

VERMICULITE

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: Two companies with mining and processing facilities in South Carolina and Virginia produced approximately 200,000 tons of vermiculite concentrate, but actual data have been rounded to one significant digit to avoid disclosing company proprietary data. Flakes of raw vermiculite concentrate are micaceous in appearance and contain interlayer water in their structure. When the flakes are heated rapidly at a temperature above 870 °C, the water flashes into steam, and the flakes expand into accordionlike particles. This process is called exfoliation or expansion, and the resulting lightweight material is chemically inert, fire resistant, and odorless. Most of the vermiculite concentrate produced in the United States was shipped to 17 exfoliating plants in 11 States. The end uses for exfoliated vermiculite were estimated to be agriculture and horticulture, 46%; lightweight concrete aggregates (including cement premixes, concrete, and plaster), 17%; insulation, 10%; and other, 27%.

Salient Statistics—United States:	2015	2016	2017	2018	2019^e
Production ^{e, 1, 2}	100	100	100	100	200
Imports for consumption ^e	25	36	28	37	32
Exports ^e	19	21	16	14	13
Consumption, apparent, concentrate ³	110	120	110	120	220
Consumption, reported, exfoliated	65	68	72	76	80
Price, range of value, concentrate, dollars per ton, ex-plant	140–575	140–575	140–575	140–575	140–575
Employment, number ^e	63	63	63	65	76
Net import reliance ⁴ as a percentage of apparent consumption ^{e, 2}	10	10	10	20	10

Recycling: Insignificant.

Import Sources (2015–18): South Africa, 66%; Brazil, 29%; Zimbabwe, 4%; and Kenya, 1%.

Tariff: Item	Number	Normal Trade Relations 12–31–19
Vermiculite, perlite and chlorites, unexpanded	2530.10.0000	Free.
Exfoliated vermiculite, expanded clays, foamed slag, and similar expanded materials	6806.20.0000	Free.

Depletion Allowance: 14% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: U.S. exports and imports of vermiculite are not collected as a separate category by the U.S. Census Bureau. However, United States imports were estimated to be about 32,000 tons in 2019, almost 14% less than those of 2018. Coarse-grade vermiculite remained in short supply; however, prices were unchanged in 2019. Most imports came from South Africa and Brazil in 2019.

Expansion at the 30,000-ton-per-year Namekara Mine in Uganda continued toward its goal of 80,000 tons per year of production. The deposit was considered to be one of the world's largest vermiculite deposits with significant portions of medium- and coarse-grade material. The Namekara deposit has enough resources for more than 50 years of production at previously announced rates.

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A company in Brazil continued to expand production capacity at its vermiculite mine in central Brazil and continued with the development of another deposit near Brasilia to bring the company's total production capacity to 200,000 tons per year. Companies in China with significant vermiculite resources also were ramping up production, although processing operations continued to be somewhat constrained by increased enforcement of environmental regulations. Specific production data were not available for China.

Exploration and development of vermiculite deposits containing medium, large, and premium (coarser) grades (mostly in China and South Africa) are likely to continue because of the higher demand for those grades. Finer grade production has exceeded consumption for several years. However, coarser grade (greater than 5-millimeter particle size) production has not been able to keep up with demand. Producers will continue to investigate ways to increase the use of the finer grades in existing products and in uses that require coarse material. Innovative applications continue to emerge, including the use of vermiculite to combat air pollution and absorb water in mines, replacing zeolites in ion-exchange columns, purifying wastewater, and containing or removing nuclear waste.

World Mine Production and Reserves:

	Mine production		Reserves ⁵
	2018	2019 ^e	
United States ^e	² 100	² 200	25,000
Brazil	50	60	6,200
Bulgaria	10	10	NA
China	NA	NA	NA
Egypt	8	10	NA
India	10	10	1,600
Russia	10	10	NA
South Africa	180	180	14,000
Uganda	20	30	NA
Zimbabwe	30	30	NA
Other countries	<u>12</u>	<u>10</u>	<u>NA</u>
World total (rounded)	400	500	NA

World Resources: In addition to the producing mines in South Carolina and Virginia, there are vermiculite occurrences in Colorado, Nevada, North Carolina, Texas, and Wyoming which contain estimated resources of 2 million to 3 million tons. Significant deposits have been reported in Australia, China, Russia, Uganda, and some other countries, but reserves and resource information comes from many sources and, in most cases, it is not clear whether the numbers refer to vermiculite alone or vermiculite plus other minerals and host rock and overburden.

Substitutes:

Expanded perlite is a substitute for exfoliated vermiculite in lightweight concrete and plaster. Other denser but less costly alternatives in these applications include expanded clay, shale, slag, and slate. Alternate materials for loose-fill fireproofing insulation include fiberglass, perlite, and slag wool. In agriculture, substitutes include bark and other plant materials, peat, perlite, sawdust, and synthetic soil conditioners.

^eEstimated. NA Not available.

¹Concentrate sold or used by producers.

²Data are rounded to one significant digit to avoid disclosing company proprietary data.

³Defined as concentrate sold or used by producers + imports – exports.

⁴Defined as imports – exports.

⁵See Appendix C for resource and reserve definitions and information concerning data sources.