

GREECE

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Larco, the sole nickel producer in the European Union (EU), established a new period of improved productivity, competitiveness and profitability with a turnover exceeding US\$150 million and a total operating profit of US\$35 million. A drilling campaign of 330 boreholes, both in Greece and Albania (Bitinska-Bilisht, Tren and Kapshtica) yielded new reserves of 3 Mt in Greece and a small but easy-to-mine deposit at Tren. A new rig (Dando, Mintec 17) equipped with a reverse circulation system was acquired to drill in fractured formations.

The output of nickeliferous ore from Larco's various mines increased to 2.6 Mt (1.35 Mt from Euboea, 770,000 t from Larymna, 390,000 t from Kastoria and 11,000 t from Bitinska). The excavation of overburden waste to about 30 Mt. The metallurgical factory was fed with 2.65 Mt of ore and pellets of recycled fines and 420,000 t of solid fuel. The net nickel production, in the form of granular Fe-Ni with 21% Ni, reached 17,100 t. Total output, ISO9002 certified, was sold to producers of stainless steel in the EU. An investment programme exceeding US\$35 million, subsidised 45% by the EU, was launched aiming at the rationalisation of energy consumption by the end of 2001, the minimisation of environmental effects and an upgrading of the mining equipment. This programme will raise annual capacity to 20,000 t of nickel and reduce production costs by 10%.

In September last year, the Greek Ministry for the Environment approved an Environmental Impact Study for TVX's Olympias gold project in Chalkidiki after a ten-month review period. The company said it paved the way for completing the permitting process which is at an advanced stage. In January this year the State Council of Greece heard challenges related to certain permits and the presiding judge recommended that the court reject the

challenges. The State Council's final decision is expected shortly.

The bankable feasibility study for the Olympias project estimates capital costs at US\$248 million and envisages an underground mine processing 680,000 t/y of ore for an annual production of 254,000 oz of gold plus 2.3 Moz of silver, 21,500 t of zinc and 22,500 t of lead over the first five years. The project is based on proven and probable reserves of 3.8 Moz of gold and a total gold resource of 4.09 Moz. Metal recovery will involve flotation, bio-oxidation, pressure oxidation and carbon-in-leach. SNC-Lavalin was awarded an engineering, procurement and construction management contract in November 1999. TVX is also scheduled to begin the permitting process for its nearby Skouries gold-copper porphyry project.

Aluminium de Grèce enjoyed a very good year as a result of a restructuring of the production process, combined with higher aluminium prices (an average of US\$1,567/t, compared with US\$1,361/t in 1999) and the stronger US dollar. Thus, the turnover increased to US\$395.2 million (US\$333.2 million in 1999) and the profit before tax reached a record US\$87.2 million (US\$21.3 million in 1999). The production of alumina increased by 9% to 690,000 t of hydrated and 668,300 t of calcined alumina. Primary (electrolytic) production of aluminium increased to 162,600 t and the total aluminium production was 167,500 t. Sales amounted to 366,000 t of alumina and 168,300 t of aluminium. (some 93,600 t of aluminium were sold in Greece). Further technical and commercial benefits are expected from the project.

The Delphi-Distomon bauxite mines are operated by an affiliate of Aluminium de Grèce with their central installations near Elaion in Amphissa. Bauxite is produced from

the areas of Amphissa and Distomon, mainly from underground mines. Special emphasis is being put on the reclamation of mined-out open pits, a task which is close to completion since mining is now underground. (The company's profits were Dr1,668 billion.)

The bauxite mining assets of Eleusis Bauxite Mines, a state-owned producer of bauxite and pyrolusite, were finally turned over to Mineral Enterprises J. Vardinoyiannis, whereas the mineral rights on nickeliferous ores were transferred to Larco. (No interest was expressed in the acquisition of the Drama manganese mines.) The output of bauxite was 90,186 t and sales were 90,430 t. Bauxite prospects are good in view of the rising demand both for metallurgical and industrial (steel industry, cements, abrasives) applications.

Grecian Magnesite SA (GM) is the sole magnesite/magnesia producer in Greece, and deals with extraction and industrial processing of magnesite. The company produces and markets four main products: calcined magnesia, deadburned magnesia, raw magnesite and basic refractories. GM is the biggest magnesia exporter in the EU and the biggest producer of calcined magnesia worldwide. The company has mines and works in Yerakini and Kastri in Chalkidiki, northern Greece plus mining rights on the island of Euboea. Furthermore, the company owns a fully equipped research and development centre in Vasilika, Thessaloniki, for the development of new products and uses.

GM also has a subsidiary company in Turkey, Akdeniz Mineral Kaynaklari AS, which produces industrial minerals. Exports represent 95% of turnover and the main destinations, in order of importance, are the EU, US, other European countries, Middle East /north Africa and the Far East.

Last year was another successful period for GM, with sales reaching Dr10 billion.

GM's sales volume was about 185,000 t, comprising 115,000 t of caustic calcined magnesia, 32,000 t deadburned magnesia, 25,000 t raw magnesite and 13,000 t of basic refractories. GM has a workforce of around 440, and has started to implement a Dr10 billion investment programme.

The investment programme consists of two parts. The first part aims at internationalising the company, beyond its traditional export activities (95% of turnover). More particularly, the company aims at participating in the production of magnesite products outside Greece as well as in their distribution. During 2000, GM increased its participation in the Spanish company Magnesitas Navarras SA, a significant magnesia producer, from 20.4% to 39.9%. The second part of GM's investment programme comprises an internal investment of around Dr3 billion. Two new lines of mineral processing are under construction which will eventually increase productivity, improve the quality of the products and allow further environmental protection.

Grecian Magnesite has recently filed an application to be listed on the primary market of the Athens Stock Exchange, in order to raise capital for the implementation of its investment programme domestically as well as abroad.

Silver and Baryte Ores (S&B) is organised in parallel production units, one for each mineral product, namely bauxite, bentonite and perlite. S&B had some 1,400 employees last year, and achieved sale of Dr102.7 billion (1999: Dr67.7 billion). Operating profit increased from Dr8.26 billion to Dr11.54

Silver & Baryte Ore mineral activities		
	Turnover (Dr m)	Volume ('000 t)
Bentonite	36,636	1,062
Bauxite	14,799	1,548
Raw perlite	13,905	624.4
Expanded perlite	3,239	251.4 m ³
Other minerals	8,523	95.6

billion and net consolidated group profit was Dr9.26 billion (1999: Dr6.44 billion).

Last year was very important for S&B's bauxite unit, with sales increasing by 41% in volume and by 48% in terms of revenue. Although Aluminium de Grèce is the traditional, and bigger client S&B achieved improved trade with the former Soviet Union and in particular the Russian market thanks to the good quality of its bauxite, and the advantage of transportation by sea through Euxine and for the Baltic ports. Bauxite was sold to various markets (comprising alumina 58%, aluminous cements 15%, Portland cements 14% and iron metallurgy 11%).

S&B maintained its leading position in the international market for bentonite and perlite. The total turnover of the bentonite sales was 250% higher compared with 1999, and the sales went to a diversified market: foundries (44.8%), pelletising of ores (33.5%), civil engineering applications (13%), oil wells (6%) and sanitary sand for pets (2.7%).

S&B is still the biggest producer of perlite in the world and perlite turnover increased this year by 42%. Sales to the US and Canada (23% of the total) were especially profitable thanks to the high value of the US dollar, but the company's main market is Europe (67%). New developments include:

- increased production capacity of the plants in Greece and China
- rationalisation of reserves, to maximise the mines' present value
- intensive efforts for expansion in the Far East markets served from China
- strengthening the position in the US market
- improving 'just in time' deliveries by moving perlite stores from Duisburg to Gelsenkirchen in Germany, and by establishing new stores in Port Cocoona in Canada.

Finally, S&B mined and exported 3,800 t containing 85% zeolites, under the commercial name Vivolith 85.

Lava SA produced 885,000 t of pumice (of which 670,000 t was exported) plus 110,000 t of silica, 340,000 t of pozzolane and 210,000 t of gypsum. Lava maintained its position as the biggest pumice producer in the world. Total turnover amounted to Dr3.6 billion, and the operating profit was Dr1.08 billion.

Mevior SA mined out and prepared 13,000 t quartz and 72,000 t of feldspar with the following quality specifications and tonnage: quartz A (milky quartz with 99.8% min SiO_2 and 0.02% max Fe_2O_3): 8,000 t, quartz B (99.5% min SiO_2 and 0.15% max Fe_2O_3): 5,000 t, feldspar A (9.5-10% Na_2O , $\text{K}_2\text{O} < 1\%$, $\text{Fe}_2\text{O}_3 < 0.1\%$): 35,000 t, feldspar B (8.5-9% Na_2O , $\text{K}_2\text{O} < 1\%$, $\text{Fe}_2\text{O}_3 < 0.2\%$): 35,000 t.

Leuka Orykta SA (White Minerals) mined out 5,950 t of raw houndite-hydromagnesite natural mixture and prepared 4,170 t of exported crushed and dried product used as a flame retardant filler or as an extender in the paint industry.

Ionian Kalk SA produced from Cephalinia 110,000 t of calcium carbonate, with a revenue of Dr3.2 billion, half of which was exported.

Gold Sector

Thrace Minerals, a joint venture between Greenwich Resources and Kyprou Gold, has identified two gold deposits within the Sappes lease: Viper contains 1.2 Mt with an average grade of 18.4 g/t (687,000 oz of gold) and St Demetrios, which contains 260,000 t, with an average grade of 3.5 g/t (30,000 oz). The gold is associated with sulphide ore, and detailed mine plans have been drawn up for an underground mine at Viper, and an open-pit at St Demetrios at a strip ratio of 0.1:1. The visual impact of mining operations will be minimal.

The revised operating and capital cost, based on the concentrate-sale route, is estimated at US\$155/oz (an operating cost of US\$105 and a capital cost of US\$50/oz). This is in the lower quartile of world costs and, together with the fiscal incentives available in the province of Thrace, this should ensure a strong cash flow. The Ministry of Environment in Athens has approved the pre-approval study, and the Environmental Impact Study will be submitted shortly along with a bankable feasibility study.

Silver and Baryte is participating in the gold sector through a 20% stake in Thracian Gold Mines SA, which owns the Perama Hill gold deposit, 25 km northwest of Alexandroupolis in northeastern Greece. The deposit is formed mainly in volcano-sedimentary sequences of the Maronia graben and partially in the Mesozoic metamorphic sequences of Makri. Drilling to date has defined a resource of 13.4 Mt at 3.4 g/t, offering the potential for a shallow, low-cost, low-strip ratio operation. Thracian Gold is permitting in order to start the construction phase for the gold mine, and holds a strong tenement position covering some 450 km².

Last year, Greek American Exploration Ltd (Gramex) evaluated the exploration licence of Ocna de Fier in Romania with a detailed geochemical exploration programme (on which it spent US\$103,000). Although the rights for the licence were for five years, Gramex decided to abandon the area and to focus on new potential targets. Owned equally by S&B and Denver-based Royal Gold, Gramex is in partnership with Phelps Dodge Exploration Corp. in exploration and evaluation work in Bulgarian tenements under the name of Sofia Minerals Ltd. Somin, which is based in Sofia and Plovdiv, has signed five concession agreements with the Bulgarian Committee of Geology and Natural Resources (Ministry of Environment) to conduct geological research in the Stremtsi, Panayurishte and

Spluka areas. The exploration programme has included geological mapping, rock chip and soil sampling, trenching and drilling in Stremtsi and Panayurishte.

Midas SA, a wholly-owned subsidiary of S&B, holds a gold exploration on licence Milos and three surrounding islands (Kimolos, Poliegos and Antimilos). The joint venture between Royal Gold Inc. and Rakov Pty Ltd (a subsidiary of Aegean Gold Inc.) has the opportunity to earn a 50% ownership position in Midas by spending US\$5.0 million over a three-year period (ending March 2001), at a rate of not less than an annual US\$1.7 million. The joint venture between Royal Gold and Rakov Pty (subsidiary of Aegean Gold Inc.) can earn a 25% ownership position in Midas by spending US\$2.5 million over the three-year period. At the moment Royal Gold is managing the exploration programme. An estimation of inferred resources, at various gold cut-off grades, is shown below.

Gold mineralisation, as encountered on Milos to date, is particularly encouraging because of the locally high gold grades encountered in drilling (up to 31 g/t). During 2000, Midas submitted an environmental impact study for the purpose of performing further exploration work on the island of Milos. However, the Greek Ministry of Environment, Regional Planning and Public Works did not approve the study. As a result, exploration and development work has been postponed until full explanations are given by the Ministry.

Energy Minerals

Public Gas Corp. of Greece (DEPA), the gas company owned 65% by the Greek State and 35% by Hellenic Petroleum, completed the basic infrastructure and continued

Cut-off Grade (g/t)	Reserves ('000 t)	Gold Grade (g/t)
0.34	30,800	1.08
0.5	20,100	1.45
1.0	8,600	2.43
1.5	4,700	3.45
2.0	3,300	4.20
2.5	2,200	5.14

commercial operations for the fourth year. DEPA imports Russian pipe natural gas and Algerian LNG and transports and distributes natural gas in Greece. In 2000, natural gas sales amounted to 1,900 million m³, compared with 1,420 million m³ in year 1999, with a turnover of Dr124 billion (US\$326 million), almost double the amount received in 1999.

Two regional gas distribution companies were established last year for Thessaloniki and Thessaly (in central Greece) with the participation and management of Italgas. This Italian company was selected as investor for these areas through a competitive tender, and the selected investor for Athens is the consortium formed between Shell UK and Cinergy of the US. The gas distribution company for Athens is expected to be established in 2001. By the end of 2000 DEPA completed the construction of a supplying station in Athens to supply, beginning 2001, 300 public transport vehicles with compressed natural gas (CNG). The liberalisation of the electricity market in Greece as from February 2001 is expected to increase the need for natural gas.

A small oilfield was discovered by the Greek company Kavalaoil, near the already depleted Prinos Field in the North Aegean, which is under evaluation.

Public Power Corp. (PPC) excavates lignite from four large open pits in the Ptolemais- Amyntaion area, Western Macedonia (Main, Kardias, Southern and Amyntaion fields) and three average-sized open pits in the area of Megalopolis, Peloponnese (Horemion, Marathousa and Kyparissia) fields. New records of productivity and technological improvement were established last year but the main field will be depleted in the next few years and must be replaced by the Mavropigi field, where development work has started for a planned lignite production of 7 Mt/y.

The total capacity of 4,900 MW of the lignite-fuelled power stations will be increased by 330 MW through the operation of the Florina station, which is expected online in 2002. The total lignite output increased by 3.9% to 63.3 Mt, out of which 50.9 Mt came from Ptolemais-Amyntaion and 12.4 Mt from Megalopolis. Some 273 million m³ of waste rock was excavated (237 million m³ from Ptolemais-Amyntaion and 35.4 million m³ from Megalopolis), which was 2.5% higher than in 1999. The lignite power stations generated 31.1 Gwh, 6% higher, corresponding to 69.2% of the total electric output in Greece.

The General Directorate of Mines operated with 6,458 employees, and investments amounted to Dr19.2 billion, mainly for land expropriation and technical improvements. PPC's restructuring programme is in progress, in anticipation of the introduction of the company to the Athens Stock Exchange.

Violignite mined 382,000 t of good quality lignite - 340,000 t from Vevi and 42,000 t from Vegora, of which 55% was sold to PPC and the rest to the private sector. Prospects of significantly higher sales to PPC are anticipated in view of the operation of the new PPC's power station in Florina in 2002.

Mineral Production In Greece ('000 t)			
Commodity	1998	1999	2000
Alumina	622	622	668
Aluminum	157	171	168
Asbestos (fibers)	35	32	-
Bauxite	1,823	2,139	2,609
Bentonite	726	850	1,062
Lignite	60,910	61,900	63,912
Magnesite	698	495	na
Magnesia, calcined	94	104	115
Magnesia, deadburned	93	42	32
Nickeliferous ore	1,670	1,750	2,510
Nickel	15	13.5	17.1
Perlite	658	600	624
Pumice	882	885	850
PbS, concentrate	30	27	27
ZnS, concentrate	37	32	32