

## THE MINERAL INDUSTRY OF

# UZBEKISTAN

By Richard M. Levine and Walter G. Steblez

Uzbekistan was the third most populous state created from the former Soviet Union (FSU) and the fourth largest in land area. Well endowed with mineral wealth, it was among the world's largest producers of gold, which was a significant source of foreign currency earnings. Gold exploration continued to be an important activity in the country's mineral industry.

Along with gold, Uzbekistan produced a number of other nonferrous metals important to its economy, including copper, lead, molybdenum, silver, tungsten, and zinc, as well as natural gas and uranium. The country also produced steel, coal, and oil and had one of the FSU's largest gas-processing facilities at Mubarek. It also produced significant quantities of industrial minerals, including feldspar and fluorspar, as well as a range of minerals for the construction industry.

Soon after declaring independence in 1991, Uzbekistan established economic policies that differed from more market-oriented approaches taken by several other former Soviet republics. State subsidies, price controls, and gradual wage increases were used to shield consumers from inflation. By 1994, however, mounting economic problems resulted in an economic reform program that included stricter fiscal policies, removing some price controls, cooperating with international financial institutions, introducing the Soum as the new national currency, and privatizing some state assets.

In 1997, Uzbekistan's gross domestic product (GDP) and industrial output increased by 5.2% and 6.5%, respectively, compared with those of 1996. This was the second year in a row that the GDP grew, although industrial output had been increasing each year since 1993. Net changes in the value of production by subsectors of industry from 1996 to 1997 showed the output of ferrous metals declining by 17.1% and that of nonferrous metals increasing by 7.6%. Also, the value of output of the chemical and petrochemical and mineral fuel sectors showed increases of 1.3% and 4.2%, respectively, while those of construction materials and electric power sectors registered declines of 3.4% and 1%, respectively. Uzbekistan's minerals industry achieved the following preliminary production results for selected commodities in 1997. The output of rolled steel amounted to 362,000 metric tons (t), which was a 7% decrease compared with that of 1996. Production of cement and mineral fertilizers amounted to about 3.5 million metric tons (Mt) and 1 Mt, respectively, which were the same levels as in 1996. Production of coal, petroleum and gas condensate, and natural gas amounted to 3.1 Mt, 7.9 Mt, and 51.2 billion cubic meters, respectively, which were slight increases compared with those of 1996. Also, Uzbekistan's output of electric power in 1997 amounted to 45.5 billion kilowatt hours, which was also a slight increase compared with that of 1996 (Interfax News Agency,

1998e).

In 1997, of the total foreign investment in the economy of Uzbekistan, the petroleum refining, natural gas, and nonferrous metals sectors were designated to receive 6.7%, 2.5% and 2.5%, respectively. Foreign investment in 1998 was anticipated to amount to \$2.9 billion (Interfax News Agency, 1998e).

The Government's investment program for geologic survey and exploration work for 1998 called for an expenditure of \$50 million, about the same amount that was allocated in 1997 (Interfax News Agency, 1998i). According to spokespersons from the State Committee for Geology and Natural Resources, more than one-half of the funds were to be allocated for gold and nonferrous metals prospecting. The State Committee for Geology indicated that declines in the world gold market had not resulted in any waivers of prospecting rights by foreign companies in Uzbekistan, although many of these companies had not yet clearly defined their programs and level of financing for 1998. The major international companies participating in exploration and development of mineral resources in Uzbekistan included Newmont Mining Corporation of the United States; Mitsui Corporation of Japan; Cameco Corporation, Teck Corporation, RUX Resources Inc., and the Mazarin Mining Corporation of Canada; and Rio Tinto plc and Oxus Mining Limited of the United Kingdom (Nizamov, 1998).

Production of several important mineral commodities produced in Uzbekistan is presented in table 1. These data were provided primarily by the Interstate Statistical Committee of the Commonwealth of Independent States (CIS).

The latest mineral trade data available for Uzbekistan lists total exports of selected minerals in 1997 as follows: secondary aluminum, 1,300 t; copper, 66,727 t; and zinc, 2,500 t (Interfax News Agency, 1998f).

Although not a producer of primary aluminum, Uzbekistan collected and processed scrap through Uzvtorchmet, the country's secondary metals processing concern. Uzbekistan reported shipping 1,100 t of aluminum to the Russian Federation from January through November 1996 (Interfax News Agency, 1997e). Reportedly, the construction of a kaolin-fed alumina refinery was put in abeyance owing to a lack of interest by foreign investors. The original feasibility study for the refinery was carried out by the Russian Aluminum and Magnesium Institute (VAMI) of St. Petersburg and financed by Matabex of Switzerland. The proposed 200,000-metric-ton-per-year (t/yr) alumina plant was to have been built in Akhangaran to take advantage of the annual output of about 6 Mt of kaolin extracted with coal at the Angren open-pit coal mine. Only about one-tenth of the kaolin produced in association with coal mining has been put to commercial use; the rest has been stored in dumps (Interfax

News Agency, 1997k).

In 1997, the Almalyk Mining and Metallurgical Complex was Uzbekistan's major base metals producer. Almalyk mined copper-molybdenum ores. In 1997, mining of lead-zinc ores was sharply curtailed. It had a copper smelter and refinery and a zinc refinery and produced refined copper, molybdenum, and zinc concentrates, as well as a number of byproduct metals, including bismuth, gold, and silver. At Almalyk, copper-molybdenum ores were mined from two open pits, the Kalmakyr and the Sary-Cheku. At these mines, the copper ores reportedly grade between 0.4% and 0.5% copper, and the molybdenum ores, between 0.004% and 0.005% molybdenum. Almalyk was interested in developing new higher grade deposits and acquiring processing technologies to extract minerals from lower grade ores.

Founded in 1949, Almalyk began mining copper-molybdenum ore in the early 1950's at the Kalmakyr deposit. During the enterprise's first 45 years of operation, about 15% of its known copper reserves and 17% of the associated gold reserves had been extracted (Ramazanov, 1984, p. 100-101; Nizamov, 1998).

In 1997, the Government was engaged in preparations to offer 40% of Almalyk's stock for sale to foreign investors through tenders. Daewoo Corporation of the Republic of Korea, Gerald Metals Inc. of the United States, Glencore International of Switzerland, and a consortium consisting of Thyssen Handelsunion and Siemens of Germany and Svedala of Sweden expressed interest in the sale. About one-half of the proceeds from the sale of stock reportedly would be allocated for retooling and modernization of the complex between 1997 and 2007. The modernization program, according to industry experts, would result in an increase of 50% to 70% in the output of copper and precious metals in 2007 compared with that of 1997. Plans called for upgrading smelting and refining technology for improving environmental protection (Interfax News Agency, 1997k).

Almalyk's mining operations provided about 70% of Almalyk's metallurgical copper feedstock requirements. The balance was imported as concentrates from Mongolia and Russia (Interfax News Agency, 1997j). About 23,000 t of copper metal was produced from concentrates imported from Mongolia from January to October 1997 (Interfax News Agency, 1997a). Almalyk was also Uzbekistan's sole producer of silver and second largest producer of gold (after Muruntau), accounting for about 12% to 20% of the country's total output of gold (Interfax News Agency, 1997f).

Most of Almalyk's production was exported. Exports in 1993 were valued at \$11.9 million, rising to \$96 million in 1995 and \$137 million in 1996. In 1997, Almalyk's export target amounted to about \$160 million. Despite the enterprise's improving production and export results, a reported continuing shortfall of working capital prevented the planned overhauls of capital equipment (\$40 million spent as opposed to \$100 million planned for the 10-month period from January to October, 1997). Similarly, a shortfall (\$10 million instead of \$30 million) was reported for purchases of new equipment during the same period (Interfax News Agency, 1997q).

An agreement was signed during the year between the Aurum Minerals Co. of Canada and Uzbekistan's Ugol coal mining enterprise to extract germanium from the Angren coal deposit. Angren's annual output of coal exceeded 3 Mt, 200,000 t of which

reportedly had an average germanium content of about 30 grams of germanium per metric ton of coal. A feasibility study undertaken by Aurum assessed the development of a hydrometallurgical method of extracting germanium from coal, which will involve the separation of germanium from crushed coal (Aurum Minerals Co., 1998, Germanium extraction from coal program—Uzbekistan: Aurum Minerals, accessed August 12, 1998, at URL <http://www.totalnet/~bogdan/germanium.html>). Uzbekistan's explored resources of gold were estimated to be about 5,300 t. The main reserves of gold, amounting to about 3,200 t, are in the Central Kyzylkum region. The Muruntau gold deposit, the largest deposit of gold in Eurasia and considered to be among the largest deposits of gold in the world, produced 1,186 t of gold between 1967 and 1996. As of January 1, 1996, reserves of gold at Muruntau were reported to be 2,230 t. Undiscovered resources to a depth of 1,500 meters (m) could add another 1,800 t of gold. Muruntau's milling operation annually processes more than 22 Mt of ore (U.S. Trade and Development Agency and the State Committee of Geology and Mineral Resources of the Republic of Uzbekistan, 1996, p. 23).

According to the State Committee for Geology and Natural Resources, seven gold deposits were under development in 1997; by 2005, Uzbekistan envisaged that gold production may be as high as 126 t (Interfax New Agency, 1997h). Foreign investment in Uzbekistan's gold mining and processing sector again played a prominent role in 1997. The leading foreign investor was Newmont, which had a 50% interest in the Zarafshan joint venture (JV) and an Uzbek Government conglomerate (50%) consisting of the State Committee of Geology and Natural Resources and the Navoi mining and beneficiation complex. The Zarafshan JV processed gold bearing tailings from the Muruntau gold mining operation. Muruntau tailings were estimated to contain more than 160 t of gold (Interfax News Agency, 1997c).

Located about 460 kilometers (km) west of Tashkent in the Kyzylkum Desert, the Zarafshan operation consisted of a four-stage crushing plant and heap-leach-processing system working in conjunction with a Merrill-Crowe gold recovery plant. During 1996, gold production at the Zarafshan-Newmont operation amounted to 10.154 t and was expected to reach 12 t in 1997 (Interfax News Agency, 1997c; Newmont Mining Corporation, 1998).

In early 1997, the Government of Uzbekistan and William Resources of Canada signed an agreement to form an equal partnership JV for exploration and development of the Kairagach gold and the Aktepe silver deposits. The operating principals in the new joint venture, Uz-Can Mining, were RUX, a subsidiary of William Resources and of Uzbekistan, the State Committee for Geology and Natural Resources, and Tashkentgeologiya (Interfax News Agency, 1997c).

Also in early 1997, Mazarin Mining and Rio Tinto of the United Kingdom bid on tenders to explore and develop seven areas believed to contain gold and nonferrous metals offered in 1996. One of the more-explored regions includes the 260-square-kilometer (km<sup>2</sup>) Tamdybulak region, about 25 km north of Muruntau. Gold, silver, and tungsten trioxide resources at Tamdybulak were estimated to be 350 t, 200 t, and 50,000 t, respectively. Exploration work was expected to take 3 to 6 years (Interfax News Agency, 1997c).

The Zoloto Pustyni JV [Teck (49% equity, through its subsidiary, Central Asia Gold Corporation) and the State Committee for Geology and Natural Resources and Kyzyltepageologiya of Uzbekistan (51%)] was established in September 1996 to explore for gold, silver, and nonferrous metals in the Kuldzhuktau mountains in the southwestern part of the Kyzylkum desert. Provisions in the regulations granted Zoloto Pustyni exclusive rights to conduct geologic work within the designated 1,000-km<sup>2</sup> territory and to mine deposits discovered in the region for up to 30 years. Two lode occurrences in the area of study reportedly had been identified with a possible gold content of 10 t (Interfax News Agency, 1997m).

In August, Lonrho PLC of the United Kingdom reportedly decided to discontinue financing operations for the Amantaytau Goldfields JV, in which it owned a 35% interest. Lonrho's decision was based mainly on rising capital and production costs. Other Western investors in the project included the International Finance Corp. with 8% of the assets. The joint-venture project intended to develop and mine the Amantaytau and the Daugistau deposits in the central Kyzylkum area; both are believed to host up to 279 t of gold. The first stage of the mining operation was to be commissioned in 1998. Reportedly, Lonrho and the State Committee for Geology and Natural Resources arrived at an agreement to seek a new partner to purchase Lonrho's 35% stake in Amantaytau Goldfields (Interfax News Agency, 1997b).

In late 1997, Cameco reportedly indicated strong interest in acquiring Lonrho's entire stake in the Amantaytau JV. Cameco had been involved in the Central Asian region in the development of the Kumtor gold deposit in Kyrgyzstan (Interfax News Agency, 1997i).

Also, in late 1997, WMC Ltd. of Australia, which won a tender in 1996 to develop the Gudzhumsay and the Zarmitan gold deposits with Uzbek authorities, indicated 2000 as the target date for the start of gold production at the Zarmitan deposit. WMC and the Government of Uzbekistan, however, were still involved in negotiation on the terms of a proposed joint venture to exploit the deposits commercially. Total resources at the two deposits reportedly amount to 21 Mt of ore, grading 10 g/t gold. The mine-development project involved the modernization of the Mardzhubulak gold recovery plant and the expansion of capacity of operating mines in the area, with output from the project projected to be from 13 to 15 t/yr of gold (Interfax News Agency, 1997q).

In 1997, the Government of Uzbekistan planned the sale of stock in the Bekabad metallurgical plant [also referred to as "Uzbekmetzavod" (the Uzbek metallurgical plant)], the country's only steelmaking plant comprising two 100-t electric arc furnaces with a combined rated capacity of 750,000 t/yr and three 100-t open-hearth furnaces with a combined rated capacity of 320,000 t/yr; the mill also possessed continuous casting machines and rolling mills. In early 1998, the Government announced plans to offer 44% of the shares of Bekabad stock to bidders, including foreign investors. In 1997, Bekabad produced 381,000 t crude steel, which was 13.8% less than that produced in 1996. Rolled steel production also declined by 7%, to 362,000 t. The plant was founded in 1943 mainly to process scrap from the Central Asian republics of the FSU. Raw material shortages began to emerge following the dissolution of the Soviet Union in 1992. In recent

years, a shortage of scrap feedstock has resulted in capacity utilization of only 25% to 30% (Interfax News Agency, 1998d). According to spokespersons from the Uzbek State Committee for Geology, the recently discovered iron ore deposits at Syuren-Ata and Temirkan may play a vital role in the steel plant's future operations. The Temirkan deposit contains an estimated 54 Mt of iron, with the ore grading about 32% Fe. The Syuren-Ata deposit has not been fully explored, but the Uzbek State Committee for Geology estimated its reserves to be 24.7 Mt of iron, with the ore grading 37.7% Fe. Additional resources at this deposit were estimated to be 58.2 Mt of iron, with the ore grading 32% Fe. The Syuren-Ata deposit was suitable for open-pit exploitation; the Temirkan deposit, however, could be mined only by underground methods. Mine-development decisions would be made subsequent to the completion of exploration and evaluation work at the Syuren-Ata deposit (Interfax, News Agency, 1998a).

At Almalyk, lead-zinc ores had been mined from three underground mines—the large Altyn Topkan with a capacity of more than 1.5 Mt/yr, the Uch Kulach Mine with a capacity of about 1 Mt/yr, and the Uch Pay mine with a capacity of about 100,000 t/yr. At these mines, the lead-zinc ores reportedly grade from 1% to 2% for lead and 1% zinc. Lead-zinc mining in Uzbekistan was sharply curtailed during 1997, and the country relied mainly on imported concentrates to produce metallic zinc. In 1997, Almalyk was estimated to have produced 50,000 t of metallic zinc.

The country hoped to increase lead-zinc mining by developing new mines. Polymetallic deposits containing lead, zinc, copper, and associated silver, gold, cadmium, selenium, and indium were found at Khandiza. In 1997, Oxus conducted a feasibility study focusing on the development of the Khandiza deposit. The completed feasibility study was to be submitted to the State Committee of Geology and Mineral Resources by December 1997. An initial agreement was signed between Oxus and the Government of Uzbekistan in December 1996 to conduct this work. The Khandiza lead-zinc deposit, in the Sukhandarya region, was reported to have reserves of about 22 Mt of ore containing 700,000 t Pb, 1.54 Mt Zn, 180,000 t Cu, and 2,300 t Ag. Additionally, there were reportedly commercially significant amounts of associated cadmium, gold, indium, and selenium. As part of its exploration and project feasibility work, Oxus conducted independent drill core analysis to validate Uzbek geologic data. Development of the Khandiza deposit through a possible joint venture between Oxus and Uzbekistan's commercial entities would be contingent upon the outcome of the study (Interfax News Agency, 1997d; Nizamov, 1998, p. 15).

Resources of lithium were identified at the Shavazsai lithium deposit in the southern slopes of the Chatkal mountain range, in the Tashkent region. According the State Committee for Geology and Mineral Resources, the Shavazsai deposit hosts reserves of about 31 Mt of ore containing about 165,500 t of lithium oxide. Recoverable byproducts include about 10,000 t of rubidium oxide and about 7,000 t of cesium oxide contained in the ore (U. S.. Trade and Development Agency and the State Committee of Geology and Mineral Resources of the Republic of Uzbekistan, 1996, p. 123). Specialists from the State Committee for Geology indicated that recoveries ranging between 67% and 78% could be achieved. Development of the deposit would be by open-pit

mining. Potassium and sodium sulfate also could be produced as byproducts, and part of the tailings could be used in cement production at the nearby cement plant. In 1997, the Government reportedly began the search for foreign investment capital to develop the deposit (Interfax News Agency, 1998b; Nizamov, 1998, p. 22).

Molybdenum concentrates produced by the Almalyk mining and beneficiation complex are shipped to the Uzbek Refractory and High-Temperature Metals Plant (Uzbek Refractory) in Chirchik. These shipments have been able to satisfy only 30% of the plant's feedstock requirements; consequently the plant was operating at only 50% of capacity (Interfax News Agency, 1997n). Molybdenum concentrates were imported mainly from Russian mines in the Orenburg region of the Urals and also from Mongolia and the Primorye region in the Russian Far East. In 1997, Spetsplav, the parent organization of the Refractory and High-Temperature Metals Plant, began to explore the possibility of importing molybdenum concentrate from Armenia as a direct purchase or on a tolling basis.

In addition, Spetsplav controlled more than 10 enterprises, including the Ingichka tungsten mine in the Samarkand region and the Koytash tungsten mine in the Dzhizak region, with design capacities of 500,000 t/yr and 165,000 t/y of ore, respectively (Interfax News Agency, 1998k, p. 6). Enterprise sources indicated continuous declines of tungsten ore grades at both mines. Spetsplav planned to discontinue tungsten mining at the Koytash mine and convert it into a wollastonite mining operation. Despite problems in the country's tungsten industry, Uzbekistan reportedly claimed to possess the world's third largest reserves of tungsten. The main undeveloped deposits are in the central Kyzylkum mountains, including the Sarytau and the Sautbai deposits, which were under exploration in 1997 by the State Committee for Geology and Natural Resources and Mindeco, a subsidiary of Japan's Mitsui Corporation (Interfax News Agency, 1997o).

The Taskazgan graphite deposit, about 230 km northwest of the Bukhara railway station in the Beltau mountains, also contains cobalt, copper, gold, nickel, and platinum-group metals, as well as significant quantities of wollastonite and zeolite. This deposit was discovered in 1928 and sporadically explored from 1931 to 1961. Graphite reserves suitable for development according to the Soviet reserve classification system (balansovye rezervy) were reportedly 6.135 Mt of ore containing 1.115 Mt of graphite, 500 t of cobalt, 3,000 t of copper, and 10,000 t of nickel. In the deposit are 6 major explored graphite-bearing ore bodies in graphitized gabbros and about 100 smaller ore bodies in the contacts of gabbro and Paleozoic carbonate rocks. The ore bodies vary from 0.5 to 51.0 m thick, with an average thickness for the entire deposit of 10.5 m. Before 1988, the deposit was operated by the Bukhara graphite-gypsum enterprise. In the beginning of 1989, operation ceased owing to a loss of customers. Some graphite, about 60 t/yr, was mined for local metallurgical use from the rich part of the deposit (Arum Minerals Co. 1998, Taskazgan graphite—Gold deposit, accessed August 12, 1998, at URL <http://www.total.net/~bogdan/graphite.html>; U.S. Trade and Development Agency and the State Committee of Geology and Mineral Resources of the Republic of Uzbekistan, 1996, p. 130).

Wollastonite reportedly is contained in commercially

significant quantities in the Koytash tungsten deposit. Plans called for phasing out the Koytash underground tungsten mining operation and converting it to an open pit wollastonite mine. Spetsplav expected the conversion process to last about 2 years. When fully operational, the converted mine would produce about 100,000 t/yr of ore, which should be enough to produce up to 30,000 t/yr of wollastonite concentrate. Commercial resources at the Koytash deposit reportedly amount to about 4.15 Mt of ore, containing 36.3% to 38.7% wollastonite (Interfax News Agency, 1997n).

In 1997, Uzbekistan increased its output of coal by 10% to produce about 3.13 Mt. The coal mining and processing enterprise Ugol, Uzbekistan's sole producer of coal, mined 97% of its coal from the Angren lignite field in the Tashkent region. The enterprise sold about 92% of its production in 1997 to the country's electric power industry. Ugol's exports of coal in 1997 amounted to about 70,000 t, compared with 100,000 t exported in 1996. Ugol also was involved in the development of the Shargun anthracite deposit in the Surkhandarya region, which produced a small amount of coal (74,000 t) in 1996 (Interfax News Agency, 1997g, p. 13).

In 1997, Uzbekistan increased production of natural gas and crude oil. By 1997, the country ceased being a net importer of crude oil, but continued to import some refinery products. According to the Soviet reserve classification system, Uzbekistan's resources of petroleum were estimated to be 4.435 billion metric tons, of which 527 Mt are termed "proven" reserves. Estimated resources of natural gas amount to 5.4 trillion cubic meters, of which 2 trillion cubic meters is proven reserves. Petroleum and natural gas occur in 160 deposits largely in the Bukhara-Khivin and the Fergana regions of the country (Interfax News Agency, 1997l). In 1997, Uzbeneftgaz negotiated with foreign petroleum companies, including Agip of Italy, Mobil Corporation and Unocal Corporation of the United States, and National Oil Corporation of Japan, to develop the country's petroleum and natural gas resources.

Uzbekistan had two operating oil refineries, the Fergana and the Alty-Aryk, with a combined capacity of 8.6 Mt/yr. Mitsui and Toyo Engineering of Japan were involved in renovating Fergana to install desulfurization equipment and to improve the quality and increase the quantity of the diesel fuel and gasoline produced. In mid-1997, Uzbekistan commissioned the first stage of a new petroleum refinery in Bukhara. The refinery was built with assistance from Technip of France and Marubeni Corporation and JGC Corporation of Japan. The refinery would produce 660,000 t/yr of unleaded gas, 1.33 million metric tons per year of diesel fuel, 300,000 t/yr of aviation fuel, and 12,000 t/yr of sulfur (Interfax News Agency, 1997j).

Also in midyear, Gazprom of the Russian Federation reportedly began considering joining an existing joint venture between Enron Corporation of the United States and Uzbekneftgaz. The existing agreement called for joint gas drilling and export of natural gas through the Russia Ukrainian pipeline network. Gazprom earlier had agreed to allow transit of Uzbek gas, but was considering entry into a joint venture in lieu of collecting transit fees. About 3 billion cubic meters per year of natural gas would be shipped during the first stage and about 5 billion cubic meters per year was to be shipped in the final stage of development

(Interfax News Agency, 1997j).

The Navoi Mining and Metallurgical Complex of Uzbekistan had been among the Soviet Union's major producers of gold and uranium. According to the International Atomic Energy Agency, Uzbekistan is believed to possess the world's seventh largest reserves of uranium. In 1997, Navoi produced about 2,000 t of uranium compared with 1,700 t in 1996. The production target for 1998 was set for about 3,000 t (Interfax News Agency, 1997p).

Lacking a domestic nuclear power industry, during the Soviet period, Navoi exported its uranium production to the Russian Federation for disposition. Since 1992, after the dissolution of the Soviet Union, all the country's uranium production was exported via the Nukem Corp. of the United States. Uzbekistan's resources of uranium were concentrated in 27 deposits, collectively containing a resource of about 55,000 t of uranium (Interfax News Agency, 1997p).

A long-term program of facility modernization and expansion, was begun in 1997; completion was envisaged by 2030. In 1997, Navoi operated three uranium mining divisions. In situ leaching was the chief mining method, where drilling and bore-hole operations composed the main operational activities at the mines. In late 1996, Navoi commissioned a new 2,000-t/y PVC pipe plant. The equipment for the plant was supplied by Mannesman Demag A.G and Klau Massei of Germany. The plant will produce pipe in quantities sufficient to meet all Navoi's annual needs for bore-hole casings; previously, Navoi purchased its casing from the Russian Federation. Industry sources estimated that the new pipe plant will allow a reduction of mining costs by 30% (Interfax News Agency, 1997p). In January 1997, Navoi commissioned a plant to produce submersible pumps; the 1,000-unit-per-year plant also would meet all needs for this equipment. With respect to drilling equipment, Navoi concluded an agreement with the Kungur Drilling Equipment Enterprise in the Perm Region of the Russian Federation. Kungur agreed to deliver drilling units, modified to meet the company's technical requirements, to Navoi by the first half of 1997. In 1997, active negotiations to form a joint mining venture with Nukem were suspended, although Nukem remained the principal exporter of Uzbek uranium to the western market. In 1997, joint uranium mining ventures in Uzbekistan with Cogema of France and the Ministry of Atomic Energy of the Russian Federation were under consideration (Interfax News Agency, 1997p). In 1997, Navoi began to develop the Kendyuk-Tyube uranium deposit. It also expected to begin mining operations at the Levlekan deposit by mid-1998. Industry experts expected a production increase of 300 to 400 t/yr of uranium metal from these mines. The company planned to increase production by 15% to 20% in 1998 compared with that of 1997 (Interfax News Agency, 1998c).

Given Uzbekistan's large gold production, as well as its self-sufficiency in mineral fuels, the mineral sector was and will remain one of the chief contributors to the country's economic development. The country was initially successful in attracting foreign investment to its gold mining sector. Its other mineral sectors, however, were also in need of investment. Their future will depend on assessing whether these other mineral industries can produce profitably for domestic and/or foreign markets and the degree to which Uzbekistan can finance their development

either through domestic or foreign investment.

Having been the first country in the FSU to have attracted large-scale foreign investment into its nonfuel mineral sector for gold production, Uzbekistan enjoyed, for a time, a reputation of having provided a business climate amenable to large-scale mineral industry investment. Despite Uzbekistan's initial success in attracting foreign investment in mineral development, however, the country still has not undergone a number of aspects of economic reform that would facilitate investment in the mineral industry, including aspects of tax reform and allowing investors full convertibility of the Soum into foreign currency. It appears that investment would proceed more rapidly if necessary legal and financial frameworks were established to permit enterprises to operate more in accordance with market practices.

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TABLE 1  
UZBEKISTAN: PRODUCTION OF MINERAL COMMODITIES

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996	1997 e/
<b>METALS</b>					
Aluminum, secondary e/	3,000	2,000	2,500	2,500	2,700 1/
Copper: e/					
Mine output, Cu content	80,000	50,000	40,000	65,000 e/	73,000
Metal:					
Blister	83,000 r/	70,000	75,000	80,000	85,000
Refined	90,000 r/	90,000	95,000	100,000	115,696 1/
Gold e/	65 r/	65	65	72	82
Lead, mine output Pb content e/	20,000	15,000	10,000	7,500	500
Molybdenum, mine output, Mo content e/	500 r/	500	400	500	500
Silver e/ kilograms	65,000	65,000	70,000	70,000	75,000 1/
Steel:					
Crude	573,000	364,000	352,000	444,000	371,400 1/
Rolled	580,000	340,000	320,000	390,000	350,000
Tungsten, mine output, W content e/	300 r/	300	300	300	250
Uranium, mine output, U content e/	2,500 e/	2,000 e/	2,000	1,700	1,955 1/
Zinc: e/					
Mine output, Zn content	35,000 r/	30,000	15,000	12,000	1,000
Metal, smelter	50,000	70,000	70,000	40,000	50,000
<b>INDUSTRIAL MINERALS</b>					
Cement	5,300,000	4,800,000	3,400,000	3,300,000	3,300,000
Feldspar e/	80,000	70,000	70,000	70,000	70,000
Fluorspar e/	100,000	90,000	90,000	90,000	90,000
Graphite e/	60	60	60	60	60
Kaolin e/	5,500,000 r/	5,500,000	5,500,000	5,500,000	5,500,000
Mineral fertilizers	1,300,000	800,000	900,000	1,000,000	954,500 1/
Nitrogen, content of ammonia e/	900,000	800,000	900,000	950,000	950,000
<b>MINERAL FUELS</b>					
Coal	4,700,000 r/	3,800,000	3,100,000	2,844,000	3,130,000 1/
Natural gas billion cubic meters	45.0	47.2	48.6	49.0	51.2 1/
Petroleum and gas condensate	3,900,000	5,500,000	7,600,000	7,624,000	7,891,000 1/

e/ Estimated r/ Revised.

1/ Reported figure.

TABLE 2  
UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(Metric tons unless otherwise specified)

Commodity	Major deposits/ facilities	Location 1/	Annual capacity e/
Coal	Central Asian Coal Association (mining) Angren brown coal deposit Baysunskoye deposit	Angren region Surkhondaryo region	6,000,000. 1,000,000.
Copper:			
Mine output, Cu content	Almalyk mining and metallurgical complex mining Kalmakyr and Sarycheku deposits	Toshkent Wiloyati (Tashkent oblast )	100,000.
Metal	Almalyk refinery	Olmalik (Almalyk)	130,000.
Feldspar	Karichasayskoye and other deposits	Deposits in Samarqand (Samarkand) and Toshkent (Tashkent) regions and Karakalpakstan (Karakalpakskaya ASSR)	120,000.
Fertilizers	Kokand superphosphate plant Samarkand chemicals plant Ammophos production association	Quqon (Kokand) Samarqand	NA. NA. NA.
Fluorspar	Agata-Chibargata, Aurakhmat, Kengutan, Kyzylbaur, Naugarzan, and Nugisken deposits	East of Toshkent (Tashkent)	150,000.
Gold	Muruntau deposit	Nawoiy (Navoi) region	85.
Kaolin	Angren deposit	Angren region	8,000,000.
Lead-zinc:			
Mine output, metal content	Almalyk mining and metallurgical complex mining Uchkulach deposit	Toshkent Wiloyati (Tashkent oblast)	40,000 (lead). 80,000 (zinc).
Zinc, metal	Almalyk refinery	Olmalik (Almalyk)	120,000.
Molybdenum:	Almalyk mining and metallurgical complex mining Kalmakyr, Sarycheku deposits	Toshkent Wiloyati (Tashkent oblast)	900.
Mine output, Mo content			
Metal	Uzbek refractory and hard metals plant	Chirchiq (Chirchik)	NA.
Natural gas liquids	Mubarek gas-processing plant	Muborak (Mubarek)	1,200,000.
Petroleum and natural gas	More than 40 oil and gas deposits and more than 15 gas deposits under exploitation	Oil and gas deposits are concentrated in the Bukhoro-Khiwa (Bukhara-Khiva) and Sukhondaryo regions and the Farghona (Fergana) valley	5,000,000. (petroleum).
Do.	Major gas deposits: Dzharkakskoye, Gazlinskoye, Mubarekskoye, and Shurtanskoye	See above.	50 billion cubic meters (natural gas).
Do.	Major oil deposits: Khaudagskoye, Uchkyzylskoye, Plautomspue, Palvantashskoye Yashi, Alamyshikskoye, Sharikhan-Khodzhiabadskoye	See above.	5,000,000 (petroleum).
Petroleum, refined	Fergana oil refinery	Farghona region	NA.
Do.	Bukhara oil refinery	Bukhoro	NA.
Steel, crude	Bekabad steel mill	Bekabad	1,100,000.
Tungsten:			
Mine output, W content	Koytash deposit Ingichka deposit Ugat deposit	Northeastern Uzbekistan Zirabulakskie Mountains northern Uzbekistan	1,200.
Metal	Uzbek refractory and hard metals plant	Chirchiq (Chirchik)	NA.
Sulfur	Mubarek gas-processing plant complex	Mubarek	2,000,000.
Uranium	Navoi mining and metallurgical complex	Nawoiy (Navoi) region	NA.

e/ Estimated. NA Not available.

1/ New names and spellings for locations will be used whenever available; old names will appear in parentheses.