

VERMICULITE

(Data in thousand metric tons, unless otherwise noted)

Domestic Production and Use: Two companies with mining and processing facilities produced vermiculite concentrate. One company had its operation in South Carolina, and the other company had an operation in Virginia and an operation in South Carolina run by its subsidiary company. Most of the vermiculite concentrate was shipped to 19 exfoliating plants in 10 States. The end uses for exfoliated vermiculite were estimated to be lightweight concrete aggregates (including concrete, plaster, and cement premixes), 15%; and insulation, agricultural, and other, 85%.

| Salient Statistics—United States: | 1997 | 1998 | 1999 | 2000 | 2001^e |
|---|-------------|-------------|--------------------|--------------------|-------------------------|
| Production ¹ | W | W | ^{e 2} 175 | ^{e 3} 150 | 150 |
| Imports for consumption ^e | 67 | 68 | 71 | 59 | 60 |
| Exports ^e | 9 | 11 | 13 | 5 | 5 |
| Consumption, apparent, concentrate | W | W | ^e 240 | ^e 204 | 205 |
| Consumption, exfoliated ^e | 155 | 170 | 175 | 165 | 165 |
| Price, average value, concentrate, dollars per ton, f.o.b. mine | W | W | W | ^{3 4} 114 | 114 |
| Stocks, producer, yearend | NA | NA | NA | NA | NA |
| Employment, mine and mill, number ^e | 230 | 230 | 230 | 230 | 230 |
| Net import reliance ⁵ as a percentage of apparent consumption | W | W | ^e 27 | ^e 26 | 27 |

Recycling: Insignificant.

Import Sources (1997-2000): South Africa, 71%; China, 25%; and other, 4%.

| Tariff: Item | Number | Normal Trade Relations 12/31/01 |
|--|---------------|--|
| 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.

VERMICULITE

Events, Trends, and Issues: Vermiculite use in insulation includes moderately high-temperature applications. Vermiculite is used with selective binders (sodium and potassium silicate) and compressed into blocks, boards, or special shapes. Bonded refractory boards and shapes are used as backup insulation behind hot refractory surfaces or as hot face media themselves. In lower-temperature, metal-melting industries, vermiculite can be used in contact with the molten metal and can withstand heat and flame up to 1,200° C. Vermiculite shapes are used in the aluminum industry in particular because vermiculite has a nonwetting characteristic with aluminum. Vermiculite also is used in refractory concretes, such as ramming mixes and castables.⁶

South Africa and the United States have been the largest producers of vermiculite. China had an estimated output of 40,000 tons in 2000. In Uganda, a Canadian firm, Canmin Resources Ltd., began commercial mining and production in 2001 with 2,000 tons of vermiculite being mined for stockpiling. The company expected to serve markets for insulation and horticulture in the Middle East.⁷ In Zimbabwe, Samrec Vermiculite (Pvt.) Ltd., the Imerys Group-owned operator of the Shawa Mine, was completing work to double its vermiculite capacity to more than 40,000 tons per year. Two-thirds of the production was being sold to Europe with the remainder going to Asia and the Middle East. The increased production would be marketed worldwide.⁸

World Mine Production, Reserves, and Reserve Base:

| | Mine production | | Reserves ⁹ | Reserve base ⁹ |
|-------------------------------|------------------|-------------------|-----------------------|---------------------------|
| | 2000 | 2001 ^e | | |
| United States | ^e 150 | 150 | 25,000 | 100,000 |
| Brazil | 23 | 25 | NA | NA |
| China | 40 | 50 | NA | NA |
| Russia | 25 | 25 | NA | NA |
| South Africa | 209 | 162 | 20,000 | 80,000 |
| Zimbabwe | 19 | 15 | NA | NA |
| Other countries ¹⁰ | 46 | 40 | 5,000 | 20,000 |
| World total (may be rounded) | 512 | 470 | 50,000 | 200,000 |

World Resources: Marginal reserves of vermiculite, occurring in Colorado, Nevada, North Carolina, Texas, and Wyoming, are estimated to be 2 to 3 million tons. Resources in other countries may include material that does not exfoliate as well as United States and South African vermiculite.

Substitutes: Expanded perlite is a substitute for vermiculite in lightweight concrete and plaster. Other more dense but less costly material substitutes in these applications are expanded clay, shale, slate, and slag. Alternate materials for loosefill fireproofing insulation include fiberglass, perlite, and slag wool. In agriculture, substitutes include peat, perlite, sawdust, bark and other plant materials, and synthetic soil conditioners.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹Concentrate sold and used by producers.

²Roskill Information Services, Ltd., 1999, The economics of vermiculite: London, Roskill Information Services, Ltd., July, 99 p. plus appendix.

³Moeller, E.M., 2001, Vermiculite: Mining Engineering, v. 53, no. 6, June, p. 65.

⁴Average of price range of \$60 to \$168 per ton, depending on sized grades.

⁵Defined as imports - exports + adjustments for Government and industry stock changes.

⁶Russell, Alison, 2000, Vermiculite: Financial Times Executive Commodity Reports, p. 16.

⁷Industrial Minerals, 2001a, Mineral notes: Industrial Minerals, no. 407, August, p. 77.

⁸———2001b, World of minerals: Industrial Minerals, no. 408, September, p. 19.

⁹See Appendix C for definitions.