



# 2009 Minerals Yearbook

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KAZAKHSTAN [ADVANCE RELEASE]

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# THE MINERAL INDUSTRY OF KAZAKHSTAN

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Kazakhstan ranked second only to Russia among the countries in the region in its quantity of mineral production. It is endowed with large resources of a wide range of metallic ores, industrial minerals, and fuels, and its metallurgical sector is a major world and (or) regional producer of a large number of metals from domestic and imported raw materials. Its mining sector produced asbestos, bauxite, cesium, chromite, copper, germanium, gold, indium, iron, lead, manganese, rare-earth elements, scandium, and zinc in ores, and its metallurgical sector produced such metals as arsenic, beryllium, bismuth, cadmium, copper, ferroalloys, gallium, indium, lead, magnesium, molybdenum, niobium, rare-earth metals, rhenium, scandium, selenium, steel, tantalum, tellurium, titanium, and zinc. The country produced industrial minerals, such as asbestos, barite, and phosphate. The country was a large regional producer of such mineral fuels as coal, natural gas, and oil, and it was the world's leading uranium producer.

## Minerals in the National Economy

In 2009, industrial production accounted for 53.6% of the gross domestic product (GDP) (Agency of Statistics of the Republic of Kazakhstan, The, 2010, p. 11). The mineral extraction sector accounted for 60.3% of the value of industrial output; of that percentage, the extraction of crude oil accounted for 50.5% of the value of industrial output; nonferrous metal ores, 3.1%; iron ore; 1.5%; coal, 1.2%; natural gas, 0.4%; and other mineral extraction activities and services, the remainder. In the mineral processing sector, metallurgy accounted for about 11.8% of industrial output, of which production of nonferrous and precious metals composed about 6.5%, and ferrous metals, about 5.2%. The oil refining sector accounted for 2.3% of the value of industrial production (Agency of Statistics of the Republic of Kazakhstan, The, 2010, p. 307, 308). In 2009, out of a total workforce of 7,903,400 people, the mining sector employed 197,900, or 2.5% of the total labor force (Agency of Statistics of the Republic of Kazakhstan, The, 2010, p. 96). From 2003 through 2008, Kazakhstan attracted large net foreign direct investment inflows, which equaled 8% of the GDP; most of this investment was in the hydrocarbon sector (Rabobank Group, 2009).

## Production

In 2009, production in Kazakhstan's mineral extraction sector remained relatively stable, showing moderate increases or decreases for most mineral commodities. Some mineral commodities, however, such as aluminum and uranium, showed percentage increases of more than 10% and others showed percentage decreases of more than 10%, including cadmium, coal, lead metal, lime, salt, and zinc metal. The largest change in production was the 65% increase in uranium output, which propelled Kazakhstan into becoming the world's leading uranium producer. Data on mineral production are in table 1.

## Structure of the Mineral Industry

Eurasian Natural Resources Corporation PLC (ENRC) was a mining and metals group with more than 70,000 employees. The ENRC group controlled Aluminium of Kazakhstan (AoK), the Kazchrome chromite mining and ferroalloys production enterprise, Kazmarganets (which controlled the Zhayrem manganese mining and beneficiation complex), and the Sokolovsko-Sarbay Mining and Production Union (SSGPO), which was the main supplier of iron ore to Russia's Magnitogorsk Iron and Steel Works. The leading shareholder in ENRC was the copper company Kazakhmys PLC (Eurasian Natural Resources Corporation PLC, 2011e). ENRC also owned assets in mineral production enterprises in China (ferroalloys), Brazil (iron ore), the Democratic Republic of the Congo [Congo (Kinshasa)] (cobalt and copper), Mali (bauxite), Mozambique (coal), Russia (chrome ore and ferroalloys), South Africa (fluorspar and platinum), Zambia (cobalt and copper), and Zimbabwe (platinum) (Eurasian Natural Resources Corporation PLC, 2011c).

Kazakhmys, which was the country's leading copper producer, was a United Kingdom-registered copper mining company whose main assets were located in Kazakhstan. The company's headquarters was located in London and the headquarters of its main subsidiary, Kazakhmys Corp., was located in Zhezkazgan, Kazakhstan. In October 2005, the company was listed on the London Stock Exchange. Glencore International AG, which was headquartered in Switzerland, owned 50.7% of the shares of Kazzinc JSC, which was the country's leading integrated lead and zinc producer; Kazzinc also produced copper, gold, silver, and other byproduct metals (Kazzinc JSC, 2010a; Glencore International plc, 2011).

All the country's major oilfield and gasfield developments since achieving statehood in 1991 were by projects in which foreign companies and Kazakhstan state-owned firms had forms of joint ownership. The country's uranium industry was controlled by Kazatomprom National Atomic Co. Kazatomprom's stock was 100% held by the Government and the company employed more than 25,000 people. Kazatomprom was also an importer, exporter, and transporter of uranium and other products used in the nuclear power industry (Interfax Russia & CIS Metals and Mining Weekly, 2007).

In January 2009, the Government of Kazakhstan established Tau-Ken Samruk to consolidate the Government's mining holdings under one entity. The new company was established for the purpose of improving efficiency in the approval process for mining projects and for increasing investment in the mining sector through raising awareness of investment opportunities. Tau-Ken Samruk reportedly could simplify matters for companies that worked with it in negotiating with the Government for new exploration projects. Tau-Ken Samruk also was established with the objective of working with international companies to develop technologies that were suited

to developing Kazakhstan's mineral industry (Jones, Tarta, and Yukin, 2010, p. 81-82).

## Mineral Trade

In 2009, the value of Kazakhstan's exports decreased by 39% compared with that of 2008, and the value of imports decreased by 25%. In 2009, fuels accounted for the majority of the value of exports, with exports of oil and gas condensate accounting for 61%; natural gas, 3.2%; petroleum refinery products, 2.8%; and coal, 1.2%. With respect to exports of metal, exports of refined copper in 2009 composed 3.3% of the value of total exports; rolled steel, 3.1%; ferroalloys, 2.7%; zinc metal, 0.9%; and lead metal, 0.3%. In 2009, the country's leading mineral commodity import was steel pipes, which accounted for 10.6% of the total value of exports, and the country also imported small amounts of coal, crude oil, natural gas, and petroleum refinery products (Agency of Statistics of the Republic of Kazakhstan, The, 2010, p. 428-430).

## Commodity Review

### Metals

**Aluminum.**—AoK, which was a subsidiary of ENRC, was the second ranked alumina producer, by volume, in the region. AoK operated the Krasnooktyabrsk and the Torgay bauxite mining complexes and produced alumina at the Pavlodar aluminum plant. AoK also developed the Keregetas limestone mine. AoK employed about 12,000 people. The Kazakhstan aluminum smelter (KAS) in Pavlodar, which was the country's first aluminum smelter, was commissioned in December 2007 and reached its rated capacity of 125,000 metric tons per year (t/yr) in the second quarter of 2008. On May 1, 2010, KAS started up its second production line, which increased its total capacity to 250,000 t/yr (Eurasian Natural Resources Corporation PLC, 2011a).

In June 2009, ENRC announced that the London Metal Exchange (LME) had approved with immediate effect the listing of primary aluminum ingots produced at KAS. Registration of the ingots with the LME enabled the ingots to be sold into LME warehouses at LME list prices, which provided ENRC with more flexibility in its sales and marketing operations (Eurasian Natural Resources Corporation PLC, 2009).

**Beryllium.**—The Ulba Metallurgical Plant Joint Stock Company (UMP), which was part of Kazatomprom, was a world leader in beryllium production and was the world's leading supplier of primary series beryllium and its master alloys base. UMP intended to enhance its beryllium production process to obtain maximum competitive advantage with respect to production costs. Plans included improving existing technology for extracting beryllium from ores and concentrates to obtain cheaper beryllium hydroxide while maintaining quality on a par with existing hydroxide output; developing technologies and equipment for producing different products from beryllium bronze in accordance with domestic and world market requirements, including products for Kazakhstan's oil and gas industry; and improving equipment and technologies

to upgrade existing capacities for producing beryllium metal and beryllium-bearing alloy. The new beryllium production and development strategy was focused on the output of competitive products with higher value added, based on state-of-the-art technologies (Kazatomprom National Atomic Co., 2011a).

In 2006, Kazatomprom concluded a joint-venture agreement with China for the production of beryllium copper flat-rolled products. Kazatomprom entered into the joint venture to take advantage of the prospect for sales in the Chinese market. UMP established a Kazakhstan-Chinese joint venture for the production of beryllium-bronze rolled metal in China with the Ningbo Xinye Electronic Copper Strip Co., which was part of the Shine Copper Industry Co., Ltd; each country had a 50% stake in the joint venture. Final registration in China of the Kazakhstan-Chinese joint venture as the Yingtian Ulba Shine Metal Materials Company Ltd. was completed in November 2007. The stated aim of the joint venture was the construction of a plant that would produce flat-rolled products from high-strength and highly conductive copper-beryllium alloy to meet the needs of Chinese consumers. Production was to include strips and other products from beryllium bronze, including sheets, rods, wire, and profiled rolled metal. Output was to be up to 2,000 t/yr of all types of products. Production volumes could be increased on the mutual agreement of the parties. The joint venture's products were to be sold in China and in overseas markets (Kazatomprom National Atomic Co., 2011b).

**Chromium.**—Kazakhstan has large resources of high-grade chromite ore with an average Cr<sub>2</sub>O<sub>3</sub> content of 50.2%, which ranked Kazakhstan's resources among the highest grade chromite ore in the world. The country's chromite ore also has a low iron content and a low content of undesirable ore constituents, including phosphorus and sulfur. The country's reserves are concentrated in the northwestern part of the country in the Aktyubinsk region in the Kempirsay massif and distributed in more than 160 deposits, of which 20 were considered to be commercially significant. Kazakhstan reportedly had confirmed reserves calculated according to the reserve system that was used in the Soviet Union in categories A, B, and C1 of 316 million metric tons (Mt). The Soviet reserves classification does not tally reserves according to economic criteria used in market economy systems. The largest portion of these reported reserves (92%) were at depths that precluded their economic extraction (Kabaziyev and Outs, 2008).

In 2009, Kazakhstan was the world's third ranked chromite producer (Papp, 2011). Kazakhstan also produced chromium ferroalloys. Domestic demand for ferroalloys was low, and most of the country's ferroalloy production was exported to countries in Europe and Southeast Asia and to the United States. China was considered the most attractive prospective market for the country's ferroalloys (Kabaziyev and Outs, 2008).

In September 2008, the Russian steelmaker Mechel OAO commissioned its new Voskhod chrome ore mine in Aktyubinsk region. The Voskhod operation, which Meckel acquired in May 2008 from Oriel Resources Plc of the United Kingdom, was expected to become one of the world's leading suppliers of chrome concentrate once the mine's output reaches the facility's design capacity (Eurasian Development Bank, 2008; Mechel OAO, 2009).

Kazchrome, which was a subsidiary of ENRC, was one of the world's leading ferrochrome producers. Its primary product was high-carbon ferrochrome, which had a chrome content of 68%. Kazchrome also produced ilmenite, rutile, and zircon concentrates and employed approximately 18,000 people. Kazchrome owned the Aksu and the Aktobe ferroalloy plants, the Donskoy chromite ore mining and processing complex, and the Kazmarganets manganese mining enterprise. ENRC also owned foreign chromite and ferrochrome producers, which included the Serov mining and metallurgical complex in the Sverdlovsk region in the Ural Mountains of Russia. ENRC had a 50% ownership stake in the Xinjiang Tuoli Taihang Ferro-Alloy Co. (Tuoli) in China, which was one of China's leading ferrochrome plants. The plant is located in Tuoli County, Xinjiang Province, about 300 kilometers (km) from the China-Kazakhstan border (Eurasian Natural Resources Corporation PLC, 2011b).

**Copper.**—Kazakhmys was the country's leading copper producer and ranked among the world's 10 leading copper producing companies. Its core business was the production and sale of copper, and the company's activities were fully integrated, from mining ore through metal production. The company also produced other metals as byproducts, including gold, silver, and zinc. Kazakhmys had operations across Kazakhstan, which included 17 open pit and underground mines, 10 concentrators, and 2 smelting and refining complexes; it also owned coal mines and powerplants, which supplied energy for the company's operations and also produced excess energy, which the company marketed commercially. Kazakhmys was developing the Atogay and the Bozshakol Mines, which were its two major projects to expand capacity; the mines were scheduled to be commissioned in 2015 and 2014, respectively (Kazakhmys PLC, 2011).

On December 30, 2009, Kazakhmys announced the allocation of a \$2.7 billion unsecured loan from the China Development Bank Corp. and the Joint Stock Company Sovereign Wealth Fund Samruk-Kazyna (Samruk); \$2.1 billion of the allocated funds was to be made available for the Bozshakol and the Bozymchak Mine development projects. The Bozshakol Mine was expected to produce about 100,000 t/yr of copper in concentrate when it reached full production capacity. The Bozymchak Mine is located in southwestern Kyrgyzstan; Kazakhmys acquired the deposit in 2008. An additional \$200 million was to be assigned to the potential development of several existing mines. The remaining \$400 million of the \$2.7 billion allocation was to be available for assignment during the next 3 years and would be allocated to other growth projects (Silk Road Intelligencer, 2008; Gray, 2009; Kazakhmys PLC, 2010b).

In 2010, Kazakhmys agreed to engage in a joint venture with China's Jinchuan Group Ltd. whereby Kazakhmys would sell Jinchuan a 49% stake in its Aktogay project in eastern Kazakhstan. The two firms would share development costs, which were estimated to be between \$1.5 billion and \$2.0 billion. Aktogay was projected to produce 100,000 t/yr of copper in concentrate. The project involved development of a large open pit mine in the Ayoguz region of Kazakhstan. Aktogay reportedly was one of the leading undeveloped copper deposits in the world, with contained copper reserves that would

support a mine life of 40 years. A feasibility study was expected to take about 1 year, and mine development was expected to take an additional 3 years (Mineprocessing, 2010).

In 2009, Kazakhmys produced 320,000 t of copper cathode from more than 32 Mt of ore with an average copper grade of 1.18% that yielded 359,000 t of copper in concentrate. In 2008, Kazakhmys produced 343,000 t of copper cathode. Kazakhmys was one of the leading employers in Kazakhstan, with 60,000 employees, and its revenues accounted for 2.5% of Kazakhstan's GDP (Kazakhmys PLC, 2010a, p. 18). Kazakhmys projected that output in 2010 through 2013 would remain at its 2009 level owing to declining ore grades at the older mines in the Zhezkazgan region and then would increase in 2014 with the commissioning of the Bozshakol Mine (Kazakhmys PLC, 2010a, p. 4, 5, 22, 23).

Kazakhmys sold its copper in Europe and to China, and these regions together accounted for between 80% and 90% of the company's sales, which were evenly divided between the two areas. China, however, was Kazakhmys' fastest growing market. Material exported to China was transported by rail, whereas material exported to Europe was sent by rail to the Black Sea for shipment (Kazakhmys PLC, 2010a, p. 9, 10).

At Kazzinc, which was the country's second ranked copper producer, blister copper production increased to 59,420 t in 2009 from 55,956 t in 2008. On December 21, 2010, Kazzinc produced its first batch of copper cathodes at its copper refinery in Oskamen, which was a new product for the company (Kazzinc JSC, 2010b).

**Gallium.**—Kazakhstan reportedly possesses about 6% of total gallium reserves in the region; total gallium reserves in the region reportedly exceed 10,000 t. Kazakhstan, along with Ukraine, was one of the major producers of metallic gallium in the region. Gallium production took place at ENRC's alumina refinery in Pavlodar (Infomine Research Group, 2007). ENRC reportedly produced 40% of the world's gallium output (Eurasian Natural Resources Corporation PLC., 2007).

**Indium.**—Kazakhstan possesses about 12% of the indium reserves in the region. Indium reserves in the region reportedly total more than 5,000 t. In Kazakhstan, indium was produced as a byproduct of lead and zinc production by Kazzinc, which had the capacity to produce metallic indium. Indium production in Kazakhstan was estimated to be less than 500 kilograms per year (kg/yr) (Infomine Research Group, 2007).

**Iron Ore.**—The Sokolovsko-Sarbay Mining Production Association (SSGPO) was ENRC's iron ore mining and beneficiation enterprise in Kazakhstan and the country's leading iron mining enterprise. It employed about 18,500 people. Its operations included the Kacharskiy, the Korzhinkolskiy, the Sarbayskiy, and the Sokolovskiy iron ore open pits; the Sokolovskiy underground mine; dolomite and limestone open pits; and crushing, concentrating and pelletizing facilities. Energy and heat were supplied by the Rudny heat and energy plant (Eurasian Natural Resources Corporation PLC, 2011d).

**Lead and Zinc.**—Kazzinc was Kazakhstan's leading producer of lead and zinc, and Kazzinc also produced copper and precious metals. The company's core operations were located mainly in the East Kazakhstan Region, and the company employed more than 22,000 people engaged in

mining, beneficiation, metallurgy, power generation, and auxiliary operations. In 1997, the company was formed through the merger of East Kazakhstan's three leading lead and zinc producing companies—Leninogorsk Polymetallic Complex, Ust-Kamenogorsk Lead and Zinc Complex, and Zyryanovsk Lead Complex. The majority owner of the three companies was the Government of Kazakhstan. The company also included the Bukhtarma hydroelectric powerplant. The controlling block of shares in Kazzinc was sold by the Government to the private sector, and Glencore International became the company's main investor. Since its creation, Kazzinc had significantly increased its production capacity and output (Kazzinc JSC, 2010a).

In 2009, production of refined lead at Kazzinc decreased to 79,041 t from 90,240 t in 2008, but production of zinc metal increased to 301,104 t from 299,443 t in 2008 (Kazzinc JSC, 2010b, c). In 2009, Kazakhmys produced 149,000 t of zinc in concentrate, which was 9% more than in 2008. Kazakhmys' Akbastau Mine, which had a zinc ore grade of just 0.63%, was closed during 2009. Kazakhmys' zinc smelter's operations were suspended during 2009 as concentrate sales were commercially more attractive than metal sales. In 2010, the production of zinc concentrate at Kazakhmys was expected to decrease from the level achieved in 2009 as the contribution from stockpiled ore was to be reduced. There were no plans to restart the zinc smelter. In 2010, all zinc concentrate produced by Kazakhmys was to be sold to customers in Kazakhstan and exported to China (Kazakhmys PLC, 2010a, p. 23).

**Manganese.**—Kazakhstan reportedly has 429 Mt of manganese ore reserves, which reportedly ranks it third in the world in manganese reserves (Rakishev, 2008). This reserve figure was calculated according to the Soviet reserve classification system, which does not correspond to reserve systems based on market economy criteria. Manganese was mined at the Zhayrem manganese mining and beneficiation complex, which was a subsidiary of ENRC; it included the Ushkatyn-3 iron-manganese and barite-lead deposit, the Zhayrem barite-lead-zinc-silver deposit, and the Zhomart iron-manganese deposit. It supplied customers in Central Asia, China, Russia, and Ukraine (Eurasian Natural Resources Corporation PLC, 2011b).

**Niobium and Tantalum.**—Kazatomprom subsidiary UMP produced niobium products in the form of ingots, ligatures, powder, rolled products, and wire (Ul'binskiy metallurgicheskiy zavod, 2010). Kazatomprom also controlled the country's tantalum production. Kazatomprom's tantalum production complex was also located at UMP. This enterprise was one of the world's leading tantalum production enterprises. It had a complete production cycle for reprocessing tantalum-niobium-bearing feedstock and producing finished products. Kazatomprom did not have its own tantalum resources and purchased tantalum concentrate. Kazatomprom had formed a strategic plan to develop its tantalum production sector, which included construction of a capacitor production plant and production of high-capacity tantalum capacitor powders. The major share of the world's tantalum was consumed in the production of high-capacity tantalum powders. Such powders were mainly used for the production of tantalum capacitors used in high-technology applications (Kazatomprom National Atomic Co., 2009a; 2011c).

Developing an appropriate technology for tantalum powder production in Kazakhstan was the impetus behind the Government's strategy of establishing a high-technology tantalum powder products sector. Tantalum powder was used in the production of capacitors for the electronics industry. In December 2008, UMP opened a facility for tantalum powder production and its tantalum powders have been qualified by consumers from Russia. The powders also were being tested by companies in Israel and Japan, and consumers from Europe and the United States had signed contracts for additional testing of subcommercial lots of the high-capacity powders (Kazatomprom National Atomic Co., 2011c).

**Rare Earths.**—The Irtysh Rare Earths Company Ltd. (IRESCO) in East Kazakhstan processed rare-earth-metal chlorides from the Solikamsk magnesium plant in Russia and produced rare-earth compounds of cerium, europium, gadolinium, lanthanum, neodymium, praseodymium, and samarium, and polishing powders based on pure cerium oxide (Vereschagin and others, 2006; Irtysh Rare Earths Company Ltd., 2011).

In 2009, Kazatomprom and Sumitomo Corp. of Japan agreed to undertake recovery of rare-earth elements from uranium ore residues. By yearend 2009, a joint venture was to be formed to produce rare-earth concentrates from uranium tailings from open pit mines. Plans called for processing the concentrate at the Ulba metallurgical plant. The tailings were reportedly rich in such rare-earth elements as dysprosium and neodymium. The project was considered advantageous because of low development costs, a quick startup time, and less environmental impact from using tailings. Furthermore, Kazatomprom could supply significant infrastructure and engineering support. It was envisaged that the new rare-earth-metals production venture's entry into the dysprosium market would provide the world market with another source of this rare-earth element besides China. The joint venture would be the second between Kazatomprom and Sumitomo (the two companies had also formed a joint venture to produce uranium) (Lui, 2009).

**Selenium and Tellurium.**—Kazakhstan produced refined selenium and tellurium. Tellurium was produced at Kazzinc, and production was estimated to be between about 17 and 18 t/yr (Kul'chintskiy and Naumov, 2010). Available information on the production of selenium, which is generally produced from anode slimes generated in the electrolytic refining of copper, was not adequate to estimate selenium production.

### *Industrial Minerals*

**Phosphate Rock.**—Kazakhstan reportedly is 1 of 10 countries that collectively possess 90% of the global phosphate rock resources. Kazakhstan produced phosphate rock in the Karatau phosphorite basin. The basin contains 45 deposits. The Karatau basin is located in the South Kazakhstan and the Zhambyl regions and extends for 25 km in width from northwest to southeast and is 120 km in length. The phosphate rock strata is near the surface, which makes it accessible for primarily open pit mining. More than 85% of the commercially developed phosphate rock deposits in the Karatau basin were surface mined and the remainder was mined by underground methods. The average content of  $P_2O_5$  in phosphate rock from the Karatau

basin was from between 21% and 27% and reached up to 30% at some deposits. The phosphate rock from the Karatau basin contains manganese oxide, which lessens the ore's quality (Ignatov & Company Group, 2010).

Kazphosphate LLC, which was established in 1999, was composed of the Karatau mining and processing complex (which contained the Chuluktai and the Zhanatas enterprises), the Novodzhambul phosphorus plant, a mineral fertilizers plant, a railway transportation complex, and a detergents plant. When Kazphosphate was established, its main task was to rehabilitate phosphate rock production, recover lost contacts in international markets, expand the geographical area of sales, and introduce new types of products. The Karatau mining and processing complex, which was created on the basis of the Karatau phosphorus basin, was the only supplier of phosphorous feedstock for the domestic phosphorus industry as well as for domestic and other Central Asian producers of mineral fertilizers. Kazphosphate mined six deposits by open pit and underground methods. The company had three main phosphate development objectives. These were (1) exploration for phosphate rock and the development of mining and processing of phosphate rock to produce phosphate fines and phosphate powder, (2) producing yellow phosphorus and its derivatives, and (3) producing phosphate fertilizers and feed phosphates (Galmor, 2002; Kazphosphate LLC, 2005).

### *Mineral Fuels and Related Materials*

**Coal.**—At the end of 2009, according to the 2010 BP Statistical review of world energy, Kazakhstan's coal reserves totaled 31.3 billion metric tons (Gt), which equaled 3.78% of the world's total reserves. Kazakhstan reportedly had the largest recoverable coal reserves in Central Asia. About 70% of Kazakhstan's coal production was used for domestic power generation, as 80% of Kazakhstan's electric power requirements were coal based. Coal was also used in the iron and steel industries. The remainder of Kazakhstan's coal production was exported, mainly to Russia and Ukraine. According to the Kazakhstan Ministry of Energy and Natural Resources, the country was planning to produce between 100 and 105 million metric tons per year (Mt/yr) of coal by 2015 (BP p.l.c., 2010, p. 32; MBendi Information Services (Pty) Ltd., 2011).

Kazakhstan reportedly has more than 400 coal deposits. One-third of these deposits contains brown coal or lignite. Most of the country's coal production takes place in two basins—the Ekibastuz and the Karaganda In the Ekibastuz Basin, which was reportedly the third largest coal basin in the region, bituminous coal was mined to supply the electric power generation sector. In the Karaganda basin, coking coal was extracted from underground mines. Bogatyr Access Komir, LLP (BAK) was the leading surface mining company in Kazakhstan. BAK owned the Bogatyr Mine, which had a projected capacity of 50 Mt/yr. BAK was wholly owned by Access Industries of the United States. Kazakhstan's leading steel producer, Ispat-Karmet, which was a subsidiary ArcelorMittal of Luxembourg, operated several coal mines in the Karaganda region that produced more than 7 Mt/yr of coal that it used to supply its steel works (MBendi Information Services (Pty) Ltd., 2011).

**Natural Gas.**—According to the January 2010 Oil and Gas Journal, Kazakhstan's estimated proven natural gas reserves were reportedly 85 trillion cubic feet (about 2.4 trillion cubic meters). Almost all natural gas produced in Kazakhstan was associated gas. More than one-half of the country's gas reserves are in the Karachaganak oil and gas field, which reportedly has proven natural gas reserves of 48 trillion cubic feet (about 1.4 trillion cubic meters). In 2009, Kazakhstan switched from being a net natural gas importer to a net exporter of 134 billion cubic feet (about 3.8 billion cubic meters). In 2009, 69% of the gas produced was reinjected into the fields to enhance oil production. The two leading natural gas producing fields were also the two leading oil producing fields (U.S. Energy Information Administration, 2010b).

About one-half of Kazakhstan's total gross gas production was produced by the Karachaganak oil and gas field, which was projected by the consortium developing the field to reach 900 billion cubic feet (about 25.5 billion cubic meters) of gas by 2012. Gross gas production at the Tengiz oil and gas field reportedly could increase to 780 billion cubic feet (about 22 billion cubic meters) by 2015. The remainder of produced natural gas came from smaller fields. Kazakhstan reportedly planned to increase total gross gas production to 2.5 trillion cubic feet (70.8 billion cubic meters) by 2015. New pipeline infrastructure would allow the country to export its increased gas output (U.S. Energy Information Administration, 2010b).

**Petroleum.**—In 2009, Kazakhstan's oil production increased to about 76.4 Mt. Domestic oil consumption was less than 12 Mt. The eight leading producing fields were located onshore. The Tengizchevroil consortium, which was led by Chevron Corp. of the United States, was the country's leading oil producer followed by the national oil and gas company Kazmunaigaz (KMG). KMG also held a 20% interest in the Tengizchevroil consortium. Growth in oil production was dependent on increasing production at the three largest fields—Karachaganak, Kashagan, and Tengiz (U.S. Energy Information Administration, 2010c).

The Tengiz field, which is located onshore in northwestern Kazakhstan, was Kazakhstan's leading oil producing field, with recoverable crude oil reserves estimated by consortium leader Chevron to be between about 800 Mt and 1.2 Gt [6 billion barrels (Gbb) and 9 Gbb]. Tengiz had been under development since 1993. Output from Tengiz was exported through the Caspian Pipeline Consortium (CPC) oil pipeline, which runs from Tengiz to Novorossiysk, Russia, on the Black Sea (U.S. Energy Information Administration, 2010c).

The Karachaganak field, which is also located onshore in northwestern Kazakhstan, has reserves of about 1.1 to 1.2 Gt (8 Gbb to 9 Gbb) of oil and gas, according to the operating consortium Karachaganak Petroleum Operating (KPO). The KPO consortium was working under a production-sharing agreement (PSA) signed in 1997 to develop the field for 40 years. KPO was able to export its condensate through Russia using the Tengiz-Novorossiysk pipeline. Karachaganak's Phase 3 development program, which was aimed at increasing condensate output, was reportedly suspended owing to delays in upgrading and expanding the Orenburg processing plant in Russia (U.S. Energy Information Administration, 2010c).

The Kashagan field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, was believed to be the largest known oilfield in terms of reserves outside of the Middle East and the fifth largest in the world. The consortium that had been developing the field was the Agip Kazakhstan North Caspian Operating Co. (Agip KCO). In January 2009, Agip KCO was replaced by the North Caspian Operating Co. (NCOC) PSA, which also operated other fields in the area, such as the Aktote, the Kairan, and the Kalamkas fields. Members of the NCOC venture included Eni S.p.A. of Italy, Exxon Mobil Corp. of the United States, JSC KazMunaiGas (KMG), Royal Dutch Shell plc of the Netherlands, and Total S.A. of France, each with a 16.8% share; ConocoPhillips Co. of the United States, which held an 8.4% share; and Inpex Corp. of Japan, which held a 7.6% share. In July 2010, KMG and Shell signed an agreement that they would jointly manage production when the field came online. Kashagan's recoverable reserves were estimated to be 11 Gbbl (about 1.5 Gt) of oil. The timetable for production startup had been delayed to October 2013, which was 8 years later than the original scheduled startup date of 2005. Initial production from phase 1 was projected to be 370,000 to 450,000 barrels per day (bbl/d) (about 18.4 to 22.3 Mt/yr), and production was projected to peak at 1.5 million barrels per day (Mbbl/d) (about 75 Mt/yr) when phase 2 was projected to come online in 2019. Cost overruns associated with the field's adverse operating environment were considered responsible for much of the delay. Development of Kashagan presented particular challenges, as the field contains a high proportion of natural gas under very high pressure, the oil in the field contains large quantities of sulfur, and the offshore platforms needed to develop the field would need to be constructed to withstand the extreme weather fluctuations in the northern Caspian Sea. The Kashagan field lies in only 3 to 5 meters of water, and drilling and extraction operations were to proceed from artificial islands. Existing pipelines to China and Russia would be able to handle only phase 1 output from Kashagan. The timing of the development of phase 2 of the Kashagan field would also determine the timing of construction of new refining and export capability at Kuryk (U.S. Energy Information Administration, 2010c).

Kazakhstan ranked as an important exporter of light, sweet crude oil. In 2009, Kazakhstan had net oil exports of about 1.3 Mbbl/d (about 65 Mt/yr), which was delivered to world markets by pipelines to the Black Sea by way of Russia; by barge and pipeline to the Mediterranean Sea by way of Azerbaijan and Turkey; by barge and rail to Batumi, Georgia, on the Black Sea; and by pipeline to China. Kazakhstan's Prime Minister in an interview in October 2009 projected that Kazakhstan would increase its oil exports to 3 Mbbl/d (about 149 Mt/yr) by 2020, but achieving such rapid growth of oil production would necessitate increasing export capacity (U.S. Energy Information Administration, 2010c).

**Uranium.**—According to Kazatomprom, Kazakhstan reportedly hosts about 19% of the world's explored uranium reserves, or about 1.6 Mt of uranium. The uranium deposits are grouped into the following six uranium provinces: the Chu-Sarysu uranium ore province with the Kanzhugan, the Moinkum, and the Uvanas Mines in operation; the Syrdarya uranium ore province, with the Northern Karamurun and

the Southern Karamurun Mines in operation; the Northern Kazakhstan uranium ore province, with the Vostok Mine and the Stepnogorsk mill in operation; the Caspian uranium ore province with uranium production mothballed in this province since the collapse of the Soviet Union; the Balkhash uranium ore province, with uranium mining discontinued after the major deposits were depleted during the Soviet era; and in the Ili uranium ore province, where uranium occurs mainly in uranium-coal deposits, but where no uranium was being produced (Kazatomprom National Atomic Co., 2009b). Kazakhstan had established joint ventures with a number of companies from different countries to mine its uranium reserves (Interfax Russia & CIS Metals and Mining Weekly, 2009).

In 2009, Kazakhstan produced 14,020 t of uranium (U content), which was about 65% greater than in 2008 and made Kazakhstan the world's leading uranium producer. Kazatomprom's uranium development program called for uranium production to increase to 15,000 t in 2010. Two new uranium mines were expected to be commissioned in 2010 (Kazakhstan National Atomic Co., 2011d).

## Outlook

Kazakhstan's long-term mineral development prospects remain promising, and in 2009, Kazakhstan had become the world's leading uranium producer. With the completion of development of its major oilfields, Kazakhstan could become one of the world's leading five oil producers within the next decade. In 2009, Kazakhstan produced about 76.4 Mt of oil, which already had made it a major oil producer. With continued development of its giant Karachaganak, Kashagan, and Tengiz fields, current production was expected at least to double by 2019. Kazakhstan's sector of the Caspian Sea was believed to contain a number of other major oil and natural gas deposits, which had not yet been developed (U.S. Energy Information Administration, 2010a).

Production growth had been taking place in practically all sectors of the mineral industry and was expected to continue in the next decade. Kazakhstan was adding capacity to increase copper production, which would result in an increase not only in the output of copper, but also that of byproduct metals. China was playing an active role in the development of Kazakhstan's metal resources and was considered to be the most prospective market for Kazakhstan's mineral exports.

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TABLE 1  
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009
<b>METALS</b>					
<b>Aluminum:</b>					
Alumina	1,505,415	1,514,749	1,555,859	1,713,818 <sup>r</sup>	1,608,000
Bauxite	4,815,400	4,883,800	4,942,600	5,160,100	5,130,000
Metal, primary	--	--	-- <sup>r</sup>	106,000 <sup>r</sup>	126,910
Arsenic trioxide <sup>e</sup>	1,500	1,500	1,500	1,500	1,500
Beryllium	NA	NA	NA	NA	NA
<b>Bismuth:<sup>e</sup></b>					
Mine output, Bi content	150	160	145	150	150
Metal, refined	120	115	120	125	125
Cadmium, metal	2,000 <sup>r</sup>	2,000	2,100	2,100 <sup>e</sup>	1,800 <sup>e</sup>
Chromite	3,581,242	3,366,078	3,687,200	3,629,000	3,333,197
<b>Copper:</b>					
Mine output, Cu content	401,700	434,100	406,500	421,700	390,000 <sup>e</sup>
<b>Metal:</b>					
Smelter, undifferentiated	404,817	426,000 <sup>e</sup>	392,834	392,575	365,000 <sup>e</sup>
Refined, primary	418,356	427,723	406,091	398,411 <sup>r</sup>	368,133
Gallium kilograms	16,000 <sup>r,e</sup>	17,000 <sup>r,e</sup>	18,666 <sup>r</sup>	18,666 <sup>r</sup>	18,702
<b>Gold:</b>					
Mine output, Au content do.	17,875 <sup>r</sup>	21,824 <sup>r</sup>	22,564 <sup>r</sup>	20,825 <sup>r</sup>	22,525
Metal, refined do.	9,774	9,011	8,157	8,205	8,734
<b>Iron and steel:</b>					
<b>Iron ore, marketable:</b>					
Gross weight	19,471,100	22,262,600	23,834,100	21,486,300	22,289,600
Fe content <sup>e</sup>	11,100,000	12,700,000	13,600,000	12,300,000 <sup>r</sup>	12,800,000
<b>Metal:</b>					
Pig iron	3,581,090	3,400,000	3,240,000	2,761,000	2,700,000 <sup>e</sup>
<b>Ferroalloys:</b>					
Ferrochromium	1,156,168	1,200,000 <sup>e</sup>	1,307,536	1,220,315	1,100,000 <sup>e</sup>
Ferrochromiumsilicon	97,870	100,000 <sup>e</sup>	145,695	133,828	125,000 <sup>e</sup>
Ferromanganese <sup>e</sup>	2,100	2,100	2,100	2,100	1,900
Ferrosilicon	104,185	105,000 <sup>e</sup>	59,886	54,964	55,400 <sup>e</sup>
Silicomanganese	170,214	220,000 <sup>e</sup>	188,445	179,939	180,000 <sup>e</sup>
Other <sup>e</sup>	9,000	9,000	9,000	9,000	8,500
Total	1,539,537	1,640,000 <sup>e</sup>	1,712,662	1,600,146	1,470,000 <sup>e</sup>
<b>Steel:</b>					
Crude	4,476,642	4,244,521	4,784,105	4,243,582	4,146,810
Finished, rolled	3,104,724 <sup>r</sup>	2,996,610 <sup>r</sup>	3,440,708 <sup>r</sup>	2,826,202 <sup>r</sup>	2,980,293
<b>Lead:</b>					
Concentrate, Pb content	31,000	48,100	40,200	38,800	39,400
Refined, primary and secondary	135,446	115,974	117,641	105,766	87,829
Magnesium, metal, primary <sup>e</sup>	20,000	21,000	21,000	21,000	21,000
<b>Manganese ore, crude ore:</b>					
Gross weight	2,233,200 <sup>r</sup>	2,531,100	2,482,000	2,485,000	2,467,700
Mn content <sup>e</sup>	540,000	550,000	600,000	600,000	595,000
Molybdenum, concentrate, Mo content	230	250	400	400	380
Nickel, Ni content of laterite ore <sup>e</sup>	193 <sup>3</sup>	200	200	500	500
Niobium, metal kilograms	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA
Rhenium <sup>e</sup> do.	8,000	8,000	5,500 <sup>r</sup>	5,500 <sup>r</sup>	3,000
Silicon	95,000	95,000	95,000	95,000	95,000
<b>Silver:</b>					
Mine output, Ag content kilograms	832,103 <sup>r</sup>	806,083 <sup>r</sup>	722,927 <sup>r</sup>	645,627 <sup>r</sup>	678,226
Refined do.	812,095	796,234	707,954	628,763	673,598
Tantalum, metal	NA	NA	NA	NA	NA
Tin, mine output, Sn content	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	-- <sup>r</sup>	--

See footnotes at end of table.

TABLE 1—Continued  
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1,2</sup>

(Metric tons unless otherwise specified)

Commodity	2005	2006	2007	2008	2009
<b>METALS—Continued</b>					
Titanium:					
Ilmenite and leucoxene	10,000	25,000	25,000	25,000	25,000
Sponge	19,000	23,000	25,400	26,000	16,800
Vanadium, ores, concentrates, slag, Va content <sup>e</sup>	1,000	1,000	1,000	1,000	1,000
Zinc:					
Concentrate, Zn content	364,300	404,600	386,000	387,400	418,600
Smelter, primary and secondary	364,821	364,821	358,226	365,561 <sup>f</sup>	328,834
<b>INDUSTRIAL MINERALS</b>					
Asbestos, all grades	305,500	314,700	292,600	230,100	230,000
Barite, marketable	251,000	251,000	280,300	492,200	490,000 <sup>e</sup>
Boron <sup>e</sup> thousand metric tons	30	30	30	30	30
Cement	4,181,200 <sup>r</sup>	4,880,200	5,698,600	5,837,300 <sup>f</sup>	5,998,200
Fluorspar <sup>e</sup>	4,750 <sup>3</sup>	30,000	64,000 <sup>3</sup>	66,300	67,000
Gypsum	820,000	820,000	653,608	696,909	700,000 <sup>e</sup>
Lime	993,544	988,094	1,023,178	905,917	803,580
Phosphate rock:					
Gross weight	800,000 <sup>r</sup>	845,000 <sup>r</sup>	720,000 <sup>r</sup>	1,226,000 <sup>r</sup>	1,230,000 <sup>e</sup>
P <sub>2</sub> O <sub>5</sub> content <sup>e</sup>	175,000 <sup>r</sup>	195,000 <sup>r</sup>	165,000 <sup>r</sup>	280,000 <sup>r</sup>	280,000
Salt and sodium chloride	178,167	416,680	227,643	504,100 <sup>r</sup>	213,320
Sulfur, byproduct: <sup>e</sup>					
Metallurgy	325,000 <sup>r</sup>	300,000 <sup>r</sup>	300,000	300,000	300,000
Natural gas and petroleum	1,700,000 <sup>r</sup>	1,700,000 <sup>r</sup>	1,660,700 <sup>3</sup>	1,732,600 <sup>3</sup>	1,700,000
Total	2,030,000 <sup>r</sup>	2,000,000 <sup>r</sup>	1,960,000	2,030,000	2,000,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal:					
Bituminous thousand metric tons	82,788	91,547	94,014	106,296	90,888
Lignite do.	3,798	4,773	4,370	4,777 <sup>f</sup>	4,882
Total do.	86,586	96,320	98,384	111,073 <sup>r</sup>	95,770
Coke	2,491,900	2,627,500	2,925,000	2,687,700	2,716,800
Natural gas thousand cubic meters	14,494,000	14,440,000	16,677,200	18,708,200	18,132,400
Petroleum:					
Crude oil and gas condensate:					
In gravimetric units	61,486,000	65,003,100	67,125,300	70,671,000	76,383,500
In volumetric units <sup>e</sup> 42-gallon barrels	451,000,000	478,000,000	493,000,000	520,000,000	565,000,000
Refinery products	11,170,000	11,664,000	12,000,000 <sup>e</sup>	11,790,500	11,590,800
Uranium:					
U content	4,357	5,279	6,633 <sup>r</sup>	8,513 <sup>r</sup>	14,020
U <sub>3</sub> O <sub>8</sub> content	5,138	6,226	7,822 <sup>r</sup>	10,039 <sup>r</sup>	16,534

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

<sup>1</sup>In addition to the commodities listed, Kazakhstan also produced a number of other mineral products, which included cesium, germanium, indium, rare-earth elements, scandium, selenium, and tellurium, but information is inadequate to estimate production.

<sup>2</sup>Table includes data available through January 31, 2011.

<sup>3</sup>Reported figure.

TABLE 2  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>e</sup>
Alumina	Pavlodar aluminum plant [Eurasian Natural Resources Corporation PLC (ENRC)]	Pavlodar	1,800,000
Aluminum, primary	Kazakhstan aluminum smelter [Eurasian Natural Resources Corporation PLC (ENRC)]	do.	250,000
Arsenic trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent	3,500
Asbestos	Facilities: Dzhetygara complex Chilisay complex	Locations: Qostanay Aqtobe phosphorite basin	1,000,000 <sup>2</sup>
Barite	Facilities: Karagaylinskiy and Zhayrem mining and beneficiation complexes Tujuk Mine Achisay polymetallic complex	Locations: Karagayly, Zhayrem deposit Almaty Kentau region	300,000 <sup>2</sup>
Bauxite	Torgay and Krasnooktyabrsk bauxite mining complexes [Eurasian Natural Resources Corp. PLC (ENRC)]	Central Kazakhstan	5,500,000
Beryllium, metal	Ulba Metallurgical Plant JSC (UMP)	Oskemen	NA
Bismuth, metal	Facilities: Ust-Kamenogorsk lead-zinc metallurgical plant (Kazzinc JSC) Ridder lead smelter (Kazzinc JSC)	Locations: Oskemen Ridder	2,200 <sup>2</sup>
Do.	Chimkent refinery	Shymkent	20
Cadmium	do.	do.	NA
Do.	Ridder mining-beneficiation complex (Kazzinc JSC)	East Kazakhstan	2,200
Chromite, mine output, Cr <sub>2</sub> O <sub>3</sub> content (50%)	Donskoy GOK mining-beneficiation complex [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Khromtau, Kimpirsay region	5,000,000
Coal	Bogartyr coalfield	Northern Kazakhstan	NA
Do.	Ekibastuz Basin	Central and north-central parts of the country	95,000,000
Do.	Karaganda Basin	do.	50,000,000
Do.	Maykuben Basin	do.	10,000,000
Do.	Severny coalfield	Northern Kazakhstan	NA
Do.	Shubarkul Basin	Central and north-central parts of the country	6,500,000
Do.	Torgay Basin	do.	1,000,000
Copper:	Kazakhmys PLC mines:		
Mining, recoverable, Cu content	Balkhash complex:		
Do.	Kounrad Mine	South-central Kazakhstan	11,800
Do.	Sayak Mine	do.	23,500
Do.	Shatyrkul Mine	do.	12,700
Do.	East region:		
Do.	Artemyevskoe Mine	East Kazakhstan	7,820
Do.	Belousovskoe Mine	do.	2,700
Do.	Irtyskoe Mine	do.	5,750
Do.	Nikolaevskoe Mine	do.	25,700
Do.	Orlovskoe Mine	do.	86,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	14,200
Do.	Karaganda region:		
Do.	Abyz Mine	North-central Kazakhstan	5,710
Do.	Nurkazgan Mine	do.	1,190

See footnotes at end of table.

TABLE 2—Continued  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>c</sup>
<b>Copper—Continued:</b>			
Mining, recoverable, Cu content— Continued	Kazakhmys PLC mines—Continued: Zhezkazgan complex:		
	Annensky Mine	North-central Kazakhstan	6,630
Do.	East Mine	do.	65,800
Do.	North Mine	do.	32,500
Do.	South Mine	do.	71,600
Do.	Stepnoye Mine	do.	31,700
Do.	West Mine	do.	23,300
Do.	Kazzinc JSC (Glencore International AG, 99%): Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,750
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk: Maleevsky Mine	do.	62,100
Processing, recoverable, Cu content	Kazakhmys PLC mines or plants: Balkhash complex: Balkhash concentrator	South-central Kazakhstan	39,500
Do.	East region: Belousovskoe Mine	East Kazakhstan	2,100
Do.	Irtyskoe Mine	do.	3,890
Do.	Nikolaevskoe Mine	do.	21,200
Do.	Orlovskoe Mine	do.	77,800
Do.	Karaganda region: Abyz Mine	North-central Kazakhstan	4,000
Do.	Zhezkazgan complex: Stepnoye Mine	do.	58,200
Do.	Zhezkazgan concentrator: Number 1	do.	88,800
Do.	Number 2	do.	111,000
Do.	Kazzinc JSC: Ridder: Ridder concentrator	East Kazakhstan	NA
Do.	Zyrianovsk: Zyrianovsk concentrator	do.	1,200
Metal	Kazakhmys PLC mines or plants: Balkhash complex:		
	Balkhash smelter	South-central Kazakhstan	250,000
Do.	Balkhash refinery	do.	250,000
Do.	Zhezkazgan complex: Zhezkazgan smelter	North-central Kazakhstan	215,000
Do.	Zhezkazgan refinery	do.	250,000
Do.	Kazzinc JSC: Ust-Kamenogorsk: Lead smelter	Oskemen	80,000
Do.	Kazzinc JSC: Copper refinery	do.	NA
<b>Ferrous alloys:</b>			
Ferrochrome:			
High-carbon 60%	Aqtobe (Akt'yubinsk) plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Aqtobe	200,000
Medium-carbon 60%	do.	do.	200,000
Do.	Aksu plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Aksu	200,000
Ferrosilicon	do.	do.	700,000
Ferrosilicochrome	do.	do.	700,000
Ferrochrome, high-carbon	do.	do.	500,000
Silicomanganese	do.	do.	90,000
Gallium	Pavlodar aluminum plant [Eurasian Natural Resources Corporation PLC (ENRC)]	Pavlodar	NA
Gold	Byproduct of polymetallic ores and native gold mining	NA	30

See footnotes at end of table.

TABLE 2—Continued  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>e</sup>
Indium	Kazzinc JSC	East Kazakhstan	NA
<b>Iron and steel:</b>			
Pig iron	Ispat-Karmet Steelworks (ArcelorMittal)	Karaganda	5,000,000
Steel, crude	do.	do.	6,300,000
Iron ore, marketable	Lisakovskiy and Sokolovsko-Sarbay Mining and Production Union (SSGPO)	Qostanay	25,000,000
<b>Lead:</b>			
Mining, recoverable Pb content of ore	Kazzinc JSC: Ridder: Shubinsky Mine	East Kazakhstan	461
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk: Grekhovsky Mine	NA	240,000
Do.	Maleevsky Mine	NA	35,100
Mining, gross weight Pb-Zn ore	ShalkiyaZinc N.V.	Kyzylorda Region	3,000,000
Processing, recoverable Pb content of ore	Kazzinc JSC: Ridder concentrator	East Kazakhstan	NA
Do.	ShalkiyaZinc N.V. processing plant	Kentau	NA
Metal	Chimkent smelter	Shymkent	60,000
Do.	Kazzinc JSC: Ust-Kamenogorsk lead smelter	Oskemen	168,000
Magnesium, metal	Ust-Kamenogorsk titanium-magnesium plant	do.	23,000
Manganese, crude ore	Facilities: Atasurda Kazakmarganets [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)] Sary-Arkapolimetall Zhezdy processing plant [Kazchrome, a subsidiary of Eurasian Natural Resources Corporation PLC (ENRC)]	Locations: Atasu, Qaraghandy Region Tur and East Kamys Mines, Qaraghandy region Zhayrang, Qaraghandy region Zhezdy, Qaraghandy region	2,550,000 <sup>2</sup>
<b>Molybdenum:</b>			
Mining, recoverable content of ore	Kazakhmys PLC facilities: Balkhash complex Karaobinskoye deposit Sayak deposit	Locations: Kounrad Mine Karaoba region Sayaq region	1,000 <sup>2</sup>
Metal	Akchatau molybdenum metal plant	Zhezkazgan region	NA
Natural gas	million cubic meters	Companies: CNPC Aktobemunaigaz Embamunaigaz Hurricane Kumkol Munai Karachaganak Petroleum Operating BV Mangistaumunaigaz Kazmunaigaz Tengizchevroil joint venture  North Caspian Operating Company Uzenmunaigaz	Locations: Aqtobe Emba region Aral Sea region Northwestern Kazakhstan Mangghyshlaq Peninsula  Tengiz deposit Zhanazhol deposit Urikhtau deposit Kashagana offshore field Uzen deposit
Niobium, metal	Ulba Metallurgical Plant JSC (UMP)	Oskemen	NA
<b>Petroleum:</b>			
Crude	Companies: CNPC Aktobemunaigaz Embamunaigaz Hurricane Kumkol Munai Karachaganak Petroleum Operating BV Kazmunaigaz Mangistaumunaigaz Uzenmunaigaz	Locations: Aqtobe Emba region Aral Sea region Karachaganak field  Mangghyshlaq Peninsula Uzen deposit	80,000,000 <sup>2</sup>

See footnotes at end of table.

TABLE 2—Continued  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>e</sup>
Petroleum—Continued:			
Crude—Continued:	Alibekmola, Ayrankul, Chinarevskoye, Kozhasay, North Buzachi, Sazankurak, Sazyube, and Urikhtau deposits	NA	NA
Do.	42-gallon barrels per day Tengizchevroil joint venture	Tengiz deposit	NA
Do.	do. North Caspian Operating Co.	Kashagan offshore field	NA
Refined, crude oil throughput	do. Atyrau Pavlodar, Shymkent refineries	Atyrau, Pavlodar, Shymkent	427,000 <sup>2</sup>
Phosphate rock	Chilisay mining directorate Karatau mining and processing complex containing Chulaktau and Zhantas mining and processing enterprises (Kazphosphate LLC)	Chilisay phosphate deposit Karatau phosphorous basin	20,000,000 <sup>2</sup>
Rare-earth metals, products	Irtysk Rare Earths Company, Ltd.	East Kazakhstan	NA
Silver, refined	Facilities: Chimkent metallurgical plants Ridder (Kazzinc JSC) Ust-Kamenogorsk (Kazzinc JSC)	Locations: Shymkent Ridder Zhezkazgan region	1,000 <sup>2</sup>
Tantalum	Ulba Metallurgical Plant JSC (UMP)	Oskemen	NA
Tin	Akchatau mining-beneficiation complex	Akzhaik deposit, Zhezkazgan	700
Titanium:			
Ore, ilmenite	Obukhovskoye, Satpayevskoye, and Shokashsk deposits	NA	30,000
Metal	Ust-Kamenogorsk titanium-magnesium plant	Oskemen	35,000
Uranium, U content	Kazatomprom National Atomic Co. affiliated companies: Akbastau JV Appak LLP Baiken-U LLP  Betpak Dala JV, consisting of Akdala Mine and Site No. 4 Mine of Inkai deposit Karatau LLP Katco JV, consisting of Site No. 1 Yuzhnyi and Site No. 2 Tortkuduk of Moinkum deposit Kyzylkum LLP  Mining Group No. 6 LLP Priaspiskiy ore enrichment center Semizbai-U  Shevchenko Stepnogorskiy mining-chemical complex, Shantobe Mine Stepnoye Mining Group LLP Taboshara Taukent Mining Chemical Plant LLP Tselinny chemical complex Ulba Metallurgical Plant JSC (UMP) JV Zarechnoye JSC  Kazatomprom National Atomic Co. mines: Kanzhugan, Moinjum, Uvanas Northern Karamurun, Southern Karamurun Vostok	Locations: Budenovskoye deposit Mynkuduk deposit Khorassan deposit, Kyzylorda Region Southern Kazakhstan  Karatau region Southern Kazakhstan  Khorassan deposit, Kyzylorda Region NA Aqtau Semizbai deposit, interface of Northern Kazakhstan and Akmola Aqtau Vostok and Zvezdnoe deposits, west of Stepnogorsk NA NA NA Stepnogorsk Oskemen Zarechnoye deposit, South Kazakhstan  Chu-Sarysu uranium ore province Srydarya uranium ore province Northern Kazakhstan uranium ore province	15,000 <sup>2</sup>

See footnotes at end of table.

TABLE 2—Continued  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2009<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	Annual capacity <sup>e</sup>
<b>Zinc:</b>			
Mining, recoverable, Zn content	Kazakhmys PLC mines:		
	East region:		
	Artemyevskoe Mine	East Kazakhstan	30,200
Do.	Belousovskoe Mine	do.	8,420
Do.	Irtyskoe Mine	do.	14,700
Do.	Nikolaevskoe Mine	do.	48,700
Do.	Orlovskoe Mine	do.	78,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	16,500
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	20,800
Do.	Kazzinc JSC:		
	Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,510
Do.	Tishinsky Mine	do.	79,500
Do.	Shaimerden deposit	North Kazakhstan	1,090,000
Do.	Zyrianovsk:		
	Grekhovskoy Mine	East Kazakhstan	240,000
Do.	Maleevskoy Mine	do.	203,000
Mining, Zn content of Pb-Zn ore	ShalkiyaZinc N.V.	Kyzlordo Region	100,000
Processing, recoverable, Zn content	Kazakhmys PLC mines:		
	East region:		
	Artemyevskoe Mine	do.	8,580
Do.	Belousovskoe Mine	do.	5,760
Do.	Irtyskoe Mine	do.	7,610
Do.	Nikolaevskoe Mine	do.	24,200
Do.	Orlovskoe Mine	do.	55,000
Do.	Yubileyno-Snegirikhinskoe Mine	do.	6,190
Do.	Kazzinc JSC:		
	Ridder concentrator	do.	NA
Do.	Shaimerden deposit	North Kazakhstan	72,000
Metal	Kazzinc JSC:		
	Ridder zinc refinery	East Kazakhstan	126,000
Do.	Ust-Kamenogorsk zinc refinery	North Kazakhstan	240,000

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. NA Not available.

<sup>1</sup>Many 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.

<sup>2</sup>Capacity estimates are totals for all enterprises that produce that commodity.