WOLLASTONITE

By Robert L. Virta and Daniel M. Flanagan

Domestic survey data were prepared by Jesse J. Inestroza, statistical assistant.

Wollastonite was mined by two companies in the United States in 2014. U.S. production data collected by the U.S. Geological Survey (USGS) are withheld to avoid disclosing company proprietary data. U.S. exports of wollastonite were thought to be slightly greater than those of 2013 and were less than 10,000 metric tons (t). Imports of wollastonite may have declined slightly from those of 2013 and were less than 4,000 t. Worldwide sales of refined wollastonite products were estimated to be in the range of 500,000 to 540,000 t in 2014 compared with an estimated 510,000 to 550,000 t in 2013.

Wollastonite, a calcium metasilicate (CaSiO₃), 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 varieties.

The history of the wollastonite industry has been rather short in the United States. Small-scale mining in California began in the 1930s and continued until 1970. Annual production was on the order of a few thousand metric tons with major markets being ceramics, landscape rock, mineral wool, and paint. In the 1950s, the development of a large deposit in New York enabled large-scale mining of wollastonite to begin. The high demand for housing following World War II resulted in the expansion of construction-related markets and provided a ready outlet for the increased production capacities. Between 1960 and 1990, production and sales of wollastonite increased steadily as existing markets expanded and new markets were developed. Wollastonite sales received a boost in the 1980s when asbestos substitute markets opened up, for which wollastonite was well suited. Production peaked at about 150,000 t in 1996 and then began to decline slightly, owing partly to increased competition in foreign markets. The recession of 2008–09 further affected production and sales because of the decline in activity of domestic construction and manufacturing sectors. Since the recession, domestic wollastonite production and sales have increased.

Production

NYCO Minerals, Inc. (a subsidiary of S&B Industrial Minerals S.A., Greece) operated a mine in Essex County, NY, and Vanderbilt Minerals, LLC (a division of R.T. Vanderbilt Holding Co., Inc.) operated a mine in Lewis County, NY, in 2014. The NYCO deposit contains diopside, garnet, and up to 60% wollastonite. The ore was processed at NYCO’s plant in Willboro, NY, where the garnet and diopside were removed using high-intensity magnetic separators. Vanderbilt Minerals’ deposit consists primarily of wollastonite (up to 90%) with minor amounts of calcite and prehnite and trace amounts of diopside. The ore was processed at the company’s plant in Balmat, NY, where it was milled and air classified. NYCO and Vanderbilt Minerals also chemically modified the surfaces of some wollastonite products to improve their performance (Robinson and others, 2006, p. 1029, 1031). In 2014, U.S. production of wollastonite decreased slightly but the quantity sold increased by an estimated 20%. Production and sales are withheld to avoid revealing company proprietary information. The increase in sales in 2014 reflects increased construction and manufacturing activity in the United States and slightly increased export sales.

The New York State Adirondack Park Agency approved a proposal to allow NYCO to conduct exploratory drilling on an 81-hectare parcel of land in the Adirondack Forest Preserve adjacent to its Lewis Mine in Willboro (Knight, 2014a). A restraining order issued by the New York Supreme Court temporarily suspended any exploration activity, but was later overturned (Knight, 2014b). Environmental groups that had been challenging the drilling program decided not to pursue any further legal action (Moore, 2015). The property contains an estimated 1.2 to 1.5 million metric tons (Mt) of wollastonite reserves, sufficient to extend NYCO’s mining operations in the area by an additional 10 years. The new mine would eventually replace the Lewis Mine, which had less than three years of life remaining. If exploratory drilling yielded favorable results, the tract was expected to be mined, reclaimed, and then returned to the State (Torrisi, 2014). In late 2014, Imerys S.A. (France) acquired NYCO’s parent company, S&B Industrial Minerals (Syrett, 2014).

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 2014 was similar to that of 2013. Plastics and rubber applications were estimated to account for more than 25% of U.S. wollastonite sales, followed by ceramics, paint, metallurgical applications, friction products, and miscellaneous uses. Worldwide, ceramic applications probably accounted for approximately one-third of wollastonite sales, followed by polymers (plastics and rubber) and paint. Minor global markets for wollastonite include construction materials, friction products, and metallurgical applications.

Based on increased industrial output of their respective manufacturing sectors, some increases in domestic wollastonite
consumption in 2014 probably occurred in friction materials, metallurgical, plastics, and rubber markets. Because commercial and residential construction increased in 2014, sales of wollastonite for the manufacture of products such as adhesives, caulks, ceramics, paints, stucco, and roof coatings likely were greater than those of 2013. In 2014, the market distribution for wollastonite in Europe was thought to be similar to that in the United States, although increases in those markets probably were slight, if any, because of the lingering effects of the 2008–09 economic recession 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 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 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 (Feytis, 2009; Roskill Information Services Ltd., 1996, p. 58–59, 78–81, 104–107, 119, 123–128; U.S. Geological Survey, 2001).

Prices

Quoted 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 acicular (15:1 to 20:1 aspect ratio) wollastonite. 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, undated). 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 2530.90.8050 (mineral substances not elsewhere specified or included). Some wollastonite also may be imported and exported under HTS code 2521.00.0000 (limestone flux, limestone and other calcareous stone). U.S. exports in 2014 were estimated to have increased slightly from those of 2013 but were probably less than 10,000 t. Documented exports totaled 987 t and were transported by ship to China, Venezuela, Italy, the Republic of Korea, the United Kingdom, Belgium, Australia, Japan, India, South Africa, Argentina, Germany, Colombia, and Brazil, in decreasing order by tonnage (JOC Group Inc., undated). Additional quantities likely were transported by truck or train to Canada.

U.S. imports may have declined slightly in 2014 and were estimated to be less than 4,000 t. Documented imports transported by ship totaled 1,420 t and were received from China, Canada, India, and Finland, in decreasing order by tonnage (JOC Group Inc., undated). Imports shipped from Canada may have been transshipments because commercial production of wollastonite in that country was limited or nonexistent in 2014. Additional quantities of wollastonite may have been imported by rail or truck from Mexico.

World Review

Most countries either do not report wollastonite production or production 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 was thought to have remained essentially unchanged in 2014 compared with that of 2013. The U.S. economy grew slightly and the economy in Asia remained fairly strong, but growth in Asia has slowed in recent years and growth remained low in much of Europe (International Monetary Fund, 2015). Estimated crude ore production was in the range of 610,000 to 640,000 t in 2014 compared with 615,000 to 645,000 t in 2013. Sales of refined wollastonite products in 2014 probably were in the range of 500,000 to 540,000 t.

In 2014, China produced an estimated 270,000 to 320,000 t of wollastonite ore concentrate. India ranked second in production with 180,000 t of refined wollastonite, followed by the United States (production data withheld), and Mexico with 54,600 t (reported, preliminary). Small quantities (10,000 t or less) of wollastonite were also produced by Finland, Spain, South Africa, Namibia, and possibly other countries, but output was not officially reported and the available general information was inadequate for the formulation of reliable output estimates.

Canadian Wollastonite planned to build a wollastonite processing plant with a capacity of 15,000 metric tons per year in 2014–15. The company had received final approval for a new mine from the Canadian Government in late 2012, the first industrial mineral license granted for an operation in southern Ontario in more than 30 years. Total reserves at the Seeleys Bay Mine were estimated to be approximately 30 Mt (Hawley, 2014).

Outlook

In 2014, U.S. manufacturing increased in several industry sectors that manufactured products containing wollastonite, including a 1.0% increase in shipments of adhesives, coatings, and paints; a 4.5% increase in transportation equipment (which uses friction products and plastic and rubber components); and a 2.2% increase in plastics and rubber (reinforcing component) (U.S. Census Bureau, 2015a). Total U.S. industrial production
increased by 4.9% from December 2013 to December 2014 (Board of Governors of the Federal Reserve System, 2015, p. 1). This increase in manufacturing and progressively increased production by domestic producers since 2009 suggests that wollastonite sales for nonconstruction uses may increase in 2015.

The U.S. Census Bureau (2015b) reported that starts of privately owned housing units were 1.0 million in 2014 compared with 925,000 in 2013, an increase of approximately 8%. The increased construction activity suggests that sales of wollastonite for construction-related products, such as caulks, ceramic tile glazes and bodies, paints, roof coatings, sanitaryware, sealants, stucco, and wallboard, may increase in 2015.

Forecasts by the International Monetary Fund (2015) indicate that the U.S. and global economies may each grow by about 3.5% in 2015, suggesting that global wollastonite sales may increase.

References Cited


