



2013 Minerals Yearbook

WOLLASTONITE [ADVANCE RELEASE]

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Wollastonite was mined by two companies in the United States in 2013. U.S. production data collected by the U.S. Geological Survey (USGS) are withheld to avoid disclosing company proprietary data. Exports of wollastonite were less than 10,000 metric tons (t), but were thought to be slightly greater than those of 2012. Imports of wollastonite were less than 4,000 t in 2013. Worldwide sales of refined wollastonite products were estimated to be in the range of 510,000 to 550,000 t in 2013 compared with 500,000 to 540,000 t in 2012.

Wollastonite, a calcium metasilicate (CaSiO_3), has an ideal composition of 51.7% silicon dioxide and 48.3% calcium oxide but can also contain trace to minor amounts of aluminum, iron, magnesium, manganese, potassium, sodium, or strontium substituting for calcium. Wollastonite occurs in the form of prismatic crystals that break into tabular-to-acicular fragments. It is usually white but also may be gray, cream, brown, pale-green, or red depending on the impurities and grain size. Wollastonite is used primarily in automobile brakes, ceramics, metallurgical processing, paint, and plastics. Some of the properties that make it useful are high brightness and whiteness, low moisture and oil absorption, low volatile content, and the acicular nature of some wollastonite.

Production

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.

Wollastonite deposits in New York have been mined for more than 50 years. In 2013, NYCO Minerals, Inc. (a subsidiary of S&B Industrial Minerals S.A., Athens, Greece) operated a mine in Essex County. Vanderbilt Minerals, LLC (a division of R.T. Vanderbilt Holding Co., Inc.) operated a mine in Lewis County. The NYCO deposit contains diopside, garnet, and wollastonite. Parts of the deposit contain up to 60% wollastonite. The ore was processed at NYCO's plant in Willsboro, NY, where the garnet was removed using high-intensity magnetic separators. NYCO also chemically modified the surfaces of some of its wollastonite products to improve their performance. Vanderbilt Minerals' deposit consists primarily of wollastonite with minor amounts of calcite and prehnite and trace amounts of diopside. The ore was processed at the company's plant in Gouverneur, NY, where it was milled and air classified. Vanderbilt Minerals also produced surface-treated products. Production increased in 2013 but data were withheld to avoid revealing company proprietary data (Robinson and others, 2006, p. 1029, 1031).

NYCO received voter approval for a State proposition to allow the company to exchange 607 hectares of New York forest land, to which it held a controlling interest, for rights to explore

and mine 81 hectares of land in the Adirondack Forest Preserve adjacent to its Willsboro Mine. The wollastonite deposit that NYCO was mining in 2013 extends under the preserve and the company estimated that wollastonite reserves were sufficient to allow mining to continue for another 10 years. If exploratory drilling proves this to be true, the 81 hectare tract would be mined, reclaimed, and then returned to the State (Industrial Minerals, 2013a; Karlin, 2013).

Consumption

The USGS does not collect apparent consumption or end-use data on wollastonite. Based on company press releases, general overview articles, U.S. manufacturing trends, and previously published consumption estimates, the U.S. end-use distribution for wollastonite in 2013 was similar to that of 2012. Plastics and rubber applications were believed to account for more than 25% of U.S. wollastonite sales, followed by ceramics, paint, metallurgical applications, friction products, and miscellaneous uses.

Ceramic applications accounted for 30% to 40% of wollastonite sales worldwide, followed by polymers (plastics and rubber) with 25% to 35% of sales, and paint with 10% to 20% of sales. The remaining sales were for construction, friction products, and metallurgical applications.

Based on increased industrial output of their respective manufacturing sectors, some increases in domestic wollastonite consumption in 2013 probably occurred in friction materials, metallurgical, plastics, and rubber markets. Commercial and residential construction increased in 2013, so sales of wollastonite for the manufacture of products such as adhesives, caulks, ceramics, paints, stucco, and roof coatings probably were slightly greater than those of 2012. In 2013, the market distribution for wollastonite in Europe probably was similar to that in the United States, although increases in those markets probably were slight, if any, because of the lingering economic instability in the region. In Asia and South America, where economic growth has been stronger, increased wollastonite consumption was likely more uniform across all markets.

In ceramics, wollastonite decreases shrinkage and gas evolution during firing, increases green and fired strength, maintains brightness during firing, permits fast firing, and reduces crazing, cracking, and other glaze defects. In metallurgical applications, wollastonite serves as a flux for welding, a source for calcium oxide, a slag conditioner, and a protective agent for 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 flattening and suspending agent. In plastics, wollastonite 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

NYCO Minerals announced price increases on its wollastonite products of 4% to 6%, effective January 1, 2013, but actual prices were not listed (Hawley, 2014). Quoted prices for domestically produced acicular wollastonite, ex-works, were \$231 to \$265 per metric ton for 200-mesh, \$243 to \$276 per ton for 325-mesh, and \$489 per ton for acicular wollastonite. Prices for wollastonite from China, free on board, in bulk, were \$80 to \$90 per ton for 200-mesh and \$90 to \$100 per ton for 325-mesh (Industrial Minerals, 2013b). 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

Comprehensive trade data were not available for wollastonite because it is included under generic U.S. Census Bureau Harmonized Tariff Schedule (HTS) code 2530.90.8060 (mineral substances not elsewhere specified or included). Some wollastonite also may be exported under HTS code 2521.00.0000 (limestone flux; limestone and other calcareous stone). U.S. exports in 2013 were estimated to have increased from those of 2012 but were still likely to be less than 10,000 t. Documented exports were 1,110 t in 2013. These exports were transported by ship to the Republic of Korea, China, Belgium, Brazil, Italy, the United Kingdom, Lebanon, Dominican Republic, Venezuela, and South Africa, in decreasing order by tonnage (United Business Media Global Trade, undated). Additional quantities probably were transported by truck or train to Canada.

U.S. imports, estimated to be about the same as in 2012, were less than 4,000 t. Documented imports were 2,340 t in 2013. These imports, transported by ship, were received from Canada, Finland, China, Germany, India, and the Republic of Korea, in decreasing order by tonnage (United Business Media Global Trade, undated). Wollastonite from Canada, Germany, and the Republic of Korea were thought to have been transshipped because wollastonite was not produced commercially in these countries in 2013. Additional quantities of wollastonite may have been imported by rail or truck from Canada (transshipments) and Mexico.

World Review

Most countries do not report wollastonite production and production for other countries is reported with a 2- to 3-year lag time. Therefore, data in this section are estimated unless otherwise noted.

World production of crude wollastonite ore probably increased slightly in 2013 compared with that of 2012. Economic growth remained slow in much of Europe, but the economy in the United States grew slightly and the economy in Asia remained fairly strong. Estimated crude ore production increased and was in the range of 615,000 to 645,000 t in 2013 compared with 600,000 to 630,000 t in 2012. Sales of refined wollastonite products probably were in the range of 510,000 to 550,000 t in 2013, an increase from 500,000 to 540,000 t in 2012.

In 2013, China was the leading producer of wollastonite with an estimated 275,000 to 325,000 t of production of ore concentrate. India ranked second with 160,000 t of refined wollastonite production, followed by the United States (production withheld), Mexico with 55,000 t, and Finland with 12,000 t. Small quantities of wollastonite were produced by Spain and South Africa and possibly other countries but output was not officially reported, and the available general information was inadequate for the formulation of reliable estimates of output.

Outlook

In 2013, U.S. manufacturing increased in several industry sectors that manufactured products containing wollastonite, including a 2.4% increase in shipments of adhesives, coatings, and paints; 7.7% increase in transportation equipment (which use friction products and plastic and rubber components); and a 3.2% increase in plastics and rubber (reinforcing component) (U.S. Census Bureau, 2014a). U.S. industrial production increased by 2.9% from January 2013 to January 2014 (Board of Governors of the Federal Reserve, 2014, p. 8). This increase in manufacturing and progressively increased production by domestic producers since 2009 suggests that wollastonite sales for nonconstruction uses may increase in 2014.

The U.S. Census Bureau (2014b) reported that starts of privately owned housing units were 923,000 in 2013 compared with 781,000 in 2012, an 18% increase. The increased construction activity suggests that sales of wollastonite for manufacturing construction-related products, such as caulks, ceramic tile glazes and bodies, paints, roof coatings, sanitaryware, sealants, structural clay products (brick and quarry tile), stucco, and wallboard, may increase in 2014.

Forecasts by the International Monetary Fund (2014) that in 2014 the U.S. and global economies will grow by 2.8% and 3.9%, respectively, suggest that global wollastonite sales may increase in 2014.

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