

SPAIN

By José Antonio Espí

The Spanish economy grew by 2.4% in 2003, a 0.4% improvement over the previous year, whilst GDP increased by 3.2%, surpassing that of 2002. An expansion of private and public consumption, and investment in construction, were both important contributors to the economy, aiding investment flows and creating employment. However, productivity improvements were limited, and average labour costs rose by 3%. The retail price index rose by 2.6% and the rate of inflation grew by just 0.4%. Disappointingly, exports rose by only 2%, in spite of the significant improvement in the global economy. However, the public accounts were in surplus by 0.5%, primarily as a result of higher returns from some taxes, especially VAT, and tax on personal income.

Energy minerals

The Spanish coal producers association, Carbuni3n, estimates that coal production in 2003 was 1.6% lower than in the previous year. The total number of workers in the coal mining sector fell by 10.7%, compared with 2002, to 12,110. This is about half the number of six years ago, at the beginning of Spain's coal rationalisation plan (Table 1).

In recent years, Spain's oil production has fallen substantially, and in 2003 the trend accelerated, with output dropping by 30% to 234,000 t. Practically all the fields are offshore (Boquer3n, Casablanca, Rodaballo and Chipir3n) and their reserves are nearly exhausted. The situation for natural gas is similar and, in spite of some production from small gasfields in the Guadalquivir Valley, production will virtually cease within five years.

All uranium oxide production by the state-owned company, Enusa, at its Ciudad Rodrigo (Salamanca) mines, has now finally ceased (output in 2002 totalled 54 t).

Metallic minerals

Production from Spain's metal mines is at an historical low, following the cessation of massive sulphide mining operations in the Iberian Pyrite Belt and the exhaustion of the Reoc3n operations in the north. After 140 years of production, the historic Reocin lead/zinc mine operated for only three months during 2003. In this short time, it mined and treated 199,376 t yielding 1,785 t of lead and 15,138 t of zinc (Table 2).

With the closure of Reocin, the only company with metallic and direct mining production is Rio Narcea Gold Mines. This company produced more than 5 t of gold, 2.3 t of silver and 570 t of copper during 2003, all obtained from the open pit operations at El Valle, and underground mining at Carl3s (a few kilometres away). The company processed a total of 761,631 t averaging 7.56 g/t Au, with a gold recovery of 94.1% and at a cash operating cost of

U\$135/oz. At El Valle, the high-grade Charnela zone in the open pit was mined, and the small Caolinas deposit nearby. Around 500,000 t of ore averaging 6.0 g/t Au was stockpiled and this will be processed in the coming years. The El Valle plant also treated 113,000 t of ore from Carlés, partly from the underground operations.

In 2004, the access drift from the open pit to the underground mine at El Valle will be completed. A grade of 8 g/t Au is expected for the underground ore, which will be mined by cut-and-fill. Also during 2004, Rio Narcea could treat ore from Nanulaq AS's small but high-grade gold mine in southern Greenland. This could boost Rio Narcea's 2004 gold production by 120,000 oz, and could help in providing adequate mill feed during the transition from open pit to underground mining at El Valle.

At the Almadén open pit mercury mine in Castilla-La Mancha, Mayasa produced 745 t of mercury from 20,115 t of stockpiled ore. No mining operations took place during the year.

The litigation in the aftermath of the 1998 tailings dam failure at Los Frailes, the zinc-copper-lead mine at Aznalcollar near Seville, Andalucia, seemed finally to have reached a conclusion last year. In January 2003, the Seville court rejected the civil action by the Government of Andalucia which had been seeking an additional penalty of €86 million from Boliden, the Swedish owner and operator of the mine, to help pay for the government's clean-up costs. In 2002, the Council of Ministers had imposed a fine of €45 million on the company, the highest-ever environmental damages penalty in Spanish history, but far less than the estimated €276 million that had by then been incurred by the regional government to pay for decontamination and clean-up.

Two years prior to the civil action, Boliden had sought unsuccessfully to sue the Spanish company responsible for constructing the tailings dam for €115 million in damages. The Andalucian Government and the Spanish Environmental Ministry, meanwhile, which together had spent more than €240 million to clean up the spill, said they would sue Boliden for damages. In the event, Boliden's Spanish subsidiary filed for insolvency and closed the mine, and the regional government was obliged to accept the mine and its assets in lieu of financial recompense, hence its civil actions. The tailings spill at Los Frailes released 4 million m³ of tailings and liquid into the Rio Agrio, and the slurry wave covered several thousand hectares of farmland and threatened the Doñana National Park.

New projects

Cobre Las Cruces SA (CLC), a company based in the city of Gerena, intends to develop Las Cruces, a copper deposit 20 km northwest of Seville. CLC is a subsidiary of MK Gold Co. of Salt Lake City, Utah, US, which purchased Las Cruces from Riomin Exploraciones SA (Riomin) in September 1999 for US\$42 million. The project has received final approval from the European Union and subsidies of €10.55 million from the regional government have been authorised. CLC anticipates a total investment of US\$289 million and employment for 270 people.

Production is anticipated at a rate of 66,000 t/y Cu, and projected operating costs are US\$0.33/lb of copper produced. The ore will be mined open pit to a depth of 240 m. The operation will move 35,000 t/d, of which 3,300 t will go to the plant. The predicted copper recovery in the concentrator will be near 97%, producing 99.99% pure copper metal. The process will include crushing and milling (to 105 microns), leaching, and copper extraction by electrowinning.

Environmental considerations are important and, in preparing the project, CLC made a careful study of the underground water flow, using more than 50 drill-holes and control points. The Niebla-Posadas aquifer will be depressed below the lowest level of the final depth of the open pit by means of a drill-extraction screen. The tailings (pyrite and residual gypsum) will be filtered to 10% moisture, and discharged and compacted between layers of marls from the mine. The open pit will partially be backfilled with marls and the tailings.

Project development will begin at the end 2004, and the required work authorisations from the Hydrographical Guadalquivir Authorities are in progress.

Also in southwestern Spain, 80 km north of Seville, Toronto-based Rio Narcea Gold Mines Ltd (RNGM) is developing what will be Spain's first ever nickel mine. The company, which has been mining gold in northern Spain for almost a decade, acquired the Aguablanca nickel property in July 2001. Aguablanca was discovered in 1993 by a joint venture involving Rio Tinto Minera and Presur (a Spanish Government agency), following up geochemical anomalies in the Monaguera State Reserve.

The Aguablanca nickel-copper-PGM deposit was defined by more than 45,000 m of drilling. Three zones of magmatic sulphide mineralisation were identified within a gabbro-norite at the contact with the Santa Olalla granodiorite complex in an area of Cambrian sediments. The nickel, copper, platinum and palladium mineralisation occurs within magmatic breccias which form gossans at the surface. Pyrrhotite, pentlandite and chalcopyrite comprise the dominant sulphide mineralisation.

As part of a bankable feasibility study, Rio Narcea completed an additional 10,000 m of infill drilling in early 2002. The results of this new work were combined with previous drilling data from the Rio Tinto Minera/Presur joint venture to establish a revised estimate of the project's ore resources. The base case pit design by Metallurgical Design & Management (Pty) Ltd (MDM) is based on a conservative open pit reserve of 15.7 Mt averaging 0.65% Ni, 0.45% Cu and 0.47 g/t PGM with a stripping ratio of 5.4:1. The operation will mine 1.5 Mt/y ore and use differential flotation to produce 10,000 t/y of nickel concentrate over an 11-year mine life, plus by-product copper and PGM. An offtake deal for the nickel concentrate has been signed with Glencore International AG. The open-pit operation has a projected capital cost of US\$71 million and cash operating costs are put at US\$1.80/lb of nickel.

In August 2003, Rio Narcea obtained government authorisation to operate the mine, and in October 2003, after receiving an environmental licence from the

Environment Ministry, mine and plant development began. Commissioning and initial production is scheduled for the final quarter of 2004.

Non-Metallic Minerals

During 2003, the Spanish company Sepiolsa followed the lead of its competitor, Tolsa, in the field of absorbent clay production, by acquiring a Senegalese company, Senegal mine, which produces sepiolite, and the French company Maquine SA, which prepares and bags finished products. Tolsa had previously acquired the Senegalese company Société Senegalaise de Phosphates de Thies SA (SSPT) and the Dutch packer, Mastert Absorbents BV. Sepiolsa is now a major producer of attapulgite, in addition to other absorbent earths such as bentonite, sepiolite and saponite (Table 3).

There is a general trend of acquisition among industrial minerals companies, the objectives being to expand/complete their product ranges and increase their market share. The French company Denain Anzin Minéraux SA (DAM) has acquired the Spanish feldspar producer, Mines of Alcántara (Minalca), which has operations in Ceclavin (Extremadura) and produces for the regional ceramic industry. DAM appears to be attempting to monopolise the supply of feldspar to the Spanish and Portuguese ceramic industry, in competition with Turkish feldspar producers.

Exploration

Rio Narcea is exploring the Ossa Morena tectonic zone, which extends into Portugal, and suspects that Aguablanca may represent only the first deposit of several that may be discovered. Reconnaissance exploration has identified more than 100 mafic-ultramafic intrusives similar to the Aguablanca host rock, including 16 nickel-copper targets. The company has also identified a similar number of targets for iron oxide-copper-gold, for example at Calzadillas. During the third quarter of 2003, it sank 10 drill holes of 3,300 m total length at Tejadillas, 65 km to the west of Aguablanca. An ultramafic, disseminated sulphide body was located at 46 m that yielded grades of 0.21% Ni, 2% Cu and 675 g/t cobalt. Drilling is currently underway at three other sites in Ossa Morena (Argallón, Olivenza and Elvas) to test geochemical nickel anomalies and interesting ultramafic bodies indicated by geophysical anomalies.

Also, Rio Narcea continues to explore for gold, both within and beyond the auriferous Asturian Belts. At the Lugo project, some 2,800 m of superficial drilling was completed. This, along with trenching, has defined a zone of mineralised breccia in a tectonic thrust, 50-100 m deep and extending for 750 m along strike. The company has acquired 85% of Exploraciones Mineras del Cantábrico, SL, which has the mining rights to the much-studied, refractory gold deposit of Salave (Asturias). Salave lies 150 km northwest of El Valle mine and has been tested with 34,000 m of drilling which has defined 10-20 Mt of material averaging between 3.0 g and 5.0 g/t Au.

Cambridge Minerals Resources plc is exploring the gold-rich Lomero Poyatos polymetallic deposit in the Iberian Pyrite Belt, recently explored by Newmont Mining. In 2003, Cambridge secured an agreement permitting it to explore in the San Telmo area, along strike from Lomero-Poyatos, which includes the

former Santa Barbara mine and where it is believed that gold mineralisation could extend to depth. This year, a detailed geophysical survey is planned for the Santa Barbara zone, following up an earlier geophysical campaign and some drilling. Cambridge affirms the existence of 2.1 Moz of gold and anticipates no problems in metallurgical processing.

The Irish exploration company Ormonde Mining plc is involved in three gold exploration projects in northern Spain – Salamón, Trives and Tracia. Salamón (Palencia) is believed to be a Carlin-type deposit. Ormonde completed 1,500 m of drilling there in 2003 and, based on that programme and drilling completed by the previous owners, it estimates that there is a resource containing 190,000 oz of gold in a deposit with an average grade of 9 g/t Au. At Trives (Orense), where there are old Roman workings, the company is investigating gold mineralisation related to a shear zone. At Tracia (Pontevedra) the target is intrusive-related gold mineralisation.

**Table 1. Output of Energy Minerals
(‘000 t except where stated)**

		2001	2002	2003 ^p
CECA		10,492	9,751	9,580
Coal (Anthracite and coal)				
Black lignite		3,456	3,558	3,520
Brown lignite		8,787	8,726	8,100
Oil		388	324	234
Natural Gas	million m ³	556	551	600
Uranium	t (U ₃ O ₈)	42	54	-

p : provisional data
Source: Carbuniön

Table 2. Production of Metallic Minerals (Metal content)

		2001	2002	2003 ^p
Copper	t	9,800	1,200	6,000
Zinc	t	165,600	69,900	15,200
Lead	t	35,600	6,200	1,800
Gold	kg	5,922	5,512	5,417
Silver	kg	52,000	3,000	2,300
Mercury	t	524	726	745

^p: provisional data.
Source: Personal research/IGME/ Ministerio de Economía

Table 3 Production of Non-Metallic Minerals
(‘000 t)

		2001	2002	2003 ^P
Fluorspar	CaF ₂	129	128	132
Potash	K ₂ O	471	407	506
Salt		3,655	4,070	3,790
Micro-silica		2,000	2,000	2,000
Special clays		965	866	900
Magnesite	MgO	233	265	255
Barite	BaSO ₄	51	52	37
Magnetite		55	25	-
Talc		93	108	101
Lepidolite		7	7	8
Diatomite		66	50	55
Sodium sulphate	Na ₂ SO ₄	855	939	930
Celestite	SrSO ₄	129	160	144
Washed Kaolin		440	450	460
Feldspar		514	550	570
Calcium carbonate		2,000	2,100	2,000
Iron pigments		126	144	150
Peat		46	51	50

^P:provisional dataSource: IGME/M^o de Economía/Author