

# THE MINERAL INDUSTRY OF KAZAKHSTAN

By Richard M. Levine

Kazakhstan is the second largest country in land area after Russia to form from the republics of the former Soviet Union (FSU). It is endowed with large reserves of a wide range of minerals. Kazakhstan was a major producer of a large number of metals, including beryllium, bismuth, cadmium, chromite, copper, ferroalloys, lead, magnesium, rhenium, titanium, uranium, and zinc. It had significant production of a number of other mineral products, including arsenic, barite, coal, gold, molybdenum, natural gas, oil, phosphate rock, and tungsten. Kazakhstan has commercial reserves of 3 ferrous metals, 29 nonferrous metals, 2 precious metals, and 84 types of industrial minerals, as well as coal, natural gas, and petroleum (Zharkenov, 1997).

During the initial post-Soviet period, the mineral industry in Kazakhstan had been characterized by falling output, increasing unemployment, stoppages at many enterprises, lowering of investment levels, and reduced demand for the industry's output domestically and on export markets where products had difficulty competing (Zharkenov, 1997).

Because the mineral industry was badly in need of investment and restructuring, a large number of enterprises were put under foreign management through concessionaire contracts in 1995-96. A large percentage of mining and metallurgical enterprises came under the control of foreign managers who, in exchange for a share of the profits, as well as potential ownership rights to stock, invested in modernizing enterprises, increasing output and exports, decreasing costs, and upgrading technology to meet environmental standards (Zharkenov, 1997).

Subsequent to the awarding of management contracts, the mineral industry entered a period of stabilization and growth (Danayev, 1997). In 1997, Kazakhstan's economy experienced a 2% increase in gross domestic product and a 4% increase in industrial output compared with those of 1996 (Interfax Statistical Report, 1998a). Mineral production accounted for more than 50% of the country's industrial output—oil and gas production accounted for about 24%, ferrous metals production almost 14%, and nonferrous metals production about 12% (Uzhkenov, 1997).

Exports to world markets increased by almost 30% in value in 1997 compared with those of 1996. According to reported trade data for a limited number of mineral commodities, exports of copper anodes, ferroalloys, iron ore and concentrates, primary lead, and crude oil increased, and exports of fertilizers and refinery products decreased (Interfax Statistical Report, 1998b).

During the Soviet period, Kazakhstan underwent extensive development of the metals mining and metallurgical industries. With the dissolution of the Soviet Union, however, the country lost almost all its former base of consumers. Intensive mining resulted in the depletion of many deposits that are now left with

low grades of ore at great depths. At the polymetallic deposits in the Rudnyy Altay, the Ertis (Irtysh), the Leninogorsk, and the Zyryanovsk regions, ore was being mined with a combined grade for copper, lead, and zinc of less than 3% from underground mines at deep levels. The lack of funds to conduct exploration since the breakup of the Soviet Union has greatly exacerbated this problem. Replenishing the reserve base with high-grade ores was considered one of the highest priorities for the minerals production sector. Also, the industry was in need of restructuring to make it cost competitive for operating under market economy conditions. This included installing state-of-the-art equipment and eliminating inefficient linkages to processing facilities that are often located hundreds, if not thousands, of kilometers from the mines (Danayev, 1997).

One of the major ways to reform the mineral industry will be to revise the laws dealing with investment and taxation to attract more foreign investment. Investment is needed for exploring and developing new deposits and introducing state-of-the-art processing technology to extract maximum value from ores and wastes (Zharkenov, 1997).

Kazakhstan has significant oil and gas reserves. The oil and gas industry, which was one of Kazakhstan's most attractive areas for foreign investment, was export-oriented. Since 1993, more than 40% of total foreign investment in Kazakhstan has gone into the oil and gas industry (Kazkommerts Securities, January 1998, Kazakhstan economic research, accessed May 15, 1999, at URL [http://www.kazecon.kz/Kazkom/NewGuide/engl/page\\_4.htm](http://www.kazecon.kz/Kazkom/NewGuide/engl/page_4.htm)). The Caspian Pipeline Consortium (CPC) project was expected to increase Kazakhstan's oil exports by around 80% (about US\$1 billion in terms of export proceeds) by 2000 and a further 40% (an additional US\$1 billion) by 2001 (Almaty Herald, December 3-9, 1998, Kazakhstan recovers from contagion, accessed on May 16, 1999 at URL [http://www.kazecon.kz/English/ABN\\_kazakh.HTM](http://www.kazecon.kz/English/ABN_kazakh.HTM)).

Coal was Kazakhstan's major source of domestic fuel. Up to 80% of the energy sector's fuel demand was met by coal. The country produced sufficient amounts of coal for domestic use and exported coal to other Commonwealth of Independent States (CIS) countries. There was a trend in the development of Kazakhstan's coal industry for industrial enterprise interested in obtaining an uninterrupted supply of energy to purchase some coal mines and electric powerplants (Kazkommerts Securities, January 1998, Kazakhstan economic research, accessed May 15, 1999, at URL [http://www.kazecon.kz/Kazkom/NewGuide/engl/page\\_4.htm](http://www.kazecon.kz/Kazkom/NewGuide/engl/page_4.htm)).

## Environmental Conditions

Kazakhstan occupies a territory of more than 2.7 million square kilometers in the center of Eurasia. Many varieties of landscapes from dry subtropics and hot deserts to high mountainous tundra and glaciers, as well as continental seas and lakes, such as the Caspian, Aral, Balqash (Balkhash), Zaysan, and Alakol' can be found. Kazakhstan's wealth of mineral resources spurred rapid development of mining and mineral-processing industries. Furthermore, the country's territory was the site of military bases, the Baykonur cosmodrome, and testing grounds for weapons, including nuclear weapons. All these resulted in intensive air, water, and soil pollution and natural resource depletion. Changes in the environment caused a sharp rise in population morbidity rates and mortality, serious destruction of ecosystems, desertification, and significant loss of biodiversity. In some regions, life expectancy was 15 to 20 years less than that in developed countries (Ministry of Environment and Natural Resources of the Republic of Kazakhstan, National environmental action plan for sustainable development of the Republic of Kazakhstan, accessed on May 4, 1999, at URL <http://www.zoo.co.uk/~z80000142/links.html>). Radioactive fallout from weapons testing traced by radioactive clouds has spread over a territory of 304,000 km<sup>2</sup> inhabited by about 1.5 million people.

Also, during the Soviet period, more than 40% of uranium output was produced in the territory of Kazakhstan. Extracting and processing uranium ores generated radioactive waste. The disposal and use of radioactive waste remain pressing issues. In February 1997, the leaders of five Central Asian states signed the Almaty Declaration, announcing 1998 to be the Year of Environmental Protection in the Central Asian region under the auspices of the United Nations and the development of a complex program for environmental protection. It challenged all interested countries to support the initiative of declaring Central Asia a nonnuclear zone on the eve of the 50th anniversary of the establishment of the Semipalatinsk nuclear weapons test site.

## Commodity Review

### Aluminum

**Reserves.**—The country's bauxite reserves are in sedimentary karst-type deposits. The largest deposits were the Belinskoye, the Koktal'skoye, the Krasnooktyabrskoye, the Tuansorskoye, and the Vostochno-Ayatskoye, which composed 76% of the country's reserves (Uzhkenov, 1997). The country's economic reserves were reported to be about 355 million metric tons (Mt). Bauxite ore averaged about 44% alumina (Kruse and Parchmann, 1998, p. 62).

**Production status.**—Kazakhstan produced alumina at the Pavlodar aluminum plant. Local ores supplied the plant, which, despite its name, produced only alumina. The country ranked as a significant world alumina producer with more than 1 million metric tons per year (Mt/yr) of production. The Pavlodar plant was also a large producer of byproduct gallium. Most alumina production was shipped to aluminum smelters in Russia (USAID Kazakhstan Securities Market Development Project, July 18, 1997, JSC alumina Kazakhstan, accessed May 4, 1999, at URL

<http://www.kazecon.kz/Memos/Eng/ALUM.htm>).

**Production development.**—Bauxite reserves were considered to be adequate for more than 90 years at the current level of output and for more than 60 years at projected levels of development. Plans called for the construction of a primary aluminum plant, which has been on the drawing board for decades. Problems in developing aluminum production included ensuring an adequate energy supply and environmental issues involving the siting of the plant (Interfax Mining and Metallurgical Report, 1999a).

**Ownership status.**—Aluminum Kazakhstan, the joint stock company (JSC) created by a Government resolution in 1996, included the Pavlodar aluminum plant and the Krasnooktyabr (Red October) and Turgay bauxite mining companies. As of 1994, Aluminum Kazakhstan had been under the management of Whiteswan Ltd. (registered in the British Virgin Islands). Whiteswan was a joint venture of the Trans World Group of the United Kingdom and Kazakhstan Mineral Resources (KMR), a Kazakhstan-based financial group. Whiteswan purchased controlling shares of the aluminum plant and the two bauxite mining companies. Whiteswan also purchased the Pavlodar No. 1 heating and power plant (USAID Kazakhstan Securities Market Development Project, July 18, 1997, JSC alumina Kazakhstan, accessed May 4, 1999, at URL <http://www.kazecon.kz/Memos/Eng/ALUM.htm>).

### Barite

**Reserves.**—Kazakhstan's barite reserves of 162 Mt of BaSO<sub>4</sub> compose more than 30% of the world's reserves (Kruse and Parchmann, 1998, p. 85). Three deposits, the Ansay, the Bestube, and the Zhayrem accounted for more than 70% of reserves in categories A, B, and C1, in the reserve classification system that was used in the Soviet Union (Daukeev, 1995, p. 11).

**Production status.**—Kazakhstan produced more than 75% of the FSU's barite output. Barite was produced by companies mining primarily polymetallic and lead-zinc deposits, although some barite was produced at 2 barite deposits in southern Kazakhstan and 11 sulfide deposits in the central, eastern, and southeastern parts of the country (Daukeev, 1995, p. 116; Kruse and Parchmann, 1998, p. 85). The Kargayly and the Zhayrem deposits accounted for more than 70% of total output. Barite concentrate was produced by flotation at nonferrous metallurgical enterprises and was of low quality owing to the presence of flotation reagents (Daukeev, 1995, p. 116). The main consumers for Kazakhstan's barite were oil-drilling and exploration enterprises in Kazakhstan and Uzbekistan (Kruse and Parchmann, 1998, p. 85).

**Production development.**—With the expansion of oil production, local barite resources will be of increasing importance. However, many oil industry enterprises have refused to use Kazakhstan's barite because of its low quality. A national program was drafted containing technical measures to improve the quality of barite concentrates. To meet future demand, there is a need to develop the Ansay and the Chaganak deposits (Daukeev, 1995, p. 118).

## *Chromite*

**Reserves.**—All chromite production was from the Donskoy group of deposits near Khromtau in the Aqtobe (Aktyubinsk) region, with more than 430 Mt of reserves averaging 50.3% Cr<sub>2</sub>O<sub>3</sub> (Kruse and Parchmann, 1998, p. 53, 54).

**Production Status.**—Kazakhstan is among the world's leading producers of chromite. More than one-half of chromite production was exported; the remainder was used domestically for ferroalloy production, which was exported. More than 90% of the country's total output of chromite and ferroalloys was exported (USAID Kazakhstan Securities Market Development Project, [no date], Kazchrome, accessed May 20, 1999, at URL <http://www.kazecon.kz/English/privatkazchrome.htm>).

**Production Development.**—The Donskoy mining and beneficiation complex was the exclusive producer of chromite in the country. Mining was being switched to underground methods with the depletion of reserves suitable for open-pit development. Kazakhstan has the ability to increase chromite output by 10% to 12% compared with its peak level of more than 3.6 Mt/yr in 1990 by using low-grade ores in ore folds. Chromite exports were projected to decrease as the country expands ferroalloy production (Zharkenov, 1997).

**Ownership Status.**—The Kazchrome Transnational Company (KCM) was established in 1996 with the transfer of 90% of the common stock of the Donskoy mining and beneficiation complex and the Ferrochrome concern, comprising the country's two ferroalloys plants, to KCM. KCM was under the management of the Japan Chrome Corporation (a subsidiary of the Trans World Group of the United Kingdom), which also owned the controlling block of shares of KCM (USAID Kazakhstan Securities Market Development Project, [no date], Kazchrome, accessed May 20, 1999, at URL <http://www.kazecon.kz/English/privatkazchrome.htm>).

## *Coal*

**Reserves.**—Kazakhstan had more than 400 coal deposits containing more than 30 billion metric tons of reserves. Major deposits were in the Ekibastuz, the Karaganda, the Maykuben, and the Turgay basins and at the Borly, the Karazhir (Yubileynyy), the Kuu-Cheku, the Priozernoeye, and the Shubarkol deposits (Daukeev, 1995, p. 122; Kruse and Parchmann, 1998, p. 41, 42). About one-third of reserves were brown coal. The Karaganda basin was the only supplier of coking coal for the metallurgical industries. The Ekibastuz basin was the chief supplier of coal for powerplants (Daukeev, 1995, p. 124).

**Production Status.**—Kazakhstan was a major coal-producing country. It had been producing more than 130 Mt/yr of coal in the 1980's, but by 1997, production has fallen by about 45%. In 1997, Kazakhstan consumed about 55 Mt and was a coal exporter to Russia and other CIS countries, even though it imported coal from the Kuznetsk basin in Russia to supply its eastern regions. Coal supplied to powerplants often had an ash content much higher than the average for energy coal available on the world market (Daukeev, 1995, p. 120).

**Production Development.**—Reserves at most operating mines were adequate to maintain production for 20 years or more. The underground mining of coking coal at Karaganda, however, was expensive and added to the cost of metal production. Development of the Karazhir deposit, with more than 1 billion tons of reserves of high-quality coal suitable for surface mining, was made possible by the shutdown of the Semipalatinsk nuclear testing grounds. With the development of Karazhir, the eastern regions of the country will no longer need to import coal (Daukeev, 1995, p.124-125).

**Ownership Status.**—In 1996, the Karaganda and the Ekibastuz production associations were dissolved and the mines put up for sale or lease. In the Karaganda basin, 15 of the mines were sold to the Karaganda iron and steel company Ispat-Karmet. That year the Shubarkol mine was leased to the Global Mineral Resources (GMR) firm registered in the United States (Peck, 1999). In 1998, the management contract with GMR was nullified by the Government of Kazakhstan. In the Ekibastuz basin, several mines and an open pit changed hands. Access Industries, a U.S. firm, purchased the Bogatyar mine and a 70% interest in the Stepnoy mine. Japan Chrome Corp., a subsidiary of Trans World Group, purchased the remaining 30% interest in the Stepnoy mine, as well as the Vostochnyy open pit. Ownership of the Severnyy mine was acquired by Unified Energy Systems, a Russian firm. In 1996, the German firm HTD GmbH acquired a 50% stake in the Maykuben pit in the Maykuben basin (Peck, 1999). In 1997, ZhezkazganTvetMet purchased the Borly coal mine, which became part of the copper production amalgamation KazakhMys Inc. joint stock company (USAID Kazakhstan Securities Market Development Project, [no date], JSC Kazakhmys Cu, accessed May 20, 1999, at URL <http://www.kazecon.kz/Memos/Eng/KAZM.htm>).

## *Copper*

**Reserves.**—Kazakhstan reportedly has about 36.6 Mt of proven reserves of copper metal (USAID Kazakhstan Securities Market Development Project, [no date], JSC Kazakhmys Cu, accessed May 20, 1999, at URL <http://www.kazecon.kz/Memos/Eng/KAZM.htm>). Of its total reserves, 39% are in copper porphyry deposits; 30%, in cupriferous sandstone deposits; and 13%, in copper pyrite deposits (Daukeev, p. 32-42). The major deposits are the Zhezkazgan, Aktogia (Semipalatinsk region), and Boshekul-Maikain (Pavlodar region). Significant reserves are in the following deposits: Rudnyy Altay (East Kazakhstan region), Yuzhniy Dzhungariya (Taldy Kurgan region), Kendyktas [Zhambyl (Dzhambul) region], and Mugodzhariya [Aqtobe (Atyubinsk) region]. Reserves average 0.68% copper for the country (Daukeev, 1995, p. 32-42; Uzhkenov, 1997).

**Production Status.**—In 1997, Kazakhstan ranked 12th in the world in mine output of copper. The majority of mine output came from the Zhezkazgan region. Approximately 55,000 people were employed in mining and processing copper. The country was a large copper exporter (USAID Kazakhstan Securities Market Development Project, [no date], JSC Kazakhmys Cu, accessed May 20, 1999, at URL <http://www.kazecon.kz/Memos/Eng/KAZM.htm>).

**Production Development.**—The reserves being exploited composed only 35% of total enterprise reserves and 11% of total reserves. Nevertheless, problems of adequate reserves exist at the two major copper producing enterprises, the Balkhash and the Zhezkazgan mining and metallurgical complexes in central Kazakhstan (Zharkenov, 1998).

**Ownership Status.**—Almost all copper-producing enterprises have been amalgamated into KazakhMys Inc. joint stock company, which was a vertically integrated company controlling mining, beneficiating, smelting, and refining. Samsung Deutschland, a subsidiary of Samsung of the Republic of South Korea, owned the largest percentage of shares of KazakhMys and had the management contract for the ZhezkazganTvetMet mining and metallurgical enterprises, which produced the majority of the country's copper.

The formation of KazakhMys began in May 1996. Samsung won a tender to purchase 40% of ZhezkazganTsvetMet, and in April 1997, Samsung purchased the Balkhash mining and beneficiation complex and the Zhezkent beneficiation plant; in May 1997, Samsung purchased the East Kazakhstan copper-chemical complex and the Borly coal mine and incorporated all its holdings into ZhezkazganTsvetMet. Then, in August 1997, Samsung formed KazakhMys on the basis of ZhezkazganTsvetMet and transferred ownership of the Balkhash, Borly, the East Kazakhstan copper-chemical complex, and Zhezkent from ZhezhkazganTsvetMet to KazakhMys.

Samsung has been purchasing the shares of ZhezhkazganTsvetmet that it won the right to purchase via tender. The Government owned the second largest percentage of shares of ZhezkazganTsvetMet, and was planning to offer a percentage of its shares for sale. Samsung also had the right to purchase a percentage of the remaining Government shares (USAID Kazakhstan Securities Market Development Project, [no date], JSC Kazakhmys Cu, accessed May 20, 1999, at URL <http://www.kazecon.kz/Memos/Eng/KAZM.htm>).

## **Gold**

**Reserves.**—Kazakhstan's gold reserve base was reportedly about 800 metric tons (t) of gold in ore grading on average 6.3 grams per ton (g/t gold with the gold content of ore in deposits under development grading on average 8.97 g/t. The country has 134 primary lode deposits with 61.5% of reserves, 60 polymetallic sulfide ore deposits with 38% of reserves, and 30 placer deposits with 0.5% of reserves (Kruse and Parchmann, 1998, p. 78). Only 41% of the ore in the reserve base can be processed by using simple gravitation and flotation technology. The remainder has been categorized as being more difficult to beneficiate (Uzhkenov, 1997).

**Production Status.**—Approximately one-half of the country's gold output had been a byproduct of nonferrous metals mining, and a program was underway to develop primary gold deposits (Daukeev, 1995, p. 93). Gold was mined at about 65 deposits (Uzhkenov, 1997, p. 22). A large percentage of the gold extracted was refined in Kazakhstan.

**Production Development.**—The program "Gold of Kazakhstan" called for increasing gold extraction to more than 50 t/yr and creating additional facilities for processing gold ores in

the country. To accomplish this, the Ministry of Geology issued licenses for exploration and extraction to about 70 commercial entities (Zharkenov, 1997). To achieve this increase in output, the Ministry of Geology estimated that more than \$1 billion in investment will be required (Uzhkenov, 1997). Another important component of the program was to introduce new technology, including heap leaching, to recover gold from wastes (Zharkenov, 1997).

**Ownership Status.**—In January 1993, the principal mining and beneficiation enterprises were placed under the control of the state firm Altynalmas. Foreign investment was being sought for mines under Altynalmas' control. Asier, a state-owned firm, was created to hold the Government's interest in joint ventures involving mines for which foreign investment was obtained. Also, foreign firms could own a 100% interest in gold mines, as well as engage in management contracts with options to purchase shares of the mines (Peck, 1998, p. 29-32).

## **Iron ore**

**Reserves.**—At the beginning of 1997, Kazakhstan reportedly had an iron ore reserve base of 16.9 billion tons in 27 deposits, of which 9.1 billion tons were proven reserves in categories A,B,C1 (Uzhkenov, 1997). The average iron content of proven reserves is 38.9%. The Minister of Energy and Natural Resources stated that there were 12.5 billion tons of economic iron ore reserves. Of these economic reserves, 40% were characterized as composing ore suitable for direct shipping or as being easy to beneficiate (Uzhkenov, 1997). Skarn magnetite deposits supplied the Sokolovsko-Sarbay and other mining enterprises, sedimentary brown hematite deposits supplied the Lisakovskiy and other mining enterprises, and vulcanogenic-sedimentary-hematite-magnetite deposits supplied the West Karazhal mining enterprise (Kruse and Parchmann, 1998, p. 49).

**Production Status.**—Since 1990, iron ore production has fallen sharply. In 1997, mining enterprises were working at less than 50% of capacity (Uzhkenov, 1997). Iron ore was used to supply the country's iron, steel, and ferroalloys industries; a significant portion was also exported, mainly to Russia and China. In Kazakhstan and Russia, the significant decline in ferrous metals production decreased demand for iron ore.

**Production Development.**—Plans called for stabilizing iron ore production at a level of 15 to 16 Mt/yr. Reserves are considered to be adequate for the next century. These production levels will be attained following a decrease in output at the Sokolovskiy and the Sarbayskiyi open pits and the intended closing down of the unprofitable Sokolovskiy underground mine and the Kruzunkul'skiyi open pit. Domestic demand was expected to stabilize, as well as demand for exports. Development was planned for the Kacharskiyi mining and beneficiation complex with the participation of Russian or other interested foreign investors to produce iron ore and pellets with a high iron content. Plans called for maintaining production at the Lisakovskiy mining and beneficiation complex by introducing state-of-the art technology for processing low-grade ore. To reduce costs in the ferrous metals production sector, the quality of ore delivered to the Ispat-Karmet steel mill will have to be improved (Zharkenov, 1997).

**Ownership Status.**—In 1995, management of the country's largest mining enterprise, the Sokolovsko-Sarbay, was transferred to Ivedon International, which, although registered in Iceland, was a joint venture of the Trans World Group and Kazakhstan Mineral Resources (KMRC). In 1966, a 51% stake in the country's second largest mine, the Lisakovskiy, was purchased by the Yesil enterprise, a financial-industrial company from Kazakhstan. In 1997, an 80% stake in the Atasuruda mine, which supplied the Ispat-Karmet steel mill, was purchased by the Kazakhstan firm ELROVO (Peck, p. 20-23).

### *Lead and Zinc*

**Reserves.**—Reserves of lead reportedly totaled 14.9 Mt and of zinc 34.7 Mt (Kruse and Parchmann, 1998, p. 67). The ore is low grade, averaging 1.31% lead and 3.11% zinc (Uzhkenov, 1997). Major deposits that have been developed were the Grekhovskiy and the Zyryanovskiy, which supplied the Zyryanovsk complex; the Ridder-Sokolnoye, the Shubinskoye, and the Tishinskoye, which supplied the Leninogorsk complex; the Belousovskiy and the Beresovsko-Irtysh deposits, which supplied the Irtysh complex (which appears to have ceased operations); the Kamyshinskoye, the Nikolayevskoye, and the Shemonaikhinskoye, which supplied the East Kazakhstan copper-chemical complex; the Orlovskoye, which supplied the Zhezkent complex; the Ushkatyn III and the Zhayrem, which supplied the Sary-Arkapolimetal complex; the Karagayliskoye, which supplied the Akchatau complex; the Koksuy, the Tekeli, the Tulyuk, and the Zapadnyy, which supplied the Tekeli complex; and the Ansayskoye, the Bayzhansai, the Mirgalimsayskoye, and the Shalkia, which supplied the Achisay complex. Two major deposits slated for development in eastern Kazakhstan were the Artemyevskoye and the Maleyevskoye (Daukeev, 1995, p. 43-58). The largest deposits, the Shalkia and the Zhayrem, had 28% of the country's lead reserves and 34% of its zinc reserves (Uzhkenov, p. 1997).

**Production Status.**—Kazakhstan had been the major producer of lead and zinc among the republics of the Soviet Union, and has remained the largest producer of these metals of the countries of the FSU. Production has fallen by about 85% for lead and by about 55% for zinc from peak output levels in the 1980's. Peak mine output was 207,600 t/yr for lead and 494,900 t/yr for zinc (Uzhkenov, 1997). Major lead and zinc mining and metallurgical enterprises were part of the Kazzinc company, which was the country's main producer of lead and zinc. It included the Ust-Kamenogorsk, the Zyryanovsk, the East Kazakhstan copper-chemical, and the Tekeli complexes. Kazzinc contained five mines, two zinc plants, and one lead plant, and employed 26,000 people [(USAID Kazakhstan Securities Market Development Project, [no date], KAZZINC, accessed May 20, 1999, at URL <http://www.kazecon.kz/English> [using the heading Description of companies activities and status])]. Although mines and beneficiation plants were working at far below capacity, the country fully met its domestic demands for lead and zinc, as well as exported large amounts of these metals (Uzhkenov, 1997, p. 20).

**Production Development.**—The Ministry of Energy and Natural Resources claimed that economic reserves at existing

enterprises were adequate for ensuring an additional 25 years of production, although not specifying the level of production (Uzhkenov, 1997, p. 19). Plans called for developing the Artem'yevskoye, the Chekmarskoye, the Maleyevskoye, and the Yubileyno-Snegirikhinskiy deposits and further developing the Irtysh, the Nikolayevskoye, the Shemonaikhinskoye, the Shalkia, the Tishinskoye, the Zhayrem, and other deposits (Uzhkenov, 1997; Zharkenov, 1997). Plans also called for modernizing zinc production facilities at Kazzinc [(USAID Kazakhstan Securities Market Development Project, [no date], KAZZINC, accessed May 20, 1999, at URL <http://www.kazecon.kz/English> [using the heading Description of companies activities and status])].

**Ownership Status.**—In January 1997, Kazzinc company was formed as a result of the amalgamation of the country's largest lead and zinc producers. Kazzinc included the Ust-Kamenogorsk metallurgical complex and the Leninogorsk, the Tekeli, and the Zyryanovsk mining and beneficiation complexes. Kazzinc's main shareholder was Kazastur Zinc AG, which owned 62.4% of the shares, and was created by Glencore International AG of Switzerland and Asturiana de Zinc of Spain [(USAID Kazakhstan Securities Market Development Project, [no date], KAZZINC, accessed May 20, 1999, at URL <http://www.kazecon.kz/English> [using the heading Description of companies activities and status])].

In 1997, the Shymkent lead smelter was under the management of RR Kazakhstan-Trade, the Akchatau mining and beneficiation complex was under the management of Novo-Trading of Switzerland, and the Achisay mining and beneficiation complex was under the management of River International. These three management companies were experiencing considerable difficulties in 1997, and it was not certain that these management contracts would remain in effect (Peck, 1998, p. 15-19).

### *Manganese*

**Reserves.**—Kazakhstan had 11 identified manganese deposits with a total reserve base of 600 Mt of ore, of which 426 Mt were classified in reserve categories A,B,C1. According to the Minister of Energy and Natural Resources, 558.7 Mt was economic reserves. The average manganese content of the economic reserves is 20.5%, which is low grade. High quality ore averaging 40% manganese is in the Kamys and the Ushkatyn-III deposits, which composed 0.2% of reserves (Uzhkenov, 1997).

**Production Status.**—In 1997, Kazakhstan's three manganese mining enterprises were working at less than 20% of their design capacity of 2.55 Mt/yr of crude ore (Uzhkenov, 1997).

**Production Development.**—The commissioning of ferromanganese and other manganese products (dioxide, chemical compounds, etc.) production increased domestic demand for manganese. Reserves were considered adequate for the next century (Uzhkenov, 1997). To meet domestic demand, plans called for doubling manganese concentrate production to between 550,000 and 600,000 Mt/yr by 2000 with crude ore extraction totaling 1 Mt/yr. Plans also called for eventually tripling current levels of output to supply domestic ferroalloy producers, as well as for export (Uzhkenov, 1997).

**Ownership Status.**—The country's three manganese mining

enterprises—Atasuruda, Kazakhmarganets, and Sary-Arkapolimetal, which is associated with the Zhayrem mine—were under the management of the Swiss firm Nakosta, which also owned shares or had some ownership options in these enterprises (Uzhkenov, 1997, p. 18).

### *Natural gas*

**Reserves.**—Kazakhstan reportedly had 900 million cubic meters of proven gas reserves (Uzhkenov, 1997). More than 40% of its reserves were in the giant Karachaganak field in the northwestern part of the country. There are large reserves of associated gas from oilfields, including the Tengiz field (U.S. Department of Energy, January, 1999, Kazakhstan, accessed June 8, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>).

**Production Status.**—Kazakhstan was not a major gas producer and had difficulty supplying domestic consumers because the domestic gas sector lacked pipelines. Although six gas pipelines connected Kazakhstan to other Central Asian countries and Russia, the country's gas-producing areas in the west were not connected by pipelines to domestic consumers in the populous southeast, east, and industrial north. In 1997, Kazakhstan exported its gas production from the western part of the country to Russia and imported 40% of its gas consumption needs from Turkmenistan and Uzbekistan along with a small amount from Russia. However, Uzbekistan stopped deliveries in 1988 because of unpaid bills (U.S. Department of Energy, January 1999, Kazakhstan, accessed June 8, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>).

**Production Development.**—Construction of a domestic pipeline was under consideration to transport gas from Kazakhstan's western fields to all regions of Kazakhstan (U.S. Department of Energy, January 1999, Kazakhstan, accessed June 8, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>). Agreements for development of the Karachaganak oilfield and gasfield were signed with a foreign consortium of major oil companies in November 1997. The 40-year agreement with the Kazakhstan Government for the development of the Karachaganak field was expected to lead to the production of approximately 170,000 barrels per day of oil and 500 cubic meters per day of gas by 2000 (UN-ECE, November 2, 1997, Gas centre database Kazakhstan, Highlights, accessed June 13, 1999, at URL [http://www.gascentre.unece.org/ungcpubdb/O\\_KZ.HTM](http://www.gascentre.unece.org/ungcpubdb/O_KZ.HTM)).

**Ownership Status.**—The members of the offshore exploration consortium for development of the Karachaganak oilfield and gasfield are Total, Royal Dutch/Shell Group, an alliance between British Petroleum Co. plc and Norway's Statoil, BG, Agip and Mobil, as well as the Kazakhstan state entity, KazakhstanCaspishelf (UN-ECE, November 2, 1997, Gas centre database Kazakhstan, Highlights, accessed June 13, 1999 at URL [http://www.gascentre.unece.org/ungcpubdb/O\\_KZ.HTM](http://www.gascentre.unece.org/ungcpubdb/O_KZ.HTM)).

### *Petroleum*

**Reserves.**—Kazakhstan's Ministry of Energy and Natural Resources reported proven geologic oil reserves to be 6.4 billion metric tons. Reserves are in the Precaspian, the Ustyurtsko-Buzashinskiy, the Mangistauskiy, and the

Yuzhno-Turgayskiy basins (Uzhkenov, 1997). The largest oilfields are concentrated in western Kazakhstan where the Tengiz field is located.

**Production Status.**—Kazakhstan was the FSU's second largest oil producer after Russia. Almost one-half of Kazakhstan's oil production came from three large onshore fields—Karachaganak, Tengiz, and Uzen. Kazakhstan was seeking to develop its oil resources through foreign investment. International projects included joint ventures, production-sharing agreements, and exploration/field concessions. The largest of these was the Tengizchevroil joint venture concluded in April 1993, to develop the Tengiz oil field with 6 billion to 9 billion barrels of estimated oil reserves. In 1997, Tengizchevroil exported about 170,000 barrels per day (b/d) of crude oil through existing Russian pipeline routes, as well as by barge and rail (U.S. Department of Energy, January, 1999, Kazakhstan, accessed June 8, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>).

**Production Development.**—Kazakhstan needed to resolve two major issues to increase oil production. One was the development of export routes to bring Kazakhstan's oil to world markets. The other was that development of the Kazakhstan's offshore oil potential in the Caspian Sea had been slowed by a dispute over ownership rights among Caspian Sea littoral states concerning how the Caspian Sea should be divided under international law (U.S. Department of Energy, January, 1999, Kazakhstan, accessed June 8, 1999 at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>).

Chevron Oil Corp. believed that it could reach peak production of 750,000 b/d from Tengiz by 2010. For the Tengizchevroil joint venture to produce at planned capacity would require additional pipeline capacity. To meet this requirement, a new pipeline will be built. Tengiz oil will be exported by the CPC to world markets via a new 900-mile pipeline connecting to the Russian Black Sea port of Novorosiisk (U.S. Department of Energy, January, 1999, Kazakhstan, accessed June 8, 1999 at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>).

**Ownership Status.**—Of the large state-owned oil production associations that existed in Kazakhstan in 1991 when it was part of the Soviet Union, several attracted foreign investment. In 1993, the production association Tengizneftgaz became the base for the Tengizchevroil joint venture with Chevron. Members of the Tengizchevroil joint venture as of 1997 were Chevron (45%), Kazakhoil (25%), Mobil (25%), and LukArco (5%). In April 1997, Kazakhstan sold a 70% stake in Mangistaumunaigaz to Indonesia's Central Asia Petroleum. In 1996, the Yuzhneftegaz production association was sold by tender to the Canadian firm Hurricane Hydrocarbons Ltd; the new enterprise was named Hurricane Kumkol Munai (Peck, 1998, p. 41, 42). In 1997, shares in the Aktobemunaigaz and the Uzenmunaigaz production associations were sold to the Chinese National Petroleum Company which has proposed to construct a pipeline to China. In 1998, the Government transferred its public shares in production and refining companies to the state oil and gas company KazakhOil as a preliminary stage for possible privatization (U.S. Department of Energy, January 1999, Kazakhstan, accessed June 8, 1999, at URL <http://www.eia.doe.gov/emeu/cabs/kazak.html>). In 1998, the Kazakhstan Government's shares in the joint ventures were

transferred to the state firm KazakhOil (Peck, 1999).

### **Phosphate Rock**

**Reserves.**—Kazakhstan reported economic reserves of phosphate rock as of January 1, 1993, at 785 Mt of P<sub>2</sub>O<sub>5</sub> in reserve categories A,B,C1. Of these reserves, 650 Mt was in the Karatau basin, and the remaining 135 Mt in the Aktyubinsk basin. In terms of phosphate rock, reserves in the Karatau basin as of January 1, 1993, totaled about 2.6 billion tons of which about 600 Mt was deemed suitable for surface mining (Daukeev, p. 110).

**Production Status.**—In the 1980's, Kazakhstan had ranked as one of the world's leading phosphate rock producers, although almost all its output was consumed within the Soviet bloc. The drop in phosphate rock production following the dissolution of the Soviet Union was precipitous. In 1993, owing to falling demand, production ceased at the Chilisay complex in the Aktyubinsk region and production at Karatau had fallen sharply (Daukeev, p. 110). The Karatau mines reportedly were mostly idle in 1997 and the first part of 1998. Plants in Uzbekistan, which were the main users of Karatau phosphates, were unable to make payments for the phosphate rock (Louis, 1998, p. 35).

**Production Development.**—The future of the industry is uncertain with mining capacity idle for long periods at Karatau and the closure of the Chilisay mining complex. Reserves are adequate, but the industry cannot revive until demand revives. The country again could become a regional supplier of phosphate raw materials when the economies of the Central Asian countries again are in a position to produce and purchase fertilizer. In 1999, it was announced that the Kazakhstan firm Aktal Ltd. intended to develop the Kok-Dzhon phosphate rock deposit in the Karatau basin (Interfax Mining and Metals Report, 1999b).

**Ownership Status.**—The closure or idling of most production capacity, coupled with the fact that the industry served primarily regional markets, kept it from being a prime target of foreign investment. Two mills at the Karatau deposit, however, although idle, were under the management of the Hong Kong firm Texuna (Interfax Mining and Metals Report, 1999b).

### **Steel**

**Production Status.**—Kazakhstan was of only regional importance as a steel producer. It had one steel mill that produced more than 6.7 Mt of crude steel in 1990. Steel production, however, has fallen by more than 50% since then.

**Production Development.**—Under the foreign management and ownership of Ispat International of the United Kingdom, production appeared to be reviving. In 1998, the Karaganda steel mill, renamed Ispat-Karmet, succeeded in attracting \$473 million in investment from the European Bank for Reconstruction and Development and the International Finance Corp. to upgrade production facilities (Metal Bulletin, 1998). In 1998, Ispat-Karmet's exports were affected by falling demand in Southeast Asia, and the company was seeking new export markets. Following a small drop in production in 1998, plans called for Ispat-Karmet to increase production by 15% to more than 3 Mt in

2000 (Metal Bulletin, 1998).

**Ownership Status.**—In November 1995, Ispat-International acquired the management contract for the Karaganda steel mill, following the failure of an initial contract with the Eisenberg Group, a subsidiary of U.S. Steel Group. Ispat also exercised its option to purchase the steel mill and has purchased in addition the Karaganda powerplant and 15 coal mines in the Karaganda region, a number of which Ispat may close (Peck, 1998, p. 23-25).

### **Titanium**

**Reserves.**—Prior to the breakup of the Soviet Union, Kazakhstan had received all its raw material for titanium production from Ukraine and Russia. It received titanium slag from Ukraine and carnallite from Russia. Following the dissolution of the Soviet Union, Ukraine and Russia curtailed shipments to Kazakhstan. Kazakhstan then began importing slag from the West and magnesium metal and liquid chlorine instead of carnallite from Russia. Kazakhstan had identified a number of ilmenite deposits and Specialty Metals, the owner of Kazakhstan's Ust-Kamenogorsk Titanium-Magnesium Plant (UKTMP), was seeking a pool of investors to develop these deposits (Gehler, 1998). Development reportedly has begun of domestic placer deposits in the north and west of the country with identified reserves of about 3 Mt of TiO<sub>2</sub> (Kruse and Parchmann, 1998, p. 57).

**Production Status.**—In the late 1980's, Kazakhstan and Russia were the world's leading producers of titanium sponge; UKTMP had the capacity to produce more than 40,000 t/yr of sponge, making it the world's largest titanium sponge plant. In 1990, Kazakhstan produced 38,822 t of sponge. By 1994, production at UKTMP had fallen to less than 4,000 t of sponge (Gosudarstvennyy Komitet Respubliki Kazakhstan Po Statistike I Analizu, 1996, p. 179). Production then began increasing, doubling the next year. In 1997 and 1998, Kazakhstan was estimated to be the world's third largest producer of titanium sponge (Gambogi, 1999, p. 182-183). Capacity at UKTMP, however, was less than that during the Soviet period.

**Production Development.**—Efforts have been made by UKTMP to meet the requirements of the western titanium industry. Quality controls were introduced that resulted in certification of sponge from UKTMP by airplane engine manufacturers, including Pratt Whitney, Rolls Royce, General Electric Co., and SNECMA. UKTMP has been developing titanium slag production and also pigment production based on production of excess slag (Gehler, 1998).

**Ownership Status.**—As of 1998, the Belgian firm Speciality Metals Company SA owned a 65% share of UKTMP, with 15.5% of the shares still held by the State, 14.5% by the management and staff of the plant, and 0.5% in the hands of local funds (Gehler, 1998).

### **Uranium**

**Reserves.**—According to Kazakhstan's Ministry of Energy and Natural Resources, the country's natural uranium reserves were

assessed at 469,700 t in categories B,C1, of which 456,000 t was assessed as capable of being produced at less than \$80 per kilogram. The country's major deposits are the Kokshetauskaya in the East Kazakhstan region, the Mangyshlakskaya in the Prikaspiyskaya region, the Kendyktas-Chuili-Bekpakdalinskaya in the Pribalkhashskaya region, and the Illiyskaya in the Chu-Syrday'inskaya region. In total, there are 53 known deposits (Uzhkenov, 1997).

**Production Status.**—Kazakhstan was the largest producer of uranium in the Soviet Union, but since the dissolution of the Soviet Union, production was estimated to have fallen by more than two-thirds. Kazakhstan's final product was U<sub>3</sub>O<sub>8</sub> with a natural uranium content of about 87% produced at the Tselinny mining and metallurgical complex. Production was limited by demand on world markets. In 1992, Kazakhstan's main customer, Russia, practically ceased purchases, and domestic demand was almost nil (Uzhkenov, 1997).

**Production Development.**—The situation in the industry should improve with the planned development of a series of domestic nuclear powerplants. There is much spare capacity to meet demand domestically and on the world market. However, to increase output to former levels of 3,200 to 3,500 t/yr of U will require renovation of existing enterprises, development of new mines, and introduction of underground leaching technology (Uzhkenov, 1997).

**Ownership Status.**—The Government firm KazAtomProm held the state share in uranium mining and processing enterprises. In 1996, the Canadian firm World Wide Minerals Ltd entered into an agreement to manage the Tselinny uranium mining and chemical complex with the option to purchase a 90% stake in Tselinny. (J.G. Wade, November 15, 1996, World Wide makes "go" decision on Kazakhstan uranium project, November 15, 1996, accessed on June 7, 1999, at URL <http://www4.techstocks.com/~wsapi/investor/subject-11296>). The cancellation of the management contract with World Wide Minerals in 1997 resulted in a legal dispute (World Wide Minerals Ltd., May 31, 1999, Corporate profile, accessed on June 7, 1999, at URL <http://www.worldwideminerals.com/WWS/InvRel.nsf/Public>). The Inkai joint venture was formed in 1966 with the Canadian company Cameco and the German firm Uranearth Exploration and Mining to develop the Inkai deposit; the Katco joint venture was formed in 1966 with Kogema of France to develop a deposit in the Zhambyl region (Peck, 1998, p. 48-50).

## References Cited

- Danayev, N.T., 1997, Gorno-metallurgicheskiiy kompleks Kazakhstana, osnovnye napravleniya razvitiya i investitsii [The mining metallurgical complex of Kazakhstan, basic directions in development and investment]: Kazmin' 97, 1st Kazakhstan International Mining Conference, Almaty, Kazakhstan, September 30, 1997, Proceedings, p. 66-71.
- Daukeev, S.Zh., ed. 1995, Mineral and raw material base of the Republic of Kazakhstan's on the verge of transition to market economy: Almaty, Ministry of Geology and Preservation of Underground Resources, 156 p.
- Gambogi, J.M., 1999, Titanium and titanium dioxide: U.S. Geological Survey Mineral Commodity Summaries 1999, p. 182-183.
- Gehler, Sylvain, 1998, Kazakhstan—A key factor in the growth of the titanium market: Titanium & Its Markets Seminar, February 15-17, San Antonio.
- Gosudarstvennyy Komitet Respubliki Kazakhstan Po Statistike I Analizu [State Committee of the Republic of Kazakhstan for Statistics and Analysis], 1996,

- Statisticheskiiy Yezhegodnik Kazakhstana [Kazakhstan statistical yearbook], Gosudarstvennyy Komitet Respubliki Kazakhstan Po Statistike I Analizu, Almaty, 312 p.
- Kruse, Michael, and Parchmann, Jochen, eds., 1998, Zentralasiatische Laender der GUS, XIII, Rohstoffwirtschaftliche Laenderstudien [Central Asian countries of the CIS, no. XIII, of Raw material country studies]: Hannover/Berlin, Bundesanstalt fur Geowissenschaften und Rohstoffe, 106 p.
- Interfax Mining and Metals Report, 1999a, Kazakhs still await environmental verdict on smelter plans: Interfax Mining and Metals Report, v. VIII, issue 3, January 15, p. 8.
- 1999b, Kazakhstan to put phosphorite deposit on stream: Interfax Mining and Metals Report, v. VIII, issue 7, February 2, 1999, p. 15.
- Interfax Statistical Report, 1998a, Key socioeconomic indicators for CIS nations: Interfax Statistical Report, v. VII, issue 13, March 20-27, p. 6.
- 1998b, Structure of foreign trade by Kazakhstan in 1997: Interfax Statistical Report, v. VII, issue 10, February 27-March 6, p. 17-20.
- Louis, P., 1998, Recent developments and short-term outlook for the supply and international trade of the main fertilizers and raw materials: IFA [International Fertilizer Association] Enlarged Council Meeting, 24th, 1998 FAI Annual Seminar, New Dehli, November, 57 p.
- Metal Bulletin, 1998, Production falls at Ispat Karmet: Metal Bulletin, December 10, p. 21.
- Peck, A.E., 1998, Assets on the block: Foreign investment in Kazakhstan's primary industries: Post Soviet Geography and Economics, v. 40, no. 7, October-November, p. 471-518.
- Uzhkenov, Bulat, 1998, Mineral'no-syr'yevoy kompleks respubliki Kazakhstan v mirovoy sfere proizvodstva [The mineral-raw material complex of the Republic of Kazakhstan in the world sphere of production]: Kazmin' 97, 1st Kazakhstan International Mining Conference, Almaty, Kazakhstan, September 30, 1997, Proceedings, p. 15-25.
- Zharkenov, M.I., 1997, Syr'yevoy potentsial Kazakhstana [The raw material potential of Kazakhstan]: Gornyy Zhurnal [Mining Journal], no. 10, p. 14-17.

## Major Sources of Information

In 1997-98, the capital of Kazakhstan was moved from Almaty to the new capital of Astana (formerly Akmola). Addresses for many of the agencies in Akmola are not yet available, and a number of the phone numbers are still connected to Almaty. Owing to the fact that many of the agencies are in the process of moving and a number of them appear to be undergoing organizational changes, the names and addresses listed may not be current or complete. In Astana, the main address of the National Government of Kazakhstan is 11 Mira St., Astana 473000, Republic of Kazakhstan.

National Agency for Statistics at the Ministry of Economy and Trade

125, Abai Avenue

Almaty, 480008

Kazakhstan

Telephone: 621323

Information & Presentation Center of the Mineral Sector of the Republic of Kazakhstan

85, Dostyk Avenue, first floor, Room 103

Almaty, 480100

Kazakhstan

Telephone: 7-(3272)-63 33 23; 63 54 16

Fax: 7-(3272) 63 87 73

Ministry of Natural Resources and Ecology  
Astana

Kazakhstan

Ministry of Economy

115 Zheltoksan Street

Astana, 480091



Kazakhstan  
Telephone: 00 7 3272 62 65 00  
Fax: 00 7 3272 63 66 05  
Ministry of Industry and Trade  
111 Gogolya Street  
Almaty, 480003  
Kazakhstan  
Telephone: 7-(3272)602-892  
Fax: 7-(3272)623-748  
Ministry of Finance  
97 Abylay Khan Avenue  
Astana, 480091  
Kazakhstan  
Telephone: 00 7 3272 62 40 75  
Fax: 00 7 3272 62 27 70

(Note: As of December 1997, there was a merger of the State Property Committee with the Privatization Committee, with the latter becoming the Privatization Department within the Ministry of Finance. The Department will monitor privatization contracts and supervise fulfillment of the terms of tenders.)

Ministry of Energy, Economy, Trade  
142 Bogenbay Batyr Street  
Astana, 480091  
Kazakhstan  
Telephone: 00 7 3272 62 6410  
Fax: 00 7 3272 62 66 30  
Committee of Earth Resources Management  
Astana  
Kazakhstan  
Telephone: 32 02 11  
State Committee for Investments  
Telephone: 00 7 3272 62 59 03  
Fax: 00 7 3272 69 22 37  
State Customs Committee  
555 Seyfullina Street  
Almaty, 480012  
Kazakhstan

Telephone: 7-(3272)399-924; Fax: 7-(3272)328-234  
State Tax Committee  
93/95 Ablai Khan Street  
Almaty, Kazakhstan, 480091  
Telephone: 7-(3272)620-432  
Fax: 7-(3272)624-863  
Chamber of Commerce and Industry of the Republic of  
Kazakhstan  
50 Kazybek Bi Street  
Almaty  
Kazakhstan, 480091  
Telephone: 7-(3272)621-446, 621-910  
Fax: 7-(3272)507-029  
United States-Kazakhstan Council  
531 Seyfullina St., Room 405  
Almaty, 480083  
Kazakhstan  
Telephone: 7-(3272)637-098  
Fax: 7-(3272)694-803  
In the United States:  
2000 L Street NW  
Suite 200  
Washington, DC 20036  
Telephone: (202)416-1624  
Fax: (202)416-1865  
Central Asian-American Enterprise Fund  
531 Seyfullina Street, second floor  
Almaty  
Kazakhstan  
Telephone: 7-(3272)654-695, 638-815  
Fax: 7-(3272)694-589  
In the United States:  
595 Madison Avenue  
Suite 3000  
New York, NY 10022

TABLE 1  
KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996	1997 e/
<b>METALS</b>					
Alumina	1,091,000 r/	822,300 r/	1,024,500 r/	1,083,000	1,050,000
Arsenic trioxide e/	2,000	1,500	1,500	1,500	1,500
Bauxite	2,911,000 r/	2,584,000 r/	3,319,000 r/	3,140,000 e/	3,100,000
Beryllium, metal e/	100	100	100	100	100
Bismuth, metal	180 r/	85 r/	33 r/	33 r/ e/	50
Cadmium, metal	773 r/	1,097 r/	797 r/	800 r/	900
Chromite	2,968,000 r/	2,103,000 r/	2,417,000 r/	1,190,000	1,800,000
Cobalt, mine output, metal content e/	600	300	300	300	300
<b>Copper:</b>					
Mine output, metal content e/	265,000 r/	210,000 r/ 2/	200,000	250,000	316,000
<b>Metal:</b>					
Smelter, undifferentiated	300,000 e/	285,000 r/ e/	242,800 r/	245,000 r/	310,000
Refined, primary	317,500 r/	278,500 r/	255,600	267,100 r/	301,100
Gold, primary e/ kilograms	20,000 r/	14,483 r/ 2/	18,200 r/	18,000 r/	18,600
Refined	8,648	10,444	10,921	10,000 e/	9,700
<b>Iron and steel:</b>					
Iron ore, marketable	13,129,000 r/	10,521,000 r/	14,900,000	13,200,000 r/	13,700,000
<b>Metal:</b>					
Pig iron	3,544,000	2,432,000	2,528,000	2,536,000	3,000,000
<b>Ferroalloys:</b>					
Ferrochromium	327,896	373,300 e/	511,600 r/	352,000	600,000
Ferrochromiumsilicon	60,800 r/	26,900 r/	21,300 r/	20,000 e/	15,000
Ferrosilicon	418,200 r/	208,200 r/	256,000 r/	119,000 e/	100,000
Silicomanganese e/	--	40,000	20,000	50,000	40,000
Other e/	15,000	10,000	10,000	10,000	9,000
<b>Steel:</b>					
Crude	4,279,000	2,969,000	2,963,000 r/	3,142,000	3,900,000
Finished	3,400,000	2,300,000	2,100,000	2,200,000	3,000,000 2/
<b>Lead:</b>					
Mine output, metal content	95,000 r/ e/	57,000	40,000	35,000 r/ e/	31,000
Metal, refined e/	255,000 r/	13,700 r/	88,500 r/	70,000 r/	76,000
Magnesium e/	2,000	-- 2/	9,000 r/	9,000 r/	8,972 2/
Manganese ore, marketable e/	400,000	400,000	428,000	430,000	400,000
Molybdenum, mine output, metal content e/	100 r/	100 r/	75 r/	100 r/	100
Nickel, mine output, metal content e/	8,500	8,500	9,900 2/	9,800	10,000
Silver e/	500,000	506,000 r/	489,000 2/	467,700 r/2/	465,000
Tin, including secondary	21 r/	14 r/	4 r/	4 r/ e/	4
Titanium, metal	8,354 r/	3,809 r/	9,592 r/	12,500	13,000 e/
Tungsten, mine output, metal content e/	350 r/	122 2/	249 r/2/	-- r/	--
Vanadium, metal content	800 r/	878	924	900 e/	900
<b>Zinc:</b>					
Mine output, metal content e/	250,000	190,000	225,000	225,000	225,000
Metal, smelter	238,500 r/	172,500 r/	169,200 r/	168,500	170,000
<b>INDUSTRIAL MINERALS</b>					
Asbestos, all grades	130,000 r/ e/	130,000 r/ e/	128,400 r/	128,700 r/	125,000
Barite	210,300 r/	90,200 r/	83,000 r/	50,000 r/e/	38,000
Boron	8,000 r/	7,000 r/	7,000 r/ e/	7,000 r/ e/	7,000
Cement	4,000,000	2,000,000	2,616,000	1,120,000 r/	661,000
Phosphate rock e/	4,000	1,700 r/ 2/	1,400	1,000	--
<b>Sulfur: e/</b>					
Native	-- r/	-- r/	-- r/	-- r/	--
Pyrites	219,000	200,000	71,000	71,000	--
<b>Byproduct:</b>					
Metallurgy	276,000	261,000	131,000	139,000	139,000
Natural gas and petroleum	182,000	219,000	255,000	515,000	806,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal	112,000,000	105,000,000	83,200,000	7,660,000	7,260,000 2/
Natural gas million cubic meters	6,700	4,500	4,800	6,400	8,100 2/
Petroleum, crude	23,000,000	20,300,000	20,600,000	20,500,000	25,800,000 2/
Uranium concentrate, U content	2,700	2,240 r/	1,630 r/	1,320 r/	1,000 2/

e/ Estimated. r/ Revised.

1/ Table includes data available through July 2, 1999.

2/ Reported figure.

TABLE 2  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Alumina	Pavlodar aluminum plant	Pavlodar	1,200,000.
Arsenic, trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent (Chimkent) 1/	3,500.
Asbestos	Dzhetygara complex	Qostanay (Kustanay ) region 1/	1,000,000 total.
Do.	Chilisay complex	Aqtobe (Aktyubinsk) phosphorite basin 1/	
Barite	Karagaylinskiy mining and beneficiation complex	Karagayliy region	300,000 total.
Do.	Tujuk Mine	Almaty region	
Do.	Achisay polymetallic complex	Kentau region	
Bauxite	Turgay, Krasnooktyabr bauxite mining complexes	Central Kazakhstan	600,000 total.
Beryllium, metal	Ulbinskiy metallurgical plant	Oskemen (Ust-Kamenogorsk) 1/	NA.
Bismuth, metal	Ust-Kamenogorsk lead-zinc metallurgical plant	do.	70 total.
Do.	Leninogorsk lead smelter	Leninogorsk	
Cadmium	Leninogorsk mining and beneficiation complex	do.	1,200.
Chromite	Donskoy mining and beneficiation complex	Khromtau region	3,800,000.
Coal	Karaganda Basin	Central and north-central parts of the country	50,000,000.
Do.	Ekibastuz Basin	do.	85,000,000.
Do.	Maykuben Basin	do.	10,000,000.
Do.	Turgay Basin	do.	1,000,000.
Copper, mining, recoverable copper content	Balkhash	Zhezkazgan (Dzhezkazgan) region 1/	200,000.
Do.	Dzhezkazgan	Zhezkazgan region	250,000.
Do.	Irtysk	Ertis (Irtysk) region	10,000.
Do.	Leninogorsk	Leninogorsk region	15,000.
Do.	Zhezkent	Zhezkent region	25,000.
Do.	Zyryanovsk mining and beneficiation complexes	Zyryanovsk region	5,000.
Do.	East Kazakhstan copper-chemical complex	East Kazakhstan region	10,000.
Copper, metallurgy, metal	Balkhash	Zhezkazgan region	150,000.
Do.	Zhezkazgan	do.	250,000.
Do.	Irtysk smelting and refining complex	Ertis region	40,000.
Do.	Ust-Kamenogorsk plant	Oskemen	37,100 (blister copper) 2/ 6,600 (refined copper) 2/
Ferroalloys	Aktyubinsk plant	Aqtöbe	High-carbon 60% ferrochrome, 150,000; medium-carbon 60%, ferrochrome, 130,000.
Do.	Aksu (Yermak) plant	Aksu (Yermak) 1/	Ferrosilicon 700,000; ferrosilicochrome, 700,000; high-carbon ferrochrome 400,000. silicomanganese, 90,000.
Gallium	Pavlodar aluminum plant	Pavlodar	NA.
Gold	Byproduct of polymetallic ores and native gold mining	Byproduct gold collocated with non-ferrous metals mining	30.
Iron and steel:			
Pig iron	Ispat-Karmet Steelworks	Karaganda	5,000,000.
Steel, crude	do.	do.	6,300,000.
Iron ore, marketable	Sokolovsko-Sarbay, and Lisakovskiy mining and metallurgical complexes	Qostanay region	25,000,000 total.
Lead and zinc, mining: (recoverable lead and zinc content of ore)	Achisay	Kentau and Karatau regions 1/	Lead 40,000, zinc 20,000.

See footnotes at end of table.

TABLE 2--Continued  
KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Lead and zinc, mining: (recoverable lead and zinc content of ore)	Akchatau	Zhezkazgan region	Lead 10,000, zinc 30,000.
Do.	Irtysk (apparently closed)	Oskemen region	Lead 10,000, zinc 50,000.
Do.	Karagayly	Karagayly region	Lead 20,000 zinc 55,000.
Do.	Leninogorsk	Leninogorsk region	Lead 60,000, zinc 120,000.
Do.	Tekeli	Tekeli and Taldyqorghan (Taldi-Kurgan) regions 1/	Lead 20,000, zinc 30,000.
Do.	Zhezkent	Semey (Semjipalatinsk) region	NA
Do.	Sary-Arkapolimetal	Zhayrang (Zhayrem) region	Lead 20,000, zinc 40,000.
Do.	Zyryanovsk complexes	Zyryanovsk region	Lead 20,000, zinc 60,000.
Do.	East Kazakhstan copper-chemical complex	East Kazakhstan region	Zinc 15,000.
Lead, refined	Ust-Kamenogorsk plant	Oskemen	145,000.
	Shymkent	Shymkent	NA
Manganese, crude ore	Atasurda	Atasu	2,550,000 total.
Do.	Kazakhmarganets	Zhezdy	
Do.	Sary-Arkapolimetal	Zhayrang (Zhayrem) region	
Molybdenum, mining: (recoverable molybdenum content of ore)	Kounrad Mine	Balqash complex	6,000 total.
Do.	Karaobinskoye deposit	Karaoba region	
Do.	Sayak deposit	Sayaq (Sayak) region 1/	
Molybdenum, metal	Akchatau molybdenum metal plant	Zhezkazgan region	NA.
Petroleum and natural gas	Aktubinsk munaigaz	Aqtobe region	28,000,000 (total crude oil 10 million cubic meters (total natural gas).
Do.	Embamunaigaz	Emba district	
Do.	Hurricane Kumkol Munai	Aral Sea region	
Do.	Karachaganak field	Northwestern Kazakhstan	
Do.	Mangistaumunaigaz	Mangghyshlaq (Mangyshlak) Peninsula 1/	
Do.	Tengizchevroil joint venture	Tengiz deposit	
Do.	Uzenmunaigaz	Uzen deposit	
Phosphate rock	Karatau production association	Zhambyl (Dzhambul) and Shymkent regions	10,000,000 total.
Do.	Chilisay mining directorate	Aqtobe phosphorite basin	
Rare metals (columbium, indium, selenium, tellurium).	Aktau complex	Aktau (Shevchenko)	NA.
Do.	Belogorsky rare metals plant	Belgorsiy (Belogorsk) 1/	NA.
Do.	Chimkent polymetallic plant	Shymkent	NA.
Do.	Ust-Kamenogorsk lead-zinc plant	Oskemen	NA.
Do.	Akchatau mining and beneficiation complex	Zhezkazgan region	NA.
Rhenium	Balkhash copper mining and metallurgical complex	do.	NA.
Tantalum	Yermak ferroalloy plant	Aksu	NA.
Tin	Akchatau mining and beneficiation complex	Akzhal deposit, Zhezkazgan region	700.
Titanium, metal	Ust-Kamenogorsk titanium- magnesium plant	Oskemen	35,000.
Silver, byproduct	Ust-Kamenogorsk	do.	1,200 total.
Do.	Leninogorsk	Leninogorsk	
Do.	Chimkent metallurgical plants	Shymkent	
Uranium, U content	Stepnogosk	Stepnogosk	3,500 total.
Do.	Shevchenko	Aqtau	
Do.	Taboshara	Taboshara	
Do.	Prikaspiskiy ore enrichment center	Aqtau	
Do.	Tselinny chemical complex	Stepnogosk	
Zinc, metal	Leninogorsk	Leninogorsk	106,500. 2/
Do.	Ust-Kamenogorsk plant	Oskemen	215,000. 2/

e/ Estimated. NA Not available.

1/ New names and spellings are given when available. The old name will appear in parentheses the first time the new name is used.

2/ Reported figure.