



2017–2018 Minerals Yearbook

CANADA [ADVANCE RELEASE]

THE MINERAL INDUSTRY OF CANADA

By James J. Barry

In 2017, Canada, a member of the Group of Seven (G7) nations, had one of the largest economies in the world, ranking 10th based on its nominal gross domestic product (GDP). In 2017, the real GDP of Canada was \$1.4 trillion,¹ which was a 6.9% increase compared with that of 2016. Canada was one of the leading mining nations in the world. It produced a wide array of industrial minerals, metals, and mineral fuels and had one of the largest mining supply sectors, with several thousand companies providing services to global mining operations. Vancouver, British Columbia, was the headquarters for the largest concentration of the world's mineral exploration companies and Toronto, Ontario, was a global hub for mineral industry financing. The Toronto Stock Exchange (TSX) accounted for 38%, or \$6.3 billion, of the world's mining equity capital raised in 2017. The TSX and the TSX Venture Exchange (TSX-V) listed 50% of the world's publicly traded mining companies. Canadian mining companies operated in more than 100 countries, and the value of the country's assets abroad equaled \$124.5 billion in 2017. Canadian companies were active in 34 countries in Africa, 21 countries in Asia (including the Middle East) and Europe, and in every country in Latin America (Mining Association of Canada, 2019, p. 36, 72; Natural Resources Canada, 2019a; Statistics Canada, 2019; World Bank Group, The, 2019).

Canada was the world's leading producer of potash and ilmenite in 2017, accounting for 29% and 16% of world production, respectively. It was the second-ranked producer of niobium and tellurium, accounting for 10% of the world's production of each, and was the third-ranked producer of palladium and graphite, accounting for 8% and 4%, respectively, of world production. Canada was the fourth-ranked producer of nickel (accounting for 10% of world production), mica (9%), cadmium and indium (7% each), and aluminum and platinum (5% each). Canada was the fifth-ranked producer of sulfur, gold, and salt, accounting for 7%, 5%, 4%, respectively, of world production, and the sixth-ranked producer of peat and cobalt, accounting for 6% and 3%, respectively, of world production. As reported by the Kimberley Process Certification Scheme, Canada was the second-ranked diamond producer by weight and the third-ranked diamond producer by value. The average value of Canada's diamond output in 2017 was \$88.66 per carat. According to the World Nuclear Association, Canada was the second-ranked producer of uranium, accounting for 22% of world production. Canada was also a leading natural gas- and crude petroleum-producing country and, according to BP p.l.c., the country accounted for about 4.8% of the world's production of natural gas and 5.2% of the world's production of crude petroleum in 2017 (Anderson, 2019a, b; Apodaca, 2019; Bedinger, 2019; Bolen, 2019; BP p.l.c., 2019, p. 16, 32;

Bray, 2019; Briocche, 2019; Curry, 2019; George, 2019; Jasinski, 2019; McRae, 2019; Olson, 2019; Padilla, 2019; Shedd, 2019; Singerling, 2019; Tolcin, 2019; World Nuclear Association, 2019; Kimberley Process Certification Scheme, 2020).

Minerals in the National Economy

In 2017, the mining, quarrying, and petroleum and natural gas extraction industries contributed \$107.8 billion to Canada's real GDP; this was an 11% increase compared with that of 2016. The increase was largely attributed to a nearly \$1.8 billion increase in the value added by support activities in the mineral extractives sector. Within the extractives industry, petroleum and natural gas extraction accounted for \$75 billion of real GDP, metal ore mining accounted for \$14 billion, nonmetallic mineral mining and quarrying accounted for \$9 billion, and coal mining accounted for \$2.5 billion (Statistics Canada, 2019).

The mining and quarrying industries employed 426,000 people in Canada in 2017. About 107,000 people worked in mineral extraction; 40,000, in metal mining; 37,000, in services; 25,000, in nonmetallic mineral mining; and 5,000, in coal mining. In 2017, nonmetallic mineral product manufacturing accounted for 50,000 jobs and primary metal manufacturing accounted for about 46,000 jobs. Data from two large oil sands mining companies indicated that there were at least 19,000 jobs in oil sands extraction and processing in 2017, not including indirect employees. Support activities for mining and quarrying employed a reported 23,425 people in Canada in 2017. This figure reflected only a fraction of those providing support services, as there were an estimated 208,000 indirect jobs provided by suppliers and services across sectors that are not included in the reported total for mining and quarrying support activities (Mining Association of Canada, 2019, p. 46, 53; Natural Resources Canada, 2019b).

In 2017, the cost of fuel and electricity consumed by mineral industry activities overall in Canada increased by 11.4% compared with the cost in 2016. The cost of fuel and electricity consumed by nonmetallic mineral mining activity, which included quarrying, increased by 19.1%. However, 65.9% of fuel and electricity costs were attributed to metal ore mining activities, including uranium ore mining, which saw a 9.1% increase in fuel and electricity costs. The cost of materials and supplies consumed by mineral industry activities increased by 2.2% overall, although the cost of materials and supplies used in nonmetallic mineral mining activities decreased by 4.1%. Metal ore mining activities accounted for 78.7% of the total cost of materials and supplies for the mineral industry, and the cost for metal ore mining activities increased by 4%. In 2017, the value of Canada's mineral industry production (excluding petroleum and natural gas extraction) increased by 13.2%, including a 20.3% increase in nonmetallic mineral mining activities and a 10.2% increase in metal ore mining activities (Natural Resources Canada, 2019c).

¹Where necessary, values have been converted from Canadian dollars (CAD) to U.S. dollars (US\$) at an annual average exchange rate of CAD 1.297=US\$1.00 for 2018, CAD 1.350=US\$1.00 for 2017, and CAD 1.379=US\$1.00 for 2016.

At the Provincial and Territory level, mining, quarrying, and petroleum and natural gas extraction accounted for the greatest share of the GDPs of the Provinces and Territories of Alberta, Newfoundland and Labrador, the Northwest Territories, Nunavut, Saskatchewan, and Yukon, since 2011. The Provinces and Territories where mining, quarrying, and petroleum and natural gas extraction accounted for the smallest share of the GDPs were British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, and Quebec. Additionally, there was a significant gap in the value added from the mineral extractives sector between the high-income and low-income Provinces and Territories. In 2017, mining, quarrying, and petroleum and natural gas extraction accounted for 37% of the GDP of the Northwest Territories; of Newfoundland and Labrador, 36%; Alberta, 26%; Saskatchewan, 26%; Nunavut, 25%; Yukon, 7%; British Columbia, 4%; Manitoba, 3%; Quebec, 2%; New Brunswick, 1%; Nova Scotia, 1%; Ontario, 1%; and Prince Edward Island, less than 1% (Statistics Canada, 2019).

In 2017, Quebec was the leading Province in terms of exploration and deposit appraisal expenditures, accounting for 26.3% of Canada's total exploration and deposit appraisal expenditures; Ontario, 24.7%; British Columbia, 13.8%; Saskatchewan, 8.7%; Nunavut, 8.1%; Yukon, 7.7%; the Northwest Territories, 4.2%; Manitoba, 1.9%; Newfoundland and Labrador, 1.9%; Alberta, 1.1%; Nova Scotia, 0.8%; and New Brunswick, 0.7%. Canada was the world leader in nonferrous metal mineral exploration spending in 2017, accounting for 13.8% of global expenditures. In 2017, there was a total of 108 major mining projects in Canada (projects with capital costs of at least \$37 million [reported as \$50 million Canadian dollars]), including 31 new projects. However, the total value of these major mining projects decreased by 11% compared with that of 2016 owing largely to the completion of many projects. Global economic growth and an increase in mineral commodity prices were contributing factors in the level of mining project investment (Natural Resources Canada, 2017a, p. 6, 8; 2020b; Mining Association of Canada, 2019, p. 6–7).

In 2017, the value of Canada's domestic mining assets (assets that included mineral properties, deferred mineral exploration expenses, and royalties) included 1,025 companies and was about \$67.7 billion compared with \$67.3 billion in 2016. The combined value of the mining assets of the 186 Canadian companies operating in South America was \$40.7 billion in 2017 compared with \$41 billion in 2016. The combined value of the mining assets of the 110 Canadian companies operating in Africa was \$19.5 billion in 2017 compared with \$20.2 billion in 2016. Canada's mining assets in the United States consisted of 286 companies that had a combined value of \$18.4 billion compared with \$18.2 billion in 2016. The combined value of the mining assets of the 110 Canadian companies operating in Mexico was \$13.6 billion compared with \$13.2 billion in 2016. The combined value of the Canadian mining assets in the Asia and the Pacific region was unchanged, totaling \$10.9 billion in both 2017 and 2016. In Central America, Canadian mining assets consisted of 17 companies valued at a combined \$8.8 billion in 2017 compared with \$7.0 billion in 2016. The combined value

of the mining assets of the 64 Canadian companies operating in Europe was \$7.2 billion in 2017 compared with \$7.4 billion in 2016 (Natural Resources Canada, 2019a).

Government Policies and Programs

The Minerals and Metals Policy of the Government of Canada is the Federal policy that outlines and describes the Federal Government's role, objectives, and strategies for development of the country's mineral resources. Minerals are generally owned and managed by the government of the Province or Territory in which they occur, however, and each jurisdiction has its own mining, environmental, and occupational health and safety laws and regulations. The three Territories—the Northwest Territories, Nunavut, and Yukon—have responsibilities for environmental assessment, land use planning, and water resources, and generally operate under a system of co-management boards with representation from First Peoples groups (First Nations, Inuit, and Métis). In general, there are two types of First Peoples claims in Canada that are commonly referred to as land claims—comprehensive claims and specific claims. Comprehensive claims arise in areas where First Peoples land rights have not been defined by past treaties or through other legal means, whereas specific claims are defined by treaties or laws. For comprehensive claims, agreements are negotiated between the First Peoples group, the Government of Canada, and the government of the Province or Territory (Government of Canada, 2018; Wacaster, 2017, p. 5.2).

All new mines and some mine expansion projects are subject to Federal review and approval, in addition to Provincial or Territorial permitting requirements. Most major mining projects in the country are subject to the Canadian Environmental Assessment Act of 2012 and may be subject to approvals under the Fisheries Act and the Navigation Protection Act. A Federal review of the Metal Mining Effluent Regulations was completed in 2015, and proposed amendments were expected in 2018 (Mining Association of Canada, 2019, p. 65).

Mineral resources that underlie the continental shelf, Federal lands (including national parks), First Nation lands, and offshore waters are owned by the Federal Government. Direct Federal regulation of mining operations is limited in scope, but includes activities associated with the uranium fuel cycle from exploration to disposal of nuclear waste, activities related to Federal Crown corporations, and mining activities on Federal lands and offshore areas. The manufacture, sale, use, storage, and transportation of explosives used in exploration and mining in Canada are regulated under the Federal Explosives Act. The export, import, and transit across Canada of rough diamond are regulated under the Federal Export and Import of Rough Diamonds Act. Any written or oral mining disclosures made available to the public in Canada are governed by National Instrument 43–101 (NI 43–101) Standards for Disclosure in Mineral Projects (Kazaz and Fipke, 2012, p. 4; Natural Resources Canada, 2017b).

Although the majority of mineral rights in Canada are owned by the Provinces and Territories, mineral rights may also be held by the Federal Government, First Peoples groups, or private entities. The Federal, Provincial, and Territorial governments have shared regulatory responsibilities that are

similar across jurisdictions, but each jurisdiction maintains its own distinct regulatory regime in terms of minerals management. Responsibilities that are generally in the Provincial or Territorial regime include resource ownership and management; land use decision making; resource exploration and development regulations; exploration and development of resources; operational matters, such as licensing, permitting, and monitoring; mining royalties and Provincial income taxes; Provincial statistics and geoscience data; and the generation and distribution of electricity. Mineral processing and further beneficiation are generally subject to the same legislative regimes that apply to mineral exploration and extraction, because the same Provincial, Territorial, or Federal statutes regulate all stages of the mining process. Most jurisdictions do not require mineral processing to take place within the Province or Territory of extraction except for New Brunswick, Newfoundland and Labrador, and Nova Scotia. Local or municipal governments administer bylaws dealing with land use planning and issuance of permits for construction, water supply and distribution, and waste management. First Peoples governments exercise powers over reserve lands and other territories covered by specific agreements negotiated with the Federal and Provincial governments. Such governance on reserves has many of the same powers and responsibilities as local, municipal, or Provincial governments (Lawson Lundell LLP, 2017, p. 68; Natural Resources Canada, 2017b).

With respect to energy development in Canada, Federal and Provincial governments share responsibility for energy production, environmental protection, and trade. The Provinces have jurisdiction over the development of crude petroleum within the Provincial boundaries. The National Energy Board (NEB) regulates construction, operation, and decommissioning of pipelines; construction and operation of international power lines and designated interprovincial power lines; imports of natural gas and exports of crude petroleum, natural gas liquids, natural gas, refined petroleum products, and electricity; and petroleum and natural gas exploration and production activities in specified areas that are not regulated under joint Federal and Provincial accounts. The NEB's responsibilities are described in the National Energy Board Act, the Canada Oil and Gas Operations Act, and the Canada Petroleum Resources Act. For certain projects, an environmental assessment is required by such Federal laws as the Canadian Environmental Assessment Act, the Mackenzie Valley Resource Management Act, and the Inuvialuit Final Agreement or Nunavut Land Claims Agreement (Canada Energy Regulator, 2019b).

Federal and Provincial or Territorial governments in Canada receive direct revenue from energy industries in the form of corporate income taxes; indirect taxes, including sales and payroll taxes; royalties to the Crown, Province, or Territory; and Crown land sales. Between 2013 and 2017, the average revenue received from energy industries included \$6.4 billion in royalties, \$3.2 billion in income tax, \$2.1 billion in indirect taxes, and \$800 million in land sales (Natural Resources Canada, 2020a).

More-extensive coverage of Government policies and programs of Canada, including provisions for each Province and Territory, can be found in the U.S. Geological Survey Minerals Yearbook 2014, volume III, Area Reports—International—Latin America and Canada.

Production

In 2017, the top nonfuel mineral commodities produced in Canada were, by value, gold, coal, copper, potash, iron ore, nickel, diamond, sand and gravel, and stone; they had a combined value of \$28 billion. Production of many reported metals increased by 10% or more in 2017 compared with that of 2016, including mined bismuth, mined cadmium, ferroniobium, direct-reduced iron, mined and secondary refined lead, molybdenum, niobium, tellurium, and titanium. For many of these commodities, the increased production was a result of stable or increasing global prices of the respective commodities. Metal production decreased by more than 10% for refined cadmium, mined cobalt, mined copper, primary refined lead, minor PGMs (iridium, rhodium, and ruthenium) mined nickel, palladium, platinum, selenium, and smelter zinc. Industrial minerals with increased production greater than 10% included barite, diamond, gypsum, potash, salt, and sand and gravel (industrial silica). In 2017, gemstones, sand and gravel (construction), and metallurgy sulfur were the only industrial minerals for which production decreased by more than 10%. For mineral fuels and related materials production, aviation gasoline, diesel fuel, and heavy fuel oil all increased by more than 10%, whereas refinery (other) products and uranium decreased by more than 10%. Data on mineral production are provided in table 1 (table 1; Mining Association of Canada, 2019, p. 25).

Structure of the Mineral Industry

As one of the world's most active mining countries, Canada had numerous mineral exploration, mine development, and mining projects underway in 2017. Canada's mineral industry was characterized by free enterprise in which private companies were involved in exploration, mine development, mineral production, mineral processing, and marketing. In 2017, the Mining Association of Canada reported that there were 1,189 operating mines in Canada, including 1,126 nonmetallic mineral mines and 63 mines that produced metal ores. According to Natural Resources Canada, the country had 7,000 sand and gravel pits and stone quarries. Canada also had about 50 nonferrous metal smelters, refineries, and steel mills. Table 2 is a list of major mineral industry facilities (Natural Resources Canada, 2016, p. 6; Mining Association of Canada, 2019, p. 13).

Mineral Trade

Canada is one of the most open countries in the world in terms of trade and investment in mining, and there are few barriers to foreign ownership. The Canada-European Union (EU) Comprehensive Economic and Trade Agreement (CETA) negotiations concluded in September 2014 and went into force in September 2017. Ratification of the treaty lifted nearly all tariffs between the two entities, reducing the costs of goods traded. Once the CETA and the Trans-Pacific Partnership (a trade agreement among Canada and 11 other countries that was intended to reduce tariffs between participating countries) were in full force, Canada would have trade agreements with 51 countries. Canada also had Foreign Investment Promotion

and Protection agreements with 37 countries, the stated objective of which was to maintain transparency in foreign investments (Natural Resources Canada, 2016, p. 7; Global Affairs Canada, 2019, p. 109).

In 2017, the value of domestic exports of minerals and mineral products (not including crude petroleum and petroleum products) was about \$72 billion, of which metals and metallic minerals accounted for 78%; nonmetallic minerals and industrial materials accounted for 15%; and coal and coke accounted for 7%. The country's leading trade partner, in terms of value of mining exports, was the United States, followed by the countries of the EU (as an aggregate sum), China, and Japan (Mining Association of Canada, 2019, p. 101–104).

In 2017, in terms of value, the United States accounted for 57% of Canada's metallic mineral exports; 59% of its nonmetallic mineral exports; and 7% of its coal and coke exports (combined). The combined total of aluminum and iron and steel exports accounted for 56% of the value of metals exported to the United States from Canada. The value of exports to the countries of the EU accounted for 25% of Canada's metals exports, 11% of its nonmetallic mineral exports, and 12% of its coal and coke exports (combined). Gold exports accounted for 67% of Canada's total metal exports to the EU. China accounted for 4% of Canada's metallic mineral exports, 5% of its nonmetallic mineral exports, and 13% of its coal and coke exports (combined). Copper, iron ore, and nickel together accounted for 61% of all Canada's metal exports to China. Japan accounted for 3% of Canada's metallic mineral exports, less than 1% of its nonmetallic mineral exports, and 24% of its coal and coke exports (combined) (Mining Association of Canada, 2019, p. 102–104).

In terms of value, gold was Canada's leading metallic mineral export in 2017, accounting for 24% of the value of metal exports and 19% of the total value of mineral and mineral-product exports. The EU accounted for 67% (by value) of the gold exports. Iron and steel was Canada's second-ranked metallic mineral export, accounting for 20% of metal exports and 15% of the total mineral and mineral-product exports. The United States accounted for 87% (by value) of the iron and steel exports from Canada. Potash and potassium compounds combined were Canada's leading nonmetallic mineral export, accounting for 36% of the nonmetallic exports and 5% of the total mineral and mineral-product exports. The United States accounted for 55% of the potash and potassium compound exports. Diamond was the second-ranked nonmetallic mineral export, accounting for 19% of nonmetallic exports and 3% of the total mineral and mineral-product exports from Canada (Mining Association of Canada, 2019, p. 102–104).

In 2017, the value of imports of minerals and mineral products (not including crude petroleum and petroleum products) was about \$60 billion, of which metals and metallic minerals accounted for 82%; nonmetallic minerals and industrial materials accounted for 16%; and coal and coke accounted for 1%. Canada's leading trade partner in 2017, in terms of value of mining imports, was the United States, followed by China, the countries of the EU as an aggregate, and Mexico (Mining Association of Canada, 2019, p. 105–107).

In terms of value, iron and steel was Canada's leading mineral import, accounting for 30% of the total value of mineral and mineral-product imports. The United States accounted for 55% of the iron and steel imports. Gold was the second-ranked mineral import, accounting for 11% of the value of total mineral and mineral-product imports. The United States accounted for 17% of Canada's gold imports (Mining Association of Canada, 2019, p. 104–106).

Commodity Review

Metals

Aluminum.—The majority of aluminum smelters in Canada were wholly or partially owned by Rio Tinto Alcan Inc., which was headquartered in Montreal. In 2017, aluminum production was 3,211,882 metric tons (t), which was essentially unchanged from that of 2016. The total value of aluminum and aluminum-product exports from Canada in 2017 was \$9.4 billion; the value of aluminum and aluminum-product imports was \$5.3 billion. With the implementation of the CETA between Canada and the EU in September 2017, tariff rates ranging from 6.3% to 10% for aluminum and aluminum products were removed (as were tariffs on most other goods, mineral or otherwise) on exports to the EU (tables 1, 2; Mining Association of Canada, 2018, p. 73; 2019, p. 102, 105).

Bismuth and Cadmium.—In 2017, mine output of bismuth was 4 t, doubling the output of 2016. Production of bismuth had decreased every year since 2011, representing a total decrease of 99% between 2011 and 2016. Mine output of cadmium increased for the first time in 8 years to 158 t in 2017, which was a 163% increase compared with that of 2016, but a 93% decrease compared with the high of 2,403 t in 2010. Bismuth and cadmium were primarily obtained as byproducts of the production of concentrates from lead- and zinc-bearing ores. The largest decreases in annual cadmium production (those recorded in 2011 and 2012) preceded significant decreases in mine production of both lead and zinc in 2013 and 2014, whereas the largest decrease in bismuth production took place in 2014. Proven and probable reserves of lead and zinc at operating mines had continually decreased since 1984. The closure of several mines in recent years was a contributing factor to the decrease in reserves and in the production of lead and zinc (table 1; Mining Association of Canada, 2019, p. 95, 98).

Cobalt.—In 2017, Canada's mined cobalt production was 3,704 t compared with 4,216 t in 2016, and refined cobalt production was 6,355 t compared with 6,302 t in 2016. Mined cobalt included production from the following three mines owned by Vale S.A. of Brazil: 1,829 t from the Voisey's Bay Mine, 840 t from the Ontario Division (Sudbury mines), and 138 t from the Manitoba Division (Thompson Mine). In addition, Glencore plc of Switzerland's Sudbury operations produced 800 t. Vale S.A.'s Port Colborne refinery produced 1,675 t of cobalt metal. Vale also began refining operations at Long Harbour in Newfoundland and Labrador, producing 1,231 t of cobalt rounds. The total value of cobalt and cobalt product exports from Canada in 2017 was \$436 million; that of imports was about \$70 million (tables 1, 2; Glencore plc, 2018, p. 70; Vale S.A., 2018a, p. 2, 55; Mining Association of Canada, 2019, p. 102, 105).

Copper.—Production of mined copper decreased to 594,994 t in 2017, or by 14% compared with that of 2016. Since 2011, mined copper production had increased at an average annual rate of 5.5% until it decreased in 2016. Teck Resources Ltd.'s Highland Valley Mine in British Columbia produced 92,800 t of copper in concentrate compared with 119,300 t in 2016. The variations in yearly production were expected to continue owing to significant fluctuations in ore grades. Vale's Ontario Division (Sudbury mines) accounted for 98,300 t in 2017 compared with 121,600 t in 2016; and Taseko Mines Ltd.'s Gibraltar Mine in British Columbia produced 64,000 t of copper in 2017 compared with a revised 60,500 t in 2016. Production at these three operations accounted for 43% of the copper produced in Canada in 2017 (table 1; Taseko Mines Ltd., 2018, p. 5; Teck Resources Ltd., 2018, p. 18; Vale S.A., 2018b, p. 16).

In 2017, the advanced-stage Casino Mine project, which was wholly owned by Casino Mining Corp. (a wholly owned subsidiary of Western Copper and Gold Corp.) had an estimated annual production potential of 111,000 t of copper, which would make it one of the largest copper-producing mines in Canada and the largest mining operation in the Yukon. The mine was located about 300 kilometers (km) northwest of Whitehorse, Yukon. In January 2013, a bankable feasibility study was released, and despite current copper and gold prices being lower than those assumed in the feasibility study, the project remained economic. In 2016, Western Copper and Gold received the environmental and socioeconomic (ESE) statement guidelines from the Yukon Environmental Socio-Economic Assessment Board and began preparing the ESE study. Mine production was expected to commence about 2 years after permitting and the securing of project financing were completed (Western Copper and Gold Corp., 2015; 2017, p. 2–4; Topf, 2016; Casino Mining Corp., 2018).

Gold.—Gold production increased by 4% to 168,072 kilograms (kg) in 2017 compared with that of 2016. Exploration for precious metals continued to receive the largest share of exploration spending in Canada in 2017, accounting for 65% of the total. Owing to higher precious metal prices in 2017, spending intentions for exploration of precious metals increased by 48% to \$2.25 billion from \$1.08 billion in 2016. The value of gold exports in 2017 was \$14.35 billion, and that of gold imports was \$6.97 billion (table 1; Mining Association of Canada, 2019, p. 37, 102, 105).

In July, Pretivm Resources Inc.'s Brucejack project, which is located about 65 km north of Stewart in northwestern British Columbia, commenced commercial production. Production in 2017 included 4,732 kg of gold, plus another 265 kg of precommercial production and 5,575 kg of silver. Brucejack (including Valley of the Kings and West Zones) had proven and probable reserves of 271,000 kg of gold and 993,000 kg of silver, with a projected annual production of 15,700 kilograms per year (kg/yr) during the first 8 years of production and 12,600 kg/yr during the estimated 18-year mine life (Pretivm Resources Inc., 2017; 2018, p. 8, 14, 17, 19).

In October, New Gold Inc.'s Rainy River project, which is located about 50 km northwest of Fort Frances, Ontario, achieved commercial production of 1,152 kg of gold. New Gold's 2018 production guidance for Rainy River was about

10,100 to 11,400 kg of gold. Rainy River had proven and probable reserves of more than 137,000 kg of gold and 397,000 kg of silver (New Gold Inc., 2018, p. 9, 15, 20, 25).

Lead and Zinc.—Production of mined lead in 2017 was 13,494 t, which was a 12% increase compared with that of 2016. The increased production was largely attributed to the first full year of commercial production at Trevali Mining Corp.'s Caribou Mine, which is located about 50 km west of Bathurst in New Brunswick. The Caribou Mine produced 14,026 t of payable lead, accounting for all Canada's 2017 lead production. Prior to 2015, lead production had been decreasing every year since 2011 owing to a near depletion of lead reserves. The lead content of proven and probable minable ore reserves at operating mines in Canada had been steadily decreasing since 1980. In 2017, these reserves reached 165,000 t, which was a 99% decrease compared with that of 1980. The amount of primary refined lead decreased by 12% in 2017 compared with that of 2016; however, the amount of total refined lead remained unchanged owing to a 13% increase in secondary refined lead production. The value of Canada's lead exports was \$655 million, and the value of lead imports to Canada was \$268 million in 2017 (table 1; Trevali Mining Corp., 2018, 2019; Mining Association of Canada, 2019, p. 40, 95, 102, 105; 2020, p. 38).

Production of mined zinc in 2017 increased to 305,314 t, or by 1% compared with that of 2016. Like lead reserves, zinc reserves had been decreasing steadily since 1980. The zinc content of proven and probable minable ore reserves at operating mines in Canada was 2,286,000 t in 2017, which represented a 92% decrease compared with that of 1980. Smelter zinc production, which had remained relatively stable in recent years, decreased by about 13% in 2017 compared with that of 2016. The value of Canada's zinc exports in 2017 was \$1.6 billion and the value of zinc imports to Canada was \$807 million (table 1; Mining Association of Canada; 2019, p. 40, 95, 101, 106; 2020, p. 38).

Nickel.—In 2017, nickel production was 206,354 t compared with 230,210 t in 2016. Vale and Glencore produced 95% of the nickel produced in Canada. Vale's operations in Ontario (Sudbury mines), Manitoba (Thompson Mine), and Newfoundland and Labrador (Voisey's Bay Mine) accounted for 66% of total production of mined nickel. An additional 28% of total production of mined nickel was produced by Glencore's Sudbury and Raglan Mines. The value of Canada's nickel exports was \$2.9 billion and the value of Canada's nickel imports was \$607 million (Glencore plc, 2018, p. 70; Vale S.A., 2018b, p. 13; Mining Association of Canada; 2019, p. 102, 105).

Platinum-Group Metals.—In 2017, production of platinum-group metals (PGMs) as a whole decreased to 27,400 kg, or by 13% compared with that of 2016. Glencore, North American Palladium Ltd., and Vale were responsible for most of the palladium produced in Canada, accounting for 4,230 kg, 6,270 kg, and 6,656 kg, respectively, in 2017. The two main producers of platinum—Vale and Glencore—produced 4,479 kg and 2,332 kg, respectively. The value of Canada's PGM exports was \$627 million, and the value of PGM imports to Canada was \$394 million (table 1; Glencore, 2018, p. 70; North American Palladium Ltd., 2018; Vale S.A., 2018b, p. 19; Mining Association of Canada, 2019, p. 102, 105).

Silver.—In 2017, silver production was 366 t compared with 385 t in 2016. Like lead and zinc, the silver content of proven and probable minable ore reserves at operating mines in Canada had been steadily decreasing, although in 2017, silver reserves increased by 40% to almost 5,100 t. Fluctuations in reserve estimates since 2009 were related to variations in prices for precious metals (table 1; Mining Association of Canada, 2019, p. 40; 2020, p. 38).

Industrial Minerals

Diamond.—Canada's diamond production in 2017 increased by 78% compared with that of 2016 to more than 23 million carats. Rio Tinto's Diavik Mine produced 4.5 million carats, and the Gahcho Kué Mine [De Beers Canada Inc., 51% (a wholly owned subsidiary of De Beers Group, S.A.), and Mountain Province Diamonds Inc., 49%] produced 6 million carats, accounting for 45% of Canada's diamond production in 2017. The value of Canada's diamond exports was \$2 billion, and the value of diamond imports to Canada was \$415 million (tables 1, 2; Anglo American plc, 2018, p. 3; De Beers Group, 2018; Rio Tinto plc, 2018, p. 4; Mining Association of Canada, 2019, p. 103, 106).

Potash.—In 2017, production of potash increased by 16% to 12.6 million metric tons (Mt) compared with 10.8 Mt in 2016. Potash Corp. of Saskatchewan Inc. operated the Allan, Cory, Lanigan, Patience Lake, and Rocanville potash mines. The total combined production of these mines increased by 14% to 9.8 Mt and accounted for 78% of Canada's total potash production. In December, the U.S. Federal Trade Commission granted approval for Agrium Inc. and Potash Corp. of Saskatchewan to merge, clearing the last regulatory hurdle toward completion of the merger. With the merged companies operating under the name Nutrien, the merger was expected to go into effect on January 1, 2018, with Nutrien controlling the majority of North America's potash production capacity. As of yearend 2017, construction at BHP Billiton Group of Australia's wholly owned Jansen potash project, which was located about 140 km east of Saskatoon, Saskatchewan, was 75% completed. Measured resources estimated at Jansen as of June 30, 2017, were 5.2 billion metric tons containing 25.7% potassium oxide (equivalent to 40.7% potassium chloride) and 0.08% magnesium oxide. Initial production capacity at Jansen was expected to be 4 million metric tons per year (Mt/yr) (table 1; BHP Billiton plc, 2017, p. 62, 268; 2018, p. 8; Thomson Reuters, 2017; Potash Corporation of Saskatchewan Inc., 2018, p. 15).

Mineral Fuels and Related Materials

Coal.—Production of all types of coal decreased by about 1% to 60.8 Mt in 2017 compared with that of 2016. Three companies were responsible for most of the coal produced in Canada in 2016. Teck Resources Ltd. produced coal from six coal operations; Teck was the sole controlling company for four of them, and the other two were joint ventures with Nittetsu Mining Co. Ltd. of Japan and (or) POSCO Canada Ltd. (a subsidiary of POSCO of the Republic of Korea). These operations, including the Cardinal River, Coal Mountain, Elkview, Fording River, Greenhills, and Line Creek Mines, produced 26.6 Mt of metallurgical-grade coal, which accounted

for almost all Canada's metallurgical coal production and 44% of Canada's total coal production in 2017. Westmoreland Coal Co. of Englewood, Colorado, operated the Prairie mining projects, which consisted of eight mining complexes in Alberta and Saskatchewan, including the Coal Valley, Estevan (including the Bienfait and Boundary Dam Mines), Genesee, Paintearth, Poplar River, and Sheerness complexes. Combined production from Westmoreland's Canadian operations was 22.5 Mt, accounting for 37% of the country's total production in 2017. Production from TransAlta Utilities Corp. of Alberta's Highvale Mine was estimated to have accounted for 13% of Canada's total production (tables 1, 2; Teck Resources Ltd., 2018, p. 1, 10; TransAlta Utilities Corp., 2018; Westmoreland Coal Co., 2018, p. 7, 14).

Natural Gas.—In 2017, marketable natural gas production increased to 166.3 billion cubic meters from 159.9 billion cubic meters in 2016. Natural gas in Canada was primarily sourced from the western Canadian sedimentary basin in Alberta, British Columbia, and Saskatchewan. Although natural gas from conventional sources had declined in recent years, the technically recoverable resources in conventional reservoirs was 10.1 trillion cubic meters in 2017. Also included in Canada's technically recoverable resources of natural gas was an additional 24.4 trillion cubic meters in unconventional reservoirs, such as coalbed methane, shale gas, and tight gas. Canada's domestic natural gas supply exceeded consumption. Although Canada's natural gas markets were integrated with those of the United States, and Canada exported its surplus gas to the United States, there were no liquefied natural gas (LNG) production facilities in Canada to facilitate overseas natural gas exports. There were several LNG projects in the country, but none were yet under construction in 2017 (Canada Energy Regulator, 2019a; Natural Resources Canada, 2020c).

Petroleum.—In 2017, crude petroleum production was 1.76 billion barrels (Gbbbl), which was an 8% increase compared with that of 2016. The country had 167.7 Gbbbl of proven crude petroleum reserves, of which 97% consisted of oil sands. In 2017, 99% of Canada's 1.2 Gbbbl of crude petroleum and its equivalents were exported to the United States. Canada was the leading foreign supplier of crude petroleum to the United States, accounting for 43% of the United States' crude petroleum imports and 21% of crude petroleum intake for refineries operating in the United States. About 64% of Canada's petroleum production in 2017 was sourced from oil sands, and the remainder was from conventional, offshore, and tight oil production. Most of Canada's crude petroleum production came from the Provinces of Alberta (80.7%) and Saskatchewan (11.7%), followed by Newfoundland and Labrador (5.3%), British Columbia (1.4%), Manitoba (0.9%), and others (0.1%) (table 1; Natural Resources Canada, 2018, p. 48, 49, 51, 53).

Reserves and Resources

Proven and probable reserves of some metals in Canada had been decreasing for several decades, particularly those of lead, silver, and zinc, which resulted in decreased production; reserves of gold, on the other hand, reached record highs and reserves of copper rebounded. The long-term decrease in reserves of certain mineral commodities was the result of many

factors, including trends of international mineral commodity prices and domestic and global economic trends. These factors had a negative effect on the amount of capital available to junior mining companies that performed early-stage exploration activities and led to fewer discoveries to develop, which in turn resulted in less reserves added to replace those removed by mining. The total value of expenditures for exploration and deposit appraisal in Canada was in decline from 2011 to 2015. In 2016 and 2017, the total value of exploration and deposit appraisal increased to \$1.6 billion and \$1.7 billion, respectively (Mining Association of Canada, 2019, p. 43).

The Federal Government extended the Mineral Exploration Tax Credit and a financing tool available to Canadian resource companies (the super flow-through share provision) for 5 years. The super flow-through share provision allows companies to issue shares to investors at a higher price than they would normally receive. The purpose of these measures are to assist financing and exploration efforts needed to address decreasing base-metal reserves. Reserve estimates (including proven and (or) probable reserves) for some mineral commodities are in table 3 (Mining Association of Canada, 2019, p. 39).

MINERAL INDUSTRY HIGHLIGHTS IN 2018

Minerals in the National Economy

In 2018, Canada's real GDP was \$1.5 trillion, which was a 3.2% increase compared with that of 2017. With a value of \$112.1 billion, the mining, quarrying, and petroleum and natural gas extraction industries accounted for 8% of real GDP. Within the extractive sector, petroleum and natural gas extraction contributed \$68.0 billion; metal ore mining, \$16.8 billion; support activities, 12.5 billion; nonmetallic mining and quarrying, \$10.0 billion; and coal, \$2.6 billion (Statistics Canada, 2020b).

In 2018, the value of exports of metal ores and minerals was \$14.9 billion (an increase of 19.7%), and the value of exports of metal and mineral products was \$49.8 billion (a 4.8% increase). The increased value in exports was largely attributable to increases in export volumes. Exports of metal ore and minerals to the United States equaled \$3.4 billion, which was 22.8% of all metal ore and mineral exports; exports of metal and mineral products equaled \$28.7 billion, or 57.6% of all exports of metal and mineral products. There were significant increases in exports of aluminum (280%), mineral fuels and petroleum (63%), and miscellaneous base metals (56%) to the EU owing to the first full year of the CETA being in force. Imports of metal ores and minerals to Canada was \$11.1 billion, a 16.1% increase, and imports of metal and mineral products was \$32 billion, a 1.4% increase. Canada imported \$3.2 billion of metal ore and minerals from the United States, which was 28.8% of all metal ore and minerals exports, and imported \$26.3 billion of metal and mineral products from the United States, or 82.2% of all exports of metal and mineral products (Global Affairs Canada, 2019, p. 62, 64, 66, 109; Statistics Canada, 2020a).

Production

In 2018, production of the following nonfuel mineral commodities increased by more than 10%: gemstones, mined and primary refined lead, minor PGMs (iridium, rhodium, and ruthenium), potash, silicon metal, talc, and smelter zinc. Aviation gasoline was the only commodity in the mineral fuel and related materials category for which production increased by more than 10%. Nonfuel mineral commodities for which production decreased by 10% or more included barite, primary refined copper, ferrosilicon, primary refined indium, mined and refined nickel, selenium, tellurium, and titanium. Production of the following mineral fuels and related materials decreased by more than 10%: asphalt, all forms of coal, heavy and light fuel oil, liquefied petroleum gas, natural gas liquids, peat, crude petroleum, refined petroleum (other), and uranium (table 1).

Commodity Review

Metals

Cobalt.—In 2018, First Cobalt Corp. initiated studies to restart the company's refinery, which was located near Cobalt, Ontario. In October, First Cobalt announced positive results from studies related to reopening the refinery. The refinery would be capable of producing battery-grade cobalt from cobalt hydroxide sourced from the Democratic Republic of the Congo and from recycled battery material. Under the base case of the studies, the refinery would be capable of producing between 568 and 1,063 metric tons per year (t/yr) of cobalt. In November, the company began testing potential cobalt hydroxide feedstocks for the refinery and stated that the refinery could be reopened as soon as 18 months after the optimal feedstock was determined (First Cobalt Corp., 2018a–c).

Copper.—In July, the high-grade copper-producing Reed Mine was closed. The mine was located near Flin Flon, Manitoba. Reed, which was owned by Hudbay Minerals Inc., had opened in 2014 with limited mineral reserves but high-grade content. In October 2018, the copper-producing Minto Mine, which was owned by Capstone Mining Corp., was placed on care-and-maintenance status after Pembridge Resources of the United Kingdom backed out of a pending agreement to purchase the mine owing to low copper prices. Prior to the action, Minto had produced 9,400 t of copper. The mine had a capacity of 21,000 t/yr and, according to Capstone, if the price of copper increases, the mine could reopen and be economic until at least 2020 (table 2; Capstone Mining Corp., 2018; CBC News, 2018; Westhaver, 2018).

Iron Ore.—In February, Quebec Iron Ore Inc., which was a jointly owned subsidiary of Champion Iron Ltd. (63.2%) and Ressources Québec (36.8%), announced the restart of the Bloom Lake iron mine located about 13 km from Fermont, Quebec. The Bloom Lake Mine produced 5.8 Mt of iron concentrate in 2018 and had the capacity to produce 20 Mt/yr of processed ore containing 7.4 Mt/yr of iron concentrate at a grade of 66.2% iron. Based on a 2017 feasibility report, Bloom Lake had a mineral reserve of 411.7 Mt and a 21-year mine life (Champion Iron Inc., 2018a, p. 4; 2018b; 2019, p. 4; 2020).

Lead, Silver, and Zinc.—In September, Coeur Mining Inc. of the United States announced that the Silvertip Mine—a silver-zinc-lead mine—had commenced commercial production. Silvertip was commissioned in March and produced 1,775 t of lead, 10,575 kg of silver, and 3,076 t of zinc in 2018. In December, Coeur Mining announced an NI 43–101-compliant reserve estimate of about 90,000 t of lead, 466,000 kg of silver, and 133,000 t of zinc. Based on these estimates, the mine was expected to have annual production of 16,800 t of lead, 345,000 kg of silver and silver equivalent, and 20,400 t of zinc during its 4.5-year mine life (Coeur Mining Inc., 2018a, b; 2019).

Industrial Minerals

Graphite.—In 2018, there were three advanced graphite projects in Canada. In March, Ontario Graphite Ltd. released a definitive feasibility study for restarting the Kearney Graphite Mine located about 26 km northeast of Kearny, Ontario. According to the study, Kearney would produce an average 22,000 t/yr of graphite concentrate at a grade of 92.3% graphitic carbon (Cg) during a 20-year mine life. Reserves for Kearney were estimated to be 23 Mt grading 1.95% Cg. In October, Nouveau Monde Graphite Inc. announced the results of a feasibility study for its Matawinie graphite project located about 150 km north of Montreal, Quebec. According to the study, Matawinie had reserves of 59.8 Mt grading 4.35% Cg and would have the capacity to produce an average of 100,000 t/yr of high-grade (97% Cg) graphite concentrate during its expected 25.5-year mine life. In December, Mason Graphite Inc. published an NI 43–101 technical report update to the feasibility study for its Lac Guéret Project. According to the report, Lac Guéret would have a mine life of 25 years and produce 51,900 t/yr of graphite concentrate at a grade of 93.7% Cg. The reserves at Lac Guéret were estimated to be 4.7 Mt at an average grade of 27.8% Cg (Mason Graphite Inc., 2018, p. 1–12, 1–13, 22–3; Nouveau Monde Graphite Inc., 2018; Ontario Graphite Ltd., 2018, p. 32, 36, 136).

Outlook

Canada is likely to maintain its position as a leading global mining country, and its mineral industry has the potential for continued expansions based on its mineral resources and its access to international markets. Although there is expectation for a continued rebound in prices among metal commodities, the following factors are expected to temper the value of mining in the near term: uncertainty in terms of demand related to potentially slower global economic growth; potential excess global supply of certain mineral commodities, such as iron; decreasing proven reserves of certain commodities, such as lead and zinc; and uncertain trade policies with some major partnering countries. Exploration activity is expected to continue to increase in 2019 as mining exploration companies project increases in exploration spending in the near term. Canada's mineral sector continues to be challenged by globalization of the industry, as many other countries can develop their mineral resources at lower costs than Canada. However, the Federal, Provincial, and Territorial governments in Canada are

developing and expanding policies related to mining to meet the challenges for the medium- and long-term security of the sector while also addressing environmental and social demands.

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TABLE 1
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018	
METALS						
Aluminum:						
Alumina, Al ₂ O ₃ content	1,562,559	1,560,932	1,566,467	1,570,000	1,568,000	
Aluminum, metal, primary	2,858,200	2,880,035	3,208,888	3,211,882	2,923,204	
Antimony, mine, Sb content	5	1	--	1	1	
Bismuth, Bi content:						
Mine	4	2	2	4	4	
Refinery ^c	25 ^f	25	25	25	25	
Cadmium:						
Mine, Cd content	129 ^f	68 ^f	60 ^f	158	147	
Refinery, primary	1,187	1,159	2,305	1,802	1,676	
Cobalt, Co content:						
Mine ³	3,907	4,339	4,216 ^f	3,704	3,524	
Refinery, metal, metal powder, oxide	5,491	6,126	6,302 ^f	6,355	6,296 ⁴	
Copper:						
Mine, concentrates, Cu content	672,729	714,647 ^f	693,059 ^f	594,994	542,932	
Smelter, blister:						
Primary	288,699	281,416	304,349	289,400	290,100	
Secondary	32,069	28,713	29,165	31,000	30,000	
Total	321,000	310,000	334,000	320,000	320,000	
Refinery:						
Primary:						
Leaching, electrowon	900 ^f	500 ^f	-- ^f	--	--	
Other	292,900 ^f	301,300 ^f	284,400 ^f	300,700	258,700	
Secondary	32,500	29,100	29,700 ^{f, e}	32,000 ^e	30,000	
Total	325,000	330,000 ^f	314,000	333,000	289,000	
Ferroalloys:						
Ferroniobium:						
Gross weight ^e	8,900 ^f	8,300 ^f	9,400 ^f	11,000	11,000	
Nb content	5,774 ^f	5,385 ^f	6,099 ^f	6,981	7,500	
Ferrosilicon ^e	thousand metric tons	32	38	40	36	
Ferrovandium ^e	do.	1	1	1	1	
Gold, mine, Au content	kilograms	151,742 ^f	160,751	161,497 ^f	168,072	183,047
Indium, refinery, primary, In content, metal ^e	do.	67,000	70,000	71,000	67,000	58,000
Iron ore, mine:						
Gross weight	thousand metric tons	43,173	46,220	46,731	50,300	52,387
Fe content ^e	do.	25,900 ^f	27,700 ^f	28,100 ^f	30,200	31,500
Iron and steel:						
Direct-reduced iron	do.	1,550	1,502	1,399	1,608	1,670
Pig iron	do.	6,728	5,851	6,240	6,306	6,680
Raw steel	do.	12,730	12,473	12,646	13,208	13,443
Lead:						
Mine, Pb content		3,579	3,699	12,020	13,494	18,947
Refinery:						
Primary		130,827	127,264	142,076	124,555	160,096
Secondary		150,629	141,600	132,150	149,506	149,506
Total		281,000	269,000	274,000	274,000	310,000
Magnesium, primary, metal		--	--	--	300 ^e	300 ^e
Molybdenum, mine, Mo content		9,358	2,505	2,783 ^f	4,765	4,681
Nickel:						
Mine, sulfide ore, concentrate, Ni content		218,233 ^f	225,351 ^f	230,210 ^f	206,354	175,761
Refinery, metal		149,486	149,716	158,299	154,759	135,921
Niobium, mineral concentrate, Nb content ^{5, 6}	kilograms	6,000,000 ^f	5,600,000 ^f	6,300,000 ^f	7,200,000	7,700,000 ^e

See footnotes at end of table.

TABLE 1—Continued
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018	
METALS—Continued						
Platinum-group metals, mine: ^c						
Palladium, Pd content	kilograms	23,000 ^r	24,000 ^r	22,000 ^r	19,000	20,000
Platinum, Pt content	do.	7,200 ^r	8,600 ^r	8,400 ^r	7,600	7,100
Iridium, rhodium, ruthenium, elemental content	do.	1,000 ^r	1,000 ^r	1,200 ^r	760	1,200
Total	do.	31,200 ^r	33,600 ^r	31,600 ^r	27,400	28,300
Selenium, Se content	do.	142,000	156,000	175,000	72,000	61,000
Silicon, metal ^c	thousand metric tons	30	30	27	28	34
Silver:						
Mine, Ag content	kilograms	472,000 ^r	371,000 ^r	385,000 ^r	366,000	353,000
Refinery, primary	do.	1,525,135	1,891,692	1,877,394	1,758,682	1,700,000 ^e
Tellurium, refinery, Te content	do.	8,000	10,000	18,000	49,000	40,000 ^e
Titanium, titaniferous slag, sorels ^c		900,000	700,000	700,000	800,000	700,000
Tungsten, mine, concentrate, W content ⁷		2,344	1,600 ^e	--	--	--
Zinc:						
Mine, Zn content		322,605 ^r	275,410 ^r	301,210 ^r	305,314	287,119
Smelter, primary		649,217	683,118	691,389	598,438	696,591
INDUSTRIAL MINERALS						
Barite ^c		35,000	42,000 ^r	20,000 ^r	50,000	40,000
Cement and clinker:						
Clinker	thousand metric tons	10,930 ^r	11,541 ^r	11,383 ^r	12,412	13,184
Hydraulic cement	do.	11,879	12,167	11,693 ^r	12,706	13,554
Clay, bentonite		2,083	580 ^e	600 ^e	600 ^e	600 ^e
Diamond, gem, unspecified	thousand carats	12,012	11,677	13,036	23,234	23,194
Feldspar, mine, nepheline syenite	thousand metric tons	654	614	571	612	575
Fluorspar		--	--	--	NA	20,000 ^e
Gemstones, amethyst and jade		6,919	8,233	154	89	156
Graphite, crystalline flake		NA	NA	NA	14,000	13,000
Gypsum, and anhydrite ⁸	thousand metric tons	1,793	1,726	1,679	3,001	2,997
Lime	do.	1,995	1,852	1,807	1,842	1,805
Magnesite ^c		150,000	100,000	150,000 ^r	150,000	150,000
Mica		NA	NA	22,000 ^{r,e}	22,000 ^e	21,000 ^e
Nitrogen, ammonia, N content		3,716,000 ^r	4,004,000 ^r	4,133,000 ^r	3,745,000	3,832,000
Potash, K ₂ O content	thousand metric tons	10,818	11,462	10,790	12,563	13,835
Salt	do.	14,473	14,343	10,252	11,424	10,568
Stone, sand, and gravel:						
Sand and gravel, construction, unspecified	do.	223,407	228,030	280,550	231,219	216,707
Sand and gravel, industrial, silica	do.	2,011	2,053	2,256	2,540	2,778
Stone, unspecified	do.	147,739	158,034	160,016	169,518	166,488
Sulfur, byproduct:						
Metallurgy	do.	590	558	635	524	532
Natural gas and petroleum	do.	5,252	5,187	4,746	4,803	4,792
Total	do.	5,840	5,750	5,380	5,330	5,320
Talc and related minerals, pyrophyllite, soapstone, talc	do.	90	175	199	215	246
MINERAL FUELS AND RELATED MATERIALS						
Coal: ^c						
Bituminous	thousand metric tons	4,840	4,340	4,290	4,250	3,800
Lignite	do.	8,990	8,060	7,970	7,900	7,060
Metallurgical	do.	31,100	27,900	27,600	27,300	24,400
Subbituminous	do.	24,200	21,700	21,500	21,300	19,000
Total	do.	69,100	62,000	61,300	60,800	54,300
Natural gas, marketable	million cubic meters	151,534	154,633	159,854 ^r	166,278	172,725
Peat, horticultural use	thousand metric tons	1,178	1,297	1,452 ^r	1,459	1,240 ^e

See footnotes at end of table.

TABLE 1—Continued
CANADA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2014	2015	2016	2017	2018
MINERAL FUELS AND RELATED MATERIALS—Continued					
Petroleum:					
Crude thousand 42-gallon barrels	1,558,915	1,601,985	1,631,550 ^r	1,763,315	1,900,920
Natural gas liquids, gas plant production: do	314,394	317,563	360,328 ^r	370,508	249,952
Refinery:					
Asphalt do.	13,817 ^r	25,445 ^r	28,892 ^r	31,388	25,000 ^e
Diesel do.	177,061 ^r	176,595 ^r	175,300 ^r	193,261	208,000 ^e
Fuel oil:					
Heavy do.	41,199 ^r	31,263 ^r	27,150 ^r	31,275	21,000 ^e
Light ⁹ do.	34,476 ^{r, 10}	35,206 ^{r, 10}	26,936 ^r	25,653	21,000 ^e
Gasoline:					
Aviation do.	32,697 ^{r, 11}	26,810 ^{r, 11}	35,954 ^r	44,463	69,000 ^e
Motor do.	242,359 ^r	258,126 ^r	271,848 ^r	284,326	291,000
Liquefied petroleum gas do.	8,119 ^r	9,717 ^r	7,893 ^r	7,119	5,700 ^e
Other do.	81,147 ^{r, 12}	84,688 ^{r, 12}	86,467 ^r	65,940	53,000 ^e
Total do.	631,000 ^r	648,000 ^r	660,000 ^r	683,000	694,000
Uranium, mine, uranium oxide, U content	9,780 ^r	13,279 ^r	14,133 ^r	12,207	9,078

^eEstimated. ^rRevised. do. Ditto. NA Not available. -- Zero.

¹Table includes data available through March 9, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²In addition to the commodities listed, aluminum hydroxide Al(OH)₃ (hydrate), cesium, ilmenite, ore containing indium, pumice, silicon metal, and zeolites may have been produced, but available information was inadequate to make reliable estimates of output.

³Recoverable metal in ores and concentrates shipped.

⁴Excludes cobalt oxide.

⁵Pyrochlore concentrate.

⁶Production includes niobium (columbium) contained in ferroniobium shipped with the value as reported by the shipper.

⁷Datum for 2014 based on production reported by North American Tungsten Corp.; datum for 2015 based on half-year production from North American Tungsten Corp. and an estimate for production from July through October 2015.

⁸Prior to 2017, reported production excluded quantity used for manufacture of cement products.

⁹Based on historical ratio.

¹⁰Includes stove oil, kerosene and tractor fuel.

¹¹Includes aviation gasoline and aviation turbo fuels.

¹²Includes petro-chemical feedstocks, naphtha specialties, petroleum coke, lubricating oils and greases, still gas, and other products.

TABLE 2
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Rio Tinto Group	Vaudreuil refinery, Jonquiere, Quebec	1,559.
Do.	Axens IFP Group Technologies	Brockville refinery, Brockville, Ontario	18.
Aluminum	Alcoa Inc.	Smelter in Baie-Comeau, Quebec	280.
Do.	Rio Tinto Alcan Inc., 40%; Aluminium Austria Metall Québec, 20%; Hydro Aluminum, 20%; Marubeni Québec Inc., 13.33%; Société générale de financement du Québec, 6.67%	Alouette smelter in Sept-Iles, Quebec	611.
Do.	Alcoa Inc., 75%, and Rio Tinto Alcan Inc., 25%	Becancour smelter in Becancour, Quebec	446.
Do.	Alcoa Inc.	Deschambault smelter in Deschambault, Quebec	280.
Do.	Rio Tinto Group	Alma smelter in Alma, Quebec	471.
Do.	do.	Arvida smelter in Arvida, Jonquiere, Quebec	236.
Do.	do.	Grande-Baie smelter in Grande-Baie, Quebec	227.
Do.	do.	Kitimat smelter in Kitimat, British Columbia	420.
Do.	do.	Laterrière smelter in Laterrière, Quebec	247.
Ammonium sulfate	metric tons Teck Resources Ltd.	Trail refinery, Trail, British Columbia	NA.
Barite	MarFred Minerals Ltd.	Tracey Lake barite property, North Williams, Ontario	NA.
Do.	Fireside Minerals Ltd	Fireside Mine, Fireside, British Columbia	NA.
Cadmium metal	Noranda Income Fund	Valleyfield refinery, Quebec	NA.
Do.	Teck Resources Ltd.	Trail refinery, Trail, British Columbia	100.
Cement	Ciment Québec Inc.	Saint-Basile, Quebec	1,571.
Do.	Colacem Canada Inc. (Colacem S.p.A.)	Grenville-sur-la-Rouge, Quebec	300.
Do.	ESSROC Canada Inc. (Italcementi Group)	Picton, Ontario	792.
Do.	Federal White Cement Ltd.	Woodstock, Ontario	544.
Do.	Holcim (Canada) Inc. (Holcim AG)	Joliette, Quebec	1,475.
Do.	do.	Mississauga, Ontario	2,000.
Do.	Lafarge Canada Inc. (Lafarge North America)	Bath, Ontario	1,176.
Do.	do.	Grinding plant, Stoney Creek, Ontario	814.
Do.	do.	Exshaw, Alberta	1,422.
Do.	do.	Kamloops, British Columbia	324.
Do.	do.	Richmond, British Columbia	1,319.
Do.	do.	St. Constant, Quebec	1,157.
Do.	do.	Brookfield, Nova Scotia	621.
Do.	Lehigh Inland Cement Ltd. (HeidelbergCement Group)	Edmonton, Alberta	1,380.
Do.	do.	Delta, British Columbia	1,356.
Do.	St. Marys Cement (Canada) Inc. (Votorantim Cimentos S.A.)	Bowmanville, Ontario	1,800.
Do.	do.	St. Marys, Ontario	645.
Clay, bentonite	Canadian Clay Products Inc.	Wilcox, Saskatchewan	NA.
Coal	Anglo American plc	Trend open pit mine, near Tumbler Ridge, British Columbia	2,000.
Do.	Up Energy Dev. Group Ltd., 85.31%, and Winsway Coking Coal Holdings Ltd., 14.69%	Grande Cache Mine, near Grande Cache, Alberta	3,600.
Do.	Teck Resources Ltd.	Cardinal River operations, near Hinton, Alberta	200.
Do.	do.	Coal Mountain open pit mine at Sparwood, British Columbia	2,700.
Do.	do.	Fording River open pit mine, near Elkford, British Columbia	8,500.
Do.	do.	Line Creek Mine, near Sparwood, British Columbia	3,500.
Do.	Teck Resources Ltd., 95%; Nittetsu Mining Co. Ltd., 2.5%; POSCO Canada Ltd., 2.5%	Elkview open pit mine, near Sparwood, British Columbia	7,000.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Coal—Continued	Teck Resources Ltd., 80%, and POSCO Canada Ltd., 20%	Greenhills open pit mine, near Elkford, British Columbia	5,200.	
Do.	TransAlta Utilities Corp.	Highvale open pit mine, near Seba Beach, Alberta	13,000.	
Do.	Conuma Coal Resources Ltd.	Willow Creek Mine, Tumbler Ridge, British Columbia	1,200.	
Do.	do.	Brule Mine, Tumbler Ridge, British Columbia	2,500.	
Do.	do.	Wolverine Mine, Tumbler Ridge, British Columbia	2,000.	
Do.	Westmoreland Coal Co.	Coal Valley Mine, near Edson, Alberta	5,200.	
Do.	do.	Boundary Dam open pit mine, near Estevan, Saskatchewan	6,500.	
Do.	do.	Poplar River open pit mine, near Coronach, Saskatchewan	3,600.	
Do.	do.	Bienfait open pit mine, near Bienfait, Saskatchewan	2,800.	
Do.	do.	Genesee open pit mine, near Warburg, Alberta	5,600.	
Do.	do.	Sheerness open pit mine, near Hanna, Alberta	3,000.	
Do.	do.	Paintearth open pit mine, near Forestburg, Alberta	3,500.	
Cobalt:				
Ore, Co content	metric tons	Glencore plc	Raglan Mine in Ungave, Quebec	700.
Do.	do.	Vale S.A.	Voisey's Bay Mine, Newfoundland and Labrador	NA.
Do.	do.	do.	Ontario operations, Ontario	700.
Do.	do.	do.	Thompson Mine, Manitoba	NA.
Metal	do.	KGHM Polska Miedź S.A.	Sudbury operations, Ontario	NA.
Do.	do.	do.	do.	NA.
Do.	do.	Vale S.A.	Copper Cliff refinery and smelter in Sudbury, Ontario	NA.
Do.	do.	do.	Port Colborne refinery, Ontario	NA.
Do.	do.	do.	Voisey's Bay, Newfoundland and Labrador	NA.
Do.	do.	Glencore plc	Sudbury smelter in Sudbury, Ontario	NA.
Do.	do.	Vale S.A.	Long Harbour hydrometallurgy smelter	NA.
Copper:				
Ore, Cu content		Agnico-Eagle Mines Ltd.	LaRonde Mine, about 650 kilometers northwest of Montreal, Quebec	5.
Do.		Copper Mountain Mining Corp., 75%, and Mitsubishi Materials Corp., 25%	Copper Mountain Mine, British Columbia	48.
Do.		Hudbay Minerals Inc.	Reed Mine, Flin Flon, Manitoba ¹	21.
Do.		Teck Resources Ltd.	Highland Valley copper mine, Kamloops, British Columbia	125.
Do.		Imperial Metals Corp., 50%; Mitsubishi Materials Corp., 31.25%; Dowa Metals & Mining Co., Ltd., 6.25%; Furukawa Co., Ltd., 6.25%; Marubeni Corp. 6.25%	Huckleberry Mine, 123 kilometers southwest of Houston, British Columbia	32.
Do.		Imperial Metals Corp.	Mount Polley Mine at Williams Lake, British Columbia	25.
Do.		North American Palladium Ltd.	Lac des Iles Mine, about 85 kilometers northwest of Thunder Bay, Ontario	2.
Do.		Nyrstar N.V.	Langlois Mine, 313 kilometers northeast of Val-d'Or, Quebec	39.
Do.		do.	Myra Falls complex, Vancouver Island, British Columbia	4.
Do.		KGHM Polska Miedź S.A.	Sudbury operations, Ontario	30.
Do.		Capstone Mining Corp.	Minto Mine, Yukon ²	21.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
Copper:—Continued				
Ore, Cu content— Continued	Taseko Mines Ltd., 75%; Lojitz Corp., 12.5%; Dowa Holdings Col Ltd., 6.25%; Furukawa Co. Ltd., 6.25%		Gibraltar Mine, British Columbia	63.
Do.	Teck Resources Ltd.		Duck Pond Mine, about 100 kilometers southwest of Grand Falls-Windsor, Newfoundland and Labrador	19.
Do.	Vale S.A.		Ontario Division, Ontario	120
Do.	do.		Voisey's Bay Mine, Newfoundland and Labrador	55.
Do.	Glencore plc		Kidd Creek Mine, about 20 kilometers north of Timmins, Ontario	46.
Do.	do.		Nickel Rim South Mine, Sudbury district, Sudbury, Ontario	18.
Do.	do.		Raglan Mine in Ungave, Quebec	7.
Do.	Yukon Zinc Corp.		Wolverine Mine, Yukon	5.
Smelter	Glencore plc		Home smelter in Noranda, Quebec	194.
Do.	Vale S.A.		Copper Cliff smelter in Sudbury, Ontario	NA.
Do.	Glencore plc		Sudbury smelter, Sudbury, Ontario	131.
Do.	Vale S.A.		Long Harbour hydrometallurgy smelter	NA.
Refinery	Glencore plc		CCR Refinery in Montreal-Est, Quebec	276.
Do.	Taseko Mines Ltd., 75%; Lojitz Corp., 12.5%; Dowa Holdings Col Ltd., 6.25%; Furukawa Co. Ltd., 6.25%		Gibraltar solvent extraction-electrowinning (SX-EW) facility, British Columbia	1.
Do.	Vale S.A.		Copper Cliff refinery in Sudbury, Ontario	NA.
Do.	Cobalt Refinery Co. Inc.		Fort Saskatchewan refinery	NA.
Do.	Noranda Income Fund		Valleyfield refinery	NA.
Do.	Vale S.A.		Voisey Bay refinery, Newfoundland and Labrador	NA.
Do.	Government		Royal Canadian Mint, Ottawa, Ontario	NA.
Diamond	thousand carats	Rio Tinto plc, 60%, and Dominion Diamond Corp., 40%	Diavik open pit mine (includes the A154 North and the A154 South kimberlite pipes), northeast of Yellowknife region, Northwest Territories	10,000.
Do.	do.	Dominion Diamond Corp., 88.9%, and unnamed owner 11.1%	Ekati Mine (includes the Koala and the Panda underground mines and the Beartooth, Fox, Koala, and Misery open pit mines) in the Lac de Gras region, Northwest Territories	5,000.
Do.	do.	De Beers Group	Snap Lake underground mine, 220 kilometers northeast of Yellowknife, Northwest Territories	16,000. ¹
Do.	do.	De Beers Canada Inc., 51%, and Mountain Province Diamonds Inc., 49%	Gahcho Kué open pit mine, 280 kilometers northeast of Yellowknife, Northwest Territories	4,500.
Do.	do.	do.	Victor open pit mine, 90 kilometers west of Attawapiskat, Ontario	600.
Do.	do.	Stornoway Diamond Corp.	Renard mine, 350 kilometers north of Chibougamau, Quebec	1,600.
Diatomite		Absorbent Products Ltd.	Red Lake deposit, British Columbia	NA.
Fluorspar		Canada Fluorspar Inc.	St. Lawrence Mine, St. Lawrence, Newfoundland and Labrador	200.
Gold:				
Ore, Au content		Abcourt Mines Inc.	Elder Mine, Rouyn-Noranda, Quebec	NA.
Do.	kilograms	Agnico-Eagle Mines Ltd.	Goldex Mine, Val-d'Or, Quebec	5,000.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Gold:—Continued				
Ore, Au content— Continued	kilo- grams	Agnico-Eagle Mines Ltd.	Lapa Mine, about 60 kilometers west of Val-d'Or, Quebec	4,000.
Do.	do.	do.	LaRonde Mine, about 60 kilometers west of Val-d'Or, Quebec	9,300.
Do.	do.	do.	Meadowbank Mine, about 70 kilometers north of Baker Lake, Nunavut	10,000.
Do.	do.	QMX Gold Corp.	Lac Herbin Mine	1,000.
Do.	do.	Anaconda Mining Inc.	Pine Cove Mine, near Baie Verte, Newfoundland and Labrador	500.
Do.	do.	Aurizon Mines Ltd.	Casa Berardi Mine, about 95 kilometers north of La Sarre, Quebec	5,000.
Do.	do.	Alamos Gold Inc.	Young-Davidson Mine, Larder-Cadillac Break, 487 kilometers northwest of Toronto, Ontario	5,400.
Do.	do.	Barkerville Gold Mines Ltd.	QR Mine, British Columbia	400.
Do.	do.	Barrick Gold Inc.	Hemlo operation, includes David Bell underground mine and Williams open pit and underground mine, about 350 kilometers east of Thunder Bay, Ontario	7,100.
Do.	do.	Brigus Gold Corp.	Black Fox Mine, about 75 kilometers east of Timmins, Ontario	2,800.
Do.	do.	Capstone Mining Corp.	Minto Mine, about 240 kilometers northwest of Whitehorse, Yukon ²	600.
Do.	do.	Claude Resources Inc.	Seabee operations (includes the Seabee Deep and the Santoy 8 Mines), Laonil Lake, Saskatchewan	1,500.
Do.	do.	Detour Gold Corp.	Detour Lake Mine, 208 km northeast of Timmins, Cochrane District, Ontario	20,400.
Do.	do.	Goldcorp Inc.	Hoyle Pond Mine, 20 km northeast of Timmins, Eastern Ontario District, Ontario	2,300.
Do.	do.	do.	Musselwhite Mine, 480 kilometers north of Thunder Bay, Ontario	8,100.
Do.	do.	do.	Porcupine Mine, Timmins, Ontario	10,000.
Do.	do.	do.	Red Lake Mine (includes Red Lake and the Campbell complexes), 180 kilometers	26,000.
Do.	do.	Golden Band Resources Inc.	EP Mine and Roy Lloyd Mine, Saskatchewan	1,500.
Do.	do.	Imperial Metals Corp., 50%; Mitsubishi Materials Corp., 31.25%; Dowa Metals & Mining Co., Ltd., 6.25%; Furukawa Co., Ltd., 6.25%; Marubeni Corp., 6.25%	Huckleberry Mine, 123 kilometers southwest of Houston, British Columbia	110.
Do.	do.	IAMGOLD Corp.	Westwood Mine, 40 kilometers east of Rouyn-Noranda, Quebec	4,200.
Do.	do.	Kirkland Lake Gold Inc.	South Mine complex (Macassa Mine, Ontario)	2,400.
Do.	do.	Tahoe Resources Inc.	Bell Creek Mine, northeast of Timmins, Ontario, and Timmins West Mine, 18 kilometers west of Timmins, Ontario	1,500.
Do.	do.	Metanor Resources Inc.	Bachelor Lake Mine and mill, about 225 kilometers northeast of Val-d'Or, Quebec	1,200.
Do.	do.	Imperial Metals Corp.	Mt. Polley Mine, 8 kilometers southwest of Likely, British Columbia	1,200.
Do.	do.	North American Palladium Ltd.	Lac des Iles Mine, about 85 kilometers northwest of Thunder Bay, Ontario	400.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Gold:—Continued				
Ore, Au content— Continued	kilo- grams	Nyrstar N.V.	Myra Falls complex, British Columbia	300.
Do.	do.	Pretivm Resources Inc.	Brucejack Mine, about 65 kilometers north of Stewart, British Columbia	12,600.
Do.	do.	New Gold Inc.	Rainy River Mine, about 50 kilometers northwest of Fort Francis, Ontario	11,000.
Do.	do.	Agnico Eagle Mines Ltd., 50%, and Yamana Gold Inc., 50%	Canadian Malartic Mine, about 20 kilometers west of Val d'Or, Quebec	17,000.
Do.	do.	KGHM Polska Miedz S.A. GK	Sudbury operations, Sudbury, Ontario	NA.
Do.	do.	Richmont Mines Inc.	Beaufor Mine, about 21 kilometers northeast of Val-d'Or, Quebec	800.
Do.	do.	Richmont Mines Inc.	Island Gold Mine, near Dubreuilville, Ontario	1,200.
Do.	do.	Klondex Mines Ltd.	Rice Lake Mine, Manitoba	2,500.
Do.	do.	Stroud Resources Ltd.	Hislop Mine, Ontario	600.
Do.	do.	Kirkland Lake Gold Inc.	Holloway Mine, Ontario	700.
Do.	do.	do.	Holt Mine, Ontario	2,700.
Do.	do.	Vale S.A.	Manitoba Division (includes the Birchtree Mine ³ and the Thompson Mine), Thompson, Manitoba	NA.
Do.	do.	do.	Ontario Division, Ontario	2,500.
Do.	do.	Wesdome Gold Mines Ltd.	Eagle River Mine, about 50 kilometers west of Wawa, Ontario	1,900.
Do.	do.	do.	Kiena Mine, about 10 kilometers west of Val-d'Or, Quebec	1,300.
Do.	do.	Yukon Zinc Corp.	Wolverine Mine, Yukon	628.
Refinery	do.	Glencore plc	CCR refinery in Montreal-Est, Quebec	300.
Do.	do.	Teck Resources Ltd.	Trail refinery, Trail, British Columbia	NA.
Do.	do.	Government	Royal Canadian Mint, Ottawa, Ontario	NA.
Graphite		Imerys Graphite and Carbon	Saint Aime du Lac des Iles, Quebec	NA.
Gypsum		Mosher Limestone Co. Ltd.	Upper Musquodoboit, Nova Scotia	NA.
Do.		National Gypsum (Canada) Ltd.	East Milford quarry, Milford, Nova Scotia	3,100.
Do.		CertainTeed Gypsum Canada, Inc.	Amaranth Mine, Harcus, Manitoba	NA.
Do.		CGC Inc.	Hagersville Mine, Hagersville, Ontario	NA.
Ilmenite (titanium production)		QIT Fer et Titane Inc.	Lac Tio Mine, Havre Saint Pierre, Quebec	600.
Indium	metric tons	do.	do.	70.
Iron and steel:				
Iron ore:				
Ore		ArcelorMittal Inc., 85%, and POSCO-China Steel Consortium 15%	Fire Lake and Mont-Wright open pit mines, Quebec	24,000.
		Quebec Iron Ore Inc. (Champion Iron Ltd., 63.2%, and Ressources Québec, 36.8%)	Bloom Lake, 13 kilometers north of Fermont, Quebec	20,000.
Do.		Rio Tinto Ltd., 58.72; Mitsubishi Corp., 26.18%; Labrador Iron Ore Royalty Income Fund, 15.1%	Carol Lake (IOC) open pit mine, Labrador City, Newfoundland and Labrador	23,000.
Pellets		ArcelorMittal Mines Canada Inc. (ArcelorMittal)	Pelleting plant, Port Cartier, Quebec	9,000.
Do.		Cliffs Natural Resources Inc.	Pelleting plant, Pointe Noire, Quebec	5,200.
Do.		Iron Ore Company of Canada (Rio Tinto Ltd., 58.72%; Mitsubishi Corp., 26.18%; Labrador Iron Ore Royalty Income Fund, 15.1%)	Pelleting plant, Labrador City, Newfoundland and Labrador	13,000.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity	
Iron and steel:—Continued				
Steel, raw	AltaSteel Ltd. (Arrium Ltd.)	Edmonton, Alberta	320.	
Do.	ArcelorMittal Dofasco Inc. (ArcelorMittal SA)	Hamilton, Ontario	4,100.	
Do.	ArcelorMittal Montreal Inc. (ArcelorMittal SA)	Contrecoeur East and Contrecoeur West plants, Quebec	2,500.	
Do.	Essar Steel Algoma Inc. (Essar Global Ltd.)	Sault Ste. Marie, Ontario	2,800.	
Do.	Gerdau Steel North America Inc. (Gerdau S.A.)	Whitby, Ontario	790.	
Do.	do.	Selkirk, Manitoba	430.	
Do.	do.	Cambridge, Ontario	380.	
Do.	Hamilton Specialty Bar (2007) Inc.	Hamilton, Ontario	360.	
Do.	Ivaco Rolling Mills Inc.	L'Orignal, Ontario	450.	
Do.	MMFX Steel of Canada Inc. (MMFX Technologies Corp.)	Welland, Ontario	120.	
Do.	QIT-Fer et Titane Inc. (Rio Tinto Iron and Titanium Inc.)	Sorel, Quebec	500.	
Do.	SSAB Svenskt Stål AB—IPSCO Division	Regina, Saskatchewan	1,500.	
Do.	U.S. Steel Canada Inc. (United States Steel Corp.)	Lake Erie Works, Nanticoke, Ontario	2,400.	
Lead:				
Ore, Pb content	Coeur Mining, Inc.	Silvertip Mine, British Columbia, 8 kilometers south of the border with Yukon	16.8.	
Do.	Trevalli Mining Corp.	Caribou Mine, Bathurst, New Brunswick	NA.	
Refinery	Teck Resources Ltd.	Trail operations, Trail, British Columbia	NA.	
Smelter:				
Primary	Teck Resources Ltd.	Trail operations, Trail, British Columbia	100.	
Secondary, includes alloys	NovaPb Inc. (Newalta Corp.)	Ville Sainte Catherine, Quebec	100.	
Do.	Tonolli Canada Ltd.	Mississauga, Ontario	35.	
Do.	Metalex Products Ltd.	Richmond, British Columbia	8.	
Lime	Graymont Inc.	Havelock, New Brunswick	110.	
Do.	do.	Bedford, Bedford, Quebec	400.	
Do.	do.	Faulkner, Manitoba	117.	
Do.	Brookville Manufacturing Co.	Brookville, Saint John, New Brunswick	NA.	
Do.	E.C. King Contracting Ltd	Owen Sound, Ontario	NA.	
Magnesite	Baymag Inc.	Mount Brussilof Mine, British Columbia	NA.	
Molybdenum	metric tons	Teck Resources Ltd., 97.5%, and Highmont Mining Co., 2.5%	Highland Valley copper mine, Kamloops, British Columbia	5,000.
Do.	do.	Imperial Metals Corp., 50%; Mitsubishi Materials Corp., 31.25%; Dowa Metals & Mining Co., Ltd., 6.25%; Furukawa Co., Ltd., 6.25%; Marubeni Corp., 6.25%	Huckleberry Mine, 123 kilometers southwest of Houston, British Columbia	140.
Do.	do.	Taseko Mines Ltd., 75%; Sojitz Corp., 12.5%; Dowa Holdings Co. Ltd., 6.25%; Furukawa Co. Ltd., 6.25%	Gibraltar Mine, British Columbia	1,200.
Do.	do.	Thompson Creek Metals Company Inc., 75%, and Sojitz Moly Resources, Inc., 25%	Endako Mine, near Fraser Lake, about 160 kilometers northwest of Prince George, British Columbia	5,200.
Mica (phlogopite)	Imerys Mica Suzorite, Inc	Suzorite Mine, Mauricie, Quebec	NA.	
Nepheline syenite	Unimin Canada Ltd.	Blue Mountain quarry, Methuen Township, Ontario	NA.	
Do.	do.	Nephton quarry, Methuen Township, Ontario	NA.	
Nickel:				
Ore, Ni content	KGHM Polska Miedz S.A.	Morrison (Levac) Mine, Sudbury, Ontario	6.	
Do.	Vale Canada Ltd. (Vale S.A.)	Ontario operations, Ontario	85.	
Do.	do.	Manitoba Division (includes the Birchtree Mine ³ and the Thompson Mine), Thompson, Manitoba	45.	
Do.	Vale Newfoundland & Labrador Ltd. (Vale S.A.)	Voisey's Bay mines (includes the Ovoid Mine), Newfoundland and Labrador	80.	
Do.	Glencore plc	Raglan Mine in Ungava, Quebec	29.	

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners		Location of main facilities	Annual capacity
<u>Nickel:—Continued</u>				
Ore, Ni content— Continued	Glencore plc		Fraser Mine and Nickel Rim South Mine in the Sudbury district, Ontario	20.
Do.	North American Palladium Ltd.		Lac des Iles Mine, about 85 kilometers northwest of Thunder Bay, Ontario	800.
Smelter	Vale S.A.		Copper Cliff smelter in Sudbury, Ontario	NA.
Do.	do.		Smelter in Thompson, Manitoba	82 (Ni anode).
Do.	Glencore plc		Sudbury smelter in Sudbury, Ontario	131 (Cu-Ni matte).
Do.	Vale S.A.		Long Harbour hydrometallurgy smelter	50.
Refinery	The Cobalt Refinery Company Inc. (General Nickel S.A., 50%, and Sherritt International Corp., 50%)		Fort Saskatchewan refinery, Fort Saskatchewan, Alberta	35 (Ni briquets and powder); 4 (Co briquets and powder).
Do.	Vale S.A.		Copper Cliff refinery in Sudbury, Ontario	NA.
Do.	do.		Thompson refinery in Thompson, Manitoba	NA.
Do.	Glencore plc		CCR refinery in Montreal-Est, Quebec	NA.
Do.	do.		Port Colborne refinery, Ontario	NA.
Do.	Vale S.A.		Voisey's Bay refinery, Newfoundland and Labrador	NA.
<u>Palladium</u>				
Ore, Pd content	kilograms	North American Palladium Ltd.	Lac des Iles Mine, about 85 kilometers northwest of Thunder Bay, Ontario	4,800.
Do.	do.	KGHM Polska Miedz S.A.	Sudbury operations, Ontario	NA.
Do.	do.	Vale S.A.	Ontario operations, Ontario	6,000.
Refinery	do.	Glencore plc	CCR refinery in Montreal-Est, Quebec	NA.
Do.	do.	Vale S.A.	Port Colborne refinery, Ontario	NA.
Do.	do.	do.	Copper Cliff refinery in Sudbury, Ontario	NA.
Smelter	do.	do.	Copper Cliff smelter in Sudbury, Ontario	NA.
Do.	do.	do.	Copper Cliff refinery in Sudbury, Ontario	NA.
Petroleum, refinery products	barrels per day	Chevron Canada Ltd. (Chevron Corp.)	Burnaby refinery, Burnaby, British Columbia	55,000.
Do.	do.	Consumers' Co-operative Refineries Ltd. (Federated Co-operatives Ltd.)	Regina, Saskatchewan	100,000.
Do.	do.	Husky Energy Inc.	Prince George refinery, Prince George, British Columbia	10,000.
Do.	do.	do.	Lloydminster asphalt refinery, Lloydminster, Alberta	25,000.
Do.	do.	Imperial Oil Ltd. (Exxon Mobil Corp., 69.6%)	Dartmouth refinery, Halifax, Nova Scotia	82,000.
Do.	do.	do.	Nanticoke refinery, 40 kilometers southwest of Hamilton, Ontario	112,000.
Do.	do.	do.	Sarnia refinery, Sarnia, Ontario	121,000.
Do.	do.	do.	Strathcona refinery, Edmonton, Alberta	187,000.
Do.	do.	Irving Oil Ltd.	Irving refinery, Saint John, New Brunswick	250,000.
Do.	do.	Moose Jaw Refinery (Gibson Energy ULC)	Moose Jaw asphalt refinery, Moose Jaw, Saskatchewan	4,100.
Do.	do.	North Atlantic Refining Ltd. (Harvest Operations Corp.)	North Atlantic refinery, Come by Chance, Newfoundland and Labrador	115,000.
Do.	do.	Nova Chemicals Corp.	Corunna petrochemical and refinery complex, Corunna, Ontario	80,000.
Do.	do.	Shell Canada Ltd. (Royal Dutch Shell plc)	Scotford refinery, 40 kilometers northeast of Edmonton, Alberta	100,000.
Do.	do.	do.	Sarnia manufacturing center (Corunna refinery), Sarnia, Ontario	72,000.
Do.	do.	Suncor Energy Inc.	Edmonton refinery, Edmonton, Alberta	135,000.
Do.	do.	do.	Montreal refinery, Montreal East, Quebec	129,800.
Do.	do.	do.	Sarnia refinery, Sarnia, Ontario	85,000.
Do.	do.	Ultramar Ltd. (Valero Energy Corp.)	Jean Gaulin refinery, Levis, Quebec	265,000.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Platinum:				
Ore, Pt content	kilograms	North American Palladium Ltd.	Lac des Iles Mine, about 85 kilometers northwest of Thunder Bay, Ontario	4,800.
Do.	do.	Vale S.A.	Ontario operations, Ontario	5,000.
Do.	do.	KGHM Polska Miedz S.A.	Sudbury operations, Ontario	NA.
Smelter	do.	Vale S.A.	Copper Cliff smelter in Sudbury, Ontario	NA.
Refinery	do.	Glencore plc	CCR refinery in Montreal-Est, Quebec	NA.
Do.	do.	Vale S.A.	Copper Cliff refinery in Sudbury, Ontario	NA.
Do.	do.	do.	Port Colborne refinery, Ontario	NA.
Perlite		Le Groupe Berger Lté	Saint-Modeste quarry, Saint-Modeste, Quebec	NA.
Potash (K ₂ O equivalent)		Agrium Inc.	Vanscoy, Saskatchewan	3,000.
Do.		The Mosaic Co.	Colonsay, Saskatchewan	2,100.
Do.		do.	Esterhazy, southeast Saskatchewan	5,300.
Do.		do.	Belle Plaine, Saskatchewan	2,800.
Do.		Potash Corp. of Saskatchewan Inc. (Potash Corp.)	Lanigan, near Lanigan, Saskatchewan	3,800.
Do.		do.	Rocanville, southeast Saskatchewan	6,000.
Do.		do.	Allan Division, Allan, Saskatchewan	4,000.
Do.		do.	Cory, near Saskatoon, Saskatchewan	3,000.
Do.		do.	Patience Lake, near Saskatoon, Saskatchewan	300.
Salt		Canadian Salt Co. Ltd.	Rock salt mine at Ojibway, Ontario	2,600.
Do.		do.	Pugwash, Nova Scotia	1,400.
Do.		Potash Corp. of Saskatchewan Inc. (Potash Corp.)	Sussex, New Brunswick	700.
Do.		Sifco Canada Inc. (Compass Minerals Group Inc.)	Goderich Harbour, Ontario	6,500.
Do.		Seleine Mines Division of Canadian Salt Co. Ltd.	Iles-de-la-Magdalen, Quebec	1,625.
Do.		Mosaic Potash Esterhazy Limited Partnership Ltd. [The Mosaic Co., 75%, and Potash Corp. of Saskatchewan Inc. (Potash Corp.), 25%]	Esterhazy, southeast Saskatchewan	NA.
Do.		NSC Minerals Inc.	Salt recovery from potash tailings at Rocanville and Vanscoy, Saskatchewan	NA.
Do.		Nexen Inc. and Alchem Industries Ltd.	Plant near Bruderheim, Alberta	NA.
Do.		Dow Chemical Canada Inc.	Fort Saskatchewan, Alberta	NA.
Do.		Junex Solnat (Junex Inc.)	Becancour, Quebec	NA.
Do.		Saskatoon Chemicals Holdings, Inc.	Plant near Saskatoon, Saskatchewan	NA.
Do.		Sifco Canada Inc. (Compass Minerals Group Inc.)	Amherst, Nova Scotia	NA.
Do.		do.	Plant near Unity, Saskatchewan	NA.
Do.		Canadian Salt Co. Ltd.	Belle Plaine, Saskatchewan	NA.
Do.		do.	Lindberg, Alberta	NA.
Silicon, metal		Québec Silicon Ltd. (Globe Specialty Metals Inc., 51%, and Dow Corning Corp., 49%)	Plant at Becancour, Quebec	47.
Silver:				
Ore, Ag content	kilograms	Agnico Eagle Mines Ltd., 50%, and Yamana Gold Inc., 50%	Canadian Malartic Mine, about 20 kilometers west of Val d'Or, Quebec	18,500.
Do.	do.	Capstone Mining Corp.	Minto Mine, about 240 kilometers northwest of Whitehorse, Yukon ²	7,600.
Do.	do.	Coeur Mining, Inc.	Silvertip Mine, British Columbia, 8 kilometers south of the border with Yukon	345,000.
Do.	do.	Glencore plc	Kidd Creek underground mine, 25 kilometers north of Timmins, Ontario	115,000.
Do.	do.	Imperial Metals Corp.	Mount Polley Mine at Williams Lake, British Columbia	13,000.
Do.	do.	KGHM Polska Miedz S.A.	Sudbury operations, Ontario	NA.
Do.	do.	Nyrstar N.V.	Myra Falls complex, Vancouver Island, British Columbia	17,000.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Silver:—Continued				
Ore, Ag content— Continued	kilo- grams	Nyrstar N.V.	Langlois Mine, 313 kilometers northeast of Val-d'Or, Quebec	11,500.
Do.	do.	Teck Resources Ltd.	Duck Pond Mine, about 100 kilometers southwest of Grand Falls-Windsor, Newfoundland and Labrador	13,300.
Do.	do.	Yukon Zinc Corp.	Wolverine Mine, Yukon	153,000.
Refinery		Glencore plc	CCR refinery in Montreal-Est, Quebec	NA.
Do.		Teck Resources Ltd.	Trail refinery, Trail, British Columbia	NA.
Do.		Government	Royal Canadian Mint, Ottawa, Ontario	NA.
Smelter		Glencore Plc	Belledune smelter, New Brunswick	NA.
Stone, dolomite and limestone		Atlantic Minerals Ltd. (Newfoundland Cement Co. Ltd., 100%)	Lower Cove, Newfoundland and Labrador	800.
Do.		Nova Scotia Power Inc.	Glen Morrison quarry, Cape Breton, Nova Scotia	NA.
Do.		Antigonish Limestone Ltd.	Southside Antigonish Harbour	NA.
Do.		Mosher Limestone Co. Ltd.	Upper Musquodoboit, Nova Scotia	NA.
Do.		Lafarge Canada Inc.	Brookfield, Brookfield, Nova Scotia	NA.
Do.		do.	Bath, Ontario	NA.
Do.		do.	Woodstock, Ontario	NA.
Do.		Graymont Inc.	Havelock quarry, Havelock, New Brunswick	NA.
Do.		do.	Faulkner, Manitoba	NA.
Do.		Holcim (Canada) Inc. (Holcim AG)	Joliette, Quebec	NA.
Do.		do.	Ogden Point quarry, Victoria, British Columbia	NA.
Do.		ESSROC Canada Inc	Picton, Ontario	NA.
Do.		St. Marys CBM (Canada) Inc.	Bowmanville, Ontario	NA.
Do.		do.	St. Marys, Ontario	NA.
Talc		IMERYS Talc	Penhorwood Mine, Ontario, Canada	NA.
Titanium, TiO ₂ slag		Fer et Titane, Inc.	Sorel-Tracy, Quebec	1,100 (Sorelslag [®]); 250 (UGS [™] slag); NA (RTCS [™] slag).
Tungsten, WO ₃ content		North American Tungsten Corporation Ltd.	Cantung Mine, Northwest Territories ⁴	3,500.
Uranium:				
Oxide	metric tons	Cameco Corp., 69.805%, and Orano, 30.195%	McArthur River Mine, Saskatchewan ⁵	9,300.
Do.	do.	Cameco Corp., 50.025%; Orano, 37.1%; Idemitsu Canada Resources Ltd., 7.875%; Tokyo Electric Power Company Holdings, Inc. (TEPCO), 5%	Cigar Lake Mine, Saskatchewan	4,100.
Dioxide		Cameco Corp.	Port Hope conversion facility	NA.
Trioxide		do.	Blind River refinery, Ontario	NA.
Hexafluoride		do.	Port Hope conversion facility	NA.
Vermiculite		Le Groupe Berger Ltée	Saint-Modeste quarry, Saint-Modeste, Quebec	NA.
Wollastonite		Canadian Wollastonite (2005948 Ontario Ltd.)	St. Lawrence Mine, City of Kingston and the municipality of Leeds and the Thousand Islands, Ontario	NA.
Zeolites		HCA Mountain Minerals (Lethbridge) Ltd. (Heemskirk Canada Ltd.)	Processing plant at Lethbridge, Alberta	NA.
Do.		Heemskirk Canada Ltd. (Heemskirk Consolidated Ltd.)	Bromley Creek (Princeton) Mine, near Copper Mountain, British Columbia	NA.
Do.		do.	Z1 (Ranchlands) quarry, near Cache Creek, British Columbia	NA.
Do.		Industrial Mineral Processors Ltd.	Z2 quarry, near Cache Creek, British Columbia	NA.
Do.		do.	Processing plant at Ashcroft, British Columbia	NA.
Do.		Absorbent Products Ltd.	Red Lake deposit, British Columbia	NA.

See footnotes at end of table.

TABLE 2—Continued
CANADA: STRUCTURE OF THE MINERAL INDUSTRY IN 2018

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Zinc:			
Lead-zinc ore	Agnico-Eagle Mines Ltd.	LaRonde Mine, 60 kilometers west of Val-d'Or, Quebec	55.
Ore, Zn content	Coeur Mining, Inc.	Silvertip Mine, British Columbia, 8 kilometers south of the border with Yukon	20.
Do.	Glencore plc	Kidd Creek underground mine, 25 kilometers north of Timmins, Ontario	80.
Do.	Nyrstar N.V.	Langlois Mine, 313 kilometers northeast of Val-d'Or, Quebec	39.
Do.	do.	Myra Falls complex, Vancouver Island, British Columbia	35.
Do.	Teck Resources Ltd.	Duck Pond Mine, 90 kilometers south of Buchans, Newfoundland and Labrador	34.
Refined	Noranda Income Fund, 75%, and Glencore plc, 25%	CEZ refinery, Valleyfield, Quebec	265.
Do.	Hudson Bay Mining and Smelting Co., Ltd. (HudBay Minerals Inc.)	Zinc plant (pressure leach and electrowinning) at Flin Flon, Manitoba	115.
Do.	Teck Resources Ltd.	Trail operations, Trail, British Columbia	295.

Do., do. Ditto. NA Not available.

¹Reed Mine closed in July 2018.

²Placed on care-and-maintenance status in October 2018.

³Birchtree Mine placed on care-and-maintenance October 2017.

⁴Placed on care-and-maintenance status in 2015.

TABLE 3
CANADA: RESERVES OF MAJOR MINERALS IN 2018¹

(Thousand metric tons unless otherwise specified)

Commodity	Reserves
Coal (anthracite, bituminous, subbituminous, and lignite)	million metric tons 6,582 ²
Cobalt	250 ²
Copper	8,984 ³
Gold	metric tons 2,813 ³
Iron ore	million metric tons 6,000 ²
Lead	165 ³
Molybdenum	96 ³
Natural gas	trillion cubic meters 2.1 ²
Nickel	2,790 ³
Petroleum, crude	billion barrels 167.7 ²
Platinum-group metals	metric tons 310 ²
Potash	million metric tons 1,200 ²
Rare-earth oxides	15,000 ³
Silver	metric tons 5,074 ³
Uranium (U content)	500 ⁴
Zinc	2,286 ³

¹Includes proven and (or) probable reserves.

²Source: Natural Resources Canada.

³Source: Mining Association of Canada, data as of 2017.

⁴Source: World Nuclear Association, resources, datum as of 2017.