

THE MINERAL INDUSTRIES OF 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 and 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 within the Mediterranean Alpine folded zone, which comprises the Carpatho-Balkan branch to the north and the Dinaric-Hellenic branch to the south (Bulgaria "References Cited" section Bogdanov, 1982, p. 215). The Carpatho-Balkan branch also constitutes the primary folded zone in Romania and incorporates the eastern and southern Carpathian Mountains and the Apuseni Mountains within the Carpathian arc to the west of the Transylvanian Plateau (Romania "References Cited" section Ianovici and Borcos, 1982, p. 55-58).

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

BULGARIA

Bulgaria's minerals 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, enterprises in the metallurgical branch 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 minerals industry was small and only of regional importance. Although most of the country's minerals requirements were met through domestic production, the country continued to depend on imports of iron ore, steel, and mineral fuels.

Bulgaria's economy in 2001 showed gains as the growth of the gross domestic product (GDP) increased by about 4% compared with that of 2000; industrial production, which accounted for 28% of the GDP, grew by about 2% (U.S. Central Intelligence Agency, 2002). According to the Commission of European Communities (2002, p. 36), foreign direct investment in Bulgaria's economy as a percentage of GDP was about 5.1%, in 2001, which, in relative terms, however, was less than the 7.9% mark achieved in 2000. On balance, the continuing improvement of Bulgaria's economy moved the country farther from the many uncertainties that accompanied transition from a centrally planned economy. The new legal structure, which underpinned the country's privatization process, was an important factor in the overall growth of direct foreign investment during recent years (European Bank for Reconstruction and Development, 2001, p. 23).

The Government remained committed to transforming the economy to a market-based economic system. The Law on

Transformation and Privatization of State and Municipal-Owned Enterprises, which was adopted by Parliament in 1992, and the Underground Resources Act, which was adopted in 1998, promote private enterprise and foreign investment. Although this act stipulates that underground mineral wealth is the property of the state, it provides for claims by domestic and foreign companies to be approved for the development and operation of mineral deposits for up to 35 years with additional 15-year extensions. Exploration rights to private companies can 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 conditions.

Commodity Review

Metals

Metals have been a substantial component of the mineral industry's production. Bulgaria's mine output includes copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, molybdenum, silver, and other metals have been produced, chiefly from the processing of copper and lead and zinc ores (table 1).

Copper.—In 2001, Bulgaria's copper mining and processing sector reported mixed results. Although mine production of copper rose by about 2% (copper in ore) and that of electrolytically refined copper by about 6% compared with production levels of 2000, the production of concentrates (contained metal) and smelter copper declined by 4% and 12%, respectively. The Pirdop copper smelter and refinery, which was owned by Umicore of Belgium (formerly Union Minière), accounted for about 93% of the country's total smelter copper production, of which the bulk was exported to Belgium as anode feedstock to Umicore's refinery at Olen. The facility expansion at Pirdop undertaken by Umicore would raise the production capacity for anodes to 215,000 metric tons per year (t/yr) and that for electrolytically refined copper to 45,000 t/y (Kousseff, 2002, 3 p.).

Bulgaria's major copper deposits were developed and exploited in Srednogie-Panagjurishte region of the country at the Asarel-Medet and the Elatsite surface mines and the Chelopech underground mine. The Asarel-Medet and the Elatsite open pit operations mined a low-grade (0.2%-0.5% copper) porphyry ore, which was offset somewhat by the lesser expense of open pit mining but which also posed more serious environmental problems (Tsotsorkov, 1998). The Chelopech mining operation, which is located about 70 kilometers east of Sofia, works a polymetallic deposit that contained precious metals (mainly gold and silver) and copper. Although the Chelopech mine was primarily considered to be a gold producer owing to the much higher value of gold it produced, copper

production was expected to reach about 10,000 metric tons (t) in 2001 (Metal Bulletin, 2001a).

The country's exploration and development programs for copper included mine expansion and facility modernization at Chelopech and exploration at Krumovgrad where drilling and trenching were conducted during the year (Metal Bulletin, 2001b).

Gold.—Navan Mining plc of Ireland, in addition to its operations at Chelopech, had undertaken survey and exploration work at Krumovgrad near the Greek border. Navan obtained an exploration licence in June 2000 that granted a 130-square-kilometer study area. Initial trenching in the Krumovgrad licence area found low sulfide epithermal gold hosted within sequences of Tertiary sediments and breccias. In 2001, a first-phase drilling operation was undertaken at Krumovgrad's Ada Tepe and Kuklitsa prospects. Initial drill core results reportedly found Ada Tepe more promising with gold that ranged from 5.6 to 10.1 grams per metric ton (g/t) of ore. Additional work was expected to continue in the region (Mining Journal, 2001).

Iron and Steel.—The salient event in Bulgaria's steel industry was the privatization and sale of one of the country's two major steel producers, the Stomana Joint Stock Co. Sidenor S.A. of Greece acquired 75% of Stomana's assets; the balance was acquired by several private investors. To raise product range and quality, Sidenor announced a modernization program that would concentrate on modernizing the plant's rolling mills. The plant's three electric arc furnaces and slab casters will undergo subsequent modernization. In 2001, Stomana was expected to produce about 600,000 t of steel, which would comprise about 60% plate and 49% rebar [MBM (Metal Bulletin Monthly), 2001; Metal Bulletin, 2001c].

One of the provisions of pre-entry agreements between the former centrally planned economy countries of the Balkan area and Central Europe and the European Union (EU), reportedly, was required approval by the European Commission (EC) of state subsidies during the privatization of steel industry assets. Late in the year, a spokesperson for the EC indicated that the EC found the sale of the Kremikovtzi steelworks in 1999 to be not in compliance with Bulgaria's pre-entry agreement with the EU and that sale subsidies were involved despite a finding that the sale would not likely produce an economically viable enterprise. The issue of the Sidenor sale had not arisen at that time (Metal Bulletin, 2001a).

Lead and Zinc.—The lead and zinc industry in Bulgaria was based on mining and processing operations near Plovdiv, in the Ossogovo Mountains in western Bulgaria, near the Thundza River in eastern Bulgaria, and in the Madan area, near the Greek border. Lead and zinc were smelted and refined in Plovdiv and in Kurdjali in the Madan area.

Major activities during the year included the acquisition of the lead and zinc mining and beneficiation enterprise, Gorubso-Madan JSC, by the Russian-Bulgarian joint-stock company Rhodopes Investment Gorubso JSC and the continuing efforts to reduce pollution at KCM SA, which was a major producer of lead and zinc in Bulgaria. Environmental protection work between 1995 and 2001 involved the construction of a new processing line for roasting zinc concentrates, the reconstruction of a sintering unit in the lead plant, a new waste water purification station, and a modernized pollution monitoring unit (Dobrev, 2001; Kousseff, 2002).

Manganese.—Manganese mining was resumed in 2001 after a hiatus of several years. Although mine production by yearend had not reached the production levels of 1998 and earlier years, the resumption of production, however, was accompanied by United Kingdom-based investor interest in acquiring the Obrihishte Mine from its state owner Evromangan Ltd. (Kousseff, 2002).

Industrial Minerals

Bulgaria produced a broad range of industrial minerals suitable for chemical and construction industry use. These included barite, calcareous rock, cement, clays, lime, salt, and silica. In 2001, the privatization process continued in the sector and included the sale offering of gypsum mining operations at Coshava (Kousseff, 2002). By yearend, the cement and the dimension stone industries had achieved the highest level of privatization in the sector.

The growth of foreign investment toward the end of the 1990s resulted in substantial foreign ownership in Bulgaria's cement industry. Major investment came mainly from the EU and included the Italcementi Group, Heidelberger Zement, and Holderbank Financiere Glaris AG investing in Devnya Cement, Zlatna Panega Cement EAD, and Beloizvorski Cement, respectively. To facilitate exports to the EU, the Government adopted legislation in 2000 to establish EU standards for the construction materials and cement sector (European Bank for Reconstruction and Development, 2001, p. 23).

Mineral Fuels

Bulgaria is endowed with large, albeit low-rank, resources of coal. In 2001, the country's reserves of lignite amounted to 2.5 billion metric tons (Gt), and those of subbituminous coal, to 200 million metric tons (Mt). In 1998, the "Action Plan for Coal Mining Companies" for the period from 1998 through 2001 was published by the Government of Bulgaria. The plan called for the closure of inefficient mines to be followed by free market pricing of coal and the denationalization of the coal mining industry. The plan also called for the investment of \$437 million to improve the coal mining sector; these improvements include the introduction of new technology to the industry, facility modernization, and mined-out land reclamation (U.S. Department of Energy, 1999). A substantial portion of the country's thermal electric power plants, which produce more than one-half of the country's total production of about 45 billion kilowatts, operate on domestic coal. Bulgaria also produced small quantities of crude petroleum from nine oil wells. Output in 2001 amounted to about 32,000 t, which was a decline of about 22% compared with that of 2000, and virtually all Bulgaria's crude oil needs are met through imports (table 1).

Nuclear energy, which has played a significant role in Bulgaria's energy supply, accounted for about 45% of the country's electric power. The Kozloduy Nuclear Power Plant comprised six Soviet-built reactors—four VVER 440/230 units and two VVER 1000/320 units. In accordance with an agreement concluded with the European Commission in 1999, reactors 1 to 4 (VVER 440/230 units) were to be scheduled for decommissioning owing to safety concerns. In compliance with this agreement, the Government of Bulgaria undertook measures in 2001 to schedule closure of reactors 1 and 2 by 2003 and reactors 3 and 4 by 2006, following peer reviewed safety studies. Reactor units 5 and 6 will continue to operate and

would be modernized with financial assistance from the EU (Commission of the European Communities, 2002, p. 83-86).

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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. In the metals sector, production results for 2001 showed recovery for primary aluminum, mined copper and primary copper metal, mine production of lead and zinc, as well as pig iron and crude (table 1).

In 2001, the country's economy appeared to improve from its decline in 2000. The GDP rose by 5.3%, and industrial production increased by 8.2% (Bank Austria Creditanstalt, 2002, p. 23). The policies of the Government of Romania were aimed at reforming the industrial sector to raise the sector's competitiveness and to prepare it for privatization.

Commodity Review

Metals

Aluminum.—Although the output of alumina fell by almost 25% in 2001, Romania's production of primary aluminum increased by about 1.6% compared with that of 2000. Given the cessation of mining bauxite in Romania in 1998, such raw materials as alumina and bauxite were imported. Full production was reported to have restarted at the Oradea alumina plant at yearend 2000 based on Australian bauxite as feedstock. The Oradea alumina plant's operation was taken over in May 2000 by JSC Russian Aluminium of Russia, which announced plans to raise production capacity at Oradea to more than

300,000 t/yr from about 250,000 t/yr by 2002 (Metal Bulletin, 2000b). Romania's other alumina plant, BBG Alum S.A. in Tulcea, was operated by the Balli Group of the United Kingdom. In 2001, this facility underwent modernization that included conversion to gas-based power and the production of sandy-grade alumina (Metal Bulletin, 2000b).

The denationalization of the country's aluminum smelting and fabricating enterprises was delayed in late 2000 and early 2001 owing to organizational considerations that involved property valuation and to concerns raised by trade unions about a potential negative impact of privatization on the workforce (Metal Bulletin, 2000a, p. 5). The sale of the Government's assets in primary aluminum producer SC ALRO SA (Slatina) and aluminum rolling mill SC ALPROM SA, in contrast with a prior decision to sell the assets of each enterprise in a separate transactions, would be sold as a joint lot to a single selected bidder. Aluminum industry concerns in France, Russia, and the United Kingdom reportedly expressed interest in a tender proffering of ALRO and ALPROM assets. At yearend, the Government of Romania controlled 54.72% of ALRO's assets and 69.92% of those of ALPROM (Metal Bulletin, 2002).

Copper.—Romania mined copper primarily in the northeastern part of the country that included mines at Baia Sprie, Cavnic, and Lesul Ursului and in the southwestern part of the country with major mines at Moldova Noua, Rosia Poieni, and Rosia Montana. Generally, the grade of ore at these mines had an average grade of about 0.35% copper or less. Concentrates from these areas have been smelted and refined at Baia Mare and Zlatna. At Baia Mare, SC Allied Deals Phoenix SA operated an Outokumpu flash smelter and also an electrolytic copper refinery and a continuous caster. At Zlatna, SC Ampelum SA operated an Outokumpu flash smelter and an electrolytic refinery (Moreno, 2000). In 2001, mine production of copper ore increased by more than 19% compared with that of 2000; total refined copper increased by more than 21% to 18,522 t from 15,303 t in 2000.

Gold.—The development of gold deposits at Rosia Montana was allowed to move forward following approval by local officials of a relocation and resettlement plan prepared by Gabriel Resources Ltd. of Canada; this plan formed part of the environmental impact statement for the Rosia Montana project. Gabriel Resources, which owned 80% of the Rosia Montana concession, also proceeded with the completion of a feasibility study. The Government of Romania also approved the enlargement of mining concessions at Rosia Montana to provide space for infrastructure that would include plant, equipment, and a tailings dam (Mining Journal, 2001b). Gabriel resources announced plans at yearend to raise US\$34.5 million to further its work at Rosia Montana. The funds would be used for engineering, permitting, and village relocation and resettlement (Northern Miner, 2001).

The Rosia Montana concession derives its name from a village of the same name near the towns of Abrud and Brad. Several underground workings in the area were found to date to Roman times. The deposits at Rosia Montana currently under consideration are the epithermal low-sulfur type in two hydrothermally altered subvolcanic intrusives that appear joined at depth; these are the Cetate, Cirmic, Cirmicel, Jig-Vaidoia-Igre, and Orlea Tarina deposits. These deposits overall had 208 Mt of ore with an average strip ratio of 0.86 and contained about 1.56 g/t gold and 7.8 g/t silver (Gabriel Resources Ltd., 2001).

Other activities in the gold mining and exploration sector included the completion of drilling work at the Certei gold-silver property in the Apuseni Mountains by European Goldfields Ltd. (a subsidiary of Gabriel Resources). The results from 13,000 meters of drill core from 41 bore holes showed resources that amounted to more than 44 Mt of ore which contained an average of 1.9 g/t gold and inferred resources of 17 Mt which contained 1.5 g/t gold (Mining Journal, 2001a, p. 272) European Goldfields further reported the discovery of gold at Teascu, which is in the vicinity of Certej. Work at the Teascu deposit, which is within the Baita-Craciunesti property, included drilling to outline the mineralization. Early drill core results showed gold to be in the range of 1.62 to 1.79 g/t at a 0.8 g/t cutoff grade (European Goldfields Ltd., 2001).

Iron and Steel.—The privatization of Romania's steel industry was highlighted in 2001 by the acquisition of Sidex Galati SA, which was the country's largest iron and steel complex, by United Kingdom-based LNM Holdings Ltd. More than one-third of Sidex's total rated capacity of 10 million metric tons per year (Mt/yr) of steel (mainly flat-rolled products) was modernized in the late 1990s. The steel mill's modernized facilities largely accounted for its annual output of about 3 Mt. LNM Holdings planned additional facility upgrading to raise Sidex's output to 5 Mt/yr. Siderurgica Hunedoara SA and Cost SA Tirgoviste were the remaining steel mills to be privatized (Metal Bulletin, 2001c, p. 13).

SCR Resita, which had been acquired by Noble Ventures Corp. of the United States in 2000, was forced to stop production in March because of worker unrest during the transition to private ownership and the failure of several customers to meet payment obligations for thousands of metric tons of steel. Resita's management refused to accept barter-based debt payment, which was offered by a number of clients, with the exception of such commodities as natural gas and scrap that had specific value for the mill's production needs. At the same time, Resita's labor unions pressed the Government of Romania to reverse the sale of the steel mill to Noble Ventures by alleging that Noble Venture was not meeting various obligations specified in the sale contract; these included settlement of past-due wages owed the workers and a new management-labor contract (Metal Bulletin, 2001d, e). Resita's management anticipated resolving the disputed issues and also indicated that the company's open hearth furnace was taken off-line and replaced by a new 600,000-t/yr electric arc furnace. A new continuous caster also was installed (Metal Bulletin, 2001f).

Siderca SA Calarasi, which was closed in 1999 owing to financial problems, was the focus of negotiations in 2001 between the Government of Romania and AFV Beltrame SpA of Italy. Beltrame expressed interest in acquiring Siderca Calarasi, which was a producer of sections and rail with a capacity of 450,000 t/yr (Metal Bulletin, 2001a).

On balance, the iron and steel sector achieved positive results during the year because the production of pig iron and crude steel each increased by about 6% compared with 2000 production levels. The production of ferroalloys continued to decline with the exception of ferrosilicomanganese, which increased by 15.4%. Romania's scrap exports were one of the major foreign commercial issues during the year. To stop illegal scrap exports and losses of tax revenues, the Government of Romania set stringent requirements necessary to obtain export licenses. The allegedly stringent requirements with respect to

physical infrastructure and equipment that traders were to meet had all but completely stopped Romanian scrap exports and led a number of traders to raise the matter with the EC as a restraint on trade (Metal Bulletin, 2001b).

Lead and Zinc.—Relatively low grade lead and zinc ore that graded from 0.4% to 1.0% lead and from 0.6% to 1.2% zinc was produced at underground mines in the Baia Mare, the Borsa, the Certej, and the Rodna districts. Moreover, 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 been uneven. Metal recovery in concentrate reportedly has ranged between 50% and 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 (formerly Intreprinderea Metalurgica de Metale Neferoase) Imperial Smelter at Copsa Mica. The facility expansion undertaken by Sometra in 2000 and 2001 included the installation of new furnaces and condensers and the overall upgrading of the lead and zinc refinery (Metal Bulletin, 2000c). In 2001, mine production of lead increased by about 4.9% compared with that of 2000; mine production of zinc increased by about 9%. The production of refined lead decreased by about 3.7% compared with that of 2000. The production of refined zinc in 2001 declined by about 8%; it was, however, an increase of about 56% compared with that of 1997, which reflected the recent modernization program (table 3).

Industrial Minerals

Romania produced a broad range of industrial minerals that included barite, various calcareous rocks, granitic-pegmatitic sources of feldspar and mica, clays, gypsum, graphite, silica group minerals, and salt. In 2001, 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 (Harris, 2001).

Mineral Fuels

The petroleum extraction, production, and refining industry historically has been among Romania's leading industrial sectors. Although small by world standards, the petroleum industry continued to be an important component of the country's energy balance. Estimates of petroleum resources have ranged from 1.0 to 1.6 Gt. The extraction of crude petroleum in recent years, however, has exhibited a declining trend. From 1997 through 2001, inclusively, petroleum output declined each year by about 2%, 3%, 2%, 2%, and 1% respectively, compared with the preceding year (table 1). Although the slight decrease in 2001 continued the declining trend of output, industry spokespersons anticipated a small increase in petroleum production in the near future owing to increasing exploration trend by foreign oil companies (Lynch, 1999). Following the successful testing of the Pescarus 62 offshore delineation well, exploration contracts were offered to foreign investors (Oil & Gas Journal, 2001). The country's refined petroleum products capacity amounted to about 25 Mt/yr (table 4).

Coal was produced at 34 mines from resources that amounted to 3.5 Gt, of which 75% was lignite, 22% was bituminous coal,

and 3% was brown coal. Coal accounted for about 60% of the primary fuel for the country's principal electric power stations (Lynch, 1999). The total output of marketable coal in 2001 increased by almost 14% compared with that of 2000. The production of metallurgical coke, however, declined by about 9%. In 2001, steel producer Sidex SA initiated an upgrading of its coke batteries by the planned installation of a coke oven gas desulfurization plant to remove ammonia and hydrogen sulfide. A contract was awarded to Rautaruuki Oyj of Finland to install the plant with assistance from Romanian engineering firms by the middle of 2002 (Steel Times, 2001).

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TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 e/
METALS					
Aluminum, metal, secondary	3,127	6,685 r/	4,192	8,430 r/	8,000
Bismuth, metal e/	40	40	40	40	
Cadmium, metal, smelter	280	195 r/	217	233 r/	233 3/
Copper:					
Ore:					
Gross weight thousand tons	21,836	21,207 r/	22,346 r/	22,829 r/	24,878 3/
Cu content e/ do.	109	105	113	113	115
Concentrate:					
Gross weight do.	463	438	482	462	438 3/
Cu content do.	93	88	96	92	88
Metal, primary and secondary:					
Smelter					
Refined, electrolytically	114,630	119,500	107,000 r/	178,000 r/	157,000 3/
	34,530	36,400	21,000 r/	32,400 r/	34,400 3/
Gold, metal kilograms	1,020	1,253	2,743	2,347 r/	2,540 3/
Iron and steel:					
Iron ore:					
Gross weight thousand tons	858	895	699	559 r/	325 3/
Fe content do.	242	250 e/	223	178	92
Iron concentrates do.	479	463	361	304	240 3/
Metal:					
Pig iron for steelmaking do.	1,610	1,400	1,100	1,200	1,000
Ferroalloys, ferrosilicon e/ do.	10	10	10	10	10
Steel, crude do.	2,628	2,240	1,890	2,023 r/	1,942 3/
Semimanufactures, rolled do.	2,242	1,942 r/	1,535 r/	1,455 r/	1,500
Lead:					
Mine output, Pb content	32,000	22,000	14,000	14,000	17,000
Concentrate:					
Gross weight	39,800	34,595	25,208	15,019	26,400 3/
Pb content e/	27,900	24,200	17,000	10,500	18,500 3/
Metal, refined, primary and secondary	73,000 r/	77,100	81,600	84,100	88,300 3/
Manganese ore:					
Gross weight	47,430	55,600	--	--	1,516 3/
Mn content e/	14,000	17,000	--	--	450
Silver, mine output, Ag content	32	68	59	55 r/	57 r/
Tin, metal	8	10 e/	10 e/	10	10
Uranium, oxide, U content e/	600	600	600	600	600
Zinc:					
Mine output, Zn content e/	21,000	18,000	12,000	10,000	10,600 3/
Concentrate:					
Gross weight	38,420	33,600	19,560	18,096	23,301 3/
Zn content e/	20,000	17,000	10,200	9,400	12,100
Metal, smelter, primary and secondary	82,000	86,100	83,700	84,200	88,600 3/
INDUSTRIAL MINERALS					
Asbestos fiber, all grades	300	300 e/	300 e/	300	300
Barite ore, run of mine	285,000	452,197	1,124,000	875,000 r/	825,000 3/
Cement, hydraulic thousand tons	1,656	1,742 r/	2,060 r/	2,209 r/	2,200
Clays:					
Bentonite do.	171	176	232	296	308 3/
Kaolin, washed do.	150	150 e/	140 e/	150	150
Refractory do.	62	56	48	34	37 3/
Feldspar do.	36	36	28	22	23 3/
Fluorspar e/ do.	2	2	2	2	2
Gypsum and anhydrite:					
Crude do.	156	184	149	170	167 3/
Calcined do.	60	75 r/ e/	55 e/	65	50
Lime, industrial do.	849	1,000 e/	1,068	1,388	2,025 3/
Limestone and dolomite do.	10,842	11,000 e/	11,000 e/	11,000	11,000
Nitrogen, N content of ammonia do.	982 r/	527 r/	378 r/	647 r/	600
Perlite do.	20	12	13	17	12 3/
Pyrites, gross weight e/ do.	150	150	150	150	15
Salt, all types do.	1,600	2,400	1,300	1,700	1,931 3/

See footnotes at the end of the table.

TABLE 1--Continued
 BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001 e/
INDUSTRIAL MINERALS--Continued					
Sand and gravel thousand cubic meters	2,140	2,000 e/	2,000 e/	2,200	2,000
Silica (quartz sand) thousand tons	557	593	533	690	677 3/
Sodium carbonate, calcined do.	800	800	800	800	800
Sulfur: e/					
Sulfur content of pyrite	50,000	50,000	50,000	50,000	50,000
Byproduct	50,000	50,000	50,000	50,000	50,000
Total	100,000	100,000	100,000	100,000	100,000
Sulfuric acid	550,700	500,000 e/	500,000 e/	500,000	500,000
MINERAL FUELS AND RELATED MATERIALS					
Coal, marketable:					
Anthracite thousand tons	16	16	17	18	14 3/
Bituminous do.	130	105	106	100	101 3/
Brown do.	3,491	3,692	3,074	3,211	3,151 3/
Lignite do.	26,929	27,435	22,696 r/	23,765	23,856 3/
Total do.	30,566	31,248	25,893	27,094	27,122
Coke do.	1,239	1,200 e/	1,200 e/	1,200	1,200
Natural gas, marketed million cubic meters	38	33	27	15	22 3/
Petroleum:					
Crude, reported thousand tons	28	32	39	41	32 3/
Refinery products e/ thousand 42-gallon barrels	25,000	25,000	25,000	25,000	25,000

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

1/ Table includes data available through October 2002.

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

3/ Reported figure.

TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Cement	"Devnia-Cement" EAD	Devnia	2,000.
Do.	Zlatna Panega	Panega	1,000.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bituminous	Economic Mining and Power Combine (SMEK) Balkanbass	Balkan coal basin, northwest of Silven, central Bulgaria	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin, 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 (Cu):			
Concentrate, Cu content	Asarel-Medet AD.	Panagurishte, Pazardzhik District	25.
Do.	Chelopech Ltd.	Srednogorie, Sofia District	5.
Do.	Bradze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogorie, Sofia District	15.
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, refined	Umicore Pirdop Copper Smelter & Refinery	Srednogorie, Sofia District	120.
Iron ore	Kremikovtsi Iron and Steel Combine	Kremikovtsi	2,000.
Lead-zinc (Pb-Zn):			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, all in Madan area near Greek border	59 Pb, 47 Zn.
Do.	Madzharovo Ltd.	Near Plovdiv	3 Pb, 2 Zn.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 Pb, 2 Zn.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 Pb, 0.8 Zn.
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. (Obrotchishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, northwestern Bulgaria	(1/).
Petroleum:			
Crude	do.	do.	(1/).
Refined	barrels per day Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	134,000.
Steel, crude:	Kremikovtsi Iron and Steel Works	Near Sofia	2,300.
Do.	Stomana Iron and Steel Works	Pernik	800.

1/ Insignificant capacity.

TABLE 3
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001
METALS					
Aluminum:					
Bauxite, gross weight	127,450	161,865	--	--	--
Alumina, calcined, gross weight	281,636	250,226	277,388	416,587	319,403
Ingot including alloys:					
Primary	162,987	174,038	174,452	179,038	181,831
Secondary	2,042	1,110	146	2,305	682 r/
Total	165,029	175,148	174,594	181,343	182,513
Bismuth, mine output, Bi content e/	40	40	40	40	40
Cadmium metal, smelter	5	--	--	--	--
Copper:					
Mine output, Cu content of concentrate	23,190	19,065	16,807	16,099	19,185
Metal:					
Smelter:					
Primary	25,024	18,708	24,010	16,429	8,979 r/
Secondary e/	1,000	1,000	2,000	2,000	2,000
Total	26,024	19,708	24,010	18,429	10,979
Refined:					
Primary	22,912 r/	21,008	20,294	15,303	18,522
Secondary e/	4,000	2,000	4,000	4,000	4,000
Total	26,912 r/	23,028	24,294	19,303	22,522
Gold, mine output, Au content e/ kilograms	3,500	3,500	3,500	3,500	3,500
Iron and steel:					
Iron ore:					
Gross weight thousand tons	756 r/	459	131	116	292 r/
Metal content do.	147 r/	85	71	55	76 r
Metal:					
Pig iron do.	4,557	4,541	3,006	3,066	3,243 r/
Ferroalloys:					
Ferromanganese	950	873	--	--	--
Ferrosilicon	9,620	5,553	5,000	8,309	5,823
Ferromanganese	11,505	4,170	25	1,989	384
Ferrosilicomanganese	62,570	83,617	550	62,320	71,921
Silicon metal e/	300	150	--	200	200
Steel, crude thousand tons	6,674	6,336	4,355	4,672	4,936 r/
Semimanufactures:					
Pipes and tubes do.	633	661	348	465	665 r/
Rolled products do.	4,804	4,391	3,377	3,687	3,582 r/
Lead:					
Mine output, Pb content of concentrate	19,447 r/	15,144	20,484	18,750	19,676
Smelter, primary e/	10,000	10,000	15,000	15,000	15,000
Refined: e/					
Primary	13,000 r/	15,000	13,000	25,000	24,000
Secondary	4,000	3,000	3,000	3,000	3,000
Total	17,000	18,000	16,000	28,000	27,000
Manganese:					
Ore, gross weight thousand tons	100 e/	100	60	24	70
Concentrate: 3/					
Gross weight do.	68	73	42	19	55
Mn content do.	17	19	11	5	14
Silver, mine output, Ag content	60 e/	60	18	18	18 e/
Zinc:					
Mine output, Zn content of concentrate	31,737 r/	25,650	26,536	27,452	29,786
Metal, smelter, primary and secondary	30,226 r/	29,427	29,000	51,900	47,200
INDUSTRIAL MINERALS					
Barite, processed	12,729	10,327	4,641	4,266	2,851 r/
Cement, hydraulic thousand tons	6,553 r/	6,577	5,580	6,058	5,668
Clays:					
Bentonite:					
Run of mine e/	60,000	60,000	45,000	75,000	60,000
Marketable	27,133	25,434	19,609	37,687	24,779 r/

See footnotes at end of table.

TABLE 3--Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1997	1998	1999	2000	2001
INDUSTRIAL MINERALS--Continued					
Clays--Continued:					
Kaolin:					
Run of mine e/	90,000	75,000	73,000	70,000	70,000
Marketable	29,169	24,742	23,586	18,942	21,867 r/
Diatomite	23,880	34,600	11,592	8,890	9,743 r/
Feldspar	25,962	37,010	36,635	37,157	43,037 r/
Fluorspar e/	15,000	15,000	15,000	15,000	15,000
Graphite	2,563	1,951	1,041	1,251	1,176
Gypsum	79	297	305	218	275 r/
Lime	1,599	1,813	1,464	1,666	1,790 r/
Nitrogen, N content of ammonia	783 r/	385	687	1,033	1,000
Pyrites, gross weight	208 r/	200	68	70 e/	70 e/
Salt:					
Rock salt	254	68	100	52	49 r/
Other	2,369	2,220	2,199	2,256	2,176
Total	2,623	2,288	2,299	2,308	2,224
Sand and gravel	711	1,049	748	814	733
Sodium compounds, n.e.s.:					
Caustic soda	322	310	289	343	346
Soda ash, manufactured, 100% Na ₂ CO ₂ basis	548	482	431	391	448 r/
Sulfur:					
S content of pyrites	52	50	17	10	2
Byproduct, all sources e/	200	200	200	200	200
Total e/	252	250	217	210	202
Sulfuric acid	330	229	234	181	58
Talc	7,578	8,134	8,289	7,850	7,270 r/
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	21,400	18,450	12,490	14,756	15,538
Coal, washed:					
Anthracite and bituminous	4,267	3,201	2,751	3,251	14 r/
Of which:					
For coke and semicoke production	324	192	110	13	14
For other uses	10	2	1	--	--
Brown	692	--	--	291	324 r/
Lignite	32,281	26,037	22,472	25,752	32,457 r/
Total	37,240	29,238	25,223	29,294	32,795
Coke:					
Metallurgical	3,110	2,929	1,593	1,534	1,343 r/
Other	1	--	--	79	70
Total	3,111	2,929	1,593	1,613	1,413
Gas, natural, gross:					
Associated	1,245	1,210	1,164	1,249	1,424 r/
Nonassociated	14,671	13,231	13,413	13,358	12,666 r/
Total	15,916 r/	14,441	14,577	14,607	14,090
Petroleum:					
Crude:					
As reported	6,515	6,309	6,154	6,042	6,011 r/
Converted	48,760	47,020	45,866	45,300	45,100
Refinery products e/	125,000	95,000	77,265	75,000	75,000

e/ Estimated. r/ Revised.

1/ Includes data available through October 2002.

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

3/ Estimated series were based on published data on concentrate production.

TABLE 4
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity	
Alumina	Semtrade Oradea Alimina plant	Plant at Oradea, near Hungarian border	262.	
Do.	BBG Alum SA (Balli Group of the United Kingdom and Bayrakter Co. of Turkey)	Plant at Tulcea, Danube Delta	400.	
Aluminum, primary	Alro SA (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	170.	
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, 765; clinker, 280.	
Do.	Casial SA Deva	Deva, Hundoara county.	Cement, 1,200; clinker, 1,200.	
Do.	SC Cimentul Cimus SA	Plant at Cimpulung, about 499 kilometers from port of Constanta	Cement, 2,112; clinker, 744.	
Do.	Moldocim SA Bicaz	Plant at Bicaz, about 450 kilometers from port of Constanta	Cement, 1,900; clinker, 1,520.	
Do.	SC Tagrimpex Romcif SA Fieni	Plant at Fieni, about 420 kilometers from port of Constanta	Cement, 950; clinker, 900.	
Do.	SC Alcim SA	Plant at Alesd, 812 kilometers from port of Constanta	Cement, 3,674; clinker, 2,427.	
Do.	Lafarge Romcim	Plant at Hoghiz, 437 kilometers from port of Constanta	Cement, 1,128; clinker, 970.	
Do.	do.	Medgidia plant, about 35 kilometers west of Constanta	Cement, 2,500; clinker, 1,910	
Do.	do.	Plant at Jiu, about 533 kilometers from the port of Constanta	Cement, 729; clinker, 530.	
Coal:				
Bituminous	Compania Nationala a Huilei-Petrosani	Valea Jiului Mining Complex, near Hunedoara	10,400.	
Lignite	Societatea Nationala a Lignitului Oltenia-Targu Jiu	Jiu Valley, Oltenia County, north of Craiova	20,300.	
Do.	Societatea Nationala a Carbunelui-Ploiesti	About 50 kilometers north of Bucharest	8,700.	
Copper:				
Ore (concentrate)	Compania Nationala REMIN S.A. and Compania Nationala Minvest S.A.	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	Compania Nationala REMIN S.A.	Outokumpu flash smelter and electrolytic refinery at Baia Mare in the northwestern area, near the Ukrainian border	35.	
Do.	do.	Zlatna smelter and refinery, Apuseni, northwestern Romania	13.	
Ferroalloys	Ferom-Joint Stock Co.	Complex at Tulcea	280.	
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, on the Somesul River, northwestern Romania	990.	
Lead:				
Ore (concentrate)	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 on the Tirnava Mare River, central Romania	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.

TABLE 4--Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2001

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies (Government-owned unless otherwise specified)	Location of main facilities	Annual capacity
Petroleum:			
Crude: 42-gallon barrels per day	Ministry of Industry, Department of Energy (SNP Petrom SA)	Ploesti-Teleajen, Pitesti, and Tirgoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau near the Siretul River, east-central Romania; and West Carpathian Field between the west bank of the Olt River and Tirgu Jiu, southeastern Carpathian Mountains	250,000.
Refined:	do. Ministry of Industry, Department of Energy	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.	SC Industrie Sarmei SA	Campia Turzii, Cluj, northwestern Romania	300.
Do.	Sidex S A Galati	Danube River, north of Brail, near Ukrainian border	10,000.
Do.	SC Siderurgica SA Hunedoara	West-central Romania, near Calan	2,135.
Do.	CSR SA Resita	Southwestern Romania, about 20 kilometers southwest of Caransebes	1,200.
Do.	Siderica SA Calarasi	Near the Bulgarian border close to the Danube River	2,200.
Do.	COST SA Targoviste	Tirgoviste, Dimbovita, near Bucharest	1,100.
Zinc:			
Ore (concentrate)	Compania Nationala Minvest SA	Baia Mare, near Ukrainian and Hungarian borders	60.
Metal	Sometra S.A.(Mytilineos Holdings, 88%)	Imperial Smelter at Copșa Mica, Tirnava River, central Romania	66.