

## THE MINERAL INDUSTRY OF

# BULGARIA

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In 1995, Bulgaria remained a regional producer of nonferrous metal ores and concentrates that met most of its domestic needs. Relatively small quantities of iron and manganese ores and a variety of industrial minerals that included asbestos, barite, fluor spar, gypsum, and limestone were also mined, largely for domestic consumption. However, most of the country's requirements for iron ore, steel, and mineral fuels had to be met through imports.

Reportedly, the country's economy in 1995 showed some recovery with the gross domestic product and industrial production growing slightly. The transition of Bulgaria's economy to a market-based system from 1990-95 was accompanied by a declining trend in industrial production, including the production of most mineral commodities. Generally, the decline in the country's output of minerals and other industrial products has been wholly consistent with structural adjustment needed by the economy to dismantle the former system of central economic planning. Additionally, the dissolution of a guaranteed Council of CMEA-based barter trading network, and, in a number of cases, environmental considerations also added constraints on industrial production. In 1995, the Government of Bulgaria continued to implement social and market economic reforms that began in 1989. Issues pertaining to decentralization and denationalization of the economy, as well as the need to redress decades-long problems associated with industry-generated environmental pollution, were among those that continued to be important elements in the Government's domestic agenda for 1995. The process of privatization mainly was carried out under the provisions of two laws: (1) "Bulgarian Law No. 215, 1991 on Conversion of State Enterprises" relating to private trade associations holding and/or using state property and its conversion to full commercial companies; and (2) "Bulgarian Law on Transformation and Privatization of State-Owned and Municipal Enterprises of 3/92" pertaining to the establishment of a legally designated privatization agency, the evaluation and transformation of state-owned enterprises, the sale of shares and stocks owned by the state and municipalities, and the sale of total assets or discreet parts of state-owned enterprises.<sup>1</sup> These laws also would have direct bearing on the process of denationalization of the country's minerals industry enterprises.

Environmental pollution survey data for Bulgaria, compiled by the International Bank for Reconstruction and

Development in 1994, provided environmental status reports for the cement, iron and steel, nonferrous metals, and petrochemical sectors of the country's minerals industries. According to the study, the principal pollutants generated by the cement industry were particulates and gases, such as sulfur dioxide (SO<sub>2</sub>), nitrous oxide (NO<sub>x</sub>), and carbon monoxide.<sup>2</sup> The decline in pollution generated from 1991 to 1993 largely was the result of the decline of production (about 50% compared with 1990 output) during this period.

In the iron and steel sector, the principal pollutants were ammonia, hydrogen sulfide, lead aerosols from the use of iron ores, NO<sub>x</sub>, particulates, and phenols associated with coke ovens, milling operations, and local electric power generation. Bulgaria's steel mills at Kremikovtzi and Pernik used domestic iron ores, which have a high lead and manganese content, in addition to the mainly imported ores and concentrates used in these facilities. The technology utilized at both steel mills reportedly was out of date and any modernization would abate the level of atmospheric pollutants emitted. Some modernization and repair and maintenance were reported in 1992-93, including monitoring equipment and new electrostatic precipitators. However, since 1990, the primary delimiting factor to increased levels of pollution has been the Government's limitation on the use of domestic iron ore to 10% to 20% of total charge used. Major point sources of pollution were associated with the country's nonferrous mining, processing, and smelting operations. The major pollutants in this industry have been SO<sub>2</sub> and particulates composed mainly of heavy metals. Since 1991, modernization projects that had been completed reportedly included the installation of newer and more efficient combustion units at the Plovdiv lead smelter. However, the level of investment needed by the Kurdjali zinc and Plovdiv lead smelters for actual pollution control equipment reportedly would amount to about US\$300 million. Bulgaria's petrochemical industry also was a major source of air and water contamination. In addition to particulates and SO<sub>2</sub> and NO<sub>x</sub> gases generated by the industry's powerplants, pollutants associated with petrochemical processing included hydrogen sulfide, hydrocarbons, and sludge. With the exception of the Pleven petrochemical plant, little or no pollution control equipment was reported to have been installed at the major facilities in this sector since 1991.

Some factors that contributed to the largely negative trend

in the country's output of mineral commodities from 1989 to 1994 remained in effect in 1995; namely, a structural reformation of Bulgaria's economy from a centrally planned to a market-based system and the adjustment of Bulgaria's foreign trade towards the world market. Although the steep decline of production of most mineral commodities (1989-91) appeared to have somewhat abated during 1993-95, some uncertainty still remained about the future viability of the country's minerals industries. The tension between the social cost associated with widespread and hazardous environmental pollution and that associated with widespread and extended unemployment that would arise from a rapid large-scale closure of mineral industry facilities has yet to be resolved. Bulgaria continued to experience serious shortages of capital needed for both pollution containment and facility modernization to increase efficiency and competitiveness. (See table 1.) Table 2 lists the administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1995. (See table 2.)

Until 1989, the largest share of Bulgaria's foreign trade was conducted within the CMEA barter-based trading system. Since 1989, Bulgaria's foreign trade was expanded to include Western Europe and other regional markets. However, with respect to mineral trade, former CMEA countries, especially the former Republics of the Soviet Union (FSU), remained Bulgaria's principal sources of mineral raw materials and mineral fuels. Ferroalloys, steel, and metal ores and concentrates were important mineral commodities that Bulgaria continued to trade with former centrally planned economy countries of Europe, but regular imports of natural gas and petroleum from Russia and other Republics of FSU remained critical to Bulgaria's economy.

Bulgaria's mineral industry produced copper from ores mined at the Asarel-Medet, Burgas, and Elatzite mining complexes. Recently, the Chelopech mining and processing operation was closed for environmental reasons stemming from hazardous levels of arsenic in the ore. About 95.7% of the country's copper ore was mined in open pit mines and 4.3% in underground mines. Underground copper mining was done by sublevel stoping (64%), cut-and-fill stoping (22%), and longwall stoping (12%).<sup>3</sup> In 1994, in what had been described as a breakthrough of a Bulgarian producer in the western European credit market, Handelsbank of Vienna reportedly extended a US\$24 million loan to Asarel-Medet Inc.'s copper ore mining and processing complex at Panagyurishte. The funds were to be used to modernize both the mining and beneficiation technology and equipment. Asarel-Medet's finished products were to be the basis for paying off the debt owed to Handelsbank.<sup>4</sup> In late 1995, the Government reported that investment priority would be given for the construction of a new electrolytic copper production line at the Pirdop mining, beneficiation, smelting and refining complex. The new facility would cost about US\$100 million, for which the funding would be obtained from loans from Japan's Overseas Economic Cooperation

Fund.<sup>5</sup> In 1995, Gorubso, one of Bulgaria's major producers of lead and zinc, announced plans to produce a copper concentrate from run of mine lead and zinc ore. The concentrate would be destined for domestic refineries and for export.<sup>6</sup> As part of the modernization of its beneficiation plant, Elatzite-Med Ltd. announced the awarding of a contract to supply eight crushers and six heavy screens, valued at about US\$9.8 million, to Krupp Fordertechnik GmbH of Germany. Krupp's Kubria cone crushers were to replace 10 older Soviet-built units and the beneficiation plant was to have become operational in September 1995.

In mid-1995, the Homestake Mining Co. of California concluded an agreement with Navan Resources Plc of Ireland to acquire an approximately 10.3% stake in Bulgaria's Chelopech gold-copper mine. Reportedly, Homestake Mining was to pay US\$24 million for 6 million newly issued shares of Navan Resources that would give it the stake in the Chelopech operation.<sup>7</sup> Navan's original involvement with Chelopech began in 1992 when it acquired a 25% interest in the enterprise, having demonstrated to the Government of Bulgaria the feasibility of commercially treating arseniferous concentrates without adversely affecting the environment. In 1993, Navan Resources concluded additional agreements with Bulgaria's state-owned Chelopech Ltd. which gave Navan Resources a 40% equity stake in the joint venture in return for Navan's investment to provide a bacterial-leaching plant and later a 68% interest in exchange for further investment in the enterprise. Resources at the Chelopech deposit were determined to be about 62 Mt of ore grading 0.98% copper, 2.48 grams per metric ton (g/t) gold, and 6.72 g/t of silver.<sup>8</sup> Reportedly, the resources that were considered for exploitation in the near term amounted to 32.5 Mt of ore grading 5.0 g/t of gold and about 1.4% copper at a 5.0 g/t equivalent cutoff.<sup>9</sup> By late 1994, Navan Resources had made the required investments in Chelopech to allow the commencement of tailings retreatment. It was planned to produce 5,000 tons of concentrates containing 18% copper and 45 g/t of gold. Reportedly, the tailings resources were determined to be sufficient to supplement the underground mining output for about 2 years.<sup>10</sup> Production at Chelopech in 1995 was anticipated to yield about 1.87 million grams of gold (about 60,000 troy ounces) and 5.4 t of copper.<sup>11</sup>

In May 1995, Bulgaria reported the discovery of large and commercially important gold deposits in southern Bulgaria at Ivailovgrad near the villages of Spahievo and Sedefche.<sup>12</sup> According to early reports, the deposits in this area were determined to be 150 to 200 meters (m) deep, consisting of two quartz veins. One vein was reported to be 300 m in length, 3 m wide, and 2 m thick, with five branches. The second gold-bearing vein, found below the one described above, measured 65 m in width on the surface but was of yet undetermined thickness and depth. The Bulgarian-Australian Gold Co., a joint-venture consortium of Bulgarian and Australian mining interests, reportedly submitted a request to the Government of Bulgaria to add the Spahievo-Sedefche

deposits to its principal gold mining concession at Madjarovo in the Haskovo region. The Bulgarian-Australian Gold Co. announced plans to invest about US\$11 million in the region during 1995-97, which would save and restore jobs at the nearby Gorubso lead and zinc mining and processing operations. These investments were to have included gold refining facilities to process the local ore.<sup>13</sup>

From an environmental standpoint, Bulgaria's lead and zinc industry continued to have difficulties. Limitations on output from certain operations at mining and beneficiation complexes were expected to continue until the environmental damage was rectified. Although the country's lead and zinc smelting and refining operations reportedly operated at production levels comparable with those in 1995, most of the output was exported to Europe, the Middle East, India, and Pakistan. Domestic demand for lead and zinc had been low. In 1995, the Kurdjali Lead and Zinc Works only sold 600 t of zinc to domestic consumers out of its production for the year of 27,600 tons.<sup>14</sup>

The Kremikovtsi Iron & Steel Works, the country's largest steel producer, reported continuing modernization of its operations. Bulgaria's Economic Bank approved a loan of US\$34 million from the State Fund for Reconstruction and Development to finance the construction of a continuous casting unit and the installation of Kremikovtsi's sixth oxygen converter. The continuous casting equipment was to be provided by Voest Alpine of Austria. With the completion of modernization at Kremikovtsi, the production of steel was expected to conform to western European standards.<sup>15</sup>

A variety of industrial minerals that included bentonite, dolomite, fluorite, gypsum, kaolin, marble, and perlite, largely for domestic consumption, were produced in Bulgaria. Industrial minerals were expected to obtain a greater prominence in the country's economy owing to the eventual needs of the construction materials and chemical sectors to meet the country's requirements for a modern infrastructure. At yearend, according to official Government press releases, a number of cement plants were offered for privatization to domestic and foreign investors. Modernization of the cement industry during recent years reportedly was minimal. Equipment, such as electrostatic precipitators and bag filters, was installed during the mid-1970's to the mid-1980's and was in need of replacement. Economic dislocations during the transitional period from 1990 to 1995 also reduced maintenance and delivery of needed spare parts to the mills. However, some improvements were made with the application of modern technology in one cement plant and the switch from coal to gas at a number of other facilities.

Reportedly the value of production Bulgaria's chemical industry increased by about 20% in 1995, compared with that of 1994. This was especially true of the country's producer of soda ash, Sodi Ltd. of Devnja, which reported an

income of US\$60 million in the first 8 months of 1995, compared with US\$24 million for the entire 1994 period. Major consumers were in Europe and the Far East. Exports during the first 8 months of 1995 amounted to about 360,000 tons.

In 1994, Bulgaria reported the closure of its uranium mines because of high operational costs as well as environmental concerns. The remaining uranium concentrate (640 t) that had been produced from domestic mining operations had been stockpiled for possible future use. Reportedly, from 1946 to 1989, Bulgaria's annual production of uranium ranged from 100 t to 600 t of concentrate. During that period, the country's ore was processed in the FSU. Until recently, information concerning the country's nuclear materials industry was considered classified and was not published. Owing to the environmental hazards associated with the continued storage of this material, and the lack of domestic technology needed to process the concentrate into fuel, the Government of Bulgaria decided to sell the stockpiled uranium concentrate at world market prices. However, by yearend 1995, no sales were made from the stockpiled uranium concentrate and, following protests by miners and other workers in this industry, the Government reconsidered the total closure of an industry that consisted of 51 mining operations.<sup>16</sup> Reportedly, a report prepared for the Government of Bulgaria proposed the preservation of 10 uranium mining operations that were determined to be economic and could provide up to 25% of the country's needs for nuclear fuel. An extension of liquidation terms for operations scheduled for closure also was proposed.

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<sup>1</sup>NTIS, Legal Text Service. Central and Eastern Europe and Russia and Independent States. Winter/Spring 1994.

<sup>2</sup>World Bank, Bulgaria: Environmental Strategy Study Update and Follow-Up. Report No. 13493-BUD, Washington DC, December 1994, pp. 64-74.

<sup>3</sup>Georgiev, K. Mining Industry of Bulgaria. Oruktos Ploutos (Athens), 85/1993, pp. 44-51.

<sup>4</sup>FBIS-EEU-94-164-S. Aug. 24, 1994 p. 6; from BTA 0954 GMT, Aug. 10, 1994.

<sup>5</sup>Mining Journal (London). Jan., 12, 1996, p. 25.

<sup>6</sup>———. Aug. 11, 1995, p. 98.

<sup>7</sup>American Metal Market. V. 103 No. 120, June 22, 1995, p. 16.

<sup>8</sup>SWB EE/W0292. July 29, 1993, p. A/7, from "Standard News" July 20, 1993.

<sup>9</sup>Mining Magazine. Nov. 1994, p. 242.

<sup>10</sup>Mining Journal. Oct. 21, 1994, p. 291.

<sup>11</sup>SWB EE/W0292. July 29, 1993, p. A/7, from "Standard News" July 20, 1993.

<sup>12</sup>FBIS-EEU-95-098-S. May 20, 1995, p. 4; from BTA (Sofia) 1756 GMT May 2, 1995, and Mining Journal (London). June 30, 1995, p. 481.

<sup>13</sup>Mining Journal. Sept. 22, 1995, p. 214.

<sup>14</sup>Work cited in footnote 13.

<sup>15</sup>FBIS-EEU-95-242-S. Dec. 18, 1995, p. 4; from DUMA Dec. 2, 1995, p. 5.

<sup>16</sup>FBIS-EEU-95-185-S. Sept. 25, 1995, p. 5; from BTA, 1009 GMT, Sept. 12, 1995.

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

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 e/
<b>METALS</b>					
Aluminum metal, secondary	2,052 r/	2,688 r/	1,832 r/	955	1,000
Bismuth metal e/	40	40	40	40	40
Cadmium metal, smelter	232	200	265	286	250
Copper:					
Ore:					
Gross weight	thousand tons	15,500 e/	16,000 e/	19,700	19,000
Cu content	do.	65	67	93	75
Concentrate:					
Gross weight	do.	360	270	250	250
Cu content	do.	46	35	33	33
Metal, primary and secondary:					
Smelter		27,800	25,000	28,000	40,000
Refined		12,800	18,000	26,300	27,000
Gold metal e/	kilograms	2,000	2,000	2,000	2,000
Iron and steel					
Iron ore:					
Gross weight e/	thousand tons	700	900	1,000	950
Fe content	do.	182	239	266	250
Iron concentrates	do.	270	351	428	400
Metal:					
Pig iron for steelmaking	do.	943	837	998	1,442 r/
Ferroalloys, ferrosilicon e/	do.	28	20	20	20
Steel, crude	do.	1,615 r/	1,551 r/	1,941 r/	2,491 r/
Semimanufactures, rolled	do.	1,309 r/	1,555 r/	2,046 r/	2,050
Lead:					
Mine output, Pb content		50,000	45,000	40,000	50,000
Concentrate: e/					
Gross weight		62,300	60,000	60,000	65,000
Pb content		43,600	39,000	39,000	43,000
Metal, refined, primary and secondary		56,223 r/	53,099 r/	56,994 r/	62,300
Manganese ore:					
Gross weight		34,000	25,500	15,500	11,500
Mn content		8,700	6,900	4,000	3,000
Molybdenum, mine output, Mo content e/		120	120	120	110
Silver, mine output, Ag content e/		37	35	35	35
Tin, metal		22	23	23	22
Uranium, oxide, U content e/		700	600	600	600
Zinc:					
Mine output, Zn content		29,100	29,000	32,000	30,000
Concentrate: e/					
Gross weight		70,000	70,000	65,000	75,000
Zn content		31,000	31,000	30,000	33,000
Metal, smelter, primary and secondary		58,730 r/	57,820 r/	54,039 r/	64,000
<b>INDUSTRIAL MINERALS</b>					
Asbestos		400	500	500	500
Cement, hydraulic	thousand tons	2,374 r/	2,132 r/	2,007 r/	2,200
Clays:					
Bentonite	do.	114	80 e/	67	70
Kaolin	do.	106	104	111	115
Feldspar	do.	46	48 e/	51	50
Gypsum and anhydrite:					
Crude	do.	63	125	143	150
Calcined	do.	41	57	54	60
Lime: Industrial	do.	1,030	729	531	500
Nitrogen: N content of ammonia	do.	1,092 r/	905	885	900
Pyrites, gross weight e/	do.	170	170	150	150
Salt, all types	do.	1,970	1,000	650	700
Sodium carbonate, calcined	do.	893	517	259	300
Sulfur: e/					
S content of pyrites		60,000	60,000	50,000	50,000
Byproduct, all sources		50,000	50,000	50,000	50,000
Total		110,000	110,000	100,000	100,000

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 e/	
<b>MINERAL FUELS AND RELATED MATERIALS</b>						
<b>Coal, marketable:</b>						
Anthracite	thousand tons	42	45	41	40	40
Bituminous	do.	86	203	222	200	200
Brown	do.	3,090	3,350	3,420	3,400	3,400
Lignite	do.	25,200	26,700	25,400	26,200	26,200
Total	do.	28,418 r/	30,298 r/	29,083 r/	29,840 r/	29,840
Coke	do.	738	840	912	969	950
Gas, natural, marketed	million cubic meters	10	8	7	8	8
<b>Petroleum:</b>						
Crude, As reported	thousand tons	58	53	43	45	45
Refinery products e/	thousand 42-gallon barrels	20,000	20,000	20,000	25,000	25,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Apr. 1996.

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

TABLE 2  
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity	
Cement	Reka Devnia	Devnia	1,825.	
Do.	Zlatna Panega	Panega	1,300.	
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.	
<b>Coal:</b>				
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.	
<b>Copper (Cu):</b>				
Concentrate, Cu content	Medet-Asarel Co.	Panagurishte, Pazardzhik District	25.	
Do.	Chelopech Ltd.	Srednogorie, Sofia District	5.	
Do.	Bradtze	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	Georgi Damyanov	Srednogorie, Sofia District	120.	
Iron ore	Kremikovtsi Iron and Steel Combine	Kremikovtsi	2,000.	
<b>Lead-zinc (Pb-Zn):</b>				
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.	
<b>Metal:</b>				
Pb, refined	Dimitur Blagoev	Plovdiv	65.	
Do.	Georgi Dimitrov	Kurdjali	60.	
Zn, smelter	Dimitur Blagoev	Plovdiv	60.	
Do.	Georgi Dimitrov	Kurdjali	30.	
Manganese ore	Mangan Ltd. (Obrotchishte)	Varna District	50.	
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	(1/).	
<b>Petroleum:</b>				
Crude	do.	do.	(1/).	
Refined	barrels per day	Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	260,000.
Steel, crude:		Kremikovtsi Iron and Steel Works	Near Sofia	1,800.
Do.		Stomana Iron and Steel Works	Pernik	1,300.

1/ Insignificant capacity.