construction at its Pascua-Lama gold and silver project on the border of Argentina and Chile. The additional costs and delays appeared to be owing mostly to the company having to halt pre-stripping activities in order to increase its control and mitigation of dust and enhance its management of water resources at the prospective mine site. In September and October 2012, two actions were filed against Barrick in Chile by representatives of indigenous communities and others, who sought to halt construction of the Chilean part of Pascua-Lama and claimed that the mine construction project was no longer in compliance with environmental requirements. In April 2013, a Chilean court ordered a suspension of Pascua-Lama in order to evaluate the merits of these claims, and Barrick halted construction of the mine on April 10. On July 15, 2013, a Chilean appeals court ordered that construction of the Pascua-Lama project continue to be suspended until completion of the necessary infrastructure for a water management system that would meet the requirements of the previously granted environmental permits for the project. On September 25, 2013, Chile's Supreme Court upheld this suspension. Thus, Barrick decided to reorder the mine construction activities at Pascua-Lama to complete the project's water management system by the end of 2014, before resuming other construction activities. If the new construction plan is approved and Chile's Superintendencia of the Environment

agrees that the new water management system satisfies the environmental permit requirements, Barrick expected Pascua-Lama to begin production about mid-2016 (Barrick Gold Corp., 2013a, p. 2–3, 7, 37, 161–162; 2013b, p. 6–7, 16–17; Lopez, 2013; Reuters, 2013a; Ulmer, 2013a)

On April 30, 2012, Chile's Supreme Court suspended a key environmental permit for the El Morro copper-gold project (70% owned by Goldcorp Inc. of Canada and 30% owned by New Gold Inc. of Canada), and Goldcorp halted construction activities at the project from April 27, 2012, through at least the first three quarters of 2013. Before the suspension, production at El Morro had been expected to begin sometime in 2017, but definitive information concerning a new timeline for potential startup of production at the mine was not available. In 2012, the Cerro Bayo Mine produced 90,560 kilograms (kg) of silver and about 530 kg of gold, and Compañía Minera Cerro Bayo Ltda. (100% owned by Mandalay Resources Corp. of Canada) continued to ramp up production at the mine following the restart of production in January 2011 (Ulmer and Rocha, 2012; Goldcorp Inc., 2013, p. 6, 25, 29, 62–63; Mandalay Resources Corp., 2013, p. 4, 13–14; Ulmer, 2013b).

Iron Ore and Iron and Steel.—In 2012, Compañía Minera del Pacífico S.A. (CMP) (owned 75% by CAP and 25% by MC Inversiones Ltda.) was estimated to have accounted for approximately 70% of Chile's gross weight of iron ore production compared with about 94% in 2011, although CMP did increase production slightly to 12,055,000 t of iron ore (gross weight) from about 11,883,000 t in 2011. The percentage of the Fe content of iron ore production in Chile that CMP accounted for may have differed somewhat because the company produces iron ore in various forms (including iron ore pellet feed, iron ore pellets, iron ore fines and lumps, and others), which have different Fe content, and because information on the Fe content of production by company in Chile was not available. In 2012, CMP's consolidated sales of iron ore totaled about 12.25 Mt, and 85.3% (10.45 Mt) was exported whereas 14.7% (about 1.8 Mt) was sold domestically (for the production of steel in Chile); the company exported 65.3% of its total consolidated sales of iron ore to China, 8.7% to Japan, 8% to Bahrain, 2.5% to Indonesia, and 0.8% to the United States. In 2012, the estimated annual average sales price of iron ore delivered by CMP reportedly decreased by about 26% compared with that in 2011, and the estimated annual average sales price of iron ore for all producers in Chile decreased by 23% to \$112.80 per metric ton from \$146.50 per metric ton in 2011 (tables 1, 2; CAP S.A., 2013, p. 4, 24–31; Servicio Nacional de Geología y Minería, 2013, p. 24).

In 2012, apparent use of finished steel in Chile increased to about 3.0 Mt from about 2.6 Mt in 2011, and Compañía Siderúrgica Huachipato S.A. (CSH, 100% owned by CAP) sold about 1.1 Mt of finished steel to the domestic market to account for about 37% of domestic use in 2012. Chile had to import most of the remainder of steel products that were used, and the International Steel Statistics Bureau estimated that the country's imports of steel products increased to 1.77 Mt in 2012 from about 1.32 Mt in 2011. The leading sectors for steel demand in Chile were the construction and mining sectors. In 2012, the country spent about \$2 billion on imports of iron,

steel, and related products compared with about \$1.7 billion in 2011. Just including the portion of Chile's total expenditure on imports of iron, steel, and related products that was included in the 50 most valuable products imported from China, Chile spent about \$412 million on imports of iron and steel products from China in 2012 compared with \$240 million in 2011, but accurate information concerning the tonnages of Chile's steel imports from China was not available (Banco Central de Chile, 2013b, p. 61–62, 85, 222; CAP S.A., 2013, p. 4–8, 32–34; ISSB Ltd., 2013; Ribeiro, 2013).

From January through November 2012, Venezuela was the leading destination (by volume) for China's exports of manufactured steel products to Latin America, followed by Brazil and Chile (in the region). From 2010 through 2012, steel demand in Latin America grew significantly and the current steel consumption in the region was increasingly supplied by imports during this timeframe (especially if one includes the indirect imports of steel contained in imports of other manufactured products). The two leading steel-producing countries in the region (Brazil and Mexico) and Colombia began to seek greater trade protection against imports of steel and steel products that appeared to be subsidized or otherwise sold in Latin America at prices that did not adequately reflect the actual costs of production ("dumping"). Through the end of 2012, it did not appear as though Chile was also planning to try and enact any anti-dumping or other trade-defense measures to protect the country's steel sector. Based upon production during the first 7 months of 2012, the Latin American Steel Association estimated that Brazil could have accounted for about 51% of crude steel production in Latin America during the year; Mexico, 27%; Argentina, 8%; Venezuela, 3.7%; Chile, 2.6%; and Colombia, 2% (Asociación Latinoamericana del Acero, 2012a, p. 9; 2012b; 2013; Weik, 2013).

Industrial Minerals

Lithium and Potash.—Chile's globally significant production of industrial minerals was highly dependent on the mining of the brine deposits and caliche ores contained in the salars and arid areas, respectively, in the northern part of the country. In 2012, SQM and Rockwood Lithium accounted for approximately the entire production of lithium in Chile, and these companies were estimated to have accounted for about 21% and 16%, respectively, of the world's production of lithium. In 2012, Rockwood Lithium started construction of a new plant to produce 20,000 t/yr of lithium carbonate at its facilities in La Negra, and the company expected to complete construction of the plant by the end of 2014. Both Rockwood Lithium and SQM also produce potash from mining the same brine deposits that they extract lithium from, but neither company accounted for greater than 3% of the world's potash production in 2012 (Clarke, 2012, 2013; Lismore, 2012; Rockwood Holdings Inc., 2012a, b; 2013, p. 7, 30, 37–38; Superneau, 2012c; Sociedad Química y Minera de Chile S.A., 2013, p. 16–19, 33).

In 1986, the Government declared lithium to be a strategic mineral owing to studies regarding the possible use of lithium in nuclear power that were being carried out at the time, and the mining of lithium in the country had already been restricted

to either state-owned companies or companies that had been granted lithium mining concessions before 1979 [including Chemetall (now Rockwood Lithium), CODELCO, and SQM]. In February 2012, the Government announced plans to award special contracts to encourage greater development of lithium resources in Chile, and the Government awarded a special tender for new lithium concessions to SQM on September 24. On October 4, however, the tender was annulled because SQM had lawsuits pending with the Government, and a precondition to bid on the tender was that the bidders could not have any legal issues pending with the state. In December 2012, the Government said it would wait until sometime in 2013 to decide whether to reactivate the tender process for the new lithium concessions. One option to circumvent the legislative obstacles of lithium being declared a strategic mineral and still attract new private investment to develop lithium resources in Chile was to have state-owned CODELCO participate in joint-venture contracts with private companies to develop the lithium concessions that CODELCO already has rights to, but no such projects were announced in 2012 (Clarke, 2012, 2013; Henriquez, 2012d, g; Industrial Minerals, 2012a, b; Lismore, 2012; Watts, 2012; Bourke, 2013).

Phosphate Rock.—Production of phosphate rock and phosphorite in Chile has varied quite a lot year to year. In January 2012, Lara Exploration Ltd. (Lara) of Canada formed an alliance with Kiwanda Group LLC (Kiwanda) of the United States to acquire, explore, and develop phosphate deposits in the Andean region of South America. In 2012, Lara signed a letter of intent with Compañía Minera de Fosfatos Naturales Ltda. (Bifox) and Sociedad Contractual Minera Bahía Inglesa (SCMBI) to acquire exploration and mining licenses for mineral deposits in the Bahía Inglesa district of Chile that were originally explored for sedimentary phosphates by the Government in the 1980s, and Bifox and SCMBI are currently producing phosphate concentrates from some of this same area. Under the agreement, Bifox and SCMBI could continue their phosphate mining and processing operations and would have exclusive rights to sell any production by Kiwanda Chile S.A. (50% owned by Lara and 50% owned by Kiwanda) to the Chilean market. In return, Kiwanda and Lara would have access to Bifox's laboratory and other facilities at and around Bahía Inglesa for a period of 3 years, with an option to purchase them at market prices (tables 1, 2; Lara Exploration Ltd., 2013, p. 11–12).

Mineral Fuels and Related Materials

Coal.—In 2012, Chile consumed a total of 10.161 Mt of coal (all types), and the country imported 9.265 Mt of bituminous coal. So, imports could have accounted for about 91% of total coal consumption, by volume, and imports reportedly accounted for about 94% of the coal used in power generation in the country in 2011. In 2011, the Government approved the Mina Invierno coal mining project in Region XII (the Magallanes region). In 2012, the Magallanes region accounted for about 80% (570,000 t) of the country's total production of coal. Government officials estimated that production from the new Mina Invierno Mine could average about 6 Mt/yr of subbituminous coal and replace about 30% of Chile's current

imports of coal. Thus, it appeared that a far greater volume of domestic subbituminous coal would need to be consumed to generate the equivalent amount of power currently being generated by using imports of higher quality bituminous coal. In 2012, environmentalists protested the approval of the project, citing the expected lower quality (and lower economic value per ton) of the coal from Mina Invierno relative to imports and the high estimated environmental cost to the area (which is reportedly part of the Patagonia). It appeared as though Minera Isla Riesco S.A. (the operator) continued to develop the Mina Invierno coal mining project in 2012, but information concerning a definitive timeline to its completion or whether there had been significant delays during the protests was not available (Henriquez, 2012e; Servicio Nacional de Geología y Minería, 2013, p. 107; U.S. Energy Information Administration, 2013; Comisión Nacional de Energía, undated).

Methanol and Natural Gas.—In 2012, Methanex began the process of relocating a plant (one of four) with capacity to produce 1 Mt/yr of methanol to Geismar, Louisiana, from Cabo Negro, Chile, and the company was considering relocating a second (idle) plant (with about the same production capacity) to Geismar from Cabo Negro. Owing to insufficient natural gas supplies, Methanex planned to temporarily stop all methanol production at its facilities in Cabo Negro sometime in March 2013. Combined, the four plants at Cabo Negro had a nameplate capacity to produce 3.8 Mt/yr of methanol. So, the production capacity in 2012 was estimated to be about 2.8 Mt/yr, and it could decrease to 1.8 Mt/yr of methanol if the second plant is moved to Geismar. In 2012, the company worked with both Geopark and ENAP to discover and develop additional natural gas fields in Chile, including owning 17% and 12.5% interests in joint ventures with Geopark and other companies to explore the Tranquilo and the Otway Blocks, respectively. Through the end of 2012, neither of these exploration properties were developed to the production stage, and the companies involved in the joint venture to explore the Tranquilo Block decided to not continue with exploration there; in January 2013, they relinquished the Tranquilo exploration concession (table 2; GeoPark Holdings Ltd., 2013, p. 23, 37; Methanex Corp., 2013a, p. 3, 5–11, 20–25, 33; Servicio Nacional de Geología y Minería, 2013, p. 109; U.S. Energy Information Administration, 2013).

Reserves and Resources

At the end of 2012, the country was estimated to have the leading reserves of copper, lithium, rhenium, and selenium in the world; the second-ranked reserves of iodine; and the third-ranked reserves of molybdenum and silver. Chile was also estimated to have globally significant (equal to or greater than 5% of the world total) reserves of gold, and a substantial proportion of these gold and silver reserves were associated with the copper reserves at some of the major porphyry copper deposits in the country. Chile was estimated to have accounted for less than 2% of global potash reserves. For every year since 1998 and through 2012, the U.S. Energy Information Administration has estimated that Chile had 98 billion cubic meters of proven natural gas reserves and 150 million barrels of proven crude oil reserves (Edelstein, 2013b; George, 2013a–c; Jasinski, 2013;

Jaskula, 2013; Polyak, 2013a–c; U.S. Energy Information Administration, 2013).

Outlook

In a mining survey conducted by Business News Americas Ltda. between October and early December 2011, 45% of survey respondents said that Chile had the best investment climate in Latin America for mining investment. By the end of February 2013, the Fraser Institute's global ranking of Chile as a desirable destination for investment by private companies in the mining and quarrying sector had decreased to 23rd out of 96 jurisdictions from 18th out of 93 jurisdictions in February 2012 and 8th out of 79 jurisdictions worldwide in March 2011. The Fraser Institute reported that Chile's decrease in its rankings was owing mostly to worsening perceptions of the country amongst its survey respondents in the following categories: the legal system; regulatory duplication and inconsistencies; and uncertainty regarding the administration, interpretation, or enforcement of existing regulations. Before 2012, Chile was the only jurisdiction outside of North America that consistently ranked among the top 10 in the Fraser Institute's mining survey. The director of Chile's Center for Copper and Mining Studies (CESCO) argued that the Fraser Institute's mining survey suffered from some methodological issues, including that the number of respondents could be small, the population of potential respondents could be inconsistent year-to-year, and the final ranking could be based on subjective factors. He suggested that one should look at actual investment behavior for a better indication of the competitiveness of the mining sector and its attractiveness to investors. Investment in the mining and quarrying sector in Chile increased substantially (by about 38%) in 2012 compared with that of 2011 (McMahon and Cervantes, 2011, p. 6, 9, 12; 2012, p. 7–12, 49; Henriquez, 2012b; Superneau, 2012d; Comisión Chilena del Cobre, 2013a, p. 68–69, 124; Wilson and others, 2013, p. 5, 14).

In August 2013, the Government forecast that Chile's mining and quarrying sector could attract about \$112 billion in investment during the following 8 years (until 2021). According to the CEO of CODELCO, the expected investment in Chile's copper sector during this time period could enable the country to continue to be the world's leading producer of copper, but that Chile's share of global copper production could still decrease to about 31% as the world's second-ranked producer in 2011 (Peru) could narrow the gap in copper production compared with Chile. Uncertainty owing to labor negotiations, changing tax regimes, uncertainty in output prices, accidents, equipment failures, or even natural hazard incidents (such as earthquakes) are ever present and could affect many of the projected timelines for mining projects, companies' production plans at existing mineral production facilities, and actual production in comparison to nameplate, designed, or projected production capacity. Especially for new mining projects that do not yet have a completed feasibility study or do not expect to begin production until 4 to 5 years after an announced timeline, uncertainty can lead to delays in the actual start of production until years after the initially announced startup date (Henriquez, 2012c; Vidal and González, 2012, p. 3–6; 2013, p. 3–5; Reuters, 2013b).

Based on data through September 2013 (2013 data are preliminary), Chile's production of mined copper could increase to a revised figure of about 5.75 Mt in 2013, as the Collahuasi Mine had increased production by about 43% compared with the same period in 2012 and the Escondida Mine appeared to be on pace to produce closer to 1.2 Mt of copper by the end of 2013 than BHP Billiton's projected amount of 1.1 Mt. The country's production of mined copper was projected to remain about the same (5.8 Mt) in 2014, assuming that the 2013 production gains at the Collahuasi and the Escondida Mines are maintained in 2014 and that any continuing decrease in production at the Chuquicamata Mine is compensated for by production at other mines. The country's output of mined copper could possibly increase to 5.9 Mt in 2015, when the OGP 1 expansion at the Escondida Mine is scheduled to be completed, and assuming that production at existing mines does not decrease substantially, on average, during 2014 or 2015. In 2013, Chile's production of gold could have remained about the same as in 2012 (about 48,600 kg), and it could decrease significantly in 2014 as increasing production of gold by Yamana Gold Inc. of Canada at both its El Peñón and Minera Florida Mines is not expected to exceed decreases in gold production at other mines, including copper mines. The earliest completion of a large-scale gold mining project (projected to produce greater than 10,000 kg/yr of gold) in Chile is expected to be at Barrick's Pascua-Lama project in 2016 (Garay and others, 2012, p. 11; Vidal and González, 2012, p. 15–21, 30–29; 2013, p. 3, 6–8, 13, 21, 25, 42–43, 51–60; BHP Billiton Ltd., 2013b, p. 5–6; Comisión Chilena del Cobre, 2013b; Yamana Gold Inc., 2013, p. 17–21).

In 2013, CMP worked on construction of the Cerro Negro Norte Mine and also on expansions of Los Colorados Mine and the Huasco pellets plant. Completion of the mining projects was expected to increase the company's production capacity by 6 Mt/yr of iron ore (pellet feed) in 2014 (4 Mt/yr from the new Cerro Negro Norte Mine and 2 Mt/yr from the expansion of Los Colorados Mine). In addition, CAP invested in construction of a seawater desalination plant near Caldera, and CMP worked on the Phase V extension of El Romeral Mine that was expected to begin production in the first quarter of 2014. In 2013, SQM continued to invest in increasing production of iodine, nitrates, and potassium-based products (including potash), and these expansions were expected to be implemented gradually, possibly extending into 2015. Production of lithium could increase substantially in 2015 if Rockwood Lithium completes its new lithium carbonate plant at La Negra by the end of 2014, as planned (Vidal and González, 2012, p. 23, 52–53; 2013, p. 23–24, 61–64; CAP S.A., 2013, p. 5–7, 38; Rockwood Holdings Inc., 2013, p. 7; Sociedad Química y Minera de Chile S.A., 2013, p. 16–21, 26, 38–39).

In October 2013, Methanex restarted one plant in Chile with the capacity to produce 900,000 t/yr of methanol reportedly owing to an increase in the availability of natural gas domestically and from Argentina; earlier in the year, the company had decided to relocate a second plant with the capacity to produce 1 Mt/yr of methanol from Chile to Geismar, Louisiana. Consequently, the company's production capacity in Chile in 2013 could be about 1.8 Mt/yr of methanol. Argentina was estimated to have the leading recoverable shale gas

potential in Latin America at about 23 trillion cubic meters of potentially recoverable shale gas, and Chile was ranked a distant seventh with an estimate of about 1.4 trillion cubic meters of potentially recoverable shale gas. Because the infrastructure already exists and supply agreements are already in place for Argentina to export natural gas to Chile, development of the shale gas resources in Argentina could help increase the supply of natural gas in Chile (table 2; Lenton, 2012; Methanex Corp., 2013a, p. 10–11, 22, 25, 74; 2013b).

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TABLE 1
CHILE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2008	2009	2010	2011	2012
METALS					
Arsenic trioxide ^{e,3}	10,000	11,000	11,000	11,000 ^r	10,000
Copper:					
Mine output, Cu content ⁴	5,328	5,394	5,419	5,263	5,434
thousand metric tons					
Metal:					
Smelter, primary	1,369	1,522	1,560	1,522 ^r	1,342
Refined:					
Electrowon	1,971	2,118	2,089	2,025	2,029
Primary, other	1,087	1,159	1,155	1,068	873
Total	3,058	3,277	3,244	3,093	2,902
Gold, mine output, Au content	39,162	40,834	39,494	45,137	49,936
kilograms					
Iron and steel:					
Ore and concentrate:					
Gross weight	9,316	8,242	9,129	12,625	17,330
thousand metric tons					
Fe content	5,670	5,006	5,852	7,747	9,429
Metal:					
Pig iron	1,109	923	635	1,072 ^r	1,065
Ferrous alloys:^{e,5}					
Ferrosilicon	54	11	184	35	67
Ferromolybdenum	16,900	10,800	12,500	17,200	15,500
Steel, crude	1,523	1,308	1,011	1,615 ^r	1,683
thousand metric tons					
Semimanufactures	1,573	1,286	896	1,518 ^r	1,500 ^e
do.					
Lead, mine output, Pb content	3,985	1,511	695	841	410
Manganese ore and concentrate:					
Gross weight	18,273	5,722	--	--	--
thousand metric tons					
Mn content	5,096	1,642	--	--	--
Mercury^{e,6}					
Mine output, Mo content	NA	88	176	90	52
kilograms					
Molybdenum, mine output, Mo content	33,687	34,925	37,186	40,889	35,090
thousand metric tons					
Of which, oxides ⁷	5,662	7,134	5,885	4,821	4,790
Rhenium, mine output, Re content ^{e,8}	27,600	25,000	25,000	24,000	24,000
kilograms					
Selenium ^c	78,000	90,000	70,000 ^r	75,000 ^r	75,000
do.					
Silver:					
Mine output, Ag content	1,405	1,301	1,287	1,291	1,195
thousand metric tons					
Metal, Ag content ⁹	161,992	195,375	150,060	165,550 ^r	165,000 ^e
kilograms					
Zinc, mine output, Zn content	40,519	27,801	27,662	36,602	26,762
INDUSTRIAL MINERALS					
Boron compounds:					
Boric acid (H ₃ BO ₃)	7,525	5,214	--	2,898	5,085
thousand metric tons					
Ulexite, natural	583,474	607,921	503,609	488,523	444,487
Cement, hydraulic	4,622	3,876	3,871	4,406	4,722
Clays:					
Bauxitic	60,022	69,634	29,832	38,312	4,976
Bentonite	--	--	--	1,255	893
Kaolin	63,526	48,354	62,226	59,912	60,429
Other, including ball and plastic clays	23,197	6,076	7,972	9,057	1,940
Copper sulfate	12,971	11,860	12,023	11,187	8,814
Diatomite	25,497	23,027	30,925	22,938	23,021
Dolomite	14,263	--	--	1,498	--
Feldspar	17,834	9,079	7,723	7,563	6,399
Gypsum:					
Crude	773,794	723,928	758,011	917,759	799,064
Calcined	197,264	196,043	183,919	185,576	124,154
Iodine, elemental	15,503	17,399	15,793	16,000 ^e	17,494
Lime, hydraulic ^c	820	790	890 ^r	860 ^r	970
thousand metric tons					

See footnotes at end of table.

TABLE 1—Continued
CHILE: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2008	2009	2010	2011	2012
INDUSTRIAL MINERALS—Continued					
Lithium compounds, natural:					
Lithium carbonate	48,469	25,154	44,025	59,933	62,002
Lithium chloride	4,362	2,397	3,725	3,864	4,145
Lithium hydroxide	4,050	2,987	5,101	5,800	5,447
Nitrates, crude, natural	1,158	1,049	1,059	928	823
Peat, horticultural use	--	768	1,343	958	346
Phosphatic materials, natural:					
Phosphate rock (apatite):					
Gross weight	21,306	10,584	9,019	14,304	8,585
P ₂ O ₅ content ^e	6,570	3,260	2,780	4,410	2,650
Phosphorite	16,988	1,059	40,664	--	5,750
Guano	2,892	1,649	845	1,625	1,266
Potash, natural:					
Potassium chloride, KCl	753,995	942,309	1,523,222	1,328,504	1,581,226
Of which, K ₂ O equivalent ¹⁰	476,300	595,300	962,200	839,200	998,900
Potassium sulfate, K ₂ SO ₄	163,096	188,643	2,774	43,185	105,182
Of which, K ₂ O equivalent ^{e,11}	83,000	96,000	1,400	22,000	54,000
Pumicite	1,063,176	919,249	824,049	816,565	826,779
Pyrophyllite	1,147	412	1,126	349	730
Salt (NaCl)	6,431	8,382	7,695	9,966	8,057
Siliceous sand and gravel (silica):					
Quartz, unspecified	535,771	601,344	501,534	422,468	359,692
Silica sand	864,995	803,177	824,759	814,375	907,784
Sodium compounds, n.e.s., sulfate ^{12,13}	128	112	60	--	--
Stone:					
Calcium carbonate, limestone	7,295	6,012	6,518	6,270	6,658
Of which:					
Coquina	420	297	329	391	375
Ground calcium carbonate, white	34	46	48	45	44
Limestone, crude	6,841	5,670	6,141	5,834	6,238
Lapis lazuli	5	215	--	--	--
Marble	187	1,582	2,170	3,201	2,285
Travertine	11,413	5,473	4,015	4,117	4,467
Sulfur, byproduct ¹⁴	1,586	1,658	1,686	1,723	1,681
Talc	961	790	238	--	--
Zeolites	140	--	--	94	250
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous and lignite, marketable	534	636	619	654	712
Coke ^c	520	450	350	560	580
Methanol	1,088	942	935	554	313
Natural gas, marketable	1,828	1,889	1,793	1,440	1,207
Petroleum:					
Crude and condensate ¹⁵	966	1,355	1,536	1,741	2,267
Refinery products: ¹⁶					
Liquefied petroleum gas	7,674	8,560	7,787	7,529	6,774
Gasoline, including for aviation	21,687	21,121	17,549	18,957	19,379
Kerosene, including for jet fuel	4,573	5,271	4,994	4,988	5,548
Diesel and distillate fuel oil	27,549	25,751	21,738	23,694	21,436
Residual fuel oil	12,756	11,177	9,202	8,737	8,020
Other, including asphalt, ethylene, naphtha, propylene, solvents, and so forth	8,334	7,875	5,862	6,277	6,611
Total	82,573	79,755	67,131	70,182	67,766

See footnotes at end of table.

TABLE 1—Continued
CHILE: PRODUCTION OF MINERAL COMMODITIES¹

²Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ¹Revised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through February 12, 2014.

²In addition to the commodities listed, pyrite is also produced, but available information is inadequate to make reliable estimates of output.

³Estimated arsenic trioxide equivalent of possible arsenic-containing residues and smelter dusts that might be recovered from nonferrous metals plants in Chile, although these residual materials may not have been processed to recover commercial-grade arsenic trioxide.

⁴Figures are the nonduplicate copper content of ore concentrates, blister, and refined copper measured at the last stage of commercial production, as reported by Comisión Chilena del Cobre (COCHILCO). Mine production reported by Servicio Nacional de Geología y Minería (SERNAGEOMIN) for the same years was only slightly higher (0.01% to 0.95%).

⁵Estimated from reported net exports.

⁶Data represent only U.S. imports from Chile. Source: U.S. International Trade Commission, Interactive Tariff and Trade DataWeb, Version 3.1.0.

⁷Production of molybdenum oxide only from the Chuquicamata and Radomiro Tomic Divisions of Corporación Nacional del Cobre de Chile (CODELCO).

⁸Data could include some estimated rhenium content from Belgium, Mexico, Peru, and the United States that was processed in Chile.

⁹Production of refined silver metal (granular) only from the Ventanas smelter and refinery.

¹⁰Based on 63.17% potassium oxide equivalent for potassium chloride (sylvite) in Chile, as reported by SERNAGEOMIN, and rounded to four significant digits.

¹¹Based on an assumed 51% potassium oxide equivalent for potassium sulfate, according to a minimum global average estimate and rounded to two significant digits. Source: Jasinski, S.M., 2012, Potash, *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2010, v. I, p. 58.1–58.9.

¹²Not elsewhere specified.

¹³Includes production of natural sodium sulfate and anhydrous sodium sulfate, which are coproducts of the nitrate industry (salitre).

¹⁴Sulfur content of sulfuric acid as a byproduct of metallurgy and processing of mineral fuels, as reported by COCHILCO.

¹⁵Includes natural gasoline.

¹⁶Includes production from both imported and domestic petroleum, as reported by Empresa Nacional del Petróleo (ENAP).

TABLE 2
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Arsenic (stabilized as nonhazardous waste)	EcoMetales Ltd. (Codelco Technologies Ltd., 100%)	Plant to remove the arsenic and antimony contained in smelting residues from the Chuquicamata Division, Region II	10
Barite metric tons	Sociedad Minera Godoy Schwenger y Cía.	La Calera, Region V	400
Bentonite do.	Sociedad Legal Minera Mabel Dos Primera de Arica	Quarry and plant near Arica, Region XV	1,500
Boron compounds, B ₂ O ₃ content	Química Industrial del Bórax Ltda. (private, Chile-based investors, 100%)	Ulexite mine at Salar del Surire; and boric acid and agrochemical plants near Arica, Region XV	550
Do.	S.Q.M. Boratos S.C.M. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Mine brines of Atacama Salar, and boric acid plant at Antofagasta, Region II	200
Do.	S.Q.M. Salar S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Plant in Santiago Metropolitan Region	NA
Calcium carbonate, natural	Minera El Way S.A. (Cementos Bío Bío S.A., 100%)	Quarry near Antofagasta, Region II	NA
Do.	Minera El Jilguero S.A. (Cementos Bío Bío S.A., 100%)	Quarry near Copiapo, Region III	NA
Do.	Minera Río Teno S.A. (Cementos Bío Bío S.A., 100%)	Quarry and plant at Teno, near Curico, Region VII	NA
Do.	Minera Río Colorado S.A. (Cementos Bío Bío S.A., 51%, and Soprocál Calerías e Industrias S.A., 49%)	La Perla Mine and plant near Melipilla, Santiago Metropolitan Region	NA
Do.	Sociedad Minera Las Abuelitas Ltda. (Soprocál Calerías e Industrias S.A., 100%)	Mine and plant near Melipilla, Santiago Metropolitan Region	NA
Do.	Minera Melón S.A. (Melón S.A., 100%)	Navío Mine near Quillota, Region V	NA
Do.	Alfredo Villalobos Román Tarsicio S.A.	Quarry and plant near Illapel, Region IV	NA
Do.	César B. Formas Ortiz S.A.	Plant at Chañaral, Region III	NA
Do.	Explotaciones de Minas Tongoy Ltda.	Quarry and plant near Tongoy, Region IV	NA
Do.	Imopac Ltda.	Plant at Vallenar, Region III	NA
Do.	Mario Alberto Pizarro A. S.A.	Plant at Los Vilos, Region IV	NA
Do.	Minera Trucco Ltda.	Mine and plant, Santiago Metropolitan Region	NA
Do.	Cristalerías Toro S.A.I.C.	Plant at Santiago, Santiago Metropolitan Region	NA
Do.	Sociedad Minera Godoy Schwenger y Cía.	Mine and plant near Quillota, Region V	NA
Do.	Compañía Minera Feltre Ltda.	Plant at Santiago, Santiago Metropolitan Region	NA
Do.	Compañía Minera Saturno Ltda.	do.	NA
Do.	Unimin Chile Ltda.	do.	NA
Do.	Sociedad Minera y Comercial Alegría y Cia Ltda.	Mine and plant at Coquimbo, Region IV	NA
Do.	Sociedad Contractual Minera Pirineos	Quarry and plant at Vallenar, Region III	NA
Do.	Cemento Polpaico S.A. (Holcim Ltd., 54.3%; Compañía de Consumidores de Gas de Santiago, 40.9%; other, 4.8%)	Cerro Blanco plant, Santiago Metropolitan Region; Mejillones plant, Region II; Coronel plant, Region VIII	NA
Cement	do.	do.	2,700 ¹
Do.	Melón S.A. (Inversiones Brescia S.A., 99.24%, and other private, 0.76%)	La Calera plant, Region V, and grinding plant at Puerto Montt, Region X	1,800 ¹
Do.	Cementos Bío Bío S.A. (private, 100%)	Talcahuano Plant, Region VIII	750 ¹
Do.	do.	Grinding plant at San Antonio, Region V	300 ¹
Do.	Industria Nacional de Cemento S.A. (INACESA), 100%	Plant near Antofagasta City, Region II	500 ¹
Do.	do.	Plant near Curico City, Region VII	1,700 ¹
Clays, unspecified	Sociedad Minera Casablanca S.A.	Quarry and plant in Santiago Metropolitan Region	NA
Do.	Sociedad Minera Godoy Schwenger y Cía.	Quarry and plant near Quillota, Region V	NA
Do.	Minera Lealtad Ltda.	Quarry and plant at Til Til, Santiago Metropolitan Region, and at Olmue, Region V	NA
Coal, bituminous and lignite	Empresa Nacional del Carbón S.A. (ENACAR)	Trongol Mine near Curanilahue, and plant at Lota, Region VIII	NA
Do.	Carbonífera Victoria de Lebu S.A. (Empresa Nacional del Carbón S.A., 100%)	La Fortuna de Lebu Mine near Lebu, Region VIII	150
Do.	Ingeniería del Sur S.A.	Bish Mine and possibly other active mines, Pecket deposit, Magallanes coal basin, Region XII	600
Copper, Cu content	Compañía Minera Cerro Colorado (BHP Billiton plc, 100%)	Cerro Colorado Mine and SX-EW ² plant, Region I	120 ¹

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity ^c
Copper, Cu content— Continued	Minera Escondida Ltda. (BHP Billiton plc, 57.5%; Rio Tinto plc, 30%; Japan Escondida Corp., 10%; International Finance Corp., 2.5%)	Escondida open pit mine, two concentrator plants, an oxide plant for cathode production (SX-EW ²), and a sulfide-leach plant for cathode production, Region II	1,300
Do.	Minera Spence S.A. (BHP Billiton plc, 100%)	Spence Mine and SX-EW ² plant, Region II	200 ¹
Do.	Compañía Minera Doña Inés de Collahuasi SCM (Anglo American plc, 44%; Xstrata plc, 44%; companies led by Mitsui & Co. Ltd., 12%)	Collahuasi open pit mine, concentration plant, and SX-EW ² plant, at Ujina, Region I	400
Do.	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Chuquicamata Division, including Chuquicamata and Mina Sur Mines; Chuquicamata SX-EW ² plant (oxide), smelter, and refinery (oxide and sulfide), Region II	450
Do.	do.	Radomiro Tomic Division and Mine, and Radomiro Tomic SX-EW ² plant, Region II	480
Do.	do.	El Teniente Division and Mine, and Caletones smelter (anodes) and refinery (fire-refined ingots), Region VI	430
Do.	do.	Ventanas Division, Las Ventanas smelter and refinery (cathodes), Region V	402 ¹
Do.	do.	Andina Division, including Rio Blanco and Sur Sur Mines (concentrates), Region V	270
Do.	do.	Salvador Division, including Campamento Antiguo and Damiana Norte open pit mines; Inca underground mine; and Potrerillos SX-EW ² plant and refinery, Region III	70
Do.	Minera Gaby S.p.A. [Corporación Nacional del Cobre (CODELCO) (Government, 100%), 100%]	Gabriela Mistral Mine and SX-EW ² plant, Sierra Gorda, Region II	170 ¹
Do.	Compañía Minera Los Pelambres S.A. (Antofagasta plc, 60%, and a Japanese consortium, 40%)	Los Pelambres open pit mine and concentration plant, Region IV	430
Do.	Minera Esperanza S.A. (Antofagasta plc, 70%, and Marubeni Corp., 30%)	Esperanza sulfides mine and milling/flotation plant, Region II	175
Do.	Minera El Tesoro S.A. (Antofagasta plc, 70%, and Marubeni Corp., 30%)	El Tesoro open pit mine and SX-EW ² plant, Region II	110
Do.	Minera Michilla S.A. (Antofagasta plc, 74.2%, and other private Chilean investors, 25.8%)	Michilla Mine and SX-EW ² /sulfide-leaching plant, Region II	45
Do.	Empresa Nacional de Minería (ENAMI) (Government, 100%)	Hernán Videla Lira smelter (anodes and blister), Paipote, Region III	340
Do.	do.	Concentration plants: Manuel Antonio Matta, Paipote; Osvaldo Martínez, El Salado; and Vallenar, Region III; and José Antonio Moreno, Taltal, Region II	180
Do.	Anglo American Sur S.A. (Anglo American plc, 50.1%, Mitsubishi Corp., 20.4%, Corporación Nacional del Cobre, 20%, and Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine (concentrates) and Tortolas SX-EW ² plant (cathodes), Santiago Metropolitan Region	450
Do.	do.	Chagres smelter (anodes and blister), Region V	175
Do.	do.	El Soldado Mine (concentrates), Region V	50
Do.	Empresa Minera de Mantos Blancos S.A. (Anglo American plc, 99.9%, and other private, 0.1%)	Mantos Blancos open pit mine and SX-EW ² plant, Region II	100
Do.	do.	Mantoverde open pit mine and SX-EW ² plant, Region III	65
Do.	Xstrata Copper Chile S.A.	Altonorte smelter (anodes and blister), La Negra, Region II	300 ¹
Do.	Compañía Minera Xstrata Lomas Bayas (Xstrata plc, 100%)	Lomas Bayas Mine and SX-EW ² plant, Region II	75 ¹
Do.	Sociedad Contractual Minera El Abra [Freeport-McMoRan Copper & Gold Inc., 51%, and Corporación Nacional del Cobre (CODELCO) (Government, 100%), 49%]	El Abra Mine and SX-EW ² plant, near Calama, Region II	225 ¹
Do.	Cía. Contractual Minera Candelaria (Freeport-McMoRan Copper & Gold Inc., 80%, and SMMA Candelaria Inc., 20%)	Candelaria open pit mine, underground mine, and concentration plant, near Copiapo, Region III	150

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Copper, Cu content— Continued		Cía. Contractual Minera Ojos del Salado (Freeport-McMoRan Copper & Gold Inc., 80%, and SMMA Candelaria Inc., 20%)	Ojos del Salado Mine and concentration plant, near Copiapo, Region III	35
Do.		Compañía Minera Zaldívar (Barrick Gold Corp., 100%)	Zaldívar open pit mine and SX-EW ² plant, Region II	150
Do.		Compañía Minera Quebrada Blanca [Teck Cominco Ltd., 76.5%; Inversiones Mineras S.A. 13.5%; Empresa Nacional de Minería (ENAMI) (Government, 100%), 10%]	Quebrada Blanca open pit mine and SX-EW ² plant, Region I	100
Do.		Minera Valle Central S.A. (Amerigo Resources Ltd., 100%)	Facilities near Rancagua, Region VI, to process tailings of the Collahuasi and El Teniente mines	30
Do.		Compañía Minera Carmen de Andacollo [Teck Cominco Ltd., 90%, and Empresa Nacional de Minería (ENAMI) (Government, 100%), 10%]	Carmen de Andacollo Mine and SX-EW ² plant, Region IV	22
Do.		EcoMetales Ltd. (Codelco Technologies Ltd., 100%)	Plant to acid-leach fine copper at Chuquicamata Mine, Region II (from residual material produced by the Chuquicamata and El Teniente Divisions)	25
Copper sulfate	metric tons	Compañía Minera Cerro Negro	Portales Mine and a plant at Cabildo, Region V	200
Do.	do.	Minera Capacho Viejo Ltda.	Mine and plant near Tocopilla, Region II	5,000
Do.	do.	Compañía Minera San Gerónimo	Mine and plant near Coquimbo, Region IV	10,000
Diatomite		Celite Chile Ltda. (IMERYS S.A., 100%)	Plant at Port of Arica, and mining operations nearby in Regions I and XV	30
Dolomite		Minera El Jilguero S.A. (Cementos Bio Bio S.A., 100%)	Quarries and plant near Copiapo, Region III	30
Feldspar		Minera Alfa Quintay Ltda.	Quarry and plant, Santiago Metropolitan Region	NA
Do.		J.B. Schiappacase A.	Quarry and plant near Limache, Region V	NA
Do.		Minera Pacifico Ltda.	Quarries and plants in Region VI, and plant in Santiago Metropolitan Region	NA
Ferromolybdenum		Molibdenos y Metales S.A. (MOLYMET) (private, 100%)	Nos plant, San Bernardo, 30 kilometers south of Santiago, Santiago Metropolitan Region	25
Gold:				
Metal ingots	kilograms	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Ventanas refinery, Region V	12,000 ¹
Mine output	do.	do.	Andina, Chuquicamata, El Teniente, Radomiro Tomic, and Salvador Divisions (byproduct of copper production)	2,000
Do.	do.	Minera Escondida Ltda., 100%	Escondida copper mine and plants, Region II	4,500
Do.	do.	Cía. Contractual Minera Candelaria, 100%	Candelaria copper mine and plant, Region III	2,500
Do.	do.	Cía. Contractual Minera Ojos del Salado, 100%	Ojos del Salado copper mine and plant, Region III	600
Do.	do.	Compañía Minera Los Pelambres S.A., 100%	Los Pelambres Mine and plant, Region IV	1,700
Do.	do.	Empresa Nacional de Minería (ENAMI) (Government, 100%)	Manuel Antonio Matta plant, Paipote; Osvaldo Martínez plant, El Salado; and Vallenar plant, Region III; and José Antonio Moreno plant, Taltal, Region II	400
Do.	do.	Compañía Minera Doña Inés de Collahuasi SCM, 100%	Collahuasi Mine and plants, Region I	NA
Do.	do.	Compañía Minera Mantos de Oro (Kinross Gold Corp., 100%)	La Coipa Mine and plant, Region III, 140 kilometers north of Copiapo	6,000
Do.	do.	Compañía Minera Maricunga (Kinross Gold Corp., 100%)	Maricunga open pit, heap-leach mine, Region III, 100 kilometers east of Copiapo	7,500
Do.	do.	Cía. Minera Meridian S.A. (Yamana Gold Inc., 100%)	El Peñón Mine and concentration plant, Region II	10,500
Do.	do.	Minera Esperanza S.A. (Antofagasta plc, 70%, and Marubeni Corp., 30%)	Esperanza sulfides mine and milling/flotation plant, Region II	8,000
Do.	do.	Minera Florida S.A. (Yamana Gold Inc., 100%)	Minera Florida Mine and concentration plant, Santiago Metropolitan Region	3,000
Do.	do.	Compañía Minera Cerro Bayo Ltda. (Mandalay Resources Corp., 100%)	Cerro Bayo Mine and concentration plant, Region XI	950
Do.	do.	Sociedad Contractual Minera El Toqui Ltda. (Nyrstar NV, 100%)	El Toqui Mine and Doña Rosa concentration plant, Region XI, 120 kilometers north of Coyhaique	1,500

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Gypsum, natural		Compañía Industrial El Volcán S.A. (Saint-Gobain Gypsum S.A., 100%)	El Volcan quarry near Santiago, Santiago Metropolitan Region	100
Do.		Compañía Minera Romeral S.A. (Etex Group S.A., 59.8%, and Melón S.A., 40.2%)	El Romeral quarry near Santiago, Santiago Metropolitan Region	50
Do.		Minera Lo Valdés Ltda.	Santiago Metropolitan Region	NA
Do.		Compañía Minera Polpaico Ltda.	Yeso Norte Mine, Region II	NA
Do.		Industria Nacional de Cemento S.A. (INACESA), 100%	Mantos Verdes quarry near Antofagasta City, Region II	NA
Do.		Antonio Zotti Rosetti y Cía. Sociedad Minera	La Confianza and San Jose Mines near Los Vilos, Region IV; Margarita and San Nicolas Mines, and a plant near Renca, Santiago Metropolitan Region	NA
Iodine	metric tons	SQM Químicos S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Nueva Victoria Mine and plant and Iris Plant, Region I; El Toco Mine and María Elena plant; and Pampa Blanca and Pedro de Valdivia Mines and plants, Region II	12,500 ¹
Do.	do.	Atacama Chemical S.A. (Cosayach) (Inverraz S.A., 100%)	Mine and plant near Iquique, Region I	3,000
Do.	do.	Atacama Minerals Chile Sociedad Contractual Minera (Sirocco Mining Inc., 100%)	Mine and plant in Aguas Blancas, Region II	1,100
Do.	do.	ACF Minera S.A.	Lagunas mine and plant near Iquique, Region I	1,400
Iron ore, Fe content		Compañía Minera del Pacífico S.A. (CMP) (CAP S.A., 75%, and MC Inversiones Ltda., 25%)	Cristales and El Algarrobo Mines, El Algarrobito and Huasco concentration plants, Huasco pellets plant, and Los Colorados Mine and concentration plant, Region III; El Romeral and El Tofo Mines, and El Romeral concentration and pellet-feed plants, Region IV; and El Laco concentration plant, Region II	9,000
Do.		Minera Hierro Atacama S.A. (Compañía Minera del Pacífico S.A., 100%)	Magnetite plant to process tailings from the Candelaria Mine and other iron-bearing raw materials from third parties, near Copiapo, Region III	2,000
Do.		Minera Santa Fe SCM, 100%	Carmen Mine, near Copiapo, Region III	2,000
Do.		Santa Fe Mining (JSW Steel Ltd., 70%, and Minera Santa Fe SCM, 30%)	Bellavista Mine, near Copiapo, Region III	1,000
Kaolin		Compañía Minera Polpaico Ltda.	El Guindo Mine and a plant in the Santiago Metropolitan Region	NA
Do.		Minera Lealtad Ltda.	Mine and plant at Til Til, Santiago Metropolitan Region	NA
Do.	metric tons	Mario Alberto Pizarro A.S.A.	Plant at Los Vilos, Region IV	600
Lapis lazuli	do.	Las Flores de los Andes S.A.	Mine near Ovalle, Region IV	400
Lead, mine output	do.	Minera Florida S.A. (Yamana Gold Inc., 100%)	Minera Florida Mine and concentration plant, Santiago Metropolitan Region	NA
Do.	do.	Sociedad Contractual Minera El Toqui Ltda. (Nyrstar NV, 100%)	El Toqui Mine and Doña Rosa concentration plant, Region XI, 120 kilometers north of Coyhaique	3,000
Lime, hydraulic		Industria Nacional de Cemento S.A. (INACESA) (Cementos Bío Bío S.A., 100%)	Plants near Antofagasta City, Region II, and near Copiapo City, Region III	800 ¹
Do.		Soprocál Calerías e Industrias S.A.	Plant at Melipilla, Santiago Metropolitan Region	165
Lithium carbonate	metric tons	Rockwood Lithium Ltda. (Rockwood Holdings Inc., 100%)	Chemetall Foote plant at La Negra, near the city of Antofagasta, Region II	26,000
Do.	do.	SQM Salar S.A. [subsidiary of Sociedad Química y Minera de Chile S.A. (SQM)] (private, 100%)	Plant at Salar del Carmen, near the city of Antofagasta, Region II	48,000 ¹
Lithium chloride	do.	do.	do.	NA
Do.	do.	Rockwood Lithium Ltda. (Rockwood Holdings Inc., 100%)	Chemetall Foote plant at La Negra, near the city of Antofagasta, Region II	6,000
Lithium hydroxide	do.	do.	do.	6,000 ¹
Manganese	do.	Manganesos Atacama S.A. (subsidiary of CAP S.A.)	Plant in Coquimbo city and mines in Region IV ³	10,000
Marble, dimension stone	do.	Pier Luigi Indri S.A.	Quarry at Cerrillos, Region III	250
Do.	do.	Compañía Minera Feltre Ltda.	Quarry and plant in Region III	1,400
Methanol		Methanex Chile S.A. (Methanex Corp., 100%)	Three methanol plants at Cabo Negro, near Punta Arenas City, Region XII	2,800 ¹

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Molybdenum, mine output	metric tons	Anglo American Sur S.A. (Anglo American plc, 50.1%, Mitsubishi Corp., 20.4%, Corporación Nacional del Cobre, 20%, and Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine and Tortolas molybdenum flotation plant, Santiago Metropolitan Region	3,000
Do.	do.	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Chuquicamata and Radomiro Tomic Divisions, Region II	20,000
Do.	do.	do.	El Teniente Mine and plant, Region VI	6,500
Do.	do.	do.	Andina Division, Region III	5,000
Do.	do.	do.	El Salvador Division, Region III	1,500
Do.	do.	Compañía Minera Los Pelambres S.A., 100%	Los Pelambres Mine and plant, Region IV	12,500
Do.	do.	Compañía Minera Doña Inés de Collahuasi SCM, 100%	Collahuasi Mine and molybdenum plant, Region I	6,000
Molybdenum concentrate, Mo content	do.	Minera Valle Central S.A. (Amerigo Resources Ltd., 100%)	Facilities near Rancagua, Region VI, to process tailings of the Collahuasi and El Teniente Mines	400 ^c
Molybdenum oxide, Mo content	do.	Molibdenos y Metales S.A. (MOLYMET) (private, 100%)	Nos plant, San Bernardo, 30 kilometers south of Santiago, Santiago Metropolitan Region	45,000
Do.	do.	do.	Molynor plant, Mejillones, Region II	15,000
Do.	do.	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Chuquicamata and Radomiro Tomic Divisions, Region II	7,500
Natural gas	million cubic meters	Empresa Nacional del Petróleo (ENAP) (Government, 100%)	About 23 oilfields, including Costa Auera, in the Magallanes basin, Region XII	2,200
Do.	do.	GeoPark Chile Ltd. (operator) (GeoPark Holdings Ltd., 100%)	Oilfields and gasfields and the Kimiri Aike natural gas plant on the Fell block, Magellan or Austral Basin, Region XII	380
Nitrates:				
Primarily potassium nitrate		SQM Nitratos S.A. [subsidiary of Sociedad Química y Minera de Chile S.A. (SQM)] (private, 100%)	El Toco Mine and Maria Elena plant; Pampa Blanca and Pedro de Valdivia Mines and plants; and Coya Sur plant, Region II	950 ¹
Primarily sodium nitrate		do.	do.	770 ¹
Nitrates, in fertilizers		Cosayach Nitratos S.A. (Inverraz S.A., 100%)	Mine and plant near Iquique, Region I	200
Do.		SQM Industrial S.A.	Mine and plant near Santiago, Region II	100
Do.		ACF Minera S.A.	Lagunas Mine and plant near Iquique, Region I	NA
Petroleum	thousand 42-gallon barrels	Empresa Nacional del Petróleo (ENAP) (Government, 100%)	About 23 oilfields, including Costa Auera, in the Magallanes basin, Region XII	6,500
Do.	do.	GeoPark Chile Ltd. (operator) (GeoPark Holdings Ltd., 100%)	Oil and gas fields in the Fell block, Magellan or Austral Basin, Region XII	800
Petroleum refinery products	do.	Empresa Nacional del Petróleo (ENAP) (Government, 100%)	Aconcagua, Bio Bio, and Gregorio refineries	90,000
Phosphatic materials, natural:				
Guano		Guano Rojo Punta Gruesa Ltda.	Mine and plant near Iquique, Region I	3
Phosphate rock, apatite		César B. Formas Ortiz S.A.	Mine near Chanaral, Region II	20
Do.		Compañía Minera El Sauce Ltda.	Mine near La Serena, Region IV	5
Phosphorite		Compañía Minera de Fosfatos Naturales Ltda. (Bifox Ltda.) (TEHMCORP S.A., 100%)	Mines at and around Bahía Inglesa; Osorno plant near Bahía Inglesa, Region III; and Bahía Inglesa plant at Caldera, Region IV	45
Do.		Sociedad Contractual Minera Bahía Inglesa	Selaqueos Mine near Bahía Inglesa, Region III	NA
Pig iron		Cía. Siderúrgica Huachipato S.A. (subsidiary of CAP S.A.) (private, 100%)	Plant in Bahía de San Vicente, Region VIII, 14 kilometers northeast of Concepcion	1,200
Potash (KCl and K ₂ SO ₄), K ₂ O content		SQM Salar S.A. [subsidiary of Sociedad Química y Minera de Chile S.A. (SQM)] (private, 100%)	A dual-use plant and three KCl plants at Salar del Carmen, near the city of Antofagasta, Region II	1,600
Do.		Rockwood Lithium Ltda. (Rockwood Holdings Inc., 100%)	Chemetall Foote plant at La Negra, near the city of Antofagasta, Region II	50
Potassium chloride (KCl)		Sociedad Contractual Minera Virginia (Inverraz S.A., 100%)	Mine and plant near Iquique, Region I	NA
Do.		ACF Minera S.A.	Lagunas Mine and plant near Iquique, Region I	NA

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Pumicite, including pozzolan		Empresas El Melón S.A.	Quarry at Rinconada Lo Vial near Maipu, and plant at Santiago, Santiago Metropolitan Region	1,200
Do.		Compañía Minera Polpaico Ltda.	Puzolana Norte Mine, Region II; and Puzolana Pudahuel Mine and a plant in the Santiago Metropolitan Region	NA
Do.		Minera Río Teno S.A. (Cementos Bío Bío S.A., 100%)	Quarry and plant near Curico, Region VI	200
Do.		Minera El Way S.A. (Cementos Bío Bío S.A., 100%)	Quarries and plant near Antofagasta, Region II	100
Do.		Harborlite Chile Ltda. (IMERYS S.A., 100%)	Laguna del Maule Mine at Talca, Region VII, and plant at Santiago, Santiago Metropolitan Region	NA
Pyrophyllite	metric tons	Sociedad Minera Godoy Schwenger y Cía.	Mine and plant near La Calera, Region V	1,800
Do.	do.	José Orrego Buguño S.A.	Mine and plant near Chincolco, Region V	1,000
Do.	do.	Mario Alberto Pizarro A. S.A.	Plant at Los Vilos, Region IV	1,000
Rhenium, metal	kilograms	Molibdenos y Metales S.A. (MOLYMET) (private, 100%)	Nos plant, San Bernardo, 30 kilometers south of Santiago, Santiago Metropolitan Region	30,000
Salt, NaCl		Sociedad Minera Punta de Lobos S.A. (K+S Aktiengesellschaft, 100%)	Open pit mine in the Salar Grande de Tarapaca, Region I, and port facilities at Puerto Patillos	6,500 ¹
Do.		Benjamín Nuñez Ltda.	Mine near Iquique, Region I	NA
Do.		Inversiones Alpina Ltda.	Mine in the Salar Grande Irlanda and plant at Iquique, Region I	NA
Do.		Playa Grande Ltda.	Mine in Region I	NA
Do.		José Álvarez Jara Ltda.	do.	NA
Do.		Christian Fletcher Ltda.	do.	NA
Do.		Elías Echeverría Ltda.	do.	NA
Do.		Cía. Minera Cordillera Chile S.C.M.	do.	NA
Selenium	metric tons	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Ventanas smelter and refinery, noble metals plants, Region V (byproduct of copper production)	95
Silica, quartz		Cedric Fernández y Compañía Ltda.	Mine and plant near Calama, Region II	100
Do.		Antonio Zotti Rosetti y Cía. Sociedad Minera	La Confianza and San Jose Mines near Los Vilos, Region IV; Margarita and San Nicolas Mines, and a plant near Renca, Santiago Metropolitan Region	20
Do.		Minera Granos Industriales Ltda.	El Turco Mine and Migrin Plant near Cartagena, Region V	250
Do.		Productora Cuarzo El Peral Ltda.	El Peral Mine and plant near Cartagena, Region V	250
Do.		Minera Alfa Quintay Ltda.	Quarry and plant, Santiago Metropolitan Region	30
Do.		Minera Pacífico Ltda.	do.	NA
Do.		Sociedad Legal Minera Pedro Luís	Mine and plant near Copiapo, Region III	120
Do.		Minera San Pedro Ltda.	Natacha Mine and El Rulo plant at Til-Til, Santiago Metropolitan Region	30
Do.		SLM Santa Dorila de las Arenitas	Mine and plant at Constitucion, Region VII	250
Do.		Cristalerías Toro S.A.	Mine at Rancagua, Region VI	120
Do.		Vidrios Lirquén S.A.	Mine and glass plant at Lirquen, Region VIII	80
Do.		Minera Arsil S.A.	Mine and plant at Concepcion, Region VIII	50
Silver:				
Metal grains	kilograms	Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Ventanas refinery, Region V	220,000
Mine output	do.	do.	Andina, Chuquicamata, El Teniente, Radomiro Tomic, and Salvador Divisions (byproduct of copper production)	300,000
Do.	do.	Compañía Minera Mantos de Oro (Kinross Gold Corp., 100%)	La Coipa Mine and plant, Region III, 140 kilometers north of Copiapo	150,000
Do.	do.	Cía. Minera Meridian S.A. (Yamana Gold Inc., 100%)	El Peñón Mine and concentration plant, Region II	300,000
Do.	do.	Minera Florida S.A. (Yamana Gold Inc., 100%)	Minera Florida Mine and concentration plant, Santiago Metropolitan Region	26,000
Do.	do.	Minera Escondida Ltda., 100%	Escondida copper mine and plants, Region II	180,000
Do.	do.	Empresa Nacional de Minería (ENAMI) (Government, 100%)	Manuel Antonio Matta plant, Paipote; Osvaldo Martínez plant, El Salado; Vallenar plant, Region III; and José Antonio Moreno plant, Taltal, Region II	6,000

See footnotes at end of table.

TABLE 2—Continued
CHILE: STRUCTURE OF THE MINERAL INDUSTRY IN 2012

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity ^e
Silver—Continued:				
Mine output— Continued	kilograms	Compañía Minera Cerro Bayo Ltda. (Mandalay Resources Corp., 100%)	Cerro Bayo Mine and concentration plant, Region XI	110,000
Do.	do.	Compañía Minera Doña Inés de Collahuasi SCM, 100%	Collahuasi Mine and plants, Region I	60,000
Do.	do.	Compañía Minera Los Pelambres S.A., 100%	Los Pelambres Mine and plant, Region IV	42,000
Do.	do.	Anglo American Sur S.A. (Anglo American plc, 50.1%, Mitsubishi Corp., 20.4%, Corporación Nacional del Cobre, 20%, and Mitsui & Co., Ltd., 9.5%)	Los Bronces Mine and plants, Santiago Metropolitan Region	35,000
Do.	do.	Cía. Contractual Minera Candelaria, 100%	Candelaria Mine and concentration plant, Region III	30,000
Do.	do.	Cía. Contractual Minera Ojos del Salado, 100%	Ojos del Salado copper mine and plant, Region III	4,500
Do.	do.	Sociedad Contractual Minera El Toqui Ltda. (Nyrstar NV, 100%)	El Toqui Mine and Doña Rosa concentration plant, Region XI, 120 kilometers north of Coyhaique	11,000
Sodium sulfate	metric tons	SQM Químicos S.A. [Sociedad Química y Minera de Chile S.A. (SQM), 100%]	Nueva Victoria Mine, Region I, and Maria Elena Mine and Coya Sur plant, Region II	80,000
Do.	do.	Sociedad Legal Minera Santa Inés Uno de Antofagasta	Santa Ines Mine near Antofagasta, Region II	150
Steel, crude		Compañía Siderúrgica Huachipato S.A. (subsidiary of CAP S.A.) (private, 100%)	Primary plant in Talcahuano and plant in Rengo, Region VIII	1,500
Do.		Gerdau AZA S.A.	Steel plants in Renca and Colina, Santiago Metropolitan Region	520
Sulfuric acid		Xstrata Copper Chile S.A. (Xstrata plc, 100%)	Altonorte smelter, Region II	900 ¹
Do.		Anglo American Sur S.A. (Anglo American plc, 50.1%, Mitsubishi Corp., 20.4%, Corporación Nacional del Cobre, 20%, and Mitsui & Co., Ltd., 9.5%)	Chagres smelter, Region V	500
Do.		Corporación Nacional del Cobre (CODELCO) (Government, 100%)	Ventanas sulfuric acid plant, Region V	380 ¹
Do.		do.	Caletones plant, Region VI	1,000
Do.		do.	Chuquicamata plant, Region II	500
Do.		do.	Portrerillos plant, Region III	100
Do.		Empresa Nacional de Minería (ENAMI) (Government, 100%)	Hernán Videla Lira smelter, Paipote, Region III	290
Talc	metric tons	Sociedad Talco Eduardo Martín Abejón Ltda.	Mines near Constitucion, Region VII, and plant at Santiago, Santiago Metropolitan Region	1,000
Do.	do.	Minera Trucco Ltda.	Mine and plant near Santiago, Santiago Metropolitan Region	NA
Travertine, dimension stone	do.	Mármoles San Marino Chile S.A. (Grupo San Marino S.A., 100%)	Quarry near Calama, Region II, and plant in Til-Til, Santiago Metropolitan Region	7,000
Do.	do.	Andes Travertine & Stones S.A.	Quarry and plant in Region II	NA
Do.	do.	Canteras de Atacama S.A.	Quarry and plant at Calama, Region II	6,000
Zeolites	do.	Sociedad Legal Minera Serrín Tercera	Serrín Tercera Mine and Remulcao Plant at Talca, Region VII	300
Zinc in concentrate	do.	Sociedad Contractual Minera El Toqui Ltda. (Nyrstar NV, 100%)	El Toqui Mine and Doña Rosa concentration plant, Region XI, 120 kilometers north of Coyhaique	35,000
Do.	do.	Minera Florida S.A. (Yamana Gold Inc., 100%)	Minera Florida Mine and concentration plant, Santiago Metropolitan Region	6,500

^eEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹Reported figure.

²Solvent-extraction/electrowinning.

³No production during 2012.