THE MINERAL INDUSTRY OF

BULGARIA

By Walter G. Steblez

The period from 1996 to 1997 was a significant watershed in Bulgaria's transition to a market economy. Despite preliminary signs of slow economic activity in 1996, on balance, 1996 and 1997 saw major efforts made to stimulate private ownership in the economy and to attract foreign investment in the country's mineral industries.

In 1997, Bulgaria's gross domestic product (GDP) declined by 7% compared with that of 1997. This was a significant improvement compared with that of 1996 when the GDP declined by about 11% compared with that of 1995. The value of industrial production in 1997 also declined by more the 7%. In 1997, inflation was highlighted by a sharp devaluation of the currency. Although the rate of inflation was expected to reach 550%, it was anticipated that it would decline to 12% by year end 1998 and 7% by 1999 mainly owing to the efforts of the new Government (elected in April) and the establishment of a currency board, which pegged the Bulgarian lev to the Deutsche mark (DME1=BL1000). The Government of Bulgaria agreed to maintain hard currency reserves in quantities that would be sufficient to cover all levs in circulation, as well as those being held as commercial banking reserves in the central bank (U.S. Department of Commerce, 1997).

The Government remained committed to transforming the economy to a market-based system. The legal basis for this transformation was the Law on Transformation and Privatization of State and Municipal-Owned Enterprises, which was adopted by Parliament in 1992. At the same time, the Privatization Agency was created to develop plans for the sale of Government assets valued in excess of BL 70 million (increased to BL 350 million in 1997). The Government's privatization program was to use direct sales and tender offerings.

State-owned assets that were to remain entirely state owned were the Bulgarian State Railroads, Bulgargas (gas industry), Bulgarian Posts, Education and Sciences Establishment, Cartography Company, National Cadastral Company, National Geodesy Company, Geopribor (geological equipment production), Geozashchita, and Vodokanalenzhnir (water main engineering) (U.S. Department of Commerce, 1997). Enterprises in which the Government was to retain at least a 51% controlling interest included Balkan Airlines, the Russe and the Varna merchant fleets, major airports and seaports, and construction companies involved in highway, railroad, and seaport construction.

The abatement of pollution from mineral industry point sources remained an important issue in 1997. In 1989, the beginnings of the dissolution of the centrally planned economy regimes in Eastern Europe, concentrations of sulfur dioxide (SO_2) in Bulgaria were, with the exception of Poland, the highest in the former Council for Mutual Economic Assistance (CMEA) block. In all areas affected by coal-burning point sources of atmospheric pollution, concentrations of SO_2, nitrogen oxide (NO_x), and particulate was above the health safety level. The emissions of SO_2 and NO_x amounted to 1.7 million metric tons (Mt) and 300,000 metric tons (t), respectively, and more than 2 Mt of other pollutants was released into the environment. (*See table 1.*) Additionally, only 1 out of the 13 major rivers in the country was considered to be clean. Numerous stretches of the rest of Bulgaria's rivers were contaminated to varying degrees by discharges from heavy industry, open pit mines, and agricultural runoff (Natsionalen Statisticheski Institut, 1989-93). Radioactive wastes also reportedly were discharged into the Danube River from the Kozloduy nuclear electric power plant.

In the early 1990's, Bulgarian data showed a decline in total pollution—the total level of pollution generated during 1992 was 30% to 40% less than that during 1991. This was, however, attributable more to a decline in the level of the country's industrial output during this period than to a significant assimilation of pollution-abatement technology.

The latest data available on environmental protection efforts in Bulgaria were for 1996 and show a steady increase in expenditures for environmental protection assets and their operational costs from 1992 to 1996. (*See table 2.*)

The sharp increase in outlays for environmental protection from 1993 to 1996 appears to have produced a corresponding decline in total emissions of contaminants into the atmosphere in 1996, given a steady or even slight increase in output levels during this period. (*See table 1.*)

By world standards, Bulgaria remained a modest producer of nonferrous metal ores and concentrates, which met most of the country's domestic and export requirements. Small amounts of iron and manganese ores and a variety of industrial minerals also were mined (asbestos, barite, fluorspar, gypsum, and limestone), largely for domestic consumption.

In 1997, Bulgaria's production of such metals as cadmium, copper, manganese, pig iron, and steel and steel semi manufactures showed overall recovery compared with most output levels in 1996. During the same period, however, the output of rolled aluminum, lead and zinc ores, leads concentrate, lead metal, and silver declined by about 9%, 7%, 2%, 3%, and 35%, respectively. Most categories of mineral fuel production declined in 1997 compared with those of 1996. Total coal output declined by 5%; petroleum production, about 18% (petroleum production, however, is negligible); and natural gas production, by about 9%. With the exception of limestone and dolomite, the production of most major categories of industrial minerals declined sharply during the year. (*See table 3.*)

The volume of Bulgaria's trade for selected minerals from 1992 to 1996 is shown in tables 4 and 5. Bulgaria was a net importer of coal from 1993 to 1996; in 1996, the value of these imports amounted to more than US$18 million (US$1=1.754.4BL). In 1996, Bulgaria also was a net exporter of iron and steel products and construction materials, the net values of which amounted to more than about US$24 million and US$3.4 million, respectively. Having been a net importer from 1992 to 1995, Bulgaria became a net exporter of chemicals in 1996, with the net value of exports amounting to more US$50 million (Natsionalen Statisticheski Institut, 1997, p. 244, 245). In 1996, the value of exports of basic mineral and mineral-related commodities was 425% greater than that of imports; this represented a significant change from 1995 when the value of exports was about 220% greater than that of imports.

The pattern of consumption of most major minerals raw material commodities followed the general production trend; namely, contraction during the period of transition to a market economy. (*See table 6.*)

Metals have been a substantial component of the mineral industry's production profile. Mine output included copper, iron, lead and zinc, and manganese. Additionally, byproduct gold, silver, molybdenum, and other metals were produced, chiefly from processing copper and lead and zinc ores. During the period of economic transition (1991 to 1997), consumption patterns (parallel with those of production) in the country's economy showed widespread declines compared with production and consumption patterns in the 1980's because end use was no longer under a central planning stimulus. Compared with consumption levels in 1992, some increases in consumption were noteworthy with respect to cement, energy, and several iron and steel semi manufactures.

Bulgaria's major copper deposits have been exploited in the Srednogorie-Panagjurishte region. The Asarel-Medet Co. and Elatzite-Med Ltd. surface mines and the Chelopech Ltd. underground mine were in operation. MDK S.A.'s copper smelter and refinery operated in this region at Pirdop (Kraicheva, 1996). The Asarel-Medet and the Elatsite open pit operations mined a low-grade porphyry ore (0.2%-0.5% Cu), which was offset somewhat by the lesser expense of open pit mining, but which also posed more serious environmental problems. At Asarel-Medet, about US$3 million per year has been earmarked for environmental protection (Tsotsorkov, 1998).

The Chelopech mining operation [about 70 kilometers (km) east of Sofia] works a polymetallic deposit containing copper and precious metals. Gold was the most important element because it represents a major portion of Bulgaria's gold reserve. The high arsenic content of the ore, however, has been the cause of serious environmental concerns. Additionally, copper was mined from skarn-vein-type copper ore in the Burgasko-Strandjanski region of the country (Kraicheva, 1996).

In 1997, the major technical and economic parameters at Chelopech were as follows:

- Cost of production of 1 metric ton (t) of ore— 16,023 BL
- Basic equipment:
  - one Damrock minematic drill carriage
  - one Boomer drill carriage
  - five Toro load-haul-dump machines
  - two Simba Junior drill rigs
  - one Solo drill rig
  - one charge loader
  - seven 10KR-2 (K-10) electric locomotives
- Productivity (per capita):
  - ore, 1,903 metric tons per year (t/yr)
  - ore and overburden, 2,074 t/yr

The ore from Chelopech was processed at the independently owned and operated beneficiation plant belonging to Bimak AD, where it passes through primary, secondary, and tertiary crushing to a minus 20-millimeter (mm) sizes. The sized ore then passes through a ball mill that operates with a closed-loop 750-mm-diameter hydrocyclone (second stage). The material from the second-stage hydrocyclone (65%-70%, minus 0.08 mm) is entrained to the flotation shop. The copper and pyrite concentrates undergo dewatering in SP-18 thickeners and vacuum-drum filters.

In 1997, the technical operating parameters of the Bimak concentrator, which included feestock from Chelopech, were as follows (Vylchev and Kesyakov, 1998):

- Ore processed— 587,900 t
- Metal content of the ore
  - copper (percentage)— 1.2
  - gold (grams per ton)— 3.5
- Recovery of copper in copper concentrate (percentage)— 81.28
- Copper concentrate produced, gross weight (thousand tons)— 32.2
  - copper content (percentage)— 18
  - gold content (grams per ton)— 36.24
- Pyrite concentrate produced, gross weight (thousand tons)— 60.0
  - copper content (percentage)— 0.96
  - gold content (grams per)— 7.35
- Gravity separation concentrate, gross weight (tons)— 2.05
  - gold content (percentage)— 5.16
- Gold recovery (percentage):
  - copper concentrate— 61
  - pyrite concentrate— 21.5
  - gravity concentrate— 5.1

Major issues concerning Bulgaria's copper and copper-gold branches in 1997 and involved the Chelopech mining and MDK smelting operations. In June, Navan Resources Plc. of Ireland, a major investor in the Chelopech mining operation, reported significant discoveries of gold mineralization within its Etropole-Iskar licence area, about 40 to 50 km northwest of Chelopech. The discoveries were made during the company's first-quarter exploration program (Mining Magazine, 1997). Also in midyear, Navan and Homestake Mining Co. of the United States announced an agreement to expand operations at Chelopech and to conduct jointly exploration of Navan's highly prospective licenced properties, as well as to develop jointly commercially valuable deposits in the area. Upon final approval by the companies' shareholders, the agreement called for Homestake to make a direct investment in Chelopech, amounting to US$30 million; to fund US$10 million contingency standby loans for the operation; and to provide US$8 million to finance a new joint venture to conduct exploration (Homestake Mining Company,

1997; Skillings Mining Review, 1997).

Homestake's increased involvement with Chelopech began with its decision in 1996 to exercise its option to acquire a 50% stake in Navan Bulgarian Mining (NBM), a wholly owned subsidiary of Navan (Mining Journal, 1996). Homestake had acquired this option in 1995 through the purchase of 6 million shares of Navan for US$24 million. Originally, NBM formed a joint venture with Chelopech (Bimak) to mine copper and gold in Bulgaria. NBM's share in the joint venture's equity amounted to 68% (Metal Bulletin, 1996). The need for rapid environmental improvement at Chelopech, provided Navan with the original investment opportunities in the operation. Owing to the high pollution of the Topolnitz tailings dam with arsenic in 1990, the Environmental Law of 1991 forced the Government of Bulgaria to prohibit the processing of Chelopech ore at MDK (Pirdop) because copper concentrate produced at this facility contained as much as 0.75 As. With output down to about one-fifth of capacity, Chelopech established a joint venture with Navan (Bimac-AD) that would introduce new technology at this operation (Kraicheva, 1996).

In 1997, Navan and Homestake conducted discussions with the Government of Bulgaria, involving the full privatization of the Chelopech operation, the expansion of the mine's production, and obtaining mineral concessions. The companies viewed Chelopech as a "long-term competitive producer of copper and gold" (Skillings Mining Review, 1997). Planned facility expansion at Chelopech would raise production of copper to about 18,000 t/yr and gold to about 5,000 kilograms per year (kg/yr) (Homestake Mining Company, 1997; Skillings Mining Review, 1997). During the January- to September period in 1997, production at Chelopech amounted to a 28% rise in copper production, from 3,601 to 4,606 t. Output of gold increased by 1.6% from 1,268 kilograms (kg) (40,764 ounces) in 1996 to 1,288 kg (41,396 ounces) in 1997 during the same 9-month period (Mining Journal, 1997b).

The Chelopech mining operation worked a polymetallic deposit that, apart from gold, contains commercially useful values of germanium, iridium, palladium, and silver. Reserves at Chelopech were calculated on the basis of a cutoff grade of 5 grams per ton (g/t) of gold, and were estimated to be about 7 million ounces (about 218 t) of gold. At a cutoff grade of 3 g/t, reserves of gold were determined to be 14 million ounces (about 435 t) (Mining Journal, 1997c).

The Chelopech mine and beneficiation plant had the capacity to treat 750,000 t/yr of ore. Facility modernization included entire new complements of flotation cells, pumps, instrumentation, and electrical switchgear. Copper-gold concentrate, a product of primary flotation, accounted for 80% of the copper and 57% of the gold recovered. The residual pulp was acidified to produce pyrite concentrate containing 25% to 30% gold. The main environmental problem rested with the copper-gold concentrate, which contained from 4% to 5% as, by weight. To avoid a large smelter penalty and/or closure, an 85,000-t/yr roaster plant to remove the arsenic was purchased from Outokumpu Oy of Finland. Because the gold contained in the pyrite concentrate is refractory (i.e., requiring a high temperature to process), small amounts were sold locally (15,000 to 20,000 t/yr). Because of Navan's acquisition of Almagera S.A. in Spain's pyrite belt, the Chelopech pyrite concentrates have begun to be processed at Almagere. Deliveries to Almagere from June through year-end amounted to 35,000 t.

Modernization at the Chelopech mine included the acquisition of Toro 300 and 301D scoops, a Tamrock mininmatic drill carriage and a Solo drill rig, and a variety of utility vehicles. New garage facilities also were completed at the 405-meter (m) level for maintenance of the new diesel fleet. Electrical switchgear and compressed air systems were extensively renovated and replaced. The results of a study conducted at Chelopech to extend the depth of the mine was as follows: (1) A 20-square-meter (m^2) ramp would have to be constructed from the surface to the 405-m level to provide access to the main garage complex and would free the Kapitalna shaft for rock hoisting, (2) the conversion of the Kapitalna shaft to skip hoisting from wagon haulage would require redesigning the shaft and lengthening it by 185 m to enable the installation of a loading pocket, and (3) material from below the 405-m level should be moved to a new in shaft primary crusher on the 255-m level and the levels would be connected by a ramp system. Also, to meet the objective of increasing production to 1.5 million metric tons per year (Mt/yr), the beneficiation process should undergo modification that was to include a semiautogenous grinding mill (Mining Journal, 1997c).

Navan's exploration in the Chelopech area focused mainly on four licenced exploration areas, targeting Upper Cretaceous gold and copper mineralization. As indicated earlier, exploration at the Etropole-Iskar licence area showed promise during the year. The other licence areas included Breznick/Western Srednagora (west of Sofia, extending to the Serbian border), Golema Rakovitsa (west of Chelopech and south of Etropole-Iskar), Stara Zagora (in the center of Bulgaria), and Chelopech/Schvishti Plaz (an area immediately north of Chelopech) (Mining Journal, 1997c).

The privatization of the MDK SA Copper Smelter & Refinery (formerly the Georgi Damyanov Copper Smelter and Refinery) was among the chief events in Bulgaria's copper-gold branch. Built in 1958 as Bulgaria'a only smelting and refining complex, MDK was upgraded in 1987 when a 360,000-t/yr copper slag flotation plant, a second sulfuric acid plant, and a 120,000-t/yr Outokumpu flash smelter were added to the operation. The dissolution of Bulgaria's central economic planning system prevented the completion of a planned third sulfuric acid plant and a new 130,000-t/yr copper refinery, until 1994, when work was resumed. The difference in capacities between the flash smelter and the new refinery was accounted for by the 14,000-t/yr smelter capacity of the Eliseina copper smelter. In 1997, work on the new refinery and sulfuric acid plant continued, but scheduled completion was contingent on the availability of funds (Gill, 1997e). The cost to complete the construction of these facilities, along with technical improvements to abate pollution, was estimated to be between US$80 million and US$180 million. To help meet these needs, the Government offered 56% of MDK's stock for sale (Gill, 1997e).

In September, the Privatization Agency of Bulgaria signed an agreement with Union Minière of Belgium (UM), to sell 56% of MDK stock to UM for US$80 million. UM reported plans to invest US$200 million during a 5-year period to raise smelting capacity to 185,000 t/yr and to build the new copper refinery (Union Minière, 1997).

Foreign and domestic gold exploration and mining activities

played a role in Bulgaria's gold mining sector in 1997. Domestically, Greek American Exploration Ltd., a joint venture comprising Royal Gold Inc. of Denver and Silver and Baryte Mining Co. of Athens, signed an agreement with the Phelps Dodge Exploration Corporation to form a joint venture, Sofia Minerals Ltd. (SOMIN), to explore and develop prospective properties in Bulgaria. SOMIN and Bulgaria's Committee of Geology and Mineral Resources signed an agreement giving SOMIN requisite concession to conduct exploration work at Lozen-Stremchi in southeastern Bulgaria and Buhovo-Gorna Malina, near Chelopech, in the northwestern part of the Panaguirishte intrusive zone. The Lozen-Stremchi concession was flanked by the RTZ Corp. Plc.'s exploration concession to the north and Minorco's concession to the south and covered an area of 2,645 square kilometers (km^2) (about 1,021 square miles). Buhovo-Gorna Malina is a 600-km^2 (232-square-mile) concession area bordering a large exploration concession area in the north and east held by Navan. The Buhovo-Gorna Malina exploration area is "considered to be a possible continuation of the Srednogorie volcanic intrusive corridor," thought to contain Au-Cu mineralization. SOMIN planned to allocate about US$350,000 for extensive exploration in Bulgaria during an 18-month period (Royal Gold, Inc., 1997).

The reestablishment of cooperative work between Bulgaria and Mongolia, which largely collapsed following the dissolution of CMEA, was another important issue in the gold sector during the year. The two countries reached an agreement in October to reestablish a 50%-50% gold mining venture (Mongolbulgargeo) in Mongolia. The original agreement was terminated in 1990. Talks between the two countries resumed in 1994; the agreement that was reached in 1997 specified Mongolia as the country of registration for Mongolbulgargeo to take advantage of Mongolia's more favorable taxation regime. The principals in the joint venture are state-owned entities—Bulgargeomin on the Bulgarian side and the State Property Committee representing Mongolia. The joint venture's projected output was to amount to about 300 kg/yr of gold (Reuters Limited, 1997).

Steel trade issues with the European Union (EU) dominated events in Bulgaria's steel industry in 1997. The first issue concerned the curtailment of Bulgaria's exports of steel to the EU, and, the second, the EU's demand that Bulgaria abrogate its metal scrap export restrictions. To avoid antidumping actions by the EU, Bulgarian steel producers voluntarily restricted exports to the EU. Steel exports (hot-rolled coil), which increased between 1994 and 1996, depressed prices, especially in the steel markets in Italy, Spain, and the United Kingdom (Gill, 1997a). Owing to this curtailment, more of Bulgaria's steel exports were directed to less profitable market in Asia and the United States, where competition from Russian and Ukrainian producers was very strong. With respect to claims that Bulgarian steel was dumped on the EU market, Bulgarian producers indicated that they have been paying international or higher prices for almost all inputs to production except those for labor (Gill, 1997a).

Scrap feestock was vital to the country's steel production, especially at the Stomana Iron and Steel Works. Rising exports of iron and steel scrap affected the country's output of steel negatively, and there appeared to be a direct correlation between increases in scrap exports and the decline in total output. A spokesperson for Bulgaria's steel industry indicated that provisions within the EU association agreement allow for exclusions of critical materials; that is, materials deemed to be critical for the economy. The spokesperson further noted that eliminating Bulgaria's scrap export quotas would in no way alleviate the EU's raw material need (full exports would represent only 1% of the EU's consumption requirements), but would cause serious damage to the country's steel industry and economy (Gill, 1997a).

The country's crude steel was produced principally at Kremikovtzi EAD (Corp.) and Stomana Joint Stock Co. Kremikovtzi EAD, built in 1974, was originally planned to utilize a complex iron ore, mined about 7 km from the steelworks. The levels of lead and manganese in the ore, however, were sufficient to preclude its full scale use as a feedstock. Only 20% of Kremikovtzi's 2-Mt/yr iron ore feedstock requirements could be supplied by this deposit. The balance of the ore was supplied by the former Soviet Union (FSU) mainly with ore from deposits in Russia and Ukraine (Gill, 1997d). The decline in trade between Bulgaria and the FSU following the dissolution of the U.S.S.R. necessitated importing about 1.6 Mt/yr of iron ore from Brazil, the Republic of South Africa, and Venezuela. Also, about 1.5 Mt/yr of coking coal was shipped to Bulgaria from the United States, and relatively small quantities of coal were imported from Poland (Gill, 1997d). Despite the deterioration of export sales of steel to the FSU, some traditional regional export markets remained viable, including Greece, Serbia-Montenegro, Turkey, and the former Yugoslav Republic of Macedonia. Market opportunities also have become available in the EU, as well as in Mexico and the United States.

Approximately 80% of Kremikovtzi's steelmaking capacity required input of ore and concentrate for the oxygen converters; the balance required scrap for the production of electric steel (Dimitrov, 1998). With total steel output at Kremikovtzi amounting to about 1.85 Mt in 1996, the plant's total capacity utilization during that year was 82%, a decline of 10% compared with that of 1995. Capacity utilization of oxygen converters fell to 95.5% in 1996 from 100.5% in 1995, a decline of 5%. However, the utilization of electric arc furnaces showed the steepest decline of 43% compared with 44.9% in 1996 (Georgiev-Avramov, 1998).

As of 1991, the original production profile at the Stomana Joint Stock Company included two blast, seven open-hearths, and three 100-t electric arc furnaces. By 1997, the plant produced steel from only two of its electric arc furnaces; one of the two is new, and the other is a hybrid Mannesmann/Asea unit. The steel was refined in two ladle furnaces that had been commissioned between 1994 and 1997. The completion of a third electric arc furnace was anticipated by year-end 1997. The Stomana steelworks produced low- and high-alloy steels, as well as a small range of tool steels. The company's planned future investments included modernization of its 300,000-t/yr plate mill. In addition to increasing productivity, product quality, and reducing energy inputs, rationalization and modernization at Stomana have had a salutary effect on the plant's environmental status. The closure of Stomana's open-hearth and blast furnaces produced an environmental dividend by significantly reducing emissions of pollutants at the facility. Additionally, the most recent direct

expenditure on environmental protection included the acquisition of a Demag offgas filter valued at US$3 million and a water supply system redesigned to a closed loop, or cycle, process (Gill, 1997b).

Although Stomana does not produce special steels, the capacity to produce them exists at two nearby enterprises—the Radomir "Goliath" (producing heavy cranes, blast furnaces, and surface mining equipment using an electric furnace and technology supplied by Kobe Steel of Japan) and Kamet. The steelmaking furnace at the Goliath, however, has not been operational, and the Kamet declared bankruptcy and was not expected to reopen.

Future investment plans for the steel industry are shown in table 7.

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 smelting and refining were in Plovdiv and in Kurdjali in the Madan area. (*See table 8*).

KCM SA (KCM), the lead and zinc smelting and refining operation in the Plovdiv region, imported 70% of the lead concentrates and 40% of the zinc concentrates used in the operation. Additionally, 4% to 5% of the refined lead, as well as 20% of the zinc, was produced annually at KCM from secondary sources. In 1996, KCM produced 55,000 t of London Metal Exchange (LME)-grade zinc and 40,000 t of LME-grade lead. KCM was established to process lead and zinc sulfide ores located in deposits 15 to 50 km from the smelter and refinery (Gill, 1997c). Operating at about 92% of capacity in 1997, KCM increased its production of lead and zinc in recent years compared with the output for these commodities in 1993 of 32,000 and 46,700 t, respectively. In addition to lead and zinc, KCM produced byproducts consisting of about 200 t/yr of cadmium, 300 t/yr of bismuth alloy, 35 t/yr of dore, 2,500 t/yr of zinc sulfate, and 50,000 to 60,000 t/yr of sulfuric acid (Gill, 1997c). More than 80% of KCM's zinc and about 50% of the lead production was exported each year (about 20,000 t lead and 45,000 t zinc).

Major investments by KCM since 1989 were directed at reducing pollution. The lead plant was the most serious point source of pollution. Filters and other equipment used for pollution abatement were reported to have cut toxic waste by 300%, lead emissions by 250%, and cadmium and zinc emissions to legally permissible levels. The use of natural gas at the lead refinery and the Waeltz kiln plant instead of the steam power station resulted a reduction of SO_2 by 900 t/yr, and filters in the Waeltz unit and a leaching plant reduced dust emissions by 60%. A closed loop water cooling system was installed in 1993 that eliminated cadmium, lead, and zinc contamination of processed water. To finance these investments, KCM was able to obtain US$60 million credit packages from the Japanese Government. Scheduled completion of facility improvement at KCM was to be in 1999, and, according to the agreement with Japan, the company would not be privatized before the completion of the work (Gill, 1997c; Clifford, 1998). With respect to dust and waste water, the results of investments by KCM for environmental protection during the first half of the 1990's are shown in table 9 (Dobrev, 1998).

Lead and Zinc Complex Ltd. in Kurdjali produced about 30,000 t/yr of lead and 26,000 t/yr of zinc by using concentrates (70%) and industrial wastes (30%) as a feedstock; it also produced about 80 t/yr of cadmium. A 20,000-t/yr battery-recycling facility was planned for the operation; western financial institutions will provide assistance (Gill, 1997c). Lead and Zinc Complex was partially (25%) privatized in 1996. In 1997, Bulgaria's newly elected Government agreed to sell off the remaining 75% of the plant's assets. Investment capital was key to modernizing the production process and to introducing pollution-abatement technology. Bidders included German and Swiss companies (Mining Journal, 1997a).

The major events during the year in the manganese sector included shifts in mine ownership and efforts to increase the level of mining privatization.

In June, QEX-M Resources of Canada was in the process of acquiring a 60% interest in International Minerals & Metals Corp. of the United Kingdom (IMMC), whose interest in the Obrochishte manganese mine amounted to 51% of the operation's total equity. The mine is located about 35 km northwest of the port of Varna on the Black Sea. Reserves were estimated to be more than 80 Mt of ore, averaging about 28% manganese. Production under IMMC's management has been about 150,000 t/yr of ore to produce 80,000 t/yr of concentrate. Also, IMMC was interested in increasing its share in the Obrochishte operation to 91% through stock purchases from the Government and raising overall production capacity to 500,000 t/yr of ore to produce 260,000 t/yr of concentrate. To raise production capacity, IMMC planned to construct a second larger shaft, the construction of which was put in abeyance during the dissolution of the central economic planning system. Also, a new sinter plant was to be imported from Canada to raise the manganese content of the concentrate from 33% to 48% (Cumming, 1997).

"Bentonit"-EAD, founded in 1951 and formerly known as the Rhodopi mining complex, was one of Bulgaria's main producers of industrial minerals. Originally, the company produced only asbestos and mica. In subsequent years, it began to produce other industrial minerals, including chalk and talc. In 1997, bentonite, perlite, and zeolite were mined and processed into products of various grades that were suitable for domestic consumption and exports (Zhilov, 1998).

Holderbank Financière Glaris Ltd. of Switzerland acquired a majority shareholding (51%) in Beloizvorski Cement JD Co. of Bulgaria, a former state-owned company, for US$32.5 million. Such issues as concession rights for operating adjacent quarries also were discussed during the year (Industrial Minerals, 1998a). Located near the village of Beli Izvor in the Vratza municipal region, Beloizvorski Cement JD Co. uses locally quarried limestone and marl to produce M350 and M450 grades of cement. The plant had the capacity to produce 900,000 t/yr of cement by using 1 Polizius and 2 Sket production lines. The number of personnel prior to the sale totaled 1,260 workers and administrative staff. About 80% of the company's output has been sold on the domestic market.

Having reached a preliminary agreement in 1996 with the Government of Bulgaria to purchase Sodi S.P.J.S. Co., the country's producer of soda ash, Solvay S.A. of Belgium finalized the deal in mid-1997 to acquire 60% of Sodi's stock for US$160 million. Solvay also announced plans to invest about US$25 million to double Sodi's dense soda ash capacity from 400,000 to

800,000 t/yr and to improve storage capacity at the plant with the addition of a 18,000-t silo. Solvay also announced that it no longer would support a renewal of duties on soda ash to the EU (Industrial Minerals, 1998b).

To restructure the coal industry, the Government prepared a major two-part development plan (Markov, 1996). The short-term portion covers the period 1995 to 2010 and the long-term portion covers 1995 to 2020. The short-term plan calls for coal output to reach 35 Mt by 2000 at the same time the coal industry is to undergo reorientation to meet consumer demand and corporate restructuring. The long-term plan calls for domestically mined steam coal to account for 36% to 40% of the total electric power generated in the country. Most of the coal would be mined at the East Maritsa open pit mine, which should be sufficient to generate 16 billion kilowatts per year and to allow for the expansion of thermal electric power station capacities and the needs of the briquet plant in the region. Production of coal from the Bobov Dol open pit mines was to be maintained to produce 1.85 Mt/yr of coal to supply the rebuilt Bobov Dol thermal electric power station (3 billion kilowatts). The long-term plan also requires the stabilization of production at the western Marishki coalfield to supply supply the Maritsa-3 electric power station. Moreover, the plan called for the continuation of state subsidies to the coal mine mining industry to maintain output and expand production capacity. The subsidies are to be implemented in with the state's investment strategy for the coal industry (Markov, 1996). Additional coal production needs could be met from deposits at Elkhovo and Balsha.

One of the major issues concerning the natural gas and petroleum sector during the year was the continuing dispute about deliveries of natural gas to Bulgaria from Russia. The dispute between Gazprom of the Russian Federation, that country's giant natural gas producer, processor, and exporter, and Bulgaria's state-owned gas industry interests rose from disagreements about the purchase price of gas, which amounted to about US$100 per thousand cubic meters, a price the Bulgarian side claimed was US$10 to US$15 higher than comparable European prices. According to Bulgarian Government spokespersons, the resolution of this issue would facilitate the implementation of an earlier Bulgarian-Russian agreement on the transit of Russian natural gas to the Balkans through Bulgaria and the construction of new pipelines (Journal of Commerce, 1997).

Bulgaria appeared to have made a substantial effort to bring about change to the country's economy and political institutions to allow its participation in such trans-European institutions as, the Central European Free Trade Area, the EU, and the Organization for Economic Cooperation and Development. Because participation in these institutions has been assured, foreign commercial activity in Bulgaria should increase, given that the trend toward change continues.

References Cited

Clifford, Des, 1998, KCM takes the initiative: Mining Magazine, v. 178, no. 1, January, p.19-25.

Cumming, John, 1997, QEX Resources gains manganese mines in Bulgaria: Northern Miner, June 23, p. B-11.

Dimitrov, Dilyan, 1998, "Kremikovtzi" EAD—Sostoyaniye perspektivy razvitiya: Tsvetnyye Metally (supplement), no. 8, p. 21-24.

Dobrev, N., 1998, Kombinat tsvetnykh matallov g. Plovdiv KCM-S.A.: Tsvetnyye Metalli (supplement), no. 8, p. 31.

Georgiev-Avramov, Avram, 1998, Restrukturizatsiya stal'noy industrii Bolgarii: Tsvetnyye Metally (supplement), no. 8, p. 18-20.

Gill, Tom, 1997a, Bulgaria gets the Balkan blues: Metal Bulletin Monthly, East Europe/CIS Supplement, April, p. 20-25.

———1997b, Heavy plate lightens Stomana's burden: Metal Bulletin Monthly, East Europe/CIS Supplement, April, p. 31-33.

———1997c, KCM buoyed by growing markets: Metal Bulletin Monthly East European Supplement, April, p. 35-37.

———1997d, Kremikovtzi desperately seeking finance: Metal Bulletin Monthly, East Europe/CIS Supplement, April, p. 26-29.

———1997e, MDK searches for new owners: East European Supplement, April, p. 39-41.

Homestake Mining Company, 1997, Homestake and Navan announce revised agreement regarding Bulgaria: Homestake Mining Company press release, July 28, 1 p.

Industrial Minerals, 1998a, Holderbank invests in Bulgarian cement: Industrial Minerals Annual Review, no. 364, January, p. 9.

———1998b, [No title]: Industrial Minerals Annual Review, no. 364, January, p. 22.

Journal of Commerce, 1997, Bulgaria, Gazprom at odds: Journal of Commerce, July 11, p. 10A.

Kraicheva, M.E., 1996, Copper mining in Bulgaria: Mining Journal, v. 327, no. 8398, October 4, p. 41.

Markov, Ivan, 1996, Development of the coal industry until 2020: United Nations Economic and Social Council, Energy/WP.1/R.52/Add.4, July 22, 5 p.

Metal Bulletin, 1996, Navan advances Chelopech expansion: Metal Bulletin, March, 14, p. 9.

Mining Journal, 1996, Homestake in Bulgaria: Mining Journal, v. 326, March 8, p. 186.

———1997a, Bulgarian lead-zinc sale: Mining Journal, v. 328, no. 8432, p. 446.

———1997b, Bulgarian production up for Navan: Mining Journal, v. 329, no. 8456, November 21, p. 423.

———1997c, Chelopech—Bulgarian copper and gold: Mining Journal Advertisement Supplement, v. 329, no. 8458, December 5, p. 2-5.

Mining Magazine, 1997, Navan's Bulgarian discovery: Mining Magazine, v. 176, no. 6, June, p. 388.

Natsionalen Statisticheski Institut [National Statistical Institute], 1997, Statisticheski Godishnik [Statistical yearbook] 1997: Natsionalen Statisticheski Institut, Sofia, 550 p.

Reuters Limited, 1997, Bulgaria, Mongolia revives gold mining ventures: Reuters Limited press release, October 28, 1 p.

Royal Gold, Inc., 1997, Greek American Exploration Ltd. joins with Phelps Dodge; signs new concession agreement in Bulgaria: Royal Gold, Inc., press Release, May 1, 4 p.

Skillings Mining Review, 1997, Homestake and Navan in revised agreement regarding Bulgarian copper/gold mine: Skillings Mining Review, v. 86, no. 32, August 9, p. 10.

Tsotsorkov, L., 1998, Gorno-Obogatitel'nyi Kompleks "Asarel-Medet"-EAD, sostoyaniye i perspektivy razvitiya: Tsvetnyye Metalli (supplement), no. 8, p. 3.

Union Minière, 1997, Acquisition of the Bulgarian MDK copper plant by Union Minière: Union Minière corporate communication/press release, September 10, 1 p.

U.S. Department of Commerce, 1997, Bulgaria—Fiscal year 1998: Country Commercial Guide, December, 50 p.

Vylchev, Z., and Kesyakov, I., 1998, Razvitiye Gornykh Rabot na Rudnike "Chelopech": Tvetnyye Metally (supplement), no. 8, p. 9-11.

Zhilov, G., 1998, Produktsiya firmy "Bentonit"-EAD: Tsvetnyye Metally (supplement), no. 8, p. 12-13.

TABLE 1
BULGARIA: TOTAL REPORTED EMISSION OF CONTAMINANTS INTO THE ATMOSPHERE 1/

(Thousand metric tons)

	1994	1995		1996	
Contaminant					
CO	932	832	(-11%)	623	(-25%)
CO2	72,401	72,808	(+1%)	66,074	(-9%)
NH3	25	84	(336%)	83	(-1%)
SOx	1,469	1,477	(+1%)	1,420	(-4%)
NOx	298	265	(-11%)	259	(-2%)
N2O	49	49		48	(-2%)
Dust (nontoxic)	248	206	(-17%)	169	(-18%)
Methane	534	507	(-5%)	501	(-1%)
Nonmethane volatiles	393	351	(-11%)	309	(-12%)
Aggregated emissions	76,349	76,579	(+.3%)	69,486	(-9%)

1/ Percentage chnges are provided for the years 1995 and 1996.

Source: Natsionalen Statisticheski Institut, 1997, Statisticheski Godishnik: Natsionalen Statisticheski Institut Sofia, p. 25.

TABLE 2
BULGARIA: EXPENDITURES ON ENVIRONMENTAL PROTECTION AND RECLAMATION

Year	Total expenditure (million constant lev)	1993-96 percentage change
1996	18,160	(+233)
1995	7,789	(+47)
1994	5,308	(+40)
1993	3,801	(+53)
1992	2,478	

Source: Natsionalen Statisticheski Institute, 1997, Statisticheski Godishnik: Natsionalen Statisticheski Institute, Sofia, p. 25.

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

(Metric tons unless otherwise specified)

Commodity		1993	1994	1995	1996	1997 e/
METALS						
Aluminum metal, secondary		1,832	4,412	4,519	4,417 r/	4,500
Bismuth metal e/		40	40	40	40	40
Cadmium metal, smelter		265	286	250	250	280
Copper:						
Ore:						
Gross weight	thousand tons	19,700	19,000	21,050 r/	21,123	21,836 3/
Cu contente/	do.	93	75	105 r/	106	109 3/
Concentrate:						
Gross weight	do.	250	370	378 r/	444 r/	463 3/
Cu content	do.	33	74	76 r/	89 r/	93 3/
Metal, primary and secondary:						
Smelter		28,000	89,400	95,900 r/	104,398	114,630 3/
Refined		26,300	26,500	28,800 r/	22,301	34,530 3/
Gold metal	kilograms	2,000 e/	2,000 e/	3,100	3,390	1,020 3/
Iron and steel						
Iron ore:						
Gross weight e/	thousand tons	1,000	950	959	1,000	858 3/
Fe content	do.	266	268	270	282 r/	242
Iron concentrates	do.	428	462	483	497 r/	479 3/
Metal:						
Pig iron for steelmaking	do.	998	1,442 r/	1,581	1,481 r/	1,610
Ferroalloys, ferrosilicon e/	do.	20	20	8	8	10
Steel, crude	do.	1,941	2,491	2,724	2,457 r/	2,628 3/
Semimanufactures, rolled	do.	1,602	2,120	2,250	1,901 r/	2,242 3/
Lead:						
Mine output, Pb content		40,000	50,000	37,000	33,000	30,000
Concentrate:						
Gross weight		60,000	65,000	46,466	40,681	39,800 3/
Pb content		39,000	43,000	33,000	28,500	27,900 3/
Metal, refined, primary and secondary		56,994	61,950 r/	72,150 r/	74,690 r/	72,580 3/
Manganese ore:						
Gross weight		15,500	-- r/	19,000	44,270 r/	47,430 3/
Mn content		4,000	-- r/	5,600	13,100	14,000
Silver, mine output, Ag content e/		35	35	30	49 r/	32 3/
Tin, metal		23	22	13	8	10
Uranium, oxide, U content e/		600	600	600	600	600
Zinc:						
Mine output, Zn content		32,000	30,000	21,200	25,700	21,000
Concentrate:						
Gross weight		65,000 e/	54,900	49,200	38,000	38,420 3/
Zn content		30,000 e/	29,000	26,000	19,800	20,000 3/
Metal, smelter, primary and secondary		54,039	64,005	79,700 r/	68,018	70,420 3/
INDUSTRIAL MINERALS						
Asbestos		500	100	400 r/	300 r/	300
Barite		900,000 e/	950,000 e/	990,100	976,700	285,000 3/
Cement, hydraulic	thousand tons	2,007	1,910	2,070	2,137 r/	2,100
Clays:						
Bentonite	do.	67	76	126	202 r/	171 3/
Kaolin, washed	do.	111	145	168	189 r/	150
Refractory	do.	55 e/	60 e/	61	67	62 3/
Feldspar	do.	51	50	74	30	36 3/
Fluorspar e/	do.	5	5	4 3/	2 3/	2
Gypsum and anhydrite:						
Crude	do.	143	161	163	169	156 3/
Calcined	do.	54	62	64	64 r/	60

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity		1993	1994	1995	1996	1997 e/
INDUSTRIAL MINERALS--Continued						
Limestone and dolomite	thousand tons	10,000 e/	10,000 e/	--	10,443	10,842 3/
Lime, industrial	do.	531	665	952	991 r/	1,000
Nitrogen, N content of ammonia	do.	885	995	1,203	1,194 r/	1,200
Perlite	do.	35 e/	35 e/	33 3/	26 3/	20 3/
Pyrites, gross weight e/	do.	150	150	150	150	150
Salt, all types	do.	650	1,300	1,500	1,600	1,600 3/
Sand and gravel	thousand cubic meters	3,000 e/	3,000 e/	--	3,075	2,140 3/
Silica (quartz sand)	do.	700 e/	700 e/	707	832	557 3/
Sodium carbonate, calcined	do.	259	451	796	800	800
Sulfur: e/						
S content of pyrites		50,000	50,000	50,000	50,000	50,000
Byproduct, all sources		50,000	50,000	50,000	50,000	50,000
Total		100,000	100,000	100,000	100,000	100,000
Sulfuric acid		408,822	427,959	453,827	524,714	500,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand tons	41	29	24	23	16 3/
Bituminous	do.	222	144	170	172	130 3/
Brown	do.	3,419	3,155	3,187	3,961	3,491 3/
Lignite	do.	25,351	25,429	27,449	28,101	26,929 3/
Total	do.	29,033	28,757	30,830	32,257	30,566
Coke	do.	912	1,116	1,240	1,157 r/	1,200
Gas, natural, marketed	million cubic meters	7	8	60 r/	42	38 3/
Petroleum:						
Crude, as reported	thousand tons	43	36	47 r/	34 r/	28 3/
Refinery products e/	thousand 42-gallon barrels	20,000	25,000	25,000	25,000	25,000

e/ Estimated. r/ Revised.

1/ Table includes data available through December 1998.

2/ In addition to the commodities listed, barite, chromite, fluorspar, 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.

3/ Reported figure.

TABLE 4
BULGARIA: EXPORTS OF SELECTED MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996 p/
METALS				
Copper, ore and concentrate	119,000	107,100	72,100	87,000
Iron and steel:				
Ore and concentrate, including roasted pyrite	23,475	--	--	--
Metal, semimanufactures, flat-rolled products of iron or nonalloy steel	545,000	819,600	1,022,400	683,200
Zinc, metal including alloys, unwrought	61,800	57,800	62,600	70,700
INDUSTRIAL MINERALS				
Cement 2/	584,200	1,149,800	1,863,700	1,824,000
Fertilizer materials, manufactured, nitrogenous	209,000	287,900	766,000	746,800
Nitrates, crude	2,900	1,000	2,300	2,400
Sodium compounds, n.e.s., soda ash, manufactured	127,500	299,100	572,700	631,200
Stone, sand and gravel, dimension stone, crude and partly worked	7,600	9,800	10,300	11,500

p/ Preliminary.
1/ Table prepared by Glenn J. Wallace.
2/ May include clinker.

Source: Republic of Bulgaria, National Statistical Institute, Statistical Yearbook, 1996.

TABLE 5
BULGARIA: SELECTED IMPORTS OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996 p/
METALS				
Aluminum, metal including alloys, unwrought	9,900	9,300	13,600	7,000
Iron and steel:				
Ores	878,500	819,500	1,484,300	45,800
Metal:				
Pig iron, cast iron, related materials; and steel, primary forms	17,200	42,100	48,900	14,900
Semimanufactures, tubes, pipes, fittings	57,700	23,300	24,600	22,800
INDUSTRIAL MINERALS				
Cement 2/	12,400	17,400	17,400	12,100
Fertilizer materials, manufactured:				
Phosphatic	92	5,390	338	3,597
Potassic	5,784	16,375	17,021	35,606
Phosphates, crude	237,900	275,200	267,500	437,100
Salt and brine	173,600	118,700	118,500	116,500
MINERAL FUELS AND RELATED MATERIALS				
Coal:				
Anthracite	1,671,700	1,046,700	630,900	2,006,100
Other and briquets	1,229,900	876,300	1,231,600	231,300
Coke and semicoke	92,200	750,600	146,600	178,900
Petroleum:				
Crude thousand tons	8,900	5,900	7,400	5,600
Refinery products:				
Gasoline	143,200	107,100	12,600	1,200
Distillate fuel oil	566,200	168,600	3,100	100

p/ Preliminary.
1/ Table prepared by Glenn J. Wallace.
2/ May include clinker.

Source: Republic of Bulgaria, National Statistical Institute, Statistical Yearbook, 1996.

TABLE 6
BULGARIA: CONSUMPTION OF MAJOR MINERALS 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993		1994		1995		1996	
METALS									
Total iron and steel, rolled	714,915	551,719	(-33%)	549,287	(-1%)	647,431	(+23%)	620,487	(-8%)
By industry, total	586,765	460,349	(-22%)	450,907	(-2%)	597,316	(+32%)	549,525	(-8%)
Iron and steel-making branch	224,923	157,312	(-30%)	170,318	(+8%)	332,101	(+95%)	271,576	(-18%)
Machine-building and metal working branch	251,902	212,071	(-16%)	196,939	(-7%)	175,855	(-11%)	185,871	(+6%)
Other industrial branches	109,940	90,966	(-17%)	83,650	(-8%)	89,360	(+7%)	92,078	(+3%)
Total steel pipes and tubes:	58,795	84,295	(+43%)	83,912	(<-1%)	81,691	(-3%)	73,263	(-10%)
By industry, total	29,835	63,934	(+214%)	62,177	(-3%)	62,040	(<-1%)	51,580	(-17%)
Machine-building and metal working branch	15,798	51,590	(+326%)	49,613	(-4%)	44,084	(-11%)	32,472	(-16%)
Other industrial branches	14,037	12,344	(-12%)	12,564	(+2%)	17,956	(+43%)	19,108	(+6%)
Total nonferrous metals and semimanufactures	16,958	18,112	(+7%)	16,342	(-10%)	17,648	(+8%)	14,585	(-17%)
By industry, total	15,761	17,692	(+12%)	15,844	(-10%)	17,435	(+10%)	14,300	(-18%)
Machine-building and metal working branch	7,037	9,126	(+30%)	7,936	(-13%)	6,939	(-13%)	5,256	(-24%)
Electrical and electronic branch	3,772	4,208	(+12%)	3,477	(-17%)	3,779	(+9%)	3,271	(-13%)
Other industrial branches	4,952	4,358	(-12%)	4,431	(+2%)	6,717	(+52%)	5,773	(-16%)
Total cement	1,396,766	1,478,324	(+6%)	1,593,293	(+8%)	1,692,296	(+6%)	1,791,812	(+6%)
By industry, total:	242,912	268,401	(+10%)	226,740	(-16%)	345,430	(+52%)	364,922	(+6%)
Construction materials industry	223,543	243,599	(+9%)	198,671	(-18%)	307,007	(+55%)	322,496	(+5%)
Other industrial branches	19,369	24,802	(+28%)	28,069	(+13%)	38,423	(+37%)	42,426	(+10%)
By construction sector	966,756	1,109,047	(+15%)	1,202,609	(+8%)	1,145,617	(-5%)	1,314,554	(+15%)
By other sectors of the economy	187,098	100,876	(-46%)	163,944	(+63%)	201,249	(+23%)	112,336	(-47%)
ENERGY (terajoules)									
Total energy consumption	448,004	453,252	(+1%)	451,849	(<-1%)	481,359	(+7%)	481,385	(<+1%)
By industry:	212,529	204,220	(-4%)	220,846	(+8%)	250,251	(+13%)	243,261	(-3%)
Iron and steel (including mining)	38,132	41,614	(+9%)	52,625	(+26%)	59,141	(+12%)	53,628	(-9%)
Nonferrous metals (including mining)	11,800	12,517	(+6%)	12,619	(+1%)	13,568	(+8%)	13,824	(+2%)
Construction materials	21,153	21,391	(+1%)	24,075	(+13%)	28.502	(+18%)	27,428	(-4%)
Petroleum refining and chemicals	64,470	62,621	(-3%)	69,737	(+11%)	86,243	(+24%)	85,621	(<-1%)
Other sectors of the economy	235,475	249,032	(+6%)	231,003	(-7%)	231,108	(<+1%)	238,124	(+3%)

1/ Percentage changes are included for the 1993 to 1996 period.

Source: Natsionalen Statisticheski Institut, 1997, Statisticheski Godishnik: Natsionalen Statisticheski Institut, Sofia, p. 151 and 157.

TABLE 7
BULGARIA: PLANNED INVESTMENT IN THE STEEL INDUSTRY

(Million dollars)

	Investments	
Year	For modernization of facilities and equipment	For Environmental protection
1998	50	22
1999	60	34
2000	40	28
2005	305	60
2010	200	15

Source: Georgiev-Avramov, Avram, 1998, Restrukturizatsiya stal'noy industrii Bolgarii: Tsvetnyye Metally, supplement, no. 8, p. 18-20.

TABLE 8
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(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.
Coal:			
Bitiminous	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 Maritsa East	Maritsa East coal basin near Zagora	25,000.
Do.	Others	Marbas. Pernik, and Bobov Dol coal basins	5,300.
Copper (Cu):			
Concentrate, Cu content	Asarel-Medet 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	MDK SA 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 (formerlyDimitur Blagoev	Plovdiv	44
Do.	Lead and Zinc Complex Ltd).	Kurdjali	60.
Zn, smelter	KCM SA	Plovdiv	60.
Do.	do.	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obrotchishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	(1/).
Petroleum:			
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	2,300
Do.	Stomana Joint] Stock Company	Pernik	1,300.

1/ Insignificant capacity.

TABLE 9
EFFLUENT AND PARTICULATE DISCHARGES AT THE KCM SA LEAD AND ZINC SMELTER AND REFINERY

(Metric tons per year, unless otherwise specified)

Discharges	1990	1991	1992	1993	1994	1995
Dust	162	105	72	66	53	41
Waste water, discharge rate (liters per second) of which:	640	640	348	200	200	200
Zinc	720	680	216	36	37	35
Lead	46	46	17	11	5	6
Cadmium	6	5	1	0.7	0.7	0.7

Source: Dobrev, N., 1998, Kombinat tsvetnykh metallov g. Plovdiv KCM-S.A.: Tsvetnyye Metalli (supplement), no. 8, p. 18-20.