THE MINERAL INDUSTRY OF

SLOVAKIA

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Slovakia continued to be a modest regional producer of industrial minerals, as well as some metals. Noteworthy developments in 1996, and in the preceeding 2 years, have been the growth in the country's gold and industrial minerals mining sectors. In 1996, according to official sources (Slovak Information Agency Information 1997a), Slovakia's gross domestic product (GDP) increased by 6.9% compared with that of 1995. Significantly, the private sector's share in the creation of the GDP in 1996 amounted to 76.8%, with the service sector having the most pronounced impact on the growth of Slovakia's economy. The marked growth in Slovakia's private economic sector demonstrated the country's progress in developing a market economic system.

Government Policies and Programs

The Government of Slovakia continued to promote the structural realignment of Slovakia's economy to a market economy system. By yearend 1995, only 5% of the country's goods and services were subject to state price controls, the balance was determined by market forces (World Trade Organization, 1996a, p. 3). Having found mine production costs in many cases to be in excess of market mineral prices for a number of commodities, the Government, as early as 1989, indicated that subsidies to industry were to be terminated (Fabian, 1996). By 1996, the sectors of the country's minerals industry that were most affected by this program were coal mining, iron ore mining, and parts of Slovakia's nonferrous metals mining operations. The Government's plan to denationalize and privatize the country's mining sector was a two-stage process. The first stage, completed by 1992, included the privatization of the salt mine at Presov and the magnesite mining operations at Jelsava and Lubenik. The second stage, in preparation in 1996, included the privatization of Zelezorudne bane Sp.N.Ves. (iron ore, barites, and complex ore containing Fe, Cu, Hg, Sb, and Ag); Rudny Bane in Banska Bystrica (bentonite, dolomite, magnesite, and talc); and Slovenske Magnezitove Zavody in Kosice (magnesite) (Fabian, 1996). These enterprises were to be divided into smaller units and individually offered for sale and/or privatization.

The development of Slovakia's market economy had called for broad devlopment of the country's infrastructure, which included highways, rapid rail networks, and airports, as well as electric power and telecommunications installations (Slovak Information Agency, 1997b). Mineral inputs in the construction materials sector that would be used in the Government's infrastucture development program included bentonite, dolomite, and limestone.

Environmental Issues

Industry-generated environmental pollution, including that associated with the minerals sector, remained an important issue for the country. As in other former centrally planned economy countries of Europe, severe air pollution in Slovakia has been caused by the use of high-sulfur, low-grade coal and lignite to power the country's thermal electric power stations and by the country's chemical and metallurgical industries as raw material feedstock for coke and chemical production.

According to sources in the Ministry of the Environment (MoE), efforts were to continue to further reduce the emission of sulfur dioxide into the atmosphere. Data made available by the MoE indicated that from 1980 to 1992 the emission of sulfur dioxide had been reduced by 45% to 50% (British Broadcasting Corporation, 1994).

Despite the division of former Czechoslovakia into separate countries, legislation adopted since 1990 to protect the environment has remained operative. "CSFR Law No. 309/91 on the Protection of the Atmosphere from Polluting Substances (9/91)" codified regulations concerning air pollution and set pollution limits; defined sources of pollution, legal obligations of pollution source operators, and air pollution control authorities and fees and penalties associated with atmospheric pollution.

Czechoslovak Law on Environment of 12/91 established the basic definitions and principles regarding environmental protection, as well as the obligations of "legal and physical persons (bodies)" for protecting the environment during the use of natural resources.

Production

Following major adjustments to market economy requirements in 1992, the drop in output of most mineral commodities in Slovakia appeared to have slowed considerably during 1994-96 period. In the early stages of the transition to a market economy from central economic planning (1990-92), industrial production norms, which had been politically determined, were abolished in tandem with the abolition and/or sharp reduction of state subsidies to industry. State-owned industries had to prepare rapidly for denationalization and, at the same time, be able to function in a market environment. Initially, this led to a steep decline in industrial production, as well as increased unemployment. (*See table 1.*)

Trade

Despite the increased orientation of the country's foreign commerce toward Western European market economy countries in recent years, Russia and other former member countries of the Council for Mutual Economic Assistance (CMEA) remained Slovakia's chief partners in mineral commodity trade. Russia remained Slovakia's principal supplier of natural gas and petroleum, and Hungary and Ukraine were major suppliers of bauxite and iron ore, respectively, to Slovakia's metal industries. With respect to foreign investment in Slovakia's economy, foreign commercial entities were permitted to acquire property during the country's large-scale privatization program (World Trade Organization 1996a, p. 14). By 1996, the country's foreign trade had been liberalized to the extent that import licenses were required for only a very short list of commodities that included coal, crude petroleum, natural gas, and uranium (World Trade Organization, 1995b, p. 7).

Structure of the Mineral Industry

Table 2 lists the administrative bodies, as well as subordinate production units, of the main branches of the country's mineral industry.

Commodity Review

Metals

There has been a marked contraction of metals mining and processing operations in Slovakia since 1989. By 1992, the mining and processing of antimony- and mercury-bearing ores had been terminated. The country's output of iron ore had declined from 1.7 million metric tons (Mt) in 1990 to about 820,000 metric tons (t) in 1996. Moreover, the labor force (workers and miners) in Slovakia's the metals mining and processing sector had declined from 20,783 persons in 1989 to 9,200 in 1996 (Fabian, 1996).

Iron ore has been mined from deposits at Roznava, Rudnany, and Nizna Slana. Currently, only siderite at Nizna Slana is mined with output ranging from 800,000 metric tons per year (t/y) to 1.2 million metric tons per year (Mt/y), grading 27% to 30% Fe.

The ore at Nizna Slana was reported to be barely economical, whereas the mining costs at the Roznava and Rudnany operations were reported to exceed the selling prices of the ore by more than 200%, requiring the termination of mining activities (Fabian, 1996). Because domestically produced iron ore could meet only a small portion of the needs of the country's steel industry, the major share of iron ore and concentrate has to be imported, mainly from Russia and Ukraine. In 1996, reportedly VSZ Ocel, Slovakia's steel producer, had indicated an interest in acquiring a 51% interest in Trinecke Zelezarny, the Czech Republic's second largest steel producer (Metal Bulletin, 1996). Earlier, VSZ Ocel had conducted negotiations to purchase a 25% stake in the Czech Republic's Moravia Steel, Trinecke Zelezarny's parent company.

Foreign investment activity in the precious metals sector reached new heights as most of the country's prospective gold deposits were acquired by such companies as Keylock Resources Inc. and Argosy Mining Corporation of Canada and RTZ Corporation Plc of the United Kingdom. In early 1996, Argosy announced plans to fund about US$2.2 million for gold exploration and a mining feasibility study on the Kemnica gold-silver deposit and also to explore the Pukanec gold-silver deposit (Info Mine, 1996).

At Kremnica, Argosy conducted a two-phase drilling program. Phase 1 was completed in October and involved 3,632 meters (m) drilled in 29 drill holes. Holes drilled at the Sturec deposit reportedly revealed the most promising data, with averages of 1.45 grams per ton (g/t) of gold and 10.84 g/t of silver at a cutoff grade of 0.5 g/t of gold (Yahoo Business Wire Mining/Metals, 1996b). The Sturec ore deposit srikes north for a length of 800 meters and dips from 60° to 80° to the east, and ranges in thickness from 10 meters to more than 100 meters (Yahoo Business Wire, 1996d). Phase 2 called for drilling an additional 20 holes to test the 600-m southern section of the Sturec deposit, as well as two other areas at Kremnica, each 650 m long by 300 m wide. According to information provided by Argosy, the Kremnica region's historical production of gold and silver was estimated to be 1.48 million ounces and 6.7 million ounces, respectively. Moreover, Argosy reported having gained control over 11.8 square kilometers (km^2) within the center of the Kremnica district and had applied for an exploration license for a 16.3 km^2 area adjacent to the area already under study (Yahoo Business Wire Mining/Metals, 1996a). At Pukanec, Argosy reported the completion of its drilling operation at a 2-km^2 sector of the 35.6-km^2 project area in the central part of the country (Yahoo Business Wire Mining/Metals, 1996a). The surface exploration and drilling program at Pukanec has focused on an area of gold-silver mineralization known as Agras-Biela Bana. The mineralization is near the surface halo of a deep copper porphyry system, which includes a central granodiorite stock with numerous porphyry and rhyolite dikes that intrude andesite (Yahoo Business Wire Mining/Metals, 1996b). Nearby tailing dumps of old mine workings contain 1 to 2 g/t of gold and high silver values. Drill core from 21 holes, totaling 3,198.5 m, however, indicated that the gold-silver mineralzation is not of the disseminated variety. Within many of the holes, long intervals reportedly contain "hydrothermally altered rock and fracture-controlled pyrite or limonite but without significant gold and silver assays" (Yahoo Business Wire, 1996c). Additional exploration drilling work at Pukanec was to continue in historic gold production areas 10 kilometers (km) north of Agras-Biela Bana. Argosy also indicated that exploration work would be done at Nova Bana on a 93.8-km^2 licensed area. Initial work would involve the evaluation of old gold mining areas south of a large rhyolite dome and would consist of mapping and sampling old mine workings to determine drill targets for 1997.

In late November 1996, Argosy reported reaching an agreement with Hell Spolocnost s.r.o., owner of the Banska Stiavnica gold mining property, 30 km south of Kremnica, to conduct exploration work at the site. The agreement with

respect to a 14.2-km^2 licensed site at Banska Stiavnica would give Argosy a 75% interest in a potentially commercial operation. According to Argosy, the Banska Stiavnica gold deposit is in Neogene volcanic rocks and consists of about "120 veins within the up-domed and horst-faulted central section of a hydrothermally altered volcanic caldera" (Yahoo Business Wire, 1996a). Most of the veins dip to the east and range in width from 0.5 to 15 m. The entire vein system is 5 km long and 4 km wide. The upper, or surface, parts of the veins were reported to be very rich, especially with respect to silver. From the first mining untill cessation of mining operations in 1992, this epithermal gold deposit, which reportedly had been the largest producer of gold in Europe during the Middle Ages, yeilded 1.6 million ounces of gold and 166 million ounces of silver. Because little modern exploration had been done at Banska Stiavnica, Argosy planned an initial collection of data on geology and production, which would be used in determining a subsequent drilling program.

In June, Golden Regent Resources Ltd. (GRR) of Calgary, Canada, announced the formation of a partnership with Profile Resources Corp., also of Calgary, to explore an 11-km^2 area at Pila in for which a permit was acquired during the year. Mapping of the area had been completed and the two companies planned to conduct exploration of the permit area jointly. Initial reported results of exploratory trenching and geochemical analysis, however, indicated an area of mineralization 1 km in length with an average width of 400 m. The mineralized structure was described as highly silicified with exposed jasperoid zones throughout it. Sampling of the jasperoid has indicated contained gold ranging from 0.20 to 4.00 g/t and contained siver ranging from 3.0 to 90.0 g/t. After completing trenching and geochemical surveys of the area, a drilling program was to be be undertaken to examine the mineralized structure at depth. In addition to the Pila permit, GRR held two adjacent permit areas amounting to 23 km^2 (CNW/Canada NewsWire, 1996).

Additional foreign commercial activities involving the country's gold deposits in 1996 included the acquisition of a license by Rhodes Mining NL of Australia to conduct exploration for gold in Javorie (Hagopian, 1996, p. 5), and the acquisition by Attwood Gold Corporation of Canada of 70% of the stock of Takama Resources Inc., parent company of Tatran Minerals of Slovakia, to obtain an interest in unspecified gold properties (Northern Miner, 1996, p. 11).

Industrial Minerals

Industrial minerals and construction materials continued to have a significant role in the country's domestic and export markets. Slovakia's industrial mineral products included cement, gypsum, lime, magnesite, perlite, stone, and talc. Talc reportedly is one of the industrial minerals in Slovakia for which there are sufficient resources to meet all domestic needs. In 1995 and 1996, a large deposit of talc was evaluated by Thyssen Schactbau and Dorfer of Germany and Geologia of Slovakia. Commercial exploitation of the deposit was expected to begin in 1998 with production reaching about 100,000 t/yr. Potential markets for exported product from this deposit were belived to be in the Czech Republic, Hungary, Poland, and Russia (Mining Journal, 1996a).

Denationalization of Slovakia's economy and industry included the magnesite sector with major privatization of the magnesite industry occurring in 1994-95. Magnatech Slovakia spol. s.r.o., formerly SMZ-Hacava (part of SMZ Kosice), produced dead-burned magnesite at Hacava, about 270 km east of Bratislava. The company underwent denationalization in February 1995 and was entirely privately owned by early 1996. Historically, the Hacava operation obtained magnesite from mines at Jelsava; the magnesite was processed in two oil-fired rotary kilns, which were closed in 1990 when they became uneconomic. At that time, the state-owned parent company, SMZ Kosice, invested in a chemical beneficiation process to handle magnesia dust from the Jeslava mining operations. The new facility, which came on-stream in 1992, has a capacity to produce 26,000 t/yr of high-purity, high-bulk density magnesia. The new plant uses a combination of the Ruthner process and RCE technology. MgO dust is ground and washed prior to treatment with hydrochloric acid (dissolved) to produce a solution of MgCl. Iron and manganese are removed through oxidation; the solution then is filtered to remove other acid insolubles. Following the extraction of lime, the solution is fed into a gas-fired roaster, which produces hydrogen chloride and magnesia. The magnesia is briquetted and calcined; the briquettes are subsequently dead burned in a shaft kiln at 2,100°-2,200° C. (Industrial Minerals, 1996). Production at this facility at yearend 1995 amounted to about 16,000 t. The company expected full operational capacity to be reached by March 1996.

The two 25,000 t/yr rotary kilns mentioned above also were in the process of being brought back on line after conversion to gas-fired operation. One kiln was brought back into service at the end of 1995; the conversion of the second unit was to have been completed by the end of 1996 (Industrial Minerals, 1996). These rotary kilns dead burn magnesite mined at Jeslava, producing a product high in iron (grading 88% MgO, 6%-8% Fe_2O_3). In 1996, the company expected output to reach 25,000 tons. Magnatech also produced and marketed caustic magnesias (97.3% - 98.0% MgO, 0.32 grams per cubic centimeter (g/cm^3); 98.6% - 99.0% MgO, 0.65g/cm^3 (Industrial Minerals, 1996)). Downstream application included use in the production of paper, plastics, rubber, chemicals, and glass.

The Jeslava mining operation was privatized in 1994. Total annual output at these mines has averaged about 1.2 Mt. Crude magnesite has varied in composition from 36% to 44% MgO, 48% to 50% CO_2, 1% to 2% CaO, as much as 2.3% SiO_2, and 3.2% to 6.0% Fe_2O_3. Crude mined product is concentrated though the use of hydrocyclones and then calcined and dead burned in three rotary kilns and four shaft kilns. Recovered fines are briquetted and dead burned. Total annual marketable product amounts to about 250,000 t/yr. The output, the majority of which is exported, consists of three types of product: low-grade clinkers (all containing 6.5% to 7.8% Fe_2O_3) for steelmaking, brickmaking, mixes for ramming, gunning, and repairs; four grades of brickmaking magnesia ranging from

88.0% to 89.2% MgO, with densities of 3.25 to 3.35 g/cm^3; and magnesia for steelmaking with MgO ranging from 75% to 82% (Industrial Minerals, 1996). Of the two other magnesite operations in Slovakia, Slovamag AS (formerly, SMZ AS Lubenik) was privatized in early 1994. The remaining company, Lovinobana, remained state owned. Both meet the needs of local consumption.

Mineral Fuels

In 1993, the Government approved a plan for denationalizing the country's coal mining industry. Under the provisions of this plan, the Ministry of Industry was to oversee the privatization of the coal mining sector beginning in 1994, but would impose stricter regulations requiring compliance with environmental regulations by industry than had been previously the case. It was envisaged that coal production would be maintained at slightly more than 4 Mt/yr, and the country's consumption of coal would eventually decrease from about 11 Mt/yr to slightly more than 6 Mt/yr. In early 1996, 13 companies expressed interest in taking part in the construction of an electric power station in central Slovakia. Among these, three companies were from the United States; two, from Japan; and two, from the Netherlands. The cost of the 70 megawatt Velky Krtis plant was estimated to be US$1.479 million. The feedstock was to come from the local colliery at Bana Dolina with exploitable coal resources amounting to 11 Mt. Additional resources, amounting to 40 Mt, were determined to be uneconomic. The annual rated consumption of coal at the proposed power plant will be 300,000 t. In addition to the domestic coal earmarked for Bana Dolina, a coal mine in nearby Hungary also was to be a source of fuel (Mining Journal, 1996b).

In April, contracts were signed with Czech, French, German, and Russian companies to complete the construction of the Machovce nuclear powerplant. The total cost to complete this project was reported to be US$900 million. The financing was structured though loans from a consortium of national banks and four international banks (Nuclear News, 1996).

Taking into account Slovakia's transition to a market economy, the country's mineral reserves will have to be reevaluated under market economy conditions. As defined in market economy countries, reserves are those mineral deposits that can be mined at a profit under existing conditions with existing technology. In former CMEA countries, including Slovakia, the prior policies for centrally planned industrial development often had more to do with political than economic considerations.

Slovakia's mineral industries were expected to continue to supply the country with steel, industrial minerals, and mineral fuels that will gain in importance during the modernization of the infrastructure and the transition of the economy to a market system.

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TABLE 1
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995	1996 e/
METALS						
Aluminum:						
Alumina		143,000	140,000	75,000	100,000 e/	100,000
Aluminum ingot, primary		60,400	39,000 r/	33,000 r/	31,000 r/	35,000
Antimony, mine output, Sb content e/		450	450	--	--	--
Cobalt metal		68	--	--	--	--
Copper:						
Mine output:						
Ore, gross weight		340,000	310,000	-- r/	-- r/	190,000
Concentrate:						
Gross weight		2,210	2,000	-- r/	-- r/	1,600
Cu content e/		537	500	-- r/	-- r/	387 2/
Metal:						
Smelter, primary e/		3,000	3,000	3,000	3,000	3,000
Refined, primary and secondary		28,100	23,000 r/	20,000 r/	29,000 r/	25,000
Gallium metal	kilograms	1,300	1,300	600	600 e/	600
Gold metal	do.	18	100 r/ e/	372 r/	518 r/	540
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	1,220	920	870 r/	820 r/	850
Fe content	do.	330	250	230	225 e/	240
Metal:						
Pig iron	do.	3,020	3,205 r/	3,330	3,207 r/	3,300
Ferroalloys, total electric furnace 3/	do.	122	115	124	140 e/	93,000
Ferrochromium		52,500	50,600	48,555 r/	65,260 r/	19,900
Ferrosilicon		30,000	22,000	30,000 r/	30,000 r/	30,000
Steel, crude	thousand tons	3,600	3,768 r/	3,948 r/	3,921 r/	3,900
Semimanufactures	do.	3,130	3,457 r/	3,662 r/	3,686 r/	3,600
Lead, mine output: e/						
Concentrate, gross weight		3,500	3,500	3,500	3,500	3,500
Pb content		1,800	1,800	1,800	1,800	1,800
Mercury		60	50	--	--	--
Nickel metal, primary		1,620	--	--	--	--
Tin-tungsten ore, gross weight	thousand tons	160	190	190	--	--
Zinc:						
Mine output:						
Ore, gross weight		370,000	300,000	290,000 r/	300,000 r/	300,000
Concentrate, gross weight e/		6,900 2/	6,500	6,500	6,500	6,500
Zn content e/		3,100	2,900	2,800	2,800	2,800
Metal, secondary e/		1,070 2/	1,000	1,000	1,000	1,000
INDUSTRIAL MINERALS						
Barite		31,300	45,700 r/	41,600 r/	44,930 r/	45,000
Cement, hydraulic e/	thousand tons	2,500	2,500	2,500	2,500	2,500
Clays:						
Bentonite		25,000 e/	50,000 r/ e/	60,310 r/	74,960 r/	74,820 2/
Kaolin		25,000	25,000	24,100 r/	13,300 r/	23,240
Diamond, synthetic e/	carats	5,000	5,000	5,000	5,000	5,000
Dolomite	thousand tons	4,500	2,500	1,700	18,000 e/	18,000
Fertilizer, manufactured: e/						
Nitrogenous, N content		175,000	170,000	170,000	170,000	170,000
Phosphatic, P2O5 content		120,000	120,000	120,000	120,000	120,000
Potassic, K2O content		11,000	10,000	10,000	10,000	10,000
Mixed		50,000	50,000	50,000	50,000	50,000
Gypsum and anhydrite, crude		75,000	75,000	122,000	131,000	110,000
Lime, hydrated and quicklime	thousand tons	1,070	1,070	1,000	1,000 e/	1,000
Magnesite, crude		1,270,000	1,200,000	616,900 r/	814,500 r/	919,300
Nitrogen, N content of ammonia e/		250,000	263,000	250,000	250,000	250,000
Perlite		50,000	50,000	28,270 r/	21,850 r/	25,160
Pyrite, gross weight e/		100,000	--	--	--	--
Salt		70,000 e/	70,000 e/	99,600 r/	99,750 r/	106,800

See footnotes at end of table.

TABLE 1--Continued
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995	1996 e/
INDUSTRIAL MINERALS--Continued						
Stone:						
Limestone and other calcareous stones	thousand tons	4,500	4,500	3,887 r/	4,000 e/	4,000
Quarry stone, not further described e/	thousand cubic meters	5,000	5,000	5,000	5,000	5,000
Talc		5,000 e/	5,000 e/	4,800	5,000	5,000
Zeolite		25,000	25,000	12,670 r/	9,720	6,900
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite	thousand tons	4,000	3,500	4,078 r/	4,140 r/	3,829 2/
Coke:						
Metallurgical	do.	1,800	1,880	1,900 e/	1,900 e/	1,900
Unspecified e/	do.	300	300	200	200	200
Gas, manufactured, coke oven	million cubic meters	900 e/	900 e/	291 r/	345 r/	307 2/
Petroleum:						
Crude:						
As reported	thousand tons	70	70	68 r/	74 r/	71
Converted	thousand 42-gallon barrels	475	475	460 r/	500 r/	480
Refinery products e/	do.	40,500	40,500	40,500	40,500	40,500

e/ Estimated. r/ Revised.

1/ Table includes data available through June 1997. In addition to the commodities listed, arsenic, diatomite, feldspar, illite, sodium compounds, sulfur, sulfuric acid, and talc are produced, but information is inadequate to make reliable estimates of output.

2/ Reported figure.

3/ May include some FeCrSi and FeNi, if any was produced.

TABLE 2
SLOVAKIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1996

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities 2/	Annual capacity
Aluminum	SNP Aluminum Works	Ziar and Hronom, central Slovakia	60
Antimony, ore	Liptovska Dubrava	Central Slovakia	50
Do.	Pezinok	West Slovakia	50
Smelter	Vajskova	Central Slovakia	2
Cement	Lietavska Lucka, Stupava, and Turna	Slovakia	5,400
Coal, brown	ULB administration	Prievidza, central Slovakia	6,800
Copper:			
Ore	Slovinky, Hodrusa-Hamre, and Rudnany	Central Slovakia	500
Refinery	Krompachy	do.	27
Gallium kilograms	SNP Aluminum Works	Ziar and Hronom, central Slovakia	4,000
Iron:			
Ore	Nizana Slana and Rudnany	Central Slovakia	1,600
Concentrate	do.	do.	1,300
Lead-zinc, ore	Banska Stiavnica	do.	200
Magnesite	Magnatech Slovakia spol. s.r.o.	East Slovakia	550
Petroleum, refinery	Bratislava, Strazske, and Zvolen	Slovakia	NA
Steel, crude	Vychodoslvenske Zeleziarne sp (East Slovak Iron and Steel Works)	Slovakia, Kosice	4,000
Do.	Svermove zeleziarne	Slovakia, Podbrezova	600

1/ All mining companies are Government-owned.

2/ Names and locations of mines and crude oil refineries are identical.