

# 2006 Minerals Yearbook

# COMMONWEALTH OF INDEPENDENT STATES

# THE MINERAL INDUSTRIES OF THE COMMONWEALTH OF INDEPENDENT STATES

### Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan

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The Commonwealth of Independent States (CIS) was created in December 1991 by Republics of the former Soviet Union (FSU) and then extended to all the former Soviet Republics except the Baltic states of Estonia, Latvia, and Lithuania. In the adopted Declaration, the participants of the Commonwealth declared their interaction to be based on the principle of the sovereign equality of all members and that the member states were independent and equal subjects of international law. The CIS was not a state and it did not have supranational powers. In 2006, the members of the CIS were Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. Turkmenistan discontinued permanent membership as of August 26, 2005, and became an associate member. Turkmenistan, however, was establishing closer cooperation with the CIS following the death of its President in December 2006 and the installation of a new President (Durdiyeva, 2007).

In September 1993, the Governments of the CIS states signed an agreement on the creation of an economic union that would form a common economic space based on the free movement of goods, services, labor, and capital; the union would work to coordinate monetary, tax, price, customs, and external economic policy; develop methods of regulating economic activity; and create favorable conditions for the development of direct production relations. To facilitate further integration, an agreement on deepening integration in the economic and social spheres was entered into by four countries (Belarus, Kazakhstan, Kyrgyzstan, and Russia) and Belarus and Russia signed an agreement in 1995 on the creation of a Commonwealth of Sovereign Republics for Belarus and Russia that would establish coordinating bodies. In February 1999, Tajikistan was recognized as a participant of the customs union, and by the decision of the Interstate Council of Belarus, Kazakhstan, Kyrgyzstan, and Russia, would have full rights in the union. In October 2000, the Governments of five countries (Belarus, Kazakhstan, Kyrgyzstan, Russia, and Tajikistan) signed an agreement to create a Eurasian Economic Community (EAEC). Armenia, Moldova, and Ukraine have observer status under the EAEC. In October 2005, Uzbekistan joined the EAEC. In September 2003, four countries (Belarus, Kazakhstan, Russia, and Ukraine) signed an agreement on the formation of a Common Economic Space (CES) (Interstate Statistical Committee of the Commonwealth of Independent States, undated).

its coordinating institutions (charter bodies, executive bodies, and the bodies of branch cooperation of the CIS). To reestablish ties among the mineral industries of the CIS states that had been broken with the dissolution of the Soviet Union, the Executive Committee of the CIS, with the participation of leading scientists and specialists, prepared a Mining Charter and an Agreement on Cooperation in the study, exploration, and use of mineral resources of the CIS states. The agreement was signed on March 27, 1997, by Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Ukraine. On the basis of this agreement, an intergovernmental council was formed to fulfill the mission of the agreement. An important step taken by the intergovernmental council was an agreement signed in Minsk, Belarus, on May 30, 2001, to settle disputes regarding mineral development in border areas, to implement environmental measures to protect the population of the neighboring states when developing mineral resources, and to specify conditions for cooperation between neighboring CIS states in mineral development. One of the basic documents regulating these matters was a Model Law Code regarding Earth's resources and their use signed by an interparliamentary assembly of the CIS countries in 2002; the Model Law Code deals with a wide range of issues regarding minerals and mineral development. By 2006, the intergovernmental council was coordinating more than 10 joint programs and projects relating to scientific and technical cooperation, harmonizing laws about the use of resources, and engaging in information exchanges (Glimadov, 2007).

Integration of the countries of the CIS was executed through

The countries of the CIS, which were formerly part of the Soviet Union, inherited the Soviet reserve classification system, which was based on a system that was not comparable to that used in market economy countries. The Soviet system did not determine reserves based on the part of the reserve base that could be economically extracted or produced at the time of determination in a market economy system. Rather, the Soviet system was a cross-imposed system, which related, on the one hand, to the reliability of information on the quantity of material in place based on data obtained from an exploration grid and other testing and, on the other hand, on the economic viability of the material in place based on the goals of the central planning system. The term "reserve" when used in this report refers in most cases to reserves that were calculated according to the Soviet system. Countries of the CIS have been engaged in efforts to reevaluate their reserves according to market

economy criteria, and if it is known that such a reevaluation has been made, it is noted in the text of this report. [A more detailed description of the Soviet reserve classification system is available in the U.S. Bureau of Mines Minerals Yearbook 1989, v. 3, Europe and the USSR.]

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#### ARMENIA

Armenia was a major producer of molybdenum, ranking seventh in the world in mine output in 2006 (Magyar, 2008). Besides molybdenum, Armenia produced other metals, including copper, gold, lead, silver, and zinc; and industrial minerals, including basalt, diatomite, granite, gypsum, limestone, and perlite. The country also produced aluminum foil using raw materials imported from Russia and had developed a diamond cutting industry based on imported rough diamond. A major part of the country's mine production was exported. Armenia had almost no domestic fuel production and relied for electric power on a domestic nuclear powerplant and hydroelectric plants. It imported fuel for its nuclear powerplant and natural gas from Russia.

Armenia possesses significant resources of copper, gold, iron, lead, molybdenum, and zinc. It also has resources of construction material, such as basalt, granite, limestone, marble, tuff, and so forth; semiprecious stones, such as agate, jasper, obsidian, and so forth; and other nonmetallic minerals, such as bentonite, diatomite, perlite, and zeolite. The copper, copper-molybdenum, and copper-polymetallic deposits that occur in the north of Armenia contain about 475 million metric tons (Mt) of ore. The Zangezur copper-molybdenum complex possesses large molybdenum reserves, which are concentrated in the Kadzharan porphyry deposit. Gold reserves at the Zod deposit, which was being mined by the Ararat Gold Recovery Co. (ARGC), were reportedly 80 metric tons (t) (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

#### Production

Data on mineral production are in table 1.

#### **Structure of the Mineral Industry**

Table 2 is a list of major mineral industry facilities in Armenia.

#### **Commodity Review**

#### Metals

Aluminum.—The Kanaker aluminum foil rolling mill was founded in May 2000. It was one of the leading production facilities in Armenia and was the only producer of aluminum foil in the Caucasus and Central Asia regions. On May 18, 2000, the mill was integrated into the Russian aluminum company RUSAL and renamed ARMENAL and, in January 2003, the Armenian Government and RUSAL signed an investment cooperation agreement under which RUSAL acquired a 26% share and undertook modernization of the plant. Together with two other Russian foil mills (Sayanal in the Republic of Khakasia and Urals Foil), ARMENAL formed RUSAL's packaging division. The mill employed more than 600 people (RUSAL, 2007).

In 2006, ARMENAL produced 949.7 t of foil, including 945.5 t of plain foil and 4.2 t of aluminum tape. The mill was on track to operate at capacity by mid-2007. ARMENAL had a portfolio of orders from various foil consumers in Europe, the Middle East, the United States, and other regions. ARMENAL was scheduled to begin operating at full capacity in 2007, when it was expected to become one of the leading aluminum foil producers in the CIS; its sales would likely be targeted at the European and U.S. markets (RUSAL, 2007).

On October 26, RUSAL announced the reopening of ARMENAL after the completion of the modernization program. The renewed mill had super casters for continuous casting and a modernized billet mill (Quarto 180). Rolling equipment was equipped with automatic process control systems. Overall investment in the project exceeded \$70 million. After modernization, ARMENAL was able to turn out products that met world standards, including foil that was less than 9 $\mu$ m-thick, which was in the highest demand on the international market. Implementation of the modernization project would allow for increasing foil output to 25,000 metric tons per year (t/yr), including 18,000 t/yr of thin foil (6-9 $\mu$ m) and 7,000 t/yr of household foil. Future plans included increasing output of plain foil up to 40,000 million metric tons per year (Mt/yr) (RUSAL, 2007).

**Copper and Molybdenum.**—The leading producer of copper and molybdenum concentrates in Armenia was the Zangezur copper-molybdenum complex followed by the Agarak coppermolybdenum complex. Copper was also mined at the Akhtala and the Kapan copper complexes. The country's copper smelter at Alavderdi was owned by the CJSC Armenian Copper Programme (ACP), which was a Liechtenstein-registered firm. Valex F.M. Establishment owned 81% of ACP; a Russian businessman owned the remaining 19% (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

In 2006, ACP reduced blister copper production by about 11% to 8,791 t. The decrease in production was attributed to worn out equipment at ACP's roasting furnace. ACP planned to buy a new furnace with a capacity of 140 metric tons per day (t/d). In 2006, ACP processed 48,224 t of concentrate compared with 52,505 t in 2005. ACP purchased concentrate from the Zangezur copper-molybdenum enterprise and LLC Base Metals,

which mined the Drmbon copper-gold field in Nagorno-Karabakh, which is a predominately ethnic Armenian enclave in Azerbaijan that has been the subject of warfare and dispute between Armenia and Azerbaijan concerning its status (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Plans called for the ACP to develop the Tekhut copper-molybdenum deposit, which was the second ranked copper-molybdenum deposit after the Kadzharan deposit; preliminary estimates of the ore reserves at the Tekhut deposit were 450 Mt at a grade of 1.6 Mt copper and 800,000 t molybdenum. ACP planned to mine between 25,000 and 30,000 t/yr of copper and 800 t/yr of molybdenum from this deposit (Interfax Russia & CIS Metals & Mining Report, 2007a).

The largest producer of copper and molybdenum concentrates, the Zangezur copper-molybdenum complex, processed 10.4 Mt of ore in 2006 and planned to process the same amount in 2007. The introduction of new capacity would result in Zangezur being able to increase ore processing in 2008 to 15 Mt/yr. Projections called for ore processing at Zangezur to increase eventually to between 17 and 18 Mt/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Zangezur, which was privatized at the end of 2004, was owned jointly by Cronimet Mining of Germany (60%), Yerevan Pure Iron Works (15%), Armenian Molybdenum Production, (12.5%), and LLC Zangezur Mining, which represented the enterprise's former management (12.5%) (Interfax Russia & CIS Metals & Mining Weekly, 2007d). In 2003, the Agarak copper-molybdenum complex was purchased by Comsup Commodities, Inc. of the United States. The Kapan ore beneficiation plant, which processed ore from the Kapan Mine, was purchased by the Deno Company of Switzerland in 2002 (MBendi, 2008).

Armenia also engaged in ferromolybdenum production at the Armenian Molybdenum Production (AMP) enterprise. AMP was established in 2003 and began steady operation in 2004. It had the capacity to produce 4,000 t/yr of ferromolybdenum. In 2006, AMP produced 2,581 t of ferromolybdenum, which was a 14% increase compared with production in 2005. AMP purchased all its molybdenum concentrate from Armenian producers and processed about 3,000 t of molybdenum concentrate in 2006. Its main supplier was the Zangezur copper-molybdenum complex (Interfax Russia & CIS Metals & Mining Report, 2007b).

#### **Industrial Minerals**

**Diamond.**—In 2006, Armenia reduced the value of cut diamond production by 22% to \$240.5 million. Cut diamond sales fell by 20% to \$243 million, and exports fell by 20.6% to \$237.8 million. The decreases in output and sales were owing in part to a decrease in world prices for cut and polished diamond, as well as weaker dollar prices in Armenia (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

#### Outlook

The Government plans to implement a program for reviving and developing the mining industry, with the objective of increasing the extraction of copper and molybdenum and of increasing the processing and export of semifinished metal products instead of raw materials. Armenia is expected to increase its energy supply as it is scheduled to receive natural gas from Iran from a pipeline that is under construction. The pipeline is being built in two stages; the first stage was scheduled for completion in 2007. The first stage would supply Armenia with 450 million cubic meters per year of gas. Once the pipeline is expanded to its full capacity, it was to supply Armenia with 2.8 billion cubic meters per year of gas (Interfax Russia & CIS Oil & Gas Weekly, 2007).

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#### AZERBAIJAN

Azerbaijan produced a range of metals and industrial minerals, including such metals as alumina, aluminum, lead, steel, and zinc. Its major importance as a world mineral producer, however, was based on its oil extracting industry. The country had been a significant oil producer for more than a century, but the recent focus was on developing offshore resources in the Caspian Sea.

In 2006, the value of the gross domestic product (GDP) in Azerbaijan increased by 34.5% compared with that of 2005, and the value of production in the extractive industries increased by 44.7%. The country's total foreign trade surplus tripled. Crude oil and oil products dominated exports. Exports also included ferrous and nonferrous metals (Interfax Russia & CIS Statistics Weekly, 2007). In 2006, the oil sector accounted for about 10% of the country's GDP. In the summer of 2006, the first flow of commercial oil was shipped through the Baku-T'bilisi-Ceyhan (BTC) pipeline (U.S. Energy Information Administration, 2007a).

#### Production

Data on mineral production are in table 3.

#### Structure of the Mineral Industry

Table 4 is a list of major mineral industry facilities in Azerbaijan.

#### **Commodity Review**

#### Metals

Aluminum.—The Open Joint Stock Company (OJSC) Azerbaijan Aluminum concern, which comprised the Gyandzha alumina refinery, the Sumgait aluminum smelter, and the Zaglik alunite mine, planned to increase aluminum production to 60,000 t/yr by 2009. Output at the Sumgait smelter was to increase with the addition of two new potlines in 2007. In addition, a new smelter with a capacity of 100,000 t/yr was to be built in Ganca, which would raise the company's total capacity to 160,000 t/yr of aluminum. First output from the new smelter was projected for 2009 (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

In 2006, Azerbaijan produced more than 363,000 t of alumina, which was approaching the peak amount of 400,000 t/yr produced in Soviet times. Alumina was sent to Sumgait for smelting, and the remainder was exported to Tajikistan. When the new Ganca smelter is operating, most of the alumina will likely be consumed domestically to produce aluminum (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

**Iron Ore.**—On December 30, 2006, an agreement was signed between the Government of Azerbaijan and a number of foreign companies to explore and develop the Chovda, the Dagkeseme, the Geida, and the Karabakh iron ore deposits, the Kokhnemden field, and the Kurekchai Basin. Exploration was to be conducted within 48 months, although this period could be extended by an additional 16 months, if needed (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

#### **Industrial Minerals**

**Iodine and Bromine.**—Azerbaijan was producing iodine and bromine from brines at the Baku and the Novoneftechala iodine and bromine plants, which were producing 440 t/yr and 800 t/yr of iodine, respectively, and 4,600 t/yr and 3,000 t/yr of bromine, respectively. These brines also contain commercial quantities of strontium that was not being extracted (Baba-Zade and others, 2007).

#### Mineral Fuels

**Natural Gas.**—In 2006, Azerbaijan produced almost 6.1 billion cubic meters of natural gas, which was a 6% increase compared with production in 2005. About 60% of natural gas production was produced by Azneft, which was subsidiary of State Oil Company of Azerbaijan (SOCAR). The remainder was produced by joint ventures, the leading one of which was Azerbaijan International Operating Company (AIOC). In 2008, increases in production from SOCAR and the Shah Deniz natural gas and condensate field could increase the country's production to more than 500 billion cubic feet (almost 14.2 billion cubic meters) per year. Government sources in Azerbaijan predicted that the country would produce as much as 1.1 trillion cubic feet (more than 31 billion cubic meters) per year by 2011. Almost all the natural gas that Azerbaijan produced came from offshore fields. The country's leading natural gas field was the Bakharly oilfield and gasfield, which is located off the southern tip of the Absheron Peninsula; this field accounted for almost one-half of the country's natural gas output (U.S. Energy Information Administration, 2007b).

Azerbaijan's major natural gas production increases were expected to come from the development of the Shah Deniz offshore natural gas and condensate field, which industry analysts estimated to be one of the world's leading natural gas field discoveries of the past 20 years. Shah Deniz, which is located offshore approximately 60 miles (96.6 km) southeast of Baku, is being developed by the Shah Deniz consortium (whose members are BP p.l.c., Statoil ASA of Norway, SOCAR, LukAgip [a joint venture of Lukoil Corp. (a Russian owned company) and Azienda Generale Italiana Petroli (Agip) (an Italian owned company)], National Iranian Oil company (NICO), TotalFinaElf S.A. of France, and Turkiye Petrolleri Anonim Ortaklig (TPAO) (U.S. Energy Information Administration, 2007b).

With the development of Shah Deniz, Azerbaijan could eventually become a net natural gas exporter, although Azerbaijan would remain a net importer during 2007. Gas purchases from Russia were officially suspended in early 2007 when Shah Deniz started producing. Azerbaijan's natural gas exports were likely to be transported mainly through the South Caucasus pipeline, which was also known as the Baku-T'bilisi-Erzurum pipeline. It was to run parallel to the BTC pipeline for most of its route before connecting to the Turkish gas pipeline network near the town of Horasan. The pipeline was expected to transport 233 billion cubic feet (about 6.6 billion cubic meters) per year initially, which could be increased eventually to 700 billion cubic feet (almost 20 billion cubic meters) per year (U.S. Energy Information Administration, 2007b).

Petroleum.—Azerbaijan was the leading contributor to the non-Organization of the Petroleum Exporting Countries (OPEC) growth in global oil supply during 2006. Growth in oil production had come almost exclusively from the Azeri-Chirag-Guneshli (ACG) group of fields. The ACG group of fields produced more than 65% of the country's oil, and this share was expected to increase. According to industry journals, estimates of Azerbaijan's proven crude oil reserves ranged between 7 and 13 billion barrels (Gbbl) [about 950 Mt to 1.77 billion metric tons (Gt)], but the estimate of SOCAR, which was based on the Soviet reserve classification system, set proven oil reserves at 17.5 Gbbl (almost 2.4 Gt). The Soviet reserve classification system is not based on market economy criteria. The country's largest hydrocarbon structures offshore in the Caspian Sea accounted for most of the country's current petroleum production (U.S. Energy Information Administration, 2007c).

Although SOCAR's fields that were developed in the Soviet era were in decline, since 1991, large-scale new projects and the revitalization of existing facilities have been financed through foreign direct investment and have revitalized the country's oil sector. Azerbaijan had signed more than 20 major agreements to develop oilfields with about 30 companies from 15 countries (U.S. Energy Information Administration, 2007c).

Azerbaijan exported almost all its oil through the newly built BTC pipeline, which bypasses Russia. Azerbaijan began filling the BTC pipeline in 2005. Small amounts of oil were exported by rail to the coast of Georgia and then by pipeline to Novorossiysk in Russia. In 2006, the AIOC, which is the consortium that was developing the AGC field, announced that it would supply only 60% of the oil for the pipeline, which opened the way for Kazakhstan to ship oil through the BTC (U.S. Energy Information Administration, 2007c).

Azerbaijan's other export routes included the Baku-Novorossiysk pipeline (northern route) by way of Russia to the Black Sea and the Baku-Supsa pipeline (the Western early oil route), which was used when the BTC was not available (U.S. Energy Information Administration, 2007c).

Crude oil was refined domestically at two refineries—the Azerneftyag refinery (formerly the Baku refinery), which had a capacity of 242,000 barrels per day (bbl/d); and the Heydar Aliev (formerly Azernefteyagandzhah) refinery, which had a capacity of 200,000 bbl/d. Refinery utilization rates were as low as 40%. Both refineries were in need of modernization and pollution control equipment (U.S. Energy Information Administration, 2007c). In 2006, the country produced about 7.796 Mt of oil products, which was an increase of 1.9% compared with production in 2005.

Azerbaijan also produced liquefied petroleum gas (LPG) at the Heydar Aliev refinery. In 2006, the refinery produced 1.5 million barrels (Mbbl), which was a decrease of 17% compared with production in 2005 (U.S. Energy Information Administration, 2007c).

#### Outlook

The achievement of capacity flow through the BTC pipeline is expected to enable oil production from the offshore ACG project to increase. Increasing oil production and the concomitant increased oil revenues are expected to contribute to a doubling of Azerbaijan's GDP by 2008 (U.S. Energy Information Administration, 2007a).

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#### BELARUS

Belarus has a number of mineral production enterprises, including a steel minimill, a nitrogen production enterprise, two oil refineries, and a potash mining enterprise. An oil pipeline that passes through Belarus transports about 70 Mt/yr of Russian oil to Europe, and a gas pipeline that passes through Belarus, transports about 20% of Russia's gas exports to Europe.

#### **Minerals in the National Economy**

In 2006, the fuel sector accounted for 21.8% of the value of the country's industrial production; the chemical and petrochemical sector, 11.2%; the construction materials sector, 4.4%; the ferrous metallurgical sector, 3.6%; and the nonferrous metallurgical sector, 0.2% (Belarus i Rossiya, 2007). Belarus profited from the increase in energy prices by importing oil from Russia at preferential prices and then processing it and exporting the refinery products at international market prices. Also, the country benefited from high prices for fertilizers and steel, which were its major exports. Belarus had one of the world's most energy-intensive economies and was highly dependent on energy imports. Imported natural gas met 60% of the country's energy requirements.

#### Production

In 2006, the value of industrial production in Belarus increased by 11.3% compared with that of 2005. The value of production increased by 23.1% in the fuel sector, by 14.7% in the construction materials sector, and by 11.2% in the ferrous metallurgy sector. Of the main mineral products produced in Belarus, the country increased production of rolled products and crude steel by 10.7% and 6%, respectively, compared with that of 2005, but production of potash decreased by 4.9% (table 5; Interfax Russia & CIS Statistics Weekly, 2007b).

#### Structure of the Mineral Industry

The Belneftekhim State Concern for Oil and Chemicals, which included among its many enterprises the country's oil production, refining, and transport facilities and potash production enterprise, was the leading mineral production concern in the country. It included 50 organizations, which included practically all enterprises that produced chemical products. The country's only mineral production enterprise that played a major role in world markets was its potash producer, Republican unitary enterprise (RUE) Production Amalgamation (PA) Belaruskali, which mined the Starobin deposit. Belaruskali was the world's third ranked potash producer in 2006 following Canada and Russia (Ober, 2008). Belaruskali comprised four mine and beneficiation complexes, auxiliary shops, and servicing units, which together employed about 20,000 persons. Belaruskali produced potash fertilizers in the form of fine, fine crystallized, and granulated concentrate of potassium chloride. Besides potash fertilizer, Belaruskali produced a variety of salts used for domestic, industrial, and agricultural purposes. The founders of the Belarus potash company were RUE PA Belaruskali and Russia's Open Joint Stock Company (OJSC) Uralkali (table 6; Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

#### **Mineral Trade**

In 2006, the value of exports of mineral products increased compared with that of 2005. Exports of nitrogen fertilizers in the first eleven months of the year increased by 12% and those of oil products increased by 11.9% (Interfax Russia & CIS Statistics Weekly, 2007a). Belarus increased exports of iron and steel products by 24.1% to \$91.85 million. Exports in tonnage rose by 11.9% to 1.826 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007b). Plans called for the Belarusian Steelworks to increase its quantity of steel exports by 20% in 2007 owing to the addition of new production capacity. Its export strategy would include consolidating its position in the Latin American market and acquiring a niche in the Chinese market (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Belarus held 34% of the global potash export market in 2006. About 80% of the country's potash production was exported. Exports of potash mineral fertilizers to world markets were conducted by way of the Closed JSC (Joint Stock Company) Belarus Potash Company, the founders of which on parity conditions were Open JSC Uralkali and RUE PA Belaruskali. Production from RUE PA Belaruskali was exported to more than 50 countries in Africa, East Asia, Europe, India, North America, and South America (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

Tensions arose between Belarus and Russia when Russia decided to charge Belarus the world market rate for gas it consumed rather than the lower rate it had been charging. In March, Russia's state gas monopoly, Gazprom, announced that in 2007, Belarus would be charged European rates for Russian gas, which would mean that Belarus would pay up to five times as much for gas imports. At yearend, Belarus and Gazprom signed a contract for gas deliveries just before a delivery deadline was set to expire. The deal more than doubled the price that Belarus would pay for Russian natural gas in 2007, and raised the price it would pay by 2011 to European levels. Before signing the agreement, Belarus had threatened to retaliate by interrupting Russian gas crossing the country on its way to Western Europe, which echoed a similar dispute with Ukraine.

Under the agreement, Gazprom would gain a 50% stake in Belarus's state-owned domestic gas-transport monopoly, Beltranshaz. Beltranshaz controlled Belarus's local gas transmission pipeline network. Gazprom already owned all Belarus's international transit pipelines through which it shipped about 20% of Russia's gas exports to Europe. The remaining 80% of Russia's gas exports was transported by pipeline across Ukraine (Kupchinsky, 2006; Radio Free Europe/Radio Liberty, 2007). In the area of oil transport, the Russian company Transneft was proposing to construct an oil pipeline that would bypass Belarus and would be capable of transporting 50 Mt/yr of oil. The approximately 1,000-kilometer (km) Unecha-Velikiye Luki-Primorsk pipeline could be built in less than 18 months (Interfax Russia & CIS Oil & Gas Weekly, 2007).

#### Outlook

Belarus is expected to continue to be a major supplier of potash to world markets. A program for the development of RUE PA Belaruskali for the period 2006-12 addresses development of ore reserves and is based primarily on the construction of a new mine in the Krasnoslobodski area and on renovating out-of-date equipment. A main direction will be a steady increase in the quality and consumer properties of fertilizers to make them more competitive on the world market. Possessing a sufficient raw materials base with a high production potential and highly qualified personnel, Belaruskali has the potential to be a major world potash supplier for many decades (Republican unitary enterprise Production Amalgamation Belaruskali, 2007).

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#### GEORGIA

During the Soviet period, a range of mineral commodities was mined in Georgia, which included arsenic, barite, bentonite, coal, copper, diatomite, lead, manganese, zeolite, and zinc, among others. The country had been a major producer of high-grade manganese ore for about a century, and ore reserves were significantly depleted. Part of the manganese was used within Georgia for ferroalloys production. Following the dissolution of the Soviet Union, mineral production declined sharply.

Georgia's main role in the world mineral supply was serving as a transport route for oil and gas shipments out of the Caspian regions to world markets. Three of the new large oil and gas export pipelines that had been or were being constructed in the Caspian region pass through Georgia. These included the Baku-T'bilisi-Ceyhan, the Baku-T'bilisi-Erzurum, and the Baku-Supsa (Western early oil route) pipelines. Plans called for Georgia to receive a larger amount of natural gas for shipment from Caspian Sea deposits in Azerbaijan beginning in 2007 (Interfax Russia & CIS Oil & Gas Weekly, 2007a, b).

#### Production

Data on mineral production are in table 7.

#### **Structure of the Mineral Industry**

Georgia's main nonferrous and precious metals mining enterprise was the Madneuli mining and beneficiation complex, which mined the large copper-polymetallic Madneuli deposit (table 8). This deposit reportedly contained 48 t of gold reserves. Madneuli had been mined by the Madneuli mining and beneficiation complex and a joint Georgian-Austrian enterprise, Quartzite Ltd., which operated a gold recovery mill. In 2005, Madneuli was privatized with a tender awarded to Stanton Equities Corp., which was a subsidiary of Russia's Industrial Investors Group, and which also acquired a stake in the Quartzite mill.

Stanton Equities also received a 50% stake in Trans-Georgian Resources, which held the license to the Sakdrisi coppergold deposit. Stanton Equities was planning to construct a second copper concentrator in the village of Kazreti to process ore extracted from the Sakdrisi deposit. In addition, work was being conducted to construct a plant to process waste from the concentrator according to a contract signed with the country's Ministry of Environmental Protection and Natural Resources, which was within the framework of a memorandum on environmental protection that the company signed with the ministry (Interfax Russia & CIS Metals & Mining Weekly, 2007).

Georgia had mined manganese ore from the Chiatura deposit for more than a century. A portion of the ore was used to produce manganese ferroalloys at the Zestafoni ferroalloys plant. In February, Stemcor UK Ltd., which was based in the United Kingdom, bought a controlling stake in the Zestafoni ferroalloys plant. In November, at an auction organized by the Georgian Natural Resources and Environment Protection Ministry, Manganese Georgia (a subsidiary of Stemcor) bought Chiaturmarganets, which was the country's manganese mining and beneficiation complex, and acquired a 40-year license to mine manganese ore at the Chiatura deposit. According to the conditions of the tender, the company must produce at least 350,000 t of manganese concentrate within the first year of its operation and at least 400,000 t/yr in the following years. At least 200,000 t/yr of the concentrate produced must be processed in Georgia. Stemcor, by purchasing Chiatura—which was the main supplier of concentrate for the Zestafoni plant—established control over the entire production cycle. Also, Stemcor appeared able to secure the energy supply for its operations as the Georgian Government endorsed a draft Presidential Decree to sell the 100% Government stake in the Vartsikhe hydropower plant cascade to Manganese Georgia (Interfax Financial & Business Report, 2006).

#### Outlook

Production in the mineral industry is reviving in Georgia. As a result, the country could increase considerably its production of copper, gold, manganese concentrates and ferroalloys, and other mineral products.

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#### KAZAKHSTAN

Kazakhstan ranked second only to Russia among the countries of the CIS in its quantity of mineral production. It is endowed with large resources of a wide range of metallic ores, industrial minerals, and mineral fuels, and its metallurgical sector is a major producer of a large number of metals from domestic and imported raw materials. Its mining sector produced bauxite, chromite, copper, gold, iron, lead, manganese, and zinc ores, and its metallurgical sector produced such metals as beryllium, bismuth, cadmium, copper, ferroalloys, lead, magnesium, rhenium, steel, tantalum, titanium, and zinc. The country produced other nonferrous and precious metals and industrial minerals as byproducts (or in smaller-scale operations), such as arsenic, barite, cadmium, molybdenum, phosphate rock, and silver. The country was a large producer of mineral fuels, including coal, natural gas, oil, and uranium.

#### Minerals in the National Economy

In 2006, industry and mining accounted for about 39.5% of Kazakhstan's GDP (Federation of International Trade Associations, The, 2008). The petroleum industry accounted for approximately 30% of the GDP (U.S. Energy Information Administration, 2008a). Mining accounted for 4% of the GDP and 19% of industrial production (United World, 2006). In 2006, the extractive industries accounted for about 58% of the value of industrial production (Agenstvo Respubliki Kazakhstan po Statistiki, 2007).

#### **Government Policies and Programs**

According to the 2003 Land Code, only native born and naturalized citizens of Kazakhstan and Kazakhstan companies may own land, and certain categories of land are excluded from private ownership. Only state-owned entities may permanently use land according to this law. Land may be leased on a short-term or long-term basis, with short-term land leases lasting for up to 5 years and long-term leases lasting for a maximum of 49 years. Kazakhstan law specifies that no sectors of the economy are fully closed to foreign investors, but that there are some limitations on participation, depending on the sector. The 2005 Production Sharing Agreement (PSA) law mandated that, for offshore projects, the state oil company must have a minimum 50% ownership stake. In 2004, the Government amended the law regulating oil and gas exploration by assigning to the state the right of first refusal on the purchase of shares of PSAs in the extractive industries. The law, which applies to preexisting contracts as well as future contracts, is said by the Government to supersede any preemptive rights consortium partners might have negotiated in their original contracts.

Amendments passed to the Oil and Gas Law in 1999 require mining and oil companies to use local goods and services. Subsurface users must comply with local content regulations, which obligate them to purchase goods and services from Kazakhstan entities (provided that the local goods meet minimum project standards) and they must also give preference to the employment of local personnel. In their tenders, prospective subsurface users are required to specify the anticipated local content of their work, goods, and services. Amendments to the Law on Subsurface Use that were passed in 2004 also require that tender proposals specify the user's commitment to developing regional infrastructure and contributing to the provision of social services.

The Government of Kazakhstan has a major role in overseeing foreign investment. Government officials at the highest levels have screened major foreign investment proposals, such as the PSA for Kashagan (Kazakhstan's massive offshore Caspian Sea oilfield), and the PSA for the Karachaganak oilfield and gasfield, which appears to have had the President of Kazakhstan's personal imprimatur (U.S. Department of State, 2007).

#### Production

In 2006, increases in production were reported or estimated for almost all mineral commodities. Data on mineral production are in table 9.

#### Structure of the Mineral Industry

Eurasian Natural Resources Corp. (ENRC) was a mining and metals group that accounted for about 5% of Kazakhstan's GDP and had annual sales of more than \$3 billion in 2006. The ENRC group controlled Aluminium of Kazakhstan, Kazchrom chromite mining and ferroalloys production enterprise, KazMarganets (formerly Zhairem) manganese mining and beneficiation complex, and the Sokolovsko-Sarbay Mining and Production Union (SSGPO), which was the main supplier of iron ore to Russia's Magnitogorsk Iron and Steel

Works (table 10). The leading shareholders in ENRC were the Kazakhstan Government followed by the copper company Kazakhmys PLC (Reuters, 2007; Embassy of the Republic of Kazakhstan, 2008). Kazakhmys, which was the country's major copper producer, was a United Kingdom-registered copper mining company with its main assets located in Kazakhstan. Its headquarters were located in London and the headquarters of its main subsidiary, Kazakhmys Corp., were located in Dzhezkazgan, Kazakhstan. In October 2005, the company was listed on the London Stock Exchange with an opening market capitalization of £2.6 billion. Glencore International AG, which was headquartered in Switzerland, owned or controlled (by way of subsidiaries) 99% of the shares in Kazzinc JSC, which was the country's large integrated lead and zinc producer, and which also produced copper, gold, silver, and other byproduct metals (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

All the country's major oilfield and gasfield developments since Kazakhstan achieved statehood in 1991 were by projects in which foreign companies and Kazakhstan state-owned firms had forms of joint ownership. The country's uranium industry was controlled by Kazatomprom, a holding company engaged in six main areas of activity—energy, geologic exploration, metallurgy, scientific support and staff training, social support, and uranium mining. Kazatomprom exercised control in part by holding stakes in a number of uranium industry enterprises in the country. Kazatomprom was 100% state owned and also was the main importer, exporter, and transporter of uranium and other products used in the nuclear power industry (Interfax Russia & CIS Metals & Mining Weekly, 2007g).

#### **Mineral Trade**

Hydrocarbons (65%) and ores and metals (14%) accounted for 79% of the value of the country's exports (Federation of International Trade Associations, The, 2008). Kazakhstan was sending 100% of its gas exports and 90% of its oil exports on routes through Russia. Discussions were underway concerning Kazakhstan diversifying its fuel export routes (Interfax Russia & CIS Oil & Gas Weekly, 2007). Metals were the second ranked export after crude oil (Embassy of Kazakhstan in the United Kingdom of Great Britain and Northern Ireland, 2008). The vast majority of Kazakhstan's metal output was exported. China was playing an increasing role as a recipient of Kazakhstan's metal exports. Kazakhmys exported 85% of its copper cathodes and rods to China (United World, 2006). Kazakhstan had concluded an agreement with China by which Kazakhstan's iron ore exports to China increased by 83% in 2006 compared with that of 2005 (Materials World, 2007).

#### **Commodity Review**

#### Metals

**Aluminum.**—Kazakhstan adopted a program to increase alumina output to reach between 1.6 and 1.8 Mt/yr in the 2007-10 period. High-quality bauxite reserves, which were estimated to be between 35 and 45 Mt, could be sufficient to maintain these production goals for only the next 6 to 10 years. Further development of alumina production would likely be based on reserves of lower quality bauxite and nonbauxite aluminum raw materials. In 2006, bauxite was the only aluminum raw material being mined in the country. In previous years, the country had mined nepheline syenite. Total bauxite reserves were reportedly 356.7 Mt in the C1 category, according to the reserves classification system used first in the Soviet Union and then in Kazakhstan, with another 82.3 Mt of C2 reserves and 13.3 Mt of subeconomic (zabalansovye) reserves (Kovzalenko, 2007). [A more detailed description of the Soviet reserve classification system is available in the U.S. Bureau of Mines Minerals Yearbook 1989, v. 3, Europe and the USSR.]

Bauxite reserves are concentrated in the north of the country. The Krasnooktyabrskoye bauxite mining directorate (KGBR) and the Torgayskiy bauxite mining directorate were the country's leading bauxite producers and the main suppliers of bauxite for the Pavlodar alumina plant. All bauxite mined in Kazakhstan was processed into alumina at the Pavlodar plant, which was one of the world's ten leading alumina plants in terms of output (Kovzalenko, 2007).

**Beryllium and Tantalum.**—Kazatomprom, which controlled the country's entire uranium industry, was engaged in full-cycle beryllium production that extended from ore processing to production of beryllium alloys at its Ulba Metallurgical Plant in Oskamen. Ulba was the only plant in the CIS with this production capability. Ulba was also the only enterprise in the CIS with the capability to process tantalum feedstock and produce finished products. Kazatomprom did not have its own tantalum resources and purchased tantalum concentrate (Interfax Russia & CIS Metals & Mining Weekly, 2007h).

Chromium.—Kazchrome was the world's single leading chromium ore mining enterprise, the world's third ranked ferrochrome producing enterprise, and the world's leading ferrochrome producer on the basis of chromium content. Kazchrome was one of the main assets of ENRC (Reuters, 2007; Embassy of the Republic of Kazakhstan, 2008). Kazchrome supplied high-quality ferroalloys to leading steelmakers worldwide, including countries in Central Asia, Southeast Asia, Europe, North America, and South America. Kazchrome had invested in new technology and plant facilities, which had increased its annual ferrochrome production to more than 1 Mt/yr, and it planned to increase production of calcined chrome ore pellets substantially by adopting new technology. Kazchrome consisted of the following four production units: the Aktobe and the Aksu ferroalloys plants, the Donskoy mining and beneficiation complex, and the KazMarganets manganese mining and beneficiation complex. It employed about 18,000 workers, reportedly had 169 Mt of high-grade chromium resources, and had 43 electric furnaces engaged in ferroalloy production. The company's Molodezhnaya Mine produced about 2 Mt/yr of chromite. The chromite mining division had three beneficiation plants with a combined capacity to process 5 Mt/yr of ore to produce 3.5 Mt/yr of concentrate. A newly constructed fired pellets plant that employed technology from the Finnish company Outokumpu Technology Oy was to have an annual capacity of 700,000 t (Eurasian Natural Resources Corp., 2008a).

**Copper.**—The country's major copper producer was Kazakymys PLC, which was engaged in mining, beneficiating, smelting, and refining copper products, including copper cathodes and rods. Kazakhmys operated 19 open pit and underground mines and 2 smelting and refining complexes. Kazakhmys also owned Mansfelder, Kupfer, & Messing GmbH (MKM), a copper products fabrication company located in Germany. In 2006, Kazakhmys increased production of copper cathode by more than 5% compared with that of 2005. Copper concentrate production increased by 9% compared with that of 2005. The increase in production resulted mainly from mining higher-grade copper ore as well as production from new mines, which included the Artemyevskoye, the Kosmurun, and the Zhomart Mines (Interfax Russia & CIS Metals & Mining Weekly, 2007a; Kazakhmys PLC, 2007).

Iron Ore.—In 2006, SSPGO produced a combined 16 Mt/yr of iron ore concentrate and fluxed pellets for domestic customers and foreign customers primarily in China and Russia. The iron content of its iron ore concentrate reached 66%, and the iron ore content of its fluxed pellets, about 61.5%. SSGPO was under the control of ENRC and its assets included the Kachar, the Kurzhunkul, the Sarbai, and the Sokolov iron ore open pits; the Sokolov underground mine; dolomite and limestone open pits; and concentrating, pelletizing, and stone-crushing facilities. Power for these operations was supplied by the Rudny heat and energy plant, which was purchased by SSGPO in 1998. SSPGO employed about 18,500 people. The company's investment program was directed at increasing production levels and efficiency through the installation of integrated computer systems. Through enhanced computer systems, capacity at the Sokolov open pit, for example, had risen substantially within the past 2 years. SSPGO reportedly had iron ore resources totaling 3.6 Gt, of which 1.5 Gt was reportedly proven and probable reserves capable of sustaining production for 40 years (Eurasian Natural Resources Corp., 2008b).

Lead and Zinc.—Kazzinc JSC was the country's leading producer of lead and zinc. In 2006, Kazzinc produced 289,095 t of zinc, which slightly exceeded its production target of 288,000 t. Sales revenues rose steeply to \$1.758 billion from \$792 million in 2005. Kazzinc planned to increase zinc production by 1.3% in 2007 compared with that of 2006. The company planned to invest \$353 million in developing production in 2007 compared with the \$193 million it invested in 2006. Plans called for spending \$126 million of the planned investment on the New Metallurgy project, which included construction of a copper smelter and modernization of lead production facilities at the Ust-Kamenogorsk metallurgical plant (Interfax Russia & CIS Metals & Mining Weekly, 2007e).

ShalkiyaZinc N.V. was another zinc and lead mining company in Kazakhstan. The company's main operations were located in southern Kazakhstan and included the underground Shalkiya Mine in the Kyzylorda Region, a processing plant near the town of Kentau (which is located 165 km southeast of the Shalkiya Mine), and the Talap deposit, which is a greenfield deposit located 30 km southwest of the Shalkiya Mine. One of the company's major assets was the Shalkiya deposit, which reportedly was the largest known zinc deposit in Kazakhstan and accounted for approximately 30% of the country's total zinc reserves. The company sold zinc and lead concentrate to regional smelters and traders. ShalkiyaZinc was listed on the London Stock Exchange (London Stock Exchange plc, 2006; Reuters, 2006). Based on a new audit of its reserves, which was conducted by AMC Consultants of the United Kingdom according to the JORC system, ShalkiyaZinc planned to increase its lead-zinc ore extraction at the Shalkiya deposit to 4 Mt/yr from 3 Mt/yr by 2010. According to the latest audit, ShalkiyaZinc's probable metal reserves totaled 6.6 Mt of zinc and 1.7 Mt of lead. The new audit showed that the zinc content of ore that could be profitably mined was far lower than 3%, which was the previous assessment. ShalkiyaZinc had a contract with Outokumpu to construct a new ore processing plant at the deposit (Interfax Russia & CIS Metals & Mining Weekly, 2007f).

**Manganese.**—The KazMarganets manganese mining and processing enterprise was the country's main manganese producer and was under the control of Kazchrome, which was a part of ENRC. KazMarganets reportedly had measured and indicated resources totaling 47.7 Mt of manganese ore with proven and probable reserves totaling 24.5 Mt. KazMarganets was composed of the East Kamys and the Tur manganese ore deposits (Karaganda region), and the Zhezdy processing plant. It had the capacity to process more than 1 Mt/yr of ore to produce 330,000 t/yr of manganese concentrate. KazMarganets' investment program was directed towards the expansion of operating facilities and the discovery of new deposits in the Ulytau-Zhezdy area (Eurasian Natural Resources Corp., 2008a).

**Titanium.**—The Ust-Kamenogorsk titanium-magnesium complex (UKTMK) was producing at about 50% of its design capacity. It exported about 50% of the titanium sponge it produced to the United States. It had developed its own domestic resources of titanium raw material (which it had previously imported primarily from Ukraine) and had also commissioned facilities to produce titanium ingots and slabs. Ilmenite ore was mined at the Obukhovskoye, the Satpayevskoye, and the Shokashskoye deposits in Kazakhstan (Skorodumov and Nikitina, [2007]).

#### Mineral Fuels and Related Materials

Coal.—In 2006, Kazakhstan produced 96.3 Mt of coal, which was an 11.5% increase compared with production in 2005. Kazakhstan planned to increase coal production by less than 1% in 2007. Plans for 2007 also called for implementing development projects in the Ekibastuz subbituminous coal basin and closing unprofitable coal mines in the Karaganda basin (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Long-range plans called for Kazakhstan to reduce coal consumption by 45% by 2024 as part of its program to achieve sustainable growth. At the same time, the use of renewable energy was targeted to increase from 0.2% in 2006 to 5% in 2024. Long-range plans also called for Kazakhstan to increase annual coal production to 145.6 Mt by 2020 according to the Coal Industry Department at the Energy and Mineral Resources Ministry. Production of metallurgical coal was projected to increase to 24.3 Mt in 2020 from 12.9 Mt in 2006, and production of steam coal, to 121.3 Mt from 83.4 Mt. Achieving the targeted level for 2020 would require

an investment of \$3.9 billion, of which \$2.1 billion would be targeted for metallurgical coal development and \$1.8 billion would be targeted for steam coal (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Coal mining in Kazakhstan was conducted by 33 companies, which included 5 foreign companies. Kazakhstan claimed to be among the world's 10 leading countries in coal reserves. The country has registered 49 deposits in its State reserve balance, which contains a total of 33.6 Gt and of which 21.5 Gt is hard coal and 12.1 Gt is brown coal. The reserves are located mainly in the Ekibastuz, the Karaganda, and the Shubarkol deposits and in the Turgai coal basin (Interfax Russia & CIS Metals & Mining Weekly, 2007b, c).

Natural Gas.—Although in 2006 Kazakhstan produced about as much natural gas as it consumed, the country was poised to become a net exporter in 2008 based on production at the Karachaganak and the Tengiz fields. More than 70% of the country's natural gas was produced by international consortia at the Karachaganak and the Tengiz fields. In 2007, the Oil and Gas Journal revised upwards its estimate of proven natural gas reserves in Kazakhstan to 100 trillion cubic feet (about 2.8 trillion cubic meters), which was roughly equal to Turkmenistan's natural gas reserves. Most of Kazakhstan's natural gas reserves are located in the west of the country, with about 25% of its proven reserves located in the Karachaganak field. This oil and gas condensate field reportedly has proven natural gas reserves of 48 trillion cubic feet (1.36 trillion cubic meters). The consortium developing Karachaganak expected to produce 900 billion cubic feet (about 25.5 billion cubic meters) by 2012. Natural gas production in Kazakhstan was almost entirely associated gas. The country had three gas processing plants (U.S. Energy Information Administration, 2008b).

Petroleum.-In 2006, Kazakhstan produced 64.9 Mt of oil and gas condensate, which was 5.5% more than in 2005, and exported 57.1 Mt (Interfax Russia & CIS Oil & Gas Weekly, 2007). Kazakhstan has most of the largest known oilfields in the Caspian Sea. The country's combined onshore and offshore proven hydrocarbon reserves have been estimated to be between 9 and 40 Gbbl (1.2 and 5.4 Gt), which is comparable to Algeria on the lower end and Libya on the higher end of the estimates. Major oil producing enterprises included CNPC-Aktobemunaigaz, Hurricane Kumkol Munai, Karachaganak Petroleum Operating BV, Mangistaumunaigaz, the Tengizchevroil joint venture, and Uzenmunaigaz, which accounted for about 70% of hydrocarbon production in the country. Other production was centered in smaller fields. Oil production growth was expected to increase in the next decade primarily from the Tengiz field, where production was expected to double, and from the Kashagan offshore field, which is located off the northern shore of the Caspian Sea near the city of Atyrau, and which could produce an additional 1 million barrels per day (Mbbl/d) after 2011. The Tengiz field, which had been developed since 1993 by the Tengizchevroil joint venture, was the country's leading oil producer; it had recoverable crude oil reserves estimated by Chevron Corp. to be between 6 Gbbl and 9 Gbbl (800 Mt and 1.2 Gt). According to Chevron, Tengiz could potentially produce 700,000 bbl/d by 2010 if its sour gas injection program were fully implemented (U.S. Energy Information Administration, 2008c).

The Kashagan field is the largest oilfield outside the Middle East in terms of reserves and the fifth largest in the world. The field's recoverable reserves were estimated to be 13 Gbbl (1.77 Gt) of oil equivalent, with total reserves-in-place of about 38 Gbbl (5.2 Gt). The field could produce about 300,000 bbl/d by late 2011, and full-scale commercial production was expected to commence in 2013. Estimated peak production from Kashagan was estimated to be about 1.3 Mbbl/d. The Kashagan field presented particular challenges for its developers because it contains a high proportion of natural gas under very high pressure and contains large quantities of sulfur. Offshore platforms must also withstand extreme weather fluctuations in the northern Caspian Sea. Additional oil production could originate from the Karachaganak oilfield and gas condensate field onshore in northern Kazakhstan, near the border with Russia's Orenburg field. Karachaganak's oil reserves have been estimated to be between 8 and 9 Gbbl (1.1 and 1.2 Gt) of oil and gas condensate (U.S. Energy Information Administration, 2008c). In 2006, Kazakhstan had three oil refineries in operation.

Uranium.—In 2006, Kazakhstan produced 5,279 t of uranium ( $U_3O_8$  content), which was 21% more than was produced in 2005. Of this amount, 3,010 t was produced by enterprises wholly owned by Kazatomprom, and the remainder was produced by joint ventures in which Kazatomprom was a part owner (Interfax Russia & CIS Metals & Mining Weekly, 2007g). Plans called for increasing uranium production by 31% to 6,937 t in 2007. Kazakhstan established three joint ventures with Russia to mine uranium in Kazakhstan, enrich it in Russia, and design and build nuclear powerplants to be sold to other countries (Interfax Mining and Metals Report, 2007h). Longer-term plans announced in May called for Kazatomprom to produce 17,500 t/yr of uranium by 2010, which would require placing 12 new mines into operation by 2009. This plan revised upwards Kazatomprom's production goal for 2010 because of a reassessment of world demand. Kazatomprom envisioned being the world's leading uranium producer by 2012. The company projected achieving a maximum output of 20,000 t/yr by 2016, which it could likely maintain until 2027 (Interfax CIS Mining & Metals Report, 2007h).

#### Outlook

Kazakhstan's long-term mineral development prospects remain promising. Oil production is expected to triple during the next decade and Kazakhstan was poised to become the world's leading uranium producer. Production growth had been taking place in practically all sectors of the mineral industry and is expected to continue in the next decade.

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#### KYRGYZSTAN

During the Soviet period, Kyrgyzstan's mining industry was based on the extraction of antimony, mercury, rare-earth elements, and uranium. The country was the main producer of mined mercury and of mercury and antimony metal during the Soviet period. Following the dissolution of the Soviet Union, the country's leading mineral sector became the gold mining sector following the development of the Kumtor gold deposit by Canada's Cameco Corp., which concluded an agreement for the development of Kumtor with the Kyrgyzstan Government in 1994. In 2004, all Cameco's assets in Kumtor were transferred to a jointly owned Canadian company called Centerra Gold, Inc.

#### Minerals in the National Economy

In 2005, which was the latest year for which data were available, the mining sector contributed 10.2% of the country's GDP, 48.4% of the country's industrial output, and 11% of the tax revenue collected (Zubkov, 2007). Kumtor Gold Co., which was a subsidiary of Centerra, was the country's leading mineral producing enterprise; in 2006, it accounted for 4.3% of the country's GDP and 14.4% of its industrial output (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

#### Production

In 2006, Kyrgyzstan experienced a 10.2% decrease in industrial production compared with that of 2005, which was primarily the result of decreased gold production from Kumtor Gold (Interfax Russia & CIS Statistics Weekly, 2007a). Antimony metal production appeared poised to resume at a much higher level at the end of 2006 with the resolution of raw material supply problems. Data on mineral production are in table 11.

#### Structure of the Mineral Industry

Besides Centerra, the country's main mining enterprises were the Kadamzhay antimony mining and metallurgical complex, the Khadarkan mercury mining and metallurgical complex, and the Makmal gold mining complex. Table 12 is a list of Kyrgyzstan's major mineral industry facilities.

#### **Mineral Trade**

In 2006, mineral products played a large role in Kyrgyzstan's exports. Precious metals and their products comprised 27.3% of total exports for the first 11 months of the year; of exports of mineral products, 21.7%; and of products made from stone, gypsum, cement, glass, and its products, 5.9%. Kyrgyzstan's main imports were mineral products composed of coal, natural gas, and petroleum refinery products, which accounted for 32% of total imports for the first eleven months of the year and nonprecious metals and their products, which accounted for 6.1% of total imports (Interfax Russia & CIS Statistics Weekly, 2007b).

#### **Commodity Review**

#### Metals

Antimony.—The Kadamzhay antimony mining and metallurgical complex was a vertically integrated antimony production complex that mined the Kadamzhay and the Terek deposits. The complex contained two mines (the Kadamzhay and Terek-Sayskiy), beneficiation plants, and the Kadamzhay metallurgical plant that produced metallic antimony and compounds. With the development of large antimony reserves in Russia and Tadzhikistan, ore production at Kadamzhay decreased. In 2004 and 2005, the Kadamzhay complex was not operating, and in 2005, it was privatized. The new owners engaged in investing in technically reequipping the plant and in infrastructure for the mines. From mid-2005 until November 2006, Kadamzhay ceased producing its core products because it had not been able to obtain raw material supplies from the Anzob mining and beneficiation plant in Tajikistan, which had been its main raw material supplier.

To resolve its raw material supply problem, in 2006, the Kadamzhay metallurgical plant oriented its production to processing concentrate from Russia. In the fall, Kadamzhay began receiving its supplies of raw materials from the Chita region in Russia, which would enable it to resume stable operations. Plans called for Kadamzhay to produce between 3,000 and 5,000 t/yr of antimony metal and its compounds.

Kadamzhay, despite more than 70 years of development, still had a large quantity of reserves in both deposits that had not been mined and in other deposits that the complex was keeping in reserve. The company determined that it was necessary to reevaluate these reserves on the basis of market economy criteria rather than the method that had been used in Soviet times. In the summer, ATF Invest, a subsidiary of the ATF Bank of Kazakhstan, purchased a 70.4% stake in Kadamzhay (Interfax Russia & CIS Metals & Mining Weekly, 2007a; Zubkov, 2007).

**Gold.**—In 2006, Kyrgyzstan experienced a 36% decline in gold production to 10.721 t. Gold was the country's main mineral commodity produced, in terms of value. Plans had called for producing 12.795 t. Kumtor Gold, which was the country's leading gold producer, reduced output by 39.5% to 9.443 t, which was 16.1% less than planned output. The decline in gold production at Kumtor Mine was caused mainly by a pit wall collapse at the mine in July, but was also the result of the company having to mine lower-grade ore; the ore graded 1.5 grams per metric ton (g/t) gold compared with the higher-grade ore previously mined, which graded 2.5 g/t gold. In 2007, plans called for Kumtor Gold to increase gold production to 15 t (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Mercury.—The Khaydarkan mercury mining and metallurgical complex mined the Khaydarkan and the Novoye deposits. Remaining reserves at the Khaydarkan deposit were reportedly 11,000 t, and at the Novoye deposit, 5,500 t. These deposits also reportedly contain 1.071 Mt of fluorspar and 107,700 t of antimony reserves. The Khaydarkan complex contained two underground mines, a beneficiation plant, and metallurgical processing facilities. Khaydarkan was producing about 500 to 600 t/yr of mercury in recent years, but this amount fell to 304 t in 2005. Calcined antimony produced at Khaydarkan as a result of processing antimony-fluorspar concentrate was sent to Kadamzhay for processing, and the fluorspar concentrate was sold to consumers. The potential for future expansion of mercury production at Khaydarkan was limited owing to the limited quantity of primarily mercury ore reserves. The majority of the remaining reserves at Khaydarkan were of complex ores from which it was more difficult to extract mercury. Plans called for the Government to privatize Khaydarkan in 2007 (Zubkov, 2007).

#### **Industrial Minerals**

**Rare Earths.**—Open pit mining of rare-earth metals had taken place in Kyrgyzstan from 1960 through 1992 at the Kutessai II deposit, and the majority of rare-earth metal reserves there still remained. Of the remaining rare-earth metal reserves, 54.5% were of the cerium group and 43.7% were of the yttrium group. The complex had produced up to 120 types of rare-earth metal products. During the beneficiation process, lead and molybdenum concentrates also were produced and sold. In 2006, a private firm purchased the license to continue developing this deposit. It was conducting a reevaluation of the reserves to determine the potential for the economic production of rare-earth metals (Zubkov, 2007).

#### Outlook

In the short term, the economic well-being of the country as well as that of the mineral sector depend, in part, on the revival of gold production at Kumtor Mine. Centerra planned to increase production by between 48% and 52%, or from 9.4 t in 2006 to between 14 and 14.3 t in 2007, by mining higher-grade ore, which would likely bring gold output at Kumtor more in line with its historic average levels and consequently bolster the country's GDP (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

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#### MOLDOVA

Moldova had a small mineral industry that was primarily engaged in the mining and production of industrial minerals and products, including cement, dimension stone, gypsum, limestone, industrial sand, and sand and gravel (table 13). Moldova had a steel minimill in Ribnita, the Moldova Steel Works, which had the capacity to produce more than 1 Mt/yr of crude steel and 960,000 t/yr of rolled products (table 14).

The extractive industries accounted for less than 2% of the value of the country's industrial production (Statistica Moldovei, 2005, 2006). The country has numerous deposits of industrial minerals and small oil and gas reserves, which it hoped to develop with the aid of foreign investment (Austrian Energy Agency, 2009). Practically all mineral production enterprises were stock companies that had the participation of foreign enterprises (Zhalalite and others, 2007).

In 2005, more than 70% of the value of the country's mineral imports came from the CIS. Moldova did not have any oil refineries and was entirely dependent on imports of petroleum products. Almost all these imports come from Romania and Ukraine, although in the 1990s, almost all had come from Russia. Moldova imported all the natural gas it consumed from Russia (Austrian Energy Agency, 2009).

Moldova had been experiencing a continuous shortage of high-strength gravel and stone. The country was mining granite at only one deposit (the Kosoutskoye), which in 2006 produced 130,000 cubic meters—an amount that was not adequate to meet Moldova's requirements for high-strength construction stone. Also in 2006, out of 125 explored sand and gravel deposits, 71 were being mined with an output of 925,000 cubic meters of sand and gravel. Although this amount was three times greater than the amount produced in 2000, it was significantly less than the country was producing in 1990. Of the 105 known deposits containing reserves of clay and loam suitable as raw material for bricks, tiles, and ceramic drainage pipes, 11 deposits of ceramic raw materials were under development. Of 16 explored deposits of porous clay filler (keramzit) for cement, two were under development (Zhalalite and others, 2007).

The country's steel mill was located in the region of Transnistria (officially Pridnestrovie), which is a territory within the internationally recognized boundaries of the Republic of Moldova. Transnistria declared its independence as a separate republic of the Soviet Union on September 2, 1990. Although the separatist Pridnestrovian Moldovan Republic (PMR) had exercised de facto control over most of Transnistria, its independence had not been recognized by Moldova or internationally. The steel mill was Transnistria's leading industry and accounted for about 50% of the region's budget revenues. Steel was one of Transnistria's major exports.

In 2006, steel output at the Moldova Steel Works decreased by about 32.5% to 675,400 t. The Moldova Steel Work's functioning was impaired by a number of factors, which included a halt in supplies of Russian gas to Moldova, the introduction of a Ukrainian customs duty of 30 euros per metric ton on scrap metal, and a shut down in operations in October owing to renovation. Efforts were underway to resolve the problem of scrap supply in 2007 by accumulating stocks of scrap and by setting up firm commitments with scrap suppliers. The steel works exported about 75% of its output (Interfax Mining and Metals Report, 2007).

#### Production

Data on mineral production are in table 13.

#### Structure of the Mineral Industry

Table 14 is a list of major mineral industry facilities in Moldova.

#### Outlook

The mineral industry of Moldova appears likely to continue to be centered on the production of industrial minerals and steel. The country has very limited resources of hydrocarbons and iron ore, and its only significant mineral resources are of industrial minerals used in the cement, chemical, construction materials, food processing, and glass industries. For Moldova to significantly increase production of industrial minerals, it would have to significantly increase its investment in exploration, which would probably require establishing additional cooperative projects with foreign partners (Zhalalite and others, 2007).

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#### RUSSIA

Russia is one of the world's leading mineral producing countries and accounts for a large percentage of the FSU's

production of a range of mineral products, including industrial minerals, metals, and mineral fuels. In 2006, Russia ranked among the leading world producers or was a large producer of such mineral commodities as aluminum, arsenic, asbestos, bauxite, boron, cadmium, cement, coal, cobalt, copper, diamond, fluorspar, gold, iron ore, lime, lithium, magnesium compound and metals, mica (scrap, sheet, and flake), natural gas, nickel, nitrogen, oil shale, palladium, peat, petroleum, phosphate, pig iron, potash, rhenium, silicon, sulfur, titanium sponge, steel, tin, tungsten, and vanadium.

#### Minerals in the National Economy

The mineral raw material sector in Russia produced about 30% of the country's GDP and contributed about 70% of the country's budget revenues (Chanturiya, 2007). Analyses from the International Monetary Fund and The World Bank have estimated that the oil and gas sector accounted for about 20% of the country's GDP (U.S. Energy Information Administration, 2007a). The metallurgical sector accounted for about 5% of the GDP, 18% of industrial production, and 15% of exports (Parkhomenko, 2007). In 2006, 1,036,000 workers that made up 1.5% of the labor force were engaged in mining (Rossiya v Tsifrakh 2007, 2008a). Russia, however, ranked among the lower 20% of mineral extracting countries in its per capita consumption of metals (Chanturiya, 2007). Domestic consumption of mineral products was increasing, however. In 2006 in the ferrous sector, domestic demand for rolled steel increased by 16.5%, and domestic demand for steel pipes increased by 27.8%; in the nonferrous sector, domestic demand for aluminum increased by 3.8%; that for copper, by 2.7%; and that for nickel, by 2.9% (Parkhomenko, 2007).

The growth in domestic demand was attributable to increased demand in the domestic machine manufacturing, transport, and fuel sectors. Owing to the need of these sectors for high-quality metals or for a specific assortment of products not produced domestically, such as zinc-coated and alloyed steels and a variety of steel pipes, these industries continued to import a percentage of these metal products (Nekrasov, 2007).

#### **Government Policies and Programs**

Amendments to Russia's law on the use of subsurface resources were ratified on January 31, 2007. These amendments set criteria for deposits containing strategic commodities and limited the rights of foreigners to invest in a controlling stake in such deposits if they have not yet been developed with foreign participation. Strategic deposits include oilfields with more than 70 Mt of reserves, natural gas fields with more than 50 billion cubic meters of reserves, copper deposits with more than 500,000 t of copper contained in the ore, and gold deposits with more than 50 t of gold contained in the ore. All mineral deposits of diamond, pure quartz, and uranium are considered strategic. These new amendments set criteria for strategic deposits that are much lower for oilfields and gasfields than criteria proposed earlier and encompass, therefore, a much larger number of these fieldsabout 30 oilfields and 40 gasfields. For copper, three deposits, including the Udokan deposit, would be listed as strategic, and for

gold, the Sukhoy Log deposit would be listed as strategic (Interfax Russia & CIS Metals & Mining Weekly, 2007n).

United Company RUSAL (formerly RUSAL) stated that it understands the importance of climate change to future generations and set a goal to reduce emissions from its smelters by a total of 50% by 2015. It planned to spend \$1.4 billion by 2013 for this purpose. All smelters were to be modernized to conform to one standard. RUSAL was planning to have its operations be carbon neutral through improved energy efficiencies and through recycling. RUSAL was deriving about 80% of its electricity from hydroelectric sources, and developing hydroelectric projects was a prominent feature of RUSAL's development plans. RUSAL was also devoting substantial resources to researching and developing more environmentally friendly ways to use coal. By increasing recycling, RUSAL would save substantial energy as remelting aluminum requires only 10% of the energy used to produce primary aluminum. RUSAL claimed that it was the first major Russian company to take these steps and hoped that it would set an example for other Russian companies (Interfax Russia & CIS Metals & Mining Weekly, 2007h).

#### Production

Russia, according to calculations by the Center for Strategic Research at Moscow State Mining University, was the leading country in the world in the number of minerals that it mined (Chanturiya, 2007). In 2006, in the mineral sector (with a few exceptions for such commodities as gold, magnesium, tin, and tungsten), production increases were registered for practically all ferrous and nonferrous metals and fuels (table 15; Nekrasov, 2007).

#### Structure of the Mineral Industry

Russia has more than 100 large mining and beneficiation and mining and metallurgical enterprises that mine and process ferrous and nonferrous metals. The country had 238 coal mining enterprises, which mined coal at 134 open pits and 104 underground mines. Coal processing was performed at 42 beneficiation plants, 27 beneficiation installations, and 17 sorting stations (Chanturiya, 2007; Linyev and others, 2007). The leading enterprises in the nonferrous enterprise sector included RUSAL for aluminum and OJSC MMC Norilsk Nickel for cobalt, copper, gold, nickel, platinum-group metals (PGM), and other byproduct metals. In the ferrous metals sector, the major metallurgical enterprises were the EvrazHolding, the Lipetsk, the Magnitogorsk, the Mechel, the Metallinvest, and the Severstal' steel mills (Parkhomenko, 2007). Table 16 is a list of major mineral industry facilities in Russia.

#### **Mineral Trade**

In 2006, exports of mineral products were valued at \$199 billion, of which \$178.7 billion was exported outside the CIS and accounted for 65.8% of the total value of exports and 68.7% of the total value of exports outside the CIS. The value of exports in 2006 was significantly higher than in 2005

when exports of mineral products were valued at \$156 billion and exports outside the CIS were valued at \$140.9 billion and accounted for 64.6% of total exports and 67.5% of exports outside the CIS. Russia's exports of natural gas and oil and of ferrous and nonferrous metals accounted for between 7% and 20% of the total volume of world exports of these products (Chanturiya, 2007). Oil and gas exports accounted for more than 60% of export revenues and 30% percent of all foreign direct investment (FDI) in the country. Russia relied heavily on oil and natural gas exports, and fluctuations in the world price of oil could have a large effect on its economy (U.S. Energy Information Administration, 2007a).

Of Russia's total exports, those of ferrous and nonferrous metals ranked second to mineral fuels and accounted for 15% of the total value of exports. In 2006, however, the total value of ferrous and nonferrous metals as a percentage of the country's total exports decreased somewhat compared with that of 2005. In 2006, Russian metal exporters continued to face trade sanctions, with more than 38 trade sanctions still in place in such countries as Argentina, Australia, countries of the European Union (EU), India, Mexico, Turkey, the United States, and Venezuela. Such restrictions were affecting both ferrous and nonferrous exports. In 2006, Russia still had not achieved acceptance to the World Trade Organization, which, if such membership is achieved, could remove a number of the trade barriers that were erected against Russian metal exports (Nekrasov, 2007).

In 2006, Russian exports of ferrous metals totaled 45.96 Mt and were valued at \$17.85 billion (Interfax Russia & CIS Metals & Mining Report, 2007a). In the ferrous sector in 2006, Russia exported 22.9 Mt of iron ore and concentrate, which was a 25.8% increase in exports compared with those of 2005; 6.1 Mt of pig iron, which was a 15.3% increase; and 19.889 Mt of steel products, which was about a 1% increase (Rossiya v Tsifrakh 2007, 2008b). In 2006, Russia increased its aluminum exports by 10.1% to 4.064 Mt, but copper exports decreased by 12.9% to 271,000 t, and nickel exports decreased by less than 1% to 259,800 t. In the fuel sector in 2006, Russia exported 91.4 Mt of hard coal, which was a 14.5% increase in exports compared with those of 2005; 248 Mt of crude oil, which was about a 2% decrease; 103 Mt of refinery products, which was a 6% increase; and 203 billion cubic meters of natural gas, which was a 2.4% decrease (Rossiya v Tsifrakh 2007, 2008b).

Only a small percentage of Russian exports of mineral products went to countries of the CIS. The leading consumer of Russian energy products was the EU, which accounted for 63% of Russia's total oil exports and 65% of its gas exports. Russia was the EU's single leading supplier of oil and gas and provided 27% of total EU oil imports and 44% of total EU natural gas imports (Moscow News, 2007; Rossiya v Tsifrakh 2007, 2008b).

#### **Commodity Review**

#### Metals

Aluminum.—RUSAL was Russia's leading domestic aluminum producing company and SUAL Group was the second

ranked domestic aluminum producer and the leading domestic bauxite producer. Together, these two firms controlled all Russian aluminum, alumina, and bauxite production enterprises. Plans called for RUSAL to merge with SUAL and with the Switzerlandbased Glencore International AG to become the United Company RUSAL, which would then become the global leader in aluminum production. The merger was completed in March 2007.

In 2006, RUSAL was investing to expand and modernize its production facilities. It was engaged in commissioning the Khakaz aluminum smelter with a capacity of 300,000 t/yr. The Khakaz aluminum smelter was the first aluminum production facility built in Russia in the past 20 years. The first batch of aluminum was manufactured at the Khakaz smelter in December 2006. The total amount of investment in the project exceeded \$750 million. The Khakaza smelter was projected to reach its installed capacity in October 2007. It had 600 employees (United Company RUSAL, 2007).

In 2006, RUSAL began work to construct a 750,000-t/yr greenfield aluminum smelter in Taishet, which is a small town located near Irkutsk. The construction was expected to be completed in 2011. RUSAL also was carrying out large-scale modernization of the Irkutsk aluminum smelter, which was commissioned in 1962. After commissioning of a new potline no. 5, the total capacity of the smelter would increase by 50% to 450,000 t/yr. The first stage of potline no. 5 was to start production in 2007 and full production capacity for potline no. 6 was planned after the construction of potline no. 5. When the planned construction of potline no. 6 is completed in 2009, the smelter's production capacity would reach 500,000 t/yr (United Company RUSAL, 2008).

Plans for RUSAL also called for modernizing the Sayanogorsk aluminum smelter in 2006 to increase the output of aluminum and alloys and to modernize the Nikolayev alumina refinery in Ukraine to increase the output to 1.6 Mt/yr of alumina. RUSAL also planned to continue to expand production capacity at the Achinsk alumina refinery, increasing its output to 1.1 Mt/yr of alumina (United Company RUSAL, 2008).

Included in RUSAL's investment project portfolio was the Komi Aluminum project, which was initiated by SUAL. The project entailed the development, construction, and operation of a bauxite-alumina complex in the Komi Republic, which would be supplied by ore from the Middle Timan bauxite deposit that was under development and would include an alumina refinery to be constructed at Sosnogorsk. The design capacity of the complex was 6.5 Mt/yr of bauxite and 1.4 Mt/yr of alumina. From 1998 until 2006, mining at the Komi project was taking place only at open pit no. 2, but in January 2006, open pit no. 3 was commissioned, and in June, open pit no. 1 was commissioned. Bauxite production at Komi had increased from 63,479 t in 1998 to 2,010,864 t in 2005. Plans called for increasing bauxite production at Komi to 6.5 Mt/yr in the 2009-10 period. Construction of the alumina plant in Sosnogorsk had not begun, and the functioning of the alumina plant would depend on its obtaining an uninterrupted supply of bauxite from the Komi project when it has achieved its design capacity to produce 6.5 Mt/yr of bauxite. The completion of the Komi project would considerably reduce the Russian aluminum industry's dependence on foreign countries for bauxite and alumina (Broneyoy and others, 2007).

Antimony.--Russia reportedly was second in the world to China in antimony reserves. Russia's antimony reserves are located primarily in the Sakha (Yakutiya) Republic. These reserves are comparatively rich in antimony content with ores that grade between 20% and 25%. Practically all explored reserves are located in the Sarylakh and Sentachun deposits, which contain reportedly 200,000 t of antimony reserves; these reserves account for 83% of the country's total reserves of almost 240,000 t, which are contained in nine deposits. Ore from the Sarylakh deposit has an average grade of 13.2% antimony, which can be beneficiated to obtain a concentrate containing 60% antimony. Ore from the Sentachun deposit has an average grade of 28.7% antimony and the concentrate produced contains 58.9% antimony. Ore from these deposits was processed using a gravitation-flotation beneficiation method (Solozhenkin, 2007).

**Beryllium.**—The country's beryllium consumption was between 2 and 3 t/yr and was projected to increase to between 10 and 12 t/yr by 2010. Reserves of beryllium are located in 27 deposits and subeconomic (zabalansovye) reserves were located in an additional 8 deposits. Most of these deposits have complex pegmatitic ore, and beryllium would be a byproduct. The most prospective deposit was reportedly the Yermakovskoye fluoritebertrandite-phenacite deposit in Buryatia, the development of which would fully satisfy the country's future demand for beryllium (Kurkov and Kotova, 2007).

**Copper.**—At Russia's leading copper producing enterprise, Norilsk Nickel, copper metal production fell slightly in 2006 to 425,000 t compared with 427,000 t in 2005, which was in keeping with targets that the company had set. Production of copper was targeted to remain in the range of from 422,000 to 427,000 t in 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007f). Based on the results of an independent audit conducted in accordance with the standards of the Joint Ore Reserves Committee (JORC), proven and probable reserves of copper contained in deposits on the Kola and the Taymir Peninsulas exceeded 9 Mt (MMC Norilsk Nickel, 2007).

The Urals Mining and Metallurgical Company (UMMC), which was Russia's second ranked copper producer with about 40 enterprises in 11 regions managed by UMMC Holding, had about a 40% share of the domestic copper cathode market. In 2006, UMMC produced 354,258 t of cathode copper, which was about equal to its 2005 production level, and it planned to increase production in 2010 by 41% to 500,000 t. In 2006, UMMC had the capacity to produce 360,000 t/yr of copper cathodes (Interfax Russia & CIS Metals & Mining Weekly, 2007q, r). Plans called for reconstruction of an electrolysis unit, which would enable UMMC to increase copper cathode production by 150,000 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007s).

The Russian Copper Company (RCC), which was the country's third ranked copper producer with production facilities centered in the Ural Mountains, increased production of copper cathode in 2006 by 33% to 164,000 t. RCC combines 11 upstream and downstream enterprises, which mine and process copper ores and produce copper products. In 2006, RCC's share

of the Russian market rose to 18% from 3%, and its share of the world market was 1%. Plans called for RCC to increase copper cathode production to 185,000 t using its own raw materials. Cathode production capacity was increased at RCC's Kyshtym refinery in the Chelyabinsk region and at its new Novgorod refinery. RCC's copper cathode production capacity increased by 60,000 t/yr in 2006. RCC planned to increase copper cathode output to 290,000 t in 2010. In 2007, RCC planned to add a third electrolytic plant at Kyshtym with a capacity of 100,000 t/yr; the first 50,000 t of capacity would be added in the late spring and the remaining 50,000 t would be added in December (Interfax Russia & CIS Metals & Mining Weekly, 2007l).

Reserves were being reevaluated at the Udokan copper deposit in Chita oblast', which is one of the largest copper deposits in the area of the FSU. The reevaluation was to be completed at the end of 2009. It was being conducted by the geological firm Giprotsvetmet with the participation of Norilsk Nickel, which was one of the companies contending for rights to develop the deposit. Owing to the size of its reserves, Udokan was being classified as a strategic deposit, which means that foreign companies would not be able to have a controlling interest in the ownership of the deposit (Interfax Russia & CIS Metals & Mining Weekly, 2007o).

Gold.—Gold output in 2006 in Russia, including secondary recovery, decreased by 2.2% and totaled 164.3 t. Mine output of primary gold, which does not include byproduct gold, decreased by 2.9% to 147.6 t, but secondary gold production increased by 2.1% to almost 5 t. Gold mine output was reduced mainly because of a decline of 9.6 t in placer gold production (Interfax Russia & CIS Metals & Mining Report, 2007b). Almost the country's entire production of gold (98.9%) took place in the 14 leading gold mining regions, which each had an annual output of more than 1 t. The leading gold producing region in 2006 was Krasnoyarsk Kray, with output of 31.491 t; it was followed by the Sakha (Yakutiya) Republic, with 19.920 t; Magadan Oblast', 17.288 t; Khabarobsk Kray, 15.742 t; Irkutsk Oblast', 14.542 t; and Amur Oblast', 14.491 t. The remaining eight major gold producing regions had outputs of less than 7 t in 2006. In 2006, the Kamchatka Oblast' was included on the list. Among those regions previously on the list, in only two, Krasnoyarsk Kray and the Sakha (Yakutiya) Republic, did production increase. Particularly large production decreases in output occurred in Khabarovsk Kray and Magadan Oblast' (Brayko and Ivanov, 2007).

Production fell primarily because of reduced output from placer deposits where reserves were being depleted and production capacity was being transferred to mine hard rock deposits. Depletion of reserves at placer mines also was attributed in part to a lack of resources by the small companies mining these deposits to conduct necessary exploration. In 2006, 62 t was produced from placer deposits, which was far less than the amount produced from placers between 1976 and 1990, when production ranged between 110 and 130 t/yr (Brayko and Ivanov, 2007).

In 2006, the country's leading gold mining company remained the OAO Polyus Zoloto, which produced 37.548 t of gold compared with 32.322 t in 2005. It mined gold in five major gold producing regions. The total increase in extraction from hard rock mining enterprises in 2006 was 2.6 t, as production increases at some enterprises were offset by decreases at others. Extraction of gold by foreign-controlled enterprises decreased by 10% in 2006. The Krasnoyarsk nonferrous metals plant remained the country's leading gold refinery, processing 48.9% of mined gold (Brayko and Ivanov, 2007).

Iron and Steel.-In 2006, Russia increased output of crude steel by 6.8% to 70.766 Mt, and output of rolled steel, by 6.5% to 58.212 Mt. Russia increased steel pipe output by almost 19.5% to 7.974 Mt. Oxygen converters were used to produce about 59% of total steel output and electric furnaces were used to produce about 21%, which was an increase of 6.1% in the production of steel from oxygen converter furnaces and an increase of 10.6% for steel produced in electric furnaces. The percentage of steel produced in open-hearth furnaces fell to 19.9% of total steel output. The amount of steel produced by continuous casting increased to 68.4% in 2006 when 48.4 Mt was produced by continuous casting, from 66% in 2005. All Russia's steelmaking plants increased their output of crude steel in 2006 except one, and all but two increased their output of rolled steel (Interfax Russia & CIS Metals & Mining Weekly, 2007i, k; Nekrasov, 2007).

In 2006, 44.6% of total steel production occurred at the three leading steel mills (Magnitogorsk, Novolipetsk, and Severostal). The rate of investment in the steel sector varied greatly among enterprises. For the three leading steel mills, the average rate of investment was \$32 per metric ton of steel produced; for the six in the second-tier group of steel mills, the average rate of investment was \$15 per metric ton of steel, and for the third group of smaller steelmakers, the average rate of investment was only between \$7 and \$8 per metric ton (Yuzov and others, 2007). Plans called for completely eliminating open-hearth steel production by 2010, which would necessitate a change in the type of refractory raw materials in use and could increase the demand for less conventional refractory raw materials, such as andalusite, bauxite, kyanite, sillimnanite, and zirconium (Shevelyev and Tokhtas'yev, 2006).

**Iron Ore.**—In 2006, Russia's iron ore mining industry achieved a 7.3% growth in output to 102 Mt compared with almost 97 Mt in 2005. The growth was fueled by an increase in domestic demand for pig iron and also by the increased demand for iron ore on the world market. The major iron ore producers remained the enterprises in the Kursk Magnetic Anomaly (KMA) and in the North West region, which produced 56% and 17%, respectively, of total output. Growth was specifically notable at the Lebedi and the Mikhaylovka mining and beneficiation complexes in the KMA and at the Korshunovo mining and beneficiation complex in the North West region (Nekrasov, 2007).

Russia's reported iron ore reserves are located in 172 deposits, 53 of which were being mined. The basic iron ore reserves are composed mainly of magnetite and hematite-magnetite ores with the average iron content in the magnetite ores ranging between 31% and 35% and in the hematite ores, between 40% and 50%. The differing ore types require specialized technologies to beneficiate in order to produce a marketable product (Avdokhin and Gubin, 2007).

**Lead and Zinc.**— UMMC, which was Russia's second ranked copper producer with facilities centered in the Ural

Mountains, planned to increase zinc metal production to 250,000 t in 2012, or by 184%. UMMC produced about 88,000 t of zinc in 2006. Plans called for UMMC to construct a 140,000- to 150,000-t/yr-capacity zinc smelter in the Sverdlovsk region, which would be capable of processing all UMMC's raw materials. The new smelter was to be commissioned in the summer of 2008. Plans called for UMMC to produce 87,500 t in 2007 and 2008 and to increase production to 110,000 t in 2009. In 2006, UMMC processed most of its zinc concentrate at its zinc refinery in Vladikavkaz, which had a capacity to produce 90,000 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007r).

In 2006, UMMC produced 42,000 t of lead, with production of 28,000 t at its Elektozinc enterprise in Vladikavkaz and 14,000 t at its Uralektromed enterprise. UMMC planned to increase production at Elektrozinc by 85% to 50,000 t by 2010 with output in 2007 targeted at 30,000 t (Interfax Russia & CIS Metals & Mining Weekly, 2007d).

Siberian Polymetals, which was a subsidiary of UMMC, planned to commission the Zarechenskiy Mine in June, which would increase polymetallic ore production by 100,000 t/yr in the first stage; the design capacity of 300,000 t/yr of ore would be reached in 2009. In 2007, the new mine was projected to produce 30,000 t of ore. Reserves were reportedly 1.3 Mt of ore (Interfax Russia & CIS Metals & Mining Weekly, 2007e).

Magnesium.—Russia had two major magnesium producing enterprises-the Avisma titanium-magnesium plant in Berezniki in the Perm region, which produced magnesium metal and compounds and was a subsidiary of titanium producer VSMPO-Avisma, and the Uralkaliy potash and magnesium mining and beneficiation plant, which was also located in the Ural Mountains. In 2006, Avisma, which produced magnesium from carnallite ore mined by the Sylvinit mining enterprise and processed at Uralkaliy, reduced magnesium metal production to 15,800 t from 23,000 t in 2005, or by 33.9%. The decrease in output took place because of low profit margins and the inability of magnesium from Avisma to complete on world markets. Production also fell below the targeted amount of 16,000 t owing to an accident at raw material supplier Uralkaliy at the end of 2006. It was envisaged that raw materials supply would stabilize in 2007 and that Avisma would be able to honor all existing contracts to supply magnesium (Interfax Russia & CIS Mining & Metals Weekly, 2007v).

**Magnesium Compounds.**—The Magnezit Group was Russia's leading magnesite producer and had a 67% share of the Russian refractories market and a 60% share of the CIS market. It included the Kyshtym refractories plant, the Magnazit Works, Sibirsky Magnezit, two plants in China, and two sales divisions. The Magnezit Group operated the Karagayskiy open pit mine and the Magnezitovaya underground mine. The Karagayskiy open pit was near depletion and development of the Yelnichnoye deposit within the Satkinaya group of deposits was underway to replace production from Karagayskiy. The Magnezit Group also had a license to develop the Goluboye deposit in the Krasnoyarsk region, which reportedly has explored reserves of 15.5 Mt. A planned mine would have the capacity to produce 200,000 t/yr of raw magnesite and was scheduled to achieve capacity production in 2008. Planning was underway for construction of a plant that would have the capacity to produce 95,000 t/yr of roasted magnesite from this ore; the plant was scheduled to be completed in 2009. The Magnezit Group reportedly had 150 Mt of proven reserves in its deposits in the Chelyabinsk region (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

Nickel.—In 2006, Norilsk Nickel, which was the world's leading nickel producer and which had mining and processing operations on the Kola Peninsula in the northwestern part of the country and on the Taymyr Peninsula in Siberia, produced 244,000 t of nickel metal products compared with 243,000 t in 2005, which was in keeping with the company's production targets. Norilsk Nickel's mining operations on the Taymyr Peninsula consisted of seven mines that extracted mixed sulfide ores with varying contents of cobalt, copper, gold, nickel, PGM, and other ore constituents. Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of nickel on the Kola and the Taymyr Peninsulas exceeded 6 Mt. Norilsk Nickel operated four mines on the Kola Peninsula that extracted disseminated sulfide ores containing copper, nickel, and other ore constituents. Norilsk Nickel had ore processing and metallurgical enterprises at both locations, but the refining of PGM concentrates from Norilsk Nickel was outsourced under a tolling agreement to the Krasnoyarsk nonferrous metals plant (MMC Norilsk Nickel, 2007).

Norilsk Nickel's plans for 2007 called for producing between 243,000 and 248,000 t of nickel products (Interfax Russia & CIS Metals & Mining Weekly, 2007f). In 2006, development of the Severny-Gluboky underground mine on the Kola Peninsula continued. The mine had a planned annual capacity of 6 Mt of disseminated ore. Commissioned capacity at Severny-Gluboky was 1 Mt/yr of ore in 2006. Longer-range plans for Norilsk Nickel called for increasing the total annual ore production on the Kola and the Taymyr Peninsulas from 21.8 Mt in 2006 to 26 Mt by 2015 (MMC Norilsk Nickel, 2007).

Ore production on the Taymyr Peninsula was projected to increase to 18.5 Mt in 2015 from 14.127 Mt in 2006, with the production of nickel-rich ore (grading 2.5% nickel, 2.25% copper, and 5 to 100 g/t PGM), cuprous ores (grading 0.2% to 2.5% nickel, 1% to 15% copper, and 5 to 50 g/t PGM), and disseminated ores (grading 0.2% to 1.5% nickel, 0.3% to 2% copper, and 2 to 10 g/t PGM) reaching levels of 7.5 Mt, 5.5 Mt, and 5.5 Mt, respectively. In 2006, the composition of ore extracted on the Taymyr Peninsula changed with a 180,000-t reduction in the production of nickel-rich ore owing to the decommissioning of facilities and a 220,000-t decrease in output of cuprous ores owing to the renovation of facilities. Output of disseminated ore increased by 139,000 t (MMC Norilsk Nickel, 2007).

The key projects that would enable Norilsk Nickel to achieve its production target of 7.5 Mt/yr of nickel-rich ore on the Taymyr Peninsula were the development of the Skalisty Mine, which would have a total capacity of 3 Mt/yr, and mining of the lower horizons of the Taymyrsky Mine, which would increase total output at Taymyrsky to 4 Mt/yr by 2011 (MMC Norilsk Nickel, 2007).

The increase in cuprous ore output on the Taymyr Peninsula to 5.5 Mt would be achieved by increased mining of curprous

ores at the Oktyabrsky Mine to 3 Mt/yr, which would offset the depletion of nickel-rich ore. An expansion of cuprous ore mining by 2.5 Mt/yr was planned at the Komsomolsky Mine, with a total projected output at Komsomolsky of 4.3 Mt/yr. Achieving an optimal production of disseminated ore of 5.5 Mt/yr would be achieved by stripping new mining areas at the Komsomolsky, the Oktyabrsky, and the Zapolyarny Mines (MMC Norilsk Nickel, 2007).

In 2006, Norilsk Nickel's ore production on the Kola Peninsula totaled 7.634 Mt, which was an increase of 12.2%. Production on the Kola Peninsula was projected to remain at about 7.5 Mt/yr, which would be achieved by commissioning the Severny-Gluboky Mine at its design capacity of 6 Mt/yr by 2012; production from Severny-Gluboky would offset the decommissioning of the Tsentralnaya open pit (MMC Norilsk Nickel, 2007).

The implementation of Norilsk Nickel's mine development plan would enable Norilsk Nickel to maintain stable metal production levels. Increases in base and precious metals production on the Taymyr Peninsula would be achieved by using newly developed technology to upgrade concentration operations and expand their capacity and also by increasing the rate of processing of stored pyrrhotite tailings. On the Kola Peninsula, the modernization of metallurgical operations was primarily aimed at reducing sulfur dioxide emissions (MMC Norilsk Nickel, 2007).

The Yuzhuralnikel enterprise, which was a producer of nickel from laterite ore in the Ural Mountains, increased nickel production by 14% to 14,400 t (Interfax Russia & CIS Metals & Mining Weekly, 2007t). The Ufaley Nickel plant in the Ural Mountains, which produced cobalt metal and oxides, granulated nickel, and nickel monoxide, had plans to increase nickel production by between 18% and 27% to between 13,000 and 14,000 t/yr and to increase cobalt production by 21.7% to 2,800 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007p).

Niobium (Columbium).—Russia's niobium consumption in 2006 was estimated to be between 25 and 30 t, but was projected possibly to increase to 500 t by 2010. The country's niobium reserves are located in 22 known deposits. The only enterprise that mined niobium was the Karnasurt mining enterprise, which was subordinate to AO Sevredmet, which mined the Lovozerskoye loparite deposit on the Kola Peninsula. The concentrate was processed at the Silimae rare-earth-metals processing plant in Estonia. A Russian development program envisioned processing 12,000 t/yr of loparite ore from Lovozerskoye at the OAO Chepetskiy machinery manufacturing plant, which would produce 3,900 t/yr of titanium dioxide, 873 t/yr of niobium pentoxide, 472 t/yr of neodymium oxide, 310 t/yr of zirconium dioxide, 280 t/yr of lanthanum oxide, 61 t/yr of tantalum pentoxide, and 56 t/yr of praseodymium oxide (Kurkov and Kotova, 2007). The Katuginskyoe deposit in Chita Oblast was projected to be a significant supplier of niobium after 2010. The largest and most significant prospective source of niobium was the Tomtorskoye deposit on the Taymyr Peninsula in East Siberia, which had an average contained niobium oxide content of 6.71%. The first stage of a planned mining enterprise to develop this deposit was projected to produce 10,000 t/yr of

ore; reserves were adequate to maintain production for about 100 years (Kurkov and Kotova, 2007).

**Platinum-Group Metals.**—In 2006, output at Norilsk Nickel, which produced more than 95% of the country's platinumgroup metals (PGM), totaled 3,164,000 troy ounces (97.4 t) of palladium and 752,000 troy ounces (23.4 t) of platinum, which was a slight (0.9%) increase compared with output in 2005. The increase was partly the result of the increased content (1.7%) of PGM in the ore (MMC Norilsk Nickel, 2007).

Plans for 2007 called for Norilsk Nickel to produce between 98 and 99 t of palladium and between 23 and 24 t of platinum. A comparatively small amount of PGM consisting primarily of platinum was being mined from placer deposits (Interfax Russia & CIS Metals & Mining Weekly, 2007f). Based on the results of an independent audit conducted in accordance with the standards of the JORC, proven and probable reserves of palladium on the Taymir Peninsula exceeded 63 million troy ounces (about 2,000 t) and more than 16 million troy ounces of platinum (about 500 t) at a combined grade of 7.54 g/t PGM (MMC Norilsk Nickel, 2007).

Barrick Gold Corp. ABX of Canada estimated that its Fedorova Tundra deposit in the Murmansk region contains measured and indicated resources of 1.1 million troy ounces (about 34 t) of palladium and 300,000 troy ounces (about 9 t) of platinum and inferred resources (as of the end of 2006) of 1.3 million troy ounces of palladium (about 40 t) and 300,000 troy ounces (about 9 t) of platinum. Barrick planned to mine the deposit to produce concentrate, which would be processed at Norilsk Nickel's Severonikel plant on the Kola Peninsula. Production was scheduled to commence in 2010, with output projected to be 150,000 t/yr of concentrate expected to contain 98 g/t of PGM. Barrick had a 50% stake in the project; the other 50% belonged to Cascadia International Resources, Inc. of Canada, which received the right to mine this project from BHP Billiton in 2001 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

**Rhenium.**—Future Russian consumption of rhenium was projected to be between 2 and 5 t/yr. Rhenium reserves are hosted in three molybdenum deposits—the Agaskyrskoye and the Sorskoye deposits in Khakasiya and the Malo-Oynogorskoye deposit in Buryatiya (Kurkov and Kotova, 2007).

**Scandium.**—In 2006, Russia was not producing scandium. Russia's annual demand for scandium after 2010 was estimated to be in the range of from 1.6 to 2 t. Scandium reserves are located in four deposits, one of which is a bauxite deposit in Sverdlovsk Oblast' and three of which are tin deposits in Chita Oblast' and Khabarovsk Kray. The country has many other potential sources of scandium, which include production as a byproduct of uranium ore and recovery from wastes produced during the magnetic separation of iron-vanadium ores (Kurkov, and Kotova, 2007).

**Tantalum.**—Russian tantalum consumption in 2006 was about 10 t/yr, but could be 100 t/yr by 2010. Reserves of tantalum are in 21 deposits and almost all also contain niobium. In 2006, tantalum was being mined from the Lovozerskoye deposit on the Kola Peninsula. Tantalum mining at the Etykinskoye deposit of the Zabaykalskiy mining and beneficiation complex had practically ceased. It will likely not be possible to satisfy future Russian tantalum demand by mining these two deposits. The Lovozerskoye and the Zabaykalskiy mining enterprises were either on the verge of being unprofitable or were unprofitable. Russia did not have any enterprises that produced metallic tantalum and depended on tantalum metal that had been produced at the Ulba plant in Kazakhstan. The most prospective deposit for tantalum development was considered to be the Katuginskoye deposit in the Chita Oblast' (Kurkov and Kotova, 2007).

Titanium.-Russia's VSMPO-Avisma, which was the world's leading producer of milled titanium products, produced titanium sponge and rolled titanium metal; in 2006, it increased production of titanium metal by 15% to 23,900 t owing to increased global demand for titanium and its products. The company planned to increase production of titanium metal to 27,200 t in 2007, and then to 31,400 t in 2008, at which time plans called for exporting 25,000 t and for the remaining 6,400 t to be sold to consumers in Russia and other CIS countries. Longer-range plans called for VSMPO-Avisma to produce 32,800 t in 2009, 35,600 t in 2010, and more than 35,800 t in 2011. Demand for titanium metal in Russia was forecast to increase to 10,000 t in 2012 from 5,400 t in 2006 owing in part to increased demand from the expanding Russian aircraft industry. The Russian aircraft industry was projected to consume 6,500 t by 2012 compared with 3,500 t in 2006. The state-owned weapons exporter Rosoboronexport owned 66% of VSMPO-Avisma (Interfax Russia & CIS Metals & Mining Weekly, 2007u, v).

#### **Industrial Minerals**

**Barite.**—In 2006, Russia's barite production was estimated to be 63,000 t, but Russia's barite consumption was assessed to be between 350,000 and 400,000 t and was projected to increase to between 800,000 and 900,000 t by 2010. The country's main barite producer was the Salarinskiy lead-zinc mining and beneficiation complex, which mined the Kvartsitovaya Sopka deposit and was supplying 10% of the country's barite consumption. Barite from Salarinskiy was produced as a byproduct of lead-zinc ore mining because barite made up less than 15% of the content of the ore. Russia's barite resources were estimated to total 165.3 Mt, of which 30 Mt was assessed to be economic reserves (Gerasimov, 2007).

**Diamond.**—In 2006, Russia increased diamond mine production to 38,360,810 carats, or by less than 1%. Russia mined 38 million carats of diamond in 2005. Mine production of raw diamond increased in value to \$2.575 billion in 2006 from \$2.531 billion in 2005. Russia exported 35 million carats of uncut diamond valued at \$1.7 billion in 2006, which included exports of diamond from the State Precious Metals and Gemstones Repository (Gokhran). Russia exported 23 million carats of uncut diamond worth \$1.658 billion in 2005. Among the leading importers of Russian uncut diamond in 2006 were the EU, Israel, and the United Arab Emirates (Interfax Russia & CIS Metals & Mining Weekly, 2007j).

**Gemstones.**—The Kaliningrad Amber enterprise, which was located in the Kaliningrad region where 95% of the world's amber reserves are located, was the only commercial amber

producer in the region. In 2003, the Amber enterprise declared bankruptcy but completely paid off its debts in May 2007. Almost all net profits earned in 2006 went to paying off its debts. In the fall, it was agreed that ALROSA, the country's monopoly diamond producer, and the Kalinigrad regional authorities would become joint owners of Kalinigrad Amber, which consists of a mining enterprise and a jewelry firm. Investment in Kaliningrad Amber would enable it to raise production to between 200 and 250 t/yr (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

**Lithium.**—In the mid-1980s, the Soviet Union, which was producing about 10 t/yr of lithium calculated in carbonate equivalent, was the world's second ranked lithium producer following the United States. It was mining low-grade ore from the Zavitinskoe deposit, which had an average lithium oxide content of 0.6%. After the dissolution of the Soviet Union, this deposit was not profitable for Russia to mine under market economy conditions and production was mothballed.

Russia occupies a leading position in the world in lithium reserves, which are located primarily in two regions. One region is the Kola Peninsula, which has about 7 Mt of lithium oxide, and the other is in Sayanakh, which has 1 Mt of lithium oxide. Programs had been drawn up to restart production at the Zavitinskoye deposit and at the Achikanskiy sector near the Etykinskoye deposit, which contain a lithium oxide content of between 0.7% and 0.8% lithium oxide. Decisions about the future development of lithium reserves would depend on changes in the use of lithium in the 21st century and technological developments for processing lithium (Kurkov and Kotova, 2007).

**Phosphate Rock.**—In Russia, the major source of phosphate raw material ore is the apatite reserves in the Khibiny massif and Kovdor deposit on the Kola Peninsula. The Khibiny apatite-nepheline ores contain about 90% of the country's apatite reserves and have a  $P_2O_5$  content of between 12% and 16%; the Kovdor ores contain about 6% of the country's reserves and have a  $P_2O_5$  content of between 6% and 7% (Brylyakov and others, 2007).

The OAO Apatit complex (a part of FosAGro Holding), which mines the Khibiny massif, produced about 8.5 Mt/yr of apatite and nepheline concentrates and employed about 12,500 people. Beneficiation of apatite-nepheline ore from the Khibiny massif occurred at two beneficiation plants, which produced two types  $39\% P_2O_5$ , and "super," which contains  $40\% P_2O_5$  and less than 0.02% titanium dioxide. OAO Apatit consisted of four mining enterprises-the Kirovsky, the Rasvumshorrsky, the Tsentralny, and the Votochny. About 54% of ore from the Khibiny massif was mined from open pits, and the remaining 46% was mined from underground mines; in the future, extraction would be solely from underground mines because of depleting reserves. Reserves at Khibiny are sufficient to sustain production through 2050. The Kovdor mining and beneficiation complex had an open pit with the capacity to mine 10 to 12 Mt/yr of ore to produce 1.9 Mt of apatite concentrate (Brylyakov and others, 2007; Grigoryiev, 2007).

Another source of phosphate raw material is the more than 30 sedimentary phosphate rock deposits in the European part of Russia; this raw material can be processed into phosphate flour. These deposits are only economic to mine if all byproducts are fully used, including dolomite, glauconite, and quartz (Brylyakov and others, 2007).

Sedimentary phosphate rock from deposits in the Bryanskaya Oblast' (Polpinskoye deposit), Kirov Oblast' (Vyatsko-Kamskoye deposit), and Moscow Oblast' (Yegor'yevskoye deposit) can be processed into phosphate flour. Although Russia once had the capacity to produce 4.7 Mt/yr of phosphate flour containing 1 Mt of  $P_2O_5$  from these sedimentary phosphate rock deposits, since 2000, production has practically ceased; in 2006, production was about 12,800 t of  $P_2O_5$ . The country's demand for phosphate flour from these sedimentary phosphate rock deposits is in the range of from 1.1 to 2.6 Mt/yr of  $P_2O_5$  (Brylyakov and others, 2007).

Sedimentary phosphate rock containing about  $6\% P_2O_5$  from the Baltic Basin was mined primarily by the OAO Fosforit enterprise from the Kingisepp deposit, which produces a phosphate flour with a  $28\% P_2O_5$  content. Fosforit was constructed with a capacity to mine 7 Mt/yr of ore, but owing to the lack of demand in the world market for phosphate flour, it had mothballed about one-half of its production capacity. The remaining phosphate flour was produced for use domestically to produce complex fertilizers. Since 2005, Fosforit had been processing about 2.5 Mt/yr of ore containing 6.8% P<sub>2</sub>O<sub>5</sub> and producing 380,000 t/yr of phosphate flour (Brylyakov and others, 2007).

**Rare Earths.**—Russia consumed about 100 t of rare earths in 2006. Reserves of rare earths were located in 14 deposits, but rare earths were being mined only at the Lovozerskoye deposit on the Kola Peninsula. Rare-earth elements make up 32% of the loparite ore (Kurkov and Kotova, 2007). The richest source of rare-earth ores in Russia is the Tomtorskoye deposit on the Taymyr Peninsula. The rare earths of the cerium and samarium subgroups make up 11.96% of the ore, and those of the yttrium subgroup make up 0.84%. The yttrium oxide content of the ore is between 0.5% and 0.8%. An economic assessment of this deposit determined that it would be economic even at the small production level of 100,000 t/yr of ore (Kurkov and Kotova, 2007).

Salt.—Russia reportedly has abundant salt reserves, which were estimated to total about 49 Gt. The country produces only about 2.9 Mt/yr of salt, however, which is less than is produced in other large countries, such as Canada, China, India, and the United States. Russia imported more than 17% of its salt consumption. In 2005, the Artemsol' enterprise in Ukraine exported 870,000 t of table salt to Russia; another major supplier of salt to Russia was the Mozyrsol' enterprise in Belarus. The main obstacle to Russia developing its salt resources for domestic consumption is the cost of shipping salt over long distances. Owing to the small profit margin in salt, it must be marketed fairly close to the region in which it is mined. Table salt production occurred at seven enterprises, each of which had a relatively concentrated market. The leading Russian producer of table salt was AO Bassol', which supplied 70% of the country's needs. Another significant producer was OAO Silvinit, which developed the reserves of the Verkhnekamsk deposit of potash-magnesium salts to produce a combined 1.08 Mt of table and technical salt in 2006. OAO Silvinit produced one-third of the country's technical salt.

**Zirconium and Hafnium.**—Russia reportedly ranked fourth in the world in zirconium reserves with about 8.5% of world reserves. Russia's reserves of zirconium that were termed economic reserves (balansovye zapasy) under the reserve classification system that had been used in the Soviet Union and then in Russia are located in 11 deposits, of which 6 are placer deposits and the remainder are hard rock deposits. About 70% of the country's zirconium reserves are located in Siberia. Up until 2010, placer deposits could be mined to provide zirconium; development of the hard rock deposits would follow (Kurkov and Kotova, 2007).

The country's only domestic source of zirconium production was the 3,000 to 5,000 t/yr of baddeleyite concentrate produced as a byproduct from apatite-magnetite ores at the Kovdor mining and beneficiation complex on the Kola Peninsula. The concentrate had a low zirconium content and the extraction rate of the metal was also quite low, amounting to about 17%. The concentrate was exported mainly to Japan and Norway (Shevelyev and Tokhtas'yev, 2006; Kurkov and Kotova, 2007).

The country's atomic energy industry's demand for zirconium was 100 t in 2002, but this demand was projected to increase to 1,400 t in 2010. The most prospective hard rock deposit was deemed to be the Katuginskoye complex rare-earth-chryolitezirconium-niobium-tantalum deposit in the north of Chita Oblast' in the Baikal-Amur Mainline (BAM) railroad region. This deposit was considered adequate to fully supply the atomic energy industry's needs for zirconium, as well as for niobium and tantalum, and to supply partially its demand for yttrium. Mining of this deposit, if it is developed, would not occur until 2010 (Kurkov and Kotova, 2007).

#### Mineral Fuels and Related Materials

The country's energy sector, which was a main determinant of the country's economy, was on the verge of a significant structural change owing in part to projected changes in the country's energy balance caused by the changing relative prices of fuels. In 2005, natural gas generated 44% of the country's electric energy; coal and hydroelectric power, 20% each; nuclear power, 15%; and oil, 3%. The Government had placed an emphasis on the future development of domestic electric energy generation capacity through the development of coal, hydroelectric, and nuclear sources for generating electric power to meet the large and increasing domestic demand. In the process, the role of natural gas, which was the main source of fuel for electric energy generation, would be diminished and role of coal woul be increased (Linyev and others, 2007; Shchadov, 2007).

**Coal.**—Out of a total of 309 Mt of coal mined in 2006, about one-third was mined underground (Taraznov, 2007). As of January 2006, Russia had in operation 97 underground coal mines and 139 open pits and a total design capacity to mine about 325 Mt/yr of coal. The country's coal reserves were assessed to be about 200 Gt. Reserves were adequate to ensure coal output for centuries, even at double to triple the country's current output. The Kuznetsk Basin (Kuzbas) was the country's main producing region and would be in the future. Reserves in the Kuzbas contained all grades of hard coal and were suitable for use in energy generation and coke production. The Kuzbas

accounted for more than 56% of Russia's coal output and provided 80% of the metallurgical coal consumed domestically (Shchadov, 2007).

Revised projections in a moderate case scenario called for Russian coal production to increase to 410 Mt by 2015 and 470 Mt by 2020. Earlier projections in the moderate scenario called for coal production to increase to 375 Mt by 2020 (Shchadov, 2007). In 2006, 14 coal mining enterprises were in the stage of design and construction with a total capacity of 14 Mt/yr; 4 beneficiation plants were also in this stage with a capacity of 4 Mt/yr. Growth in coal production would come from the eastern part of the country from the large Kansk Achinsk brown coal basin; the Pechora Basin, which has significant reserves of metallurgical coal; and from the South Yakutiya basin. Coal production in the current large producing areas in the European part of Russia and the Ural Mountains was projected to stabilize but, under favorable circumstances, could increase by 30 Mt/yr (Shchadov, 2007).

Improving coal quality through washing and employing technologies to lower the moisture content and the nonhydrocarbon mineral content of coal would be an important factor in increasing the role of coal in the country's energy balance and in protecting the environment. Russia's electric power stations consumed coal, it was claimed, with a lower calorific value than any other country of the world. The ash content of coal consumed at Russia's power stations was as high as 20%, which did not include coal obtained from the Ekibaztus coal basin in Kazakhstan where the ash content exceeded 40%. The average moisture content of coal used at Russian electric powerplants was 23%. Coal that Russia exported, however, had an average ash content of 11% and a moisture content of 8%. In the ecological sphere, the Government was calling for implementing measures to capture and use emissions from coal beneficiation as well as coal-bed methane (Shchadov, 2007).

The number of fatalities from accidents in Russian coal mines has ranged from as high as 288 per year to as low as 85 per year in the past 10 years. The number of fatalities in 2006 was 85 (Taraznov, 2007).

Natural Gas.—Russia was the world's leading natural gas producer and exporter and has the world's largest natural gas reserves, with 1,680 trillion cubic feet (almost 47.6 trillion cubic meters) of reserves, which is almost twice the size of the reserves in Iran, which has the next largest gas reserves (U.S. Energy Information Administration, 2007b). In 2006, natural gas production increased by about 3% compared with that of 2005 to more than 656 billion cubic meters. Almost 90% of the country's natural gas was produced in the Ndym-Pur-Taz (NPT) region in northern West Siberia. (The name of the region was derived from the names of three rivers that border the region.) The NPT region hosts three massive Russian gasfields (Medvezhye, Urengoy, and Yamburg), which had been the country's main producers, supplying about 70% of the country's gas production. These three fields were in decline, however, as reserves were being depleted. Owing to the growth in the Russian economy and the country's long-term export commitments to Europe, to increase gas output Russia would have to incur greater costs to develop fields further north and to the east in an even more difficult physical environment than in the NPT region. A main target for future

development is likely to be the Yamal Peninsula, where large reserves were discovered in several fields (Sagers, 2007).

OAO Gazprom, which was a joint stock company in which the Government was the largest stakeholder (a 50.002% controlling share), produced 83.9% of the country's gas output in 2006 and controlled and operated the country's natural gas trunk pipeline network. Gazprom was Russia's leading foreign currency earner and paid about 25% of the country's total Federal tax revenues. Although Gazprom projected that it would increase natural gas output between 2008 and 2030, most increases in natural gas output were projected to come from independent gas companies, such as Itera, Northgaz, and Novatek, which, although blocked from the export market, had found a niche supplying the domestic market (Sagers, 2007; U.S. Energy Information Administration, 2007b).

Gazprom owned the world's largest gas transmission system, the Unified Gas Supply System of Russia, which extended for 156,900 km and through which it exported gas to 32 countries. In 2006, Gazprom sold 101 billion cubic meters of gas to the CIS and the Baltic States and 161.5 billion cubic meters to other European countries. In 2005, construction began on the Nord Stream pipeline; this pipeline could substantially enhance the flexibility of Gazprom's supply routes to Europe. Gazprom was preparing to develop the Barents Sea Shtokman offshore field, which was to serve as the resource base for Russian gas exports to Europe by way of the Nord Stream pipeline. In 2006, Gazprom and ENI S.p.A. of Italy signed a memorandum of understanding regarding construction of the South Stream gas pipeline, which would be laid on the bottom of the Black Sea from the Russia's coast to the coast of Bulgaria. Priorities for Gazprom were the development of gasfields on the Arctic continental shelf, in East Siberia, in the Russian Far East, and on the Yamal Peninsula (Gazprom, 2008).

Petroleum.-In 2006, Russia's production of crude oil increased by 2.3% to 480.48 Mt and made Russia the world's leading oil producer, overtaking Saudi Arabia. Russia remained the world's second ranked petroleum exporting nation. Since 2004, however, the rate of growth in Russian oil production had leveled off to somewhat above 2% annually, which had called into question the long-term growth potential for Russia's oil. Slow growth had been attributed to lack of adequate investment, although questions had also been raised regarding the country's reserve potential. According to data in the BP Statistical Review of Energy 2006, Russia's proven reserves of oil and gas condensate at the end of 2005 totaled 10.2 Gt, which yielded a reserves-to-production ratio of 21.4 years. Reserves in fields that were in operation could be depleted within a decade, however. In 2006, additions to reserves exceeded production. Some Russia officials believed that Russia has a large resource base that could serve to replenish oil reserves if adequate investment is devoted to exploration (Kryukov and Moe, 2007).

Most of Russia's reserves are located in West Siberia between the Ural Mountains and the Central Siberian Plateau. Little exploration had occurred in East Siberia where only four or five oilfields and gasfields had been discovered despite the promise of large resources. For the coming decade, Russian oil production was projected to grow at an annual rate of about 1.5% to 2.5% annually, owing in part to increased output from oil development on Sakhalin Island coupled with a slowdown in growth from the major mature oilfields in West Siberia, a number of which had passed peak production. New fields that that were under development would likely produce almost all Russia's increase in annual oil output in the next 5 years and could probably produce more than one-half of the country's oil by 2020. These new fields will help stem production losses at older fields. The new fields include Lukoil/ConocoPhillips's TimanPechora project, Rosneft/Gazprom's offshore Prirazlomnoye project, Rosneft's Vankorskoye and Komsomolskoye development, projects on Sakhalin Island, and the Shell Joint Venture's West Salymskoye project (U.S. Energy Information Administration, 2007c).

Uranium.-Russian uranium production was controlled by the Corporation TVEL TVEL supplied the entire fuel requirement to 73 nuclear powerplants in Russia and in 13 countries, which included Armenia, Bulgarian, China, the Czech Republic, Finland, Hungary, Lithuania, Slovakia, and Ukraine, to 30 research reactors in Russia and abroad, and to ship-propulsion reactors of the Russian fleet. TVEL held 17% of the world's nuclear fuel market. It included enterprises that mine and process uranium, including the Priargunsky Industrial Mining and Chemicals Association, the OAO Khiagda, and the ZAO Dalur uranium mining enterprises. The Priargunsky Industrial Mining and Chemical Association (Krasnokamensk, Chita Region) was among the five leading uranium mining enterprises in the world. TVEL also included enterprises that produced component parts and fuel assemblies. These enterprises included Chepetsky Mechanical Plant (Glazov, Udmurtia), Mashinostroitelny Zavod (Electrostal, Moscow Region), and Novosibirsk Chemical Concentrates Plant (Novosibirsk). TVEL employed a total of about 40,000 people (Corporation TVEL, 2007).

In 2006, under an initiative launched by the Russian President, a course was set for increasing nuclear power generation's share to 25% of the country's energy generation by 2030, which would involve building of up to 40 new nuclear reactors in Russia. During 2006, TVEL paid special attention to the development of mining enterprises. The main processing complex at the Dalur mining and ore beneficiation plant was commissioned, which significantly increased ore processing capacity (Corporation TVEL, 2007).

The Priargunsky Industrial Mining and Chemicals Association could increase uranium production in the Chita region to 5,000 t/yr by 2015, or by more than 50%. Plans called for Priargunsky to develop the sixth and eighth mines. The sixth mine would be the main source of uranium and was scheduled to be producing 1,000 t/yr by 2015, and the eighth mine, 800 t/yr. With production from these two mines, Priargunsky could produce 5,000 t/yr. It would require considerable investment to commission these new mines and also to implement associated measures to protect the environment (Interfax Russia & CIS Metals & Mining Weekly, 2007g).

Russia was establishing the Uranium Mining Company (UMC), which was registered on November 20, to consolidate its uranium mining assets in Russia and abroad. UMC would mine uranium not just in Russia but also abroad, possibly in Australia and Canada. Plans called for UMC to be fully formed

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during the first half of 2008. It would require transferring the mining assets of TVEL to UMC, which would first become the trustee of these assets. The company would be fully established once Atomenergoprom, a holding company for civilian atomic energy enterprises, was formed. Russia's Prime Minister signed a resolution establishing Atomenergoprom, but the Government would have to issue another resolution approving the new holding's charter before it could be fully established. Atomenergoprom was scheduled to be formed by July 1, 2007 (Corporation TVEL, 2007).

#### **Reserves and Resources**

More than 20,000 mineral deposits had been discovered in Russia, of which about 40% was in commercial production. From 1992 to 2003, there was a sharp reduction in the amount of geologic exploration, but this trend was reversed beginning in 2004. Russia reportedly has adequate mineral reserves to meet the country's current metal consumption needs except for chromite, lead, manganese, molybdenum, and tungsten, although the time period for which these reserves would be adequate was not specified. However, the average ore grade of many of the metallic ores, which include bauxite, copper porphyries, tin, tungsten, and others, is lower than in other producing countries. In the past 20 years, the average metal content of ores has decreased by between 30% and 50%, and the gold and iron content in ores, by 25%. The percentage of ores and coal classified as difficult to beneficiate has increased to 40% from 15%. A large percentage of the reserves that were classified as economic (balansovye) according to the reserve classification system used in the Soviet Union and then in Russia would be reclassified as subeconomic resources if they were evaluated based on market economy criteria. Reportedly, 34% of lead, 49% of tin, and from 15% to 30% of apatite, coal, copper, and titanium reserves would have to be reclassified as subeconomic resources (Chanturiya, 2007).

To secure its raw material resource base for oil and gas, the Ministry of Natural Resources was conducting exploration in 2006 that resulted in the discovery of 37 new oil and gas deposits, with 395,000 square kilometers (km<sup>2</sup>) prepared for licensing. For the second year in a row, Russia's discovery of oil and gas reserves exceeded its annual extraction. Basic gas and oil exploration expenditures in 2008 were to be directed at regions of East Siberia, the Sakha (Yakutiya) Republic, and Russia's continental Arctic shelf. Expeditions conducted in 2005 and 2007 in the Arctic led the Russian Ministry of Natural Resources to conclude that the Lomonosov range of the shelf should be included in Russia's economic zone. Russia was preparing documentation to submit its claim to the appropriate international organizations. Among the most notable discoveries was the Central Astrakhan gas condensate deposit, which was estimated to have about 1.26 billion cubic meters of gas; the Angoaro-Lenskoye deposit in Irkutsk Oblast, with reserves of 1.1 billion cubic meters of gas; and the Severo-Komar'inskoye and Kosukhinkoye oil deposits in the south of Tyumen' Oblast', with reserves of 19.7 Mt and 18 Mt, respectively (Ekonomika i Zhizn', 2007).

Norilsk Nickel, which was the world's leading producer of nickel and palladium and a major global producer of copper and platinum, signed an exploration agreement with Rio Tinto Group in 2006 for the exploration and subsequent development of deposits in the Far East and the Siberian regions of the country and with BHP Billiton for exploration in West Siberia and the northwestern regions of the country (MMC Norilsk Nickel, 2007).

#### Outlook

The mainstay of Russia's mineral sector and economy for the coming decade is expected to be the oil and gas sector, where production is projected to increase, although at a lower rate of growth than in the preceding decade because of depleting reserves and a lack of adequate investment. Nevertheless, a continuation of high energy prices would enable Russia to continue its high rate of economic growth based on revenues from oil and gas exports. In Russia's nonfuel mineral production sectors, Russia's Economic and Trade Ministry projects that the output of nonferrous metals could increase by as much as 13% by 2010. This is predicated on significant growth in the aluminum industry through projects underway to upgrade existing production capacity and the construction of a new aluminum smelter. New copper mines are being developed in the Ural Mountains, which will provide for an increase in copper production of between 2% and 3% per year; the construction of a zinc plant in the Ural Mountains will increase zinc output. Increases are also projected for nickel production (Interfax Russia & CIS Metals & Mining Weekly, 2007m).

In the Russian metallurgical industry, only about one-half of the technological processes used in production are on the level of those used in industrially developed countries. This has had the negative effect of requiring above-average expenditures compared with those of industrially developed countries to produce goods, thereby affecting the competitiveness of the products produced. For the Russian metallurgical sector to remain competitive on the world market, it would need to develop resource-saving technologies, organize new types of production, and develop more high-value-added products (Parkhomenko, 2007).

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#### TAJIKISTAN

Tajikistan's mineral industry formerly mined mineral ores and produced mineral products, which included aluminum, antimony, arsenic, boron, celestite, cement, coal, construction materials, fluorspar, gold, lead and zinc, mercury, molybdenum, natural gas, petroleum, semiprecious and decorative stones, salt, silver, strontium, tin, tungsten, and uranium. Production of some of these mineral commodities had been greatly reduced or had ceased since the dissolution of the Soviet Union. The Tajik aluminum smelter (TadAZ) was the country's only large-scale production enterprise in the mineral sector.

Tajikistan was the world's third ranked producer of hydroelectric power after the United States and Russia. Hydroelectric power accounted for more than 75% of the country's total energy output. The country's energy consumption per capita was among the lowest in the CIS. Developing hydroelectric energy was considered key for future economic growth because of the country's need to import oil and natural gas from neighboring countries and the high energy consumption of the TadAZ aluminum smelter. Tajikistan imported a significant portion of fuel from Uzbekistan, which supplied more than 70% of Tajikistan's petroleum needs. Other CIS countries, such as Kazakhstan and Turkmenistan, provided much of the remainder of the country's imported hydrocarbons (Embassy of Tajikistan to Pakistan, undated).

More than 400 mineral deposits had been explored that were deemed suitable to be considered for development. Tajikistan possesses significant resources of precious metals. According to the Academy of Science of the Republic of Tajikistan, 28 gold deposits that contained total estimated resources of 429.3 t of gold had been identified. The Bol'shoy Kanimansur deposit, which is located in the north of Tajikistan, was reportedly the largest silver deposit in the CIS and also one of the largest in the world. The resources of antimony in Tajikistan are the largest in the CIS (Embassy of Tajikistan to Pakistan, undated).

Deposits of construction and decorative materials, such as marble, granite, limestone, and volcanic tuff, are located in the north of Tajikistan. Coal was mined at the Fan-Yagnob and Shurab coal deposits. The Maykhura tungsten deposit was being prepared for development in central Tajikistan 80 km north of Dushanbe. Reserves reportedly could provide for profitable production of 150,000 t/yr of ore (Ibrokhim and Dzhanobilov, 2007; Embassy of Tajikistan to Pakistan, undated).

In the south of Tajikistan 46 km to the north of the city of Kulyaba, the Chilkultan and the Davgir sectors of the Chaltazh

strontium deposit had been explored and were being prepared for development. The country had lead and zinc deposits in the north of the country at the Altyn-Topkan and the Bol'shoy Kanimansur deposits. At the Anzob mining and beneficiation complex, which mined the Dzhizhikrutskoye antimony-mercury deposit, the completion of exploration at lower horizons of the deposit could provide data on reserves that could serve as a basis for doubling of its capacity if the necessary economic factors support development (Ibrokhim and Dzhanobilov, 2007).

The south of the country has resources of billions of tons of salt. The country had explored and prepared the Yakarkharskoye boron deposit for development; this deposit is reportedly the largest boron deposit in the CIS. The boron is contained in datolite and danburite ores (Ibrokhim and Dzhanobilov, 2007).

Tajikistan has a number of silver and gold deposits. Total silver in ore was estimated to be 60,000 t, and the largest deposit, the Bol'shoy Kanimansur, has about 38,000 t of silver in ore. There were more than 30 known gold deposits, of which only a few had been prospected.

Several potentially important coal deposits had been identified but had not yet been exploited. Although many deposits of coal were suitable for open pit mining, they are located in mountainous regions, which are subject to extreme weather conditions and where transportation routes are difficult or nonexistent (Embassy of Tajikistan to Pakistan, undated).

#### Production

In 2006, industrial production in Tajikistan increased by 4.9% compared with that of 2005, with production increasing by 20% in the construction materials sector, 9% in the nonferrous metals sector, and 0.9% in the fuel and energy sector. In the fuel sector, production of hard coal reportedly increased by 18.2% to 80,600 t; brown coal, by 5.2% to 21,800 t; and oil, by 3.2% to 22,300 t, but natural gas production decreased by 32% to 19.9 million cubic meters. In the construction materials sector, production of cement increased by 11.2% to 281,500 t, but gypsum production fell by 57.6% to 3,600 t (table 17; Interfax Russia & CIS Statistics Weekly, 2007).

#### Structure of the Mineral Industry

Besides TadAZ, only a few metal mining enterprises were still operating (table 18). These included the Anzob mining and beneficiation complex, which mined the Dzhikrutskoye antimony-mercury deposit, and the Adrasman mining and beneficiation complex, which developed copper-bismuth and lead-silver ores. Main output at Adrasman included concentrate with a lead content of 43% and a silver content of 5.943 g/t. The country also had enterprises that were engaged in gold mining and the extraction of coal, natural gas, and oil.

#### **Commodity Review**

#### Metals

**Aluminum.**—TadAZ, which was located in Tursunzade (formerly Regar), had a design capacity to produce 517,000 t/yr

of aluminum. It was 100% dependent on imported alumina, consumed nearly 40% of the country's total power output, employed 12,000 workers, and indirectly supported a community of 100,000 (Interfax Russia & CIS Metals & Mining Weekly, 2007). TadAZ accounted for more than 5% of the country's total value of exports. Almost all the aluminum produced by TadAZ was exported. An estimated 5,000 t/yr of aluminum was consumed domestically to produce kitchenware and other household necessities (Embassy of Tajikistan to Pakistan, undated).

RUSAL and the Government of Tajikistan had signed an agreement in 2004 whereby RUSAL was to invest in the construction of the Roghun hydroelectric powerplant in Tajikistan. The plant was to provide power for an aluminum smelter that RUSAL planned to construct in southern Tajikistan. As part of the arrangement, RUSAL was also going to invest in renovating the TadAZ plant (Whetton, 2006).

In 2006, the Government of Tajikistan decided to complete the construction of the Roghun hydroelectric plant on its own and was planning to finance the construction of the Roghun hydroelectric plant from its own state budget funds. The Government planned to compete construction in 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007).

Lead and Zinc.—China Global New Technology Export and Import company purchased at auction in November the Altyn-Topkan mining and beneficiation complex in Sogdiyskaya Oblast and was investing in renovating the mine. The company, which had received a license for its development, planned to mine lead-zinc ore to produce concentrate. The initial production capacity of the complex reportedly would enable it to produce 250,000 t/yr of lead concentrate; this amount would be increased eventually to between 500,000 and 700,000 t/yr and then to 1 Mt/yr. Construction of the complex was scheduled to be completed in the beginning of 2009 (Metall Ukrainy, 2007).

The Altyn-Topkan mining enterprise was commissioned in 1954, and until 2000, ore mined at Altyn-Topkan was processed at the Almalyk mining and processing enterprise in Uzbekistan, which had concessionary control of Altyn-Topkan. As a result of the fall in lead and zinc prices in 2000, Almalyk ceased mining at Altyn-Topkan and turned control of Altyn-Topkan back to the Government of Tajikistan. At that time, production facilities at Altyn-Topkan were mothballed and remained so until the acquisition of the facility by China Global New Technology Export & Import (Metall Ukrainy, 2007).

#### Outlook

Tajikistan has significant mineral resources awaiting development, some of which could be used to supply markets in Asia. With the end of the civil war in the country in 1997, Tajikistan has been able to return to a period of peace and economic stability. However, the country still suffers from a lack of infrastructure. Development of mineral resources will depend on its ability to attract investors, which could require providing tax incentives, incentives for technological upgrades of production lines, and full hard currency convertibility (World Bank, The, 2006).

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#### TURKMENISTAN

Although Turkmenistan produces a wide range of industrial minerals, its major mineral resources are its oil and gas reserves, and the country is a leading regional natural gas producer. Turkmenistan hosts several of the world's largest gasfields; they include the Dauletabad, which was brought into production in 1982, and the Shatlyk, which was brought into production in the early 1970s. Turkmenistan's oil refineries are the Seydi and the Turkmenbashy.

The country's leading nonfuel mineral enterprises were the Arpaklenskiy barite-witherite enterprise, the Cheleken ozokerite enterprise, the Gaurdak sulfur plant, the Karabogazsulfate Association, the Kara-Kum sulfur plant, and the Oglanly bentonite mining enterprise. One of the leading enterprises that extracted chemical raw materials was the Karabogazsulfate Association, which recovered salts from the Kara-Bogaz Gol lagoon off the Caspian Sea. The association produced bischofite, Caspian Sea salt, epsomite, Galauber's salt, and sodium sulfate. In the western part of the country, the Boyadagskoye, the Cheleken, and the Nebitdag deposits of iodine-bromine brines were being extracted and the brines were processed at the Cheleken and the Nebitdag iodine/bromine plants.

The country had discovered 149 gas and gas condensate deposits with total reported reserves of 5 trillion cubic meters of natural gas. Of these deposits, 139 deposits were located onshore and had reported reserves of 4.6 trillion cubic meters and 10 deposits were located on the Caspian Shelf and had reported reserves of 400 billion cubic meters. Fifty-four deposits with reported reserves of 2.6 trillion cubic meters and 11 deposits with reported reserves of 260 billion cubic meters were being prepared for development. Seventy-three deposits with reported reserves of 2 trillion cubic meters were under exploration, and 11 deposits with reported reserves of 140 billion cubic meters had been placed on hold. The majority of the country's reported natural gas reserves were located in the Dauletobad and the Shatlyk basins, and extraction had taken place at the major deposits for more than 15 years (Eder, 2007).

By the beginning of 2006, Turkmenistan had discovered 34 oil deposits and 82 gas condensate deposits, of which 20 oil deposits and 38 gas condensate deposits were under development. Four gas condensate deposits were being prepared for development, and exploration work was being conducted at 14 oil and 39 gas condensate deposits. The majority of oil reserves are located in the Southern Caspian oil and gas basin in the western part of the country (Eder, 2007).

Owing to a lack of adequate information about the country's oil and gas reserves and the lack of a complete international audit of reserves, the reserves numbers that have been published by a number of organizations outside Turkmenistan can only be considered estimates. Furthermore, a large portion of the country still had not undergone intensive exploration (Eder, 2007).

Future development of the country's oil and gas sector will depend primarily on the development of offshore oil and gas resources in the Caspian Sea. According to Turkmenistan's Ministry of the Oil and Gas Industries and Mineral Resources, Turkmenistan has resources 12 Gt of oil and 6.2 trillion cubic meters of natural gas in the Caspian Sea at depths of between 2,000 and 7,000 meters (Eder, 2007).

#### Production

Data on mineral production are in table 19.

#### Structure of the Mineral Industry

All mineral production enterprises were state owned and all deposits were being developed by enterprises subordinate to the state and its ministries. Based on a law passed in 1992, foreign firms were permitted to establish joint ventures only with state-owned companies. This law was changed in late 2007 to allow foreign investors the right to fully or partially own enterprises, as well as to own movable property and real estate. Ownership rights can be purchased from individuals as well as from legal entities registered in Turkmenistan (Interfax Russia & CIS Metals & Mining Weekly, 2007).

The role of foreign firms in the country's oil and gas production was less than 10%, although attracting foreign investment and the participation of foreign firms would likely be a major factor in the country increasing production on the Caspian shelf. In 2006, foreign firms increased oil production by 40% to 2.3 Mt (Eder, 2007).

Table 20 is a list of major mineral industry facilities in Turkmenistan.

#### **Mineral Trade**

Revenues from exports of natural gas and oil and oil products accounted for about 80% percent of Turkmenistan's merchandise exports as the country experienced a large inflow of revenue because of the high world market prices for oil. In 2006, Turkmenistan negotiated improved payment terms for its natural gas exports with Russia and Ukraine, which included eliminating barter settlements and an almost 50% increase in the export price. A 25-year gas export agreement signed with Russia in 2003 and a 30-year agreement signed with China in the spring of 2006 will likely enable Turkmenistan to maintain a steady stream of foreign exchange inflows (World Bank, The, 2007).

In 2006, Turkmenistan had two gas-export pipelines. One was a major pipeline route built in the Soviet-era that connected to the pipeline network in Russia and through which the majority of Turkmenistan's gas was exported. The other was a much smaller pipeline built in the post-Soviet period that linked to the pipeline network in Iran through which Turkmenistan exported about 8 billion cubic meters of gas annually to Iran. In 2007, Turkmenistan was to export 50 billion cubic meters of gas to Russia. Turkmenistan's gas flowed directly only to these countries (Pannier, 2008).

#### **Commodity Review**

#### Mineral Fuels

**Natural Gas.**—Gas production in Turkmenistan had fallen from a high of about 80 billion cubic meters per year in the 1980s to only 12 billion cubic meters in 1998 owing to the lack of permission to transport its gas to markets through the Russian pipeline network, which was the country's only available route to export gas. Domestic consumption of natural gas in 2006 was 17.8 billion cubic meters, and domestically produced natural gas was the country's chief source of energy. In 2006, Turkmenistan's net gas exports totaled about 50 billion cubic meters. The resolution of transport issues between Russia and Turkmenistan would enable Turkmenistan to increase its natural gas output (Eder, 2007).

The majority of the country's natural gas was produced in the southeastern part of Turkmenistan from the large Doviet-Denmez field, which produced of about 40 billion cubic meters per year and which had resources initially estimated to be 4.5 trillion cubic meters. Potential increases in natural gas production were expected to come from a group of fields associated with the Caspian Shelf on the right bank of the Amu Darya River and from the Yashlar-South-Iolotan group of fields, which includes the South-Iolotan deposit; this deposit has reserves reported to be 15 trillion cubic feet (more than 400 billion cubic meters) of natural gas and 17 Mt of oil, making it one of the largest deposits of natural gas in Central Asia (Eder, 2007).

Plans for 2007 called for Turkmenistan to increase gas production to 80 billion cubic meters or by more than 20% compared with that of 2006 and to increase oil production by more than 15% to 10.4 Mt. Turkmenistan planned to increase gas exports in 2007 to 58 billion cubic meters in accord with intergovernmental agreements. Turkmenistan would need to take additional measures, which would require major new investment to accelerate oilfield and gasfield development and construct transport infrastructure, to fulfill its signed delivery agreements (Interfax Oil and Gas Report, 2007).

**Petroleum.**—The country had raised oil and gas condensate production to about 9 Mt/yr after it fell from between 6 and 7 Mt/yr in the 1980s to about 4 Mt/yr in the mid-1990s. The country's major oil producer was the state company

Tukmenneft'. The state company Turkmengaz produced more than 80% of the country's natural gas production and also produced oil and gas condensate (Eder, 2007).

Turkmenistan had an oil refining industry that was represented by the Seydi oil refinery and the Turkmenbashi complex of oil refineries (TKNZ), which had a total capacity of 12 Mt/yr. The refineries in 2006 were refining about 6.9 Mt of oil, with domestic consumption of refinery products varying between 3 and 5 Mt/yr in the past decade and reaching 5.3 Mt in 2006. In 2006, the country exported 4 Mt of crude oil and 1.6 Mt of refinery products (Eder, 2007).

#### Outlook

Exports of natural gas could at least double in coming years as new pipelines are completed to improve links to China, Russia, and other countries, including Pakistan. In the spring of 2007, Turkmenistan signed a pipeline deal with Kazakhstan and Russia to build a pipeline with a throughput capacity of at least 20 billion cubic meters annually along the northeastern shore of the Caspian Sea; this pipeline eventually would supply markets in Europe. This pipeline is expected to be operational by 2010. and possibly could supplant a proposed Trans-Caspian Gas Pipeline (TCGP), which would have supplied European markets but bypassed the Russian pipeline network. Besides the TCGP, a number of other alternate routes have been proposed that would enable Turkmenistan to export gas through routes that bypass Russia. It is possible that construction of one or more of these pipeline routes is still feasible. In April, Turkmenistan signed an agreement with China to begin exporting about 30 billion cubic meters of gas annually to China by way of a proposed pipeline that could be operational by the end of 2009 (Zissis, 2006; Abdurasulov, 2007).

To fulfill all its signed contracts for gas delivery, Turkmenistan is projected to have to increase its natural gas output to between 140 and 150 billion cubic meters per year by 2010 and to between 160 and 170 billion cubic meters per year in 2020 and, concomitantly, to increase gas exports to 95 billion cubic meters in 2010 and 135 billion cubic meters in 2020. Russia is expected to increase purchases of natural gas from Turkmenistan to 90 billion cubic meters per year after 2010 (Eder, 2007).

Turkmenistan's crude oil exports also could increase with increased oil production, with projections calling for crude oil exports to increase to 12 Mt in 2010 and 15 Mt in 2015. Projections called for crude oil production to increase to 19 Mt in 2010, 25 Mt in 2015, and to 30 Mt in 2020 (Eder, 2007).

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#### UKRAINE

Ukraine was a major world producer of coal, ferroalloys, ilmenite, iron ore, manganese ore, and steel. The country's steel exports were of major importance on world markets. Other major mineral commodity exports were iron ore and ferroalloys. Ukraine had been a lesser producer of a number of other metallic mineral products, which included alumina, aluminum, cadmium, germanium, secondary lead, magnesium, mercury, nickel, rutile, uranium, secondary zinc, zircon, zirconium, and a large number of industrial minerals, which included dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials. Production of a number of these mineral products had decreased significantly or ceased since the dissolution of the Soviet Union. Ukraine is one of the world's leading energy transit countries, with large oil and gas pipeline networks that transport Russian and Caspian Sea oil and gas across its territory.

#### **Minerals in the National Economy**

The steel industry was a major component of Ukraine's economy, accounting for between 5% and 6% of the GDP and 34% of export revenues. It employed about 420,000 people, which constituted about 10% of industrial employment and about 2% of total employment. Energy demand in Ukraine was characterized by high energy intensity owing to the large share of heavy industry in the country's economy and industry's low level of energy efficiency, which made Ukraine's economy highly vulnerable to increases in oil and gas prices. Natural gas provided about 50% of the country's primary energy consumption, and domestic gas production met about 12% of the country's energy needs. The country has significant natural gas reserves and could increase production with adequate investment (World Bank, The, 2005).

#### Production

In 2006, the value of industrial production increased by 6.2% compared with that of 2005. The value of production in the extractive industries increased by 5.8%, which included a 9.4% increase in the mining of metallic ores, a 5.2% increase in oil and gas extraction, and a 2.8% increase in the mining of coal and peat. In the metallurgy and metal working sector, the value of production increased by 8.4%, which included a 12.8% increase for steel pipes; an 8.4% increase for pig iron, steel,

and ferroalloys; and a 2.6% increase for nonferrous metals. In the chemical and petrochemical sector, the value of industrial production increased by 3% (table 21; Interfax Russia and CIS Statistics Weekly, 2007).

#### Structure of the Mineral Industry

The country's iron ore and steel production sector included 20 metal ware plants, 15 iron and steel works and plants, 15 tube producing enterprises, 14 mining enterprises, 13 refractory production plants, 12 byproduct coke plants, and 3 ferroalloy plants (National Exhibition of Ukraine in the USA, 2006). Table 22 is a list of major mineral industry facilities in Ukraine.

#### **Mineral Trade**

Ukraine was among the world's three leading steel-exporting countries, with net exports of 27.8 Mt in 2006. Imports of oil and natural gas accounted for about 28% of the country's total imports, amounting to about \$12.7 billion. A large amount of oil and natural gas destined for the EU and southeastern Europe was transported through Ukraine, including about 23% of the EU's oil imports and 46% of the EU's gas imports. Ukraine's trunk gas transport system was state owned and was the main transit route for Russian gas exports to Europe.

Tensions arose between Ukraine and Russia when Russia decided to charge Ukraine the world market rate for gas it consumed rather than the lower rate it had been charging. In early 2006, Russia began to increase natural gas prices for Ukraine toward prices charged in Western Europe. Ukraine claimed that the proposed almost fourfold price increase was politically motivated because of the "Orange Revolution" that had occurred in Ukraine and the country's election of a President perceived to be more politically oriented towards the West than towards Russia. Russia began cutting gas supplies to Ukraine in an energy price dispute that became a major political dispute. This crisis created fears that Russian exports to Western Europe could be affected, as most of the gas from Russia destined for Europe was channeled through Ukrainian pipelines and Ukraine was capable of diverting these supplies for its own needs. Russia insisted that there would be no disruption of supplies to Europe (BBC News, 2006).

An agreement reached between Russia and Ukraine set the gas import price at \$95 per thousand cubic meters, which was a 64% increase from the previously prevailing price. Ukraine's gas sector had been controlled by Naftogaz, a state-owned enterprise. Naftogaz was Ukraine's largest firm in terms of assets, and supplied nearly all Ukraine's gas consumers through 2005. Beginning in 2006, however, as a result of the new gas contract between Ukraine and Russia, Ukraine's gas imports were to be handled by UkrGasEnergo (UGE), which was a joint venture between Naftogaz and a privately owned firm, RosUkrEnergo (RUE). RUE provided gas at the Ukraine-Russia border to UGE, which sold and distributed it to industrial consumers and to heating and power companies. The household market remained under the control of Naftogaz (Kramer, 2008).

#### **Commodity Review**

#### Metals

Aluminum.---Ukraine's aluminum industry consisted primarily of the Nikolayev alumina refinery and the Zaporozhye aluminum smelter (ZALK). The Nikolayev alumina refinery increased production from 2000 through 2006 by about 30% to 1.42 Mt from 1.1 Mt. Plans called for further expansion of alumina production facilities at Nikolayev, with alumina production in 2008 projected to reach between 1.6 and 1.7 Mt. The Zaporozhye aluminum smelter was built in 1933. It became part of Russia's SUAL in 2004 and then part of United Company RUSAL in 2007 with the merger of SUAL, RUSAL, and Glencore International AG. A large portion of the smelter's output was sold domestically to enterprises in the machine manufacturing sector. The main issue facing ZALK was obtaining an adequate supply of affordable energy. Prices for energy in Ukraine had risen to the extent that the director of the smelter stated that his enterprise could not remain competitive unless the Government lowered the price that it had set for ZALK's energy supplies (Metall Ukrainy, 2007).

Iron and Steel.-In 2006, Ukraine increased production of crude steel by about 5.9% to 40.899 Mt, but increased the production of finished rolled steel by less than 1% to 22.387 Mt. Projections for 2007 called for crude steel output to increase to 42 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007b). Strong demand for steel products globally had helped fuel Ukraine's economy as Ukrainian steel producers were among the lowest-cost steel producers in the world. Ukraine's abundant iron ore and manganese ore reserves, its large coal production and proximity to Russian coal supplies, and its developed transport infrastructure enabled Ukraine to be a major global steel producer. The year started with a number of difficulties facing the steel industry caused by the weather, a shortage of natural gas, and a weak international market. After the first quarter of the year, however, conditions improved as supplies of iron ore and scrap and natural gas increased. The world market demand for and price of steel also increased, which led to a revival of the country's steel production (Kharakhulakh, 2007).

The country's major steel producing enterprises each produced more than 4 Mt/yr of steel, with some producing more than 7 Mt/yr. Of the total volume of steel produced, 51.7% was produced by oxygen converter furnaces, 44.6% in open-hearth furnaces, and 3.7% in electric furnaces, which was the same ratio as in 2005 (Kharakhulakh, 2007). Ukraine's steel industry was undergoing a major transformation as major mills invested to modernize production facilities to achieve improved operational and environmental performance. Investments were being made to introduce pulverized coal injection to reduce coal use, replace open-hearth furnaces with oxygen converter furnaces, and develop inhouse power generation units to achieve energy self-sufficiency.

Because the steel industry was dominated by large producers, switching to electric furnaces for steel production was not considered realistic. Furthermore, the country's supply of steel scrap was quite limited. Also, plans that called for the introduction of more continuous casting of steel, which accounted for 30% of steel produced, would reduce the amount of turnaround scrap available. The availability of scrap could increase if depreciation rates on capital stock were accelerated and if the amount of scrap available from automobiles increases with increased car ownership (Krivchenko and others, 2007).

**Iron Ore.**—In 2006, Ukraine's iron ore mines increased their output of crude ore by 7.9% to 74 Mt; of concentrate, by 7% to 56.68 Mt; and of pellets, by 20% to 20.87 Mt. Sinter production remained level at 47.4 Mt. A number of iron ore mining enterprises increased their output, including the Poltavskiy mining and beneficiation complex, which was Ukraine's leading producer of iron ore pellets. In 2006, Poltavskiy increased iron ore concentrate production by 15.7% to 9.621 Mt, and commercial pellet production, by 10.2% to 8.55 Mt. Poltavskiy exported about 90% of its pellets, mainly to customers located in Europe (Austria, Bulgaria, the Czech Republic, Italy, Poland, Romania, and countries of the former Yugoslavia), but also to China. Switzerland's Ferrexpo AG owned 85.85% of Poltavsky as of mid-September 2006 (Interfax, 2007).

Output also increased at the Pivdenny (Southern) mining and beneficiation complex where iron ore concentrate production increased by 7% to 8.71 Mt and sinter output increased by 13.4% to 4.652 Mt in 2006. Pivdenny supplied Ukraine's steel mills with 3.703 Mt of concentrate and 4.655 Mt of sinter. The Pivnichny (Northern) mining and beneficiation complex increased its iron ore concentrate output by 12% to 11.963 Mt and its pellet production by 33.9% to 10.1 Mt, and the Donetsk-based System Capital Management (SCM) controlled 99% of its shares. The Tsentralnyy (Central) mining and beneficiation complex increased its concentrate production by 4.6% to 5.572 Mt and its pellet output by 3.1% to 2.217 Mt. Tsentralnyy sold most of its pellets to Ukrainian steel mills. SCM also controlled 99% of Tsentralnyy. The Kryvy Rih mining and beneficiation complex increased its iron ore output by 10% to 7.1 Mt, and the Zaporizhye mining and beneficiation complex increased its iron ore output by 2.7% to 4.32 Mt. Zaporizhye is a Ukrainian-Slovak joint venture and its main shareholders were Minerfin of Slovakia and Zaporizhstal, which was one of Ukraine's leading steel companies. It exported 60% of its ore to Austria, the Czech Republic, Poland, and Slovakia and sold the remaining 40% to Zaporizhstal (Interfax, 2007).

The output of iron ore concentrates at the Inhulets mining and beneficiation complex decreased by 3.6% to 13.013 Mt in 2006. Inhulets sold 12.59 Mt of concentrate to Ukrainian steel mills in 2006 and had a 77% share of the Ukrainian iron ore concentrate market. The Zaporizhia-based Smart Group controlled the plant (Interfax, 2007).

**Manganese.**—Ukraine was the leading producer of manganese ore in the CIS. Ukraine's two manganese producing enterprises, the Marganets and the Ordzhonikidze mining and beneficiation enterprises, were owned by the Privat Group, which also controlled the Stakhanov and the Zaporizhye ferroalloy plants. In 2006, Marganets produced 937,200 t of manganese concentrates and Ordzhonikidze produced 669,200 t of manganese concentrates and also produced 405,500 t of manganese sinter (Interfax Russia & CIS Metals & Mining Weekly, 2007g). Ukraine had 75% of the manganese reserves of the CIS. Explored reserves prepared for development were reportedly 2.26 Gt, which had an average manganese content of 23.1% (Goshovskiy, 2007).

#### Mineral Fuels and Related Materials

**Coal.**—In 2006, Ukraine increased production of raw coal by 1.7% to 75.824 Mt. Metallurgical coal production decreased compared with that of 2005 to 30.145 Mt, but steam coal production increased by 10.9% to 50.112 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007d). Plans called for increasing coal production to 100 Mt in 2008, with 50 new coal faces scheduled to go into production at the end of 2007 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

Ukraine's coal sector was mostly state owned, although Government participation was declining. Non-state-owned enterprises produced more than 35% of Ukraine's coal (World Bank, The, 2005). The country's coal mines were subject to chronic financial distress and only limited efforts had been made to improve their performance (International Monetary Fund, 2007).

In December 2005, Ukraine's Coal Industry Ministry selected seven of the most promising hard coal deposits with combined reserves in excess of 1 Gt for development. The seven new mines, if developed, would have a combined capacity to produce 17.7 Mt/yr of coal. Ukraine's energy strategy for the period to 2030, which was approved by the Government in 2006, called for increasing coal output to 130.3 Mt (Interfax Russia & CIS Metals & Mining Weekly, 2007f).

Ukraine's Coal Industry Ministry stated that Ukraine has explored brown coal reserves of between 6 and 8 Gt with an average ash content of 20%. Most of the reserves are located in the Dnipr basin, as well as in the Cherkassy, the Kharkiv, the Kirovohrad, the Poltava, and the Zhitomir regions. The Ministry planned to attract investors to develop deposits in the Dnipr brown coal basin, according to an investment proposal that it posted on its Web site on August 15, 2006. The proposal called for developing two deposits-the Aleksandriiskoye deposit, which has brown coal reserves reported to be 485 Mt, of which 63 Mt were considered suitable for open pit development, and the Verkhnedniprovskoye deposit, which has reported reserves of 236 Mt, for which the explored sections were considered suitable for open pit development. The Ministry calculated that these deposits have the potential to produce between 5 and 6 Mt/yr of brown coal by open pit mining. Mines at the deposits were projected to come onstream in 2 years once development begins (Interfax Russia & CIS Metals & Mining Report, 2007e).

**Uranium.**—Ukraine planned to increase uranium output from 800 t in 2006 to 1,400 t by 2010. Ukraine reportedly was mining only 30% of the uranium that it needed for its nuclear power generation at the Vostochnyy mining complex (VostGOK), which is located in Zheltye Vody in the Dnipropetrovsk region. VostGOK was mining the Michurinskoye, the Tsentralnoye, and the Vatutinskoye deposits in the Dnipropetrovsk and Kirovohrad regions, where 50% to 60% of the reserves had been depleted. Ore was processed in Zheltye Vody. Plans announced in March, which called for increasing uranium ore extraction by 120% by 2010 and by between 400% and 520% by 2020, were linked

with the development of the Novokonstantinovskoye field in the Kirovohrad region (Interfax Russia & CIS Metals & Mining Weekly, 2007c).

#### Outlook

Ukraine's steel industry was a mainstay of its economy and a major source of export revenues. For Ukraine to remain competitive on the international steel market, the country would need to switch from energy-intensive costly technologies to technologies that reduce energy usage and costs and improve the quality of steel produced. This would require, in part, replacing open-hearth furnaces with oxygen converters and electric furnaces and greatly increasing the percentage of steel produced with continuous casting at existing enterprises, as well as at any new facilities (Krivchenko and others, 2007).

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#### UZBEKISTAN

Although Uzbekistan was a significant regional producer of a number of mineral commodities, including nonferrous metals and natural gas, it was a major world producer of two mineral commodities, gold and uranium. Minerals were extracted from more than 400 mines, open pits, and oil wells. The two leading mineral production enterprises in the country were the Almalyk and the Navoi mining and metallurgical complexes.

#### Production

Data on mineral production are in table 23.

#### Structure of the Mineral Industry

Table 24 is a list of major mineral industry facilities in Uzbekistan.

#### **Commodity Review**

#### Metals

**Copper.**—The Almalyk complex was based on a large copper porphyry deposit that contained copper reserves of more than 17 Mt. In more than 50 years of mining, only about 20% of Almalyk's copper reserves (calculated according to the Soviet reserve classification system) had been depleted. The Almalyk complex was processing about 30 Mt/yr of ore, and the metallurgical plant had the potential to significantly increase production. Besides copper, ore from Almalyk contained gold, rhenium, selenium, silver, sulfur, and tellurium. Production of these byproduct metals comprised 40% of the value of Almalyk's output (Mavlyanov and others, 2007).

**Gold.**—The country's main reserves of gold and uranium are located in the Central Kyzykum region between the Amu Darya and the Syr Darya rivers. The ores are mined and processed by the Navoi mining and metallurgical complex. The Navoi complex had more than 20 gold deposits in western Uzbekistan, of which the largest by far is the Muruntau deposit, which is one of the world's largest gold deposits. Gold from this deposit was mined from an open pit. Navoi's gold production had averaged between 57 and 60 t/yr in recent years. Navoi also shared production from the Zarafshan-Newmont joint venture, which was formed by Navoi, Newmont Gold Corp. of the United States, and the Uzbekistan State Committee for Geology and Mineral Resources (Goskomgeologia).

The Zarafshan-Newmont joint venture recycled tailings generated from the Muruntau gold lode. The processing plant was officially opened on May 25, 1995. The joint venture initially contracted to process 220 Mt of ore averaging 1.23 g/t gold and containing 5.1 million troy ounces (158.63 t) of recoverable gold. Zarafshan-Newmont employed about 900 people. The joint venture produced 7.192 t of gold in 2006, which was a decrease from the 7.714 t produced in 2005 and the 12 t produced in 2004 (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

On August 11, the Government of Uzbekistan launched a criminal investigation against the joint venture and its employees and blocked the export of any gold. Newmont lost control over day-to-day operations of the joint venture, but the company continued to mine and process gold. Uzbekistan notified the company in March that tax reforms were in process and, in June, Uzbekistan's courts had ordered Zarafshan-Newmont to pay \$48 million in back taxes, froze the joint venture's assets, and seized some of its gold (Radio Free Europe/Radio Liberty, 2006).

In September, Newmont wrote off the value of its stake in the joint venture, two months after authorities seized gold and other assets based on two tax claims for payments due between 2002 and 2005. An Uzbekistan court seized \$49 million for the disputed tax claims and declared the joint venture bankrupt. However, Newmont was still pursuing a settlement in 2006. It reached an agreement in 2007 whereby it agreed to transfer its stake in the Zarafshan-Newmont venture to Uzbekistan with none of the parties admitting liability regarding any matters in the dispute (Reuters, 2007). According to the agreement, Newmont received \$80 million for its 50% stake, which reportedly was less than its estimated book value. The operation planned to continue to process tailings from Muruntau (Interfax Russia & CIS Metals & Mining Weekly, 2007b).

Lead and Zinc.—Almalyk in 2007 was producing zinc metal at its zinc smelter on a tolling basis. Almalyk, however, had started to develop a lead and zinc mining and beneficiation complex to develop the Uchkulach lead-zinc deposit where Almalyk had a mothballed mine. Almalyk was also planning to develop the Khandiza polymetallic ore deposit. The beneficiation plant at the Uchkulach Mine would be capable of processing 500,000 t/yr of ore, and the beneficiation plant at the Khandiza Mine would be able to process 650,000 t/yr of ore. Plans called for the complex to begin operations in 2009 (Interfax Russia & CIS Metals & Mining Weekly, 2007a).

#### Mineral Fuels and Related Materials

**Uranium.**—The Navoi mining and metallurgical complex was the country's only complex for mining and enriching uranium. Navoi incorporated three enterprises that mined uranium using in situ leaching. Uranium was milled at its No. 1 Hydrometallurgical Plant in the city of Navoi (Interfax, 2007). In 2006, the Navoi mining and metallurgical complex produced 2,260 t of uranium, which was 1.7% less than the 2,300 t it produced in 2005. The decline in output was attributed to a lack of financing, which resulted in technological and supply problems and, in particular, a lack of sulfuric acid (Interfax, 2007).

#### Outlook

The U.S. Department of State stated that Uzbekistan had the lowest level of foreign direct investment per capita among members of the CIS. The action taken against Newmont could make it more difficult for Uzbekistan to attract major foreign investment to develop its mineral resources.

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### TABLE 1 ARMENIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodit	у	2002	2003	2004	2005	2006
METALS						
Aluminum:						
Rolled		<sup>r</sup>	<sup>r</sup>	<sup>r</sup>		
Foil		5,240	9,317	6,193		950
Copper:						
Concentrate, Cu content		16,641	18,068	17,700 <sup>e</sup>	16,256	15,000
Blister, smelter, primary <sup>e</sup>		6,700	7,500	7,500	9,881 <sup>r, 2</sup>	8,791 2
Ferroalloys:						
Ferromolybdenum		NA	NA	NA	2,260	2,581
Ferrotungsten		NA	NA	NA	8	42
Gold, mine output, Au content	kilograms	3,200	1,800	2,100	1,400	1,400
Molybdenum:						
Concentrate, Mo content		2,884	2,763	2,950 °	3,030	4,098
Metal		NA	NA	NA	270	487
Rhenium <sup>e</sup>	kilograms	800	1,000	1,000	1,200	1,000
Silver <sup>e</sup>	do.	5,500	4,000	4,000	4,000	4,000
Zinc, concentrate, Zn content		782	2,056	1,927	3,196	2,270
INDUSTRIAL MI	NERALS					
Caustic soda		3,600	1,800	2,800	6,200	6,500
Cement	thousand metric tons	355	384	501	605	625
Clays, bentonite, powder		258	642 <sup>e</sup>	700	732 <sup>r</sup>	720
Diamond, cut	thousand carats	370	400	263	222 <sup>r</sup>	184
Gypsum		44,900	57,800	65,000	44,200	40,000
Limestone	thousand metric tons	12,500	13,000	16,000 <sup>e</sup>	17,000	17,000 <sup>e</sup>
Perlite <sup>e</sup>		35,000	35,000	35,000	35,000	35,000
Salt		30,300	31,900	31,600	34,700	37,000
MINERAL FUELS AND REL	ATED MATERIALS					
Natural gas, dry	million cubic meters	NA	NA	NA	NA	1,596 <sup>p</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. <sup>p</sup>Preliminary. <sup>r</sup>Revised. NA Not available. -- Zero.

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

### TABLE 2 ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

			Annual
Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	capacity <sup>e</sup>
Aluminum, rolled and foil	ARMENAL (formerly Kanaker aluminum plant) (RUSAL)	K'anak'err	25,000
Copper:			
Mine output, Cu content	Facilities in operation:		30,000 5
	Agarak copper-molybdenum mining and	Agarak	
	processing complex		
	Kapan mining directorate	Kapan	
	Zangezur copper-molybdenum complex [CJSC	Kadzharan	
	Armenian Copper Programme (ACP), 90%]		
	Facilities not in operation:		
	Akhtala mining directorate	Akhtala	
	Shamlugh mining directorate	Shamlugh	
Blister	CJSC Armenian Copper Programme (ACP)	Alaverdi	15,000
Diamond, cut stones	Aghavni diamond-cutting works <sup>4</sup>	Nor Geghi	NA
Do.	Amma group diamond-cutting works <sup>4</sup>	Artashat	NA
Do.	Andranik-Dashk diamond-cutting works	Nor Hachyn	NA
Do.	Arevakn diamond producing plant	do.	NA
Do.	Diamond Company of Armenia (DCA)	Yerevan	NA
Do.	Diamond Tech	Talin	NA
Do.	Lori diamond-cutting works	Nor Hachyn	NA
Do.	Lusampor <sup>4</sup>	Melik'gyugh	NA
Do.	Punji diamond-cutting works <sup>4</sup>	Yerevan	NA
Do.	Sapphire diamond-cutting works	Nor Hachyn	NA
Do. thousand carats	Shoghakan gem-cutting plant	do.	120
Gold kilograms	Zod mining complex	Zod	2,000
Do.	Megradzor deposit	Megradzor	NA
Do.	Lichkvazkoye, Shaumyanskiy Rayon, Sotkskoye, and	NA	NA
	Terterasarskoye deposits		
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Molybdenum, mine output, Mo content	Zangezur copper-molybdenum complex (Cronimet	Kadzharan	20,400
	Mining, 60%; Yerevan Pure Iron Works, 15%;		
	Armenian Molybdenum Production, 12.5%; LLC		
	Zangezur Mining, 12.5%)		
Do.	Agarak copper-molybdenum mining and	Agarak	2,000
	processing complex		
Perlite thousand metric tons	Aragats-Perlite mining-beneficiation complex	Aragats deposit	1,110
Zinc, mine output, Zn content	Kapan mining directorate	Kapan	NA

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

<sup>1</sup>Table includes data available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

<sup>4</sup>Current existence of the enterprise cannot be confirmed.

### TABLE 3 AZERBAIJAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

2002	2003	2004	2005	2006
91	180	232	315	363
	18,565	29,537	31,762	31,852
400 <sup>e</sup>	3,100	19,100	7,300	11,300
230	1,800	11,100	3,650	5,650
32,671 <sup>r</sup>	56,354 <sup>r</sup>	90,410 <sup>r</sup>	286,117 <sup>r</sup>	54,309
2,545	5,400	84	1,257	14,108
NA	NA	NA	53,700	40,600
2,000	2,000	2,000	2,000	2,000
20,500	21,600	24,700	30,000	30,000
847,700	1,012,700	1,427,500	1,537,900 <sup>r</sup>	1,622,000
1,039	3,848	8,840	28,242	35,034
377	349	300	300	300
631,500	762,000	1,273,000	1,256,443	1,416,038
5,380	7,645	9,234	11,202 <sup>r</sup>	12,029
482,200	516,600	684,110	662,410	715,500
17,000	22,500	26,400 r	18,800 <sup>r</sup>	22,000
5,143,700	5,127,700	4,995,400	5,732,100	6,079,500
15,333,500	15,251,300	15,348,800	21,993,600	32,185,600
6,051,900	6,156,400	6,607,200	7,655,900	7,795,800
	2002 91  400 ° 230 32,671 r 2,545 NA 2,000 20,500 847,700 1,039 377 631,500 5,380 482,200 17,000 5,143,700 15,333,500 6,051,900	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$2002$ $2003$ $2004$ 9118023218,56529,537 $400^{c}$ 3,10019,1002301,80011,10032,671 r56,354 r90,410 r2,5455,40084NANANA2,0002,0002,00020,50021,60024,700847,7001,012,7001,427,5001,0393,8488,840377349300631,500762,0001,273,0005,3807,6459,234482,200516,600684,11017,00022,50026,400 r5,143,7005,127,7004,995,40015,333,50015,251,30015,348,8006,051,9006,156,4006,607,200	$2002$ $2003$ $2004$ $2005$ 91180 $232$ $315$ $18,565$ $29,537$ $31,762$ $400^{\circ}$ $3,100$ $19,100$ $7,300$ $230$ $1,800$ $11,100$ $3,650$ $32,671^{\circ}$ $56,354^{\circ}$ $90,410^{\circ}$ $286,117^{\circ}$ $2,545$ $5,400$ $84$ $1,257$ NANANA $53,700$ $2,000$ $2,000$ $2,000$ $20,500$ $21,600$ $24,700$ $30,000$ $2,000$ $20,500$ $21,600$ $24,700$ $30,000$ $30,000$ $847,700$ $1,012,700$ $1,427,500$ $1,039$ $3,848$ $8,840$ $28,242$ $377$ $349$ $300$ $300$ $300$ $631,500$ $762,000$ $1,273,000$ $1,273,000$ $1,256,443$ $5,380$ $7,645$ $9,234$ $11,202^{\circ}$ $482,200$ $516,600$ $684,110$ $62,410$ $17,000$ $22,500$ $26,400^{\circ}$ $18,800^{\circ}$ $5,143,700$ $5,127,700$ $4,995,400$ $5,732,100$ $15,333,500$ $15,251,300$ $15,333,500$ $15,251,300$ $15,348,800$ $21,993,600$ $6,051,900$ $6,156,400$ $6,607,200$

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>In addition to the commodities listed, Azerbaijan also produced copper, gold, lead, molybdenum, silver, and zinc, and a number of industrial minerals, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Bromine and iodine production series in table may be revised in the 2007 report based on recent information reported in the text of this report.

### TABLE 4 AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

		Major operating companies, main		Annual
Coi	mmodity	facilities, or deposits	Locations or deposit names	capacity <sup>e</sup>
Alumina		Gyandzha refinery	Ganca	100,000
Aluminum	thousand metric tons	Sumgait smelter	Sumqayit	100 to 150
Alumite ore		Zaglik alunite mining directorate	Zaglik, Dashcasan Region	600,000
Arsenic		Bitibulagh enargite deposit	Gedabay	NA
Do.		Daridagh red orpiment-realgar deposit	Julpha	NA
Do.			Dzhul finskiy Region	NA
Barite		Azad, Bashgishlag, Chaycand, Chovdar, Gusgchu, Tonashen, and Zaylik deposits	Khanlarskiy Region	NA
Bauxite		Permian deposit	Nakhichevan Region	NA
Cement		Plants:	Locations:	1,000,000 3
		Karadagly	Karadagly	
		Tauz	Tauz Region	
Chromite		Epack, Goydara, Kazimbinasy, Khatavang	Calbajar and Lachin Regions	NA
Clays:				
Bentonite		Dash-Salakhlinskoye deposit	do.	1,000,000
Refractory		Chardakhla deposit	Chardakhla	NA
Construction materia	lls, includes	Aidagh, Dash Salahly, Dilagarda, Dovlatyarly,	NA	320,000 3
building sawn stor	ne-block and	Gozdak, Mardacan, Naftalan, Shahbulag,		
facing stone		Zayam, Dashcasan, Gulably, Gulbacht, and Shahtahty deposits		
Copper		Karadagskiy complex	Shamkhorskiy Region	30,000
Dolomite		Negram and Kobustan deposits	do.	NA
Gemstones, precious		Agate, chalcedony, and heliotrope deposits	Santon	NA
and semiprecious				
Do.		Amethyst, garnet, and granite deposits	Gedebey Rayonu	NA
Gypsum		Deposits:	Locations:	40,600 <sup>3</sup>
		Agdjakend deposit	Kazakhskiy Region	
		Araz deposit	Nakhichevan Region	
		Jukhary Aghjacand anhydrite deposit	Goranboy Region	
Iodine and bromine		Baku, Karadagly, and Novaneftechala plants	Process oil well brines at plants in Baku, Karadagly, and Neftechala	NA
Iron ore, marketable		Dashkasan mining directorate	Dashkasan Region	1,400,000
Lead-zinc ore		Gumushlu deposit	Ordubadskiy and Norashenskiy	NA
			Regions	
Limestone		Dashkesan deposit	Dashkasan Region	NA
Natural gas, processi	ng	Karadagly plant	Near Baku	NA
Quartz sands		Miocene-Pliocene deposits	Gobustan, Absheron Peninsula, Guba Region	10,000
Petroleum, crude and	l natural gas: <sup>4</sup>			
Crude petroleum a	and	State Oil Company of Azerbaijan Republic	Production from 37 onshore deposits,	3,000,000 3
gas condensate		(SOCAR) in conjunction with international	which includes deposits on the	
		production-sharing agreements	Ashperon Peninsula and in the Izhnekurin Valley	
Do.		do.	Production from 17 offshore fields	19,000,000 3
			and almost 50% of crude petroleum	
			produced from the Guneshli field	
Natural gas	million cubic meters	Azneft, a subsidiary of State Oil	Almost all production from offshore	6,000 <sup>3</sup>
-		Company of Azerbaijan Republic	fields with more than 50% of	
		(SOCAR) in conjunction with international	natural gas produced from the	
		production-sharing agreements	Bakharly field	
Do.		do.	Guneshli, Nakhchyvan, and	NA
			Shah-Deniz offshore fields	
Petroleum, refined	24-gallon barrels	Azerneftyag (formerly Baku) refinery	Baku	83,950,000 4
Do.	do.	Heydar Aliev (formerly Azernefteyagandzhah	do.	77,380,000 4
		and Novo-Baku refinery)		

### TABLE 4—Continued AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

		Major operating companies, mai	n	Annual
C	Commodity	facilities, or deposits	Locations or deposit names	capacity <sup>e</sup>
Rock salt		Hehram and Pusyan deposits	Nakhichevan Region	2,500,000
Steel:				
Crude		OAO Azerboru	Sumqayit	800,000
Rolled		do.	do.	700,000
Pipe, tubes		do.	do.	540,000

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

<sup>1</sup>Table includes data available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

<sup>4</sup>Capacity for crude petroleum distillation.

#### TABLE 5

#### BELARUS: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Steel:					
Crude thousand metric tons	1,607	1,694	1,920	2,076	2,200 °
Rolled do.	1,400	1,425	1,580	1,850 <sup>r</sup>	2,048
Pipes	76,700	96,200	109,700	108,300	117,132
INDUSTRIAL MINERALS					
Cement thousand metric tons	2,171	2,472	2,731	3,131	3,495
Diamond, synthetic <sup>e</sup> thousand carats	25,000	25,000	25,000	25,000	25,000
Nitrogen, N content of ammonia	799,000	726,000	765,000 <sup> r, e</sup>	800,000 <sup>r</sup>	850,000 <sup>e</sup>
Potash, K <sub>2</sub> O equivalent <sup>e</sup> thousand metric tons	3,800	4,230	4,600	4,844 <sup>2</sup>	4,605 2
Salt <sup>3</sup>	1,369,000 <sup>r</sup>	1,543,000	1,883,000	1,839,000	1,900,000 °
Sulfur <sup>e</sup>	25,000	30,000	30,000	30,000	30,000
MINERAL FUELS AND RELATED MATERIALS					
Natural gas million cubic meters	246	254	245	228	220
Peat:					
Horticultural use <sup>e</sup>	200,000 <sup>2</sup>	100,000	100,000	100,000	100,000
Fuel use	2,201,000	1,802,000	2,008,000	2,308,000	2,400,000 °
Total	2,401,000	1,902,000	2,108,000	2,408,000	2,500,000 °
Petroleum:					
Crude thousand metric tons	1,846	1,820	1,804	1,785	1,780
Refined do.	15,247	15,774	18,451	19,802	21,253

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

<sup>3</sup>Includes byproduct salt from potash production.

### TABLE 6 BELARUS: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1</sup>

#### (Metric tons unless otherwise specified)

	Major operating companies, main		Annual
Commodity	facilities, or deposits	Location or deposit names	capacity <sup>e</sup>
Cement	Krichevskiy and Volkovysk plants	Mahilyowskaya and Wawkavysk	3,500,000
		Voblasts'	
Diamond	Gomel Production Association "Kristall"	Homyel'skaya Voblasts'	NA
Nitrogen, N content of ammonia	Grodno "Azot" Association	Hrodna Region	1,000,000
Peat, fuel use	37 enterprises that produce mainly briquets	All regions of the country	5,000,000 <sup>2</sup>
Petroleum:			
Crude	Belarusneft Association	Southeastern part of the country	2,000,000
Refined	Mazyr refinery	Mazyr	16,000,000 <sup>3</sup>
Do.	Naftan refinery	Navapolatsk	8,450,000 <sup>3</sup>
Potash, K <sub>2</sub> O equivalent	Belaruskali Production Amalgamation (PA)	Salihorsk area	5,000,000
Steel:			
Crude	Belarusian Steelworks	Zhlobin	1,400,000
Pipe	Mogilev Metallurgical Works jsc	Mahilyowskaya Voblasts'	80,000
<sup>e</sup> Estimated: estimated data are rounded to	no more than three significant digits NA Not available		

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Total peat for fuel use.

<sup>3</sup>Crude throughput.

# TABLE 7 GEORGIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Copper, mine output, Cu content of concentrate <sup>e</sup>	10,000	12,000	12,000	12,000	12,000
Gold <sup>e</sup> kilograms	2,000	2,000	2,000	2,000	2,000
Iron and steel:					
Ferroalloys, electric furnace:					
Ferromanganese	NA <sup>r</sup>	12,400 <sup>r</sup>	12,800 r	13,945 <sup>r</sup>	5,130
Silicomanganese	NA <sup>r</sup>	50,900 <sup>r</sup>	91,900 <sup>r</sup>	109,414 <sup>r</sup>	116,945
Total	NA <sup>r</sup>	63,300 <sup>r</sup>	104,700 <sup>r</sup>	123,359 <sup>r</sup>	122,075
Lead, mine output, Pb content <sup>e</sup>	400	400	400	400	400
Manganese ore, marketable:					
Gross weight	103,400	173,500	218,700	251,800	328,643
Mn content <sup>e</sup>	30,000	50,500	63,600	73,000	95,300
Silver <sup>e</sup> kilograms	33,000	33,000	33,000	33,000	33,000
Zinc, mine output, Zn content of concentrate <sup>e</sup>	400	400	400	400	400
INDUSTRIAL MINERALS					
Barite <sup>e</sup>	NA	NA	NA	NA	NA
Cement	346,800	344,800	424,600	450,000	450,000 <sup>e</sup>
Clays, bentonite <sup>e</sup>	7,000	9,700	1,800	7,876 <sup>r, 2</sup>	4,487 <sup>2</sup>
Gypsum	NA	NA	NA	238	123
Nitrogen, N content of ammonia	91,500	102,300	107,800	130,000 <sup>e</sup>	140,000 <sup>e</sup>
Perlite	NA	NA	45,000 <sup>e</sup>	45,000 <sup>e</sup>	45,000 <sup>e</sup>
Salt <sup>e</sup>	30,000	30,000	30,000	30,000	30,000
Zeolites	NA	NA	NA	NA	NA
MINERAL FUELS AND RELATED MATERIALS					
Coal, bituminous	6,100	8,000	8,000	5,100 <sup>r</sup>	8,284
Natural gas thousand cubic meters	16,700	17,800	6,100	14,800	21,400
Petroleum:					
Crude	73,900	139,700	97,600	66,700	63,506
Refined	16,700	18,600	37,500	40,000	40,000
<u>a</u>					

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

### TABLE 8 GEORGIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons)

			Annual
Commodity	Major operating companies, main facilities, or deposits	Location or deposit names	capacity <sup>e</sup>
Arsenic:	Deposits:	Locations:	2,000 <sup>3</sup>
As content of ore	Lukhumi deposit	Ambrolauri Region	
	Tsani deposit	Lentekhi Region	
Metal and compounds	Racha mining and chemical plant	Racha	NA
Do.	Tsana mining and chemical plant	Ts'ana	NA
Barite	Chordskoye deposit	Onis Raioni (Onskiy Rayon)	70,000
Do.	NA	Madneuli deposit	NA
Barite-zinc	NA	Kvaisi deposit	NA
Bentonite	Gumbrskoye and Askanskoye deposits	Gumbra and Askana Regions	200,000 <sup>3</sup>
Cement	Rust'avi cement plant	Rust'avi	1,500,000
Coal	Akhaltsikhe, Tkibuli-Shaorskoye, and Tkvarchelskoye	Akhalts'ikhis Raioni, Tqibuli,	300,000 <sup>3</sup>
	deposits	and Tqvrach'eli Regions	
Copper, Cu content of ore	Madneuli complex (Stanton Equity Corp., a subsidiary	Bolnisi Region	12,000
	of International Investor Group of Russia)		
Diatomite	Kisatibskoye deposit	K'isat'ibi Region	150,000
Ferroalloys:			
Ferromanganese	Zestafoni plant (Stemcor UK Ltd.)	Zestap'onis Raioni	100,000
Silicomanganese	do.	do.	250,000
Manganese sinter	do.	do.	250,000
Gold, mill	Quartzite enterprise	Madneuli deposit	3
Iron ore	Hrazdan deposit	Sulagyan Mountains	NA
Do.	Tkibuli-Shaorskoye deposit	Tqibuli Region	NA
Lead-zinc:			
Pb content of ore	Kvaisi deposit	Kvaisi	1,200
Zn content of ore	do.	do.	3,000
Manganese, marketable ore	Chiaturmarganets complex (Manganese Georgia, a	Chiatura-Sach'kheris Raioni field	400,000
	subsidiary of Stemcor UK Ltd.)		
Petroleum:			
Crude	About 60 wells that account for 98% of output	Mirzaani, Sup'sa, and Zemo T'elet'i	200,000 <sup>3</sup>
		Regions	
Refined	Batumi refinery	Bat'umi	NA
Do.	Sartichala refinery	Sartichala	NA
Steel, crude	Rust'avi steel mill	Rust'avi	1,400,000

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimate is the total for all enterprises that produce that commodity.

### TABLE 9 KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Aluminum:						
Alumina th	nousand metric tons	1,386	1,419	1,468	1,505	1,514
Bauxite		4,376,600	4,737,100	4,705,600	4,800,000 °	4,800,000 e
Arsenic trioxide <sup>c</sup>		1,500	1,500	1,500	1,500	1,500
Bismuth: <sup>e</sup>			150	150	1.10	1.10
Mine output, Bi content		161	150	150	140	140
Metal, refined		130	130	130	120	115
Cadmium, metal		1,300	1,351	1,900	2,000	2,000 e
Chromite		2,369,400	2,927,500	3,287,000	3,579,000	3,600,000 °
Copper:					· · · · · ·	
Mine output, Cu content		474,000	485,000	461,000 -	422,000	457,000
Metal:		116 200	421.020	115 200	10 ( 000 f	126 000 6
Smelter, undifferentiated		446,200	431,930	445,200	426,000 <sup>r</sup>	426,000 °
Refined, primary		453,000	432,901	445,200	388,000	408,000
Gallium		15 '	10 '	5	7	10
Gold:	1.11	22,402	20.000 ¢	20.000 ¢	18.0(2	19.000 e
Mine output, Au content	Kilograms	22,402	30,000 °	30,000 °	18,062	18,000 °
Metal, refined	do.	10,959	9,906	9,576	9,788	NA
Iron and steel:						
Iron ore, marketable:		17 (75 000	10 200 000	20 200 000	16 460 000	10 (00 000 6
Gross weight		17,675,000	19,300,000	20,300,000	16,469,900	18,600,000
Fe content		10,000,000	10,935,000	11,499,000	9,300,000	10,500,000
Dia iron		4 080 100	4 140 000 ¢	4 200 000	2 591 000	2 400 000 \$
		4,089,100	4,140,000	4,300,000	5,581,090	3,400,000
Ferrochromium		825 800	003 000	1 080 002 <sup>r</sup>	1 156 169	1 200 000 °
Ferrochromiumsiliaan		102 022	993,000	1,080,993	1,130,108	1,200,000 °
Earromanganasa		2 278	96,130	2 000 °	2 100 °	2 100 °
Earrosilicon		126.068	1,951	103 580	104 185	2,100 105,000 °
Silicomanganese		164,000	178 920	155 324 <sup>r</sup>	170 214	220,000 °
Other <sup>e</sup>		9,000	9,000	9,000	9,000	9,000
Total		1 246 074	1 408 281	1 455 697 <sup>r</sup>	1 539 537	1 640 000 °
Steel:		1,240,074	1,400,201	1,455,077	1,557,557	1,040,000
Crude		4 868 000	5 066 600	5 371 700	4 452 000	4 225 000
Finished, rolled		3 800 000	3,837,800	4,039,700	3,392,000 <sup>r</sup>	3,163,000
Lead:		2,000,000	5,057,000	1,005,700	0,002,000	5,105,000
Concentrate Ph content <sup>e</sup>		40.000 r	44.000 r	44.000 <sup>r</sup>	44,000	48,000
Refined, primary and secondary		1.622.000	133.200	157.000 °	131.316	125.000
Magnesium metal primary <sup>e</sup>		18.000	14.000	18.000	20.000	21.000
Manganese ore, crude ore:			,		,	,
Gross weight		1.792.200 <sup>r</sup>	2.361.000 r	2,318,000	2,207,700	2,250,000
Mn content <sup>e</sup>		440,000 r	580,000	570,000	540,000	550,000
Molybdenum, concentrate. Mo content <sup>e</sup>		230	230	230	230	250
Nickel, Ni content of laterite ore					193	200 <sup>e</sup>
Rhenium <sup>e</sup>	kilograms	2,600	2,600	5,000	8,000	8,000
Silicon	<u> </u>	NA	83,000	88,000	95,000	95,000
Silver, mine output, Ag content	kilograms	855,612	804,874	707,443	832,000	830,000 <sup>e</sup>
Titanium:	<u> </u>					
Ilmenite and leucoxene			9,300	11,670	10,000	25,000
Sponge		14,900	12,500	16,500	19,000	23,000
Vanadium, ores, concentrates, slag. Va c	content <sup>e</sup>	1,000	1,000	1,000	1,000	1,000
Zinc:						
Mine output, Zn content		390,000 r	395,000 r	360,000 r	400,000	400,000 <sup>e</sup>
Smelter, primary and secondary		286,300 <sup>r</sup>	279,000 <sup>r</sup>	316,500 <sup>r</sup>	356,907	349,000

# TABLE 9—Continued KAZAKHSTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERALS						
Asbestos, all grades		291,100	354,500	346,500	355,000	355,000 <sup>e</sup>
Barite		79,000	219,200	310,700	120,000	120,000 <sup>e</sup>
Boron <sup>e</sup> thousand	l metric tons	30	30	30	30	30
Cement		2,129,400	2,569,700	3,662,000	3,974,800	4,200,000 <sup>e</sup>
Clays, kaolin <sup>e</sup>		70,000	70,000	70,000	70,000	70,000
Gypsum		710,700	711,000 <sup>e</sup>	800,000	820,000	820,000
Phophate rock:						
Gross weight		136,500	169,000 <sup>r</sup>	230,000 r	263,000 r	270,000 <sup>e</sup>
P <sub>2</sub> O <sub>5</sub> content		39,600	38,000 <sup>r</sup>	52,000 <sup>r, e</sup>	55,000 <sup>r, e</sup>	55,000 <sup>e</sup>
Sulfur, byproduct: <sup>e</sup>						
Metallurgy		260,000	325,000	325,000	325,000	300,000
Natural gas and petroleum		1,600,000	1,600,000	1,650,000	1,700,000	1,700,000
Total		1,860,000	1,930,000	1,980,000	2,030,000	2,000,000
MINERAL FUELS AND RELATED MAT	ERIALS					
Coal		73,731,000	84,906,500	86,875,100	86,385,000	96,320,800
Natural gas thousand of	cubic meters	13,100,000	14,700,000	14,400,000	14,494,000	14,440,000
Petroleum:						
Crude oil and gas condensate:						
In gravimetric units		47,271,000 r	51,451,000 <sup>r</sup>	59,485,000 <sup>r</sup>	61,500,000	64,860,000
In volumetric units <sup>e</sup> 42-ga	allon barrels	347,000,000 r	378,000,000 <sup>r</sup>	437,000,000 <sup>r</sup>	451,000,000 <sup>r</sup>	476,000,000
Refinery products		NA	8,750,000 <sup>e</sup>	9,390,000	11,170,000	11,664,000
Uranium:						
U content		2,374 <sup>r</sup>	2,798 <sup>r</sup>	3,154 <sup>r</sup>	3,695 <sup>r</sup>	4,476
$U_3O_8$ content		2,800 r	3,300 <sup>r</sup>	3,719 <sup>r</sup>	4,357 <sup>r</sup>	5,279

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

# TABLE 10 KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Alumina	Pavlodar aluminum plant [Eurasian Natural Resources Corp. (ENRC)]	Pavlodar	1,250,000
Arsenic trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent	3,500
Asbestos	Facilities:	Locations:	1,000,000 3
	Dzhetygara complex	Qostanay	,,
	Chilisay complex	Aqtobe phosphorite basin	
Barite	Facilities:	Locations:	300,000 <sup>3</sup>
	Karagaylinskiy and Zhayrem mining and	Karagayly, Zhayrem deposit	
	beneficiation complexes		
	Tujuk Mine	Almaty	
	Achisay polymetallic complex	Kentau Region	
Bauxite	Turgay and Krasnooktyabrsky bauxite mining	Central Kazakhstan	5,000,000
	complexes		
Beryllium, metal	Ulba metallurgical plant (Kazatomprom)	Oskemen	NA
Bismuth, metal	Facilities:	Locations:	70 <sup>3</sup>
	Ust-Kamenogorsk lead-zinc metallurgical	Oskemen	
	plant (Kazzinc JSC)		
	Ridder lead smelter (Kazzinc JSC)	Ridder	
Do.	Chimkent refinery	Shymkent	20
Cadmium	do.	do.	10
Do.	Ridder mining-beneficiation complex	East Kazakhstan Region	1,200
	(Kazzinc JSC)		
Chromite, mine output,	Donskoy GOK mining-beneficiation complex	Near Khromtau, Kempirsai Region	5,000,000
$Cr_2O_3$ content (50%)	[Kazchrome, a subsidiary of Eurasian		
	Natural Resources Corp. (ENRC)]		
Coal	Karaganda Basin	Central and north-central parts of	50,000,000
		the country	
Do.	Ekibastuz Basin	do.	95,000,000
Do.	Maykuben Basin	do.	10,000,000
Do.	Turgay Basin	do.	1,000,000
Copper:			
Mining, recoverable, Cu content	Kazakhmys PLC mines:		
	Balkhash complex:		11.000
	Kounrad Mine	South-central Kazakhstan	11,800
Do.	Sayak Mine	do.	23,500
 	Shatyrkul Mine	do.	12,700
Do.	East Region:	East Kasalıkatarı	7 920
	Artemyevskoe Mine	East Kazaknstan	7,820
Do	Letushakaa Mina	do.	2,700
Do.	Nikoleovskoo Mino	do.	25,730
Do.	Orlayskaa Mina	do.	25,700
Do.	Vubilevno Snegirikhinskoe Mine	do.	14 200
 	Karaganda Region:	d0.	14,200
D0.	Abyz Mine	North-central Kazakhstan	5 710
Do	Nurkazgan Mine	do	1 190
 	Zhezkazgan complex:	uv.	1,170
20.	Annensky Mine	do	6 630
Do	East Mine	do	65 800
<u></u> <u></u> <u></u>	North Mine	do.	32,500
<u> </u>	South Mine	do.	71.600
Do.	Stepnoy Mine	do.	31.700
Do.	West Mine	do.	23,300

# TABLE 10—Continued KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Copper—Continued:			
Mining, recoverable, Cu content-	Kazzinc JSC (Glencore International AG, 99%):		
Continued	Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,750
Do.	Tishinsky Mine	do.	15,000
Do.	Zyrianovsk: Maleevsky Mine	do.	62,100
Processing, recoverable, Cu content	Kazakhmys PLC mines or plants:		
	Balkhash complex—Balkhash concentrator	South-central Kazakhstan	39,500
Do.	East Region:		
	Belousovskoe Mine	East Kazakhstan	2,100
Do.	Irtyshskoe Mine	do.	3,890
Do.	Nikolaevskoe Mine	do.	21,200
Do.	Orlovskoe Mine	do.	77,800
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	4,000
2	Zhezkazgan complex:		50.000
Do.	Stepnoy Mine	do.	58,200
2	Zhezkazgan concentrator:		~~~~~
Do.	Number I	do.	88,800
Do.	Number 2	do.	111,000
D.	Kazzine JSC:		
Do	Ridder—Ridder concentrator	East Kazakhstan	NA 1 200
	Zyrianovsk—Zyrianovsk concentrator	d0.	1,200
Metal	Razakinitys PLC linnes of plants:		
	Balkhash complex:	Southo ontrol Kozolchoton	250,000
Do	Balkhash refinery	do	250,000
 	Zhezkazgen complex:	d0.	250,000
D0.	Zhezkazgan smelter	North central Kazakhetan	215 000
Do	Zhezkazgan refinery	do	213,000
Do.	Kazzinc ISC—Ust-Kamenogorsk lead smelter	Oskemen	8 400
Ferroallovs:	Ruzzine 35C - 63t Runchögörsk feud sineher	Öskemen	0,400
Ferrochrome:			
High-carbon 60%	Actobe (Aktyubinsk) plant [Kazchrome	Aatobe	200.000
	a subsidiary of Eurasian Natural Resources		200,000
	Corp. (ENRC)]		
Medium-carbon 60%	do.	do.	200.000
Do.	Aksu plant [Kazchrome, a subsidiary of Eurasian	Aksu	200,000
	Natural Resources Corp. (ENRC)]		
Ferrosilicon	do.	do.	700,000
Ferrosilicochrome	do.	do.	700,000
Ferrochrome, high-carbon	do.	do.	500,000
Silicomanganese	do.	do.	90,000
Gallium	Pavlodar aluminum plant [Eurasian Natural	Pavlodar	NA
	Resources Corp. (ENRC)]		
Gold	Byproduct of polymetallic ores and native gold	NA	30
	mining		
Iron and steel:			
Pig iron	Ispat-Karmet Steelworks	Karaganda	5,000,000
Steel, crude	do.	do.	6,300,000
Iron ore, marketable	Lisakovskiy and Sokolovsko-Sarbay mining	Qostanay	25,000,000
	and metallurgical complexes		
	[Sokolovsku-Surbaymining and production		
	union (SSGPO)		

# TABLE 10—Continued KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

		Major operating companies, main facilities,		Annual
C	ommodity	or deposits	Location or deposit names	capacity
Lead:				
Mining, recoverabl	e Pb content of ore	Kazzine JSC:		
		Ridder:		461
		Shubinsky Mine Tiskingler Ming	East Kazakhstan	461
Do.			d0.	15,000
D0.		Crathovsky Mine	ΝA	240.000
Do		Maleevsky Mine	NA	35,100
Mining gross weig	ht Ph-7n ore	ShalkiyaZinc N V	Kyzylorda region	3 000 000
Processing recover	rable Ph content of ore	Kazzing ISC—Ridder concentrator	Fast Kazakhstan	NA
Do.		ShalkiyaZinc N V processing plant	Kentau	NA
Metal		Chimkent smelter	Shymkent	60.000
Do.		Kazzinc JSC—Ust-Kamenogorsk lead smelter	Oskemen	168.000
Magnesium, metal		Ust-Kamenogorsk titanium-magnesium plant	do.	23.000
Manganese, crude ore		Facilities:	Locations:	2.550.000 3
		Atasurda	Atasu	,
		Kazakmarganets [Kazchrome, a subsidiary of	Tur, East Kamys mines (Karaganda	
		Eurasian Natural Resources Corp. (ENRC)]	Region)	
		Sary-Arkapolimetal	Zhayrang Region	
		Zhezdy processing plant (Kazchrome,	Zhezdy	
		a subsidiary of Eurasian Natural Resources	-	
		Corp. (ENRC)]		
Molybdenum:		Facilities:	Locations:	6,000 <sup>3</sup>
Mining, recoverabl	e content of ore	Balkhash complex	Kounrad Mine	
		Karaobinskoye deposit	Karaoba Region	
		Sayak deposit	Sayaq (Sayak) Region	
Metal		Akchatau molybdenum metal plant	Zhezkazgan Region	NA
Natural gas	million cubic meters	Companies:	Locations:	16,000 <sup>3</sup>
		CNPC Aktobemunaigas	Aqtobe	
		Embamunaigaz	Emba District	
		Huricane Kumkol Munai	Aral Sea Region	
		Karachaganak Petroleum Operating BV	Northwestern Kazakhstan	
		Mangistaumunaigaz	Mangghhyshlaq Peninsula	
		Tengizchevroil joint venture	Tengiz deposit	
			Zhanazhol deposit	
			Urikhtau deposit	
		Agip Kazakhstan North Caspian Operating	Kashagan offshore field	
		Company (AGip KCO)	<b>T</b> T 1 1	
D ( 1		Uzenmunaigas	Uzen deposit	22 000 000 3
Petroleum:		Companies:	Locations:	32,000,000 5
Crude		Emborunoi 202	Aquode Emba District	
		Emoanunaigaz	Anal Saa Dagion	
		Huricane Kullikol Mullal	Afai Sea Region	
		Mangistaumunaigaz	Managahayshlag Peninsula	
		Uzenmunaigaz	Uzen denosit	
Do		Alibekmola Avrankul Chinarevskove Kozbasav	NA	NA
20.		North Buzachi, Sazankurak, Saztvube, and	- · · · · ·	1121
		Urikhtau deposits		
Do.	24-gallon barrels per day	Tengizchevroil joint venture	Tengiz deposit	750.000
 Do.	do.	Agip Kazakhstan North Caspian Operating	Kashagan offshore field	100,000
		Company (AGip KCO)		- ,
Refined, crude oil	do.	Atyrau Pavlodar, Shymkent refineries	Atyrau, Pavlodar, Shymkent	427,000 <sup>3</sup>
throughput			-	

# TABLE 10—Continued KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Phosphate rock	Companies:	Locations:	10,000,000 3
	Chilisay mining directorate	Aqtobe phosphorite basin	
	Karatau production association	Shymkent and Zhambyl Regions	
Rare metals (columbium, indium,	Aktau complex	Aktau	NA
selenium, tellurium)	-		
Do.	Belogorsky rare metals plant	Belogorskiy	NA
Do.	Shymkent polymetallic plant	Shymkent	NA
Do.	Ust-Kamenogorsk lead-zinc plant	Oskemen	NA
Do.	Akchatau mining-beneficiation complex	Zhezkazgan Region	NA
Rhenium	Balkhash copper mining-metallurgical complex	do.	NA
Silver, refined	Facilities:	Locations:	1,000 3
	Chimkent metallurgical plants	Shymkent	,
	Ridder	Ridder	
	Ust-Kamenogorsk	Zhezkazgan Region	
Tantalum	Ulba metallurgical plant (Kazatomprom)	Oskemen	NA
Tin	Akchatau mining-beneficiation complex	Akzhaik deposit. Zhezkazgan	700
	i nonaut mining concretation compren	Region	,00
Titanium:		Region	
Ore ilmenite	Obukhovskove Satnavevskove and	ΝA	30,000
ore, intente	Shokoshskove deposits		50,000
Matal	List Kamanagarsk titanium magnasium complex	Ockaman	25 000
Metal	(UKTMK)	Oskellien	55,000
Unanium II content	(UKIMK) Kazatamman fasilitias	Logationa	5 000 3
Oranium, O content	Razatomptom factures:	Locations:	3,000
		Aqtau	
	Snevcnenko		
	Stepnogorsk	Stepnogorsk	
	l abosnara	l abosnara	
	I selinny chemical complex	Stepnogorsk	
Mining, recoverable, Zn content	Kazaknmys PLC mines:		
	East Region:	<b>T 1</b>	20.200
	Artemyevskoe Mine	East Kazakhstan	30,200
Do.	Belousovskoe Mine	do	8,420
Do.	Irtyshskoe Mine	do.	14,700
Do.	Nikolaevskoe Mine	do.	48,700
Do.	Orlovskoe Mine	East Kazakhstan	78,200
Do.	Yubileyno-Snegirikhinskoe Mine	do.	16,500
Do.	Karaganda Region: Abyz Mine	North-central Kazakhstan	20,800
Do.	Kazzinc JSC:		
	Ridder:		
	Ridder-Sokolny Mine	East Kazakhstan	NA
Do.	Shubinsky Mine	do.	2,510
Do.	Tishinsky Mine	do.	79,500
Do.	Shaimerden deposit	North Kazakhstan	1,090,000
Do.	Zyrianovsk:		
	Grekhovsky Mine	East Kazakhstan	240,000
Do.	Maleevsky Mine	do.	203,000
Processing, recoverable, Zn content	Kazakhmys PLC mines:		
	East Region:		
	Artemyevskoe Mine	do.	8,580
Do.	Belousovskoe Mine	do.	5,760
Do.	Irtyshskoe Mine	do.	7,610
Do.	Nikolaevskoe Mine	do.	24,200
Do.	Orlovskoe Mine	do.	55,000
Do.	Yubileyno-Snegirikhinskoe Mine	do.	6,190

### TABLE 10—Continued KAZAKHSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Major operating companies, main facilities,				
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>	
Zinc—Continued:				
Processing, recoverable, Zn content-	Kazzinc JSC:			
Continued	Ridder concentrator	East Kazakhstan	NA	
Do.	Shaimerden deposit	North Kazakhstan	72,000	
Metal	Kazzinc JSC:			
Do.	Ridder zinc refinery	East Kazakhstan	126,000	
Do.	Ust-Kamenogorsk zinc refinery	North Kazakhstan	240,000	
a				

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

<sup>1</sup>Table includes data available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

#### TABLE 11

#### KYRGYZSTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
METALS						
Antimony:						
Mine output, Sb content <sup>e</sup>		150	40	20	10	50
Metal and compounds		1,504	1,500	1,000	500	203
Gold <sup>e</sup>	kilograms	17,000	22,476 <sup>2</sup>	22,000	16,700	10,721 2
Mercury:						
Mine output, Hg content <sup>e</sup>		425	370	488	200	250
Metal		537	500	500	250 <sup>e, 3</sup>	250
Molybdenum, mine output, Hg content <sup>e</sup>		250	250	250	250	250
Tin, mine output, Sn content <sup>e</sup>		300				
INDUSTRIAL MINER	ALS					
Cement		532,800	757,300 <sup>r</sup>	870,100 <sup>r</sup>	900,000 <sup>r</sup>	1,215,600
Fluorspar, concentrate <sup>e</sup>		2,750	3,973 <sup>2</sup>	4,000	4,000	4,000
Kaolin		237,100	381,100	400,000 <sup>e</sup>	400,000 <sup>e</sup>	400,000 <sup>e</sup>
Lime, dead-burned		9,300	8,700	11,200	9,500	9,500
Rare earths:						
Concentrate, gross weight		NA <sup>r</sup>	NA	NA	NA	NA
Rare earth oxide equivalent:						
Compounds		NA	NA	NA	NA	NA
Metals		100 <sup>e</sup>	NA	NA	NA	NA
Other <sup>e</sup>		2,000	2,000	NA	NA	NA
Salt		770	1,100	1,100 <sup>e</sup>	1,100 <sup>e</sup>	1,100 e
MINERAL FUELS AND RELATE	D MATERIALS					
Coal		497,500	411,300	454,900	340,200 <sup>r</sup>	314,276
Natural gas n	nillion cubic meters	29	27	29	25	19
Petroleum, crude th	nousand metric tons	75,500	68,500	73,800	74,400	70,600

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

<sup>3</sup>Reported data obtained after estimated data were entered stated that mercury metal production was 304 t in 2005. The series will be updated in the 2007 report.

### TABLE 12 KYRGYZSTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006 $^{1,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Antimony:			
Sb content of ore	Kadamzhay and Khaydarkan complexes	Kadamzhayskiy Rayon, Khaydarkan Region	2,400 <sup>3</sup>
Ore	Kadamzhay beneficiation plant	Kadamzhay deposit	200,000
Do.	Terek-Sayskiy beneficiation plant	Terek-Sayskiy deposit	60,000
Metal and compounds	Kadamzhay metallurgical facility	Kadamzhayskiy Rayon	28,000
Cement	Kantskiy cement plant	Kant	1,500,000
Coal	Seven underground mines and five open pits include the following deposits: Almalyk, Dzhergalan, Kara-Kiche-Kok-Yangak, Kyzyl-Kiya, Sulyukta, and Tashkumyr	Southwestern, central, and northeastern parts of the country	2,200,000 <sup>3</sup>
Fluorspar, concentrate	Khaydarkan mining-metallurgical complex	Khaydarkan deposit	5,000
Gold:			
Au content of ore	Makmalzoloto	Makmal deposit	3
Do.	Kumtor Gold Company (Centerra Gold, Inc.)	Kumtor deposit	22
Do. kilograms	Solton-Sary Mine	Naryn	500
Do.	Taldybulak Levoberezhny deposit	NA	NA
Do.	Talas Gold	Jerooy, Talas Region	NA
Au content of ore, open pit	Kyrgyzaltyn-Noroks Mining Company JV	Dzher-Uy deposit	650,000
Au content of ore, underground	do.	do.	350,000
Refined	Kara-Balta refinery	Chuskaya Oblast'	22
Mercury: Hg content of ore	Khaydarkan mining-metallurgical complex	Khaydarkan, Chauvi, Chonkoy, and Novoye deposits	700 <sup>3</sup>
Metal	do.	do.	1,000
Molybdenum, for nonmetallurgical uses	Molibden Joint Stock Company	Chuskaya Oblast'	NA
Do.	Kara Balta mining-metallurgical complex	NA	NA
Natural gas million cubic meters	Kyrgyzazmunayzat	Approximately 300 wells; Changyr-Tash, Chigirchik Pereval, Izbaskentskoye, Kara-Agach, Mayluu-Suu, Susahoye, and Togap-Beshkenskoye deposits (major)	100 <sup>3</sup>
Petroleum	do.	do.	150,000
Do.	Kyrgyz Petroleum Company	Dzhalal-Abad Region	NA
Rare earths: Concentrates, gross weight	Aktyuzskiy mining directorate	Kutessai II and Aktyuz-Boordu deposits	14,000
Compounds and metals, rare-earth oxide equivalent	Kyrgyz chemical and metallurgical plant	Orlovka	8.000
Silver	Kumyshtag deposit	Talasskaya Oblast'	NA
Do.	Karagoyskove deposit	Oshskaya Oblast'	NA
Tin	Uchkoshkon deposit	Sary-Dzhas field	NA
Do.	Tyanshanolovo mining-beneficiation complex	do.	NA
Do.	Enil'chek JSC mining enterprise	Atdzhaylau deposit	150
Do.	do.	Trudovoye deposit	350
Tungsten	do.	do.	95,600
Do.	do.	Atdzhaylau deposit	90
Do.	do.	Trudovoye deposit	120
Uranium, processed	Kara-Balta mining-metallurgical complex	Chuskaya Oblast'	1,200

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

<sup>1</sup>Table includes data available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

### TABLE 13 MOLDOVA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Crude steel	514,000	886,000	1,012,600	1,000,000 °	675,400
INDUSTRIAL MINERALS					
Cement	279,000	255,400	439,700	641,000 <sup>r</sup>	837,000
Gypsum	91,300	116,100	102,500	562,700 <sup>r</sup>	725,900
Lime	3,300	2,880	1,911	1,900	1,900
Sand and gravel <sup>e</sup>	700,000 <sup>r</sup>	1,000,000 <sup>r</sup>	1,600,000 <sup>r</sup>	1,900,000 <sup>r</sup>	2,100,000
MINERAL FUELS AND RELATED MATERIALS					
Natural gas, dry million cubic meters	NA	NA	NA	NA	56 <sup>p</sup>
Peat <sup>e</sup>	475,000	475,000	475,000	475,000	475,000

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

<sup>1</sup>Table includes data available through November 2007.

### TABLE 14 MOLDOVA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Major operating companies, main					
Commodity		facilities, or deposits	Location or deposit names	capacitye	
Oil and natural gas:					
Oil		Redeco Moldova oil and gas company	Valeni oilfield	100,000	
Natural gas	thousand cubic meters	do.	Victorovca gasfield	5,000	
Steel, crude		Moldova Steel Works minimill	Ribnita, Transnistria Region	1,100,000	
a					

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits.

<sup>1</sup>Table includes data available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

### TABLE 15 RUSSIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Aluminum:					
Ore and concentrate:					
Alumina thousand metric tons	3,131	3,230	3,269	3,259	3,265
Bauxite	4,586,000	5,442,000	6,000,000 <sup>e</sup>	6,400,000 <sup>e</sup>	6,600,000 <sup>e</sup>
Nepheline concentrate, 25% to 30%	1,022,000	1,014,000	1,000,000 °	1,000,000 <sup>e</sup>	1,000,000 °
Metal, smelter, primary	3,347,413	3,478,057	3,591,747	3,647,072	3,717,907
Antimony, mine output, recoverable Sb content <sup>e</sup>	1,000	2,000	3,000	3,000	3,500
Arsenic, white <sup>e</sup>	1,500	1,500	1,500	1,500	1,500
Bismuth: <sup>e</sup>					
Mine output, Bi content	50	50	50	50	55
Metal, refined	10	10	10	10	11
Cadmium, metal, smelter <sup>e</sup>	950	950	950	1,000	1,100
Chromium, chrome ore, marketable	74,300	116,455	320,200	772,000	800,000
Cobalt: <sup>e</sup>					
Mine output, recoverable Co content	4,600	4,800	4,700	5,000	5,500
Metal, refined	5,100	5,500	5,400	5,800	6,300
Copper:					
Ore, recoverable Cu content <sup>e</sup>	695,000	675,000	675,000	700,000	725,000
Metal:					
Blister, smelter: <sup>e</sup>					
Primary	660,000	670,000	662,000	686,000	712,000
Secondary	200,000	170,000	257,000	272,000	290,000
Total	860,000	840,000	919,000 <sup>2</sup>	958,000	1,000,000
Refined:					
Primary	670,000 <sup>e</sup>	670,000 <sup>e</sup>	662,000	664,000	684,000
Secondary	200,000 <sup>e</sup>	170,000 <sup>e</sup>	257,000	269,000	284,000
Total	870,000 <sup>e</sup>	840,000 <sup>e</sup>	919,000	933,000	968,000
Gallium <sup>e</sup>	11	10	9	10	11
Gold:					
Mine output, Au content kilograms	168,411	170,068	163,148	163,186 <sup>r</sup>	159,340
Secondary recovery do.	2,493	6,835	4,844	4,884	4,981
Indium <sup>e</sup>	10	10	11	12	12
Iron and steel:					
Iron ore:					
Gross weight	84,236,400	91,759,800	96,980,000	96,764,400	102,000,000
Fe content, 55% to 63% <sup>e</sup>	49,000,000 <sup>2</sup>	53,000,000	56,200,000	56,100,000	59,100,000
Metal:					
Pig iron	46,060,000	48,368,000	50,426,700	49,175,000 <sup>r</sup>	51,683,000
Direct-reduced iron <sup>e</sup>	2,910,000 <sup>2</sup>	2,900,000	3,140,000	3,340,000	3,340,000
Ferroalloys: <sup>e</sup>					
Blast furnace:					
Ferromanganese	105,000	101,000	108,000	108,000	125,000
Ferrophosphorus	3,500	3,500	3,500	3,500	3,500
Spiegeleisen	7,000	7,000	7,000	7,000	7,000
Electric furnace:					
Ferrochromium	210,000 <sup>-2</sup>	357,000 <sup>2</sup>	453,700 <sup>-2</sup>	578,000 <sup>2</sup>	600,000
Ferrochromiumsilicon	4,000	4,000	4,000	4,000	4,000
Ferronickel	45,000	23,547 <sup>r, 2</sup>	28,654 <sup>r, 2</sup>	24,050 <sup>r, 2</sup>	28,200
Ferrosilicon	701,000	760,000	721,000 r	742,000 2	750,000
Ferrovanadium	15,100	8,000	13,700 <sup>r</sup>	12,880 2	13,000
Silicomanganese	127,000	83,000	143,000	145,000	170,000
Silicon metal	40,000 r	45,000 r	45,000 r	45,000	46,000
Other	14,900	22,000	22,000	22,000	22,000
Total	1,270,000 <sup>r</sup>	1,410,000 <sup>r</sup>	1,550,000 <sup>r</sup>	1,690,000 <sup>r</sup>	1,770,000

# TABLE 15—Continued RUSSIA: PRODUCTION OF MINERAL COMMODITIES<sup>1, 2</sup>

(Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS—Continued					
Iron and steel—Continued:					
Metal—Continued:					
Steel:					
Crude	59,776,600	62,707,600	65,645,600	66,186,200	70,766,000
Finished, rolled	48,700,000	51,050,000	53,800,000	54,600,000	58,200,000
Pipe	5,115,200	6,102,000	5,990,000	6,673,000	7,974,000
Lead: <sup>e</sup>					
Mine output, recoverable Pb content	19,000	24,000	23,000	36,000	36,000
Metal, refined, primary and secondary	60,350 <sup>2</sup>	66,000	70,000	66,000	78,000
Magnesium: <sup>e</sup>					
Magnesite	1,000,000	1,200,000	1,200,000	1,100,000 <sup>r</sup>	1,200,000
Metal, including secondary	40,000	43,000	45,000	45,000	50,000
Manganese ore: <sup>e</sup>					
Gross weight	115,000	115,000	115,000	115,000	120,000
Mn content	23,000	23,000	23,000	23,000	24,000
Mercury <sup>e</sup>	50	50	50	50	50
Molybdenum <sup>e</sup>	2,900	2,900	2,900	3,000 <sup>r</sup>	3,100
Nickel: <sup>e</sup>					
Mine output, recoverable Ni content	310,000	300,000	315,000	315,000	320,000
Matte, for export	7,783	3,866	599	700 <sup>r</sup>	1,300
Nickel products:					
Ferronickel, Ni content	12,000	13,500	14,000	13,000	15,500
Metal	239,000	260,000	261,000	266,000	270,000
Oxide sinter	6,000	5,000	5,000	5,000	5,500
Chemicals	2,000	2,500	3,000	3,000	3,500
Total	259,000	281,000	283,000	287,000	295,000
Platinum-group metals: <sup>e</sup>					
Platinum kilograms	27,000	28,000	28,000	29,000 r	29,000
Palladium do.	96,000	97,000	97,000	97,400	98,400
Other do.	14,500	15,000	15,000	15,500	15,600
Total do.	138,000	140,000	140,000	142,000 r	143,000
Rhenium <sup>e</sup> do.	1,400	1,400	1,400	1,400	1,400
Selenium	60	81	85	100	110
Silicon <sup>e</sup>	NA	570,000	550,000	525,000	540,000
Silver <sup>e</sup>					
Mine output, Ag content kilograms	400,000	700,000	1,276,900 <sup>2</sup>	1,350,000 <sup>2</sup>	1,300,000
Secondary recovery <sup>e</sup> do.	250	250	265	265	265
Tin: <sup>e</sup>					
Mine output, recoverable Sn content	1,300	2,000	2,500	3,000	3,000
Metal, smelter:					
Primary	4,615 <sup>2</sup>	4,100	4,570	5,000 <sup>r</sup>	4,980
Secondary	500	500	500	500 <sup>r</sup>	500
Total	5,120	4,600	5,070	5,500 <sup>r</sup>	5,480
Titanium sponge <sup>e</sup>	22,000	23,000	26,000 r	29,000 <sup>r</sup>	32,000
Tungsten, concentrate, W content <sup>e</sup>	5,300	5,450	5,500	4,400 <sup>r</sup>	4,000
Vanadium, metal <sup>e</sup>	8,000	5,800	10,900	15,100	15,100
Zinc: <sup>e</sup>					
Mine output, recoverable Zn content	130,000 <sup>2</sup>	159,000	179,000	180,000	190,000
Metal, smelter, primary and secondary	244,000	253,000	240,000	220,000	240,000
Zirconium, baddeleyite concentrate, averaging					
98% ZrO <sub>2</sub> <sup>e</sup>	6,900 <sup>r</sup>	6,600 <sup>r</sup>	5,500 <sup>r</sup>	5,000 <sup>r</sup>	5,000
INDUSTRIAL MINERALS					
Asbestos, grades I-VI <sup>e</sup>	775,000	878,000 <sup>2</sup>	923,000 <sup>2</sup>	925,000	925,000
Barite <sup>e</sup>	59,000	78,000	63,000	63,000	63,000
Boron <sup>e</sup> thousand metric tons	1,000	1,000	500	400	400
Cement, hydraulic	37,700,000	41,000,000	45,700,000	48,500,000 <sup>r</sup>	54,700,000

### TABLE 15—Continued RUSSIA: PRODUCTION OF MINERAL COMMODITIES<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued	2002	2003	2001	2003	2000
Clays, kaolin concentrate <sup>e</sup>	45,000 <sup>2</sup>	45,000	45,000	45,000	45,000
Diamond: <sup>e</sup>		· · · · ·	· · · · · ·		
Gem carats	17,400,000	20,000,000	21,400,000	23,000,000	23,300,000
Industrial do.	11,600,000	13,000,000	14,200,000	15,000,000	15,100,000
Synthetic do.	80,000,000	80,000,000	80,000,000	80,000,000	80,000,000
Total do.	109,000,000	113,000,000	116,000,000	118,000,000	118,400,000
Feldspar <sup>e</sup>	45,000	45,000	45,000	45,000	45,000
Fluorspar, concentrate, 55% to 96.4% CaF <sub>2</sub>	169.000	170.000 °	226,400	245,500	210.000 °
Gypsum <sup>e</sup>	1.600.000	1,750,000	$2.077.000^{-2}$	2,200,000	2,200,000
Iodine <sup>e</sup>	300.000	300.000	300,000	300,000	300.000
Lime industrial and construction <sup>e</sup>	8.000.000	8.000.000	8.200.000 <sup>2</sup>	8.200.000	8.200.000
Lithium minerals, unspecified <sup>e</sup>	2.000	2.000	2.200	2.200	2.200
Mica <sup>e</sup>	100,000	100.000	100,000	100.000	100,000
Nitrogen N content of ammonia	8 600 000	9 100 000	9 900 000 <sup>r</sup>	10 300 000 <sup>r</sup>	10 500 000
Phosphate rock <sup>e</sup>	0,000,000	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10,000,000	10,000,000
Gross weight	10 700 000	11,000,000	11,000,000	11,000,000	11,000,000
$P_2 O_{\epsilon}$ content:	10,700,000	11,000,000	11,000,000	11,000,000	11,000,000
Apatite concentrate, 37% to 39.6%	$4.038.000^{-2}$	$4.121.000^{-2}$	4,120,000	4,100,000 <sup>r</sup>	4,100,000
Sedimentary rock, 19% to 30%	120,000 r	120.000 r	120,000 r	120.000 r	120,000
Total	4 160 000 r	4.240.000 r	4.240.000 r	4.220,000 r	4.220,000
Potash marketable K.O equivalent <sup>e</sup>	4 400 000	4 740 000	5,000,000	5,000,000	5 720 000
Salt all types <sup>e</sup>	2,900,000 r	2,700,000 <sup>r</sup>	2 900 000 <sup>r</sup>	2,000,000 r	2 900 000
Soda ash <sup>e</sup>	2,500,000	2,400,000	2,500,000	2,700,000	2,900,000
Sulfur <sup>e</sup>	2,100,000	2,100,000	2,000,000	2,000,000	2,000,000
Suntu: Native	50,000	50,000	50,000	50,000	50,000
Pyrites	350,000	350,000	300,000	300,000	300,000
Byproduct:	550,000	550,000	500,000	500,000	500,000
Metallurgy	500.000	520,000	570.000	600.000	650,000
Notural gas	5 600,000	5 800 000	6 000 000	6 000,000	6 000 000
Total	6 500 000	6 720 000	6,000,000	6,000,000	7,000,000
	8,500,000	8,800,000	9,920,000	0,950,000	9,300,000
	100,000	100,000	100,000	100,000	9,300,000
	25,000	25,000	25,000	25,000	25,000
MINEDAL EUELS AND DELATED MATEDIALS	25,000	25,000	25,000	25,000	25,000
Cool:					
Anthracita	9,000,000	7 900 000	7 800 000	8 000 000	18 000 000
Bituminous	247,000,000	269,100,000	203 200 000	195,000,000	215,000,000
Lignita	247,000,000	209,100,000	203,200,000	05 200 000 <sup>r</sup>	213,000,000
	220,200,000	256 400,000	281,400,000	208 200 000 <sup>r</sup>	208 800,000
Tola Colve 60 moisture content	330,200,000	330,400,000	281,400,000	298,300,000	22,700,000
Notural gas, marketed million subia maters	505,000	52,700,000	622.050	625.064	52,700,000 656 220
Natural gas, marketed minion cubic meters	1 100 000	1 240 000	1 220 000	1 200 000 1	1 200 000
Distate	1,100,000 r	1,240,000	1,230,000	1,200,000	1,200,000
Pear, fuer use		1,000,000	1,500,000	1,000,000	1,300,000
Petroleum:					
	270.000.000	410.077.000	450 000 000	460 600 000	400 400 000
Gravimetric units	3/9,000,000	412,377,000	458,808,000	469,600,000	480,480,000
Volumetric units thousand 42-gallon barrels	2,790,000	3,000,000	3,300,000	3,500,000	3,530,000
Refinery products	184,960,000	190,030,000	195,000,000	207,000,000	219,575,000
Uranium:					
U content <sup>e</sup>	2,900	3,150	3,200	3,430	3,190
$U_3O_8$ content	3,420	3,715	3,774	4,045	3,762

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

<sup>3</sup>Not distributed by type and therefore not suitable for conversion to volumetric units. Data include all energy and nonenergy products but exclude losses.

# TABLE 16 RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006 $^{\rm l,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Alumina	Achinsk (RUSAL)	Achinsk in East Siberia	900,000
Do.	Bogoslovsk (SUAL Group)	Krasnotur'insk	1,050,000
Do.	Boksitogorsk (RUSAL)	European north	200,000
Do.	Pikalyovo (SUAL Group)	Pikalyovo	300,000
Do.	Uralsk (SUAL Group)	Kamensk-Uralskiy	700,000
Aluminum, primary smelters	Bogoslovsk (SUAL Group)	Krasnotur'insk	175,000
Do.	Bratsk (RUSAL)	Bratsk	950,000
Do.	Irkutsk (SUAL Group)	Irkutskaya Oblast'	300,000
Do.	Kandalaksha (SUAL Group)	Kola Pennisula	75,000
Do.	Khakaz (RUSAL)	Khakassiya	300,000
Do.	Krasnoyarsk (RUSAL)	Krasnoyarskiy Kray	875,000
Do.	Nadvoitsy (SUAL Group)	Nadvoitsy in Karelia	75,000
Do.	Novokuznetsk (RUSAL)	Novokuznetsk	300,000
Do.	Sayansk (RUSAL)	Sayanogorsk	425,000
Do.	Uralsk (SUAL Group)	Kamensk-Uralskiy	150,000
Do.	Volgograd (SUAL Group)	Volgogradskaya Oblast'	175,000
Do.	Volkhov (SUAL Group)	Volkhov, east of St. Petersburg	20,000
Amber	Kaliningrad Amber enterprise (Kaliningrad regional authorities and Alrosa)	Kaliningrad Region	250
Antimony:			
Sb content of concentrate	Sarylakh deposit	Ust'-Nera Region, Sakha (Yakutiya) Republic	6,000 <sup>3</sup>
Do.	Sentachan deposit	Northeastern Sakha (Yakutiya) Republic	NA
Compounds and metals	Ryazsvetmet plant	Ryazanskaya Oblast'	NA
Apatite, concentrate	Khibiny apatite association (OAO Apatit)	Kola Peninsula	15,000,000
Do.	Kovdor iron ore mining association	do.	700,000
Asbestos	Kiyembay	Orenburgskaya Oblast'	500,000
Do.	Tuvaasbest	Tuva Autonomous Region	250,000
Do.	Uralaasbest	Central Ural Mountains	1,100,000
Barite	Salarinskiy mining and beneficiation complex	Kvartsitovaya Sopka deposit	100,000
Bauxite	North-Urals mining company (SUAL Group)	Severoural'sk Region	NA
Do.	South-Urals mining company (SUAL Group)	South Ural Mountains	NA
Do.	Severnaya Onega Mine (RUSAL)	Northwest Region	800,000
Do.	Komi Aluminum (SUAL Group)	Sredne-Timan	3,000,000
Boron, boric acid	Bor Association	Maritime Territory	140,000
Do.	Amur River complex	Far East	8,000
Do.	Alga River chemical complex	do.	12,000
Chromite	Saranov complex	Saranovskiy	200,000
Coal	Donets (east) Basin	Rostovskaya Oblast'	30,000,000
Do.	Kansk Achinsk Basin	East Siberia	50,000,000
Do. thousand metric ton	s Kuznetsk Basin (Kuzbas)	West Siberia	160,000
Do.	Moscow Basin	Moscow Region	15,000,000
Do.	Neryungri Basin	Sakha (Yakutiya) Republic	15,000,000
Do.	Pechora Basin	Komi Republic	30,000,000
Do.	South Yakutiya Basin	Sakha (Yakutiya) Republic	17,000,000
Cobalt:	MMC Noril'sk Nickel	Noril'sk, Kola Peninsula	4,000
Do.	Rezh and Yuzhuralnikel enterprises	South Ural Mountains	2,100
Do.	Ufaleynikel company	Chelyabinsk region, Ural Mountains	4,000
Do.	Tuva cobalt	Khovu-Aksy, Tuva Autonomous Region	NA
Copper:			
Cu in ore	 MMC Noril'sk Nickel	Noril'sk region, Kola Peninsula	500,000
Do.	Russian Copper Company (RCC)	Ural Mountains	70,000
Do.	Urals Mining and Metallurgical Company (UMMC)	do.	230,000

#### (Metric tons unless otherwise specified)

Major operating company		Major operating companies, main facilities,		Annual
Commo	odity	or deposits	Location or deposit names	capacity <sup>e</sup>
Copper—Continued:	•	<u>^</u>	*	• •
Metal, refined		MMC Noril'sk Nickel	Noril'sk region, Kola Peninsula	450,000
Do.		Russian Copper Company (RCC)	Ural Mountains	170,000
Do.		Ural Mining and Metallurgical Company (UMMC)	do.	360,000
Diamond, gem and	thousand carats	Almazy Rossii-Sakha Association (Alrosa)	Sakha (Yukutiya) Republic	
industrial		enterprises:	mines:	
		Udachnyy mining and beneficiation complex	Zarnitsa and Udachnyy	NA
Do.	do.	Mirny mining and beneficiation complex	Mir and International	NA
Do.	do.	Aikhal mining and beneficiation complex	Aikhal and Komsomol'skiy	NA
Do.	do.	Anabaraskiy mining and beneficiation complex	Alluvial mines	NA
Do.	do.	Nyurbinskiy mining and beneficiation complex	Nyurbinskiy and Botuobinskiy	NA
Do.	do.	Lomonosov	Arkhangel'skaya Oblast'	NA
Feldspar		Kheto-Lanbino and Lupikko deposits	Karelia	NA
Ferroallovs		Kosava Gora iron works	Kosava.Gora	200.000
Do.		Kuznetsk ferroallovs plant	Novokuznetsk	400.000
 Do.		Lipetsk iron and steel works	Lipetskava Oblasť	NA
 Do.		Seroy ferroalloy plant	Serov	NA
Do		Chelvabinsk electrometallurgical plant	Chelvabinskava Oblast'	450,000
 		Chusovov iron and steel plant	Chusovov	NA
 		Klyucheysk ferroalloy plant	Dvurechensk	160,000
 Ferronickel		Ufalevnikel company	Chelvabinsk Region Urals	5,000
Ferrovanadium		Vanadii-Tulachermet	Tula North Caucasus	
Fluorepar		Abagaytuy deposit	Transhaikal	
Do		Usuali mine	do	
Do.		Kyakhtinsky denosit	do.	
 		Kyakiniisky deposit	Chite Bagion Transheikel	
 		Veroslavsky mining complex	Dogranichnova and Vosnosonskova	
D0.		ratostavsky mining-beneficiation complex	deposite Dynamic For Fost's Maritima	INA
			(Drimorlya) Degion	
Cald	trilo anomo	Mining companies:	(Prinior ye) Region	
Gold	knograms	A mun olo ZAO	Whether and the second se	5 500
	1-	Allul a/s ZAO	Riadarovsk Kray	5,300
 	do.		Chulastel Automatic Ohlast	5,000
 	do.		Chukotsk Autonomous Oblast	1,700
D	do. 1		Sakna (Yukutiya) Republic	4,000
Do	do. 1	L1-Resurs, ZAO		2,700
 	do	Neryungri-Metallik, 000	Sakha (Yukutiya) Republic	1,500
Do	do.	Nirungan, 000		1,100
 	do.		Magadan Oblast	3,000
Do.	do.	Omolonskaya ZRK, OAO	do.	5,000
Do.	do.	Omsukchanskaya GGK, ZAO	do.	3,000
Do.	do.	Oyna, a/s	Tyva Republic	1,500
Do.	do.	Pokrovskiy mine OAO	Amur Oblast'	6,000
Do.	do.	Polimetal, MNPO, OAO	Magadan and Sverdlovsk	7,500
			Oblast's, Khabarovsk Kray	
Do.	do.	Polyarnaya, a/s	Chukotsk Autonomous Oblast'	1,000
Do.	do.	Polyus ZAO	Krasnoyarsk Kray	38,000
Do.	do.	Priisk Drazhnyy, OOO	do.	1,200
Do.	do.	Priisk Solov'yevskiy, OAO	Amur Oblast'	1,500
Do.	do.	Ros-DV, OOO	Khabarovsk Kray	1,100
Do.	do.	Russdragmet OOO	Khabarovsk Kray, Chita Oblast'	6,000
Do.	do.	Seligdar, a/s	Sakha (Yukutiya) Republic	2,000
Do.	do.	Sovrudnik, OOO	Krasnoyarsk Kray	2,000
Do.	do.	Susumanzoloto, OAO	Magadan Oblast'	3,000
Do.	do.	Uralelktomed', OAO	Sverdlovsk Oblast'	1,400
Do.	do.	Vitim. a/s	Irkutsk Oblast'	2,900

(Metric tons unless otherwise specified)

		Major operating companies, main facilities,		Annual
Commodit	у	or deposits	Location or deposit names	capacity <sup>e</sup>
Gold—Continued	kilograms	Mining companies:	Mining regions:	
		Votok, a/s	Khabarovsk Kray	1,100
Do.	do.	Yuzhuralzoloto	Chelyabinsk Oblast'	4,200
Do.	do.	Zapadnaya, a/s	Krasnoyarsk Kray	1,900
Do.	do.	Zolotaya, ZDK, ZAO	Khakasiya Republic	1,200
Iron ore		Kursk Magnetic Anomaly (KMA) region, which	·	50,000,000 <sup>3</sup>
		contains the following enterprises:		
		Lebedi and Stoilo	Gubkin	
		Mikhavlovka	Zheleznogorsk	
Do		Northwest region, which contains the following	Linerezhogoroa	$22,000,000^{-3}$
201		enterprises:		22,000,000
		Kostomuksha	Kostomuksha	
		Kostomuksna	Kostoliuksila Kola Daningula	
		Olareseret		
		Olenegorsk	Olenegorsk	10,000,000,3
Do.		Siberia region, which contains the following		18,000,000
		enterprises:		
		East:		
		Korshunovo	Zheleznogorsk	
		Rudnogorsk	Rudnogorsk	
		West:		
		Abakan	Abaza	
		Sheregesh	Sheregesh	
		Tashtagol	Tashtagol	
		Teya	Vershina Tei	
Do.		Ural Mountains region, which contains the following		22,000,000 <sup>3</sup>
		enterprises:		
		Akkermanovka	Novotroitsk	
		Bakal	Bakal	
		Goroblagodat	 Kushva	
		Kachkanar	Kachkanar	
		Magnitogorak	Magnitogorak	
		Deskaharder	Deducishar	
T 1 / 1		Pesnenanka	Rudnichnyy	20.000
Lead, metal		Dalpolymetal lead smelter	Rudnaya in the Maritime District	20,000
Do.		Elektrozinc lead smelter [Urals Mining and	Vladikavkaz in North Caucasus	40,000
		Metallurgical Company (UMMC)]		
Lead-zinc, recoverable conten	it of ore:			
Lead, recoverable Pb conte	nt of ore	Altay mining-beneficiation complex	Altay Mountains region, South	2,000
			Siberia	
Do.		Dalpolymetal mining-beneficiation complex	Maritime Territory	20,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	7,000
Do.		Sadon lead-zinc complex	Severnaya Osetiya-Alaniya Republic	5,000
Do.		Salair mining-beneficiation complex	Kemerovo Oblast'	2,000
Zinc, recoverable Zn conten	nt of ore	Altay mining-beneficiation complex	Altay Mountains region, South	1,000
			Siberia	
Do.		Dalpolymetal mining-beneficiation complex	Maritime Territory	25,000
Do.		Nerchinsk polymetallic complex	Chitinskaya Oblast'	12,500
Do.		Sadon lead-zinc complex	Severnava Osetiva-Alaniva Republic	14.000
Do.		Salair mining-beneficiation complex	Kemerovo Oblasť	10.500
Magnesite		Karagayskiy open pit (Magnezit Group) and	Sakha group of deposits	3.800.000 3
		Magnezitovava underground mine (Magnezit Group)	(Chelvabinsk Oblast')	2,000,000
Magnesium metal (for sala)		Avisma plant	Berezniki	35 000
Do		Solikamek plant (Uralkaliv)	Solikamsk	20,000
DU.		Alder	Solika (Volastiva) Domibilio	50,000
Mica		Aidan	Sакпа (такинуа) Керибис	NA
D0.		Karei	Karelia	NA
<u>D0.</u>		Kovdor	Kola Peninsula	NA
Do.		Mam	Irkutsk complex	NA

#### (Metric tons unless otherwise specified)

		Major operating companies, main facilities,		Annual
Comn	nodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Molybdenum		Dzhida tungsten-molybdenum mine	West Transbaikal	NA
Do.		Sorsk molybdenum mining enterprise	Sorsk Region	NA
Do.		Tyrnyauz tungsten-molybdenum mine	North Caucasus	NA
Do.		Shakhtaminskoye molybdenum mining enterprise	Chitinskaya Oblast'	NA
Natural gas	million cubic meters	Komi Republic	Komi Republic	8,000
Do.	do.	Noril'sk area	Noril'sk area	5,500
Do.	do.	North Caucasus	North Caucasus	6,000
Do.	do.	Sakhalin	Far East	2,000
Do.	do.	Tomsk Oblast	West Siberia	500
Do.	do.	Tyumen Oblast, of which:	do.	575,000 <sup>3</sup>
Do.	do.	Medvezhye field	do.	(75,000)
Do.	do.	Urengoy field	do.	(300,000)
Do.	do.	Vyrngapur field	do.	(17,000)
Do.	do.	Yamburg field	do.	(170,000)
Do.	do.	Bovanenko field	Yamal Peninsula	NA
Do.	do.	Pestsovoyy field	Ob-Taz Gulf area	NA
Do.	do.	Zapolyarnyy field	do.	NA
Do.	do.	Schtokmanov field	Barents Sea	NA
Do.	do.	Urals	Ural'skiye Gory	45,000
Do.	do.	Volga	Volga Region	6,000
Do.	do.	Yakut-Sakha	Sakha (Yakutiya) Republic	1,500
Nepheline syenite		Apatite complex	Kola Penisula	1,500,000
Do.		Kiya-Shaltyr Mine	Goryachegorsk Region, east Siberia	NA
Nickel:			, , , , , , , , , , , , , , , , , , , ,	
Ni in ore		MMC Noril'sk Nickel	Noril'sk Region, Kola Peninsula	300,000
Do.		Yuzhuralnikel company	South Ural Mountains	3,000
Do.		Ufaleynikel company	Chelyabinsk Region, Ural Mountains	17,000
Metal:				,
Smelting		MMC Norilsk Nickel	Noril'sk region	160.000
Do.		do.	Pechenga	50,000
Do.		do.	Monchegorsk	50,000
Refining		do.	Noril'sk region	100.000
Do.		do.	Monchegorsk	140.000
Ni products and Ni	in FeNi	Rezh, Ufalevnikel, and Yuzhuralnikel enterprises	South Ural Mountains	65.000
Niobium (columbium)		Karnarsurt mining enterprise (AO Sevredmet)	Lovozerskove deposit, Kola	12.000
(,		8	Peninsula	,
Oil shale		Leningradslanets Association	Slantsy Region	5.000.000
Petroleum		East Siberia, Tomsk Oblast	Tomskaya Oblast'	11,000,000
Do.		European Russia:	, and the second s	
		Astrakhan	North Caspian Sea basin	700,000
Do.		Bashkortostan	Ural'skiye Gory	28,000,000
Do.		Checheno-Ingush Republic	South Caucasus	4,500,000
Do.		Dagestan	North Caucasus	700.000
Do.		Kaliningrad Oblast	Baltic coast	1,800,000
Do.		Komi Republic	Northwest	15,000,000
Do.		Krasnodar Krav	North Caucasus	2,000,000
Do.		Orenburg Oblast	Ural'skive Gory	13.000.000
Do.		Perm Oblast	do.	12,000.000
Do.		Samara	Volga Region	16,000.000
Do.		Saratov Oblast	do.	1,500.000
Do.		Stavropol Krav	North Caucasus	2,000.000
Do.		Tatarstan	Volga Region	40,000.000
Do.		Udmurt Republic	Ural'skive Gory	9,000,000

#### (Metric tons unless otherwise specified)

			Major operating companies, main facilities,		Annual
	Comr	nodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Petroleum-	-Continued	thousand metric tons	Fields, of which:	Tyumenskaya Oblast', West Siberia	300,000 4
Do.			Kogolym	do.	(34,000)
Do.		do.	Krasnoleninskiy	do.	(12,000)
Do.		do.	Langepas	do.	(30,000)
Do.		do.	Megion	do.	(18,000)
Do.		do.	Nizhnevartovsk	do.	(70,000)
Do.		do.	Noyabrsk	do.	(37,000)
Do.		do.	Purneftegaz	do.	(12,000)
Do.		do.	Surgat	do.	(48,000)
Do.		do.	Uray	do.	(8,000)
Do.		do.	Varegan	do.	(10,000)
Do.			Sakhalin Island	Sakhalin Island	2,500,000
Phosphate	rock		Kingisepp complex (OAO fosforit)	Leningradskaya Oblast'	3,500,000
Do.			Lopatino and Yegorevsk deposits	Moscow Oblast'	NA
Do.			Polpinskoye deposit	Bryanskaya Oblast'	NA
Do.			Verkhnekamsk deposit	Ural'skiye Gory	NA
Phosphate	rock, apatite o	concentrate	OAO Apatit	Kola Peninsula	12,000,000
Do.			Kovdor iron mining complex	do.	700,000
Platinum-g	group metals:				
Ore, PG	M content		MMC Noril'sk Nickel	Noril'sk region	150
Do.			AO Koryakgeoldobycha, Amur Prospectors	Placer deposits (mostly platinum),	10 <sup>3</sup>
				Urai Mountains; Siberia; Russian	
Matala			Krospoversk Norferrous Matels Dient	Fai East	NLA
Metals			(Krastsvetmet)	Krasnoyarskiy Kray	NA
Do.			Ekaterinburgskiy plant (EZOTsM)	Ekaterinburg	NA
Do.			Priobsk plant	Priobsk	NA
Potash, K <sub>2</sub>	O equivalent		Uralkaliy	Verkhnekamsk deposit	3,000,000
Do.			Silvinit (Joint-Stock Co.)	Solikamsk-Berezniki regions, Ural'skive Gorv	2,000,000
Rare earths	s		Lovozerskove deposit	Kola Peninsula	NA
Salt			AO Bassol'	Lake Baskunchak in Astrakhan	2,500,000
				Region	, ,
Silver			Dukat Mine	Magadanskaya Oblast'	1,000
Soda ash			Achinsk plant	East Siberia	595
Do.			Berezniki plant	Ural'skiye Gory	1,080
Do.			Pikalevo plant	Leningradskaya Oblast'	200
Do.			Sterlitamak plant	Sterlitamak	2,135
Do.			Volkhov plant	Leningradskaya Oblast'	20
Steel, crude	e		Amurstal	Komsomol'sk-na-Amure	1,600,000
Do.			Asha	Asha	450,000
Do.			Beloretsk	Bashkirskoye	380,000
Do.			Chusovoy	Chusovoy	570,000
Do.			Elektrostal	Moscow	314,000
Do.			Gorky	Nizhniy Novgorod	78,000
Do.			Gur'yevsk	Gur'yevsk	160,000
Do.			Karaganda	Karaganda	6,300,000
Do.			Kuznetsk	Novokuznetsk	4,700,000
Do.			Lys'va	Lys'va	350,000
Do.			Magnitogorsk	Magnitogorsk	16,200,000
Do.			Mechel (Chelyabinsk)	Chelyabinskaya Oblast'	7,000,000
Do.			Nizhniy Tagil	Nizhniy Tagil	8,000,000
Do.			Nizhniy Sergi	Nizhniye Sergi	300,000
Do.			Nosta (Orsk-Kahlilovo)	Novotroitsk in Orenburgskaya Oblast'	4,600,000
Do.			Novolipetsk	Lipetskaya Oblast'	9,900,000
Do.			Novosibirsk	Novosibirskaya Oblast'	1,100,000

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Steel, crude—Continued	Omutninsk	Omutninsk	210,000
Do.	Oskol Electric Steel	Staryy Oskol	2,500,000
Do.	Petrovsk-Zabaykal'skiy	Petrovsk-Zabaykal'skiy	426,000
Do.	Revda	Revda	281,000
Do.	Salda	Sverdlovskaya Oblast'	1,900
Do.	Serov A.K.	Serov	1,000,000
Do.	Serp i Molot	Moscow	70,000
Do.	Severskiy	Polevskoy in Sverdlovskaya Oblast'	825,000
Do.	Severstal (Cherepovets)	Cherepovets	14,000,000
Do.	Sibelektrostal	Krasnoyarsk Kray	110,000
Do.	Sulin	Sulin	280,000
Do.	Taganrog	Taganrog	925,000
Do.	Tulachermet Scientific and Industrial Association	Tula	18,400
Do.	Verkh-Isetskiy	Ekatrinenburg	132,000
Do.	Volgograd	Volgogradskaya Oblast'	2,000,000
Do.	Vyksa	Vyksa	540,000
Do.	West Siberian	Novokuznetsk	6,900,000
Do.	Zlatoust	Zlatoust in Chelyabinskaya Oblast'	1,200,000
Talc	Onotsk deposit	Irkutskaya Oblast'	NA
Do.	Kirgiteysk deposit	Krasnoyarsk Kray	NA
Do.	Miass deposit	Chelyabinskaya Oblast'	NA
Do.	Shabrovsk deposit	Sverdlovskaya Oblast'	NA
Tantalum, ore	Lovozerskoye deposit	Kola Peninsula	10 <sup>3</sup>
	Zabaykalskiy mining and beneficiation complex	Etykinskoye deposit	
Tin:	Novosibirsk mining-beneficiation complexes:	· · ·	
Ore	Khinganskoye olovo (Jewish Autonomous	Khabarovskiy Kray	NA
	District)		
Do.	Dalolovo	Solnechnyy deposit, Primor'ye	NA
Do.	Deputatskiv (Sakhaolovo)	Sakha (Yakutiya) Republic	NA
Do.	Vostokolovo	Russian Far East	NA
Do.	Iultin mining-beneficiation complex	Magadanskava Oblasť	NA
Do.	Khrustalnyy mining-beneficiation complex	Maritime Territory	NA
Do.	Pevek mining-beneficiation complex	Magadanskava Oblasť	NA
Metal	Novosibirsk smelter	Novosibirskava Oblasť	NA
Do.	Podol'sk smelter	Podol'sk	NA
	Rvazan smelter	Ryazanskava Oblasť	NA
Titanium:		ngulanonaja oonat	
Sponge	VSMPO-Avisma titanium-magnesium complex	Sverdlovskaya Oblast', Ural Mountains	40,000
Metal	Moscow plant	Moscow	NA
Do.	Podol'sk plant	Podol'sk	NA
Do.	VSMPO-Avisma titanium-magnesium complex	Sverdlovskaya Oblast', Ural	NA
		Mountains	
Tungsten:			
W content of concentrates	Antonovogorsk	East Transbaikal	NA
Do.	Balkan	Northeast of Magnitogorsk,	NA
		Ural'skiye Gory	
Do.	Belukha	East Transbaikal	NA
Do.	Bom-Grokhom	West Transbaikal	NA
Do.	Dzhida	do.	NA
Do.	Iultin	Magadanskaya Oblast'	NA
Do.	Lermontov	Russian Far East	NA
Do.	Solnechnyv	Southern Khabarovskiv Krav	NA
Do.	Tvrnyauz tungsten-molybdenum mining and	Kabardino-Balkariva. North	NA
	processing complex	Caucasus	

(Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Tungsten—Continued:			
W content of concentrates-Continued	Primorsky	Russian Far East	NA
Do.	Aginskoye deposit	Sakha (Yakutiya) Republic	NA
Do.	Kti-Teberdaskoye deposit	North Caucasus	NA
Metal, tungsten anhydride	Gidrometallurg plant	Nal'chik, North Caucasus	NA
Uranium, U content	Facilities:	Locations:	3,500 <sup>3</sup>
	ZAO Dalur mining enterprise (TVEL Corp.)	Kurgan Region	
	OAO Khiagda mining enterprise (TVEL Corp.)	Buryatiya	
	Priargunsky mining and chemical union (TVEL	Krasnokamensk, Chita Region	
	Corp.)		
Vanadium:			
Ore	Kachkanar iron mining complex	Ural'skiye Gory	NA
Metal	Chusovoy and Nizhniy Tagil plants	do.	17,000
Pentoxide	Vanadii-Tulachermet	Tula, North Caucasus	NA
Zinc:			
Zn content of ore	Bashkir copper-zinc complex	Sibai, southern Ural Mountains	5,000
Do.	Buribai copper-zinc mining complex	Buribai, southern Ural Mountains	1,500
Do.	Gai copper-zinc mining-beneficiation complex	Gai, southern Ural Mountains	25,000
Do.	Kirovgrad copper enterprise	Kirovgrad, central Ural Mountains	1,200
Do.	Sredneuralsk copper complex	Revda, central Ural Mountains	5,000
Do.	Uchali copper-zinc mining-beneficiation complex	Uchalinskiy Rayon, southern Ural	90,000
		Mountains	
Metal	Chelyabinsk electrolytic zinc plant	Chelyabinskaya Oblast'	200,000
Do.	Elektrozink plant [Urals Mining and Metallurgical	Vladikavkaz, North Caucasus	90,000
	Company (UMMC)]		
Do.	Uralelektromed plant [Urals Mining and Metallurgical	Verkhnaya Pyshma	17,000
	Company (UMMC)]		
Zirconium, baddeleyite concentrate	Kovdor iron ore mining and beneficiation complex	Kola Peninsula	3,500

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

<sup>1</sup>Table includes data and information available through November 2007.

<sup>2</sup>Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

### TABLE 17 TAJIKISTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

2002	2003	2004	2005	2006
307,589	319,360	358,082	379,630	413,800
3,000	1,800	2,000	2,000	2,000
2,700	2,700	3,000	3,000	3,000
800	800	800	800	800
20	30	30	30	30
5,000	5,000	5,000 <sup>e</sup>	5,000 <sup>e</sup>	5,000 °
100,000	166,300	193,600	253,100	281,500
9,000	9,000	9,000	8,500 <sup>r</sup>	8,500
NA <sup>r</sup>	50,100 <sup>r</sup>	57,200 r	8,500 <sup>r</sup>	3,600 °
15,300 <sup>r</sup>	15,300 <sup>r</sup>	44,900 <sup>r</sup>	45,000 <sup>r</sup>	45,000
		59,495	65,992	52,459
35,500	46,500	92,900 <sup>r</sup>	98,500 <sup>r</sup>	102,400
33,000	32,800	35,600 <sup>r</sup>	29,300 <sup>r</sup>	19,900
16,100	17,700	18,900	21,600	22,300
	2002 307,589 3,000 2,700 800 20 5,000 100,000 9,000 NA <sup>r</sup> 15,300 <sup>r</sup>  35,500 33,000 16,100	2002         2003           307,589         319,360           3,000         1,800           2,700         2,700           800         800           20         30           5,000         5,000           100,000         166,300           9,000         9,000           NA r         50,100 r           15,300 r         15,300 r           35,500         46,500           33,000         32,800           16,100         17,700	2002         2003         2004 $307,589$ $319,360$ $358,082$ $3,000$ $1,800$ $2,000$ $2,700$ $2,700$ $3,000$ $800$ $800$ $800$ $20$ $30$ $30$ $20$ $30$ $30$ $5,000$ $5,000$ $5,000$ $100,000$ $166,300$ $193,600$ $9,000$ $9,000$ $9,000$ $9,000$ $9,000$ $9,000$ $NA$ $50,100$ $57,200$ $15,300$ $15,300$ $44,900$ $$ $-59,495$ $35,500$ $46,500$ $92,900$ $33,000$ $32,800$ $35,600$ $16,100$ $17,700$ $18,900$	2002 $2003$ $2004$ $2005$ $307,589$ $319,360$ $358,082$ $379,630$ $3,000$ $1,800$ $2,000$ $2,000$ $2,700$ $2,700$ $3,000$ $3,000$ $800$ $800$ $800$ $800$ $20$ $30$ $30$ $30$ $5,000$ $5,000$ $5,000$ $5,000$ $100,000$ $166,300$ $193,600$ $253,100$ $9,000$ $9,000$ $9,000$ $8,500$ r $100,000$ $166,300$ $193,600$ $253,100$ $9,000$ $9,000$ $9,000$ $8,500$ r $15,300$ r $15,300$ r $44,900$ r $45,000$ r $$ $$ $59,495$ $65,992$ $35,500$ $46,500$ $92,900$ r $98,500$ r $33,000$ $32,800$ $35,600$ r $29,300$ r $16,100$ $17,700$ $18,900$ $21,600$

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>In addition to the commodities listed, Tajikistan produces a number of other mineral commodities for which available information is inadequate to make reliable estimates of output.

# TABLE 18 TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

Major operating companies, main facilities,			Annual	
Commodity		or deposits	Location or deposit names	capacity <sup>e</sup>
Aluminum		Tajik aluminum plant (TadAZ)	Tursunzade	517,000
Antimony:				
Ore		Anzob mining-beneficiation complex	Dzhizhikrutskoye Sb-Hg deposit	700,000
Metal		Isfara hydrometallurgical plant	Isfara	500
Arsenic		Mosrif deposit	NA	NA
Bismuth		Leninabad mining-beneficiation complex	Yuzhno-Yangikanskiy deposit	25
Do.		Isfara hydrometallurgical plant	Isfara	500
Bismuth, copper, fluorspar, gold	l,	Adrasman mining-beneficiation complex	Kanimansurskoye deposit	650,000
silver, zinc (ore processing)				
Boron		Yakarkharskoye deposit	Badakhshan Region	NA
Coal		Isfara hydrometallurgical plant	Isfara	300,000
Do.		Shurab brown coal deposit	Shurab Region	NA
Do.		Fan-Yagnob hard coal deposits	Pyandzh Region	50,000
Copper-lead-zinc		Leninabad mining-beneficiation complex	Yuzhno-Yangikanskiy deposit	2,500
Dolomite		Yavan electrochemical complex	Pashkharvoskoye deposit	NA
Fluorspar, concentrate		Takob mining-beneficiation complex	Takob and Krasnye Kholmy deposits	60,000 <sup>3</sup>
Gold:			· · · ·	
In ore	kilograms	Tajikzoloto mining-beneficiation complex,	Darvazy and Rankul placer deposits,	5,000 <sup>3</sup>
	e	Pamir Artel	placers in central and southern	,
			parts of the country	
Do.	do.	Zerafshan Gold Company	Dzhilau and Taror deposits. Sughd	$2.500^{-3}$
			Oblast'	_,
Do.	do.	Darvaz joint venture	Yak-Suyskove deposit. Khatlonskava	2.000
		,	Oblast'	_,
Do	do	Aprelevka joint venture	Aprelevka deposit	200
Ore processing	do.	Vostokredmet refinerv	Chkalovsk	NA
Do	do	Kansavskava factory	Aprelevka Burgunda Kyzyl-Chek	165 000 3
20.	<b>u</b> 0.	Tunisu jinu ju nucci j	and Shkol'nove deposits	105,000
Lead-zinc		Kansayskove mining complex	Kara-Mazar Region	NA
Do		Altyn-Tonkan mining directorate (China Global	Altyn-Tonkan deposit (ore was	NA
20.		NewTechnology Export and Import)	processed until 2000)	1471
Do		do	Pay Bulak deposit (mining ceased	NA
20.		uo.	in 1997)	1471
Do		Adrasman mining-beneficiation complex	NA	NA
 		Takaeliyskiy metallurgical complex	NA	NA
Limestone		Dushanbe cement complex	Kharangonskove deposit	NA
Linestone		do	Varzobskove Ushchel've deposit	NA
Marble		Dashtak deposit	Darvaz region	NA
		lilikul deposit	Pendzhikent region	NA
 		Dal'yan Bolo denosit	Shakhristanskiy region	NA
Mercury		Anzoh mining-heneficiation complex	Dzhizhikrutskove deposit	150
Natural gas and petroleum:		Thizob mining beneficiation complex	Dzilizliki utskoje deposit	150
Natural gas	thousand	Sixteen oil-gas deposits under exploration	Fergana depression	$200,000^{-3}$
Natural gas	cubic meters	which includes Avritanskove	r ergana depression	200,000
	cubic meters	Madanivatskove and Ravatskove		
Detroleum		Beshtentyakskove Kichik Belskove	Southern Tajik depression	200 000 3
Fettoleulli		Shaambary and Uzunkhorskova deposite	Southern Tajik depression	200,000
Salt		Vavan algetrachemical complex	Tut Pulakskova daposit	NA
Do		Vocavskiv plant	Khodzha Muminskova daposit	NA
 		A shtekiy plant	Kamushkurganskova denasit	
Do		ASINGNIY Plan Khoia Santaz Samanahi and Tanahahi danit-	NA	
<u>Silver</u>		Adrasman mining banaficiation complay	Rolshov Konimonsur donosit	15 000
Strontium		Chaltash Chilkatan and Davair deposite	Khatlon Pagion	180,000
Tin tungsten		Tafkon denosit	NA	100,000 NIA
Tungsten ore		Maykhura deposit	Central Tajikistan	150 000
i ungsten ole		may kilula ucposit	Central Lajikistali	150,000

### TABLE 18—Continued TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN 2006<sup>1, 2</sup>

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

<sup>1</sup>Table includes data and information available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

### TABLE 19 TURKMENISTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
INDUSTRIAL MINERALS					
Bentonite <sup>e</sup>	50,000	50,000	50,000	50,000	50,000
Bentonite powder <sup>e</sup>	250	250	250	250	250
Bischofite <sup>e</sup>	100	100	100	100	100
Bromine <sup>e</sup> kilograms	150,000	150,000	150,000	150,000	150,000
Cement <sup>e</sup>	450,000	450,000	550,000 <sup>r</sup>	650,000 <sup>r</sup>	800,000
Epsomite	NA	NA	NA	NA	NA
Ferrous bromide, 51% Br <sup>e</sup>	85	85	85	85	85
Gypsum <sup>e</sup>	100,000	100,000	100,000	100,000	100,000
Iodine <sup>e</sup>	200,000	200,000	250,000	270,000	270,000
Lime <sup>e</sup>	16,000	16,000	16,000	16,000	16,000
Nitrogen, N content of ammonia <sup>e</sup>	85,000	85,000	85,000	85,000	90,000
Salt <sup>e</sup>	215,000	215,000	215,000	215,000	215,000
Sodium sulfate <sup>e</sup>	60,000	60,000	60,000	60,000	60,000
Sulfur <sup>e</sup>	9,000	9,000	9,000	9,000	9,000
MINERAL FUELS AND RELATED MATERIALS					
Natural gas million cubic meters	45,000	59,100	58,570	55,800	65,000
Petroleum, crude	8,919,000	9,306,000	10,051,000	9,700,000	9,000,000

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

<sup>1</sup>Table includes data available through November 2007.

# TABLE 20 TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{\rm l,\,2}$

#### (Metric tons unless otherwise specified)

Major operating companies, main facilities, An				Annual
Con	nmodity	or deposits	Location or deposit names	capacity
Ammonia	thousand metric tons	Maryzoat Association	Mary Region	400,000
Argillite	cubic meters	Keramzit plant	Yagmanskoye deposit	200,000
Barite-witherite		Arpaklenskiy mining enterprise	Arpaklen deposit	10,000
Do.		Kumytash deposit and other deposits	NA	NA
Bischofite, epsomite, C	alauber's salt,	Karabogazsulfate Association	Kara-Bogaz-Gol Lagoon, off the	NA
sea salt			Caspian Sea	
Bromine		Cheleken plant	Cheleken Region	4,740
Do.		Nebitdag plant	Nebitdag Region	2,370
Cement:				
From bench gravel a	nd loam	Bezmeinskiy cement plant	Bezmeinskoye deposit	1,400,000 <sup>e</sup>
From limestone and	clay	Kugitangskoye deposit	NA	NA
From limestone and	marl	Gingol'skoye deposit	NA	NA
Clays:				
Bentonite		Oglanly Mine	Oglanly Region	100,000
Kaolin		Ashkhabad glass plant	Kyzylkainskoye deposit	80,000 <sup>e</sup>
Do.		Tuarkyrskoye deposit	250 kilometers southeast of	NA
			Turkmenbashi	
Coal, oxidized		do.	do.	NA
Dolomite		Ashkhabad glass plant	Kelyatinskoye deposit	6,000 <sup>e</sup>
Gypsum		IA Turkmenmineral	Mukry, Tagorin deposits	300,000
Do.		Wastes from Gaurdak sulfur deposit	Gaurdak, Gora	400,000
Do.		Krasnovodsk Aylagy (anhydride) deposit	9 kilometers east of Turkmenbashi	160,000
Iodine		Cheleken plant	Cheleken Region	355
Do.		Nebitdag plant	Nebitdag Region	255 °
Limestone		Gaurdak deposit	4 kilometers northeast of Gaurdak	NA
Do.		Kara-Dzhumalakskoye deposit	60 kilometers from Gaurdak	NA
Limestone, for facing r	naterials	Charshanginskoye, Gaurdakskoye, Geok-Tepinskoye,	NA	NA
		Kaylyu, Krasnovodsk Aylagy (tuff and granite),		
		and Tyuzmergenskoye deposits		
Do.	cubic meters	Tagarinskoye deposit	8 kilometers from Gaurdak	1,000 e
Limestone, for filling s	tone do.	Aeroport deposit	21 kilometers northeast of	2,000
			Turkmenbashi	
Do.	do.	Bekdashskoye deposit	200 kilometers north of	5,000
			Turkmenbashi	
Do.	do.	Dostluksoye deposit	230 kilometers southeast of	2,000
			Turkmenbashi	
Do.	do.	Mukrinskoye deposit	60 kilometers southwest of	25,000
			Gaurdak	
Natural gas	million cubic meters	Achakskoye, Dauletabad, Doviet-Denmez (Donmez),	Onshore in eastern and southwestern	90,000 <sup>e, 3</sup>
		Gygyrlinskoye, Ioltan, North and South Naipskiye,	parts of the country and offshore	
		West Shatlykskiye, and Yashlar deposits	in the Caspian Sea; Amu-Dar'ya and	
			Murgab Basins; Dashoguzskiy,	
			Lebapskiy, and Maryyskiy deposits	
Natural pigment		Bakhchesu/Cheshme/Gadyn deposit	28 kilometers southwest of Serdar	NA
Ozokerite		Cheleken mining enterprise	NA	NA
Petroleum:				
Crude		Barsa-Gelmesskoye, Burunskoye, Cheleken,	Onshore in southwestern part of	5,500,000 <sup>e, 3</sup>
		Gograndagskoye, Ioltan, Kamyshldzhinskoye,	the country and offshore in the	
		Korturtepinskoye, Kum Dag, Kuydzhikskoye,	Caspian Sea	
		Okaremskoye, and Yashlar deposits		
Refined	thousand metric tons	Refineries:	Locations:	12,000 <sup>3</sup>
		Seydi refinery	Chardzhou Rayon	
		Turkmenbashi refinery	Turkmenbashi	
Potash (sylvinite, carna	llite)	Karlyuk deposit (experimental mine closed 1998)	25 kilometers from Gaurdak	NA
Do.		Karabil'skoye deposit	17 kilometers south of Gaurdak	NA
G G G G G G G G G G G G G G G G G G G				-

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
	or deposits	Location or deposit names	capacity
	Annauskoye, Babadurmazskoye, and Bakhardenskoye	NA	NA
	deposits		
	Gaurdak deposit	8 kilometers from Gaurdak	15,000 <sup>e</sup>
	Khodzhaguymaskoye deposit	4 kilometers west of Gaurdak	NA
	Kugitangskoye deposit	75 kilometers from Gaurdak	2,000 e
	Uzun-Kudukskoye deposit	20 kilometers from Gaurdak	2,000 e
	Kuulinskoye deposit	40 kilometers north of Turkmenbsahi	650,000 <sup>e</sup>
ibic meters	Dushaksoye deposit	NA	1,150,000
do.	Kala-I-Morskoye deposit	NA	925,000
do.	Kernayskoye deposit	NA	36,000
do.	Kubatayskoye deposit	NA	740,000
do.	Ufrinskoye deposit	NA	900,000
	Karabogazsulfate Association	Bekdash, Kara-Bogaz Lagoon	400,000
		(off the Caspian Sea)	
	Arikskoye deposit (mining ceased 1992)	Near Gaurdak	NA
	Shakhtaminskoye deposit	do.	NA
	IA Turkmenmineral	Gora deposit	340,000
	Gaurdak plant	Gaurdak deposit (mining ceased 1997)	500,000 <sup>e</sup>
	Darvaza, Segli-Kar, and Kara-Kum sulfur plants	Kara-kum deposit (mining ceased 1962)	NA
	Kugitangskoye deposit	75 kilometers from Gaurdak	NA
	bic meters do. do. do.	Major operating companies, main facilities, or deposits         Annauskoye, Babadurmazskoye, and Bakhardenskoye deposits         Gaurdak deposit         Khodzhaguymaskoye deposit         Kugitangskoye deposit         Uzun-Kudukskoye deposit         Kuulinskoye deposit         bic meters         Dushaksoye deposit         do.         Kala-I-Morskoye deposit         do.         Kubatayskoye deposit         do.         Kurayskoye deposit         do.         Kubatayskoye deposit         do.         Karabogazsulfate Association         Arikskoye deposit         IA Turkmenmineral         Gaurdak plant         Darvaza, Segli-Kar, and Kara-Kum sulfur plants         Kugitangskoye deposit	Major operating companies, main facilities, or deposits       Location or deposit names         Annauskoye, Babadurmazskoye, and Bakhardenskoye deposits       NA         Gaurdak deposit       8 kilometers from Gaurdak         Khodzhaguymaskoye deposit       4 kilometers west of Gaurdak         Kugitangskoye deposit       20 kilometers from Gaurdak         Uzun-Kudukskoye deposit       20 kilometers from Gaurdak         Kuulinskoye deposit       40 kilometers north of Turkmenbsahi         bic meters       Dushaksoye deposit       NA         do.       Kala-I-Morskoye deposit       NA         do.       Kuatayskoye deposit       NA         do.       Kustayskoye deposit       NA         do.       Kustayskoye deposit       NA         do.       Kustayskoye deposit       NA         do.       Ufrinskoye deposit       do.         IA Turkmenmineral       Gora deposit       do.

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

<sup>1</sup>Table includes data and information available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

COMMONWEALTH OF INDEPENDENT STATES-2006

### TABLE 21 UKRAINE: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Alumina	1,351,000	1,434,050	1,562,170	1,632,020 <sup>r</sup>	1,671,620
Aluminum:					
Primary	112,459	113,640	113,151	114,224	92,067
Secondary	130,000	130,000	130,000	130,000	130,000
Total	242,459	243,640	243,151	244,224	222,067
Cadmium, metal <sup>e</sup>	25	25	25	25	25
Gallium <sup>e</sup>	14	13	14	15	15
Germanium <sup>e</sup>	10	20	20	20	20
Iron and steel:					
Iron ore, marketable:					
Gross weight	58,900,000	62,497,600	65,550,000 <sup>r</sup>	68,569,600	74,000,000 <sup>e</sup>
Fe content	32,300,000	34,300,000 e	36,000,000 <sup>e</sup>	37,700,000	40,700,000 <sup>e</sup>
Metal:					
Pig iron	27,560,000	29,570,000	31,060,000	30,747,000	32,926,000
Ferroalloys:					
Blast furnace: <sup>e</sup>					
Ferromanganese	85,000	85,000	79,000	30,000	30,000
Spiegeleisen	5,000	5,000	5,000	5,000	5,000
Electric furnace:					
Ferromanganese	250,617	250,000 °	375,990	359,000 r	373,000
Ferronickel <sup>e</sup>	41,000		78,000	78,000	90,000
Ferrosilicon	250,617	250,000 <sup>e</sup>	248,060	228,000 <sup>r</sup>	168,000
Silicomanganese	732,592	740,000 <sup>e</sup>	1,060,000	1,046,000 <sup>r</sup>	1,168,000
Other <sup>e</sup>	25,000	25,000	25,000	25,000	25,000
Total	1,389,826	1,360,000 <sup>r, e</sup>	1,871,050	1,771,000 <sup>r</sup>	1,859,000
Steel:					
Crude	34,538,000	36,900,000 <sup>e</sup>	38,738,000	38,636,000	40,899,000
Finished, rolled	26,400,000	22,500,000 r	23,200,000 r	22,180,000	22,387,000
Pipe	1,522,700	2,054,000	2,034,000	2,293,000	2,759,000
Lead, refined, secondary <sup>e</sup>	12,000	7,000	7,000	6,000	6,000
Magnesium, primary <sup>e</sup>	3	3	3	2,000	2,200
Manganese ore, marketable:					
Gross weight	2,469,600	2,590,900	2,362,000	2,260,000	1,606,400
Mn content <sup>e</sup>	840,000	880,000	810,000	770,000	550,000
Mercury	NA				
Nickel: <sup>e</sup>					
Mine output, Ni content of laterite ore	2,000	2,000	2,000	6,000 <sup>r</sup>	12,000
Ni content of ferronickel	6,000		12,000	14,000	18,000
Silicon <sup>e</sup>	r	r	r	r	
Titanium:					
Ilmenite concentrate:					
Gross weight	512,400	420,500	370,000 <sup>e</sup>	375,000 <sup>r, e</sup>	470,000
$TiO_2$ content, $61\%^e$	313,000	257,000	226,000	229,000 <sup>r</sup>	287,000
Rutile concentrate. 95% TiO <sup>e</sup>	70,000	60,000	60,000	60,000	60,000
Metal, sponge <sup>e</sup>	6,200 <sup>e</sup>	6,934	7,497	8,397	9,997
Zirconium concentrates <sup>e</sup>	34,300	35,000	35,000	35,000	35,000
INDUSTRIAL MINERALS	,	,	,	,	*
Bromine <sup>e</sup> thousand kilograms	3,000	3,000	3,000	3,000	3,000
Cement	7,157,000	8,923,000	10,635,000	12,183,000	13,732,000
Clavs:					
Ball clay				118,000	294,000
Bentonite <sup>e</sup>	300,000	300,000	300,000	300,000	300,000
Kaolin	225,000	225,000 °	225,000 °	217,000 r	251,000
Diamond, synthetic <sup>e</sup> carats	8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Feldspar	NA	NA	NA	63.930	67.312
				<i>p</i> = -	

### TABLE 21—Continued UKRAINE: PRODUCTION OF MINERAL COMMODITIES<sup>1, 2</sup>

#### (Metric tons unless otherwise specified)

Commodity		2002	2003	2004	2005	2006
INDUSTRIAL MINERAL	S-Continued					
Graphite <sup>e</sup>		7,500	7,500	7,500	7,500	7,500
Gypsum		207,000	264,000	337,000 <sup>r</sup>	380,600 <sup>r</sup>	375,900
Nitrogen, N content of ammonia		3,700,000	3,900,000 °	3,900,000 °	4,300,000	4,200,000 °
Potash, K <sub>2</sub> O equivalent <sup>e</sup>		60,000	50,000 <sup>r</sup>	50,000	65,000	65,000
Salt		NA <sup>r</sup>	3,863,000 r	4,393,000 r	4,811,000 r	5,996,000
Soda ash <sup>e</sup>		679,000 <sup>r, 2</sup>	656,000 <sup>r, 2</sup>	650,000	700,000	700,000
Sulfur, native <sup>e</sup>		124,000	142,000	136,000	135,000	135,000
Sulfuric acid		935,000	1,113,000	1,425,000	606,000	1,493,000
MINERAL FUELS AND RELA	ATED MATERIALS					
Coal, raw:						
Anthracite	thousand metric tons	15,000	14,427	18,295	16,204 <sup>r</sup>	16,592
Bituminous	do.	66,400	63,866	62,100	58,000	59,000
Lignite	do.	1,000	950	3,000	355 <sup>r</sup>	232
Total	do.	82,400	79,243	83,395	74,559 <sup>r</sup>	75,824
Marketable	do.	62,000	59,800	59,400	60,400	61,600
Coke		18,596,000	19,300,000 <sup>r</sup>	18,858,000	21,999,000	19,200,000
Natural gas	cubic meters	18,400,000	18,600,000 <sup>r</sup>	20,400,000 r	20,788,000 r	21,067,000
Peat, horticultural use and fuel use <sup>e</sup>		600,000 <sup>r</sup>	600,000 <sup>r</sup>	500,000 <sup>r</sup>	600,000 <sup>r</sup>	600,000
Petroleum:						
Crude and gas condensate:						
As reported	gravimetric tons	3,720,000	3,975,000	4,179,000	4,414,000 <sup>r</sup>	4,398,000
Converted <sup>e</sup>	42-gallon barrels	27,304,800	29,200,000	30,700,000	32,400,000 <sup>r</sup>	32,300,000
Refinery products		20,200,000	21,900,000	22,000,000 r	18,400,000 <sup>r</sup>	NA
Uranium:						
U content <sup>e</sup>		800	800	800	800	800
$U_3O_8$ content		943	943	943	943	943

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

# TABLE 22 UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{1,\,2}$

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Alumina	Nikolayev refinery (RUSAL)	Mykolayivs'ka Oblast'	1,500,000
Do.	Zaporozhye (Dneprovsk) refinery	Zaporiz'ka Oblast'	245,000
Aluminum, primary	Zaporozhye (Dneprovsk) smelter (ZALK)	do.	120,000
Coal:			
Hard thousand metric tons	Donets coal basin with about 225 mines	Dnipropetrovs'ka, Donets'ka,	130,000 <sup>3</sup>
	produces more than 90% of Ukraine's coal	and Luhans'ka Oblasts'	
Do.	Lviv-Volynskiy Basin produces remainder from 18 mines	Western Ukraine	6,000,000 <sup>3</sup>
Brown	Dnipr (Dneprovskoye) Basin	Central Ukraine	7,000,000
Ferroalloys:			
Ferrochrome	Zaporozhye plant	Zaporiz'ka Oblast'	NA
Ferromanganese	do.	do.	NA
Do.	Nikopol' ferroalloys plant	Nikopol'	250,000
Ferromanganese, blast furnace	Kostvantvnivka metallurgical plant	Donets Basin	NA
Do.	Kramatorsk metallurgical plant (production ceased in 1999)	NA	NA
Ferrosilicon	Nikopol' ferroallovs plant	Nikopol'	200.000
Do	Stakhanov plant	Luhans'ka Oblast'	NA
Silicomanganese	do	do	1.200.000
Do	Zaporozhve plant	Zaporiz'ka Oblast'	160,000
	Nikonol' ferroallovs plant	Nikopol'	NA
Graphite	Zavalvevskiv graphite complex	Zavalvevskiv denosit	40,000
Iron ore:	Zavaryevskiy graphice complex		40,000
Underground mining	Krivbassruda production association with 16	Kryvyy Rih Basin	15,000,000 <sup>3</sup>
Do.	Eksplutatsionnaya Mine of the Zaporozhye	do.	3,500,000
Open pit mining	Inguletskiy (Inhulets), Kamysh-Burunskiy, Kryvyy Rih, Poltavskiy, Severnyy (Pivnichny), Sukhaya Balka, Tsentralnyy, Yuzhniy (Pivdenny) and Zaporizhia mining-beneficiation complexes	do.	90,000,000 <sup>3</sup>
Kaolin	Prosvanovskove mining-beneficiation complex	Dnipropetrovs'ka Oblast'	NA
Lead, secondary	Ukrtsink plant	Kostvantvnivka	70.000
Magnesium	Zaporozhve plant	Zaporiz'ka Oblast'	10,000
Do	Magnii concern	Kalush	18,000
Manganese:			10,000
Ore, marketable	Marganets and Ordzhonikidze mining-beneficiation complexes	Nikopol' basin	6,000,000 <sup>3</sup>
	Tavricheskiy complex (under development)	Bol'shoy Tokmak basin	
Metal	Zaporozhye plant	Zaporiz'ka Oblast'	40,000
Sinter	Nikopol' ferroalloys plant	Nikopol	3,000,000
Mercury	Nikitovskiy mining-metallurgical complex	Donets'ka Oblast'	120
Nickel, Ni content in FeNi	Pobuzhskiy mining-beneficiation complex,	Pobugskoye Basin	7,000 <sup>3</sup>
Potash, K <sub>2</sub> O equivalent	Khlorvinil production association, Stebnik potash	Pricarpathian Region	300,000
Steel emide	plant		
	Industrial Union of Dank-s (UUD):		
D0.	Alahaya'li ataal mill	A lob ava'lr	4 500 000
			4,500,000
<u>D0.</u>	Azovstal steel mill		4,000,000
<u>D0.</u>			1,300,000
<u>D0.</u>	Unepropetrovsk pipe plant	Dnepropetrovsk Oblast	NA
<u>D0.</u>	Knartsyzsk pipe plant	Donets ka Oblast	NA
D0.	Danko: Yenakiyeyeskiy steel mill	NA	1.200.000

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Steel, crude—Continued	Donets'k acquisitions and (co-)owners-Continued:		
Do.	Privat Bank:	_	
	Dnepropetrovsk pipe plant	Dnepropetrovsk Oblast'	1,230,000
Do.	Zaporozhye rolling mill	Zaporiz'ka Oblast'	2,300,000
Do.	Dneprovskiy steel mill	Dniprodzerzhyns'k	3,850,000
Do.	do.	Dnipropetrovs'ka Oblast'	1,900,000
Do.	Kostyantynivka steel mill	Donets Basin	NA
Do.	Dneprospetstal	Zaporiz'ka Oblast'	1,400,000
Do.	Il'yich plant	Mariupol'	7,300,000
Do.	ISTIL mini-mill	Donetsk	1,000
Do.	Kirov plant	Makeyevka	4,000,000
Do.	Kryvy Rih plant	Kryvyy Rih	10,650,000
	Interpipe group:		
Do.	Nizhnedneprovsk pipe plant	NA	NA
Do.	Nikopol' pipe plant	NA	NA
Sulfur	Sera production association	Rozdol mining complex mines:	1,500,000 <sup>3</sup>
		Rozdol, Soroks, and	
		Zdhidalchev deposits	
		Yarvorov complex mines:	
		Nemirov-Yazov deposits in	
		Livivs'ka and Kyyivs'ka	
		Oblasts'	
Titanium:	Facilities:		600,000 <sup>3</sup>
Ilmenite concentrate	Irshansk mining-beneficiation complex	Irsha Valley	
	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	
	Verkhnedneprovsk mining-metallurgical complex	Verkhnedneprovsk Region	
Rutile	do.	do.	60,000
Do.	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	NA
Sponge	Zaporozhye titanium-magnesium plant	Zaporiz'ka Oblast'	20,000
Uranium	Vostochnyy mining and beneficiation complex	Zheltye Vody	NA
Zinc, secondary	Ukrtsink plant	Kostyantynivka	25,000
Zirconium:			
Ore, zircon	Verkhnedneprovsk mining-metallurgical complex	Verkhnedneprovsk Region	100,000
Do.	Vol'nogorsk state mining-metallurgical complex	Dnipropetrovs'k Region	NA
Metal and compounds	Pridneprovsk chemical plant	Dnipropetrovs'ka Oblast'	NA
Do.	Kharkiv physical-technical institute	Kharkivs'ka Oblast'	NA

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

<sup>1</sup>Table includes data and information available through November 2007.

<sup>2</sup>Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.

### TABLE 23 UZBEKISTAN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

#### (Metric tons unless otherwise specified)

Commodity	2002	2003	2004	2005	2006
METALS					
Aluminum, secondary <sup>e</sup>	3,000	3,000	3,000	3,000	3,000
Copper: <sup>e</sup>					
Mine output, Cu content	80,000	80,000	110,000 <sup>r</sup>	110,000 <sup>r</sup>	115,000
Metal:					
Blister, refinery, primary	75,000	75,000	93,770 <sup>r, 2</sup>	103,870 <sup>r, 2</sup>	110,000
Smelter, primary	75,000	75,000	94,000 r	105,000 <sup>r</sup>	110,000
Gold <sup>e</sup> kilograms	90,000 <sup>2</sup>	90,000	93,000	90,000	85,000
Molybdenum, mine output, Mo content <sup>e</sup>	500	500	500	575 <sup>r</sup>	600
Rhenium <sup>e</sup> kilograms	NA	NA	NA	NA	NA
Silver, mine output <sup>e</sup> do.	80,000	80,000	80,000	83,000	83,000
Steel:					
Crude	450,000 e	472,000 e	602,166 <sup>r</sup>	607,253	730,000 <sup>e</sup>
Rolled	420,000 e	446,521	562,200	562,000	675,000
Zinc, metal, smelter, primary <sup>e</sup>	80,000 <sup>r</sup>	60,000 <sup>r</sup>	60,000 <sup>r</sup>	35,030 <sup>r, 2</sup>	35,000
INDUSTRIAL MINERALS					
Cement	4,062,200	4,804,800	5,067,800	5,068,000	5,000,000 <sup>e</sup>
Clays, kaolin <sup>e</sup>	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000
Feldspar <sup>e</sup>	4,300	4,300	4,300	4,300	4,300
Graphite <sup>e</sup>	60	60	60	60	60
Iodine <sup>e</sup> kilograms	2,000	2,000	2,000	2,000	2,000
Nitrogen, N content of ammonia	740,000	815,000 °	875,300	850,000 <sup>e</sup>	870,000 <sup>e</sup>
Phosphate rock: <sup>e</sup>					
Gross weight	425,000	430,000	430,000	430,000	600,000
P <sub>2</sub> O <sub>5</sub> content	101,000	102,000	102,000	102,000	140,000
Sulfur:					
Byproduct: <sup>e</sup>					
Metallurgy	170,000	170,000	170,000	170,000	170,000
Natural gas and petroleum	350,000	350,000	350,000	350,000	350,000
Total	520,000	520,000	520,000	520,000	520,000
Sulfuric acid	841,800	802,400	834,300	740,500	600,000
MINERAL FUELS AND RELATED MATERIALS					
Coal	2,735,000	1,909,000	2,700,000	3,000,000 <sup>r</sup>	3,121,000
Natural gas million cubic meters	57,670	57,481	59,864	59,686	58,000
Petroleum and gas condensate	7,198,000	7,134,000	6,580,000	5,490,000 <sup>r</sup>	5,410,000
Petroleum refinery products	5,500,000	5,807,000	7,749,000 <sup>r</sup>	4,600,000 <sup>r</sup>	4,600,000
Uranium:					
U content	1,860	1,598 <sup>r</sup>	2,016	2,300	2,260
U <sub>3</sub> O <sub>8</sub> content	2,193	1,885 <sup>r</sup>	2,377	2,712	2,665

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

<sup>1</sup>Table includes data available through November 2007.

<sup>2</sup>Reported figure.

# TABLE 24 UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY IN $2006^{\rm l,\,2}$

#### (Metric tons unless otherwise specified)

		Major operating companies, main facilities,		Annual
Commodity		or deposits	Location or deposit names	capacity <sup>e</sup>
Bismuth		Ustarassay deposit (depleted)	Chotqol and Kuraminskiy Khrebet	NA
Cesium, lithium, rubidium		Shava-Sav deposit	NA	NA
Clavs:				
Bentonite		Arab-Dasht and Khaudag deposits	NA	NA
Kaolin		Angren deposit	Angren Region	8,000,000
Coal		Central Asian Coal Association (mining):		
		Angren brown coal deposit	do.	6,000,000
Do.		Baysunskoye and Shargunskoye deposits	Surkhandarya Region	1,000,000 3
Copper:		· · · · ·	· · ·	
Mine output, Cu content		Almalyk mining-metallurgical complex	Dalneye, Kalmakkyrgan, and Sary- Cheku deposits	100,000 <sup>3</sup>
Metal		Almalyk refinery	Olmaliq	130,000
Diamond		Karashok and Kok-Say deposits	Nawoiy District	NA
Feldspar		Karichasayskoye and other deposits	Deposits in Samarqand and Tashkent Wiloyati Regions; Karakalpakstan (Kara-Kalpakskaya ASSR)	120,000 <sup>3</sup>
Fertilizers		Ammophos production association	Olmaliq	NA
Do.		Azot production association	Farghona	NA
Do.		Elektrokhimprom production association	Chirchiq	NA
Do.		Kokand superphosphate plant	Qo'qon	NA
Do.		Naviazot production association	Nawoiy Wiloyati	NA
Do.		Samarkand chemicals plant	Samarqand	NA
Fluorspar		Agata-Chibargata, Aurakhmat, Kengutan, Kyzylbaur, Naugarzan, and Nugisken deposits	East of Tashkent Wiloyati	150,000
Do.		Syrpatash deposit	Namanganskaya Oblast'	NA
Gold	kilograms	Adzhi-Bugutty, Amantaytau, Balpantau, Bulutkan, Donguz-Tau, Muruntau, and Taurbay deposits	Central Kyzylkum Region	85,000 <sup>3</sup>
Do.		Navoi Integrated Mining and Metals complex	Muruntau deposit	65
Do.		Kochbulak and Kyzyl-Al'ma-Say deposits	Tashkentskaya Oblast'	NA
Do.		Almalyk mining and metallurgical complex	Dalneye, Kalmakkyrgan, and Sary-Cheku deposits	NA
Graphite		Tadzhi-Kazgan deposit	Navoiyskaya Oblast'	NA
Iron ore		Syurenata deposit	Tashkentskaya Oblast'	NA
Lead, mine output, Pb content		Almalyk mining-metallurgical complex;	Uchkulach deposit in Tashkent	40,000 <sup>3</sup>
		Altyn-Topkan and Uchkulach deposits	Wiloyati; Altyn-Topkan deposit in Kurama mountain range in Tajikistan (in March 1999, Altyn-Topkan transferred to control of Tajikistan)	
Manganese		Dautashskoye deposit	Kashkadar'inskaya Oblast'	40,000
Molybdenum:				
Mine output, Mo content		Almalyk mining-metallurgical complex; Kalmakyr and Sarycheku deposits	Tashkent Wiloyati	900 <sup>3</sup>
Metal		Uzbek refinery and hard metals plant	Chirchiq	NA
Natural gas	million cubic meters	Gazli, Kandym, Khauzak, Kokdumalak, Pamuk, and Shurtan-Say deposits (major)	Amu-Dar'ya Basin; Mubarek area	70,000 <sup>3</sup>
Do.		Itera/Lukoil (Russia), Uzbekneftegaz JSC	Kan-Dam field	NA
Natural gas condensate		Trinity Energy (United Kingdom)	Ustyurt Plato Region	NA
Natural gas liquids	million cubic meters	Mubarek gas processing plant	Muborak	28,000
Do.		Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya Region	137,000

#### (Metric tons unless otherwise specified)

	Major operating companies, main facilities,		Annual
Commodity	or deposits	Location or deposit names	capacity <sup>e</sup>
Petroleum:			
Crude	Kokdumalak and Mingbulak deposits (major)	NA	9,000,000 <sup>3</sup>
Refinery products	Fergana oil refinery	Farghona Region	8,800,000
Do.	Bukhara oil refinery	Bukhoro	2,500,000
Phosphate	Kyzyl Kum complex	Dzheroy-Sardarin Moroccan type;	NA
		Karaktay, Severnyy and Dzhetymtau	
		deposits	
Polyethylene	Shurtan gas-chemical complex	Shurtan-Say deposit, Kashkad'ya	125,000
		Region	
Potash	Tyubegatan deposit	Southern Uzbekistan	NA
Silver	Kosmanachi, Okzhetpes, and Vysokovoltnoye deposits	Namanganskaya Oblast'	NA
Steel, crude	Bekabad steel mill	Bekabad	1,100,000
Sulfur	Mubarek gas processing plant complex	Muborak	2,000,000
Tungsten:	Deposits:	Locations:	1,200 <sup>3</sup>
Mine output, W content	Koytash deposit	Northeastern Uzbekistan	
	Ingichka and Lyangar deposits	Zirabulak Mountains	
	Ugat deposit	Northern Uzbekistan	
Mine output, WO <sub>3</sub> content (0.49%)	Sautbay wolframite deposit	Kyzylkum Region	NA
Metal	Uzbek refractory and hard metals plant	Chirchiq	NA
Uranium, U content	Navoi mining-metallurgical complex	Central Kyzylkum Region	3,000
Vermiculite cubic meters	Tebin-Bulak deposit	NA	25,000
Zinc:			
Mine output, Zn content	Almalyk mining-metallurgical complex	Khandiza and Uchkulach deposits	NA
Metal	do.	do.	80,000

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

<sup>1</sup>Table includes data and information available through November 2007.

 $^{2}$ Many location names have changed since the breakup of the Soviet Union. Many enterprises, however, are still named or commonly referred to based on the former location name, which accounts for discrepancies in the names of enterprises and that of locations.

<sup>3</sup>Capacity estimates are totals for all enterprises that produce that commodity.