

# WOLLASTONITE

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**Domestic survey data were prepared by Linder Roberts, statistical assistant.**

Wollastonite, a calcium metasilicate ( $\text{CaSiO}_3$ ), has a theoretical composition of 48.3% calcium oxide and 51.7% silicon dioxide but may contain trace to minor amounts of aluminum, iron, magnesium, manganese, potassium, and sodium. It occurs as prismatic crystals that cleave into massive-to-acicular fragments. It is usually white but also may be gray, brown, or red depending on its composition.

Wollastonite forms when either impure limestones are metamorphosed (subjected to heat and pressure) or silica-bearing fluids are introduced into calcareous sediments during metamorphic processes. In both cases, calcite reacts with silica to produce wollastonite and carbon dioxide.

Deposits of wollastonite have been found in Arizona, California, Idaho, Nevada, New Mexico, New York, and Utah. These deposits are typically skarns containing wollastonite as the major component and calcite, diopside, garnet, idocrase, and (or) quartz as minor components.

## Production

Wollastonite has been mined commercially in California and New York. The California deposits, which were 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 per year for ceramics, decorative stone, paint, and mineral wool production.

In New York, deposits in Essex and Lewis Counties have been mined for more than 40 years. Two companies currently are mining wollastonite—NYCO Minerals Inc., a subsidiary of Fording Inc., operates a mine in Essex County, and R.T. Vanderbilt Co. Inc. operates a mine in Lewis County. The NYCO deposit contains wollastonite, garnet, and diopside. The ore is processed at the Willsboro plant where the diopside and garnet are removed by using high-intensity magnetic separators. NYCO also chemically modifies the surfaces of some of its wollastonite products. The Vanderbilt deposit in Lewis County contains wollastonite, calcite, and diopside. The ore is processed at its Balmat plant.

Domestic wollastonite production and sales declined slightly from those of 1997. Prices also were lower partially owing to competitive price pressure from imports. Domestic production data for wollastonite were collected by means of a voluntary survey of the two domestic mining operations, representing 100% of the production data.

## Consumption

The major uses of wollastonite are in ceramics, paint, and plastics and as a substitute for asbestos. Wollastonite also is

used in adhesives, friction products (brakes and clutches), joint compounds, refractories, rubber, wallboard, and metallurgical applications. In ceramics, it decreases shrinkage and gas evolution during firing, increases green and fired strength, permits fast firing, and reduces crazing, cracking, and glaze defects. As a filler in paint, it reinforces the paint film, acts as a pH buffer, improves its resistance to weathering, reduces pigment consumption, and acts as a flattening 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 into 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 a good reinforcer. In Europe, another major use is as a flux for welding and controlling casting speed during continuous casting of steel. This application is gaining in popularity in the United States. Although data are not available, domestic consumption may have increased slightly in 1998.

## Prices

Prices per metric ton for wollastonite, exworks, acicular, were \$180 for -200-mesh material, \$224 for -325-mesh material, and \$248 for -400-mesh material. The prices per ton, exworks, were \$308 for acicular, high-aspect-ratio material and \$620 for ground (10-micron) material. Prices per ton for wollastonite, f.o.b. plant, bulk, were \$170 for 200-mesh material and \$214 for 325-mesh material (Industrial Minerals, 1998a). Quoted prices should be used only as a guideline because actual prices depend on the terms of the contract between seller and buyer.

## Foreign Trade

Imports of wollastonite were estimated to be between 5,000 metric tons (t) and 10,000 t, a slight increase from those of 1997. Most of the wollastonite was imported from China, Finland, India, and Mexico. Exports were estimated to be between 25,000 t and 30,000 t.

## World Review

Worldwide production of wollastonite was estimated to be between 575,000 t and 625,000 t in 1998. China accounted for approximately 300,000 t. Production for Finland, India, and

Mexico was estimated to be 22,000, 83,000, and 50,000 t, respectively. Small tonnages probably were produced in Chile, North Korea, Pakistan, South Africa, and Turkey.

**Canada.**—After making initial shipments from its wollastonite operation in Quebec, Orleans Resources Inc. filed a plan to restructure its debt under the Bankruptcy and Insolvency Act. The company hoped to reopen its production facilities in middle to late 1999 (Orleans Resources Inc., March 18, 1999, Restructuring plan approved by the shareholders of Orleans Resources Inc., accessed March 25, 1999, at URL <http://www.newswire.ca/releases/March1999/18/c5368.html>). Whitegold Resource Corp. completed a feasibility study of its wollastonite deposit in northwestern British Columbia and was reviewing financial strategies before proceeding further (Whitegold Resource Corp., 1998).

**Mexico.**—Minera NYCO S.A. de C.V., Fording Inc.'s wollastonite subsidiary in Mexico, completed its first full year of operation. Sales reportedly were smaller than expected owing to an extended plant commissioning and slow product acceptance. Minera will continue to focus on lower value, larger volume markets. NYCO Minerals Inc., Fording's wollastonite operation in New York, will focus on higher value applications (Canadian Pacific, 1998, p. 51).

**Spain.**—Compañía Minera Ilustración, which is a joint venture among Pydhesa S.A., Criaderos Minerales y Derivados S.A., and Desarrollo de Recursos Geológicas S.A., continued with its plans to open a wollastonite mine in Spain in 1999. The deposit, located about 200 kilometers from Oporto, contains 4.5 million metric tons (Mt) of proven reserves and another 20 Mt of probable reserves (Industrial Minerals, 1998b).

## Outlook

Worldwide sales of wollastonite continued to increase

although the annual rate of growth was considerably less than that of the early 1990's—wollastonite may have saturated the easily penetrable domestic markets. Consequently, annual growth in domestic sales probably will be between 3% and 5% or slightly greater than the growth rate of the gross domestic product through 2003. The plastics market will continue to offer the greatest growth potential.

## References Cited

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## SOURCES OF INFORMATION

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