

# THE MINERAL INDUSTRY OF SPAIN

By Harold R. Newman

Spain occupies about 85% of the Iberian Peninsula and has some of the most mineralized territory in Western Europe. The main polymetallic deposits, from west to east, include Tharsis, Scotiel, Rio Tinto, and Aznalcollar. In terms of value of mine output of metallic and nonmetallic minerals and quarry products, Spain was one of the leading European Union (EU) countries. Consequently, it had one of the highest levels of self-sufficiency with respect to mineral raw materials among the EU members. Spain has had a long history of base-metal mining, and although the numbers of active operations have significantly decreased in recent years, the country remained an important producer.

Spain had a population of more than 41 million in 2003 and has a land area of 504,750 square kilometers (km<sup>2</sup>), which included the Balearic and the Canary Islands. In 2003, the gross domestic product (GDP) at purchasing power parity was \$903 billion, and per capita income at purchasing power parity was \$22,400. The inflation rate was 3% and the unemployment rate was 11%. Spain's economy, with a growth rate of 2.8%, continued to perform modestly in 2003. The budget remained in deficit in 2003 but was forecasted to record a small surplus in 2004 (International Monetary Fund, 2004<sup>§1</sup>).

The economy was bolstered somewhat by major projects to meet the demands of EU integration, other development projects underway in 2003, and private consumption.

## Government Policies and Programs

Legislation to abolish state and private monopolies passed in midyear 2002, and the Government continued with its program of liberalizing Spanish industries in 2003. Electricity markets, the natural gas sector, and the petroleum sector continued to be key targets in the liberalization efforts. The natural gas liberalization process has been faster than that required by the EU (U.S. Energy Information Administration, 2004<sup>§</sup>).

## Environmental Issues

Environmental regulatory bodies for Spain include the Ministerio de Agricultura (Ministry of Agriculture), the Ministerio de Medio Ambiente (Ministry of the Environment), the Ministerio de Trabajo y Asuntos Sociales (Ministry of Labor and Social Matters), and the Instituto Nacional de Seguridad e Higiene en el Trabajo (National Institute for Health and Safety at Work). Environmental issues in Spain included pollution of the Mediterranean Sea from deforestation, effluents from the offshore production of natural gas and petroleum, raw sewage, and water quality and quantity. A natural hazard in Spain was periodic droughts (U.S. Central Intelligence Agency, 2004<sup>§</sup>).

## Production

Production of selected mineral commodities is listed in table 1. Primary aluminum metal production increased. With few exceptions, mine production was lower than that of 2002. Production of mined lead and mined zinc continued to decrease. Mine production of silver also decreased. Total refined copper production decreased along with secondary lead production. Gold production, however, increased.

Quarried mineral products, particularly quarried stone, accounted for a significant share of the mineral production in Spain (table 1). Output of natural gas and petroleum remained about the same as that of 2002. Spain's production of crude oil was limited, and the country continued to be a large importer of mineral fuels. Spain imported about 99% of its crude oil mainly from Libya, Mexico, Nigeria, and Saudi Arabia. The country imported 60% of its natural gas from Algeria (U.S. Energy Information Administration, 2004<sup>§</sup>). The indices of production of selected sectors, in terms of value, are listed in table 3.

## Trade

Spain's international economic profile has grown appreciably in recent years. Spain was one of the five largest economies in the EU and the world's 16th ranking exporting country. The principal export market was the EU, which accounted for almost 70% of Spain's exports and 65% of its imports. Spain's principal export destinations in 2003 were France (19.3%), Germany (12%), and Italy (9.7%). Principal import sources were France (16.8%), Germany (16.7%), and Italy (8.8%) (Australian Department of Foreign Affairs and Trade, 2004<sup>§</sup>).

Spain eliminated tariff barriers for imports from other EU countries and applied common EU external tariffs to imports from non-EU countries. Similarly, Spain followed the U.S.-EU mutual recognition agreements in its application of nontariff regulations and conformity assessment procedures applied to certain goods from the United States (U.S. Commercial Service, 2003<sup>§</sup>).

## Structure of the Mineral Industry

The mineral industry comprised a mix of state-owned, state and privately owned, and privately owned companies (table 2). Minerals belong to the state under an arrangement known as the *Regalía Principal*. The Mining Law of July 21, 1973, and the Hydrocarbon Law of October 7, 1998, governed the mineral industry. The Dirección General de Política Energética y Minas (General Directorate of Energy Policy and Mines), which is under the Ministerio de Economía (Ministry of Economy), implemented these mineral laws. The Sociedad Estatal de Participaciones Industriales (State Society of Industrial Participation) and the Instituto Geológico y Minero de España (Mining and Geological Institution of Spain) were the principal Government mineral-resource agencies. Also, some

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

of Spain's regional governments, such as Andalusia, Asturias, and Catalonia, have interests in the development of mineral resources in their geographic areas.

## Commodity Review

### Metals

**Bauxite and Alumina and Aluminum.**—Alumina and primary aluminum were produced almost entirely by Alcoa Inespal S.A. Alcoa was a holding company with three primary aluminum plants and three flat-rolled sheet and extrusions plants. Alumina Española S.A. (a subsidiary of Alcoa), which was located near San Ciprian, was Alcoa's only European producer of alumina and alumina hydrates. The company was also a producer of primary aluminum in standard sheets and special aluminum alloys.

**Copper.**—MK Gold Co. reported that it was granted a Regional Incentives Subsidy of €36.9 million (\$48.7 million) by the Ministerio de Economía to develop Las Cruces copper project. The subsidy was authorized by the EU, subject to conditions, which included the creation of jobs and capital expenditures of at least €264 million (\$348 million) by the end of March 2006. The subsidy would then be available (Mining Journal, 2003).

MK Gold completed a feasibility study on the Las Cruces project that called for an open pit mine with estimated minable ore reserves of 16.1 million metric tons (Mt) at a grade of 6.53% copper. An earlier study had minable reserves of 15.8 Mt at a grade of 5.94% copper. Capital costs for the project were expected to be about €281 million (\$370 million). Cash operating cost at the proposed mine was expected to be about €0.33 (\$0.44) per pound of copper produced. This would place Las Cruces among the lowest cost copper producers (Mining Engineering, 2004).

**Gold.**—Cambridge Mineral Resources plc of the United Kingdom was continuing with exploration drilling on the Lomero-Poyatos gold deposit in the Iberian Pyrite Belt in southern Spain. Cambridge acquired the property through the acquisition of the Spanish mining company Recursos Metalicos SL in 2000. The company reported that drilling in the northeastern zone had produced excellent gold grades, the best of which were in excess of 10 grams per metric ton (g/t) gold with considerable widths of mineralization. Cambridge was extending the drilling program through the third quarter of 2003. Trenching and ground geophysical electromagnetic surveys were also carried out at Las Merinas within the Lomero-Poyatos deposit to determine the potential extent of sulfide mineralization at depth (Cambridge Mineral Resources plc, 2003a§).

Cambridge was also continuing exploration of the San Telmo concession, which lies contiguously along strike to the Lomero-Poyatos deposit. San Telmo comprised 34 concessions, which included the Santa Barbara Mine and several mineralized zones, that covered approximately 12.5 km<sup>2</sup>. Surface sampling at the Carpio target returned assays from outcrops and float samples that ranged from 3.7 to 9.3 g/t of gold. Other prospects at San Telmo, which included an area of interest where historic drill

information indicated gold and copper mineralization, were being evaluated (Cambridge Mineral Resources plc, 2003b§).

Ormonde Mining plc of Ireland announced that it had signed a joint-venture agreement with International Gold Exploration AB (IGE) of Sweden on the Tracia gold property in northwestern Spain. Tracia is located 60 kilometers (km) south by southeast of Rio Narcea Gold Mines Ltd.'s (RNG) Corcoesto deposit in Galicia, which was being developed as an open pit gold mine. IGE can earn a 50% interest in the project by spending €260,000 (\$340,000) within a 2-year period. Exploration was in progress with drilling to start in early 2004. Ormonde acquired the property in early 2003 and identified gold mineralization associated with veining, silification, and sulfides in altered granite in four principal locations (Ormonde Mining plc, 2003b§).

Ormonde was continuing its investigation of a high-grade gold occurrence exposed in Roman workings at Portas on its Trives property in northwestern Spain. This work revealed that gold mineralization was contained in a 20-meter (m)-wide northwest-trending structural zone. Within this zone, the gold occurs as subvertical lenses that are parallel to the structural trend and also in stacked narrow veins that run perpendicular to the structural zone cutting across the structure-parallel gold-bearing veins. In the subvertical lenses, assay results were 2 m at a grade of 7.3 g/t gold, 4 m at a grade of 4.9 g/t gold, 2.5 m at a grade of 5 g/t gold, and 8 m at a grade of 2.6 g/t. In the cross-cutting veins, results were 7.1 g/t, 17.2 g/t, 19.6 g/t, and 28.6 g/t gold (Ormonde Mining plc, 2003a§).

Ormonde continued with a drilling program and surface rock sampling at the Salamon gold deposit. The company had exploration permits that totaled some 120 km<sup>2</sup> in Leon Province in northern Spain. Sampling in the carbonate-hosted gold zone returned average gold grades of 8.6 g/t and a maximum value of 44.8 g/t. Ormonde thought that the carbonate-hosted mineralization at Salamon has many affinities with the Carlin-type deposits in Nevada, which extend through several stratigraphic units. At yearend, the deposit was estimated to have a mineral resource of 5,700 kilograms (kg) of gold; the average grade of the deposit was 9 g/t (Ormonde Mining plc, 2003c§).

RNG was a mineral resource company with operations, development projects, and exploration activities in Spain and Portugal. The company produced gold at its Carles and El Valle Mines and was proceeding with feasibility studies at its Corcoesto and Salave gold deposits. The company produced 5,400 kg of gold in 2003. The mill processed 761,630 metric tons (t) at an average head grade of 7.6 g/t with recoveries of 94% (Rio Narcea Gold Mines Ltd., 2004§).

RNG entered into an agreement with Outokumpu Mining Sucursal España to acquire up to a 70% interest in the Lugo properties, which are located in northern Spain. The Lugo properties cover 387 km<sup>2</sup> and include the Carla Group property, which covers 82 km<sup>2</sup>. The Villalba occurrence was the principal target on the Carla Group property where Roman workings exploited an epithermal gold system hosted in a 200-m-thick section of dolomite and limestone. The style of mineralization, stratigraphic section, and regional structure are very similar to the Rio Narcea Gold Belt. A major north-trending fault system

at Villalba hosts a fingered array of clay altered porphyritic quartz diorite intrusives that are spatially related to a low-temperature gold system in silicified dolomites. The Villalba occurrence is one of six major airborne magnetic anomalies thought to represent similar intrusives along a regional north-trending fault system that extends 18 km<sup>2</sup> through the Carla Group. Funds for the exploration were part of RNG's \$4.4 million gold exploration budget for 2003 (Rio Narcea Gold Mines Ltd., 2002§).

**Iron Ore.**—The Compañía Andaluza de Minas S.A. mine, which is located near Alquife, was closed in 2000 owing to the low grade of the ore. The small amount of iron ore from stockpiles that was produced was for nonmetallic applications (Carmen Marchan, Mining Engineer, Instituto Geológico y Minero, written commun., December 10, 2003).

**Mercury.**—The mercury deposits of Minas de Almadén y Arrayanes S.A. at Almadén accounted for the largest quantity of liquid mercury metal produced in the world. Almadén is located about 200 km south of Madrid in the Province of Ciudad Real in the Brown Mountain range. Almadén was the leading mercury mine in the world in 2003.

**Nickel.**—RNG announced the beginning of underground development at the Aguablanca deposit to access the higher grade zones of nickel-copper-platinum-group-metals mineralization below the open pit operation, which was under construction by Fluor Corp. The deposit, which is defined by more than 45,000 m of drilling, was formed by three zones of magmatic sulfide mineralization and occurs in a gabbronorite intrusive along the north contact of the Santa Olalla granodiorite complex. The mineralization is similar in type to the Noril'sk deposit in Russia and to the Voisey's Bay deposit in eastern Canada. Nickel, copper, platinum, and palladium mineralization occurs within magmatic breccia bodies that form gossans at the surface. Chalcopyrite, pentlandite, and pyrrhotite comprise the dominant sulfide mineralization (Rio Narcea Gold Mines Ltd., 2003§).

RNG signed a long-term off-take agreement with Glencore International AG for the sale of nickel concentrate from the Aguablanca Project. Under the terms of the agreement, Glencore will purchase 100% of Aguablanca's nickel concentrate production until 2010. Other items of the agreement, such as price and delivery schedule of the concentrate, was not announced (Engineering & Mining Journal, 2003§).

The Solid Resources Ltd. and Desarrollo de Recursos Geológicos S.A. joint venture was continuing its investigation of a nickel concession located 32 km northwest of Malaga. Preliminary grab samples of underground workings assayed up to 6.56% nickel at a grade of 8.7 g/t gold. A grab sample from a mine dump assayed 1.2% nickel, 2.8 g/t gold, and 2.8 g/t platinum-group metals. The property has not been drilled. Several old abandoned nickel mines (El Ingles, San Augustin, San Juan, and Sapo) are located in the 82-km<sup>2</sup> concession area. Alluvial platinum has been reported in some of the stream that drains the ultramafic complex. The ultramafic rock of the Malaga Massif has been compared with the nickel/platinum-bearing rocks of the Ural Mountains of Russia. The nickel

mineralization is niccolite, not laterite. Niccolite is less costly to treat (MBendi, 2003§).

**Steel.**—Compañía Española de Laminación S.L. (Celsa) opened in 1967 and produced more than 1.6 million metric tons of steel per year (Mt/yr). Celsa installed a new electric furnace with a capacity of 140 t and two continuous casting machines, one of which had a square section and the other, a blank-beam section. Another furnace was to be inaugurated in December 2004. The company hoped that these improvements would make it possible to achieve a production level of 2 Mt/yr. Celsa also had two complementary installations for the manufacturing of graphite and miniflat rods from rolled wire (Compañía Española de Laminación S.L., 2003§).

**Zinc.**—Asturiana de Zinc S.A. continued to increase output at its San Juan de Nieva plant. Austriana's production capacity increased to 485,000 t/yr in 2003 from 300,000 t/yr in 1999. The latest improvement cost was about €4 million (\$5.2 million). The company stated that further increases would depend on the zinc market (Metal Bulletin, 2003).

### *Industrial Minerals*

**Cement.**—The Lafarge Group announced that it had signed an agreement to sell two 1.38-Mt/yr-capacity Asland S.A. cement plants to Cementos de Portugal S.A.; also included was the grinding station Cementos d'El Monte, which was located near the Port of Palos de la Frontera, and a terminal in Seville. The transaction would have to be approved by the Government competition authority (International Cement Review, 2003).

Following approval by Spain's competition authorities, Holcim Ltd. of Switzerland took over from Dyckerhoff AG of Germany almost 100% of Cementos de Hispania S.A. (Hispania). The acquisition also included the mortar business of Preresá S.A. (a subsidiary of Hispania). Holcim (España) S.A. will assume management responsibility. Holcim (España) operated six cement plants that had a combined annual capacity of 5.2 Mt and nine terminals in major markets in the center, northwest, and southwest. The Spanish cement market was the largest in Europe, and the purchase of Hispania gave Holcim España good access to that market, particularly the Madrid area (Cementweb, 2003§).

**Fluorspar.**—Minerales y Productos Derivados S.A. (Minersa) was Europe's leading fluorspar producer because of its three deposits in Asturias in northern Spain. The Emilio, the Jaimina, and the Moscona underground mines produced about 420,000 t/yr of fluorspar. Minersa's production capacity for concentrate was 150,000 t/yr. Mostly acid-grade fluorspar but also some metallurgical- and ceramic-grade fluorspar were produced (Industrial Minerals, 2004).

**Potash.**—Iberpotash S.A. was a 100% owned subsidiary of Dead Sea Works Ltd. (DSW), which was the world's fourth leading producer of potash. The company was a part of DSW's strategy to be a major presence in potash. The Iberpotash mines represented one of the most important potash resources in Western Europe and are located near major potash-consuming areas of the EU. Iberpotash mined sylvinitic and sylvite ore from the Catalonia deposit in the Suria area near Barcelona (Dead Sea Works Ltd., 2003§).

**Sepiolite.**—Spain maintained its world leadership in sepiolite production and held 70% of the world's reserves, which are located mostly around Madrid. The largest deposit was thought to be in excess of 15 Mt. Because high freight costs have reduced profitability, speciality clay producers tended to concentrate on alternative markets, such as foundry, pet litter, and rheological additives (Grupo Tolsa, 2003§).

**Soda Ash.**—Solvay S.A., which was the leading sodium carbonate (soda ash) supplier in Europe, was building a new 80,000-t/yr sodium bicarbonate production line at its soda ash plant in Torrelavega. The location, which is close to the Port of Santander, will provide the possibility of combining sodium bicarbonate exports with high-volume movements of soda ash exports. The new line will bring the company's total European production of sodium bicarbonate to 450,000 t/yr (Solvay S.A. 2003§).

**Strontium.**—Bruno S.A. operated one of the world's richest strontium deposits at Monteveve, which is located near Granada. The deposit is a unique concentration of celestite where more than 6 Mt of in situ ore of about 80% strontium sulfate is contained in a single hill. The deposit is amenable to open pit mining on a year-round basis and is located within 70 km of a deepwater port. Commercial applications for celestite in its natural form are very few. More than 98% of celestite was converted to strontium carbonate, which was consumed in the faceplate glass industry (Industrial Minerals, 2003).

### **Mineral Fuels and Other Energy Sources**

Spain was a country with a strong dependency on external sources of energy—no oilfields or natural gasfields are located onshore or offshore, and the coal mines consisted mainly of low quality coal. In 2003 the demand for electricity was 5.9% higher than 2002 with a total value of 236,538 gigawatthours (GWh). In 2003, the contribution of coal to total production was 37%; the nuclear sector, 31%; and hydropower, 20%. The electricity produced inside the Special Regime, which included cogeneration, small hydropower, and renewable energy sources (RES), 39,563 GWh, 10.6% more than 2002. Approximately 1,400 megawatts (MW) of new power capacity was installed in gas powerplants and RES, which was mainly wind farms (International Energy Agency, 2004§).

**Coal.**—Coal reserves were abundant but difficult to mine. Consequently, the cost of production was high, which made Spanish coal less competitive than that of many other countries. Spain's attempts to modernize and restructure its coal industry has resulted in a decline in production and not led to decreasing production costs. Production could eventually be phased out despite EU subsidies to maintain production.

The leading producer of bituminous coal was Huelleras del Norte S.A., and the leading producer of lignite was Empresa Nacional de Electricidad S.A. In 2002, coal-generated power accounted for 34.9% of electricity production (International Energy Agency, 2004§).

**Natural Gas.**—An international natural gas pipeline connection between France and Spain was planned with construction slated for completion by 2005. The proposal for the 30-km-long 500-million-cubic-meter-per-year pipeline

evolved from efforts to promote interconnections among France, Portugal, and Spain and to develop a southern gas-trading hub. The connection will extend from Bayonne, France, to San Sebastian, Spain. The only other gas link between France and Spain was the Lacq-Calahorra gas pipeline that crosses the Pyrenees Mountains farther east (Oil & Gas Journal, 2003).

The Spanish utility company Iberdrola S.A. was to take the place of the Italian oil group ENI S.p.A. in the Medgaz Consortium, which was planning to build a natural gas pipeline between Algeria and Spain. The 200-km-long underwater pipeline would connect Algeria with the Spanish Port of Almeria. Investment in the project was estimated to be \$1.5 billion (Alexander's Gas & Oil Connections, 2003a§).

**Petroleum.**—Spain filed a \$3.56 billion lawsuit against the U.S. ship classification firm, American Bureau of Shipping (ABS) for its alleged part in the *Prestige* oil tanker sinking that triggered the worst environmental disaster in Spain's history. The *Prestige*, which was an ABS-approved vessel, was carrying more than 500,000 barrels (bbl) of oil when it broke in two off the coast of northwestern Spain and sank in November 2002. Authorities estimated that the wreck still contained about 270,000 bbl of oil. The Government was hoping to capture most of this oil by puncturing the hull and capturing the oil in giant bags (Alexander's Gas & Oil Connections, 2003b§).

**Renewable Energy.**—Ocean Power Technologies (OPT) reported that it had signed an agreement with Iberdrola for a pilot project that involved 10 power-generating buoys. These would be placed about one-half mile off Spain's northern coast midway between Bilbao and Santander. Although the project will generate less than 1 MW, OPT expected to have a 100-MW wave farm in place by 2006. The full-sized wave-powered farm will use a new generation of 500-kilowatt PowerBuoys, which were four times the size OPT will use in the pilot project. The buoys, which will be anchored to the seabed and floating beneath the surface, capture and convert wave energy into a controlled mechanical force that drives a generator linked by an undersea cable to the shore. The buoys offer between 80% and 90% availability, which is comparable to conventional fossil fuel generators, and have an advantage over wind (30%-45% availability) and solar (20%-30% availability) power generation. Operating costs of wave plants were expected to be \$0.03 to \$0.04 per kilowatt hour compared with \$0.05 to \$0.06 for wind plants (Reuters, 2003§).

### **Outlook**

The Government is expected to continue with its privatization and liberalization efforts. The economy will continue to be affected by the demands of EU integration and will grow modestly. The country will continue to have a strong dependency on external sources of energy. More attention will be directed toward renewable energy.

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## Major Sources of Information

Instituto Geológico y Minero de España  
 Rio Rosas, 23  
 28003 Madrid, Spain  
 Ministerio de Ciencia y Tecnología  
 Doctor Fleming, 7  
 28036 Madrid, Spain

TABLE 1  
SPAIN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003 <sup>c</sup>
<b>METALS</b>					
<b>Aluminum:</b>					
Alumina <sup>e,2</sup>	1,100,000	1,200,000	1,100,000	1,000,000	1,000,000
<b>Metal:</b>					
Primary	363,900	365,700	376,400	380,100	389,100 <sup>3</sup>
Secondary	224,000	240,520	221,720	242,600	245,000 <sup>3</sup>
Total	587,900	606,220	598,120	622,700	634,100 <sup>3</sup>
<b>Copper:</b>					
Mine output, Cu content	1,738	23,312	9,748	1,248 <sup>r</sup>	643
<b>Metal:</b>					
<b>Blister:</b>					
Primary	292,800	258,600	255,200	281,300 <sup>r</sup>	280,000
Secondary	25,000 <sup>e</sup>	31,300 <sup>e</sup>	24,700	16,700 <sup>r</sup>	20,000
Total	317,800	289,900	279,900	298,000	300,000
<b>Refined:</b>					
Primary	250,756	258,000	235,100	271,500 <sup>r</sup>	208,000
Secondary	65,000 <sup>e</sup>	58,000 <sup>e</sup>	55,600	36,700 <sup>r</sup>	65,000
Total	315,756	316,000	290,700	308,200 <sup>r</sup>	273,000
Germanium oxide, Ge content <sup>e</sup>	kilograms	6,000	6,000	6,000	5,000
Gold, mine output, Au content	do.	5,018	4,310	3,720	5,158 <sup>r</sup>
5,362 <sup>3</sup>					
<b>Iron and steel, metal:</b>					
Pig iron	thousand tons	4,146	4,059	4,094	3,978
Ferroalloys, electric furnace	do.	179	180	180 <sup>e</sup>	175 <sup>e</sup>
Of which ferrochromium, crushed <sup>e</sup>		1,000	950 <sup>3</sup>	--	--
<b>Steel:</b>					
Crude	thousand tons	14,886	15,844	15,834	16,358
Hot rolled	do.	13,846	14,599	14,931	15,000 <sup>e</sup>
14,000					
<b>Lead:</b>					
Mine output, Pb content		41,800	40,300	36,000	6,171 <sup>r</sup>
1,765 <sup>3</sup>					
Metal, secondary <sup>e</sup>		96,000	120,000	121,600 <sup>3</sup>	116,000 <sup>r</sup>
99,100 <sup>3</sup>					
Mercury, mine output, Hg content		433 <sup>r</sup>	237 <sup>r</sup>	524 <sup>r</sup>	727 <sup>r</sup>
500					
Silver, mine output, Ag content	kilograms	117,735 <sup>r</sup>	114,537 <sup>r</sup>	54,836 <sup>r</sup>	3,409 <sup>r</sup>
2,246 <sup>3</sup>					
Tin, mine output, Sn content <sup>e</sup>		2,000	1,091 <sup>r</sup>	425 <sup>r</sup>	267 <sup>r</sup>
247 <sup>3</sup>					
Titanium dioxide <sup>e</sup>		16,000	--	--	--
--					
Uranium, mine output, U <sub>3</sub> O <sub>8</sub> content		362	347 <sup>r</sup>	416 <sup>r</sup>	372 <sup>r</sup>
300					
<b>Zinc:</b>					
Mine output, Zn content		154,062	200,021	164,900	69,926 <sup>r</sup>
44,660 <sup>3</sup>					
Metal, primary and secondary		393,000	387,100	436,800 <sup>r</sup>	460,000 <sup>r,e</sup>
479,700 <sup>3</sup>					
<b>INDUSTRIAL MINERALS</b>					
Barite, BaSO <sub>4</sub>		35,000 <sup>r</sup>	28,796 <sup>r</sup>	50,640 <sup>r</sup>	52,494 <sup>r</sup>
50,000					
Bromine <sup>e</sup>		100	--	--	--
--					
Calcium carbonate <sup>e</sup>		1,950	2,000	2,000	2,000
2,100					
Cement, hydraulic, other than natural	thousand tons	35,830	38,154	40,512	42,417 <sup>r</sup>
44,000					
<b>Clays:</b>					
Attapulgite		130,000 <sup>e</sup>	28,307	24,477	22,918 <sup>r</sup>
18,975 <sup>3</sup>					
Bentonite		190,000 <sup>e</sup>	90,152	90,000 <sup>e</sup>	123,457 <sup>r</sup>
103,174 <sup>3</sup>					
Kaolin, washed		320,000	353,355	400,000 <sup>e</sup>	419,483 <sup>r</sup>
450,000					
Other <sup>e</sup>	thousand tons	15,000	15,000	15,000	15,000
15,000					
Diatomite and tripoli		51,897 <sup>r</sup>	64,616 <sup>r</sup>	66,433 <sup>r</sup>	53,558 <sup>r</sup>
52,700					
Feldspar		430,000 <sup>r</sup>	492,028 <sup>r</sup>	514,285 <sup>r</sup>	538,407 <sup>r</sup>
600,000					
<b>Fluorspar, CaF<sub>2</sub> content:</b>					
Acid-grade		133,000	132,690	126,535	131,155 <sup>r</sup>
129,195 <sup>3</sup>					
Metallurgical-grade		9,000	7,776	7,504	10,279 <sup>r</sup>
10,503 <sup>3</sup>					
Total		142,000	140,466	134,039	141,434 <sup>r</sup>
139,698 <sup>3</sup>					
Gypsum and anhydrite, crude	thousand tons	9,450	9,929	11,901 <sup>r</sup>	11,218 <sup>r</sup>
12,000					

See footnotes at end of table.

TABLE 1--Continued  
 SPAIN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	1999	2000	2001	2002	2003 <sup>c</sup>
<b>INDUSTRIAL MINERALS--Continued</b>					
Kyanite, andalusite, related materials <sup>c</sup>	2,500	--	--	--	--
Lime, hydrated and quicklime <sup>c</sup> thousand tons	1,500	1,700 <sup>r</sup>	1,700 <sup>r</sup>	1,800 <sup>r</sup>	1,800
Magnesite, calcined	211,000	160,000	156,000	150,000 <sup>e</sup>	150,000
Mica	2,500 <sup>e</sup>	10,086	10,000 <sup>e</sup>	11,786 <sup>r</sup>	11,800
Nitrogen, N content of ammonia thousand tons	437	442	436	415	432 <sup>3</sup>
Pigment, mineral:					
Ocher	67,000 <sup>r,e</sup>	87,000	126,000 <sup>r</sup>	140,000 <sup>r</sup>	174,153 <sup>3</sup>
Red iron oxide <sup>c</sup>	15,000	10,000 <sup>r</sup>	5,000 <sup>r</sup>	4,500 <sup>r</sup>	5,404 <sup>3</sup>
Potash, K <sub>2</sub> O equivalent	549,000	646,294	569,127	481,329 <sup>r</sup>	594,355 <sup>3</sup>
Pumice	600,000 <sup>e</sup>	761,540	857,223 <sup>r</sup>	701,528 <sup>r</sup>	711,898 <sup>3</sup>
Pyrite, including cuprous, gross weight thousand tons	733	205	152	100 <sup>e</sup>	--
Salt:					
Rock, including byproduct from potash works do.	2,200	2,328	2,200 <sup>r</sup>	2,560 <sup>r,e</sup>	2,563 <sup>3</sup>
Marine and other do.	1,400	1,541	1,500 <sup>r</sup>	1,334 <sup>r</sup>	1,400
Sand and gravel, silica sand <sup>d</sup> do.	65,000 <sup>e</sup>	86,321	95,000 <sup>e</sup>	95,768 <sup>r</sup>	105,000
Sepiolite, meerschaum	800,000	794,114	896,983	733,134 <sup>r</sup>	690,395 <sup>3</sup>
Sodium compounds, n.e.s.: <sup>c</sup>					
Soda ash, manufactured thousand tons	500	500	500	500	500
Sulfate, natural:					
Glauberite, Na <sub>2</sub> SO <sub>4</sub> content	675,000	669,256 <sup>3</sup>	705,000	754,945 <sup>r,3</sup>	815,560 <sup>3</sup>
Thenardite, Na <sub>2</sub> SO <sub>4</sub> content	200,000 <sup>3</sup>	167,800 <sup>3</sup>	168,000	160,000	200,000
Manufactured	125,000	125,000	125,000	125,000	125,000
Stone:					
Chalk <sup>c</sup> thousand tons	136	889 <sup>3</sup>	980	876 <sup>r</sup>	920
Dolomite do.	9,080 <sup>e</sup>	8,752	9,628	11,537 <sup>r</sup>	12,000
Limestone <sup>c</sup> do.	220,000 <sup>r</sup>	240,000 <sup>r</sup>	250,000 <sup>r</sup>	236,411 <sup>r,3</sup>	248,000
Marble, ornamental do.	3,850 <sup>e</sup>	3,687	3,941 <sup>r</sup>	5,230 <sup>r</sup>	5,000
Marl do.	10,030 <sup>e</sup>	9,966	10,495	10,000 <sup>e</sup>	10,000
Basalt do.	1,000 <sup>e</sup>	3,044	3,348	3,400 <sup>e</sup>	3,400
Granite, ornamental <sup>c</sup> do.	1,750	1,188 <sup>3</sup>	1,200	1,200	1,412 <sup>3</sup>
Ophite do.	2,000 <sup>e</sup>	2,579	2,840	2,800 <sup>e</sup>	2,800
Phonolite do.	650 <sup>e</sup>	1,479	1,630	1,761 <sup>r</sup>	2,000
Porphyry do.	1,000 <sup>e</sup>	2,159	2,483	1,971 <sup>r</sup>	2,100
Quartz do.	1,720 <sup>e</sup>	1,961	2,150	2,000 <sup>e</sup>	2,000
Quartzite do.	2,200 <sup>e</sup>	2,131	2,150	2,784 <sup>r</sup>	2,900
Sandstone do.	2,500 <sup>e</sup>	2,318	2,430	2,246 <sup>r</sup>	2,400
Other do.	1,000 <sup>e</sup>	794	897	900 <sup>e</sup>	900
Slate <sup>c</sup> do.	600	751 <sup>3</sup>	790	800	837 <sup>3</sup>
Other <sup>c</sup> do.	1,000	1,000	1,000	1,000	1,000
Strontium minerals, Sr <sub>2</sub> O <sub>4</sub> content	128,000	148,352	143,320	171,293 <sup>r</sup>	152,383 <sup>3</sup>
Sulfur:					
S content of pyrites thousand tons	388	94	90 <sup>r</sup>	-- <sup>e</sup>	--
Byproduct: <sup>c</sup>					
Metallurgy do.	455	454	461	544	500
Petroleum do.	110	115	135	140	150
Coal (lignite) gasification do.	1	1	1	1	1
Total do.	954	664	687 <sup>r</sup>	685	651
Talc and steatite	111,000	114,654	115,000 <sup>e</sup>	115,000 <sup>e</sup>	115,000
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Coal, marketable:					
Anthracite thousand tons	5,436	4,651	4,694	4,393 <sup>r</sup>	3,863 <sup>3</sup>
Bituminous do.	6,828	6,173	5,797	5,383 <sup>r</sup>	5,531 <sup>3</sup>
Lignite, black and brown do.	12,535	12,153	12,193	8,762 <sup>r</sup>	7,981 <sup>3</sup>
Total do.	24,799	22,977	22,684	18,538 <sup>r</sup>	17,375 <sup>3</sup>
Coke, metallurgical do.	2,332	2,470	2,400 <sup>e</sup>	2,628 <sup>r</sup>	2,500

See footnotes at end of table.

TABLE 1--Continued  
 SPAIN: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity		1999	2000	2001	2002	2003 <sup>c</sup>
MINERAL FUELS AND RELATED MATERIALS--Continued						
Gas, natural, marketed	thousand cubic meters	112,000 <sup>r</sup>	179,293 <sup>r</sup>	556,650 <sup>r</sup>	553,156 <sup>r</sup>	550,000
Peat <sup>e</sup>		50,000	50,000	50,000	55,302 <sup>r, 3</sup>	55,000
Petroleum:						
Crude	thousand 42-gallon barrels	2,295	1,648	2,505	2,427 <sup>r</sup>	2,404 <sup>3</sup>
Refinery products: <sup>e</sup>						
Liquefied petroleum gas	do.	36,000 <sup>r</sup>	36,000 <sup>r</sup>	36,000 <sup>r</sup>	35,164 <sup>r, 3</sup>	33,234 <sup>3</sup>
Naphtha	do.	25,000	25,000	25,000	26,069 <sup>r, 3</sup>	25,000
Gasoline, motor	do.	85,000	85,000	85,000	74,035 <sup>r, 3</sup>	85,000
Jet fuel	do.	30,000 <sup>r</sup>	30,000 <sup>r</sup>	30,000 <sup>r</sup>	28,944 <sup>r, 3</sup>	24,456 <sup>3</sup>
Kerosene	do.	16,000 <sup>r</sup>	16,000 <sup>r</sup>	16,000 <sup>r</sup>	15,965 <sup>r, 3</sup>	15,942 <sup>3</sup>
Distillate fuel oil	do.	150,000	150,000	150,000	149,759 <sup>r, 3</sup>	111,676 <sup>3</sup>
Residual fuel oil	do.	85,000	85,000	85,000	68,085 <sup>r, 3</sup>	60,353 <sup>3</sup>
Other	do.	38,000	38,000	38,000	38,000	38,000
Refinery fuel and losses	do.	10,000	10,000	10,000	10,000	10,000
Total	do.	475,000 <sup>r</sup>	475,000 <sup>r</sup>	475,000 <sup>r</sup>	446,000 <sup>r</sup>	404,000

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to total shown. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>Table includes data available through September 2004.

<sup>2</sup>Reflects aluminum hydrate.

<sup>3</sup>Reported figure.

<sup>4</sup>Includes sand obtained as a byproduct of feldspar and kaolin production.



TABLE 2  
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Alumina Española S.A. (Alcoa Inespal)	Alumina plant at San Ciprian, Lugo	1,000
Aluminum	do.	Electrolytic plant at San Ciprian, Lugo	230
Do.	Industria Española del Aluminio, S.A. (Alcoa Inespal)	Electrolytic plant at Aviles	85
Do.	do.	Electrolytic plant at La Coruna	85
Coal:			
Anthracite	Antracitas Gaiztarro S.A.	Mines at María and Paulina	2,000
Do.	do.	Mines near Oviedo	2,000
Do.	Antracitas del Bierzo S.A.	Mines near Leon	1,000
Bituminous	Hulleras del Norte S.A. (Hunosa)	Various mines and plant	3,300
Do.	Hulleras Vasco Leonesa S.A.	Santa Lucia Mine, Leon	2,000
Do.	Minas de Figaredo S.A.	Mines near Oviedo	1,000
Do.	Nacional de Carbon del Sur (Encasur)	Rampa 3 and San Jose Mines, Cordoba	200
Lignite	Empresa Nacional de Electricidad S.A. (Endesa)	As Pontes Mine, and Andorra Mine, La Corona	15,000
Barite	Minas de Baritina S.A. (Kali-Chemie AG of Germany, 100%)	Mine and plant in Espiel area, Cordoba	50
Cement	Ashland S.A.	Puerto de Sagunton, Valencia	2,000
Do.	do.	Villaluenga de la Sagra, Toledo	2,000
Do.	do.	Three other plants	2,000
Do.	35 other companies	49 other plants	38,000
Total			44,000
Copper:			
Metal	Atlantic Copper Holding S.A. (Freeport MacMoRan Inc., 65%, and Ercros Group, 35%)	Refinery at Huelva	270
Do.	do.	Electrolytic refinery at Huelva	105
Do.	Industrias Reunidas de Cobre	Smelter at Asua-Bilbao	30
Do.	Elmet SL	Smelter and electrolytic refinery at Berango, Vizcaya	60
Ore, metal	Atlantic Copper Holding, S.A. (Freeport MacMoRan Inc., 65%, and Ercros Group, 35%)	Mines and plant at Ariertero near Santiago de Compostela, Corta Atalay open pit mine, Cerro Colorado open pit mine	12
Do.	do.	Alfredo underground mine in Rio Tinto area	30
Do.	Navan Resources Ltd.	Almagera mine and plant (closed 2001)	6
Do.	Boliden Apiria S.A.	Los Frailes mine and plant (closed 2001)	5
Dunite	Pasek España S.A.	Mines and plant at Landoy, Ortigueira	1,500
Fluorspar, ore	Minerales y Productos Derivados S.A.	Plant at Torre, Austrias	150
Do.	do.	Underground mines at Emilio, Jaimina, and Moscona, Austrias	420
Gold kilograms	Rio Narcea Gold Mines, Ltd.	Belmonte de Miranda, Asturias	3,750
Iron ore	Compañía Andaluza de Minas S.A. (Mokta S.A., 62%)	Mine at Alquife, Granada (closed 2000)	4,000
Lead:			
Metal	Española del Zinc S.A.	Refinery at Cartagena, Murcia	50
Do.	Compañía La Cruz, Minas y Fundaciones de Plomo S.A.	Smelter at Lineares, Jaen	40
Do.	do.	Refinery at Lineares, Jaen	40
Do.	Tudor S.A.	Secondary smelter at Saragoza	16
Do.	Ferroaleaciones Españolas, S.A.	Secondary smelter at Medina del Campo	12
Do.	Derivados de Minerales y Metales	Secondary smelter at Barcelona	5
Ore	Sociedad Minera y Metalúrgica de Peñarroya de España S.A. (Peñarroya, France, 90%)	Opencast mine at Montos de Los Azules	25
Do.	Andaluza de Piritas S.A.	Mine at Aznalcollar (closed 2001)	21
Do.	Exploración Minera Internacional España S.A. (EXMINE S.A.)	Underground mine at Rubiales, Lugo	16
Magnesite	Magnesitas de Rubián S.A.	Plants at Zubiri	100
Do.	do.	Mines and plant near Sarria, south of Lugo	220

TABLE 2--Continued  
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY IN 2003

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners		Location of main facilities	Annual capacity
Mercury	flasks	Minas de Almadén y Arrayanes S.A. (Government, 100%)		Mines (closed) and smelter at Almaden	70,000
Petroleum:					
Crude	42-gallon barrels per day	Chevron S.A.		Oilfield at Casablanca	300
Refined	do.	Repsol-YPF S.A.		Refinery at Escombreras	200,000
Do.	do.	do.		Refinery at Puertollano	14,000
Do.	do.	do.		Refinery at Tarragona	260,000
Do.	do.	Refinería de Petróleos del Norte S.A. (Petronor)		Refinery at Somorrostro	240,000
Do.	do.	Compañía Española de Petróleos S.A. (Cepsa)		Refinery at Santa Cruz de Tenerife	160,000
Do.	do.	Petróleos del Mediterráneo S.A. (Petromed)		Refinery at Castellon de la Plana	120,000
Do.	do.	Compañía Iberica Refinadora de Petróleos S.A. (Petroliber)		Refinery at La Coruna	140,000
Potash, ore		Iberpotash S.A. (Dead Sea Works Ltd., 60%; La Seda S.A., 20%; Tolsa S.A., 20%)		Mines and plants at Suria near Barcelona	850
Pyrite		Compañía Española de Minas de Tharsis		Mines and plants at Tharsis and Zarza near Seville	1,300
Do.		do.		Plant at Huelva	600
Do.		Rio Tinto Minera S.A. (Rio Tinto plc, 75%, and Rio Tinto Zinc, 25%)		Mines and plant at Rio Tinto (closed 2001)	900
Sepiolite		Tolsa S.A.		Mine and plant at Vicalvaro near Madrid	100
Do.		Silicatos-Anglo-Ingleses S.A.		Mine and plant at Vilecas near Madrid	200
Sodium sulfate		Crimidesa S.A.		Mine and plant at Cerezo de Rio, Burgos	600
Steel		Aceralia Corporación Siderúrgica (Arbed S.A., 35%)		Plants at Aviles, Gijon, Sagunto, and Sestao,	8,000
Do.		Cía Espanola de Laminacion SL (Celsa Group, 100%)		Plant at Barcelona	1,600
Strontium		Solvay Minerales S.A.		Mines and plant at Escuzar, Granada	85
Do.		Bruno S.A.		Mine and plant at Montevives, Granada	50
Uranium, U <sub>3</sub> O <sub>8</sub>	metric tons	Empresa Nacional del Uranio (Enusa) (Government, 100%)		Mines and plant near Ciudad Real	500
Zinc:					
Metal		Asturiana de Zinc S.A. (Azsa) (Glencore International AG, 44%)		Electrolytic zinc plant at San Juan de Nieva	480
Do.		Española del Zinc S.A.		Electrolytic plant at Cartagena	50
Ore		Asturiana de Zinc S.A. (Azsa) (Glencore International AG, 44%)		Reocin mines and plants near Torrelavega, Santander	500
Do.		Boliden Apirsa S.A. (Boliden Ltd., 100%)		Los Frailes Mine (closed 2001)	3,500
Do.		Exploración Minera Internacional España S.A. (EXMINE S.A.)		Underground mine at Rubiales, Lugo	500
Do.		Sociedad Minera y Metalúrgica de Penarroya-Espana S.A.		Mines and plants at Montos de los Azules y Sierra de Lujar, San Agustin	200

TABLE 3  
SPAIN: SELECTED INDICES OF PRODUCTION

(1995 index = 100)

Sector	1998	1999	2000	2001	2002	2003
General	112	115	119	118	118	120
Mining	92	90	91	88	83	88
Manufacturing	113	116	120	117	118	120
Electricity and gas	108	115	125	130	132	134

Source: United Nations, 2004, Monthly Bulletin of Statistics, v. LVIII, no. 9, p. 20.