VERMICULITE

By Michael J. Potter

Flakes of raw vermiculite concentrate are micalike in appearance and contain interlayer water in their structure. When the flakes are heated rapidly, above 870 C, the water flashes into steam, and the flakes expand into accordionlike particles. This process is called exfoliation, and the resulting lightweight material is chemically inert, fire resistant, and odorless. In lightweight plaster and concrete, vermiculite provides good thermal insulation. Vermiculite can absorb liquids, such as fertilizers, herbicides, and insecticides, which can then be transported as free-flowing solids (Harben and Kuzvart, 1996).

Production

The total of U.S. vermiculite concentrate sold and used was withheld to avoid disclosing company proprietary data. Output of exfoliated vermiculite sold or used was an estimated 155,000 metric tons. Domestic producers of vermiculite concentrate were W.R. Grace & Co., from its operation at Enoree, SC, and Virginia Vermiculite Ltd., with operations near Woodruff, SC, and in Louisa County, VA.

U.S. production of exfoliated vermiculite by 13 companies came from 20 plants in 11 States. Of these plants, four in four States were operated by W.R. Grace. The largest producing States of exfoliated vermiculite, based on partly estimated data, were, in descending order of output sold and used, South Carolina, Ohio, Arizona, Arkansas, Pennsylvania, Florida, and New Jersey.

Domestic production data for vermiculite were collected by the U.S. Geological Survey (USGS) from two separate voluntary surveys—one for mine/mill operations and the other for exfoliation plants. Of the three known mine/mill operations, data were obtained for one, representing a response rate of 33%. Production for the two nonrespondents was estimated by the USGS on the basis of previous years' production levels and estimates. Of 20 exfoliation plants, data were obtained from 10 for a response rate of 50%. By tonnage, the 10 operations represented an estimated 37% of the output. Production for the 10 nonrespondents was estimated by the USGS on the basis of previous years' production levels.

Prices

Yearend prices for U.S. vermiculite concentrate, explant, bulk, dollars per metric ton, ranged from about \$143 to \$220. For South African vermiculite, crude, bulk, f.o.b. barge, Gulf Coast, in dollars per metric ton, prices ranged from \$127 to \$209 (Industrial Minerals, 1997).

Foreign Trade

Trade data for vermiculite are not collected as a separate category

by the Bureau of the Census, but, instead, are in a basket category with a number of other mineral commodities. On the basis of a nongovernment source, U.S. imports of vermiculite were estimated to be 67,000 tons in 1997. South Africa was the largest supplier, with some material coming from China.

Outlook

Potting soils and other horticultural and fertilizer products have continued to be the largest enduse of vermiculite. A mixture of vermiculite, peat, and plant nutrients forms a soilless (hydroponic) plant medium, a packaging material for nursery stock, as well as a soil conditioner. Perlite competes with vermiculite in horticulture and as a lightweight aggregate (Harben and Kuzvart, 1996). Potential applications of vermiculite may include detoxification of water and soil and industrial spill containment and cleanup (Hindman, 1996).

References Cited

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SOURCES OF INFORMATION

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¹Prior to January 1996, published by U.S. Bureau of Mines.

TABLE 1 SALIENT VERMICULITE STATISTICS 1/

(Thousand metric tons and thousand dollars)

	1993	1994	1995	1996	1997
United States:					
Sold and used by producer	s:				
Concentrate 2/	190	177	171	W	W
Exfoliated	140	130	130	135	155 e/
Value	\$46,700	\$43,600	\$39,400	\$45,300	\$49,400 e/
Average value 3/	\$338	\$335	\$306	\$334	\$318 e/
Exports to Canada	7 e/	7 e/	6 e/	8 e/	8 e/
Imports for consumption	30 e/	30 e/	30 e/	48 e/	67 e/
World: Production 4/	490	485 r/	484 r/	265 r/ 5/	280 e/ 5

e/Estimated. r/Revised. W Withheld to avoid disclosing company proprietary data.

 $1/\operatorname{Data}$ are rounded to three significant digits.

2/ Values are withheld to avoid disclosing company proprietary data.

3/ Based on unrounded data.

4/ Excludes production by countries for which data were not available.

5/ Excludes U.S. data.

TABLE 2EXFOLIATED VERMICULITESOLD AND USED IN THE UNITED STATES, BY END USE 1/

(Metric tons unless otherwise specified)

	1996	1997	
Aggregates:			
Concrete	16,200 r/	19,200 e/	
Plaster	3,220	2,600 e/	
Premixes 2/	1,590	5,960	
Total	21,000	27,700 e/	
Insulation:			
Loose-fill	W	W	
Block	12,000	W	
Other 3/	W	1,400	
Total	27,100	W	
Agricultural:			
Horticultural	26,500 r/	25,100	
Soil conditioning	19,700 r/	29,900 e/	
Fertilizer carrier e/	W	W	
Total e/	W	W	
Other 4/	W	7,660	
Grand total	135,000	155,000 e/	

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total" and/or "Grand total."

1/ Data rounded to three significant digits; may not add to totals shown.

 $2\!/$ Includes acoustic, fireproofing, roofing, and texturizing uses.

3/ Includes high-temperature and packing insulation and sealants.

4/ Includes various uses not specified.

TABLE 3 ACTIVE VERMICULITE EXFOLIATION PLANTS IN THE UNITED STATES IN 1997

Company	County	State	
A-Tops Corp.	Beaver	Pennsylvania.	
W. R. Grace & Co., Construction Products Div.	Jefferson	Alabama.	
Do.	Maricopa	Arizona.	
Do.	Broward	Florida.	
Do.	Laurens	South Carolina.	
Palmetto Vermiculite Co., Inc.	Spartanburg	Do.	
P.V.P. Industries	Trumbull	Ohio.	
The Schundler Co.	Middlesex	New Jersey.	
The Scotts Company	Hempstead	Arkansas.	
Do.	Union	Ohio.	
Do.	Greenville	South Carolina.	
Southwest Vermiculite Co., Inc.	Bernalillo	New Mexico.	
Strong-Lite Products Corp.	Jefferson	Arkansas.	
Strong Products Corporation	La Salle	Illinois.	
Thermic Refractories, Inc.	Macoupin	Do.	
Thermo-O-Rock, Inc.	Maricopa	Arizona.	
Do.	Washington	Pennsylvania.	
Verlite Co.	Hillsborough	Florida.	
Vermiculite Industrial Corp.	Allegheny	Pennsylvania.	
Vermiculite Products, Inc.	Harris	Texas.	

TABLE 4 VERMICULITE: WORLD PRODUCTION, BY COUNTRY 1/2/

(Metric tons)

Country	1993	1994	1995	1996	1997 e/
Argentina	38	32	44	40 r/ e/	45
Brazil	14541	17233 r/	18806 r/	20000 r/	20000
Egypt e/	500	500	500	500	500
India	1485	1903	1696 r/	2405 r/	2400
Japan e/	15000	15000	15000	15000	15000
Kenya	1961	1113 e/	457	734 r/	800
Mexico	134	300	225	350 r/	295 3/
Russia e/	50000	40000	40000	30000	25000
South Africa	211143	223478	221748	186082	210675 3/
United States (sold and used by producers) 4/	190000	177000	171370	W	W
Zimbabwe	5032	8184	13742	10249 r/	5000
Total	489,834	484,743 r/	483,588 r/	265,360 r/	279,715

e/ Estimated. r/ Revised. W Withheld to avoid disclosing company proprietary data; not included in "Total."

1/World totals, U.S. data, and estimated data are rounded to three significant digits; may not add to totals shown.

2/ Excludes production by countries for which data are not available and for which general information is inadequate for formulation of reliable estimates. Table includes data available through July 22, 1998.

3/ Reported figure.

4/ Concentrate.