

THE MINERAL INDUSTRY OF

PORTUGAL

By Harold R. Newman

Portugal, which is located in the Iberian Pyrite Belt (IPB), is one of the most mineralized areas of Western Europe. The area is geologically very complex, which tends to increase the diversity of the mineral resources in the country. The IPB, which stretches about 250 kilometers (km) from Seville, Spain, to the southwestern coast of Portugal, has an important mining history that goes back to Phoenician times. Its abundant mineral resources were one of the considerations that precipitated the Roman conquest and development of the region. Deposits were extensively worked, mainly for gold and silver, from the gossan material that overlay the pyrite ore bodies and were the main source of precious metals for the Roman Empire and a stimulus to trade on the Mediterranean.

In 2002, the mineral industry of Portugal was modest by world standards; its growth rate during the past 20 years, however, has made minerals one of the country's dynamic industrial sectors. This was mainly because of the discovery in 1977 and subsequent development of the rich copper and tin deposits of Sociedade Mineira de Neves-Corvo S.A. (Somincor) at Neves-Corvo. Portugal was one of the largest producers of mined copper in the European Union (EU). The country was also an important producer of dimension stone and tungsten concentrates. There was potential for increased production of granite, marble, and slate (table 1). Portugal was essentially an agricultural country exporting 75% of its agricultural and cattle production and was the largest producer in Europe of cork (Strawberry World, 2003¹).

The Neves-Corvo Mine of Somincor and the Panasqueira Mine of Avocet Mining plc were the two major operations in the metals mining sector. Pirites Alentejanas S.A.R.L. was the country's largest producer of pyrite. Lusosider Aços Planos S.A. and SN Servicos S.A. were the major steel producers. Cimentos de Portugal S.A. (Cimpor), which was an important producer of cement, was one of the companies included in the Government's privatization plans. With the exception of copper, dimension stone, ferroalloys, tin, and tungsten, which were of international importance, production of other minerals and related materials had only domestic significance. Most of the large mineral-related companies were partially owned or controlled by the Government. 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 public 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 will be more market driven.

Regulation and protection of the environment was under the jurisdiction of the following: Ministry of the Environment, Territorial Planning, and Urban Development, Ministry of Agriculture, Rural Development, and Fisheries, and the Nature Conservation Institute. The country's key environmental issues included the following: air pollution caused by industrial and vehicle emissions, inadequate means of waste disposal and ineffective treatment of toxic waste, soil erosion, and water pollution, especially in coastal areas (CountryWatch, 2002§).

Portugal, which was one of the smallest European economies, had a gross domestic product (GDP) of about \$147 billion. The per capita GDP in 2002 was \$12,178, or about 54% of the EU average. Portugal's economic growth during the past decade was accompanied by a heavy investment in infrastructure improvements, which have been largely funded by the EU. Portugal has successfully parlayed several years of EU funding into strong economic growth and substantial new foreign investment. The country has made a number of major infrastructure improvements, most notably a system of modern highways. Additional infrastructure projects included a new international airport at Lisbon, an upgrade of the country's rail system, a second phase of a natural gas pipeline system, and additional dams and port projects (U.S. Department of Commerce, 2002§).

Foreign trade composed more than 50% of Portugal's GDP. Its value in 2002 was estimated to be \$78 billion. The EU accounted for almost 80% of Portugal's total trade in 2002. Its principal trading partners were, in order of importance, Germany, Spain, France, and the United Kingdom. Germany was the largest trading partner for imports, and Spain the largest trading partner for exports (Australian Department of Foreign Affairs and Trade, 2002§). Table 3 lists export-import trade with the United States.

In early 2002, Murchison United Ltd. of Australia agreed to acquire Rio Tinto plc.'s 49% interest in Somincor. The remaining 51% was owned by the state holding company Empresa Desenvolvimento Mineiro S.A. Murchison was, however, unable to get approval from the Government by a July 31, 2002, deadline for financial acquisition arrangements. This meant that Murchison's planned financial placement to raise \$42 million, which had been fully underwritten, was cancelled. The sale and purchase agreement between Murchison and Rio Tinto was terminated effective July 31, 2002 (Mining Journal, 2002b).

Connary Minerals plc (a subsidiary of Minmet plc of the United Kingdom) announced that the Secretary of State for Industry and Energy annulled its license to mine the Castromil gold-silver deposit in northern Portugal. The Government cited environmental concerns and a delay in supplying mine plans for its annulment of the license (Mining Journal, 2002a).

Beralt Tin and Wolfram S.A., which was owned by Avocet Mining plc of the United Kingdom, operated the Panasqueira Mine; this mine was one of the world's largest producers of tungsten concentrates outside of China. In February 2002, production was cut in response to a downturn in prices. Production was cut by 10% to 20% at the mine that normally produced 100 to 110 metric tons per month of tungsten concentrates that contained 75% tungsten oxide (WO₃). Beralt reduced production to levels that would supply its long-term contracts, which have a minimum floor price (Metal Bulletin, 2002).

In September 2002, Avocet and Salish Ventures Inc. of Canada announced that they had signed a memorandum of understanding

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

whereby Salish would take control of Avocet's remaining tungsten assets in exchange for Avocet receiving almost 50% of the issued share capital of Salish. These assets included the Panasqueira Mine and a 10.6% interest in the Lormontov Mine in eastern Russia. Avocet stated its intention of becoming a focused gold mining company with the objective of reaching at least 9,500 kilograms per year of gold production within the next 3 years (Avocet Mining plc, 2002§).

EuroZinc Mining Corp. announced that it had purchased controlling interest in Pirites Alentejanas S.A., which owned the Aljustrel base-metals mine. The Aljustrel Mine, which is located in the IPB, consisted of several mineral deposits as well as considerable infrastructure, which included a modern mill and underground workings. The mine was on a care-and-maintenance status, but EuroZinc completed a feasibility study for putting the mine back into production (EuroZinc Mining Corp., 2002a§).

The Feitais deposit was the most significant deposit in the Aljustrel Project area because of its high zinc content, large tonnage, and existing infrastructure. It has extensive underground development in place. The deposit has a known strike length of 700 meters (m); a projected strike length, which is based on gravity data, of 1,200 m; an average width of about 400 m; and an average thickness of about 60 m. The estimated proven and probable minable reserves were 12 million metric tons (Mt) of zinc ore with an average grade of 5.67% zinc, 1.7% lead, and 64 grams per metric ton (g/t) silver. Proven and probable minable reserves were estimated to be 1.6 Mt of copper ore with an average grade of 2.2% copper, 0.97% zinc and 14 g/t silver (EuroZinc Mining Corp., 2002b§).

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.

Demand for cement continued; however, construction activity was somewhat lower. The development of Portugal's infrastructure was expected to create a substantial demand for cement in coming years.

FLS Industries and Højgaard Holding of Denmark reached an agreement to sell their 44.6% interest in Companhia Geral de Cal e Cimento SA (Secil) to Semapa SA, which was the major shareholder of Secil. The cost was reported to be \$330 million. In addition, FLS and Højgaard will release \$16 million from their jointly owned holding company (International Cement Review, 2002).

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

Although Portugal was one of the faster growing European economies, it has limited domestic energy resources and imports about 90% of its needs. Energy imports are expected to increase significantly because the country has little potential for increasing energy production. Portugal has not produced coal since the Germunde Mine closed in 1994. It does import small amounts of coal for electricity generation. A commercially viable oil deposit has yet to be discovered in Portugal. Portugal's energy sector is expected to become increasingly more dependant and integrated with Spain's energy sector.

The 2002 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, lead, lithium, pyrites, and tin were some of the minerals targeted for exploration. The IPB is the prime area for exploration activity and would appear to have an above-average potential for success on the basis of an unusually high number of the large volcanogenic massive sulfide deposits discovered to-date.

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Major Sources of Information

Cabinete Para Pesquisa e Exploração de Petróleo-MIE
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1200 Lisboa, Portugal
Instituto Geológico e Mineiro
R. Almirante Barroso, 38
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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, unless otherwise specified)

| Commodity | 1998 | 1999 | 2000 | 2001 | 2002 ^e |
|---|----------------------|----------------------|---------------------|----------------------|----------------------|
| Metals: | | | | | |
| Aluminum, secondary ^e thousand tons | 16 | 18 | 18 | 18 | 16 |
| Arsenic, white ^e | 50 | 50 | 50 | 50 | 25 |
| Beryl, concentrate, gross weight ^e | 5 | 4 | 4 | 5 | 5 |
| Copper, mine output, Cu content | 114,637 | 99,459 | 76,200 | 82,965 | 77,227 ² |
| Iron and steel: | | | | | |
| Iron ore and concentrate, manganiferous: ^e | | | | | |
| Gross weight | 18,000 | 16,000 | 15,000 | 14,500 | 14,000 |
| Fe content | 6,800 | 11,733 ² | 11,800 | 11,000 | 10,000 |
| Metal: | | | | | |
| Pig iron thousand tons | 385 | 389 | 382 | 82 | 100 |
| Crude steel do. | 936 | 1,038 | 1,097 | 728 | 800 |
| Lead, refined, secondary ^e | 6,500 | 6,000 | 5,000 | 4,000 | 4,000 |
| Manganese, Mn content of iron ore ^e | 500 | 500 | 500 | 500 | 300 |
| Silver, mine output, Ag content kilograms | 31,900 | 26,450 | 20,430 | 23,100 | 22,500 |
| Tin: | | | | | |
| Mine output, Sn content | 3,000 | 2,163 | 1,227 | 1,174 ^r | 361 ² |
| Metal, primary and secondary ^e | 100 | 100 | 50 | -- | -- |
| Tungsten mine output, W content | 831 | 434 | 743 | 698 ^r | 693 ² |
| Uranium concentrate, U ₃ O ₈ | 16 | 12 | 16 | 5 | 3 |
| Zinc, smelter, primary ^e | 3,600 | 4,000 | 3,600 | 3,600 | 3,000 |
| Industrial minerals: | | | | | |
| Cement, hydraulic thousand tons | 9,784 | 10,147 | 10,343 | 10,000 ^e | 10,000 |
| Clays: | | | | | |
| Kaolin ³ | 180,000 | 221,296 | 162,674 | 146,436 | 148,706 ² |
| Refractory | 300,000 ^e | 521,602 | 712,951 | 660,775 ^r | 650,000 |
| Diatomite | 1,600 ^e | 785 ^e | 686 | 387 | 400 |
| Feldspar | 120,000 | 114,685 | 119,837 | 112,923 ^r | 124,117 ² |
| Gypsum and anhydrite | 500,000 ^e | 550,000 ^e | 698,673 | 787,646 ^r | 750,000 |
| Lime, hydrated and quicklime ^e | 200,000 | 200,000 | 200,000 | 200,000 | 20,000 |
| Lithium minerals, lepidolite | 7,000 | 14,862 | 9,352 | 11,571 | 16,325 ² |
| Nitrogen, N content of ammonia | 204,400 | 223,200 | 246,000 | 201,600 | 190,300 ² |
| Pyrite and pyrrhotite, including cuprous, gross weight ^e | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Salt, rock | 600,000 ^e | 558,807 | 584,516 | 625,785 | 603,959 ² |
| Sand thousand tons | 4,000 ^e | 3,664 | 8,311 | 10,000 ^r | 10,953 ² |
| 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 | 100,000 | 520,262 ² | 500,000 | 500,000 | 50,000 |
| Calcareous: | | | | | |
| Dolomite ^e thousand tons | 500 | 500 | 500 | 500 | 500 |
| Limestone, marl, calcite do. | 15,000 ^e | 35,580 | 45,785 | 37,654 ^r | 38,000 |
| Marble do. | 900 ^e | 1,215 | 933 | 835 ^r | 900 |
| Gabbro ^e do. | 100 | 100 | 100 | 100 | 100 |
| Granite: | | | | | |
| Crushed do. | 25,000 ^e | 22,400 | 20,000 ^e | 29,246 ^r | 30,000 |
| Ornamental do. | 500 ^e | 458 | 464 ^r | 909 ^r | 900 |
| Graywacke ^e do. | 22 | 20 | 20 | 1,073 ^{r,2} | 1,000 |
| Ophite do. | 5 ^e | 3 ^e | 178 | 149 ^r | 150 |
| Quartz ^e do. | 15 | 15 | 38 ² | 20 | 16 ² |
| Quartzite do. | 500 ^e | 573 | 600 | 1,036 ^r | 1,000 |
| Schist do. | 100 ^e | 136 | 149 | 140 ^e | 150 |
| Slate ^e do. | 40 | 46 ² | 40 | 40 | 40 |
| Syenite do. | 80 ^e | 80 ^e | 127 | 256 ^r | 250 |

See footnotes at end of table.

TABLE 1--Continued
 PORTUGAL: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons, unless otherwise specified)

| Commodity | 1998 | 1999 | 2000 | 2001 | 2002 ^e |
|---|---------------------|---------|--------|---------------------|--------------------|
| Industrial minerals--Continued: | | | | | |
| Sulfur:^e | | | | | |
| Content of pyrites | 5,000 | -- | -- | -- | -- |
| Byproduct, all sources | 30,000 | 32,000 | 30,000 | 28,000 | 28,000 |
| Total | 35,000 | 32,000 | 30,000 | 28,000 | 28,000 |
| Talc | 8,400 | 9,554 | 7,407 | 8,362 ^r | 8,916 ² |
| Mineral fuels and related materials: | | | | | |
| Coke, metallurgical ^e | 330 | 325 | 325 | 300 | 300 |
| Gas, manufactured ^e | 125 | 125 | 125 | 125 | 125 |
| Petroleum refinery products: | | | | | |
| Liquefied petroleum gas | 4,500 ^e | 3,874 | 3,132 | 3,200 ^e | 3,200 |
| Gasoline | 15,000 ^e | 22,679 | 20,213 | 20,000 ^e | 20,000 |
| Kerosene and jet fuel | 7,500 ^e | 7,680 | 6,216 | 6,500 ^e | 6,500 |
| Distillate fuel oil | 20,000 ^e | 31,727 | 29,131 | 30,000 ^e | 30,000 |
| Residual fuel oil | 20,000 ^e | 18,968 | 18,828 | 19,000 ^e | 19,000 |
| Unspecified | 10,000 ^e | 17,018 | 15,067 | 16,000 ^e | 16,000 |
| Refinery fuel and losses | 3,000 ^e | 4,031 | 3,618 | 3,800 ^e | 3,800 |
| Total | 80,000 ^e | 105,977 | 96,205 | 98,500 ^e | 98,500 |

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^rRevised. -- Zero.

¹Table includes data available through June 2003.

²Reported figure.

³Includes washed and unwashed kaolin.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 2002

(Thousand metric tons unless otherwise specified)

| Commodity | Major operating companies and major equity owners | Location of main facilities | Annual capacity |
|------------------------------------|--|---|--------------------|
| Cement | Cimentos de Portugal S.A. (Cimpor) (Government, 10%) | Plants (3) at Alhandra, Loulé, and Souselas | 5,450 |
| Copper concentrate | Sociedade Mineira de Neves-Corvo S.A. (Somincor) (Government, 51%; Rio Tinto plc, 49%) | Neves-Corvo Mine near Castro Verde | 500 |
| Diatomite | Sociedade Anglo-Portuguesa de Diatomite Lda. | Mines at Obidos and Rolica | 5 |
| Feldspar | A.J. da Fonseca Lda. | Seixigal Quarry, Chaves | 10 |
| Ferroalloys | Electrometalúrgia S.A.R.L. | Plant at Setubal | 100 |
| Petroleum, refined 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. (Corus Group, 50%, Usinor Group 50%) | Steelworks at Seixal | 550 |
| Do. | Lusosider Aços Planos S.A. | Do. | 500 |
| Tin | Sociedade Mineira de Neves-Corvo S.A. (Somincor) (Government, 51%; Rio Tinto plc, 49%) | Neves-Corvo Mine near Castro Verde | 5 |
| Tungsten | Beralt Tin and Wolfram S.A. (Avocet Mining plc.) | Panasqueira Mine and plant at Barroca | 1,600 |
| Uranium tons | 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 |

TABLE 3
 PORTUGAL: EXPORT AND IMPORT TRADE
 WITH THE UNITED STATES

(Million dollars)

| Month | 2001 | | 2002 | |
|-----------|---------|---------|---------|---------|
| | Exports | Imports | Exports | Imports |
| January | 162 | 88 | 98 | 101 |
| February | 116 | 103 | 103 | 80 |
| March | 142 | 119 | 115 | 75 |
| April | 141 | 128 | 132 | 63 |
| May | 140 | 114 | 173 | 56 |
| June | 139 | 100 | 147 | 61 |
| July | 138 | 102 | 164 | 46 |
| August | 162 | 103 | 164 | 50 |
| September | 98 | 92 | 142 | 48 |
| October | 119 | 103 | 155 | 94 |
| November | 113 | 94 | 141 | 89 |
| December | 89 | 94 | 139 | 97 |
| Total | 1,559 | 1,240 | 1,673 | 860 |

Source: U.S. Census Bureau, Foreign Trade Division, April 2003.