

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 in the southwestern part of the peninsula are well known internationally. The metallogenic province stretches about 250 kilometers (km) from Seville, Spain, to the southwestern coast of Portugal.

The IPB's volcanogenic massive sulfide (VMS) deposits, which are of Upper Devonian and Lower Carboniferous age, were deposited during submarine felsic volcanism. Clusters of deposits occur around individual volcanic centers; the ore lies in zones within volcanic and sedimentary host rock sequences. Typically, these are overlain by a continental flysch group that can be up to 5 km thick. The largest individual deposit located to date was estimated to have held an original resource of about 500 million metric tons (Mt), which was a significant proportion of the 1,725-Mt total resource estimated for the IPB as a whole on the basis of the 90 or so known sulfide deposits. Allowing for previous production, current (1999) resources were estimated to be about 1,100 Mt (Mining Journal, 1999).

In 1999, the mineral industry of Portugal was modest by world standards; its growth rate during the past few years, however, has made minerals one of the country's dynamic industrial sectors. This was mainly because of the discovery and development of the rich copper and tin deposits of Sociedade Mineira de Neves-Corvo S.A. (Somincor) at Neves-Corvo.

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 is more market driven.

The Neves-Corvo Mine of Somincor and the Panasqueira tungsten mine of Beralt Tin and Wolfram (Portugal) Ltd. were the two major operations in the metal mining sector. Pirites Alentejanas S.A.R.L. was the country's largest producer of pyrite. Siderurgia Nacional S.A.R.L. produced iron and steel. Cimentos de Portugal, S.A., 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. Portugal was the largest producer of mined copper in the European Union (EU) in 1999 (table 1).

Table 2 lists the impact of selected classes of mineral commodities on Portugal's balance of payments position in relation to the EU and the world in 1998 (the latest year for which data are available). Tables 3 and 4 list exports, as well as

reexports, and imports of selected mineral commodities by Portugal in 1998 (the latest year for which data are available), respectively.

About 32,000 people were employed by the mineral industry, which included mining and processing. Most of the large mineral-related companies were owned or controlled by the Government, although some operations were privately owned (table 5).

Somincor was 51% Government-owned through the mining conglomerate Empresa de Desenvolvimento Mineiro (EDM). The minority partner was United Kingdom-based Rio Tinto Ltd., which owned 49% of the joint venture. Their underground mine, which used a drift-and-fill mining method, was designed to produce 1.5 million metric tons per year of raw ore that yielded a concentrate averaging 26% copper content. A conventional drilling, blasting, and mucking cycle was used. Primary crushing of ore was underground, and the ore was moved via conveyor to a vertical shaft where it was hoisted to the surface for secondary crushing and treatment. The life of the mine, which was based on estimated proven reserves, was expected to be 20 years (Richards and others, 1991).

Gold exploration activities were continuing in the Jales-Tres Minas gold district by the joint venture of Sociedade des Mines du Bourneix, which was a wholly owned subsidiary of Compagnie Générale des Matières Nucléaires of France, and EDM. The area includes the ancient Jales Mine and is 150 km east of Oporto. Jales-Tres Minas was probably the most important gold district in Portugal (Neiva and others, 1989).

Auspex Minerals Ltd. announced the results of gold exploration programs underway in Portugal. The Montemor gold concession, which was held in a 50-50 joint venture with European Gold Resources Inc. (formerly Montemor Resources Inc.), was the most advanced of the company's four gold properties. A substantial amount of exploration was conducted by Rio Tinto from 1984 to 1992. Drilling was continuing on the prospect. By 1999, 5 main gold belts had been mapped corresponding to belts of shearing along favorable zones, and 13 deposits with potential economic gold mineralization had been identified and considered to be significant (Auspex Minerals Ltd., April 1999, Gold exploration in Portugal, accessed June 24, 1999, at URL <http://www.auspex-min.com/portugal.html>).

The Portuguese iron and steel operation was nationalized in 1975 to function as a public entity incorporated as Siderurgia Nacional Empresa de Productos Planos (SN-Planos). The Government changed SN-Planos into a public limited company as a major step toward privatization.

EuroZinc Mining Corp. was formed in early 1999 by the amalgamation of Auspex and International Vestor Resources Ltd., which was its joint-venture partner, and EDM. EuroZinc

was encouraged by the results of a prefeasibility study that confirmed their expectation that on the basis of development of a new deposit, the Aljustrel mine/mill complex could be brought into production relatively quickly as a low cost zinc producer. Several deposits—the Feitais, the Gaviao, the Moinho, and the São Joao—occur within the Aljustrel mining lease. These deposits were historically mined for pyrite but still host copper, gold, lead, and zinc mineralization. The bulk of the drilling (down to a depth of 300 meters) was focused on the high-grade Feitais deposit. Six drill holes intersected wide intervals of high-grade zinc and silver mineralization, as well as respectable gold grades (Northern Miner, 1999).

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.

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. There was potential for increased production of granite, marble, and slate (Associação Portuguesa dos Industriais de Marmores, Granitos e Ramos Afins, 1999).

Demand for cement continued as the building and construction industry maintained a high level of activity. This situation was expected to continue with the substantial volume of work in coming years to develop Portugal's infrastructure.

Most coal was imported although there were some domestic sources available. Empresa Carbonifera de Douro S.A.R.L.'s Germunde Mine at Castello de Pavia closed because of high production costs and difficult mining conditions.

The present structure of the mineral industry could change in the near future because of significant mining exploration by several foreign companies. 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 the district's record of about 90 documented mineralized deposits, which is an unusually high number of large VMS deposits (Mining Journal, 1999).

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Major Sources of Information

Cabinete Para Pesquisa e Exploração de Petróleo-MIE
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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1995	1996	1997	1998	1999 e/
METALS					
Arsenic, white e/	125	100	50	50	50
Beryl concentrate, gross weight e/	4	4	5	5	4
Copper, mine output, Cu content	134,181	107,773	106,479	114,637	99,500 3/
Iron and steel:					
Iron ore and concentrate:					
Gross weight, manganiferous	14,535	18,620	18,905	18,000 e/	16,000
Fe content, manganiferous	5,417	7,876	6,800	6,800 e/	6,500
Metal:					
Pig iron	411	421	431	385	389 3/
Crude steel	829	871	905	854 r/	850 3/
Lead, refined, secondary e/	7,700	5,900	6,000	6,500	6,000
Manganese, Mn content of iron ore e/	500	500	500	500	500
Silver, mine output, Ag content	38,600	33,700	33,900	31,900 r/	26,500
Tin:					
Mine output, Sn content	4,627	4,637	2,667	3,000 e/	2,500
Metal, primary and secondary e/	100	100	100	100	100
Tungsten, mine output, W content	875 r/	776 r/	1,036 r/	831 r/	450 3/
Uranium concentrate, U ₃ O ₈	22	17	18	16	15
Zinc, smelter, primary e/	4,000	3,600	3,600	3,600	4,000
INDUSTRIAL MINERALS					
Cement, hydraulic	8,123 r/	8,455 r/	9,395 r/	9,500 r/ e/	9,400
Clays:					
Kaolin 4/	180,000 e/	177,423	180,000	180,000 e/	175,000
Refractory e/	300,000	392,148 3/	300,000	300,000	300,000
Diatomite e/	1,780	1,550	1,540	1,600 r/	1,600
Feldspar	106,559	98,596	121,380	120,000 r/ e/	120,000
Gypsum and anhydrite e/	450,000	520,722 3/	500,000	500,000	550,000
Lime, hydrated and quicklime e/	200,000	200,000	200,000	200,000	200,000
Lithium minerals, lepidolite	8,740	7,626	6,883	8,000	8,000
Nitrogen, N content of ammonia	155,100	197,600	195,600	204,400	223,200 3/
Pyrite and pyrrhotite (including cuprous), gross weight e/	12,000 3/	10,000	10,000	10,000	10,000
Salt, rock	544,647	609,639	596,000	600,000 e/	600,000
Sand e/	5,000	5,127 3/	5,000	5,000	5,000
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: e/					
Basalt	100	100	100	100	100
Calcareous:					
Dolomite	500	510	500	500	500
Limestone, marl, calcite	15,000	35,370 3/	15,000	15,000	15,000
Marble	800	945	900	900	900
Diorite	1,000	282	1,000	1,000	1,000
Gabbro	100	147	100	100	100
Granite	18,000 r/	18,412 r/ 3/	24,057 r/ 3/	25,000 r/	25,000
Graywacke	20	60	20	22	20
Ophite	50	25 r/	9 r/	5 r/	3
Quartz	28	14	14	15	15
Quartzite	500	594	500	500	500
Schist	100	260	100	100	100
Slate	30	20	30	30	30
Syenite	25	27 r/	86 r/	80 r/	80
Sulfur: e/					
Content of pyrites	5,000	5,000	5,000	5,000	5,000
Byproduct, all sources	4,000	4,000	3,000	3,000	3,000
Total	9,000	9,000	8,000	8,000	8,000
Talc	8,400 e/	8,277	8,236	8,400	8,200
MINERAL FUELS AND RELATED MATERIALS					
Coal, anthracite e/	140	--	--	--	--
Coke, metallurgical	329	332	330 e/	330 e/	325
Gas, manufactured e/	125	125	125	125	125

See footnotes at end of table.

TABLE 1--Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1995	1996	1997	1998	1999 e/	
MINERAL FUELS AND RELATED MATERIALS--Continued						
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	4,768	4,338	4,500	4,500 e/	4,500
Gasoline	do.	23,826	21,828	15,000	15,000 e/	15,000
Jet fuel	do.	8,000	7,500	7,000	7,000 e/	7,000
Kerosene	do.	400	400	225	225 e/	225
Distillate fuel oil	do.	20,000	20,000	20,000	20,000 e/	20,000
Residual fuel oil	do.	20,000	20,000	20,000	20,000 e/	20,000
All other products	do.	9,000	9,000	10,000	10,000 e/	10,000
Refinery fuel and losses	do.	3,500	3,500	3,000	3,000 e/	3,000
Total	do.	89,494	86,566	77,525	77,500 e/	77,500

e/ Estimated. r/ Revised. -- Zero.

1/ Table includes data available through May 2000.

2/ Estimated data are rounded to no more than three significant digits; may not add to totals shown.

3/ Reported figure.

4/ Includes washed and unwashed kaolin.

TABLE 2
PORTUGAL: 1998 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Cement, hydraulic	108	36,472	(36,364)	2,635	58,347	(55,712)
Clays, crude	97	5,394	(5,297)	192	5,617	(5,425)
Feldspar	183	3,366	(3,183)	183	3,588	(3,405)
Granite, sandstone etc.	50,847	4,661	46,186	60,218	12,508	47,710
Salt and brine	417	4,800	(4,383)	1,142	5,441	(4,299)
Steatite, natural, talc	4	3,037	(3,033)	37	3,291	(3,254)
Other	3,567	47,515	(43,948)	7,195	63,625	(56,430)
Total	55,223	105,245	(50,022)	71,602	152,417	(80,815)
Metalliferous ores:						
Copper	83,088	--	83,088	104,609	--	104,609
Lead	--	30	(30)	--	30	(30)
Tin	--	--	--	13,625	--	13,625
Zinc	--	--	--	--	280	(280)
Other (including waste and scrap)	2,343	7,655	(5,312)	6,295	24,872	(18,577)
Total	85,431	7,685	77,746	124,529	25,182	99,347
Metals:						
Aluminum	97,499	186,001	(88,502)	100,734	314,488	(213,754)
Iron and steel 1/	522,219	1,465,816	(943,597)	651,691	1,720,955	(1,069,264)
Lead	465	5,474	(5,009)	476	18,601	(18,125)
Mercury	--	30	(30)	2	30	(28)
Other nonferrous metals	8,449	75,390	(66,941)	8,943	80,573	(71,630)
Total	628,632	1,732,711	(1,104,079)	761,846	2,134,647	(1,372,801)
Mineral fuels	146,762	643,668	(496,906)	403,518	2,052,397	(1,648,879)

-- Zero.

1/ Includes ferroalloys and silicon metal.

Source: United Nations Statistical Office (microfiche).

TABLE 3
PORTUGAL: EXPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
METALS			
Aluminum:			
Oxides and hydroxides	24	--	Thailand 20; Denmark 3.
Ash and residue	272	--	All to Spain.
Metal including alloys:			
Scrap	12,349	--	Spain 12,084; Hong Kong, China 82; Netherlands 56.
Unwrought	34,213	--	Spain 31,943; France 2,186; Germany 80.
Semimanufactures	7,703	(2/)	Spain 2,798; France 2,515; United Kingdom 810.
Antimony, metal including alloys, all forms	value, thousands \$3	--	Brazil \$1; Spain \$1.
Bismuth, metal including alloys, all forms	do. \$1	--	All to Latvia.
Copper:			
Ore and concentrate	447,370	--	Germany 128,186; Finland 120,854; Spain 101,772.
Sulfate	3	--	All to Sao Tome and Principe.
Metal including alloys:			
Scrap	9,892	--	Spain 9,125; Belgium-Luxembourg 249; Netherlands 233.
Unwrought	value, thousands \$2,209	--	Germany \$1,321; United Kingdom \$641; Spain \$215.
Semimanufactures	3,203	1	United Kingdom 1,109; Spain 912; France 514.
Gold:			
Waste and sweepings	value, thousands \$436	--	All to Spain.
Metal including alloys, unwrought and partly wrought	do. \$8,385	\$13	Italy \$4,675; Spain \$3,684; Gabon \$5.
Iron and steel:			
Ore and concentrate, including roasted pyrite	5,500	--	All to Morocco.
Metal:			
Scrap	121,427	32	Spain 118,986; Hong Kong, China 2,195; Angola 117.
Pig iron, cast iron, related materials	3,006	--	Spain 2,937; Morocco 46; Benin 20.
Ferroalloys:			
Ferrosilicon	4	--	All to Morocco.
Ferromanganese	27	--	Spain 14; Morocco 13.
Ferrosilicon	218	--	Spain 215; Morocco 2; Mozambique 1.
Unspecified	1	--	All to Spain.
Steel, primary forms	88,366	20,062	Spain 34,154; Morocco 14,995; Netherlands 10,050.
Semimanufactures:			
Flat-rolled products:			
Of iron or nonalloy steel:			
Not clad, plated, coated	17,412	--	Spain 14,183; Angola 2,420; Cape Verde 267.
Clad, plated, coated	163,153	13,819	Spain 100,728; Italy 13,094; Canada 6,634.
Of alloy steel			
Bars, rods, angles, shapes, sections	5,662	3	Ireland 3,208; Spain 1,688; United Kingdom 271.
Bars, rods, angles, shapes, sections	176,378	532	Spain 141,648; Germany 15,919; United Kingdom 6,367.
Rails and accessories	157	--	India 33; Mozambique 33; Argentina 31.
Wire	21,375	549	Spain 18,888; Angola 775; United Kingdom 487.
Tubes, pipes, fittings	53,015	142	Spain 46,363; Angola 2,326; Cape Verde 1,090.
Lead:			
Oxides	3,217	417	Spain 2,466; Italy 217; Netherlands 51.
Metal including alloys:			
Scrap	1,542	--	All to Spain.
Unwrought	5	--	Do.
Semimanufactures	114	--	Spain 86; France 18; Angola 8.
Magnesium, metal including alloys:			
Scrap	value, thousands \$255	--	Norway \$252; Singapore \$2.
Unwrought	61	--	All to Norway.
Manganese, oxides	value, thousands \$1	--	All to Greece.
Mercury	3	--	All to Morocco.
Molybdenum, metal including alloys:			
Unwrought	value, thousands \$11	--	All to Brazil.
Semimanufactures	do. \$5	--	Do.
Nickel, metal including alloys:			
Scrap	28	--	All to Spain.
Semimanufactures	3	(2/)	United Kingdom 2.
Rare-earth, metals including alloys, all forms	20	--	All to Angola.
Silicon, high-purity	15	--	All to Spain.

See footnotes at end of table.

TABLE 3--Continued
PORTUGAL: EXPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
METALS--Continued			
Silver, metal including alloys, unwrought and partly wrought			
value, thousands	\$86	--	Spain \$67; Germany \$14; Angola \$2.
Tin:			
Ore and concentrate	6,257	--	Malaysia 3,179; Thailand 2,802; Turkmenistan 255.
Metal including alloys:			
Scrap	19	--	Netherlands 18; United Kingdom 1.
Semimanufactures value, thousands	\$8	--	Spain \$3; Angola \$2; Cape Verde \$1.
Titanium:			
Oxides	101	--	Angola 37; Cape Verde 24; Spain 21.
Metal including alloys, all forms value, thousands	\$50	\$49	Spain \$1.
Tungsten:			
Ore and concentrate	1,269	1,209	Japan 60.
Metal including alloys:			
Unwrought	22	--	All to Brazil.
Semimanufactures value, thousands	\$106	--	Israel \$63; Romania \$19; Japan \$18.
Uranium and thorium, ore and concentrate	do.	\$2,093	-- All to United Kingdom.
Zinc:			
Oxides	6,985	--	Spain 4,365; France 877; Italy 536.
Ash and residue	96	--	All to Spain.
Metal including alloys:			
Scrap	2,380	--	Spain 2,218; Germany 162.
Unwrought	128	--	Spain 101; unspecified 27.
Semimanufactures	780	--	Angola 418; Spain 129; Sao Tome and Principe 103.
Other:			
Oxides and hydroxides	13,532	--	South Africa 13,006; Angola 526.
Precious metals, n.e.s., waste and scrap value, thousands	\$131	--	All to Spain.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural, corundum, emery, pumice, etc.	do.	\$46	-- Spain \$43; Angola \$3.
Artificial, silicon carbide		33	-- All to Spain.
Dust and powder of precious and semiprecious stones including diamonds	value, thousands	\$88	-- Cuba \$83; Greenland \$5.
Grinding and polishing wheels and stones	957	(2)	Spain 609; Italy 169; Angola 32.
Barite and witherite	23	--	All to France.
Boron:			
Crude natural borates value, thousands	\$1	--	All to Mozambique.
Oxides and acids	41	--	Spain 24; Angola 17.
Cement	34,990	--	Cape Verde 22,429; Sao Tome and Principe 6,069; Guinea-Bissau 2,712.
Chalk	5,046	--	Spain 2,646; Brazil 1,230; Chile 572.
Clays, crude:			
Bentonite	671	--	Spain 610; Venezuela 40; Angola 21.
Chamotte earth and dinas earth	543	--	Morocco 473; Tunisia 48; Syria 22.
Fire clay	2,492	--	All to Spain.
Kaolin	2,741	--	Spain 1,821; Paraguay 449; Argentina 340.
Other	1	--	All to France.
Diamond, natural:			
Gem, not set or strung value, thousands	\$62,290	\$3,707	United Kingdom \$42,836; Belgium-Luxembourg \$15,653; Germany \$70.
Dust and powder do.	\$88	--	Cuba \$83; Greenland \$5.
Diatomite and other infusorial earth	4	--	All to Angola.
Feldspar	2,060	--	France 1,983; Spain 52; Italy 25.
Fertilizer materials, manufactured:			
Ammonia	25,122	--	Spain 18,515; Norway 6,603; Cape Verde 2.
Nitrogenous	132,561	--	Spain 87,426; Germany 28,987; Netherlands 5,989.
Phosphatic	41,725	--	Spain 28,158; Brazil 10,520; France 2,550.
Potassic	value, thousands	67	-- Cote d'Ivoire \$66; Cape Verde \$1.
Unspecified and mixed	14,893	--	Spain 141,165; Cote d'Ivoire 2,666; Angola 23.
Fluorspar	2	--	All to Morocco.
Gypsum and plaster	471	--	Cape Verde 248; Angola 171; Iceland 26.

See footnotes at end of table.

TABLE 3--Continued
PORTUGAL: EXPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Destinations	
		United States	Other (principal)
INDUSTRIAL MINERALS--Continued			
Iodine value, thousands	2	--	Angola \$1; Cape Verde \$1.
Lime	4,084	--	Spain 2,250; Angola 1,548; Cape Verde 151.
Magnesium compounds, oxides and hydroxides	10	--	Norway 9; Mexico 1.
Mica:			
Crude including splittings and waste	4	--	Angola 3; Morocco 1.
Worked including agglomerated splittings value, thousands	\$3	--	Angola \$1; Mozambique \$1; Netherlands \$1.
Pigments, mineral, iron oxides and hydroxides, processed	74	--	Spain 39; Angola 21; Guinea-Bissau 9.
Precious and semiprecious stones other than diamond, natural			
value, thousands	\$90	--	Switzerland \$55; Germany \$34.
Quartz crystal, piezoelectric do.	\$8	--	All to France.
Salt and brine	13,048	274	Nigeria 6,755; Liberia 2,428; Germany 1,913.
Sodium compounds, n.e.s., soda ash, manufactured	3,967	--	Spain 3,550; France 282; Angola 115.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked	477,257	876	Germany 139,449; Spain 136,421; France 41,288.
Worked	595,612	15,903	Germany 215,058; France 39,459; Denmark 35,826.
Dolomite, chiefly refractory-grade	7,477	--	Norway 7,475; Spain 2.
Gravel and crushed rock	12,383	--	France 6,354; Lebanon 3,006; Spain 2,191.
Limestone other than dimension	4	--	All to Angola.
Quartz and quartzite	40,557	--	Norway 39,095; Ireland 565; France 432.
Sand other than metal-bearing	96,869	--	Italy 59,866; Spain 33,682; Israel 1,677.
Sulfur:			
Elemental:			
Crude including native and byproduct	11,342	--	Lebanon 6,898; Slovenia 3,062; Spain 1,116.
Colloidal, precipitated, sublimed	8	--	Angola 6; Spain 2.
Sulfuric acid	213	--	Angola 135; Cape Verde 58; Congo (Kinshasa) 13.
Talc, steatite, soapstone, pyrophyllite	76	--	Angola 34; Saudi Arabia 20; Spain 15.
Other:			
Crude	4,071	--	Spain 4,065; Angola 3; Italy 2.
Slag and dross, not metal-bearing, granulated slag (slag sand) from iron and steel industry	19,995	--	All to Spain.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural	19,638	--	Spain 19,521; Sao Tome and Principe 49; France 24.
Carbon black	22,938	--	Spain 19,826; Germany 1,055; Netherlands 684.
Coal, bituminous	8	--	All to Spain.
Coke and semicoke	83,840	--	Spain 31,958; Tunisia 27,797; Italy 13,242.
Petroleum:			
Crude 42-gallon barrels	80	--	All to Cape Verde.
Refinery products:			
Liquefied petroleum gas do.	678,878	--	Spain 300,800; Belgium-Luxembourg 275,407; Morocco 72,651.
Mineral jelly and wax do.	18,369	(2/)	Italy 9,035; Spain 8,988; Angola 134.
Asphalt do.	309,236	--	Spain 308,278; Sao Tome and Principe 951.
Bituminous mixtures do.	14,326	--	Cape Verde 6,557; Spain 5,133; Cuba 1,376.
Petroleum coke do.	154	--	All to Spain.
Unspecified thousand 42-gallon barrels	16,237	5,365	United Kingdom 1,279; Spain 1,229; unspecified 4,669.

-- Zero.

1/ Table prepared by Glenn J. Wallace, International Data Unit.

2/ Less than 1/2 unit.

Source: United Nations Statistical Office (microfiche).

TABLE 4
PORTUGAL: IMPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS			
Alkali and alkaline-earth metals:			
Alkali metals	value, thousands	\$27	-- Germany \$13; Netherlands \$8; United Kingdom \$5.
Alkaline-earth metals		39	-- Germany 24; Spain 14.
Aluminum:			
Ore and concentrate		2,008	-- Spain 1,654; France 265; Netherlands 89.
Oxides and hydroxides		8,687	63 Spain 5,570; France 2,192; Germany 383.
Metal including alloys:			
Scrap		944	-- Spain 628; Israel 280; Russia 23.
Unwrought		109,175	12 Norway 57,978; Spain 27,679; Netherlands 7,763.
Semimanufactures		40,490	102 Spain 11,327; Germany 10,852; France 4,897.
Antimony:			
Oxides		235	-- China 75; Spain 64; United Kingdom 29.
Metal including alloys, all forms		24	-- Spain 20; Netherlands 3; Belgium-Luxembourg 1.
Arsenic, metal including alloys, all forms		25	-- All from Spain.
Beryllium, metal including alloys, all forms	value, thousands	\$5	\$4 Italy \$1.
Bismuth, metal including alloys, all forms		2	-- Belgium-Luxembourg 1; Spain 1.
Cadmium, metal including alloys, all forms	value, thousands	\$1	-- All from unspecified Europe.
Chromium:			
Ore and concentrate		1,947	-- South Africa 924; Spain 527; Netherlands 496.
Oxides and hydroxides		185	-- Spain 102; Germany 52; Netherlands 20.
Metal including alloys, all forms		5	1 Germany 4.
Cobalt:			
Ore and concentrate	value, thousands	\$67	-- France \$31; Italy \$27; Spain \$9.
Oxides and hydroxides		8	-- Belgium-Luxembourg 4; United Kingdom 2; Finland 1.
Metal including alloys, all forms		32	-- Belgium-Luxembourg 12; France 12; Germany 6.
Copper:			
Oxides and hydroxides		242	-- Norway 160; Germany 80; Spain 2.
Sulfate		2,799	-- Spain 1,395; France 659; Italy 522.
Ash and residue		22	-- All from Netherlands.
Metal including alloys:			
Scrap		2,282	35 Spain 720; United Kingdom 411; South Africa 241.
Unwrought		2,532	9 Spain 1,564; Turkey 363; Germany 304.
Semimanufactures		76,929	117 Spain 35,423; Italy 9,298; France 8,882.
Gold:			
Waste and sweepings	value, thousands	\$14	-- All from United Kingdom.
Metal including alloys, unwrought and partly wrought	do.	\$61,805	\$362 Germany \$31,425; Spain \$20,061; France \$4,936.
Iron and steel:			
Ore and concentrate, excluding roast pyrite		590,097	-- Brazil 399,263; Canada 190,477; Netherlands 300.
Metal:			
Scrap		173,556	655 United Kingdom 120,497; Germany 17,270; Netherlands 7,995.
Pig iron, cast iron, related materials		38,466	81 Russia 20,912; Spain 6,956; Germany 3,316.
Ferroalloys:			
Ferrochromium		1,037	-- Spain 306; Germany 289; Belgium-Luxembourg 251.
Ferromanganese		1,304	-- Spain 1,099; Germany 103; France 77.
Ferromolybdenum		111	-- Austria 69; Spain 28; Germany 10.
Ferriobium		4	-- Germany 3; Spain 1.
Ferrosilicomanganese		6,304	-- All from Spain.
Ferrosilicon		4,360	-- Spain 2,511; Norway 643; Brazil 579.
Ferrotitanium and ferrosilicotitanium		9	-- United Kingdom 6; Germany 2; Spain 1.
Ferrotungsten and ferrosilicotungsten	value, thousands	2	-- All from Germany.
Ferrovandium	do.	15	-- Spain \$14; Germany \$1.
Silicon metal		31	-- Spain 30; Argentina 1.
Unspecified		3,342	-- Spain 2,972; France 321; Argentina 39.
Steel, primary forms		22,860	450 Germany 5,060; Brazil 1,714; Spain 1,418.
Semimanufactures:			
Flat-rolled products:			
Of iron or nonalloy steel:			
Not clad, plated, coated		971,799	282 Netherlands 151,803; Germany 107,586; Spain 97,959.
Clad, plated, coated		270,167	578 Spain 51,866; Germany 38,131; Italy 37,413.
Of alloy steel		110,994	-- Germany 32,084; France 30,472; Spain 22,810.

See footnotes at end of table.

TABLE 4--Continued
PORTUGAL: IMPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Iron and steel--Continued:			
Metal--Continued:			
Semimanufactures--Continued:			
Bars, rods, angles, shapes, sections	795,893	620	Spain 427,118; Italy 57,441; Belgium-Luxembourg 54,557.
Rails and accessories	33,839	--	France 16,826; Spain 10,856; Italy 2,963.
Wire	41,669	26	Spain 15,686; Belgium-Luxembourg 5,432; South Africa 5,304.
Tubes, pipes, fittings	178,978	44	Spain 85,269; France 37,897; Germany 22,827.
Lead:			
Ore and concentrate	14	--	All from United Kingdom.
Oxides	830	19	Spain 811.
Metal including alloys:			
Scrap	8	--	All from Spain.
Unwrought	28,072	--	Morocco 12,084; Bulgaria 5,425; United Kingdom 1,974.
Semimanufactures	348	--	Spain 94; Greece 83; France 77.
Lithium oxides and hydroxides	value, thousands	\$2	-- Sweden \$1; United Kingdom \$1.
Magnesium, metal including alloys:			
Unwrought	383	--	Norway 363; France 16; Italy 2.
Semimanufactures	value, thousands	\$52	\$36 Germany \$6; Switzerland \$5; United Kingdom \$3.
Manganese:			
Ore and concentrate	524	--	Netherlands 280; Greece 194; Spain 50.
Oxides	358	--	South Africa 220; Spain 87; Germany 30.
Metal including alloys, all forms	29	--	Germany 21; Italy 4; Netherlands 4.
Mercury	value, thousands	\$30	-- Germany \$25; Spain \$4; France \$1.
Molybdenum:			
Oxides and hydroxides	do.	\$3	\$3
Metal including alloys:			
Unwrought	9	1	Germany 8.
Semimanufactures	value, thousands	\$104	-- Germany \$60; Italy \$25; United Kingdom \$17.
Nickel:			
Matte and speiss	42	--	Spain 39; France 3.
Oxides and hydroxides	value, thousands	\$24	-- Spain \$21; France \$2.
Metal including alloys:			
Unwrought	356	--	Netherlands 113; United Kingdom 62; Canada 53.
Semimanufactures	111	(2/)	Germany 49; Spain 27; France 9.
Platinum-group metals:			
Waste and sweepings	value, thousands	\$1	-- All from unspecified Europe.
Metal including alloys, unwrought and partly wrought:			
Palladium	do.	\$32	-- Belgium-Luxembourg \$20; Spain \$11.
Platinum	do.	\$168	-- Spain \$109; Austria \$31; Germany \$16.
Rhodium	do.	\$24	-- Italy \$15; Spain \$9.
Rare-earth, metals including alloys, all forms	2	--	Austria 1; Germany 1.
Selenium, elemental	7	--	United Kingdom 3; Spain 2; Belgium-Luxembourg 1.
Silicon, high-purity	160	--	All from Spain.
Silver, metal including alloys, unwrought and partly wrought	\$12,210	\$13	Germany \$4,424; United Kingdom \$3,549; Spain \$3,246.
	value, thousands		
Tantalum, metal including alloys, all forms	do.	\$111	\$25 Germany \$54; United Kingdom \$32.
Tin, metal including alloys:			
Unwrought	1,351	2	Spain 516; Germany 336; United Kingdom 135.
Semimanufactures	170	(2/)	United Kingdom 112; Netherlands 34; Germany 18.
Titanium:			
Ore and concentrate	319	--	South Africa 306; Spain 13.
Oxides	3,475	60	Australia 1,142; Saudi Arabia 704; Belgium-Luxembourg 517.
Metal including alloys, all forms	86	58	Italy 15; Norway 8; Japan 2.
Tungsten:			
Ore and concentrate	value, thousands	\$23	-- Italy \$21; Germany \$2.
Metal including alloys:			
Unwrought	do.	\$104	\$29 Brazil \$67; France \$6; Germany \$1.
Semimanufactures	do.	\$666	\$3 Spain \$327; Belgium-Luxembourg \$155; France \$47.

See footnotes at end of table.

TABLE 4--Continued
PORTUGAL: IMPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
METALS--Continued			
Uranium and thorium, metal including all forms:			
Uranium	value, thousands	\$26	\$26
Thorium	do.	\$39	-- All from Belgium-Luxembourg.
Vanadium, oxides and hydroxides	do.	\$4	-- All from Germany.
Zinc:			
Ore and concentrate		400	-- All from Colombia.
Oxides		2050	-- Spain 1,016; Colombia 360; United Kingdom 317.
Blue powder		576	-- Denmark 367; Belgium-Luxembourg 129; Spain 56.
Ash and residue		5903	407 Spain 4,213; Norway 485; United Kingdom 440.
Metal including alloys:			
Scrap		54	-- All from Spain.
Unwrought		21308	-- Spain 10,952; Belgium-Luxembourg 5,758; Norway 2,070.
Semimanufactures		6399	2 Spain 2,785; France 897; South Africa 705.
Zirconium, ore and concentrate		4375	18 Germany 1,896; Spain 1,145; Netherlands 936.
Other:			
Ores and concentrates		407	-- Netherlands 283; Spain 124.
Oxides and hydroxides		1541	2 Spain 1,453; Germany 53; Belgium-Luxembourg 24.
Ashes and residues		966	-- All from Spain.
Base metals including alloys, all forms	value, thousands	\$5	-- All from Switzerland.
Precious metals, n.e.s., waste and scrap	do.	\$77	-- Spain \$65; Italy \$12.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural, corundum, emery, pumice, etc.		2,529	19 Turkey 1,913; France 182; Spain 180.
Artificial:			
Corundum		1,610	4 France 748; Germany 313; Austria 262.
Silicon carbide		1,202	1 France 463; Denmark 255; Germany 211.
Dust and powder of precious and semiprecious stones including diamonds	value, thousands	\$3,788	-- Spain \$965; Belgium-Luxembourg \$694; Ireland \$572.
Grinding and polishing wheels and stones		2,493	12 Italy 1,188; Spain 551; Germany 259.
Asbestos, crude		6,302	-- Canada 5,162; Zimbabwe 377; South Africa 342.
Barite and witherite		3,656	-- Morocco 2,500; Netherlands 501; Spain 333.
Boron:			
Crude natural borates		14,400	-- Turkey 12,850; Spain 701; Argentina 565.
Oxides and acids		1,077	-- United Kingdom 708; Italy 168; Spain 118.
Cement	thousand tons	1,331	(2/) Ukraine 290; Italy 228; United Kingdom 173.
Chalk		2,980	-- France 1,870; Belgium-Luxembourg 479; United Kingdom 428.
Clays, crude:			
Bentonite		18,847	106 United Kingdom 5,496; Spain 5,435; France 5,121.
Chamotte earth and dinas earth		1,841	-- France 1,028; Spain 673; Netherlands 73.
Fire clay		260	-- Germany 147; Spain 110; Italy 3.
Fuller's earth		57	40 Spain 17.
Kaolin		121,639	700 United Kingdom 87,459; Spain 22,393; France 9,467.
Other		5,565	90 Spain 4,429; United Kingdom 716; Germany 165.
Cryolite and chiolite		45	-- Germany 44; Spain 1.
Diamond, natural:			
Gem, not set or strung	value, thousands	\$52,085	-- Belgium-Luxembourg \$40,677; United Kingdom \$5,514; Angola \$3,160.
Industrial stones	do.	\$2,211	-- Germany \$1,775; Spain \$214; Netherlands \$185.
Dust and powder	do.	\$3,706	-- Spain \$965; Belgium-Luxembourg \$620; Ireland \$572.
Diatomite and other infusorial earth		1,667	729 Spain 479; France 410; Italy 40.
Feldspar		31,026	-- Spain 17,568; France 8,963; India 2,306.
Fertilizer materials:			
Crude, n.e.s.		7,131	1 Spain 4,600; France 1,280; Israel 1,076.
Manufactured:			
Ammonia		20,028	-- Estonia 9,987; Algeria 9,971; Spain 60.
Nitrogenous		174,634	-- Netherlands 47,572; Germany 36,001; Spain 33,346.
Phosphatic		947	-- Spain 946; France 1.
Potassic		70,005	-- Israel 25,307; Spain 18,997; Jordan 14,350.
Unspecified and mixed		153,387	21 Spain 43,760; Netherlands 28,708; Tunisia 23,014.
Fluorspar		1,381	-- Spain 894; France 366; Belgium-Luxembourg 69.

See footnotes at end of table.

TABLE 4--Continued
PORTUGAL: IMPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
INDUSTRIAL MINERALS--Continued			
Graphite, natural	378	--	Spain 302; Germany 41; China 21.
Gypsum and plaster	276,003	36	Spain 240,658; Morocco 27,310; Germany 5,481.
Iodine	25	--	Belgium-Luxembourg 11; Netherlands 6; Japan 5.
Kyanite and related materials:			
Mullite	471	--	Netherlands 460; United Kingdom 11.
Unspecified	245	--	Spain 164; South Africa 80.
Lime	1,338	--	Spain 1,321; Germany 14; Denmark 3.
Magnesium compounds:			
Magnesite, crude	1,762	--	Spain 1,346; Italy 231; Greece 108.
Oxides and hydroxides	2,597	--	Spain 1,168; Netherlands 654; Italy 386.
Other	63	--	All from India.
Mica:			
Crude including splittings and waste	110	--	France 51; United Kingdom 31; Norway 18.
Worked including agglomerated splittings	18	(2/)	Kenya 8; Switzerland 5; Belgium-Luxembourg 2.
Nitrates, crude	754	--	Belgium-Luxembourg 742; Spain 8; Germany 4.
Phosphates, crude	183,954	--	Syria 154,063; Tunisia 20,100; Algeria 5,500.
Phosphorus, elemental	7	--	All from Germany.
Pigments, mineral:			
Natural, crude	14	--	France 7; Spain 5; United Kingdom 2.
Iron oxides and hydroxides, processed	2,344	--	Germany 1,075; Spain 763; Italy 118.
Precious and semiprecious stones other than diamond:			
Natural	value, thousands	\$1,255	\$17 Germany \$322; Switzerland \$153; Brazil \$151.
Synthetic	do.	\$1,345	-- Switzerland \$357; Spain \$330; United Kingdom \$249.
Pyrite, unroasted		132	-- United Kingdom 80; Spain 52.
Quartz crystal, piezoelectric	value, thousands	\$34	-- Spain \$27; Italy \$6; Thailand \$1.
Salt and brine		105,823	2 Spain 42,769; France 38,916; Netherlands 8,152.
Sodium compounds, n.e.s.:			
Soda ash, manufactured		35,773	-- Spain 35,275; France 471; Germany 26.
Sulfate, manufactured		45,398	-- Spain 45,189; France 203; Germany 5.
Stone, sand and gravel:			
Dimension stone:			
Crude and partly worked		76,258	91 Spain 39,356; South Africa 14,997; Brazil 7,763.
Worked		33,124	1 Spain 27,588; Sweden 1,529; Italy 1,487.
Dolomite, chiefly refractory-grade		9,770	2 Spain 7,454; Germany 1,591; United Kingdom 456.
Gravel and crushed rock		216,561	3 Spain 210,308; France 4,343; Italy 1,781.
Limestone other than dimension		1,659	-- France 1,652; Netherlands 7.
Quartz and quartzite		557	-- Italy 473; Germany 30; Spain 29.
Sand other than metal-bearing		121,038	55 Spain 117,568; Belgium-Luxembourg 1,960; France 858.
Sulfur:			
Elemental:			
Crude including native and byproduct		2,468	-- Spain 2,088; France 325; Belgium-Luxembourg 50.
Colloidal, precipitated, sublimed		4,576	-- Tunisia 2,592; Spain 1,952; France 25.
Dioxide		4,562	-- Sweden 3,835; Spain 716; Germany 11.
Sulfuric acid		172,649	1 Spain 118,939; United Kingdom 22,103; Germany 11,687.
Talc, steatite, soapstone, pyrophyllite		14,432	254 Spain 6,994; France 3,542; Belgium-Luxembourg 1,494.
Vermiculite, perlite, chlorite		991	-- France 707; South Africa 172; Spain 110.
Other:			
Crude		38,841	560 Spain 33,120; United Kingdom 1,551; Finland 914.
Slag and dross, not metal-bearing:			
Granulated slag (slag sand) from iron and steel industry		10,641	-- All from Spain.
Waste, scale, dross, slag of iron or steel industry		2,006	-- Do.
Slag and ash, n.e.s., including seaweed ash (kelp)		82,731	-- Spain 82,451; France 258; Italy 21.
MINERAL FUELS AND RELATED MATERIALS			
Asphalt and bitumen, natural		9,905	-- France 7,810; Spain 1,982; Germany 54.
Carbon black		5,520	-- Spain 2,297; Germany 2,034; France 832.
Coal:			
Anthracite		336,726	-- South Africa 336,711; Netherlands 15.
Bituminous	thousand tons	4,645	759 Colombia 1,756; South Africa 1,325; Venezuela 272.
Lignite including briquets		1	-- All from Germany.
All grades including briquets	thousand tons	4,990	759 Colombia 1,756; South Africa 1,667; Venezuela 272.

See footnotes at end of table.

TABLE 4--Continued
PORTUGAL: IMPORTS OF MINERAL COMMODITIES IN 1998 1/

(Metric tons unless otherwise specified)

Commodity	Total	Sources	
		United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS--Continued			
Coke and semicoke	13,022	--	Spain 8,655; France 2,402; Germany 1,964.
Gas, manufactured	value, thousands \$1	\$1	
Gas, natural, gaseous	613,427	--	All from Spain.
Peat including briquets and litter	11,843	--	Germany 6,006; Ireland 2,713; Netherlands 1,420.
Petroleum:			
Crude	thousand 42-gallon barrels 98,441	578	Saudi Arabia 19,260; Iran 16,924; Nigeria 16,500.
Refinery products:			
Liquefied petroleum gas	do. 14,359	69	Spain 7,591; United Kingdom 5,056; Libya 378.
Mineral jelly and wax	42-gallon barrels 101,436	165	Spain 56,955; China 19,211; Germany 17,889.
Asphalt	thousand 42-gallon barrels 1,875	--	Spain 1,533; France 316; unspecified 25.
Bitumen and other residues	do. 1,931	--	Spain 1,534; France 316; unspecified 74.
Bituminous mixtures	42-gallon barrels 57,982	(2/)	Spain 46,008; France 7,714; United Kingdom 3,030.
Petroleum coke	thousand 42-gallon barrels 2,211	1,036	Venezuela 544; Aruba 435; Spain 184.
Unspecified	do. 21,043	163	Spain 5,068; United Kingdom 3,477; Netherlands 1,943.

-- Zero.

1/ Table prepared by Glenn J. Wallace, International Data Unit.

2/ Less than 1/2 unit.

Source: United Nations Statistical Office (microfiche).

TABLE 5
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY IN 1999

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of facilities	Annual capacity	
Cement	Cimentos de Portugal S.A. (Government, 100%)	10 plants, various locations	6,000	
Coal	Empresa Carbonifera de Douro S.A.R.L. (Government, 100%)	Germunde Mine at Castello de Pavia (closed--maintenance standby)	150	
Copper concentrate	Sociedade Mineira de Neves-Corvo S.A. (Somincor) (Government, 51%; Rio Tinto Ltd., 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.R.L.	Plant at Setubal	100	
Steel, crude	Siderurgia Nacional S.A.R.L. (Government 100%)	Ironworks and steelworks at Seixal and Maia	1,000	
Tin	Somincor (Government, 51%; Rio Tinto Ltd., 49%)	Neves-Corvo Mine near Castro Verde	5	
Tungsten	Beralt Tin and Wolfram (Portugal) Ltd. (Avocet Mining Plc. 100%)	Panasqueira Mine and plant at Barroca Grande	1,600	
Uranium	tons	Empresa Nacional de Uranio S.A. (Government 100%)	Mines at Guargia, plant at Urgeirica	150
Zinc, refined	Quimigal E.P. (Government 100%)	Electrolytic plant at Barreiro	11	