



2006 Minerals Yearbook

NORTHERN BALKANS

THE MINERAL INDUSTRIES OF THE NORTHERN BALKANS

BULGARIA AND ROMANIA

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Bulgaria and Romania form the northeastern part of the Balkan Peninsula, which borders the Black Sea to the east, Ukraine and Moldova to the north, Greece and Turkey to the south and southeast, Macedonia, Serbia, and Montenegro to the west, and Hungary to the northwest. The Danube River forms a natural boundary between Bulgaria in the south and Romania in the north. Bulgaria is encompassed within the Mediterranean Alpine folded zone, which comprises the Carpatho-Balkan branch to the north and the Dinaric-Hellenic branch to the south (Bogdanov, 1982, p. 215). The Carpatho-Balkan branch also constitutes the primary folded zone in Romania, which incorporates the eastern and southern Carpathian Mountains, and the Apuseni Mountains within the Carpathian Arc to the west of the Transylvanian Plateau (Ianovici and Borcos, 1982, p. 55-57).

Mining and metalworking in this region has a long history that was well-documented by Roman times when Bulgaria and Romania, which were known as Thrace and Dacia, respectively, were important sources of base and precious metals. Gold and nonferrous metals mined in this region have remained attractive investment opportunities to foreign investors.

BULGARIA

Bulgaria's mineral industry included the mine output of ferrous and nonferrous metals, mineral fuels (mainly coal), and such industrial minerals as clays, gypsum, and rock salt. Additionally, the metallurgical sector smelted and refined copper, gold, iron and steel, lead, silver, and zinc. Cement, dimension stone, and other construction materials also were produced. On a world scale, however, Bulgaria's mineral industry was small and mainly of regional importance. Many of the country's mineral requirements were met through domestic production. Bulgaria, however, remained dependent on imports of copper ores, iron ore, lead and zinc ores, steel, and mineral fuels.

Minerals in the National Economy

In 2006, Bulgaria's gross domestic product (GDP) grew by about 6.1% compared with that of 2005. Industrial production, which accounted for about 26% of the GDP, grew by about 6%. In 2006, the overall output value of the mining sector increased by 1.8% compared with that of 2005. The mining industry's branches reported a 2.9% growth in the output value of coal and peat mining, a 2.7% decrease in the output value of metal ores, and an 11% increase in the output value of industrial mineral mining and quarrying (National Statistical Institute, 2007). Exploration for gold at Krumovgrad in the Kurdjali area and several other locations was among the leading activities in the mineral industry of Bulgaria in 2006.

¹Deceased.

Government Policies and Programs

The Law on Transformation and Privatization of State and Municipal-Owned Enterprises was adopted by Parliament in 1992, and the Underground Resources Act was adopted in 1998; these laws were adopted to promote private enterprise and foreign investment. The principle of equal treatment of foreign and domestic investors was promulgated in law in the Constitution and in the Law on Encouragement of Investments (Krastanova, 2005).

Despite explicitly stipulating state ownership of underground minerals, the Underground Resources Act provides for the submission and approval procedures for permits and claims by domestic and foreign companies to develop and operate mineral deposits for up to 35 years with additional 15-year extensions. Exploration rights to private companies could be granted for up to 3 years (Kousseff, 1999). In addition, the National Program for Sustainable Development of Mining in Bulgaria was drafted and approved in 1998. The Government continued to work to improve the country's environmental condition and began enforcement of environmental regulations that would meet the European Union's (EU) standards at all new mineral industry projects. In 2006, Bulgaria's Chamber of Mining and Geology (BCMG) indicated that the country's mining and mineral processing sector would need about 1.2 billion euros (€) (\$1.6 billion)² to meet the EU's ecological standards. To meet this objective, BCMG requested funds from the EU to restore areas environmentally polluted by the mineral sector (Sofia Echo, The, 2006e).

Production

In 2006, production of metals showed divergent trends. Among the base metals, production of copper concentrate and refined metal increased by 7% and 8%, respectively. Production of lead concentrate and refined metal decreased by 18% and 10%, respectively, and production of zinc concentrate and refined metal declined by 23% and 7%, respectively. Production of pig iron and steel were at about the same level as in 2005; however, the production of manganese declined to almost one-half that in 2005. Production of bentonite and kaolin increased by almost 20% each. The production of silica (quartz sand) fell to only 43% of 2005 production. Among construction materials, cement production decreased by 5%; however, sand and gravel production increased by 18%. Production of mineral fuels was at about the same level as in 2005.

²Where necessary, values have been converted from European euros (€) to U.S. dollars (\$) at an average rate of €0.758= \$1.00.

Structure of the Mineral Industry

Table 2 presents information about the significant mineral processing sites in Bulgaria.

Commodity Review

Metals

Bulgaria's mine output included copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, silver, molybdenum, and other metals have been produced, chiefly from the processing of copper and lead and zinc ores and concentrates. Bulgaria's production of primary aluminum metal (ingot) was based entirely on aluminum scrap.

Aluminum.—Bulgaria produced a small amount of secondary metal. Most aluminum required by the country's semimanufactures-producing sector came from imports. In 2006, Bulgaria's consumption of refined aluminum amounted to more than 25,000 metric tons (t), which was an increase of about 1.2% compared with that of 2005. In 2006, Alcomet AD, which was Bulgaria's producer of aluminum semimanufactures, reported several investment projects that were in progress. These included the modernization of the casting and extrusion shops (three new furnaces and five continuous casting lines), and the modernization of a 2,000-t extrusion press. The total value of investments in 2006 amounted to €5.3 million (\$7 million), which was an increase of about 47% compared with that of 2005. Alcomet's total rolling capacity in 2006 amounted to slightly more than 40,000 metric tons per year (t/yr) (Alcomet plc, 2007). Other developments involved Alcoa Inc.'s operational startup of an aluminum foil plant in Stara Zagora, which was given an investment value of about \$30 million (Reuters, 2006; Sofia Echo, The, 2006a).

Copper.—Bulgaria's major copper deposits were developed and exploited in the Srednogorie-Panagjurishte region of the country. Three major mines were in operation—the Asarel-Medet JSC and the Elatsite AD surface mines, and the Chelopech underground mine. Asarel-Medet and Elatsite, which were the principal producers of copper ore in Bulgaria, had a combined production capacity of 350,000 t/yr of copper concentrate. Asarel-Medet Mine holds more than 510 million metric tons (Mt) of ore that hosts about 2.3 Mt of copper, and Elatsite Mine holds 320 Mt of ore that hosts 1.1 Mt of copper (Euromax Resources Ltd., 2004).

The Cumerio Med (Cumerio) copper smelting and refining complex at the Pirdop complex was the principal producer of copper in Bulgaria. In 2006, Cumerio began the construction of a new copper refinery that was to have a design capacity of about 180,000 t/yr, which would triple the complex's existing refining capacity. The cost of the new refinery was estimated to be €70 million (\$92 million). Cumerio planned to start the modernization of the Pirdop smelter in 2007, which would increase the smelter's output by about 15%; the cost of the project was estimated to be about €12 million (\$16 million) (Cumerio Med, 2007a, p. 5; 2007b, p. 5).

The Chelopech mining operation, which is located about 70 kilometers (km) east of Sofia, worked a polymetallic

deposit that contained mainly copper and associated precious metals (gold and silver). Chelopech Mine was considered to be primarily a gold producer owing to the much higher value of gold produced. The copper content of the ore averaged about 1.5%. Measured and indicated resources were reported to be about 23.9 Mt of ore at a grade of 4 grams per metric ton (g/t) gold, 10 g/t silver, and 1.5% copper (about 374,000 t). Dundee Precious Metals Inc. (Dundee) of Canada, which acquired mining and exploration rights at Chelopech in 2003, continued an active exploration program for copper and gold at Chelopech and several other areas (Dundee Precious Metals Inc., 2004a, b).

Dundee's copper production at Chelopech amounted to 11,168 t in 2006. Facility expansion at the mine to raise ore output to 2 million metric tons per year (Mt/yr) was 62% completed by yearend (Dundee Precious Metals Inc., 2007b).

Gold.—In 2006, gold production amounted to about 3.8 t, which was about a 1.3% decrease compared with that of 2005. Dundee continued exploration for gold in the Krumovgrad region near Kurdjali. The prospecting concession covered 117 square kilometers (km²) and encompassed (in an east-west arc) the Sumak, the Skalak, the Kuklitsa, the Ada Tepe, and the Kupel deposits. Work at Krumovgrad in 2006 was put in abeyance pending the resolution of environmental issues (Dundee Precious Metals Inc., 2006; 2007a, p. 7).

Cambridge Mineral Resources plc of the United Kingdom continued to explore for gold at sites that define an arc along the southeastern border with Greece and Turkey in Bulgaria, which include the Dobroselets, the Gornoseltsi, the Polski Gradets, and the Rozino exploration licenses and permit areas. In 2006, Cambridge also conducted exploration for gold at Tashlaka Hill in southeastern Bulgaria. Drill results showed gold ranging from 3.2 to 29.3 g/t (Cambridge Mineral Resources plc, 2007, p. 12).

In 2006, Euromax Resource Ltd. of Canada continued to explore for gold and silver in the Rhodope Mountains. Exploration was conducted under the Popintsi, the Rakitovo, and the Trun licenses. Analysis of trenching at Popintsi showed gold values ranging from 0.8 to 4 g/t. High-grade gold mineralization was revealed at Trun where gold values ranged from 22.2 to 106 g/t (Euromax Resources Ltd., 2006a, b).

Iron and Steel.—The estimated production of pig iron and crude steel, which was based on imported raw materials, varied only slightly from the output level of 2005 (table 1). Sidenor S.A. of Greece, which was the majority stock share owner of Stomana AD (80%), continued to implement the facility expansion at Stomana, which would include a rolling mill for light long-carbon-steel products and such new equipment as automation and control equipment; a billet welder; bundling, finishing, and stacking facilities; and a preheating furnace. The aim of the upgrading program was to raise the plant's long-product's rolling capacity to 600,000 t/yr. In 2006, the International Finance Corporation (IFC), which was affiliated with the World Bank, invested \$21.4 million as part of a financial package to assist in completing the \$73 million program; this amount was in addition to an earlier IFC outlay of about \$22 million (International Finance Corporation, 2006; Stomana S.A., 2006).

In 2006, Global Steel Holdings Ltd. (GSHL) of India, which held 71% equity in the Kremikovtzi Corp., announced plans

to invest \$71 million towards the reduction of pollution by the plant by 2011 (Sofia Echo, The, 2006d).

Lead and Zinc.—The lead and zinc industry in Bulgaria was based on mining and processing operations near Plovdiv in the Ossogovo Mountains of western Bulgaria, near the Thundza River in southeastern Bulgaria, and in the Madan area near the Greek border. Lead and zinc smelting and refining operations were based in Kurdjali in the Madan area and in Plovdiv. The underground lead and zinc mining complex at Gorubso continued to be the country's major producer of lead and zinc ore (table 2).

In 2006, total mine production of lead in concentrate declined by almost 18% compared with that of 2005. The production of zinc in concentrate declined by almost 23% compared with that of 2005 (table 1). Primary and secondary lead production amounted to about 84,300 t, which was almost a 10% decrease compared with that of 2005. Lead & Zinc Complex PLC Kurdzhali (OTZK) anticipated significant production increases as a result of equipment modernization and the acquisition of several mines in the Kurdzhali area. OTZK indicated that lead production would increase by 122% to 30,000 t, and that zinc output would increase by about 6% to 27,500 t (Metals Insider, 2006, p. 17).

Manganese.—The Obroschishte manganese mine remained Bulgaria's sole producer of mainly carbonate-type (rhodocrosite) manganese ore, which was hosted in Oligocene-age volcanic sedimentary rocks (aleurolite, clay, glauconitic sandstone, marl, and tuff). Apart from the mining operations that were engaged at the Obroschishte deposit, OreVest plc of the United Kingdom undertook exploration of a 10.4-km² section of the deposit, which is located about 3 km southeast of the Obroschishte Mine, with the aim of developing a new mine (OreVest plc, 2006).

Industrial Minerals

Bulgaria produced a broad range of industrial minerals suitable for chemical and construction industry uses. These included barite, calcareous rock, cement, clays, lime, salt, and silica. Bentonit AD and Kaolin AD were the major producers of industrial minerals in Bulgaria. Kaolin AD operated quarries and processing facilities at Kaolinovo and Vetovo (kaolin), Shoumen and Varna (quartz-feldspathic sands), and Konarata and Ustrem (potassium and sodium feldspars). Final output included kaolin, glass sand, and dry and wet silica sands.

Bentonit AD was a major Bulgarian producer of bentonite, perlite, and zeolite. With bentonite, zeolite, and perlite resources amounting to about 7.3 Mt, 2.8 Mt, and 0.8 Mt, respectively, Bentonit AD's corresponding processing capacities were reported to be 200,000 t/yr, 50,000 t/yr, and 150,000 cubic meters per year.

Mineral Fuels and Other Sources of Energy

In 2006, Bulgaria reported a 1.8% increase in total coal output compared with that of 2005. Coal mining, which supplied about 45% of the fuel needed to generate electric power, was the predominant fossil fuel-producing sector in Bulgaria. The country's production of natural gas declined by about 3%

compared with that of 2005 (table 1). Petroleum production, which was small, ranged between 25,000 and 33,000 t in the 2002 to 2006 period. During the year, discussions continued among various international participants concerning the construction of several oil pipeline projects that would alleviate daily oil tanker congestion in the Bosphorus and increase deliveries of oil and gas to the EU (Alexander's Gas & Oil Connections, 2006b; Sofia Echo, The, 2006c).

At yearend 2006, Bulgaria's nuclear power sector reported the start of construction of the country's second (after the Kozloduy powerplant) nuclear-powered electric powerplant at Belene. The plant's construction was projected to take 6 ½ years; French, German, and Russian companies would combine efforts to build two 1,000-megawatt reactors (Alexander's Gas & Oil Connections, 2006a; Sofia Echo, The, 2006b).

Outlook

Bulgaria's application to join the EU carries a broad range of requirements, which include modernization of industrial plant and infrastructure. To meet these requirements, Bulgaria is expected to continue to develop its industrial minerals sector, especially quarries and processing facilities for the production of construction materials. Exploration for precious metals also is expected to increase.

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ROMANIA

Romania's production of metals (aluminum, copper, lead and zinc, manganese, and steel and ferroalloys), industrial minerals, and mineral fuels was mainly of regional importance.

Minerals in the National Economy

In 2006, Romania's real gross domestic product (GDP) increased by 7.7% compared with that of 2005. Industrial production increased by about 5.7% and accounted for about 24% of the GDP (National Institute of Statistics, 2007, p. 1; U.S. Central Intelligence Agency, 2007, p. 472). The Government of Romania continued to develop policies that were aimed at reforming the industrial sector both to increase its competitiveness in preparation for privatization and entry into the European Union (EU) and to abate pollution from mine-based point sources.

Government Policies and Programs

Certain policies that were promulgated in 2004 remained in effect in 2006; these included giving greater impetus to the reformation of Romania's mining industry. A published plan to streamline the mining sector called for the closures of mines that produced fuel and nonfuel minerals. Romania's requirements for accession to the EU stimulated the Government to develop these plans in an effort to reduce and (or) eliminate mining sector subsidies, which in 2004 amounted to about \$150 million. In April 2005, the Government adopted the 2004-2010 Mining Sector Strategy (MSS), which planned to eliminate all subsidies to metal and industrial mineral mining operations by 2007; subsidies to coal mining enterprises were to be eliminated by 2010 (World Bank, The, 2004, p. 1).

The MSS set short-, medium-, and long-term phases to implement the reforms. In the short term (yearend 2004), regulations were developed to convert the mining industry to a full market-based system from remaining aspects of central economic planning; these regulations stipulated transparency and accountability on all parts of the mining sector. In the medium-term phase (2005-06), the Government was to restructure the parts of the mining sector that were scheduled for closure and allocate their financial resources and assets to more-profitable mining enterprises that were to be privatized. The medium-term phase also was to include the organization of oversight agencies to supervise mine site reclamation and environmental rehabilitation. The long-term phase (2006-10) would implement the full elimination of state subsidies to the mining industry and the closure of up to 31 uneconomic mining operations (World Bank, The, 2004, p. 26). Additional environmental issues included a remediation project at the Vermesti Mine, which had produced brown coal until its closure in 1997. The project was funded by a \$45 million loan (issued on August 31, 1999) from the International Bank for Reconstruction and Development. These issues included claims that the reclamation project at Vermesti did not adequately assess environmental degradation in the lands surrounding the mine and increased the possibility of flooding in the region (International Bank for Reconstruction and Development, 2006).

The metal mining and processing operations identified for closure by the MSS included the following enterprises: the Balan Central Mine (underground copper ore extraction), Harghita County; the Borsa Beneficiation Plant (treatment of copper, gold, and silver ore), Maramures County; the Burloia Central Gura Baii Superior (underground copper, lead, and zinc ore extraction), Maramures County; the Buturuosa Baia de Aries Mine (underground copper, gold, and silver ore extraction), Alba County; the Fagu Cetatii Mine (underground copper ore extraction), Harghita County; the Poiana Orizont 110 Mine (underground copper ore extraction), Harghita County; and the Santimbru Mine (open pit extraction of mercury ore), Harghita County.

Among industrial mineral mining enterprises, the MSS designated the Calamani Negoiu Mine in Suceava County for closure; the mine extracted sulfur by open pit and underground method. The closure of bituminous coal mining and processing facilities in Hunedoara County included the Aninoasa Mine (underground), the Balomir Mine (open pit), the Isroni-Livenzi Sud Mine (underground), the Uricani 5 Est Mine (underground), and the Valea de Brazi Mine (underground). Beneficiation plants for bituminous coal in Hunedoara County that were designated for closure included the Lupeni, the Petrila, and the Uricana plants. Lignite mines slated for closure included the Bodos Mine (open pit), Covasna County; the Budoii Mine and Briqueting Plant (underground), Bihor County; and the Racos Put Mine and Briqueting Plant (underground), Covasna County (World Bank, The, 2004, p. 36-47).

Production

Compared with 2005, major production gains in the metals sector in 2006 included those for primary aluminum (6%),

primary refined copper (4%), and crude steel (12%). Analogously, production declines centered mainly on pig iron (3.2%), primary refined lead (14.6%), and primary and secondary smelted zinc (23%).

Structure of the Mineral Industry

Table 4 lists information on important Romanian mineral facilities.

Commodity Review

Metals

Aluminum.—In 2006, total aluminum production increased by almost 6% compared with that of 2005. At yearend 2005, Romania's primary aluminum producer, SC Alro S.A. (Alro), announced the acquisition of a majority stake in Alum S.A. Alro indicated that investment for modernizing Alum would continue (International Bank for Reconstruction and Development, 2006). The integration of the two companies proceeded in 2006 and included investments by Alro in alumina loading and storing equipment and pollution control technologies at the Alum alumina operation (Marco Group, 2006).

Copper.—Copper was mined in the northeastern part of the country (mainly at the Baia Sprie, the Cavnic, and the Lesul Ursului Mines), and in the southwestern part of the country (the major mines were the Moldova Noua, the Rosia Poieni, and the Rosia Montana Mines). Generally, such major producing mines as Moldova Noua and Rosia Poieni were hoisting ore that graded about 0.35% copper or less. Concentrates from these areas were smelted and refined at Baia Mare and Zlatna. At Baia Mare, SC Allied Deals Phoenix SA operated an Outokumpu flash smelter, an electrolytic copper refinery, and a continuous caster. At Zlatna, SC Ampelum SA processed copper concentrates and operated a smelter and an electrolytic refinery (Moreno, 2000, p. 57).

In 2006, Romania's output of copper in concentrate declined by about 18% compared with that of 2005. The production of primary refined copper increased by about 4% (table 3).

Gold.—European Goldfields Ltd. continued exploration and evaluation work at Certej. In 2006, European Goldfields published a new reserve estimate. Probable gold reserves at Certej were estimated to be 27.7 million metric tons (Mt) at average grades of 2.0 grams per metric ton (g/t) gold and 11.6 g/t silver. The reserve estimation was based on a gold price of \$425 per troy ounce and a silver price of \$7 per troy ounce. Also, studies at Certej indicated an open pit mining method (with a strip ratio of 2.6:1) that would process about 3 million metric tons per year (Mt/yr) of ore to yield 249,000 metric tons per year (t/yr) of concentrate. The annual concentrate output, with an average grade of 21 g/t gold and 125 g/t silver (at 88% recovery) would contain about 170,000 troy ounces of gold. The capital cost of Certej's development was estimated to be about \$69 million (European Goldfields Ltd., 2006; Mining Journal, 2006).

Preparatory work by Gabriel Resources Ltd. of Canada for modernizing mining operations at the Rosia Montana gold

deposit continued in 2006. Final environmental permitting documentation and detailed engineering plans for the new mine were submitted to the Government during the first half of 2006 (Gabriel Resources Ltd., 2006a; Reuters, 2006). According to Gabriel spokespersons, gold production could start in late 2008 or early 2009; at full capacity, the mine could produce up to 15,600 kilograms per year (kg/yr) of gold. Rosia Montana quartz-vein ore hosts electrum as the main gold mineral (Reuters, 2005; Manske and others, 2006). Issues that impeded rapid development of the Rosia Montana project and needed resolution included regional environmental protection; local social concerns, which included minimizing resettlement; and the protection of historical and archaeological sites (Richards, 2005). In 2006, the Romanian Supreme Court ruled that the lower court decision to deny Gabriel the right to proceed with its mine development agenda was not properly handled. The Supreme Court ordered the lower court to reexamine the Gabriel case on its merits alone and allow Gabriel to provide necessary evidence and arguments (Gabriel Resources Ltd., 2006b).

Carpathian Gold Inc. of Canada actively conducted exploration for gold under license in the Apuseni Mountains (Golden Quadrilateral); at the Colnic gold/copper porphyry deposit near Rovina; at Baia Mare in the northwest in the contiguous Firiza-Rotunda and Rotunda-Varatec area [in a joint venture with Romania's state-owned REMIN S.A. mining company (quartz-vein-type ore)]; and at the Oravita license at Banat in southwestern Romania (gold/copper porphyry). In 2006, analysis of drill core from the Colnic prospect showed gold values ranging from 0.86 to 4.35 g/t, and copper, from 0.05% to 0.14% (Carpathian Gold Inc., 2006a, b).

Iron and Steel.—Romania's iron and steel production in 2006 had mixed results. The output of pig iron declined by about 3% compared with that of 2005; steel output increased by more than 12% (table 3). Domestic production of iron ore ceased in 2005, which necessitated total reliance on imported raw materials. Romania's net imports of iron ore for the 2002 to 2006 period were about 6.2 Mt, 7 Mt, 6.6 Mt, 6.6 Mt, and 5.2 Mt, respectively. The country's consumption of crude steel during the same period was 3.4 Mt, 3.7 Mt, 3.9 Mt, 4.0 Mt, and 5.1 Mt, respectively (International Iron and Steel Institute, 2007).

Lead and Zinc.—Relatively low-grade lead and zinc ores were produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts; the ores graded between 0.4% lead and 0.6% zinc and 1.0% lead and 1.2% zinc. Romania's lead and zinc ores also contained copper (0.35%), and associated antimony, bismuth, cadmium, gold, and silver. Because of the complex mineralogy of the lead and zinc ores, concentrates produced from them have varied widely with respect to metal content. Metal recovery from concentrates has ranged from 50% to 75% for lead and zinc. Smelting and refining of lead and zinc from domestic and imported ores and concentrates was carried out at the Sometra S.A.'s Imperial smelter at Copsa Mica. The decline in output of both metals, which was apparent in 2005, continued in 2006; the reported mine production of lead and zinc (in concentrate) declined by about 35% and 30%, respectively, compared with production levels reached in 2005 (table 3). The output of primary refined

lead declined by about 15%; zinc metal production (primary and secondary) declined by about 33% compared with that of 2005 (table 3).

Industrial Minerals

Romania was known to have a broad range of industrial minerals that included barite, various calcareous rocks, clays, feldspar and mica of granitic/pegmatitic sources, graphite, gypsum, salt, and silica-group minerals. Seven privately owned companies and one state-owned company were involved in the mining and quarrying of industrial minerals. The modernization of the country's economy and infrastructure was expected to increase the domestic demand for industrial minerals and construction materials.

Mineral Fuels

The petroleum and refining industries historically have been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important factor in the country's energy balance. Estimates of petroleum resources have ranged from 1.0 billion to 1.6 billion metric tons. The extraction of crude petroleum in recent years, however, has exhibited a declining trend. According to the latest available data (from 2002 through 2006, inclusive), petroleum output declined each year by about 3% and 5%, respectively, compared with the preceding year (table 3). The output of natural gas has shown a similar declining trend in production. Lignite accounted for almost 100% of the total amount of coal produced in Romania in 2006.

Outlook

Romania's application to join the EU carries a broad range of requirements, which include modernization of industrial plant and infrastructure. To meet these requirements, Romania is expected to continue to develop its industrial minerals sector, including quarries and processing facilities for the production of construction materials. As in Bulgaria, gold exploration is expected to continue to be an important aspect of foreign investment in the country's mineral industry.

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TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2002	2003	2004	2005	2006
METALS					
Aluminum, metal, secondary	2,000	2,000	2,000 ^e	2,000 ^e	2,000 ^e
Bismuth, metal ^c thousand metric tons	40	40	30	35 ^r	30
Cadmium, metal, smelter	345	307	356	350	350 ^e
Copper:					
Ore:					
Gross weight thousand metric tons	26,030	26,415	23,879	24,807	29,572
Cu content ^c do.	112	116	107 ³	112	133
Concentrate:					
Gross weight do.	464	458	398	470	502
Cu content do.	93	92	80	94	101
Metal, primary and secondary:					
Smelter	181,000	215,300	227,100	240,100	250,500
Refined, electrolytically	40,000	42,000	52,500	60,500	65,500
Gold, metal kilograms	2,612	2,142	2,431	3,868	3,818
Iron and steel:					
Iron ore:					
Gross weight thousand metric tons	373	466	83	--	--
Fe content do.	105 ^e	127	27	--	--
Iron concentrates do.	167	248	52 ^e	--	--
Metal:					
Pig iron for steelmaking do.	1,072	1,386	1,158 ^r	1,081 ^r	1,200 ^e
Ferroalloys, ferrosilicon ^c do.	10	10	10	10	10
Steel, crude do.	1,860	1,950	2,106	1,969 ^r	2,000 ^e
Semimanufactures, rolled do.	1,035 ^r	1,206 ^r	1,391 ^r	1,452 ^r	1,400 ^e
Lead:					
Mine output, Pb content	24,000	31,000	25,000	32,000	28,000
Concentrate:					
Gross weight	31,108	35,200	29,900	31,500	25,387
Pb content ^c	21,800	24,600	19,000	22,000	18,000
Metal, refined, primary and secondary	66,000	74,000 ^r	69,000 ^r	93,500 ^r	84,300
Manganese ore:					
Gross weight	4,000	4,000	28,000	39,000	20,000
Mn content ^c	1,100	1,100	7,600	10,900	5,600
Silver, mine output, Ag content	60	50	60	60	60
Tin, metal ^c	10	10	10	10	10
Uranium oxide, U content ^c	600	600	600	600	600
Zinc:					
Mine output, Zn content ^c	25,800	31,000	19,000	22,000	17,000
Concentrate:					
Gross weight	28,672	26,000	29,900	33,700	25,917
Zn content ^c	14,900	18,800	15,500	17,500	13,500
Metal, smelter, primary and secondary	83,000	86,800	101,500	92,500 ^r	85,900
INDUSTRIAL MINERALS					
Asbestos, fiber, all grades ^e	300	300	237	--	--
Barite ore, run-of-mine	656,000	637,000	237,000 ^e	-- ^r	--
Cement, hydraulic thousand metric tons	2,137	2,100	2,100	2,100	2,000
Clays:					
Bentonite do.	212	146	225	181	216
Kaolin, raw do.	1,026	1,137	1,291	1,381	1,658
Refractory do.	38	40	30	30	15
Feldspar do.	34	4	5	5	38
Fluorspar ^c do.	2	2	2	2	2
Gypsum and anhydrite:					
Crude do.	156	168	176	188	216
Calcined ^c do.	50	50	60	65	75

See footnotes at end of table.

TABLE 1—Continued
BULGARIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2002	2003	2004	2005	2006
INDUSTRIAL MINERALS—Continued					
Lime, industrial thousand metric tons	1,156	1,500	1,500	1,500	1,400
Limestone and dolomite ^e do.	3,500 ^r	3,500 ^r	3,500 ^r	3,265 ^{r,3}	3,340 ³
Nitrogen, N content of ammonia do.	328	321	320	320	309
Perlite do.	11	17	8	15	5
Pyrites, gross weight ^c do.	150	150	150	150	150
Salt, all types do.	1,800	1,882	1,900	1,900	2,000
Sand and gravel thousand cubic meters	2,385	2,098	3,333	3,628	4,293
Silica, quartz sand thousand metric tons	607	412	545	583	250
Sodium carbonate, calcined ^c do.	800	800	800	800	800
Sulfur:^c					
S content of pyrites	30,000	30,000	25,000	25,000	25,000
Byproduct	245,000	289,000	301,000	300,000	300,000
Total	275,000	319,000	326,000	325,000	325,000
Sulfuric acid	751,018	750,000	750,000 ^e	750,000 ^e	750,000 ^e
Zeolite ^e	15,000	15,000	15,000	15,000	15,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand metric tons	13	9	--	--	--
Bituminous do.	109	44	170	96	52
Brown do.	3,232	3,044	3,071	2,620	2,557
Lignite do.	23,202	24,597	23,385	22,193	22,750
Total do.	26,556	27,694	26,626	24,909	25,359
Coke ^e do.	1,200	1,200	1,200	1,200	1,200
Natural gas, marketed million cubic meters	11	11	333	537	519
Petroleum:					
Crude, reported thousand metric tons	33	27	30	27	25
Refinery products ^e thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. -- Zero.

¹Table includes data available through November 2007.

²In addition to the commodities listed, chromite, magnesite, palladium, platinum, tellurium, uranium, and a variety of crude construction materials (common clays, dimension stone, and crushed stone) are produced, but available information is inadequate make reliable estimates of output.

³Reported figure.

TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Bentonite, mine output	Bentonite AD	Kardjali	280.
Cement	Reka Devnia	Devnia	1,825.
Do.	Zlatna Panega	Panega	1,300.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bituminous	Economic Mining and Power Combine (SMEK) Balkanbass	Balkan coal basin in central Bulgaria, northwest of Silven	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin in western Bulgaria	3,100.
Lignite	SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.	Others	Marbas, Pernik, and Bobov Dol coal basins	5,300.
Copper:			
Concentrate, Cu content	Asarel-Medet AD	Panagurishte, Pazardzhik District	55.
Do.	Chelopech Ltd.	Srednogorie, Sofia District	10.
Do.	Bradtze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogorie, Sofia District	20.
Do.	Rosen	Burgas, near the Black Sea	1.
Do.	Tsar Asen	Srednogorie, Sofia District	2.
Do.	Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5.
Metal:			
Smelter	Cumerio Med S.A. (Pirdop)	Srednogorie, Sofia District	150.
Refined	do.	do.	30.
Iron ore	Kremikovtzi Iron and Steel Works	Kremikovtzi	2,000.
Kaolin, mine output	Kaolin AD	Senovo, Rousse District	250.
Lead-zinc:			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, all in Madan area near Greek border	59 lead, 47 zinc.
Do.	Madzharovo Ltd.	Near Plovdiv	3 lead, 2 zinc.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 lead, 2 zinc.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 lead, 0.8 zinc.
Metal:			
Pb, refined	KCM SA [formerly Dimitur Blagoev]	Plovdiv	44.
Do.	Lead and Zinc Complex Ltd.	Kurdjali	60.
Zn, smelter	KCM SA [formerly Dimitur Blagoev]	Plovdiv	60.
Do.	Lead and Zinc Complex, Ltd.	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obroschishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	(1)
Perlite, mine output	Bentonite AD	Kardjali	30.
Petroleum:			
Crude	do.	do.	(1)
Refined	42-gallon barrels per day Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	260,000.
Steel, crude	Kremikovtzi Iron and Steel Works	Near Sofia	2,300.
Do.	Stomana Iron and Steel Works	Pernik	1,300.
Zeolite, mine output	Bentonite AD	Kardjali	15.

¹Insignificant capacity.

TABLE 3
ROMANIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2002	2003	2004	2005	2006	
METALS						
Aluminum:						
Alumina, calcined, gross weight	361,407	332,852	559,307	688,829	650,000	
Ingot including alloys:						
Primary	187,052	196,844	222,347	243,605	258,000	
Secondary	3,308	7,892	6,506	7,109	7,000	
Total	190,360	204,736	228,853	250,714	265,000	
Bismuth, mine output, Bi content ^c	40	40	40	40	40	
Copper:						
Mine output, Cu content of concentrate	18,962	23,389	20,380	14,868	12,200	
Metal:						
Smelter:						
Primary	8,871	4,456	61	--	--	
Secondary ^c	2,000	500	10	10	10	
Total	10,871	4,956	71	10	10	
Refined:						
Primary	11,453	16,739	24,526	20,739	21,581	
Secondary ^c	2,000	2,000	2,000	2,000	2,000	
Total	13,453	18,739	26,526	22,739	23,581	
Gold, mine output, Au content ^c	500	400	400	400	400	
Iron and steel:						
Iron ore:						
Gross weight	thousand metric tons	342	304	275	265	300
Metal content	do.	89	82	74	69	80
Metal:						
Pig iron	do.	3,979	4,101	4,244	4,098	3,966
Ferrous alloys, electric furnace:						
Ferromanganese	--	--	191	18,625	18,000	
Ferrosilicomanganese	84,720	141,899	194,754	100,957	100,000	
Silicon metal ^c	200	100	--	--	--	
Total	84,920	141,999	194,945	119,582	118,000	
Steel, crude	thousand metric tons	5,491	5,692	6,077	5,632	6,318
Semimanufactures:						
Pipes and tubes	do.	562	453	486	396	400
Rolled products	do.	3,907	4,757	5,191	5,196	5,200
Lead:						
Mine output, Pb content of concentrate	15,136	15,747	18,297	11,610	7,500	
Smelter, primary ^c	15,000	16,000	19,000	12,000	7,000	
Refined:^c						
Primary	23,100	23,100 ³	32,590 ³	32,903 ³	28,100	
Secondary	3,000	5,000	5,000	5,000	5,000	
Total	26,100	28,100	37,590 ³	37,903 ³	33,100	
Manganese:						
Ore, gross weight	thousand metric tons	60 ^e	90	95	95 ^e	95 ^e
Concentrate:⁴						
Gross weight ^c	do.	40	60	65	65	65
Mn content	do.	12	15	16	14	14
Silver, mine output, Ag content	15 ^e	18	18 ^e	15	18	
Zinc:						
Mine output, Zn content of concentrate	21,250	22,081	23,599	13,784	9,574	
Metal, smelter, primary and secondary	51,600	48,000	52,746	49,447	43,705	
INDUSTRIAL MINERALS						
Barite, processed	100	23	--	--	--	
Cement, hydraulic	thousand metric tons	5,680	5,992	6,239	7,032	7,000 ^e

See footnotes at end of table.

TABLE 3—Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2002	2003	2004	2005	2006	
INDUSTRIAL MINERALS—Continued						
Clays:						
Bentonite:						
Run of mine ^c	40,000	40,000	40,000	40,000	40,000	
Marketable	15,389	17,637	18,161	17,890	20,299	
Kaolin:						
Run of mine ^c	71,000	70,000	70,000	65,000	65,000	
Marketable	22,517	21,724	22,337	20,266	10,790	
Diatomite	20,922	33,296	20,626	1,017	--	
Feldspar	51,959	72,827	60,924	56,817	37,553	
Fluorspar ^c	15,000	15,000	15,000	15,000	15,000	
Graphite	1,001	1,014	395	478	--	
Gypsum	thousand metric tons	421	410	490 ^r	502	599
Lime	do.	1,918	1,936	1,978 ^r	1,916	1,900 ^e
Nitrogen, N content of ammonia	do.	930	1,180	1,182 ^r	2,107	2,000 ^e
Pyrites, gross weight ^e	do.	70	70	70	70	70
Salt:						
Rock	do.	46	47	43	46	46
Other	do.	2,211	2,370	2,357	2,374	2,374
Total	do.	2,257	2,417	2,400	2,420	2,420
Sand and gravel	do.	761	3,061	3,900	2,421	2,421
Sodium compounds, n.e.s.:						
Caustic soda	do.	343	382	414	443	443
Soda ash, manufactured, 100% Na ₂ CO ₂ basis	do.	454	407	402	347	347
Sulfur, byproduct, all sources ^c	do.	200	200	200	200	200
Sulfuric acid	do.	58	65	28	11	11 ^e
Talc		7,310	10,082	9,725	6,760	2,967
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		8,106	2,000	2,000	2,000	2,000
Coal, washed:						
Anthracite and bituminous	thousand metric tons	13	10	1	--	--
Of which, for coke and semicoke production ⁵	do.	13	10	1	--	--
Brown	do.	245	240	112	52	50
Lignite	do.	30,154	32,813	31,479	31,070	30,000
Total	do.	30,412	33,063	31,592	31,122	30,050
Coke:						
Metallurgical	do.	1,680	1,550	1,573	1,777	1,500
Other	do.	186	88	--	--	--
Total	do.	1,866	1,638	1,573	1,777	1,500
Gas, natural, gross:						
Associated	million cubic meters	1,403	1,345	1,267	1,220	1,200
Nonassociated	do.	12,244	11,829	12,023	11,252	11,500
Total	do.	13,647	13,174	13,290	12,472	12,700
Petroleum:						
Crude:						
As reported	thousand metric tons	5,810	5,651	5,465	5,212	5,200
Converted	thousand 42-gallon barrels	44,000	42,500 ^e	41,000	40,000	40,000
Refinery products ^c	do.	75,000	75,000	75,000	70,000	70,000

^cEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. -- Zero.

¹Table includes data available through November 2007.

²In addition to the commodities listed, antimony, asbestos, and a variety of construction materials are produced, and molybdenum may have been produced as a byproduct of copper from 1988 on; output is not reported quantitatively and available information is inadequate to make reliable estimates of output.

³Reported figure.

⁴Estimated series are based on published data for concentrate production.

⁵To avoid double counting, data not included in total coal production.

TABLE 4
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Alumina	Soc Com Alor SA	Plant at Oradea, near Hungarian border	250.
Do.	BBG Alum S.A. (51% owned by the Balli Group of the United Kingdom and the Bayrakter Co. of Turkey)	Plant at Tulcea, Danube Delta	400.
Aluminum, primary	SC Alro S.A. (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	270.
Barite	Ministry of Industry	Ortra Mine, Rosia Montana, southwest of Cluj	100.
Bauxite	do.	Oradea-Dobresti Mining Complex, near Hungarian border	350.
Cement	Cimentul SA Turda	Plant at Turda, 600 kilometers from Port of Constanta	cement, 1,360; clinker, 850.
Do.	Cimentul SA Cimus	Plant at Cimpulung, about 499 kilometers from Port of Constanta	cement, 2,200; clinker, 1,360.
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from Port of Constanta	cement, 3,100; clinker, 1,520.
Do.	Romcif SA Fieni	Plant at Fieni, about 420 kilometers from Port of Constanta	cement, 1,600; clinker, 960.
Do.	Romcim SA	Plant at Alesd, 812 kilometers from Port of Constanta	cement, 3,500; clinker, 2,120.
Do.	do.	Plant at Hoghiz, 437 kilometers from Port of Constanta	cement, 2,200; clinker, 1,520.
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	cement, 3,500; clinker, 1,980.
Do.	do.	Plant at Jiu, about 533 kilometers from the Port of Constanta	cement, 3,000; clinker, 2,045.
Coal:			
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.
Lignite	Societatea Nationala a Lignitului Oltenia-Targu Jui	Jiu Valley, Oltenia County, north of Craiova	20,300.
Do.	Societatea Nationala a Carunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.
Copper:			
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest	Baia Mare, Baia Sprie, and Cavnic Mines, northwestern area near the Ukrainian border; Rosia Montana, Noud, Borsa Balan, and Lesul Ursului Mines—in east-west arc along Carpathian range; Rosia Poieni Mine; and Moldova Noua Mine, southwest near Danubian border with Yugoslavia	180.
Metal	SC Allied Deals Phoenix SA	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the Northwestern area, near the Ukrainian border	40.
Do.	SC Ampelum SA	Zlatna smelter and refinery, Apuseni, northwest Romania	13.
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.

TABLE 4—Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2006

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Iron ore		Compania Nationala Minvest	Mining complex at Hunedoara, in west-central Romania	1,320.
Do.		do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660.
Do.		do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990.
Lead:				
In ore		Compania Nationala REMIN S.A.	Baia Mare Mine, near Ukrainian and Hungarian borders	24.
Do.		Compania Nationala Minvest	Balan Mine, 50 kilometers southwest of Piatra Neamt	10.
Metal		Sometra S.A.	Imperial Smelter at Copsa Mica, central Romania, on the Timnava Mare River	42.
Natural gas	million cubic feet per year	Ministry of Industry, Department of Energy	Tirgu Mures Field at Tirgu Mures, north-central Romania	996,000.
Do.	do.	do.	Ploesti Field, 50 kilometers north of Bucharest	249,000.
Petroleum:				
Crude	42-gallon barrels per day	do.	Ploesti-Teleajen, Pitesti, and Tirgoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau, east-central Romania near the Siretul River; and West Carpathian Field, southeastern Carpathian Mountains, between the west bank of the Olt River and Tirgu Jiu	250,000.
Refined	do.	do.	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	664,000.
Steel		Gavazzi Steel SA (formerly Otel Rosu)	Caras-Severin, southeastern region, near Yugoslav border	400.
Do.		Mechel Campia Turzii SA	Campia Turzii, Cluj, northwestern Romania	300.
Do.		Ispat Sidex SA Galati (Ispat, India and United Kingdom)	Danube River, north of Brail, near the Ukrainian border	10,000.
Do.		Siderurgica SA Hunedoara (LNM Holdings NV, United Kingdom)	West-central Romania, near Calan	2,135.
Do.		CSR S.A. Resita	Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200.
Do.		Siderica SA Calarasi	Near the Bulgarian border close to the Danube	2,200.
Do.		Mechel Targoviste	Targoviste, Dimbovita, near Bucharest	450.
Zinc:				
In ore		Compania Nationala Minvest	Baia Mare, near Ukrainian and Hungarian borders	60.
Metal		Sometra S.A.	Imperial Smelter at Copsa Mica, Timnava River, central Romania	66.