

## BARYTES

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**B**arytes had a better year in 2000, than 1999. Demand for oil and gas remained strong throughout the year, and the oil price remained high, encouraging exploration and development wells, which boost barytes consumption. Barytes, or barite, the mineral form of barium sulphate, is named from the Greek "barys" meaning heavy or dense. Approximately 90% of all barytes produced worldwide is used in oil well drilling muds, because its high density can withstand the high hydrostatic pressures needed to maintain the formation stability. Barytes is also used as a feedstock for barium chemicals production, and as a filler, extender and aggregate. Another main application is in the manufacture of ceramics and glass, after conversion to barium carbonate.

Today, four countries supply over 80% of the world's barytes production, with China providing the lion's share accounting for around 45% of supply. Other key producers include the US (15%) India (15%), and Morocco (6%). Total world production in 2000 was an estimated 5.7 Mt, just slightly up on the revised figure of 5.66 Mt in 1999, according to the US Geological Survey (USGS).

### **Production**

#### **Asia**

Chinese barytes production represents almost half the world's supply and China remains the premier producer and exporter of barytes. Government figures are not available for production levels of barytes, probably because it has never been under government administration. Although there were reports that Chinese barytes production plummeted in 1999, on the back of the depressed oil price and low demand, in fact some 2.8 Mt were produced. Production estimates for 2000 put output at around 2.5 Mt. Although

Chinese exports did drop significantly to 1.286 Mt in 1999, they rose again in 2000 to 2.534 Mt with a value of US\$79.4 million. The main producing region in China is Guangxi, which produces just over 50% of the total, with other important producing regions including Hunan, Guizhou, Guangdong and Fujian.

Indian barytes production is largely based on the huge deposit at Mangampet, Cuddapah district of Andhra Pradesh, about 280 km from Chennai. Total output from the deposit was 430,000 t in 1998, but fell to 320,000 t in 1999. In 2000 production increased slightly and is estimated to have been around 350,000 t, but again exact figures are difficult to obtain. The Indian industry was hit by internal problems and the active presence of Chinese material in the market, with some cargos replaced by Chinese material, when there were sharp increases in freight rates and severe delays for Indian material arriving in the Gulf of Mexico.

The main supplier is the Andhra Pradesh Mining and Development Corp. (APMDC), which also allocates mining leases to other companies. The other on-going problem faced by Indian barytes suppliers is that the industry has been hampered by court battles over mining leases and tenders. The 1999 tender issued by APMDC was intended to solve many of the problems, covering a four-year period rather than an annual tender. However, the 1999-2000 bids fell apart when the ex-mine bids that would allow the barytes to compete on the world market were rejected as too low. According to industry sources, problems for the Indian suppliers were then compounded as mine strikes and the inability of APMDC to overcome the politics required to follow market prices down with the rest of the world hampered India in the fight for contracts during the year.

On a more positive note, in the June quarter of 2000, a new mining operation was commissioned by Indian Barytes and Chemicals in the Khammam district, Andhra Pradesh. The mine initially has a production of 200,000 t, including 20,000 t/y of filler grades and 40,000 t/y of chemical grade. Investment so far in mine development has been over US\$1 million. Longer term, the company intends to increase production to 400,000 t/y.

Barytes production in Thailand was an estimated 80,000 t in 2000, according to the USGS. The leading producer in the country is Asian Mineral Resources Co. Ltd, which operates a surface mine at Udon and a 60,000 t/y processing plant at Nahpralarn, Saraburi.

In Turkey, the two key producers in the industry are Ado Madencilik AS and Baser Mining Industry AS. Baser has a production capacity of approximately 200,000 t/y, close to Isparta, southern Turkey, whilst Ado Mining, a subsidiary of Ado Group, produces more than 100,000 t/y from Konya, where the company has a lease on a government concession.

### **North America**

The US is a significant producer of barytes with production estimated at 600,000 t in 2000, up from 434,000 t in 1999. The four main US producers are split between those supplying drilling grade material and those supplying barytes as a filler. The two main companies supplying the drilling industry are Baroid Drilling Fluids Inc., part of Halliburton Co., and M-I L.L.C. (formerly M-I Drilling Fluids Inc.), whilst Cimbar Performance Minerals and New Riverside Ochre Co. Ltd concentrate on non-drilling grades. Cimbar is a subsidiary of Baroid Drilling Fluids Inc. and both use the material from Cimbar's mines in Cartersville, Georgia and Pototosi, Missouri.

In Canada, Robex Resources Inc. is to proceed with the development of its Upton barytes deposit in Quebec, with ground

breaking scheduled for the end of 2000. Total cost of the project is C\$8-10 million and it is expected to be in production by the end of 2001. Production levels are forecast to be 26,500-30,000 t/y of concentrate and will be aimed at the Canadian east coast oil and gas industry.

### **Europe**

The largest European barytes producer is Sachtleben Bergbau GmbH & Co. in Germany. Sachtleben Bergbau Services produces just under 60,000 t/y, from its operations in Wolfrach. Deutsche Baryt-Industrie Dr Alberti GmbH & KG produces barytes from an underground mine in Bad Lauterberg. All the sales and marketing of Deutsche Baryt are carried out through Sachtleben. Total production of barytes in Germany was reported to be 100,000 t in 2000, with all of it consumed in the filler and chemical industries, mostly in the domestic market

UK production is dominated by M-I Great Britain Ltd, from its Foss Mine near Aberfeldy, Scotland. Current production levels are 50-60,000 t/y. However, depleting reserves mean that the mine will close in the next two to three years. The company has been seeking to develop a mine nearby at Duntanlich since 1995, but the necessary planning permission required has been refused to date. M-I also operates 200,000 t/y of barytes processing capacity in the UK in Aberdeen and Great Yarmouth.

Viaton Industries Ltd, is a leading UK supplier of filler and extender grades of barytes to the paint, plastics and automotive industries. Sales to these industries are over 35,000 t/y from its processing plant in Brassington, near Wirksworth, Derbyshire. Early in 2001, the company closed its Closehouse mine. Glebe Mines Ltd, (formerly Laporte Minerals), now a wholly-owned subsidiary of Land Regeneration Management Ltd (LRM), produces some 15,000 t/y of co-product barytes from its fluorspar operations in Derbyshire.

Spain is one of the main producers of drilling grade barytes in Western Europe, following its re-entry into the market in the early 1990s. The principal producer is Minerales Y Productos Derivados SA (Minersa) from its 100,000 t/y capacity operation in Vera, Almeria, 10 km from the deep water port of Garrucha. The main French barytes producer is Barytine de Chaillac, with an 80,000 t/y mine and plant in Chaillac, which principally produces chemical grade barytes.

In Russia, Tekhnopromex Corp. has commissioned a 20,000 t/y pilot plant and begun mining at the Medvedevsky barytes deposit, Chelyabinsk oblast. The company plans to raise production to 50,000 t/y in the near future. Investment to date in the project totals US\$700,000. In 2000, Khoilinsky GOK, reportedly Russia's largest barytes miner, produced 53,000 t. The company has now begun construction of a barytes processing plant at the former Vorkuta ferro-concrete operation which should be completed in 2001.

### **Africa**

Compagnie Marocaine des Barytes (Comabar) produces over 100,000 t/y of barytes from its mine at Zelmou in western Morocco, and the balance of its 170,000 t/y total production comes from various mines supplying Comabars' milling plant at Safi.

The other principal producer is Sté Nord Africaine de Recherches et d'Exploitation des Mines d'Argana (Snarema) from its mine in Seksaoua, northeast of Agadir. Production is around the 110,000 t/y mark of which some 80,000 t/y is drilling grade and the remainder chemical grade from its beneficiation plant in Argana.

### **Current Consumption**

Barytes and bentonite are by far the most significant of the dozen or so minerals used in the production of drilling fluids for oil wells. The state of the energy industry and the oil price are crucial to the demand for barytes. High oil prices encourage oil company

exploration and development projects, which boost barytes consumption. Low oil prices prompt oil companies to withdraw from non-essential expenditure and exploration budgets are cut back. As the demand for drilling muds falls, barytes demand drops with it. However, as the oil price recovers, there is a time lag of six months to a year before barytes demand begins to pick up. This is because barytes is usually fixed on six-month contracts, and therefore reacts little to short term influences.

The *Baker-Hughes* active rig count is taken as a reasonable indicator of the drilling mud requirements. By the September quarter of 1999, the active rig count had begun to climb worldwide and rose from 1,384 in July 1999 to 1,897 in January 2000. In 2000, oil prices hit record highs, and the rig counts lifted accordingly, and by the end of 2000 the rig count reached 2,212.

One of the main drivers of the barytes market is the requirement of the North American drilling fluid industry, since the US accounts for some 30% of global barytes consumption. In 2000, US consumption of crude barytes lifted to 2.08 Mt, up from 1.28 Mt in 1999, largely on the back of increased consumption in oil-well drilling. US imports of crude barytes rose to 1.48 Mt, from the depressed figure of 850,000 t in 1999.

The balance of world barytes production is used in glass and ceramics production and filler and chemical markets, each market accounting for approximately 200,000 t/y worldwide. High purity barytes is used as a feedstock for many chemicals, including barium carbonate, precipitated barium sulphate (blanc fixe), lithopone (co-precipitated barium sulphate and zinc sulphate), barium chloride, barium oxide and hydroxide, barium nitrate and barium titanate.

The ceramic and glass applications of barytes and barytes chemicals include glazes, frits and enamels, glass tableware, and black and white television screens. In brick and tile

making, barium carbonate is added to control scum, discolouration, and porosity.

Barytes possesses a number of properties which make it an invaluable workhorse in the fillers and extenders sector. It is relatively inert, light in colour, has high brightness and exhibits low oil absorption. Barytes' natural density is also some 50-90% higher than other mineral fillers and extenders, and is the major reason for its use in a number of applications as a filler in sound and radiation adsorption materials. Broadly speaking, off-colour grades are used in industrial filler applications such as sound insulation and weighting, off-white grades are used in paints and coatings, brake linings and friction products, while the whitest grades are used in paints, plastics, powder coatings and printing inks. One area of growth for barytes is its increased consumption in powder-coating paint systems, which are being used more widely as an environmentally friendly alternative to solvent-based paint systems. In the construction industry, barytes is used in the walls on X-ray wards for radiation shielding.

In terms of substitutes, in certain applications, such as an extender in plastics, barytes is facing increasing competition from cheaper calcium carbonate. However, the loading requirement for barytes is much lower (about 1:3) for an equivalent performance, and consequently, it is still competitive despite its higher price.

### Pricing

Prices vary considerably with factors such as the specifications, the source, the quantity purchased, the application for the mineral and finance and other costs. At the start of 2000, drilling grade Chinese barytes was priced at US\$42-44/t, cif US Gulf Coast, whilst Indian was US\$42-47/t same basis. By mid-year, Chinese material was being sold at US\$43-45/t and Indian prices had also crept up to US\$45-48/t. By the end of the year, Chinese drilling grade barytes was priced at \$43-46/t and Indian, US\$48-51/t.

Chemical grade barytes prices are higher than drilling grade, because of the higher BaSO<sub>4</sub> content, typically 96-98%. Chinese chemical grade barytes was priced at US\$54-56/t at the US Gulf Coast, in mid-2000. Prices for fillers and extender grades also vary depending on the end-user industry and available substitutes. A wide range of grades is used in the industrial sector and prices vary from as little as US\$50/t up to US\$1,000/t.

<b>Barytes Prices 2000, US\$/t</b>			
	<b>January 2000</b>	<b>June 2000</b>	<b>December 2000</b>
API grade, lump cif Gulf Coast, US			
Chinese	42-44	43-45	43-46
Indian	42-47	45-48	48-51

Source: *Mineral PriceWatch* © *Industrial Minerals Information Ltd.*