



2020–2021 Minerals Yearbook

KAZAKHSTAN [ADVANCE RELEASE]

U.S. Geological Survey, Reston, Virginia: 2025

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THE MINERAL INDUSTRY OF KAZAKHSTAN

By Elena Safirova

Note: In this chapter, information for 2020 is followed by information for 2021.

In 2020, Kazakhstan produced a diverse range of mineral commodities and was the world's leading producer of uranium (41% of world output); the 2d-ranked producer of asbestos (21%); the 3d-ranked producer of chromite (19%) and barite (6.5%, excluding United States production); the 4th-ranked producer of titanium sponge (6.5%); the 5th-ranked producer of bismuth (1.2%), cadmium (6.3%), and magnesium metal (1.6%, excluding United States production); the 7th-ranked producer of gold (3.8%), rhenium (0.8%), and sulfur (5.6%); the 8th-ranked producer of refined copper (2.0%); the 9th-ranked producer of bauxite (1.3%) and silicon (0.8%, shared with Bhutan, excluding United States production); the 10th-ranked producer of fluorspar (0.9%), mined copper (2.7%), and zinc (1.9%); and the 11th-ranked producer of silver (1.9%). The country was also a significant producer of alumina, antimony, iron ore, lead, manganese, and phosphate rock. The mineral industry accounted for a significant share of the country's gross domestic product (GDP) and export revenue; petroleum and natural gas were the leading mineral commodities, in terms of production value. Kazakhstan's Government promoted the development of the mineral industry and owned interests in a number of significant mineral-commodity-producing companies (U.S. Energy Information Administration, 2019; Anderson, 2022; Apodaca, 2022; Bray, 2022a, b; Callaghan, 2022; Flanagan, 2022a, b; Gambogi, 2022; Jasinski, 2022; Klochko, 2022a, b; McRae, 2022a, b; Merrill, 2022; Polyak, 2022; Schnebele, 2022a, b; Schulte, 2022; Sheaffer, 2022; Tolcin, 2022; Tuck, 2022; World Nuclear Association, 2022).

Minerals in the National Economy

In 2020, Kazakhstan's real GDP decreased by 2.5% compared with that in 2019, and the nominal GDP was 70.6 trillion tenge (about \$171 billion).¹ The share of industrial production in the GDP was 27.0% compared with 27.5% in 2019. The total nominal value of industrial production was \$65.3 billion, and the real value of industrial production decreased by 0.5% compared with that in 2019. Mineral extraction played a significant role in industrial production, accounting for \$28.5 billion, or 43.6% of the value of industrial production. The output value of mineral extraction included \$19.3 billion from the extraction of crude petroleum; \$4.3 billion from the mining of nonferrous metal ores; \$1.2 billion from the mining of iron ore; \$811 million from the extraction of coal, including lignite; and \$659 million from the extraction of natural gas. Compared with that in 2019, the real output of mining and quarrying decreased by 3.7%.

Crude petroleum production decreased by 5.4%; coal and lignite, by 3.3%; natural gas, by 2.2%; iron ore, by 0.2%; and mined nonferrous metals, by 0.1%. In 2020, metallurgy contributed \$13.7 billion to the value of industrial output, of which nonferrous metallurgy and production of precious metals contributed \$9.6 billion, and petroleum refining and coke production accounted for \$2.0 billion. Compared with that in 2019, the real output of ferrous metals increased by 3.2%; that of nonferrous and precious metals increased by 2.6%; and that of petroleum refining and coke decreased by 1.8% (Agency of Statistics of the Republic of Kazakhstan, 2021, p. 8–10, 166, 296–297).

Government Policies and Programs

In 2017, the President of Kazakhstan signed into law a new "Subsoil and Use of Subsoil Code" (the Mining Code) of the Republic of Kazakhstan that went into effect at the end of June 2018. The new code introduced several innovations to help attract new investment and venture capital to Kazakhstan's mining industry. The new code significantly simplified the procedures required to obtain exploration and mining licenses, reduced the time requirements to obtain relevant permits, and created an interactive system to share the Government's geologic information with exploration and mining companies. Since the adoption of the new Mining Code, several amendments aimed at better coordination with other laws of Kazakhstan and other improvements have gone into effect (Forbes Kazakhstan, 2018; Vorotilov, 2018; Kazinform International News Agency, 2022).

Production

In 2020, production of many mineral commodities decreased owing to the effects of the coronavirus disease 2019 (COVID-19) pandemic both on production conditions and on world markets. Production of antimony decreased by 80%; other ferroalloys, by 70%; silicon metal, by 62%; mined lead, by 46%; manganese concentrate, by 40%; ferrosilicochromium, by 39%; magnesium metal, by 36%; titanium sponge, by 35%; manganese ore, by 29%; cadmium, chromium concentrate, and ilmenite and leucoxene, by 20% each; beryllium products, by 19%; barite, by 16%; fluorspar, by 15%; uranium, by 14%; and clays and secondary lead, by 11% each. Production of ferrosilicon increased by 126%; iron ore, by 39%; selenium, by 33%; refined petroleum products, by 32%; rolled steel, by 26%; tantalum metal, by 24%; mined gypsum, by 21%; phosphate rock, by 17%; gravel, by 14%; salt, by 13%; and refined gold, by 11%. These and other production data are in table 1.

¹Where necessary, values have been converted from Kazakhstani tenge (KZT) to U.S. dollars (US\$) at the annual average exchange rates of KTZ426.70=US\$1.00 for 2021 and KTZ414.09=US\$1.00 for 2020.

Structure of the Mineral Industry

As of January 1, 2020, Kazakhstan had 4,106 companies working in the sphere of mining and quarrying, of which 3,907 were small-size companies, 87 were medium-size companies, and 112 were large-size companies. None of the mining and quarrying companies were fully owned by the Government. AO NAK Kazatomprom (Kazatomprom) and AO NK KazMunaiGas were the leading companies that were partially owned by the Government. The most prominent private companies involved in the production of minerals were Eurasian Resources Group S.a.r.l. (ERG), Kazakhmys plc, KAZ Minerals plc, and TSO Kazzinc. Among all mining companies, 396 were owned by foreign entities and individuals; 280 were joint ventures with the participation of foreign capital; 14 were joint ventures without the participation of foreign capital; and the rest were owned by private entities and individuals in Kazakhstan. Among the large companies, 33 were owned by foreign entities and individuals; 28 were joint ventures with the participation of foreign capital; 1 was a joint venture without the participation of foreign capital; and the rest were owned by private entities and individuals in Kazakhstan. Table 2 is a list of major mineral industry facilities (Agency of Statistics of the Republic of Kazakhstan, 2021, p. 217).

Mineral Trade

In 2020, the value of Kazakhstan's exports amounted to \$47.5 billion, which was an 18.1% decrease compared with the value of exports in 2019; the decrease was owing to the effects of the COVID-19 pandemic. In 2020, Kazakhstan's imports decreased by 2.0% to \$38.9 billion (Agency of Statistics of the Republic of Kazakhstan, 2022b, p. 8).

Crude petroleum, ferroalloys, copper, natural gas, and flat-rolled steel were the primary sources of export revenue, listed in the order of decreasing export revenue. Overall, in 2020, about two-thirds (66.0%) of Kazakhstan's export revenue was from exports of mineral products. Revenue from exports of crude petroleum decreased to \$23.7 billion from \$33.6 billion in 2019; natural gas, to \$1.88 billion from \$2.51 billion; fuel oil, to \$405 million from \$921 million; and coal, to \$382 million from \$450 million (Agency of Statistics of the Republic of Kazakhstan, 2022b, p. 212–221).

Kazakhstan's main export partner was China, which received 19.8%, by value, of the country's exports. It was followed by Italy (14.0%), Russia (10.5%), the Netherlands (6.6%), Turkey and Uzbekistan (4.5% each), India (4.2%), and France (3.9%) (Agency of Statistics of the Republic of Kazakhstan, 2021, p. 371–372).

The major import categories were foodstuffs, machinery and equipment, and metal products. Kazakhstan's main import partner was Russia, which supplied 35.4% of Kazakhstan's imports, by value. It was followed by China (16.4%), the Republic of Korea (12.6%), Germany (4.4%), the United States (3.0%), France (2.5%), and Italy and Turkey (2.4% each) (Agency of Statistics of the Republic of Kazakhstan, 2021, p. 375–376).

Commodity Review

Metals

Chromium and Ferroalloys.—In 2020, AO TNK Kazkhrom (Kazkhrom), which was a division of ERG, was the major producer of chromite and ferroalloys in Kazakhstan. Kazkhrom had four major production units—the Aksu ferroalloy plant located in Pavlodar Province; the Aktobe ferroalloy plant located in the city of Aktobe; the Kazmarganets manganese mine located in Qaraghandy Province; and the Donskoy chromite mining and beneficiation complex, or “GOK,” located in the city of Khromtau in Aqtobe Province (table 2; Inbusiness.kz, 2016, 2018; Ryskulov, 2017).

In 2020, Kazkhrom produced 5.6 million metric tons (Mt) of chromite ore, which was a 6.9% decrease from that produced in 2019. Production of marketable chromium output decreased by 18.2% to 3.6 Mt. Kazkhrom produced 1.84 Mt of ferroalloys in 2020, which was 1.7% more than the company produced in 2019 and was also the historical per-year maximum of ferroalloy production for Kazkhrom. The company exported about 1.7 Mt of ferroalloys in 2020 (table 1; Kursiv, 2021a; Metal Mining Info, 2021; Globus—Geologiya i Biznes, 2021).

Cobalt and Nickel.—In 2020, Battery Metals Technologies Ltd. (BMT) was developing a mine at the Gornostayevskoye cobalt-nickel deposit in East Kazakhstan Province close to the Kazakhstan-China border. At the initial stage of the project, investment would amount to \$103 million, but the total cost of developing the mine was projected to be \$1.5 billion. The company planned to begin production in 2023 and, by 2039, to increase production to 20,000 metric tons per year (t/yr) of nickel and 1,500 t/yr of cobalt. Also, the company planned to conduct an initial public offering (IPO) at the Stock Exchange of Hong Kong at the end of 2021 (Abylgazina, 2021; Weekend Tver, 2021).

BMT had the rights to build a mine at the Gornostayevskoye deposit through its subsidiary TSO Kaznickel, which had a production license for the planned mine through February 2026. According to an independent study conducted in 2019, the total reserves of the deposit were estimated to be 169 Mt of ore containing more than 1 Mt of nickel and more than 65,000 metric tons (t) of cobalt, whereas the licensed area had reserves of 106.5 Mt of ore containing 628,000 t of nickel and 42,000 t of cobalt. The deposit had access to a road, a railroad, and two power lines with access to the northern and southern parts of the licensed area. The company planned to produce metals using in situ leaching, and the estimated life of the mine was 30 years. The company expected to sign direct contracts with producers of lithium-ion batteries by the time that industrial-scale production was to begin (Weekend Tver, 2021; Fincraft Resources AK, 2022).

Copper.—In 2020, Kazakhstan produced 121.9 Mt of copper ore, which was a 1.8% increase compared with that in 2019, and 513,600 t of copper in concentrates, which was a 1.7% decrease compared with that in 2019. Most of the copper mine production took place in three Provinces—East Kazakhstan Province (52 Mt), Qaraghandy Province (34.1 Mt), and Pavlodar Province (33.6 Mt). The leading copper producers in Kazakhstan were, in the order of decreasing production, KAZ Minerals plc,

TOO Kazakhmys, and Aktyubinskaya Mednaya Kompaniya (AMK), which was a subsidiary of Russian Copper Co. (RMK) of Russia (tables 1, 2; Metal Mining Info, 2020).

In 2020, copper smelter production in Kazakhstan increased by 2.0% to 378,618 t. TOO Kazakhmys produced 258,400 t of copper cathode (or 68.3% of the total), which was a 5.1% increase compared with the company's production total in 2019. Also, production of refined (nonelectrowon) copper in Kazakhstan increased by 1% to 477,016 t, predominantly in Qaraghandy Province (81.7%) and East Kazakhstan Province (16.4%). Kazakhstan exported most of its refined copper output, and between January 2020 and January 2021, the export price of refined copper increased by 42.7% to about \$7,730 per metric ton (Forbes Kazakhstan, 2021a; Kapital.kz, 2021b).

Gold.—In 2020, Kazakhstan produced about 117,000 kilograms (kg) of mined gold, which was a 9.8% increase compared with production in 2019. The leading producers of mined gold in Kazakhstan were TOO Altyntau Kokshetau (owned by TOO Kazzinc) and AO GMK Kazakhalytyn, both of which had operations in Aqmola Province, and Polymetal International plc (Polymetal), which was one of leading producers of precious metals in Russia and operated in East Kazakhstan Province and Kostanay Province. AO AK Altynalmas operated in Qaraghandy Province and Zhambyl Province (tables 1, 2; Forbes Kazakhstan, 2016).

According to the Ministry on Investment and Infrastructure Development (MIIR), from 2007 to 2017, Kazakhstan mined a total of 540,000 kg of gold. During the same period, new gold reserves obtained through exploration amounted to 760,000 kg of gold, which was an increase of 41%. Also, during the same period, about \$6.4 billion was invested in exploration for and production of mined gold, of which about \$430 million was directed towards gold mining. As of 2018 (the latest year for which data were available), Kazakhstan had 343 gold deposits with reserves registered by the Government; of this total, 285 were ore deposits, 43 were alluvial deposits, and 15 were technogenic deposits (that is, waste piles). Production and exploration were carried out at 204 deposits, of which 130 had only exploration work ongoing, 38 had both exploration and production work ongoing, and 36 had only production work ongoing. Total gold reserves in Kazakhstan amounted to 2.3 million kilograms; production was conducted at deposits with total reserves of about 1.7 million kilograms (National Geological Survey, 2018; TOO GP Kazspetsgeologiya, 2020).

According to TOO GP Kazspetsgeologiya, gold deposits explored in Kazakhstan may be classified into three types—complex deposits, lode deposits, and stockwerk deposits. Examples of complex deposits include the Ridder-Sokol'noye and the Tishinskoye deposits; examples of lode deposits are the Akbakay, the Aksu, and the Bestobe deposits; and examples of stockwerk deposits are the Bakyrchik, the Bol'shevik, and the Vasil'kovskoye deposits. A few skarn deposits have also been explored, but they were limited to about 2% of all fold deposits in Kazakhstan. The largest gold deposits were the Vasil'kovskoye and the Bakyrchik deposits. The Vasil'kovskoye deposit had proven reserves of 370,000 kg at a grade of 2.8 grams per metric ton (g/t), and the Bakyrchik deposit had

proven reserves of 326,000 kg at a grade of 6.9 g/t gold. The Aksu and the Bestobe deposits are classified as medium in size. The Aksu deposit has lodes that varied between 2 g/t and 50 g/t of gold content; the annual production at Aksu Mine was about 770 kilograms per year (kg/yr) of gold. The Bestobe Mine produced about 1,360 kg/yr of gold and had some lodes grading 100 g/t gold (National Geological Survey, 2018; TOO GP Kazspetsgeologiya, 2020).

Vanadium.—In January 2020, Ferro-Alloy Resources Ltd. (FAR), which was registered in Guernsey [United Kingdom], conducted an IPO at the Kazakhstan Stock Exchange. Earlier, in March 2019, the company conducted an IPO at the London Stock Exchange and was able to attract about \$7 million in investment. FAR owned a 100% share in TOO Balausa Firm, which had a production license for the Bala-Sauskandyk vanadium deposit in Qyzylorda Province. TOO Balausa Firm operated a processing plant that had the capacity to produce 150 t/yr of vanadium pentoxide. The plant was processing low-quality, imported vanadium concentrates. Company leadership stated that the production capacity could be increased to as much as 450 t/yr of vanadium pentoxide if higher quality raw materials were used. At the same time, FAR was developing the Bala-Sauskandyk deposit and planned eventually to construct another processing plant. The first stage of development would involve processing 1 million metric tons per year (Mt/yr) of ore and producing 5,600 t/yr of vanadium pentoxide. The first stage of development was expected to cost about \$100 million and take no more than 2 years to complete. In the second stage of the project, the mine capacity would be increased to 4 Mt/yr of ore and the mine would produce 22,400 t/yr of vanadium pentoxide. This second stage of development was projected to cost \$225 million and to be completed by the end of 2023 (Ibrayeva, 2017; Forbes Kazakhstan, 2019; Ferro-Alloy Resources Group, 2022).

Industrial Minerals

Cement.—In 2020, Kazakhstan produced 10.96 Mt of cement, which was a 6.8% increase compared with production in 2019. In April 2020, the Government introduced the first ban on imports of cement from countries other than those in the Eurasian Economic Union, which included Armenia, Belarus, Kyrgyzstan, and Russia. The ban was to be in effect for 6 months and applied to alumina-containing cement, clinker, other hydraulic cement, and portland cement. In 2019, Kazakhstan imported 890,000 t of cement, of which 485,000 t was from Russia and 396,000 t was from Iran. At yearend, the Government decided that the ban was having a positive economic effect. Domestic cement production at the end of the year had increased; the cement sector had paid about \$13.5 million in additional taxes; cement exports amounted to 2.0 Mt and produced revenue of about \$100 million; and the domestic producers retained jobs, which helped mitigate the effects of the COVID-19 pandemic (Cement and Its Applications Journal, 2020, 2021; Khmelevskaya, 2021).

Mineral Fuels and Related Materials

Petroleum.—In 2020, Kazakhstan decreased crude petroleum production by 5.5% to 85.7 Mt [or by about 622 million barrels (Mbbl)] and exported 68.5 Mt (about 497 Mbbl). In 2020, investors from 15 countries contributed to crude petroleum production in Kazakhstan. Kazakhstani companies produced 30.6% of the country's crude petroleum output; they were followed by companies from the United States (28.7%), Europe (18.7%), China (16.0%), and Russia (3.5%). In terms of producing companies, KazMunaiGas produced 26.9%; Chevron Corp. of the United States, 18.0%; China National Petroleum Corp. (CNPC) of China, 11.5%; Exxon Mobil Corp. of the United States, 10.7%; Shell plc (formerly Royal Dutch Shell plc) of the United Kingdom and Eni S.p.A. of Italy, 7.1% each; and PAO Lukoil of Russia, 3.5% (Ekberova, 2021; Ishekenova, 2021).

Uranium.—In 2020, Kazakhstan produced 19,477 t of uranium, which was a 14.4% decrease compared with that in 2019. Originally, Kazakhstan planned to produce 22,500 t of uranium in 2020, but production plans were lowered by about 3,000 t owing to the COVID-19 pandemic. Uranium production in the past quarter century had increased by 24-fold to about 19,500 t in 2020 from 796 t in 1997. Kazakhstan had been the world leader in uranium production since 2009 and had increased its production by sixfold in the past 10 years. Kazatomprom was the leading producer of uranium in Kazakhstan; it had carried out production at 26 sections of 14 uranium mines and was responsible for more than 50% of uranium production in the country. Kazatomprom produced uranium using the in situ leaching method. According to the company, its average time from the beginning of mine construction to production was 18 months, whereas the industry average was about 3 years (table 1; Satbayev University, 2017; CIS Internet Portal, 2021; Vestnik Kavkaza, 2021; NAK Kazatomprom, 2022).

MINERAL INDUSTRY HIGHLIGHTS IN 2021

Minerals in the National Economy

In 2021, Kazakhstan's real GDP increased by 4.3% from that in 2020, and the nominal 2021 GDP was about \$197 billion. The mining and quarrying sector's contribution to the GDP was about \$27.9 billion, or 14.2% of the GDP, compared with 12.2% in 2020 (Agency of Statistics of the Republic of Kazakhstan, 2022a, p. 9, 11, 143, 155).

In 2021, the value of Kazakhstan's exports amounted to \$60.3 billion, which was a 26.9% increase compared with the value of exports in 2020; Kazakhstan's imports increased by 6.4% to \$41.4 billion. In 2021, 65.9% of export revenues was from mineral products, and another 17.4% was from basic metals and ferroalloys (Agency of Statistics of the Republic of Kazakhstan, 2022a, p. 363–364; 2022b, p. 8).

Government Policies and Programs

In March 2021, the President signed into law a series of amendments to the "Subsoil and Use of Subsoil Code"

(the Mining Code) of the Republic of Kazakhstan related to uranium production. The changes in the law stipulated that project proposals for uranium production require independent review conducted by a company with a 100% Government ownership. Also, according to the amendments, the subsoil user may conduct additional exploration during the production period and in accordance with the production license. Finally, if the uranium reserves of a uranium mine increase by 30% or more, the company owner and (or) project operator are required to conduct an additional project directed at the socioeconomic development of the region (Exclusive, 2021).

Production

In 2021, production of mined antimony increased by 550%; barite, by 128%; mined gypsum, by 95%; selenium, by 75%; mined manganese (gross weight), by 54%; mined manganese (metal content), by 53%; manganese concentrate, by 34%; ferrosilicochromium, by 22%; nitrogen, N content of ammonia and rolled steel, by 19% each; and cement, lime, pig iron, raw steel, and uranium, by 12% each. Production of clays decreased by 36%; gravel and primary copper cathode, by 22% each; ferrosilicon, by 18%; mined zinc and secondary lead, by 13% each; sand, by 12%; coal lignite, by 11%; and fluorspar, by 10% (table 1).

Commodity Review

Metals

Chromium.—In February, the Donskoy GOK made an estimate of the resources at the new Geologicheskoye I chromite deposit located in the Khromtau area, Aqtobe Province. The resources were estimated to be 632,000 t of chromium for open pit production and 400,000 t of chromium for underground production. The average chromium oxide content of the Geologicheskoye I deposit was 54.9%, which would characterize it as a small deposit with high chromium content (Karpova, 2021).

AO Kazgeologiya had been conducting exploration for new chromite deposits in the Khromtau area since 2016 and had drilled a total of 123 kilometers. The company's total investment in exploration amounted to about \$10 million. In Aqtobe Province, 77% of the discovered reserves were located in ore bodies that were detected using mechanical drilling. The new focus was on so-called "small deposits," the development of which would provide stable production of chromite to Kazakhstan's ferroalloy plants. Small deposits were expected to use autonomous vehicles for drilling, production, and transportation of the ore (Karpova, 2021).

Three more deposits at the Donskoy GOK were in preparation for development. Production at the future Dyubersay Mine was expected to begin later in 2021 and was expected to amount to 300,000 t of ore, but at yearend, it was not known if production had begun. At the future Yuzhnyi Mine, the reserves were estimated to be 370,000 t at a grade of 46.7% chromium oxide, and production was expected to begin in 2023. Also, at the future Mirnyi Mine, the northern portion of which had

reserves of 150,000 t, preparation for production was in process (Karpova, 2021).

Development of the Geologicheskoye II and Geophysicheskoye VII chromite deposits was awaiting reserves approvals and determination of the methods of development. Two more chromite projects—the Daul’sko-Kokpektinskaya area and the Bilge deposit—were being further explored through 2025. Finally, a number of other small deposits—the Geophysicheskoye IX, Geophysicheskoye X, Geophysicheskoye XI, Geophysicheskoye XII, Iyun’skoye, and the Tygashayskaya area—were awaiting analysis of the exploration work and decisions on further courses of action (Karpova, 2021).

Ferroalloys.—In November, TOO Qaz Carbon opened a new Sary-Arka ferroalloy plant in the city of Karagandy. The construction began in December 2020, and the plant was built in 9 months. Construction was financed by AO Bank for Development of Kazakhstan (\$91.0 million) and from the company’s own funds (\$25.8 million). The plant would have a design capacity of 57,000 t/yr of various ferroalloys and would provide 300 jobs. The plant was to have a total of eight 8-megawatt (MW) furnaces. At the plant opening, only four furnaces began operations, and the rest were to be commissioned later. The furnaces would be able to switch between production of different ferroalloys within 3 hours; plant productivity would be 25 metric tons per day. By November, the plant had already produced 3,000 t of silicomanganese and shipped the output to Japan, the Republic of Korea, and countries in the Commonwealth of Independent States (CIS) and the European Union (Forbes Kazakhstan, 2020; Kapital.kz, 2021a; Kursiv, 2021b).

In December 2021, TOO EkibastuzFerroAlloys announced that it was able to attract financing for the construction of a new ferrosilicon plant in the city of Ekibastuz, Pavlodar Province. The total cost of the project was \$233 million, which included a \$169 million credit line from the AO Bank for Development of Kazakhstan; the rest was financed by private investors. The new plant would have four 94.5-MW-capacity furnaces, and the annual production capacity of the plant would be 240,000 t/yr of high-grade ferrosilicon. The plant would be fully automated and located in close proximity to the Ekibastuz GRES-1 hydroelectric powerplant. The convenient location would provide access to power and raw materials. The plant was expected to create 1,500 temporary jobs during construction and 800 permanent jobs when the plant is commissioned. The Government of Kazakhstan encouraged new industrial enterprises to source production inputs domestically and, if possible, locally. According to the company, 96% of the production costs of the TOO EkibastuzFerroAlloys facility would be sourced locally in Pavlodar Province. The plant was expected to be commissioned by the end of 2023. The output would be exported to Japan, the Republic of Korea, and the United States (INFOLine, 2021; IA Krasnaya Vesna, 2022).

Gold.—In 2021, Polymetal produced gold at two of its projects—the Varvarinskoye project in Qostanay Province (which included the Komarovskoye and the Varvarinskoye Mines), and the Kyzyl project in East Kazakhstan Province (which included the Bakyrchik and the Bolshevik Mines).

In 2021, the Varvarinskoye hub produced a total of 197,000 troy ounces (6,127 kg) of gold equivalent, which was a 24% increase compared with production in 2020. The increase in production was related to the higher metal content in the ore and to higher extraction rates owing to improvements in technological processes. At the same time, production at the Kyzyl project decreased by 6% to 360,000 troy ounces (11,197 kg) of gold equivalent. The reason for the reduced production was a planned decrease in the metal content in the ore, which was partially mitigated by an increase in the capacity of the gold processing plant to 2.2 Mt/yr (Inbusiness.kz, 2022).

As of June 2021, Kazakhstan was in the process of building five new gold-processing plants, all of which were expected to be completed by 2024. The new plants would together have the capacity to produce about 14,800 kg/yr of dore alloy. As a result, Kazakhstan was expected to increase gold production in 2023 to 122,500 kg, and in 2024, to 132,900 kg. According to the MIIR, by the end of 2021, Golden Compass Capital was expected to commission the second stage of the gold-processing plant at the Kokkia Mine in Zhambyl Province. The plant would double its annual production to between 430 and 570 kg/yr. Eastern Gold Co. planned to produce 150 kg/yr of gold at the Rodnikovoe Mine in East Kazakhstan Province. Originally, construction of the gold-processing plant was expected to be completed in 2020, but for various reasons, including the COVID-19 pandemic, completion of the plant was postponed (Gold Prime, 2021).

RG Gold (aka Raygorodok), which was a subsidiary of Vernyi Kapital, was developing the Novodneprovskoye, the North Raygorodok, and the South Raygorodok Mines, the combined resources of which were estimated to be 170,000 kg of gold. The company planned to complete construction of a gold-processing plant by the end of 2022. The plant would process 5 Mt/yr of ore and produce about 1,900 kg/yr of dore alloy. Aina Resources Co. planned to finish construction of a beneficiation and processing plant with the capacity to produce about 320 kg/yr of dore alloy at the Akbeyit deposit in Aqmola Province. Monterra Group AG of Germany planned to commission a GOK to develop the Karatas-Maybulak area in Zhambyl Province. The company had thus far invested 1.6 billion euros² (about \$1.89 billion). The GOK would have a capacity to produce 10,000 kg/yr of dore alloy. In addition, Kazakhaltyn planned to open two new gold-processing plants at the Aksu and the Bestobe deposits by 2022 (Gold Prime, 2021).

In June 2018, an amendment to the Law on Subsoil and Subsoil Use allowed artisanal production of gold in Kazakhstan. The law set the limit on gold production at 50 kg/yr for an individual artisan; also, individual artisans were not allowed to use heavy machinery in their production. The law was expected to reduce illegal gold mining by allowing small entrepreneurs to mine gold legally. Three years later, by 2021, however, evidence showed that the law was not working as expected. Data from several Provinces demonstrated that the interest in obtaining artisanal mining licenses was very low and that the law did not reduce illegal mining. It appeared that individual miners

²Where necessary, values have been converted from euro area euros (EUR) to U.S. dollars (US\$) at the annual average exchange rates of EUR0.877=US\$1.00 for 2020 and EUR0.846=US\$1.00 for 2021.

still preferred mining with no restrictions to legal mining as individual artisans (Zhuravleva, 2020; Yuritsyn, 2021).

Industrial Minerals

Cement.—In July 2021, the Government canceled the ban on cement imports. The ban had been introduced in April 2020 as a measure to protect domestic cement producers. The Government stated that the removal of the ban would promote market saturation in the western part of the country and help to lower cement prices. As of 2021, Kazakhstan had 15 cement producers with a total combined design capacity of 16.5 Mt/yr of cement. In 2020, apparent domestic consumption was about 9.6 Mt (Kapital.kz, 2021c; Khmelevskaya, 2021; Forbes Kazakhstan, 2021b).

Mineral Fuels

Coal.—In 2021, Kazakhstan increased coal production by about 1.8% to 112 Mt. The country exported 29.2 Mt of coal, and the revenue amounted to \$500.1 million. Compared with those of 2020, coal exports increased by 10% in terms of quantity and by 31% in terms of revenue. Of the total exports of coal, 23.2 Mt was exported to countries of the CIS, including Russia, which imported 65.1% of the total, followed by Belarus and Kyrgyzstan. Among other countries, Switzerland imported 4.8 Mt of coal from Kazakhstan, which was a 34.6% increase compared with the amount imported in 2020 (Inbusiness.kz, 2021; Kapital.kz, 2022).

On the domestic market, 59.8 Mt of coal was shipped to energy-producing companies, which was a 0.8% increase compared with the amount shipped in 2020; industrial coal consumers received 6.8 Mt, which was a 21.4% increase; and residential customers received 10.7 Mt, which was a 0.9% increase. Coal prices in Kazakhstan were also on the rise on the domestic market. In 2021, coal prices increased by 5.2% from those in 2020, and in 2020, by 3.3% from those in 2019 (Zakharova, 2022).

According to the Ministry of Environment, Geology, and Natural Resources, the country planned to stop using coal by 2060, and the development of the national strategy for carbon neutrality was under development. To achieve this goal, the share of coal in electricity production would need to be reduced to 0% in 2060 from 69% in 2020. According to preliminary calculations, the share of renewable sources of energy at that stage would need to be at least 82%; in 2020, however, the share of renewable sources was only 3% (Inbusiness.kz, 2021; Kapital.kz, 2022).

Outlook

Interest in Kazakhstan's mineral industry is likely to continue to increase, as is the number of projects for extracting the country's significant mineral resources. This is especially true following the adoption of the new Mining Code, which among other goals, is aimed at providing better financial protection for investors. Projects involving chromium, cobalt, copper, gold, ferroalloys, nickel, and vanadium could be of particular interest. The number of exploration projects underway in Kazakhstan indicates the potential for future increases in the country's

mineral production, but any future development will depend on a variety of factors, including mineral commodity prices and the development of Government policies and programs to encourage the growth of the industry.

References Cited

TABLE 1
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²	2017	2018	2019	2020	2021
METALS					
Aluminum:					
Bauxite	4,846,100	5,700,000	4,118,400	4,057,800	4,370,100
Alumina	1,509,005	1,481,000	1,393,411	1,393,000	1,400,000 ^c
Metal, primary	254,000	258,400	277,718	281,600	278,967
Antimony, mine, concentrate, Sb content ^c	300 ^r	100 ^r	500 ^r	100	650
Beryllium, products, metallurgical	1,585	1,712	1,688	1,365	1,403
Bismuth, refinery ^c	270	280 ^r	230 ^r	230	210
Cadmium, refinery, primary	1,500 ^c	1,500 ^c	1,500 ^c	1,200	1,200
Chromium, mine, chromite:					
Ore	6,313,300	6,688,800	7,018,900	6,326,400	6,192,000
Concentrate	4,599,000	4,965,000	5,133,100	4,129,300	3,969,700
Copper:					
Mine, Cu content:					
Concentrates	515,600	592,800	522,600	513,600	473,700
Solvent extraction ³	42,200	42,700	39,500	38,200	41,300
Smelter, primary	334,844	327,314	371,359	378,618	296,683
Refinery, primary:					
Leaching, electrowon	42,200	42,700	39,500	38,200	41,300
Other	426,191	438,115	472,327	477,016	458,604
Ferroalloys:					
Ferrochromium	1,640,300	1,740,000 ^c	1,858,130	1,841,309	1,704,561
Ferrosilicon	60,001	65,405	79,930	180,645	148,023
Ferrosilicochromium	110,497	110,000 ^c	113,980 ^r	69,877	85,335
Silicomanganese	123,977	137,710	123,464	122,743	132,119
Other, unspecified	--	46	263 ^r	78	--
Total	1,930,000	2,050,000	2,180,000	2,210,000	2,070,000
Gold:					
Mine, Au content	kilograms				
	85,339	100,288	106,559	116,964	114,843
Refinery	do.				
	44,094	53,100	61,080	67,846	64,991
Iron ore, mine:					
Gross weight	38,728,200	41,876,500	45,221,900	62,865,000	64,089,700
Fe content	10,812,300	11,727,600	11,642,900	12,673,200	13,120,600
Iron and steel:					
Pig iron	3,775,100	3,174,100	3,208,700	3,212,400	3,623,800
Steel:					
Raw steel	4,657,000 ^r	4,006,000 ^r	4,130,600 ^r	4,009,400	4,499,000
Products, finished, rolled	2,846,400	2,546,900	2,036,700	2,564,100	3,056,800
Lead:					
Mine, Pb content					
	111,200	86,500	55,700	30,200	29,900
Refinery: ^c					
Primary	130,000	132,000	115,000	112,000	105,000
Secondary	19,000	21,000	18,000	16,000	14,000
Magnesium, metal, primary ^{c,4}					
	12,000	17,000	25,000	16,000	16,000
Manganese, mine:					
Crude ore:					
Gross weight	1,460,000	1,427,300	1,142,300	813,500	1,248,700
Mn content ^c	292,000	273,000	217,000	155,000	237,000
Concentrate:					
Gross weight	463,600	434,000	460,000	276,300	370,700
Mn content	167,000 ^c	143,000 ^c	152,000 ^c	91,300 ^c	122,000
Niobium, metal, niobium products, Nb content		27	26	14	15
Rhenium, Re content ^c	kilograms				
	1,000	1,000	500	500	500
Selenium		1	1 ^c	3	4
					7

See footnotes at end of table.

TABLE 1—Continued
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, gross weight, unless otherwise specified)

Commodity ²		2017	2018	2019	2020	2021
METALS—Continued						
Silicon, metal		--	14,000	13,000 ^e	5,000 ^e	5,000 ^e
Silver:						
Mine, Ag content ^c	kilograms	461,000 ^r	369,000 ^r	422,000 ^r	435,000	400,000
Refinery, primary	do.	1,041,838	959,000	1,007,671	1,015,756	982,545
Tantalum, metal, Ta content		140	132	121	150	163
Titanium:						
Ilmenite and leucoxene		9,400	10,000 ^e	15,000 ^e	12,000 ^e	12,000 ^e
Sponge ^e		11,000	16,000	23,000	15,000	15,000
Zinc:						
Mine, concentrate, Zn content		315,900	304,400	244,700	222,400	194,100
Smelter, primary and secondary		331,018	317,965	318,399	311,322	300,886
INDUSTRIAL MINERALS						
Asbestos, all grades		192,700	202,900	210,700	227,400	250,100
Barite, ore and concentrate		569,900	570,000 ^e	530,600	445,300	1,016,500
Cement, hydraulic ⁵	thousand metric tons	9,398	9,913	10,268	10,962	12,313
Clays, unspecified	do.	7,976 ⁶	60,821 ⁶	11,677 ⁶	10,350	6,613
Fluorspar		80,000 ^e	80,000 ^e	87,800	74,500	67,000
Gypsum, mine		133,200	121,400	78,200	94,500	184,700
Lime		1,048,300	886,000	874,500	830,900	933,600
Nitrogen, ammonia, N content		178,750	172,610	178,260	178,720	213,280
Phosphate rock:						
Gross weight		1,207,900	1,250,000	1,273,900	1,495,100	1,398,100
P ₂ O ₅ content		302,000	312,500	318,500	373,800	349,500
Salt		803,794	885,717	1,094,659	1,237,455	1,231,996
Stone, sand, and gravel:						
Sand and gravel, unspecified:						
Sand ⁷	thousand metric tons	21,300	17,100	23,200	23,300	20,400
Gravel ⁸	do.	71,500	71,500	72,400	82,500	64,600
Stone:						
Crushed:						
Limestone	do.	15,971	15,932	15,668	16,678	17,166
Chalk and dolomite	do.	1,669	1,755	1,892	1,895	1,927
Size and shape unspecified, construction ⁹	do.	16,000	15,700	13,100	12,300	12,000
Sulfur:						
Byproduct, S content:						
Metallurgy		600,000	600,000	600,000 ^e	600,000 ^e	610,000 ^e
Natural gas and petroleum		2,914,000	2,910,000 ^e	4,036,000 ^r	3,876,400	3,993,100
Total		3,510,000	3,510,000 ^e	4,640,000 ^r	4,480,000	4,600,000
Compounds, sulfuric acid		2,430,700	2,297,400	2,290,800	2,140,400	2,208,400
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous		101,797,300	107,595,900	104,809,100	104,084,100	107,246,300
Lignite		6,095,000	6,560,700	5,928,900	5,422,100	4,828,700
Total		108,000,000	114,000,000	111,000,000	110,000,000	112,000,000
Coke, metallurgical		2,954,100	2,839,200	2,604,800	2,387,800	2,439,900
Natural gas:						
Associated	thousand cubic meters	30,051,300	32,785,300	34,524,300	32,261,100	32,670,900
Nonassociated	do.	22,869,800	22,668,200	22,157,000	23,117,500	21,508,200
Total	do.	52,900,000	55,500,000	56,700,000	55,400,000	54,200,000
Petroleum:						
Crude, including condensate ¹⁰	42-gallon barrels	627,000,000	657,000,000	658,000,000	622,000,000	624,000,000
Refinery ¹¹	do.	103,000,000	106,000,000	111,000,000	147,000,000	156,000,000
Uranium, mine, U content		23,390	21,705	22,761	19,477	21,819

See footnotes at end of table.

TABLE 1—Continued
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES¹

²Estimated. ³Revised. ⁴do. ⁵Ditto. ⁶-- Zero.

¹Table includes data available through November 26, 2022. 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, cesium, cobalt, germanium, indium, molybdenum, nickel, scandium, selenium, tellurium, tin, and vanadium may have been produced, but available information was inadequate to make reliable estimates of output.

³The copper content of solvent extraction output at the mine level is the same as electrowon refinery output; however, copper produced in the solvent extraction and electrowinning process is typically reported only at the refinery level.

⁴Includes magnesium used in production of titanium sponge.

⁵Excludes white cement.

⁶Includes kaolin.

⁷Converted from cubic meters assuming density of 1.5 metric tons per cubic meter.

⁸Converted from cubic meters assuming density of 1.68 metric tons per cubic meter.

⁹Converted from cubic meters assuming density of 1.6 metric tons per cubic meter.

¹⁰Figures were converted to barrels from metric tons, which were reported as follows: 2017—86,194,400; 2018—90,359,500; 2019—90,555,400; 2020—85,656,100; and 2021—85,879,400.

¹¹Figures were converted to barrels from metric tons, which were reported as follows: 2017—12,974,300; 2018—13,400,100; 2019—14,037,600; 2020—18,318,800; and 2021—19,493,500.

TABLE 2
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits		Annual capacity ^c	
Alumina	AO Aluminium of Kazakhstan [Eurasian Resources Group S.a.r.l. (ERG)]	Plant in the city of Pavlodar	1,600,000	
Aluminum, primary	Kazakhstan Electrolysis Plant (KEZ) (also known as Pavlodar Aluminum Plant) [Eurasian Resources Group S.a.r.l. (ERG)]	do.	285,000	
Asbestos	AO Kostanai Minerals	Mine in Zhitikaza, Qostanay Province	255,000	
Barite	Barite Oil Kentau LLC	Kentau District, Turkistan Province	NA	
Do.	Stroyservice LLC	do.	30,000	
Do.	TOO Vostochnoye Rudoupravleniye	Chiganak, Zhambyl Province	400,000	
Do.	Zhairemskiy GOK ² [Eurasian Resources Group S.a.r.l. (ERG)]	Ushkatyn III, Zhairem, and Zhumanai deposits near the city of Zhairem	NA	
Do.	Zharts LLC	Zhambyl Province	25,000	
Bauxite	AO Kazakhstan Aluminium Smelter [Eurasian Resources Group S.a.r.l. (ERG)]	Torgayskoye and Krasnooktyabrskoye minin complexes, Qostanay Province	5,400,000	
Beryllium, metal	Ulba Metallurgical Plant (AO NAK Kazatomprom)	Oskemen (also known as Ust-Kamenogorsk)	NA	
Bismuth, metal	Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	do.	NA	
Do.	Chimkent metallurgical plant (JSC Yuzhpolimetall)	Shymkent, Turkistan Province	NA	
Cadmium	do.	do.	NA	
Do.	Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	Oskemen (also known as Ust-Kamenogorsk)	NA	
Cement	AO ACIG	Zhambyl Province	400,000	
Do.	AO Karcement (Steppe Cement Ltd.)	Qaraghandy Province	1,200,000	
Do.	AO Central Asia Cement (Steppe Cement Ltd.)	do.	800,000	
Do.	AO ShymkentCement (HeidelbergCement Group)	Turkistan Province	1,000,000	
Do.	Bukhtarma Cement Co. (HeidelbergCement Group)	East Kazakhstan Province	1,300,000	
Do.	KaspiyCement (HeidelbergCement Group)	Mangghystau Province	800,000	
Do.	PK Cement Plant Semey (Saikan Co.)	East Kazakhstan Province	1,200,000	
Do.	PO KoksheCement	Aqmola Province	2,000,000	
Do.	TOO Gezhouba Shieli	Qyzylorda Province	1,000,000	
Do.	TOO Jambyl Cement Production Co. (Vicat, 90%; The World Bank/International Finance Corp., 10%)	Zhambyl Province	1,300,000	
Do.	TOO Jambyl Nedr	do.	300,000	
Do.	TOO Kazakhcement	East Kazakhstan Province	1,000,000	
Do.	TOO SAS-Tobe Technologies	Turkistan Province	500,000	
Do.	TOO Rudnenskiy Cement	Qostanay Province	500,000	
Do.	TOO Standard Cement	South Kazakhstan Province	2,000,000	
Chromite, ore	AO TNK Kazkhrom [Eurasian Resources Group S.a.r.l. (ERG)]	Donskoy GOK, Khromtau, Aqtobe Province	7,100,000	
Do.	Oriel Resources Ltd. (Yildirim Resources)	Voskhod GOK, Khromtau, Aqtobe Province	NA	
Coal	thousand metric tons	Companies, including: ArcelorMittal Temirtau Bogatyr' Komir Eurasian Resources Group S.a.r.l. (ERG) Karazhira	Locations: Qaraghandy Province Pavlodar Province Qaraghandy Province East Kazakhstan Province	120,000 ³

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity ^c
Copper:			
Ore, recoverable, Cu content	Aktyubinskaya Mednaya Kompaniya (AMK) [Russian Copper Co. (RMK)]	Various locations, including: 50th Anniversary of October Mine, Koktau, Aqtobe Province, Aralchinskoye Mine, Aqtobe Province Kundyzdy Mine, Aqtobe Province Priororskoye Mine, Aqtobe Province	NA
Do.	KAZ Minerals plc	Aktogay Mine, Eastern Kazakhstan	150,000
Do.	do.	Bozshakol Mine, Eastern Kazakhstan	120,000
Do.	do.	Artemevskiy, Irtyshskiy, and Orlovskiy Mines, Eastern Kazakhstan	120,000
Do.	Polymetal International plc	Varvarinskoye deposit, Qostanay Province	NA
Kazakhmys plc:			
Central Region:			
Do.	Abyz Mine	Qaraghandy Province	5,710
Do.	Akbastau Mine	East Kazakhstan Province	29,000
Do.	Konyrat Mine	Qaraghandy Province	11,800
Do.	Nurkazgan Mine	do.	20,000
Do.	Sayak I and III Mines	do.	23,500
Do.	Shatyrkul Mine	Zhambyl Province	16,000
East Region:			
Do.	Belousovsky Mine	East Kazakhstan Province	2,700
Do.	Nikolaevsky Mine	do.	25,700
Do.	Yubileyno-Snegirikhinsky Mine	do.	22,000
Zhezkazgan Region:			
Do.	Annensky Mine	Qaraghandy Province	25,000
Do.	East Mine	do.	35,000
Do.	North Mine	do.	28,000
Do.	South Mine	do.	30,000
Do.	Stepnoye Mine	do.	30,000
Do.	West Mine	do.	23,300
Do.	Zhomart Mine	do.	60,000
TOO Kazzinc (Glencore plc, 69.61%):			
Ridder complex:			
Do.	Ridder-Sokolny Mine	East Kazakhstan Province	NA
Do.	Shubinskiy Mine	do.	2,750
Do.	Tishinskiy Mine	do.	15,000
Zyryanovsk complex:			
Do.	Grekhovskiy Mine	do.	NA
Do.	Maleevsky Mine	15 kilometers north of Zyryanovsk	40,000
Concentrate, Cu content	Aktyubinskaya Mednaya Kompaniya (AMK) [Russian Copper Co. (RMK)]	50th Anniversary of October Mine, Koktau, Aqtobe Province	58,000
Do.	AO BAST	East Kazakhstan Province	NA
Do.	Polymetal International plc	Concentrator at Varvarinskoye deposit, Qostanay	NA
TOO Kazakhmys:			
Central Region:			
Do.	Balkhash concentrator	Qaraghandy Province	40,000
Do.	Karagaily concentrators:		28,000
	Abyz	do.	
	Akbastau	do.	
	Kosmurun	do.	
Do.	Nurkazgan concentrator	do.	15,000

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity ^c
Copper:—Continued			
Concentrate, Cu content—Continued	East Region:		
	Orlovsky concentrator	Qaraghandy Province	70,000
Do.	Belousovsky concentrator	East Kazakhstan Province	13,000
Do.	Irtyshsky concentrator	do.	6,000
Do.	Nikolaevsky concentrator	do.	30,000
	Zhezkazgan Region:		
Do.	Satpayev concentrator	do.	30,000
Do.	Zhezkazgan No. 1 concentrator	do.	88,800
Do.	Zhezkazgan No. 2 concentrator	do.	95,000
	TOO Kazzinc (Glencore plc, 69.61%):		
Do.	Ridder complex, Ridder concentrator	Qaraghandy Province	10,000
Do.	Zyrianovsk complex, Zyrianovsk concentrator	do.	10,000
Metal	Central Asia Metals plc	Smelter in Balkhash, Qaraghandy Province	10,000
	TOO Kazakhmys plants:		
	Central Region:		
Do.	Balkhash smelter	Qaraghandy Province	250,000
Do.	Balkhash refinery	do.	250,000
	Zhezkazgan Region:		
Do.	Zhezkazgan smelter	do.	250,000
Do.	Zhezkazgan refinery	do.	250,000
Do.	Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	Smelter in Oskemen (also known as Ust-Kamenogorsk)	70,000
Ferroalloys:			
Ferrochrome:			
	High-, medium-, and low-carbon FeCr AO TNK Kazkhrom [Eurasian Resources containing 69% Cr Group S.a.r.l. (ERG)]	Plant in Aqtobe Province	450,000
	High-carbon FeCr containing 69% Cr AO TNK Kazkhrom [Eurasian Resources Group S.a.r.l. (ERG)]	Plant in Aksu City, Pavlodar Province	850,000
Unspecified	AO TNK Kazkhrom [Eurasian Resources Group S.a.r.l. (ERG)]	Plant in Aqtobe City	NA
Ferrosilicon	do.	do.	NA
Do.	TOO YDD Corp.	Plant Qaraghandy Province	180,000
Ferrosilicochromium	AO TNK Kazkhrom [Eurasian Resources Group S.a.r.l. (ERG)]	Plant in Aqtobe Province	NA
Silicomanganese	AO TNK Kazkhrom (Eurasian Resources Group S.a.r.l. [ERG])	Plant in Aqtobe City	NA
Do.	Taraz Metallurgical Plant LLP (SAT & Co.)	Taraz, Zhambyl Province	NA
Do.	Temirtau Electrometallurgical Complex	Temirtau, Qaraghandy Province	NA
Do.	TOO Qaz Carbon	Ferroalloys plant in Qaraghandy city	30,000
Gallium	AO Aluminium of Kazakhstan [Eurasian Resources Group S.a.r.l. (ERG)]	Plant in Pavlodar City	NA
Gold:			
Mine, Au content	AO AK Altynalmas (Aquila Gold DV)	Mines in Qaraghandy and Zhambyl Province including the Pustynnoye Mine	NA
Do.	AO GMK Kazakhalyt	Aqmola Province	NA
Do.	Golden Compass Capital	Kokkia Mine, Zhambyl Province	NA
Do.	Kazakhmys plc	do.	NA
Do.	KAZ Minerals plc	Aktogay Mine, Eastern Kazakhstan	NA
Do.	do.	Bozshakol Mine, Eastern Kazakhstan	NA
Do.	Nord Gold N.V.	Suzdal Mine, East Kazakhstan Province	NA
Do.	Polyus Gold International Ltd.	Northern Kazakhstan	NA

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits			Annual capacity ^c
Gold:—Continued				
Mine, Au content—Continued	Polymetal International plc		Mines in Northern Kazakhstan including Bakyrchik, Bolshevik, Komarovskoye and Varvarinskoye Mines	NA
Do.	TOO Altyntau Kokshetau [TOO Kazzinc (Glencore plc, 69.61%)]	Aqmola Province		NA
Do.	TOO Yubileynoye	Aqtobe Province		NA
Refined kilograms	TOO Kazakhmys	Central Kazakhstan		10,000
Do. do.	TOO Tau-Ken Altyn (Government)	Astana		30,000
Do. do.	Ust-Kamenogorsk refinery [TOO Kazzinc (Glencore plc, 69 Oskemen (also known as Ust-Kamenogorsk)	Zhambyl Province		8,000
Gypsum	AO Jambylgypsum	Zhambyl Province		270,000
Indium	TOO Kazzinc (Glencore plc, 69.61%)	NA		NA
Iron and steel:				
Pig iron thousand metric tons	ArcelorMittal Temirtau	Temirtau, Qaraghandy Province		5,700
Steel:				
Raw do.	do.	do.		6,000
Products, rolled do.	do.	do.		3,000
Iron ore, marketable, gross weight do.	JSC Sokolov-Sarbai Mining Production Association [Eurasian Resources Group S.a.r.l. (ERG)]	4 open pit mines and 1 underground mine in Qostanay Province		50,000
Do. do.	TOO Orken (ArcelorMittal Temirtau)	Qaraghandy Province		10,000
Lead:				
Mine Pb content of ore	TOO Kazzinc (Glencore plc, 69.61%): Ridder complex: Shubinskiy Mine	15 kilometers east of Ridder		630
Do.	Tishinskiy Mine	15 kilometers southwest of Ridder		15,000
Do.	Zyrianovsk complex, Maleevsky Mine	15 kilometers north of Zyrianovsk		26,000
Do.	TOO ShalkiyaZinc Ltd., Shalkiya Mine	15 kilometers northeast of Zhanakorgan city		NA
Concentrate, Pb content	TOO Kazzinc (Glencore plc, 69.61%): Ridder concentrator Zyrianovsk concentrator	Locations: Ridder, East Kazakhstan Province Zyrianovsk, East Kazakhstan Province		NA
Do.	TOO ShalkiyaZinc Ltd. (Kentau concentrating plant)	Turkistan Province		NA
Do.	TOO Nova Zinc (JSC Chelyabinsk zinc plant)	Akshatau, Qaraghandy Province		NA
Metal	Chimkent metallurgical plant (JSC Yuzhpolimetall)	Shymkent, Turkistan Province		NA
Do.	Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	Oskemen (also known as Ust-Kamenogorsk)		130,000
Lime	AO Temirtau electrometallurgical complex	Temirtau, Qaraghandy Province		NA
Do.	TOO Kazchimtecsnab	Semey, East Kazakhstan Province		NA
Do.	TOO Maykain Lime Plant	Maykain, Pavlodar Province		NA
Do.	TOO Neohim	Aqtobe, Aqtobe Province		NA
Do.	TOO SAS-Tobe Technologies	Sastobe, Turkistan Province		NA
Do.	TOO SH WORK	Tekeli, Almaty Province		NA
Do.	TOO Tulkubas Lime Plant	Shymkent, Turkistan Province		NA
Limestone	Keregetas limestone mine	Keregetas, Turkistan Province		NA
Magnesium, metal	AO Ust-Kamenogorsk titanium-magnesium plant	Oskemen (also known as Ust-Kamenogorsk)		NA
Manganese, crude ore, Mn content	Facilities: Atasurda mining and processing complex (TOO Orken) Kazmarganets [Eurasian Resources Group S.a.r.l. (ERG)] AO Temirtau electrometallurgical complex TOO Arman 100 Zhairemskiy GOK ² [Eurasian Resources Group S.a.r.l. (ERG)]	Locations: Atasu Tur and East Kamys Mines, Qaraghandy Province Temirtau, Qaraghandy Province 170 kilometers east of Zhezkazgan, Qaraghandy Province Perstenevsky, Ushkatyn III, Zhomart, and Zapadny Zhomart Mines, Qaraghandy Province		400,000 ³

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Major operating companies, main facilities, or deposits				Annual capacity ^c
Commodity		Location or deposit names		
Minor metals (indium, selenium, tellurium, thallium, and so forth)	Belogorskiy rare-metals plant ⁴	Asubulak, East Kazakhstan Province		NA
Do.	Chimkent metallurgical plant (JSC Yuzhpolimetall) ⁴	Shymkent, Turkistan Province		NA
Do.	Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	Oskemen (also known as Ust-Kamenogorsk)		NA
Natural gas	million cubic meters	Companies: Karachaganak Petroleum Operating B.V. (BG Group plc., 29.25%; ENI S.p.A., 29.25%; Chevron Corp., 18%; OAO Lukoil, 13.5%; AO NK KazMunaiGas, 10%) Tengizchevroil (Chevron Corp., 50%; ExxonMobil Kazakhstan Inc., 25%; AO NK KazMunaiGas, 20%; LukArco B.V., 5%) Additional production at smaller fields	Locations: Karachaganak Field Tengiz and Korolev Fields NA	58,000 ³
Nickel, ore	metric tons	Maksut Mine (AO BAST, 100%)	East Kazakhstan Province	400,000
Niobium, metal, niobium products, Nb content		Ulba Metallurgical Plant (AO NAK Kazatomprom)	Oskemen (also known as Ust-Kamenogorsk)	28
Nitrogen, ammonia, N content		AO KazAzot	Aktau, Manghystau Province	215,000
Petroleum:				
Crude	thousand 42-gallon barrels	Various compaines: CNPC AktobeMunaiGas (China National Petroleum Corp., 85.42%) Embamunaigas (AO NK KazMunaiGas) JSC Karazhanbasmunai (CITIC Group and AO NK KazMunaiGas) JV Kazgermunai LLP (AO NK KazMunaiGas) Karachaganak Petroleum Operating B.V. (BG Group plc., 29.25%; ENI S.p.A., 29.25%; Chevron Corp., 18%; OAO Lukoil, 13.5%; AO NK KazMunaiGas, 10%) AO Mangistaumunaigaz North Buzachi oilfield North Caspian operating Co. (NCOC) (Eni, 16.81%; KazMunaiGas, 16.81%; Royal Dutch Shell, 16.81%; Total S.A., 16.81%; ExxonMobil, 16.81%; China National Petroleum Corp., 8.4%; Inpex, 7.56%) Ozenmunaigas (AO NK KazMunaiGas) PetroKazakhstan Inc. (China National Petroleum Corp., 67%; AO NK KazMunaiGas, 33%) Tengizchevroil (Chevron Corp., 50%; ExxonMobil Kazakhstan Inc., 25%; AO NK KazMunaiGas, 20%; LukArco B.V., 5%)	Various locations: Aqtobe Province Western Kazakhstan Manghystau Province Qyzylorda Province Karachaganak Field Manghystau Province do. Kashagan deposit, Atyrau Province Manghystau Province South Turgai basin Tengiz and Korolev Fields	650,000 ³
Refined, crude petroleum throughput	42-gallon barrels per year	Atyrau Refinery (AO NK KazMunaiGas, 99.49%)	Atyrau	36,500,000
Do.	do.	JSC Pavlodar Oil Chemistry Refinery (AO NK KazMunaiGas, 58%)	Pavlodar, Pavlodar Province	43,800,000
Do.	do.	PetroKazakhstan Inc. (China National Petroleum Corp., 67%; AO NK KazMunaiGas, 33%)	Shymkent, Turkistan Province	40,150,000
Phosphate rock, beneficiated		Chulaktau mining and processing complex (Kazphosphate LLC)	Chulaktau, Zhambyl Province	NA
Do.		Karatau mining and processing complex (Kazphosphate LLC)	Zhanatas, Zhambyl Province	NA
Do.		Temir Service LLP (Sunkar Resources plc)	Chilisai deposit, northwestern Kazakhstan	NA
Rare-earth metals, products		SARECO (AO NAK Kazatomprom, 51%; Sumitomo Corp., 49%)	Stepnogorsk	1,500

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity ^c
Rhenium:			
Ammonium perrhenate (containing 69.2% Re)	Zhezkazganredmet (RedMet) (Government)	Zhezkazgan, Qaraghandy Province	NA
In tailings from copper ore processing	Balkhash copper mining-metallurgical complex (Kazakhmys plc)	Qaraghandy Province	NA
Salt	AO Araltuz	Zhaksykylysh, Qyzylorda Province	NA
Do.	AO Asyltuz	Zhambyl Province	NA
Silicon, metal	Silicium Kazakhstan LLP	Qaraghandy Province	12,500
Silver:			
Mine, Ag content	Kazakhmys plc	Mines in Qaraghandy Province	NA
Do.	TOO Kazzinc (Glencore plc, 69.61%)	Mines in East Kazakhstan Province	NA
Refined	Facilities: Balkhash refinery (Kazakhmys plc) Chimkent metallurgical plant (JSC Yuzhpolimetall) Ust-Kamenogorsk metallurgical complex [TOO Kazzinc (Glencore plc, 69.61%)]	Locations: Qaraghandy Province Shymkent, Turkistan Province Oskemen (also known as Ust-Kamenogorsk)	1,000 ³
Sulfur	Tengizchevroil (Chevron Corp., 50%; ExxonMobil Kazakhstan Inc., 25%; KazMunaiGas JSC, 20%; LukArco B.V., 5%)	Tengiz and Korolev Fields	NA
Sulfuric acid	Kazakhmys plc	Various regions	NA
Do.	TOO Kazphosphat	Taraz, Zhambyl Province	NA
Do.	TOO Kazzinc (Glencore plc, 69.61%)	East Kazakhstan Province	NA
Do.	TOO SKSK (AO NAK Kazatomprom)	Stepnogorsk, Aqmola Province	NA
Do.	TOO SKZ-U (AO NAK Kazatomprom)	Qyzylorda, Qyzylorda Province	NA
Tantalum, metal, Ta content	Ulba Metallurgical Plant (AO NAK Kazatomprom)	Oskemen (also known as Ust-Kamenogorsk)	NA
Titanium:			
Ore	Satpaevsk Titanium Mines Ltd. [AO Ust-Kamenogorsk titanium-magnesium plant (UKTMK), 49%]	Bektemir deposit, East Kazakhstan Province	NA
Do.	Shokash deposit	Aqtobe Province	NA
Do.	Tioline LLP	Obuhovskoye deposit, just north of Kokshetau, Aqmola Province	NA
Metal (sponge)	AO Ust-Kamenogorsk titanium-magnesium plant (UKTMK)	Oskemen (also known as Ust-Kamenogorsk)	35,000
Uranium, U content	Companies: Akbastau JV (AO NAK Kazatomprom, 50%; Uranium One Inc., 50%) Appak LLP (AO NAK Kazatomprom, 65.0%; Sumitomo Corp., 25%; Kansai Electric Power Co. Inc., 10%) Baiken-U LLP (AO NAK Kazatomprom, 52.5%; Japanese consortium, 47.5%) Betpak Dala JV (Uranium One Inc., 70%; AO NAK Kazatomprom, 30%) Inkai JV (AO NAK Kazatomprom, 60%; Cameco Corp., 40%) Karatau LLP (AO NAK Kazatomprom, 50%; UraniumOne Inc., 50%)	Locations: Blocks 1, 3, and 4 of the Budenovskoye deposit, Sozak Region, Turkistan Province West Mynkuduk Mine of the Mynkuduk deposit, Sozak Region, Turkistan Province Block No. 2 of the Kharassan deposit, Zhanakorgan Region, Qyzylorda Province Akdala Mine and Site No. 4 (South Inkai) Mine of the Inkai deposit, Sozak Region, Turkistan Province Blocks 1, 2, and 3 of the Inkai deposit, Sozak Region, Turkistan Province Block No. 2 of the Budenovskoye deposit, Sozak Region, Turkistan Province	24,000 ³

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity ^c
Uranium, U content—Continued	Companies: Katco JV (Areva Group, 51%; AO NAK Kazatomprom, 49%) Ken Dala.kz JSC (AO NAK Kazatomprom, 100%) Kyzylkum LLP (AO NAK Kazatomprom, 50%; Japanese consortium, 30%; UraniumOne Inc., 20%) Mining Co. LLP (AO NAK Kazatomprom, 100%): Mining Group No. 6 LLP Semizbai-U (AO NAK Kazatomprom and its subsidiary, Mining Company LLP, 51%; China Guangdong Nuclear Power Group, 49%) Stepnogorsk Mining-Chemical Complex LLP (AO NAK Kazatomprom, 100%) Stepnoye Mining Group LLP Taukent Mining Chemical Plant LLP Zarechnoye JV JSC (AO NAK Kazatomprom, 49.98%; JSC Atomredmetzoloto, 49.67%)	Locations: Tortkuduk Mine and Block No. 1 of the South Moinkum deposit, Sozak Region, Turkistan Province Central Mynkuduk deposit, Sozak Region, Turkistan Province Block No. 1 of the Kharassan deposit, Zhanakorgan Region, Qyzylorda Province North and South Karamurun Mines, Shieli and Zhanakorgan Regions, Qyzylorda Province Irkol Mine in Qyzylorda Province and Semizbai Mine, on the border of North Kazakhstan and Aqmola Province Shantobe Mine of the Vostok and Zvezdnoe deposits, 300 kilometers west of Stepnogorsk Uvanas and East Mynkuduk Mines, Sozak Region, Kazakhstan Province Kanzhugan and South Moinkum Mines, Sozak Region, South Kazakhstan Province Zarechnoye and South Zarechnoye deposits, Olrarski Region, South Turkistan Province	
Vanadium, vanadium pentoxide	TOO Balausa Firm, processing plant	Qyzylorda Province	150
Zinc:			
Ore, Zn content	Kazakhmys plc: East Region complex: Artemevsky Mine	East Kazakhstan Province	90,000
Do.	Belousovsky Mine	do.	NA
Do.	Irtyshsky Mine	do.	18,000
Do.	Nikolaevsky Mine	do.	20,000
Do.	Orlovsky Mine	Qaraghandy Province	78,200
Do.	Yubileyno-Snegirikhinsky Mine	do.	16,500
Do.	Central Region complex: Abyz Mine	do.	13,500
	TOO Kazzinc (Glencore plc, 69.61%): Ridder complex:		
Do.	Ridder-Sokolny Mine	East Kazakhstan Province	NA
Do.	Shubinskiy Mine	do.	4,000
Do.	Tishinskiy Mine	do.	65,000
Do.	Shaimerden deposit	Qostanay Province	NA
Do.	Zyrianovsk complex: Maleevsky Mine	15 kilometers north of Zyrianovsk	135,000
Do.	TOO Nova Zinc (JSC Chelyabinsk zinc plant)	Akhatau, Qaraghandy Province	NA
Do.	TOO ShalkiyaZinc Ltd.	Qyzylorda Province	NA

See footnotes at end of table.

TABLE 2—Continued
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2021¹

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity ^c
Zinc:—Continued			
Concentrate, Zn content	Kazakhmys plc:		
	East Region complex:		
	Artemyevsky concentrator	Qyzylorda Province	55,000
Do.	Belousovsky concentrator	do.	5,800
Do.	Irtyshsky concentrator	do.	11,000
Do.	Nikolaevsky concentrator	East Kazakhstan Province	36,000
Do.	Orlovsky concentrator	Qaraghandy Province	60,000
Do.	Karaganda Region complex: Karagaily concentrator	do.	8,000
	TOO Kazzinc (Glencore plc, 69.61%):		
Do.	Ridder concentrator	do.	NA
Do.	Zyrianovsk concentrator	Zyrianovsk, East Kazakhstan Province	NA
Do.	TOO Nova Zinc (JSC Chelyabinsk zinc plant)	Akshatau, Qaraghandy Province	35,000
Do.	TOO ShalkiyaZinc Ltd.	Qyzylorda Province	NA
Metal	TOO Kazzinc (Glencore plc, 69.61%):		
	Ridder zinc refinery	East Kazakhstan Province	110,000
Do.	Ust-Kamenogorsk metallurgical complex	do.	190,000

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

¹Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

²GOK is the abbreviation for gorno-obogatitelnyi kombinat, which translates as "mining and beneficiation complex."

³Capacity estimates are totals for all enterprises that produce that commodity.

⁴It is unknown which, if any, minor metals were still being produced at this facility.