



2016 Minerals Yearbook

WOLLASTONITE [ADVANCE RELEASE]

WOLLASTONITE

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Wollastonite was mined by two companies in the United States during 2016. Domestic production and sales data collected by the U.S. Geological Survey (USGS) were withheld to avoid disclosing company proprietary data. U.S. exports and imports of wollastonite were thought to have remained steady, with exports estimated to be less than 10,000 metric tons (t) and imports estimated at no more than 4,000 t. Worldwide sales of refined wollastonite products were likely in the range of 800,000 to 850,000 t, slightly higher than those in 2015.

Wollastonite, a calcium metasilicate (CaSiO_3), has a nominal composition of 51.7% silicon dioxide (SiO_2) and 48.3% calcium oxide (CaO) but may contain trace to minor amounts of aluminum, iron, magnesium, manganese, potassium, sodium, or strontium. It occurs as prismatic crystals that cleave into massive-to-acicular fragments. It is usually white but also may be brown, cream, gray, pale green, 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 mineral.

Production

In 2016, wollastonite was mined by two companies—NYCO Minerals Inc. [a subsidiary of Imerys, S.A. (France)] operated two mines and a processing plant in Essex County, NY, and Vanderbilt Minerals, LLC (a subsidiary of R.T. Vanderbilt Holding Co., Inc.) operated a mine and mill in Lewis County, NY. The NYCO deposit contains diopside, garnet, and wollastonite. The ore was processed at the company's Willsboro plant where the diopside and garnet were removed by using high-intensity magnetic separators. The Vanderbilt deposit in Lewis County contains calcite, diopside, and wollastonite. The ore was processed at the company's Balmat plant.

During 2016, NYCO continued to evaluate results from an exploratory drilling program conducted in Essex County. Processing continued throughout the year at the Willsboro plant, but mining operations shifted from the Seventy Road Mine (also known as the Lewis Mine) to the Oak Hill Mine in October 2016 for economic reasons. Wollastonite reserves at the Seventy Road Mine were not exhausted (Dedam, 2016).

Domestic data for wollastonite were collected by means of a voluntary survey of the two domestic producers; a response was received from one company. Production and sales of wollastonite in the United States were estimated to have decreased in 2016 (production and sales data were withheld to avoid disclosing company proprietary data).

Consumption

The USGS does not collect consumption data for wollastonite, but consumption was estimated to have decreased slightly in 2016. Plastics and rubber applications were estimated to account for more than 25% of wollastonite sales in the United States, followed by ceramics, paint, metallurgical applications, friction products, and miscellaneous uses. Worldwide, use of wollastonite in ceramics was estimated to be nearly one-third of total sales, followed by polymers (such as plastics and rubber) and paint. Smaller uses included various construction products, friction materials, metallurgical applications, and paper (Flanagan, 2017, p. 186).

In 2016, U.S. industrial production of plastics and rubber increased only slightly. Fabrication of motor vehicles and parts (which contain wollastonite in friction products and plastic and rubber components) rose by 4%. Consumption of wollastonite for metallurgical applications likely decreased because the output of the primary iron and steel industry in the United States declined slightly. Total construction spending in 2016 increased by 4.5% above that of 2015, indicating that wollastonite sales may have increased for the manufacture of products such as adhesives, caulks, ceramics, paints, stucco, and roof coatings (U.S. Census Bureau, 2017, p. 1).

In ceramics, wollastonite decreases shrinkage and gas evolution during firing; increases green and fired strength; permits fast firing; and reduces crazing, cracking, and other glaze defects. As a filler in paint, it reinforces the paint film, acts as a pH buffer, improves resistance to weathering, reduces pigment consumption, and acts as a flattening and suspending agent. 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. 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, and stable at high temperatures (Roskill Information Services Ltd., 1996, p. 58–59, 78–81, 104–107, 119, 123–128; Feytis, 2009).

Prices

At yearend 2016, reported prices for domestically produced acicular wollastonite, ex-works, were \$231 to \$265 per metric ton for 200-mesh, \$243 to \$276 per metric ton for 325-mesh, and \$485 to \$491 per metric ton for wollastonite with an aspect ratio of 15:1 to 20:1. Prices for wollastonite from China, free on board, in bulk, were \$80 to \$100 per metric ton for 200-mesh

and \$90 to \$105 per metric ton for 325-mesh (Industrial Minerals, 2016). Domestic prices remained unchanged from those at yearend 2015, but prices for wollastonite from China increased slightly. 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 imported and exported under the generic U.S. Census Bureau Harmonized Tariff Schedule code 2530.90.8050, which includes multiple mineral commodities. In 2016, exports and imports were estimated to have remained steady. It is estimated that less than 10,000 t of wollastonite was exported and less than 4,000 t was imported.

Wollastonite was exported to Argentina, Belgium, Brazil, China, Colombia, the Dominican Republic, Germany, Hong Kong, India, Italy, the Netherlands, Portugal, and the United Kingdom. Countries from which wollastonite was imported by ocean-borne shipments included Canada, China, Finland, and India (IHS Inc., 2017).

World Review

Because wollastonite production figures were not readily available for most countries, much of the production data are estimates. In addition to the countries listed below, Chile, Kenya, Namibia, South Africa, Sudan, Tajikistan, Turkey, and Uzbekistan had combined total production of about 6,000 t. Total world production was estimated to be 800,000 to 850,000 t in 2016, unchanged from that in 2015.

Canada.—The only producer in Canada was Canadian Wollastonite, near Seeley's Bay in eastern Ontario (Canadian Wollastonite, undated). According to the company, the mine produced between 10,000 and 15,000 t in 2016 and between 5,000 and 10,000 t in 2015 (B. Vasily, President, Canadian Wollastonite, written commun., March 20, 2017).

China.—Lishu Dadingshan Wollastonite, LLC. was the leading wollastonite mining company in China, and several smaller wollastonite companies were in operation. Production in China was about 500,000 t in 2016 compared with 450,000 t in 2015 (WeChat—Wollastonite Network, 2017). Exports were about 200,000 t in 2016. Wollastonite reserves in China were estimated to be 30 million metric tons (Mt).

Finland.—Wollastonite was mined at the Limberg, Pettiby, Piukkala, Skräbböle (Nordkalk), and Storgård Quarries in the Pargas region of southwestern Finland. Wollastonite was also obtained from the Ihalainen limestone quarry near Lappeenranta in southern Finland. Data on wollastonite from Finland have not been available since 2012 (T. Ahtola, Geologist, Geological Survey of Finland, written commun., April 5, 2017). However, it was estimated that Finland produced 10,000 t of wollastonite in 2016, unchanged from that in 2015.

India.—According to the Indian Bureau of Mines (2016), significant wollastonite deposits have been identified in the Dungarpur, Pali, Sirohi, and Udaipur districts in the State of Rajasthan and the Banaskantha district in the State of Gujarat. Smaller deposits are in the Dharmapuri and Tirunelveli districts

in the State of Tamil Nadu. Reserves of 17 Mt of wollastonite have been recorded, of which about 88% are located in Rajasthan and nearly 12% are in Gujarat. Production in 2016 was 175,000 t compared with 187,000 t in 2015 (Indian Bureau of Mines, 2017, p. 69). Wolkem India Ltd. was the leading wollastonite producer in India (Wolkem India Ltd., undated).

Mexico.—NYCO purchased the Pilaes wollastonite property near Hermosillo, Sonora, in 1997 and has operated the mine since then (IMDEX, Inc., undated). Production in 2016 increased to 63,700 t from 57,500 t in 2015 (Instituto Nacional de Estadística y Geografía, 2017).

Spain.—Spain had small wollastonite operations in Somosierra, near Madrid.

Outlook

According to the International Monetary Fund (2016, p. XV; 2017) global economic growth was 3.1% in 2016, but is expected to be 3.4% in 2017. Economic growth is expected to continue in 2018, especially in emerging and developing countries.

The U.S. Census Bureau (2017) reported that the total value of all construction put in place in the United States in 2016 was 4.5% higher than that of 2015 and is projected to increase in 2017, suggesting that sales of wollastonite will rise for construction-related products.

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