The Mineral Industry of Portugal

By Harold R. Newman

The southern Iberian Peninsula, which is known as the Iberian Pyrite Belt (IPB), is one of the most mineralized areas of Western Europe and is geologically very complex. Massive sulfides linked to synorogenic volcanism were deposited in the southwestern part of the peninsula. The metallogenic province stretches about 250 kilometers (km) from Seville, Spain, to the southwestern coast of Portugal and has an important mining history. The IPB's volcanogenic massive sulfide (VMS) deposits, which date to the Upper Devonian and the Lower Carboniferous ages, were deposited during submarine felsic volcanism. Clusters of deposits occur around individual volcanic centers, and the ore is found in zones within volcanic and sedimentary host-rock sequences. The deposits, which have been mined from around 2000 B.C., were extensively worked mainly from the gossan material overlying the pyrite ore bodies in Phoenician and Roman times, and were the main source of precious metal for the Roman Empire. The IPB was the primary source of base metals in the European Union (EU). Portugal was the sixth ranked world producer of ornamental stones (Instituto Geológico e Mineiro, 2004§[1]).

The mining sector contributed approximately 1% of the gross domestic product (GDP) and also employed 1% of the work force. The country has considerable mineral wealth; the deposits, however, are scattered and not easily exploited on a large scale. The most important metallic mineral resources were copper, tin, and tungsten. Large reserves of uranium also exist. The most important mineral resources include such nonmetallic ores as high-quality marble, pyrites, and rock salt. The pyrite reserves in the Alentejo region make up about 23% of total world reserves (Link2Exports, 2004§).

Portugal has a land area of 92,390 square kilometers (km^2), which includes the Azores and the Madeira Islands, and is bordered on the east and north by Spain and on the south and west by the Atlantic Ocean. In 2004, the GDP based on purchasing power parity was $194 billion, and the per capita income based on purchasing power parity was $19,038. The inflation rate was 2.5%, and the unemployment rate was more than 6% (International Monetary Fund, 2005§).

Although the mineral industry of Portugal was modest in size, it was one of the leading producers of mined copper in the EU. The country was also a producer of dimension stone and tungsten concentrates (table 1).

At the Neves-Corvo Mine, Sociedade Mineira de Neves-Corvo S.A. mined copper with tin as a byproduct, and at the Panasqueira Mine, Beralt Tin & Wolfram S.A., which was owned by Primary Metals Inc. of Canada, mined tungsten; these were the two major operations in the metals mining sector. Pirites Alentejanas S.A.R.L. was the country's leading producer of pyrite. Lusosider Aços Planos S.A. and SN Servicos S.A. were the major steel producers. Cimentos de Portugal S.A. (Cimpor) was an important producer of cement. With the exception of copper, dimension stone, and tungsten, which were of international importance, production of other minerals and related materials had only domestic significance. Some of the larger mineral-related companies were partially owned or controlled by the Government, and some operations were privately owned (table 2).

In response to EU directives, the Government continued with the country's privatization program and was proceeding with legislation that would privatize many state-owned companies. The privatization issue was part of a broader program to reduce the role of the state and to restructure the Portuguese economy to one that would be more market driven.

Redcorp Ventures Ltd. signed an agreement with the Government to acquire the Lagoa Salgada exploration contract on November 3, 2004. The 415-km^2 Lagoa Salgada property consisted of advanced drill-stage polymetallic VMS exploration targets in the northwestern end of the IPB. The IPB hosts 85 known VMS deposits, which included the producing Neves-Corvo Mine and the permitted Aljustrel Mine project, both of which were owned by EuroZinc Mining Corp. Each of these deposits was estimated to contain more than 100 million metric tons (Mt) of copper-lead-silver-zinc- and gold-bearing massive sulfide resources (Redcorp Ventures Ltd., 2004§).

EuroZinc Mining Corp. announced that it was purchasing the Neves-Corvo Mine from Empresa de Desenvolvimento Mineiro S.A. and Rio Tinto Ltd. for $160 million and would assume $33.6 million in debt. EuroZinc was the only company to bid on the mine in January 2004. At yearend 2002, copper resources were reported to be an estimated 22.2 Mt of measured resources with an average grade of 5.65% copper, 800,000 metric tons of indicated resources with an average grade of 4.40% copper, and 7.6 Mt of inferred resources with an average grade of 4.03% copper (Metal Bulletin, 2004).

Beralt operated the Panasqueira Mine in the Beira Baixa Province. The mine was one of the world's leading producers of tungsten concentrates outside of China and produced a 75% tungsten oxide (WO_3) concentrate. Beralt announced that it had signed a long-term contract for the sale of all tungsten concentrate produced at the Panasqueira Mine. The new contract, which was viewed as being very favorable for the mine, renewed expectations of continuing long-term operation (Primary Metals Inc., 2004§).

Portugal's industrial minerals sector was a modern and efficient producer of a variety of materials, most notably dimension stone and minerals for the manufacture of ceramics. The dimension stone industry continued to be an important segment of the mining industry in terms of value and trade.

Cimpor was Portugal's leading cement manufacturer and was the second ranked producer in the world after Cemex S.A. of Mexico. In addition to cement, Cimpor also produced aggregates, precast concrete products, and dry mortars. The development of Portugal's infrastructure was expected to create

[1]References that include a section mark (§) are found in the Internet References Cited section.

a substantial demand for Cimpor's products in the coming years (Hoover's, 2004§).

Marble was the most valuable of the stone products and accounted for the majority of stone production. The main area for marble quarrying continued to be the Evora District.

Although Portugal was one of the faster-growing European economies, it had limited domestic energy resources and imported about 90% of its needs. Because a commercially viable oil deposit has yet to be discovered in Portugal, the country depends heavily on the importation of petroleum and petroleum-based products. Portugal imported small amounts of coal for electricity generation, which produced about 5% of the country's needs. One-third of Portugal's electricity was provided by hydropower. The energy sector was expected to become increasingly more dependant on and integrated with Spain's energy sector (U.S. Energy Information Agency, 2005§).

The EU Executive Commission blocked a proposed merger of Portugal's main electricity and gas groups because of objections raised by EU competition authorities. The transaction would have seen state-controlled Galp Energia sell 51% of Gás de Portugal to Energia de Portugal and the remaining 49% to ENI SpA of Italy (Alexander's Gas & Oil Connections, 2004§).

Outlook

The structure of the mineral industry could change in the near future because of continuing mineral exploration based on exploration models developed in the IPB. Copper, gold, kaolin, lithium, and pyrites are some of the minerals targeted for exploration. The IPB is a focus of interest for mining companies and for official institutions in Portugal and Spain; it is a prime area for exploration activity and appears to have an above-average potential for success on the basis of the large VMS deposits discovered to date. Companies will be targeting the Portugal area of the IPB, which is considered to be underexplored. Eurozinc's copper-zinc mining operations are in Portugal; the company plans to embark on a $10 million 18-month exploration program to explore the area near its existing Neves-Corvo Mine. Redcorp Ventures Ltd. is exploring for copper, lead, silver, and zinc on its Lagoa Salgada property. There also appears to be a potential for increased production of granite, marble, and slate in Portugal.

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Major Sources of Information

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2000	2001	2002[e]	2003[e]	2004[e]
METALS						
Aluminum, secondary[e]	thousand metric tons	18	18	16	18	16
Arsenic, white[e]		50	50	25	25	15
Beryl, concentrate, gross weight[e]		4	5	5	5	5
Copper, mine output, Cu content		76,200	82,965	77,227 [2]	77,581 [r, 2]	95,743 [2]
Iron and steel:						
Iron ore and concentrate, manganiferous:[e]						
Gross weight		15,000	14,500	14,000	14,000	14,000
Fe content		11,800	11,000	10,000	10,000	10,000
Metal:						
Pig iron	thousand metric tons	382	82	100	100	100
Steel:						
Crude	do.	1,097	728	894 [r, 2]	722 [r, 2]	720 [2]
Hot rolled	do.	910	865	1,054 [2]	1,000	1,000
Lead, refined, secondary[e]		5,000	4,000	4,000	4,000	4,000
Manganese, Mn content of iron ore[e]		500	500	300	300	300
Silver, mine output, Ag content	kilograms	20,430	23,100	19,500 [r, 2]	21,800 [2]	24,600 [2]
Tin:						
Mine output, Sn content		1,227	1,174	574 [r, 2]	354 [r, 2]	200
Metal, primary and secondary		748 [r]	716 [r]	361 [r, 2]	218 [r, 2]	--
Tungsten mine output, W content		743	698	693 [2]	715 [r, 2]	700
Uranium concentrate, U_3O_8		16	5	2 [r, 2]	-- [r, 2]	--
Zinc, smelter, primary[e]		3,600	3,600	3,000	3,000	3,000
INDUSTRIAL MINERALS						
Calcium carbonate[e]		100,000	100,000	100,000	100,000	100,000
Cement, hydraulic	thousand metric tons	10,343	10,000 [e]	10,000	10,000	10,000
Clays:						
Kaolin[3]		162,674	146,436	148,706 [2]	150,000	150,000
Refractory		712,951	660,775	614,453 [r, 2]	625,000 [r]	625,000
Diatomite		686	387	400	400	400
Feldspar		119,837	112,923	124,117 [2]	126,116 [r, 2]	126,000
Gypsum and anhydrite		698,673	787,646	579,143 [r, 2]	580,000 [r]	600,000
Lime, hydrated and quicklime[e]		200,000	200,000	20,000	200,000	200,000
Lithium minerals, lepidolite		9,352	11,571	16,325 [2]	16,000	16,000
Nitrogen, N content of ammonia		246,000	201,600	190,300 [2]	244,700 [2]	243,900 [2]
Pyrite and pyrrhotite, including cuprous, gross weight[e]		10,000	10,000	10,000	10,000	10,000
Salt, rock		584,516	625,785	603,959 [2]	602,035 [r, 2]	600,000
Sand	thousand metric tons	8,311	10,000	10,953 [2]	10,000	10,000
Sodium compounds, n.e.s.:[e]						
Soda ash		150,000	150,000	150,000	150,000	150,000
Sulfate		50,000	50,000	50,000	50,000	50,000
Stone:						
Basalt[e]		500,000	500,000	50,000	50,000	50,000
Calcareous:						
Dolomite[e]	thousand metric tons	1,600 [r]	1,700 [r]	1,758 [r, 2]	1,800 [r]	1,800
Limestone, marl, calcite	do.	45,785	37,654	51,095 [r, 2]	50,000 [r]	50,000
Marble	do.	933	835	802 [r, 2]	800 [r]	800
Gabbro[e]	do.	100	100	100	100	100
Granite:						
Crushed	do.	20,000 [e]	29,246	28,645 [r, 2]	30,000	30,000
Ornamental	do.	464	909	900	900	900
Graywacke[e]	do.	20	1,073 [2]	1,000	1,000	1,000
Ophite	do.	178	149	120 [r, 2]	120 [r]	120
Quartz[e]	do.	38 [2]	20	16 [2]	16	16
Quartzite	do.	600	1,036	455 [r, 2]	500 [r]	500

See footnotes at end of table.

TABLE 1--Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		2000	2001	2002[e]	2003[e]	2004[e]
INDUSTRIAL MINERALS--Continued						
Stone--Continued:						
Schist	thousand metric tons	149	140 [e]	150	150	150
Slate[e]	do.	40	40	40	40	40
Syenite	do.	127	256	185 [r, 2]	200 [r]	200
Sulfur, byproduct, all sources[e]		28,000 [r]	35,000 [r]	28,000	27,000 [r]	25,000
Talc		7,407	8,362	8,916 [2]	5,459 [r, 2]	5,500
MINERAL FUELS AND RELATED MATERIALS						
Coke, metallurgical[e]	thousand metric tons	325	300	300	300	300
Gas, manufactured[e]	thousand cubic meters	125	125	125	125	125
Petroleum refinery products:[e]						
Liquefied petroleum gas	thousand 42-gallon barrels	3,132 [2]	3,200	3,200	3,200	3,200
Gasoline	do.	20,213 [2]	20,000	20,000	20,000	20,000
Kerosene and jet fuel	do.	6,216 [2]	6,500	6,500	6,500	6,500
Distillate fuel oil	do.	29,131 [2]	30,000	30,000	30,000	30,000
Residual fuel oil	do.	18,828 [2]	19,000	19,000	19,000	19,000
Unspecified	do.	15,067 [2]	16,000	16,000	16,000	16,000
Refinery fuel and losses	do.	3,618 [2]	3,800	3,800	3,800	3,800
Total	do.	96,205 [2]	98,500	98,500	98,500	98,500

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

[1]Table includes data available through August 2005.

[2]Reported figure.

[3]Includes washed and unwashed kaolin.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2004

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Calcium carbonate		Omya Mineral Portuguesa Lda. (Salmon & Cia Lda.)	Mine and plant at Fatima	100
Cement		Cimentos de Portugal S.A. (Cimpor) (Government, 10%)	Plants (3) at Alhandra, Loule, and Souselas	12,000
Copper concentrate		EuroZinc Mining Corp.	Neves-Corvo Mine near Castro Verde	500
Diatomite		Sociedade Anglo-Portugesa de Diatomite Lda.	Mines at Obidos and Rolica	150
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalúrgia S.A.R.L.	Plant at Setubal	100
Kaolin		Saibrais Arelas e Caulinos S.A. (Denain Anzin Mineraux S.A.)	Mines at Casal dos Braçais and Mosteiros	175
Petroleum, refined	42-gallon barrels per day	Petroleos de Portugal (Government, 100%)	Refineries at Lisbon, Porto, and Sines	300,000
Pyrite		Pirites Alentejanas S.A. (EuroZinc Mining Corp.)	Mine at Aljustrel, plant at Setubal	100
Steel, crude		SN Servicos S.A. (Metalúrgica Galaica S.A., 100%)	Steelworks at Maia and Seixal	600
Do.		Lusosider Aços Planos S.A. (Corus Group, 50%, and Sollac S.A., 50%)	Rolling mill at Seixal	400
Tin		EuroZinc Mining Corp.	Neves-Corvo Mine near Castro Verde	15
Tungsten concentrate	metric tons	Beralt Tin & Wolfram S.A. (Primary Metals Inc.)	Panasqueira Mine and plant at Barroca	1,400
Uranium	do.	Empresa Nacional de Uranio S.A. (Government 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, refined		RMC Quimigal S.A.R.L.	Electrolytic plant at Barreiro	12