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# 2006 Minerals Yearbook

## WOLLASTONITE

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# WOLLASTONITE

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Wollastonite was mined by two companies in the United States in 2006. Mine production statistics collected by the U.S. Geological Survey (USGS) are withheld to avoid revealing company proprietary data, but industry experts have estimated U.S. average annual production to be less than 125,000 metric tons. In 2006, exports of wollastonite were estimated to be less than 3,000 t and imports were estimated to be between 2,000 and 3,000 t. World sales of refined wollastonite products during the past 3 to 4 years were estimated to be in the range of 500,000 to 550,000 t.

## Production

In 2006, domestic wollastonite production increased slightly from that of 2005. Data collected by the USGS were withheld to avoid disclosing proprietary information but industry experts have estimated U.S. average annual wollastonite production to be less than 125,000 t.

Wollastonite has been mined commercially in California and New York. The California deposits, which are in Inyo, Kern, and Riverside Counties, were mined between 1930 and 1970. These operations were limited in size, producing only a few thousand metric tons each year for ceramics, decorative stone, paint, and mineral wool production before closing.

Wollastonite deposits in New York have been mined for more than 50 years. Two companies mined wollastonite in 2006—NYCO Minerals Inc. (a subsidiary of Fording Canadian Coal Trust in Calgary, Alberta, Canada), which operated mines in Essex County, and R.T. Vanderbilt Co. Inc., which operated a mine in Lewis County. The NYCO deposit contains wollastonite, garnet, and diopside. Parts of the deposit contain up to 60% wollastonite. The ore is processed at the Willsboro, NY, plant, where the garnet is removed by using high-intensity magnetic separators. NYCO also chemically modifies the surfaces of some of its wollastonite products to improve their performance. The R.T. Vanderbilt deposit consists primarily of wollastonite as well as minor amounts of calcite and prehnite and trace amounts of diopside. The ore is processed at R.T. Vanderbilt's St. Lawrence County plant, where it is milled and air classified. R.T. Vanderbilt also produces some surface-treated products.

Fording consolidated the management of its worldwide mining operations at its NYCO plant in Willsboro. The consolidation included the NYCO wollastonite mine and plant in New York, Minera NYCO S.A. de C.V.'s wollastonite mine and plant near Hermosillo, Mexico, and American Tripoli Co.'s operation in Missouri. Business actions, such as marketing plans and research and development, will be managed from the Willsboro office (Heath, 2006). NYCO indicated that sales in 2006 from its operations in Mexico and the United States were 101,000 t compared with 90,000 t in 2005 (Fording Canadian Coal Trust, 2007, p. 4).

## Consumption

The USGS does not collect end use data on wollastonite. However, based on company news releases, general overview articles, U.S. manufacturing trends, and consumption estimates published in 1999, plastics and rubber applications were estimated to account for 25% to 30% of U.S. sales, followed by ceramics (20% to 25%), paint (15% to 20%), metallurgical applications (10% to 15%), friction products (10% to 15%), and miscellaneous (10% to 15%) (Industrial Minerals, 1999). Ceramic applications probably account for 30% to 40% of wollastonite sales worldwide, followed by polymers (plastics and rubber) with 30% to 35% of sales, and paint with 10% to 15% of sales (Kendall, 2001; Robinson, 2006). The remaining sales were for construction, friction products, and metallurgical applications.

In ceramics, wollastonite decreases shrinkage and gas evolution during firing, increases green and fired strength, maintains its brightness during firing, permits fast firing, and reduces crazing, cracking, and glaze defects. In metallurgical applications, wollastonite serves as a flux for welding, a source for calcium oxide, a slag conditioner, and to protect the surface of molten metal during the continuous casting of steel. As an additive in paint, it improves the durability of the paint film, acts as a pH buffer, improves its resistance to weathering, reduces gloss, reduces pigment consumption, and acts as a flatting and suspending agent. In plastics, it improves tensile and flexural strength, reduces resin consumption, and improves thermal and dimensional stability at elevated temperatures. Surface treatments are used to improve the adhesion between the wollastonite and the polymers to which it is added. As a substitute for asbestos in floor tiles, friction products, insulating board and panels, paint, plastics, and roofing products, wollastonite is resistant to chemical attack, inert, stable at high temperatures, and improves flexural and tensile strength (Roskill Information Services Ltd., 1996, p. 58-59, 78-81, 104-107, 119, 123-128).

## Prices

Quoted prices for domestically produced acicular wollastonite, ex works, were $226 per metric ton for 200-mesh, $273 per ton for 325-mesh, and $303 per ton for 400-mesh. The price, ex works, for acicular, high-aspect-ratio wollastonite was $380 per ton. Prices for wollastonite from China, free on board, in bulk, were $80 to $100 per ton for 200-mesh and $90 to $110 per ton for 325-mesh (Industrial Minerals, 2006). Quoted prices should be used only as a guideline because actual prices depend on the terms of the contract between the seller and the buyer.

## Foreign Trade

Comprehensive trade data were not available for wollastonite. Exports were estimated to be less than 3,000 t in 2006. Imports

were estimated to be between 2,000 and 3,000 t in 2006. Imports were received from Canada, China, Finland, India, Mexico, and Spain. Imports received from Canada and Spain were transshipments; neither country reported wollastonite production in 2006.

### World Review

World production of crude wollastonite ore exceeded 600,000 t in 2006 but sales of refined wollastonite products probably were in the range of 500,000 to 550,000 t. China was the leading producer of wollastonite with an estimated production between 350,000 and 400,000 t, based on production of 350,000 t reported in 2005 (Brown, 2007). Wollastonite also was produced in India (129,000 t), the United States (less than 125,000 t), and Mexico (41,900 t) (Department of Mines and Geology [India], 2006; Secretaria de Economia [Mexico], 2007). Wollastonite production in Finland was estimated to be 16,000 t compared with 15,950 t in 2005 (Ministry of Trade and Industry [Finland] 2006). Production in Namibia was estimated to be about 200 t based on production of 253 t reported in 2005 (Hetherington and others, 2007, p. 78). Small amounts of wollastonite probably were produced in other countries.

***Mexico.***—Minera NYCO S.A. de C.V. operated an open pit mine and a processing plant near Hermosillo in Sonora, Mexico. The company reported having 120 years of wollastonite reserves based on current production levels. Minera NYCO used flotation processing to separate the wollastonite from associated calcium carbonate. After separation, the wollastonite was milled and sized. Calcium carbonate was sold as a byproduct. More recently, Minera NYCO developed a process to upgrade its ore through the use of size fractionation at the mine site. This allowed the company to bypass the flotation step for some of its product line, thereby reducing processing costs. This cost savings allowed Minera NYCO to market products to Latin America and Europe that were competitive in price with wollastonite imports from China. The company had abandoned some low-value product lines because of competition from less expensive bulk imports from China (Heath, 2006; King, 2006).

### Outlook

As in the past few years, sales of wollastonite for filler and extender applications in plastics continued to be the most promising growth area for domestic and worldwide producers. This is particularly true of the automotive market, in which manufacturers seek to further reduce vehicle cost and weight through the increased use of plastic components. They also seek to simplify vehicle recycling by using fewer, more environmentally-friendly plastic components. Development of wollastonite products to meet these demands has been met through specialized processing and surface-treatment.

Sales of wollastonite for friction product applications probably will remain steady based on the strength of vehicle sales. Sales to ceramics, paint, and steel markets also are expected to remain unchanged. Imports of low-value wollastonite from China probably also will decrease because of increasing demand in a growing Chinese economy, increased prices for Chinese wollastonite, and increased cost of transportation from China. A recent decline in the exchange rate of the U.S. dollar may provide some advantage for domestic producers by discouraging imports of wollastonite. Worldwide consumption probably will continue to expand slowly as target markets for wollastonite producers increase in response to population growth.

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