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The Mineral Industry of New Zealand

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The economy of New Zealand continued to grow at a modest rate in 2013, and the real gross domestic product (GDP) increased by 2.5% compared to that of 2012. The agriculture, construction, and trade sectors were the main contributors to the economic growth. The post-earthquake reconstruction work in Canterbury continued, and the cost of rebuilding was expected to increase to a total of $40 billion. Reconstruction of the City of Christchurch was expected to continue during the next several years because of issues involving land remediation and related insurance claims. Increased construction activity was a key driver of GDP growth. Residential construction activity had been increasing, especially homebuilding in Auckland and Canterbury. The low interest rates and an increase in the number of immigrants contributed to the high demand for housing (Reserve Bank of New Zealand, 2014, p. 3–6; Statistics New Zealand, 2014b).

The output of the mineral industry of New Zealand was small compared with that of its neighboring country Australia. New Zealand has metallic mineral occurrences of antimony, bauxite, beryllium, chromium, copper, gallium, gold, iron, lead, lithium, magnesite, manganese, mercury, molybdenum, nickel, platinum-group metals, rare earths, silver, tin, titanium, tungsten, uranium, and zinc. Of these metallic minerals, only gold, iron, and silver were mined. Bentonite, clay, coal, diatomite, dolomite, limestone, perlite, phosphate rock, pumice, salt, silica, building and dimension stone, sulfur, and zeolites have also been discovered in the country (table 1).

The value of New Zealand's total goods and services trade in 2013 was NZ$125.2 billion (US$103.9 billion). Exports were valued at NZ$64.2 billion (US$50.6 billion), which was a decrease of 3.0% from the value in 2012. China replaced Australia as New Zealand's leading goods export destination, receiving 20.8% of New Zealand's total exports. Australia became New Zealand's second-ranked export market, receiving 20.0% of New Zealand's exports, followed by the United States, 8.5%; Japan, 5.8%; and the Republic of Korea, 3.3%. China continued to be New Zealand's leading source of goods imports, supplying 18.1% of New Zealand's imports, followed by Australia, 13.9%; the United States, 9.8%; Japan, 6.8%; and Germany, 4.8%. Agricultural products were New Zealand's leading export commodity and accounted for more than 50% of total exports. Mineral fuels were New Zealand's leading nonagricultural commodity and accounted for 2.9% of the country's total goods export value; aluminum and its products accounted for 2.0%; and iron and steel products, 1.7%. Crude oil and oil products were New Zealand's leading import commodities in terms of value, accounting for 17.0% of the country's total goods import value. Iron and steel products were the leading metallic imports, accounting for 2.6% of the country's total import value of goods. Because it had no alumina refinery, New Zealand depended on imported alumina from Australia for its aluminum production (Statistics New Zealand, 2014a, p. 12, p. 82–87).

Government Policies and Programs

The Crown Minerals Act 1991 as amended by the Crown Minerals Amendment Act 2013 sets forth the broad legislative framework for prospecting for, exploring for, and mining of Crown-owned (meaning Government-owned on behalf of all New Zealanders) minerals within New Zealand's territorial area, which extends to 12 nautical miles off the New Zealand coast. The Ministry of Economic Development, through the Crown Minerals Group, is responsible for the overall management of all state-owned minerals in New Zealand. Crown-owned minerals include gold, petroleum, silver, uranium, and all minerals on or under Crown-owned land. In some cases, the Government also has rights to certain minerals on some private land. The Crown Minerals Group also advises on policy and regulations and promotes investment in the mineral sector. The royalty regimes for coal, nonfuel minerals, and petroleum are defined in the Government mineral program that is reviewed every 10 years.

Depending on the type of mineral commodity, royalties are assessed at either a flat rate based on the quantity of production or an "ad valorem royalty (AVR)" rate based on the value of production. In its most recent review of the royalty regime, the New Zealand Government set the royalty for oil and gas at a flat rate of 7%. Coal and gold were assigned an AVR rate of 2% of net sales revenue that takes effect once the accounting profit reaches $5 million and $2 million, respectively. The AVR rate for iron sand, phosphate ore, platinum-group metals, silver, and sulfur was set at 2% of net sales revenue once the accounting profit reaches 10% (Parliament, The, 2013, p. 9–30).

The Government strengthened the workplace health and safety regime following the Pike River coal mine tragedy in 2010, including passing three separate pieces of legislation related to workplace health and safety. The Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012 took effect in 2013. The new law softens the requirements of the emissions trading scheme to avoid imposing increased costs on businesses.

Minerals in the National Economy

New Zealand's mineral resources were dominated by aggregates and gold, which together accounted for 80% of the total value of New Zealand's mineral resources. Gold, iron sand, and silver were major metallic mineral commodities that made notable contributions to New Zealand's economy. Production of other metallic minerals, such as bauxite, copper, lead, and zinc, could potentially be economically feasible if technologies and prices become favorable. Excluding the petroleum industry, the value of New Zealand's mineral sector accounted for less than 1% of the GDP. The total value of New Zealand's minerals and

mineral fuel production accounted for about 2% of the GDP (Statistics New Zealand, 2014b, p. 2).

Production

Production of such mineral commodities as dimension stone, gold, iron sand, serpentine, silica sand, silver, and zeolites increased by more than 10% compared with that of 2012. Mineral commodities for which production decreased significantly included coal, bentonite, dolomite, and oil. No dolomite production was reported for the Waikato region, which in the past has accounted for 90% of total industrial dolomite output in the country. Data on mineral production are in table 1.

Structure of the Mineral Industry

Table 2 is a list of major mineral industry facilities in New Zealand.

Commodity Review

Metals

Aluminum.—New Zealand Aluminium Smelters Ltd., which was a producer of primary aluminum, decided to shut down reduction line No. 4 in April and to restructure the organization owing to unfavorable market conditions. As a result, aluminum production in New Zealand decreased to 324,835 metric tons (t) in 2013 from 326,963 t in 2012 and 354,029 t in 2011. The company signed an 18-year electricity supply contract with state-owned Meridian Energy Ltd. in 2007 (before the global financial crisis that began in 2008), which came into force in January 2013. The demand for aluminum decreased and the price of aluminum declined during the past several years. As a result, New Zealand Aluminium faced a financial loss of $18 million in 2013 and $49 million in 2012. The increase in electricity prices under the new contract significantly increased the production costs of the smelter. Pacific Aluminium of Australia (a major shareholder of New Zealand Aluminium) began discussions in 2012 with Meridian Energy to reduce the price of electricity supplied to the smelter. The new agreement was reached in August 2013. The revised contract included a new reduced price that was effective as of July 1, and the New Zealand Government provided a NZ$30 million (US$23.6 million) payment to the smelter (New Zealand Aluminium Smelters Ltd., 2013, 2014).

Gold.—New Zealand's gold production was mainly from the Waihi area on the North Island and from the Otago region and along the west coast on the South Island. Hard rock gold mines were mined by Newmont Mining Corp. of the United States on the North Island and OceanaGold Corp. of Australia on the South Island. Newmont Waihi Gold, which was a subsidiary of Newmont Mining, mined the Martha and the Trio Mines in and around Waihi. Newmont Waihi Gold completed mining at Favona in 2012. Mining at the Martha open pit focused on the Martha East Layback and was expected to continue until 2016. Construction of two development drifts at Trio that were 510 meters (m) and 790 m in length, respectively, began in 2010. The Trio ore bodies were situated between the Martha and the Favona Mines and would be accessed from the Favona portal. Ore production at Trio began in mid-2012, and the mine was expected to be mined out in 2014. In 2011, Newmont Waihi Gold introduced a new underground exploration project in Waihi East, the "Golden Link" project, which was composed of the Correnso exploration project and the Martha exploration project. Newmont Waihi Gold planned that the Correnso Mine would replace the underground Favona and Trio Mines. As proposed, mining at Correnso would take place at a depth of 350 m, which is considerably deeper than the other mines in Waihi East. Mining at Correnso would start at the bottom of the ore body and progress up to the top of ore body, which would be about 130 m below the surface. The construction of the Correnso Mine was scheduled to start in 2014 and to be completed in 2015. The Waihi operation produced about 3.4 t (110,000 troy ounces) of gold in 2013 (Waihi Gold Co. Ltd., 2013; Newmont Mining Corp., 2014, p. 32).

Oceana Gold Ltd., a subsidiary of OceanaGold Corp., was the operator for the Macraes operation and the Reefton operation on the South Island. The Macraes operation consisted of the Macraes open pit mine, the Frasers underground mine, and the Macraes processing plant. In 2013, the Macraes plant processed 6.9 million metric tons (Mt) of ore to produce 6.18 t (198,820 troy ounces) of gold. The Reefton operation included an open pit mine and a processing plant. In 2013, the Reefton plant processed 1.7 Mt of ore and produced 1.89 t (60,635 troy ounces) of gold. Gold output from these operations was higher than in 2012, which was attributed to high ore throughput to the plant. As a result of the lower gold price on the world market, the company decided to defer the final cutback at the Reefton Mine to 2015 and would place the mine on care-and-maintenance status in mid-2015. The Frasers Mine was expected to be depleted in mid-2015, and the Macraes Mine would cease operations at the end of 2017 (OceanaGold Corp. 2014a, p. 11; 2014b).

Kent Exploration NZ Ltd. received an exploration license to conduct exploration work at the Alexander gold mine site, which had been shut down in 1943. The prospecting site, which covered 1,723 hectares, was located about 27 kilometers south-southeast of Reefton Township. The company concentrated on evaluating the economic potential of several steep-dipping gold-bearing quartz veins, which were mined in 1920. The company discovered in 2013 that the area containing gold ranged from 0.73 gram per metric ton (g/t) to 13.6 g/t and planned to continue exploring during the next 2 years (Ray, Ryland, and Robbins, 2013, p. 1–5).

The Government of New Zealand awarded Silver City NZ Pty Ltd. of Australia a 5-year permit to explore for gold in an area of 33 square kilometers on the central North Island volcanic plateau, south of Kawerau. In 2013, the Government opened a tender for mineral exploration in the Central volcanic zone, located across from the Bay of Plenty and Waikato regions of North Island. Gold and silver had been identified in the area (Ministry of Business, Innovation and Employment, 2014b).

Iron Ore and Iron and Steel.—New Zealand's iron ore deposits are iron sands, which are placer deposits formed from the erosion of andesitic and rhyolitic volcanic rocks. These iron sands occur in onshore dunes and beaches and in offshore marine sands along the coastline from Kaipara Harbor south

to Wanganui on the west coast of the North Island. Iron sand concentrate from Taharoa, which contained about 57% iron, was exported to other countries in the Asia and the Pacific region. Iron sand from the Waikato North Head site was pumped to the Glenbrook steel plant of New Zealand Steel Ltd. (a subsidiary of BlueScope Steel Ltd. of Australia) by way of an 18-kilometer (km)-long underground pipe. The Glenbrook steel plant, which was the sole integrated steel producer in the country, had an output capacity of 650,000 metric tons per year (t/yr).

The Government granted Trans-Tasman Resources Ltd. an exploration license to explore for iron ore deposits off the west coast of the North Island from the Waikato River in the north to the Rangitikei River in the south. Iron sand in the area was vanadium-bearing titanomagnetite. The company submitted a mining permit application to the Government for extracting up to 50 Mt/yr of iron sand in the South Taranaki Bight. The application covered an area of 65.76 square kilometers within the existing prospecting license zone. The Environmental Protection Authority refused the application because mining could disturb or damage the seabed or subsoil and likely have an adverse effect on the habitat of marine species (Environmental Protection Authority, 2014, p. 1).

Industrial Minerals

Cement.—New Zealand's cement industry was dominated by two producers—Golden Bay Cement on the South Island and Holcim New Zealand Ltd., which was a subsidiary of Holcim Ltd. of Switzerland, on the North Island. The two companies had a combined output capacity of 1.4 Mt/yr; however, domestic cement demand was about 1.43 Mt/yr. Holcim had planned to build a 2-Mt/yr plant at Weston (near Oamatu) to replace the existing wet kilns cement plant. Owing to the uncertainty of the international financial situation, slow recovery by the local construction sector, and high energy costs, Holcim decided to halt cement manufacturing in New Zealand. Holcim's Westport cement plant was scheduled to be shut down in 2016. Holcim planned to construct an import terminal and related infrastructure during the next 3 years that would allow it to import cement from overseas to supply to the New Zealand market (Holcim Ltd. 2013).

Mineral Fuels

Coal.—New Zealand's coal resources were estimated to be 15 billion metric tons (Gt), of which about 8.6 Gt was economically recoverable. Coal accounted for about 4% of the country's total energy consumption. Bituminous coal resources are located in the West Coast region of the South Island; subbituminous coal resources are found mainly in the Waikato region of the North Island, as well as in the Otago, the Southland, and the West Coast regions of the South Island. Lignite resources are found in the Otago and the Southland regions of the South Island. The South Island lignite deposits accounted for 80% of the country's coal resources. India was the leading destination for New Zealand's coal exports, followed by Japan and China (Ministry of Economic Development, 2010, p. 35–37).

Solid Energy New Zealand Ltd., a state-owned enterprise, was the leading coal producer in the country and operated mines in Waikato in the central region of the North Island, along the west coast of the North Island, and in the Southland region of the South Island. The company produced about 4 Mt/yr of coal, which accounted for about 70% of the country's total coal output. The company shut down the Spring Creek underground mine because of high production costs and placed it on care-and-maintenance status. The company also restructured the Huntly East and Stockton Mines. The production capacity at the Huntly East Mine was reduced by one-third. Coal output from the Huntly East Mine was transported by rail directly to New Zealand Steel Plant in Glenbrook. In August 2013, Solid Energy signed a new 5-year supply arrangement with New Zealand Steel Plant and a 4-year arrangement with Genesis Energy. The contracted coal price was not announced, but domestic analysts indicated that it was significantly lower than the price in previous contracts because coal prices at the international coal markets had dropped by 35% during the past 18 months (Solid Energy New Zealand Ltd., 2014, p. 10).

The Government accepted the Royal Commission's recommendations on addressing systemic failures in the country's health and safety regime that were brought to light following the Pike River Mine explosion, which killed 29 people in 2010. The implementation of the Commission's recommendations for modifying the health and safety regulations was discussed in 2013. The Government then introduced the Health and Safety Reform Bill 2014 to replace the Health and Safety in Employment Act 1992 in the House. The main purpose of the proposed bill is to provide a balanced framework to secure the health and safety of workers and workplaces (Parliament, The, 2014, p. 1–5).

Bathurst Resources Ltd. had two operating coal mines on the South Island—the Cascade Mine, which is located near Westport, and the Takitimu Mine, which is located at Nightcaps in the Southland region. The Cascade open pit mine, which was part of the Buller coal projects, was operated by Bathurst Resources' subsidiary, Buller Coal Ltd.; the mine produced high-quality, low-sulfur coking coal. Bathurst Resources acquired the Takitimu coal mine in 2011 when it acquired the assets of Eastern Resources Group. The two mines (Cascade and Takitimu) had a total combined output capacity of 350,000 t/yr In 2011, the Government granted Buller Coal the right to develop the Escarpment Block, which is located next to the Cascade Mine. The mine was estimated to contain about 3 Mt of high-quality coking coal and had an estimated life of 5 years. Three local environmental groups appealed to the Environment Court to block the development of this coal mine at Denniston Plateau in 2012. In October 2013, the Environment Court granted permission for coal mining to proceed at the Escarpment Block (Bathurst Resources Ltd., 2014, p. 3).

Natural Gas and Oil.—New Zealand's natural gas and oil were produced from 19 fields, all of which are located in the Taranaki basin. In 2013, New Zealand's production of natural gas increased by about 7%, whereas production of oil decreased by about 13% compared with that of 2012. Natural gas production increased at the MaKee and the Mangahewa fields, and the owner, Todd Energy Ltd., invested $800 million to

drill five wells to expand the output capacity at the Mangahewa field. Natural gas production from these fields was expected to increase during the next several years. Electricity generation accounted for 46% of the country's natural gas consumption and the methanol and ammonia sectors accounted for 29%. Nearly all natural gas consumption was on the North Island. The decrease in the production of oil was caused by a shutdown at the Maari operation between August and December for repairs. Nearly all oil production was exported to Australia for refining; cheaper overseas oil was imported to refine at the Marsden Point refinery (Ministry of Business, Innovation and Employment, 2014a).

Outlook

Most mineral production in New Zealand is consumed locally, with the exception of aluminum, coal, gold, and amorphous silica. Coal and gold are the leading exported mineral commodities. Under the Crown Minerals Amendment Act 2013, some mineral exploration restrictions have been redefined on public areas where the mineral potential is significant and mineral production could contribute significantly to the economy of New Zealand. The development of the mining sector in New Zealand, however, is constrained by the population's concerns about the environmental issues related to mining, the ecological sensitivity of the country, and New Zealand's location far from major industrial markets. Consistent with these trends, New Zealand's mineral development is expected to continue to increase only gradually.

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TABLE 1
NEW ZEALAND: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2009	2010	2011	2012	2013
METALS						
Aluminum metal, smelter, primary		271,902	343,335	354,029	326,963	324,835
Gold, mine output, Au content	kilograms	13,442	13,494	11,761	10,164	12,468
Iron and steel:						
Iron sand, titaniferous magnetite, gross weight	thousand metric tons	2,092	2,439	2,357	2,395	3,157
Iron sand, iron content[e]	do.	1,200	1,390	1,340	1,360	1,800
Pig iron[e]	do.	608	667	659	669	680
Steel, crude[e]	do.	765	853	844	912	900
Lead, refinery output, secondary[e]		13,000	9,000	9,000	9,000	9,000
Silver, mine output, Ag content	kilograms	14,264	17,136	14,324	5,629	11,223
INDUSTRIAL MINERALS						
Cement, hydraulic[e]	thousand metric tons	1,200	1,100	1,200	1,200	1,200
Clays:						
Bentonite		880	1,216	--	2,263 [r]	762
For brick and tile		40,740	30,192	10,911	71,487	62,288
Kaolin, pottery		9,016	10,700	21,545	11,578	13,066
Diatomaceous earth		10	95	--	--	4
Lime[e]		175,000	170,000	175,000	175,000	175,000
Marble[e]		15,000	14,000	14,000	14,000	14,000
Nitrogen, N content of ammonia[e]		125,000	120,000	120,000	125,000 [r]	125,000
Perlite		8,848	5,088	--	3,598	--
Pumice		159,357	118,249	229,268	72,414	93,865
Salt[e]		100,000	95,000	95,000	95,000	100,000
Sand and gravel:						
Silica sand, glass sand		43,458	113,231	109,346	73,064	101,702
Other industrial sand		1,453,793	1,726,236	1,203,103	1,517,308	1,283,125
For roads and ballast	thousand metric tons	15,471	13,257	15,258	15,439	19,947
For building aggregate	do.	8,064	7,528	6,183	6,561	8,044
Stone:						
Dimension		17,795	18,911	140	8,614	17,769
Dolomite		52,000	86,399	59,782	86,040	5,542
Limestone and marl:						
For agriculture	thousand metric tons	2,020	1,686	1,387	1,020	1,419
For cement	do.	1,888	1,800	1,705	1,797	1,884
For other industrial uses	do.	664	1,054	185	364 [r]	388
Serpentine		14,197	43	41,201	36,731	52,353
Zeolites		21,750	--	3,523	--	155
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades	thousand metric tons	4,563	5,330	4,944	4,926	4,625
Liquefied petroleum gas[e]	thousand 42-gallon barrels	857	1,200	1,200	1,200	1,200
Natural gas:						
Gross production	million cubic meters	4,644	5,052	4,678	5,188	5,583
Marketed production	do.	4,097	4,432	4,003	4,559	4,866
Petroleum:						
Crude	thousand 42-gallon barrels	20,026	19,302	16,591	14,149	12,325
Refinery products[e]	do.	35,000	34,000	33,000	39,000	37,000

[e]Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. [r]Revised. do. Ditto. -- Zero.
[1]Table includes data available through August 10, 2014.

TABLE 2
NEW ZEALAND: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity	Facilities, major operating companies, and major equity owners	Location of main facilities	Annual capacity[e]
Aluminum	Tiwai Point smelter [New Zealand Aluminium Smelters Ltd. (Pacific Aluminium, 79.36%, and Sumitomo Chemical Co., 20.64%)]	Southland, Invercargill	350
Cement	Golden Bay Cement (Fletcher Building Ltd.)	Portland	900
Do.	Holcim New Zealand Ltd.	Cape Foulwind, Westport	500
Coal	Stockton open pit mine (Solid Energy New Zealand Ltd., 51%, and Cargill Inc., 49%)	Buller, 35 kilometers northeast of Westport	2,500
Do.	Pike River underground mine (Solid Energy New Zealand Ltd.)	50 kilometers northeast of Greymouth	1,000 [1]
Do.	Spring Creek underground mine (Solid Energy New Zealand Ltd.)	Greymouth	1,000 [1]
Do.	Rotowaro open pit mine (Solid Energy New Zealand Ltd.)	Huntly	1,500
Do.	Huntly East underground mine (Solid Energy New Zealand Ltd.)	do.	500
Do.	New Vale open pit mine (Solid Energy New Zealand Ltd.)	50 kilometers northeast of Invercargill	300
Do.	Ohai open pit mine (Solid Energy New Zealand Ltd.)	Ohai	200
Do.	Terrace underground mine (Solid Energy New Zealand Ltd.)	Reefton	100
Gold metric tons	Newmont Waihi Gold (Newmont Mining Corp.)	Waihi	5
Do. do.	Macraes gold project (OceanaGold Corp.)	Otago	6
Do. do.	Reefton gold project (OceanaGold Corp.)	Reefton	10
Iron and steel:			
Iron ore	New Zealand Steel Ltd. (BlueScope Steel Ltd.)	Taharoa, 150 kilometers south of Auckland	1,300
Do.	do.	Waikato North Head, 30 kilometers south of Auckland	1,000
Steel	do.	Glenbrook	650
Do.	Otahuhu Mill [Pacific Steel Group (Fletcher Building Ltd.)]	Auckland	300
Kaolin	Imerys Tableware New Zealand Ltd.	80 kilometers northwest of Whangarei	25
Petroleum, refinery barrels per day	Marsden Point Oil Refinery (New Zealand Refinery Co., operator)	Marsden Point	95,000
Salt	Dominion Salt Ltd.	South of Blenheim	70
Silver metric tons	Newmont Waihi Gold (Newmont Mining Corp.)	Waihi	30
Do. do.	OceanaGold Corp.	Otago	1

[e]Estimated. Do., do. Ditto.

[1]On care-and-maintenance status.