

TALC AND PYROPHYLLITE

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The mineral talc is a hydrous magnesium silicate. A massive talcose rock is called steatite, and an impure massive variety is known as soapstone. Talc is used commercially because of its fragrance retention, luster, purity, softness, and whiteness. Other commercially important properties of talc are its chemical inertness, high dielectric strength, high thermal conductivity, low electrical conductivity, and oil and grease adsorption. Major markets for talc are ceramics, paint, paper, and plastics.

Pyrophyllite is a hydrous aluminum silicate with a structure similar to talc. Such properties as chemical inertness, high dielectric strength, high melting point, and low electrical conductivity make it useful for ceramic and refractory applications.

In 2001, production of talc essentially was unchanged from 2000, although domestic sales decreased by 4% to 786,000 metric tons (t). Exports and imports declined by 11% to 137,000 t and by 33% to 180,000 t, respectively. Apparent consumption declined by 7% to 896,000 t. Production and sales of pyrophyllite declined in 2001.

Legislation and Government Programs

The National Toxicology Program (NTP) of the U.S. Department of Health and Human Services continued the review process for its 10th report on carcinogens for Congress. An NTP subcommittee had nominated asbestiform talc and nonasbestiform talc for inclusion in its report in 2000. However, after receiving comments and testimony on the subject, the subcommittee decided not to include these materials in its report. No date has been set for the release of this document.

In 2001, the U.S. Department of Defense authorized the disposal of 907 t of block and lump talc and 988 t of ground talc, which is the entire uncommitted inventory, from the National Defense Stockpile.

Issues

Recently, the talc industry has had to face questions concerning the potential health risk posed by exposure to some talc products. First, the NTP investigated whether or not to include asbestiform talc and nonasbestiform talc in its report on carcinogens. While not including talc in the report, NTP indicated that the issue could come up for review at a later date. Another issue that arose was that of fibrous particulates in talc used by the manufacturers of wax crayons. Although resolved when crayon manufacturers agreed to eliminate fibrous talc from their products, the controversy highlighted the continuing concerns over the risk posed to the human respiratory system by asbestos, fibrous talc, and nonasbestiform amphiboles and

reemphasized that the analysis of these materials is not always straightforward. In particular, the fibrous particulates in the crayons were identified as asbestos, fibrous talc, talc and amphibole intergrowths, or a mixture of the three, depending on the analyst and analytical method used. In a few cases, mineral particulates in the talc samples were identified as asbestos based solely on their length and width characteristics without regard to their mineralogy. A paper presented at the 37th Forum of the Geology of Industrial Minerals (Van Gosen and others, 2001) addressed the following subjects: (1) the controversy surrounding fibrous talc from the Gouverneur, NY, area used in crayons; (2) the importance of geologic controls on the formation of talc deposits with regard to its mineralogical composition; (3) definitions of asbestos; and (4) analytical complexities, particularly when identifying transitional, or partially altered, amphibole fibers in some talc samples.

Production

Talc.—In 2001, seven companies operating nine mines in five States produced soapstone, steatite, and talc. All were open pit mines. The producers were, in decreasing order of production, Luzenac America Inc., Wold Minerals Corp., Barrett's Minerals Inc., Gouverneur Talc Co., Milwhite Inc., Suzorite Mineral Products Inc. (Zemex Corp.), and Steatite of Southern Oregon. Two other companies, CalTalc Co. in California and New World Stone Co. in Virginia, worked from stocks. Barrett's Minerals, Gouverneur Talc, Luzenac America, and Wold Minerals were the largest domestic producers, collectively accounting for more than 80% of the tonnage.

In 2001, U.S. mine production was 853,000 t valued at \$22.1 million compared with 851,000 t valued at \$22.3 million in 2000 (tables 1 and 2). Production increased in Montana and Texas, was unchanged in Oregon, and decreased in the remaining States. Montana led all States in the tonnage and value of talc produced, followed by Texas, Vermont, New York, and Oregon. Mines operating in Montana, New York, Texas, and Vermont accounted for nearly all domestic talc production.

Domestic production data were obtained through a voluntary survey of U.S. mining companies conducted by the U.S. Geological Survey (USGS). Survey forms were sent to 12 companies. Two companies indicated that they were selling from stocks in 2001, one company did not mine or sell talc in 2001, and two companies closed down their operations. Responses, which account for approximately 47% of the data, are presented in table 1; the remaining data were estimated from reported prior-year data adjusted according to employee hour and consuming industry trends.

Zemex Corp. sold its interests in its Benwood, WV, and

Natural Bridge, NY, talc milling facilities to IMI Fabi SpA. IMI Fabi already owned 60% interest in the Benwood operation. Zemex supplied talc to the paint, plastics, and cosmetics industries from these two plants. The company will continue to mine and process talc at its Van Horn, TX, facility. Talc from the 50,000- to 60,000-metric-ton-per-year (t/yr)-capacity plant in Texas is sold for ceramics, complementing the clay and feldspar products Zemex sells for ceramics (North American Minerals News, 2001).

R.T. Vanderbilt Co. Inc., the parent company of Gouverneur Talc, announced a reorganization of its sales and marketing departments. While not affecting its mining operations, a separate minerals and petroleum unit will be created that will help the company respond more effectively to its customers' needs (CI CyberNews, 2001).

Pyrophyllite.—Piedmont Minerals Co. Inc. and Standard Mineral Co. Inc. operated three mines in North Carolina. Production of pyrophyllite decreased from that of 2000.

Domestic production data were acquired through a voluntary USGS survey of the three U.S. companies that mine pyrophyllite. All three companies responded to the survey.

Consumption

Domestic consumption data for talc and pyrophyllite were developed by the USGS from a voluntary survey of U.S. mills. Survey forms were sent to 10 companies operating 13 mills in 7 States for talc and 3 companies operating 3 mills in 2 States for pyrophyllite. Approximately 81% of the talc data presented in table 3 were reported by the companies; the remaining data were estimated from reported prior-year data adjusted according to employment hours and consuming industry trends. All three pyrophyllite producers responded.

Talc.—Producers reported that 786,000 t of talc valued at \$91.3 million was sold or used in 2001, a decrease from 821,000 t valued at \$96.1 million in 2000. Domestic sales by U.S. producers declined by 6% to 677,000 t in 2001 from 722,000 t in 2000. Talc was sold for, in decreasing order of consumption, ceramics (sanitaryware, tiles, etc.), paint, paper, roofing, plastics, rubber, and cosmetics (table 3). Sales for most end uses declined in 2001, of which the largest decline was for ceramics. Three companies accounted for most of the sales loss to the ceramics industry, suggesting market shifts affecting specific companies or ceramic product lines rather than the entire ceramics industry.

Despite lower sales reported by domestic producers of talc for plastics applications, shipments of plastics have continued to increase in recent years. Imports of talc are thought to fill much of the expanding plastics market demand for talc fillers and extenders. While imported talc is not covered by the USGS producer canvass, total sales of talc for plastics applications (domestic plus imported talc) are believed to have approached or possibly exceeded 100,000 t/yr of talc for the past 5 years.

About 75,500 t of talc was reported under the "Other" category in table 3 by respondents in 2001. Of this amount, 72,600 t was used in animal feed additives, automobile body fillers, caulks, joint compounds, paint and putties, sculpture media, tile flooring, and vinyl sheet flooring. The remainder of the "Other" category (2,900 t) was used in applications that

were not identified by respondents.

Sales of talc to manufacturers of paint, sanitaryware, roofing, and tile generally are tied to the housing industry. Initiation of new privately owned housing units increased to 1.65 million in December 2001 from 1.53 million in December 2000 (U.S. Census Bureau, 2002a). Shipments of architectural paint, the major paint market for talc, declined slightly to 1.27 million gallons [4.81 million liters (ML)] in 2001 from 1.28 million gallons (4.85 ML) in 2000 (U.S. Census Bureau, 2002b). Data on sales of vitreous china plumbing fixtures (commodes, sinks, urinals, water tanks, etc.) are not available for 2001 and 2000. With the continued increase in housing starts and commercial construction, sales of vitreous china plumbing fixtures probably have increased slightly since 1999.

The ceramic tile industry, another major market for talc, has faced increased competition from imported ceramic tile in recent years. Domestic production has declined as imports have increased over the past several years. However, imports of glazed and unglazed ceramic tiles declined to 20.1 million units valued at \$149 million in 2001 compared with 22.3 million units valued at \$130 million in 2000. While encouraging for the domestic industry, imports in 2001 still exceeded by a considerable amount the 17.6 million units valued at \$142 million imported in 1996.

For perspective, the United States accounted for 4.9% of world tile consumption (the 4th leading consumer nation) but only 1.3% of world production (the 11th leading producer) in 1999. The United States was the second largest importer of ceramic tile, accounting for 13.4% of world imports. Ceramic tile was imported from Italy (36%), Spain (22%), Mexico (19%), Brazil (7%), and others (16%) (Tile & Decorative Surfaces, 2001).

Most of the 180,000 t of imported talc listed in table 6 was not included in the domestic end-use data listed in table 3. Unlike 1999 and 2000, however, import tonnages in 2001 appear to be more in line with domestic usage patterns. An estimate of the end-use breakdown based on countries of origin, ports of entry, importing companies, and regional end-use patterns is plastics, 75,000 t; paint, 35,000 t; cosmetics, 20,000 t; unknown, 20,000 t; ceramics and refractories, 15,000 t; paper, 10,000 t; and rubber, 5,000 t.

Pyrophyllite.—In 2001, domestic consumption of pyrophyllite declined from that of 2000. Pyrophyllite was used, in decreasing order of consumption, in refractories, ceramics, paint, insecticides, and rubber. Sales for paint and refractory products increased. Those for ceramics, insecticides, and rubber decreased. Ceramic and refractory uses accounted for more than 70% of domestic pyrophyllite sales.

Prices

Talc prices varied depending on the quality and the degree and method of processing. The unit value of crude talc was estimated to be \$26 per metric ton. Most of the talc sold in the United States is sold only after crushing and grinding. Consequently, the crude value for talc is of limited use. Following sorting to remove waste, primary crushing, and screening, the unit value of the unmilled talc probably would be in the range of \$50 to \$60 per ton at the mill. The average

reported unit value of processed talc was \$119 per ton, slightly greater than in 2000. The average unit values of crude and processed pyrophyllite were essentially unchanged from those of 2000.

The average free alongside ship unit value for exports of unmilled talc was \$476 per ton compared with \$236 per ton in 2000. The large increase in the average unit value was attributed to an increase in low-tonnage, high-value shipments. As in previous years, several of the small export shipments have unit values exceeding \$1,000 per ton, suggesting that sculpting-grade talc and talc products, such as body powders, also may have been included in the export data. The unit value for milled talc exports was \$204 per ton in 2001 compared with \$212 per ton in 2000. The average customs unit value for imports was \$122 per ton for unground talc compared with \$83 per ton in 2000. The difference was an increase in value of imports from China, which accounted for 95% of the import tonnage of unground talc. The average customs value was \$171 per ton for ground talc compared to \$146 per ton in 2000. In 2001 and 2000, there were shipments of unusually low value and unusually high value. Adjusting for these, the average unit values for 2001 and 2000 were \$216 per ton and \$198 per ton, respectively. The average customs value was \$919 per ton for cut or sawed talc compared with \$975 per ton in 2000.

Approximate prices for talc ranged from \$87 to \$345 per ton (Industrial Minerals, 2001b; table 4). 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

Talc exports decreased by 11% in tonnage to 137,000 t and by 12% in value to \$28.8 million. Canada, with 64,000 t, was the leading importer of U.S. talc, followed by Japan (10,000 t), Mexico (6,000 t), Brazil (5,580 t), France (5,520 t), Germany (4,890 t), Singapore (4,630 t), the Republic of Korea (4,090 t), and Belgium (4,000 t) (table 5). Exports to each of the 51 remaining countries that receive imports from the United States were less than 4,000 t for 2001. Much of the talc exported to Mexico is shipped to U.S. affiliates operating across the Mexican border and is not reported by the U.S. Census Bureau. Total talc exported across the Mexican border in 2001, including shipments to U.S. affiliates, exceeded 50,000 t.

Talc imports reported by the U.S. Census Bureau decreased by 33% in tonnage to 180,000 t and by 16% in value to \$35.8 million in 2001. This tonnage is more consistent with domestic consumption patterns than the tonnages imported in 1999 and 2000. During those 2 years, amounts in excess of market demand probably were imported and stockpiled for future sales. China supplied 55% of all talc imports, followed by Canada (30%) (table 6).

About 93% (168,000 t) of the talc imported into the United States was crude or milled. Of this amount, 46% (77,000 t) came through the customs district of New Orleans, LA (72,300 t of unmilled talc from China and 4,210 t of unmilled talc from Australia). The second leading customs district was Seattle, WA, with 35,100 t (mainly milled talc from Canada), followed by Savannah, GA, not traditionally a major port for talc, with 18,000 t (mainly milled talc from China), Buffalo, NY, with

8,050 t (mainly milled talc from Canada), and Houston, TX, with 7,600 t (mainly unmilled talc from China). These five port districts accounted for 87% of the tonnage of unmilled and milled talc imports in 2001.

World Review

China remained the world's leading producer of talc, followed by the United States, India, Finland, France, and Brazil. The Republic of Korea was the largest producer of pyrophyllite, followed by Japan and Brazil. China, Japan, the Republic of Korea, and the United States produced 66% of the world's talc and pyrophyllite (table 7).

Australia.—WMC Ltd. reached an agreement to sell its Three Springs talc operation to RTZ plc, pending governmental approval, for \$27.8 million. WMC's mining and milling capacities were 200,000 t/yr and 40,000 t/yr, respectively. The facilities are located 330 kilometers north of Perth. The site will be operated by the RTZ subsidiary Luzenac Australia Pty. Ltd. (Industrial Minerals, 2001c).

China.—The Guixin Talc Development Co. Ltd. completed the first phase of its mine development near Longchuan, Guangxi Province. The company has removed the overburden and will undertake mine development. Initial production will be between 10,000 and 20,000 t, with a target production of 50,000 t/yr planned. Most of the talc will be exported through the ports of Fangcheng and Zhangjiang. Granular and powder forms with a brightness of 91.4% to 94.4% will be offered (Industrial Minerals, 2001a).

Haicheng, Liaoning Province, is the largest talc producing region in the world with a mine output of 700,000 to 800,000 t/yr. As worldwide demand for Chinese talc increased, mine production in the region peaked at 903,000 t in 1995. There were 47 mines operating in 2000 with 95% of production from underground mines. Production is expected to decline through 2005 to 500,000 to 600,000 t with consolidation of the industry and closure of some mines. Demand for micronized products has increased since early 2000. In 2000, production capacity for 800- to 2500-mesh products was only 80,000 t/yr. In 2001, capacity exceeded 120,000 t/yr and will reach 150,000 t/yr with the expansion of several mills. About 40% of the talc sold in China is sold to the paper industry. Talc is exported to Europe and southeast Asia, with Japan being the largest importer (Zhuang, 2001).

Finland.—Omya GmbH (a subsidiary of Plüss-Staufner AG) became the sole owner of Mondo Minerals Oy with its purchase of WMC's 50% share. The sale was completed in May for about \$62.1 million. Mondo Minerals is Europe's second largest talc producer with a capacity of about 600,000 t/yr. Mondo Minerals was formed in 1998 when Omya and WMC integrated Finnminerals Oy with Westmin Talc BV and Norwegian Talc AS. Mondo Minerals sells talc for paints, paper, and plastics (Harris, 2001).

Outlook

The U.S. economy appears to be slowly recovering from its recession, although growth in major markets for talc, such as ceramics, paint, and paper, has leveled off. With the continuing

construction boom, adhesives, ceramics, joint compounds, paint, and roofing markets, all of which consume talc, should at least maintain current levels in the coming years. The U.S. paper market, however, has stagnated for several years, resulting in declining talc sales for that market. Continued foreign competition and a strong U.S. dollar appear to have slowed U.S. exports while encouraging imports, which grew astronomically between 1997 and 2000 (increasing to 270,000 t from 123,000 t). Imports probably will remain around the more realistic level observed in 2001. Overall, domestic production and sales of talc probably will be relatively unchanged for the next 2 to 3 years. Following a decline in 2001, no major changes are anticipated in pyrophyllite markets in the near future.

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TABLE 1
SALIENT TALC AND PYROPHYLLITE STATISTICS 1/

(Thousand metric tons and thousand dollars)

	1997	1998	1999	2000	2001
United States:					
Mine products, crude:					
Talc	1,050	971	925	851	853
Pyrophyllite	W	W	W	W	W
Value:					
Talc	\$33,000	\$27,300	\$26,100	\$22,300 r/	\$22,100
Pyrophyllite	W	W	W	W	W
Sold by producers, crude and processed:					
Talc	942	870	881	821 r/	786
Pyrophyllite	W	W	W	W	W
Value:					
Talc	\$111,000	\$109,000	\$102,000	\$96,100	\$91,300
Pyrophyllite	W	W	W	W	W
Exports (talc) 2/	179	146	147	154	137
Value	\$34,200	\$26,000	\$27,200	\$32,800	\$28,800
Imports for consumption	123	165	208	270	180
Value	\$21,100	\$23,300	\$35,300	\$42,500	\$35,800
Apparent consumption 3/	994	990	986	967	896
World, production	10,400 r/	9,400 r/	9,460 r/	9,020 r/	8,920 e/

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

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Excludes powders--talcum (in package), face, and compact.

3/ Production plus imports minus exports plus adjustments in Government and industry stock. Does not include pyrophyllite.

TABLE 2
CRUDE TALC PRODUCED IN THE UNITED STATES,
BY STATE 1/ 2/

(Thousand metric tons and thousand dollars)

State	2000 r/		2001	
	Quantity	Value	Quantity	Value
Texas	212	3,580	234	4,070
Other 3/	639	18,700	620	18,100
Total	851	22,300	853	22,100

r/ Revised

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Excludes pyrophyllite.

3/ Includes California, Montana, New York, Oregon, and Vermont.

TABLE 3
END USES FOR GROUND TALC 1/ 2/

(Thousand metric tons)

	2000	2001
Ceramics	196 r/	168
Cosmetics	25 r/	18
Insecticides	-- r/	--
Paint	150 r/	146
Paper	145	146
Plastics	39	38
Refractories	5	--
Roofing	58	57
Rubber	29 r/	28
Other 3/	76 r/	76
Total	722 r/	677

r/ Revised. -- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Excludes pyrophyllite.

3/ Includes art sculpture, asphalt filler, auto body filler, construction caulks, flooring, joint compounds, and other uses not specified.

TABLE 4
PRICES OF TALC

(U.S. dollars per metric ton)

Price	
New York:	
Paint:	
200 mesh	104
400 mesh	187
Ceramic:	
200 mesh	87
325 mesh	97
Italian, cosmetic-grade	254
Chinese, normal (ex-store):	
UK 200 mesh	290-326
UK 350 mesh	305-334

Source: Industrial Minerals, December 2001.

TABLE 5
U.S. EXPORTS OF TALC 1/ 2/

(Thousand metric tons and thousand dollars)

Country	2000		2001	
	Quantity	Value 3/	Quantity	Value 3/
Belgium	9	1,830	4	1,610
Canada 4/	58	9,920	64	10,900
Japan	7	1,300	10	1,770
Mexico	8	966	6	623
Other 5/	72	18,800	53	13,900
Total	154	32,800	137	28,800

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Excludes powders--talcum (in package), face, and compact.

3/ Free alongside ship (f.a.s.)

4/ Probably includes shipments in transit through Canadian ports.

5/ Includes 52 countries in 2000 and 56 countries in 2001.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF TALC, BY COUNTRY 1/

Country	Not crushed or powdered		Crushed or powdered		Cut and sawed		Total unmanufactured	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2000:								
Brazil	80	\$3	121	\$19	663	\$589	864	\$611
Canada	261	113	58,100	14,300	7,820	6,420	66,200	20,900
China	121,000	9,870	1,120	346	837	723	123,000	10,900
France	7,010	752	474	429	4,580	4,750	12,100	5,930
Japan	--	--	21,900	1,020	214	259	22,100	1,280
Other 2/	14,800	1,070	31,100	345	447	1,480	46,300	2,890
Total	143,000	11,800	113,000	16,500	14,600	14,200	270,000	42,500
2001:								
Brazil	--	--	132	33	68	90	200	123
Canada	160	82	45,100	12,500	8,460	6,510	53,700	19,100
China	79,300	9,590	18,700	197	1,270	1,220	99,300	11,000
France	--	--	819	768	1,470	1,980	2,280	2,750
Japan	--	--	1,200	535	384	421	1,580	956
Other 2/	4,220	529	18,300	368	476	921	23,000	1,820
Total	83,600	10,200	84,300	14,400	12,100	11,100	180,000	35,800

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes 26 countries in 2000 and 21 countries in 2001.

Source: U.S. Census Bureau.

TABLE 7
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Argentina:					
Pyrophyllite	3,858 r/	3,480 r/	3,400 r/	3,400 r/ e/	3,400
Steatite e/	300	300	300	300	300
Talc	4,772 r/	14,585	10,542 r/	10,000 r/ e/	10,000
Australia: 3/					
Pyrophyllite	337 r/	702 r/	347 r/	1,727 r/	1,500
Talc	185,601 r/	199,315 r/	190,037 r/	178,545 r/	180,000
Austria, talc and soapstone, crude	155,730	137,114 r/	129,516 r/	130,000 r/	140,000
Brazil:					
Pyrophyllite, crude	158,675	161,000	160,000	150,000	150,000
Talc:					
Crude	285,614	289,000	300,000	300,000	300,000
Marketable product e/ 4/	2,000	2,000	2,000	2,000	2,000
Bhutan, talc e/	3,000	3,200	3,400	3,700	3,800
Canada, pyrophyllite, soapstone, talc	73,000	71,000 r/	79,000	86,000 r/	86,000
Chile, talc	3,986	3,772	2,231 r/	2,421 r/	2,500
China, unspecified e/	4,100,000	3,800,000	3,900,000	3,500,000	3,500,000
Colombia, pyrophyllite, soapstone, talc e/	14,832 5/	15,000	15,000	15,000	15,000
Egypt, pyrophyllite, soapstone, steatite, talc	43,627	39,720	40,000 e/	40,000 e/	40,000
Finland, talc e/	350,000	350,000	469,000 r/ 5/	360,000	400,000
France, talc, crude e/	362,000 r/ 5/	360,000 r/	370,000 r/	350,000	350,000
Germany, talc (marketable) and steatite	8,819	9,000 r/	9,000 r/ e/	8,000 r/ e/	10,000
Guatemala, talc e/	700	948 r/	-- r/	-- r/	--
Hungary, talc e/	500 r/ 5/	500 r/	500 r/	500 r/	500
India:					
Pyrophyllite	121,566	79,951	85,000 e/	85,000 e/	86,000
Steatite	417,613	447,550	450,000 e/	460,000 e/	460,000
Iran, talc e/ 6/	20,000	20,000	20,000	20,000	20,000
Italy, steatite and talc e/	142,000	138,000 r/	140,000	140,000	140,000
Japan:					
Pyrophyllite	913,822	764,079	694,317	692,998	626,000
Talc	53,000	50,000	50,000	50,000	45,000

See footnotes at end of table.

TABLE 7--Continued
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT 1/ 2/

(Metric tons)

Country	1997	1998	1999	2000	2001 e/
Korea, North, unspecified e/	180,000	150,000	120,000	120,000	120,000
Korea, Republic of:					
Pyrophyllite	994,366	843,609	754,657	917,973 r/	850,000
Talc	25,751	24,411	15,313	11,344 r/	11,000
Macedonia, talc e/	10,000	10,000	9,000 r/	10,000	10,000
Mexico, talc	13,586	18,843	18,981	20,569 r/	20,000
Morocco	19,850	12,000 r/ e/	12,522 r/	14,655 r/	15,000
Nepal, talc 7/	6,809	5,553	6,157 r/	5,500 e/	6,000
Norway, talc, soapstone, steatite e/	28,000	26,000	26,000	27,000	27,000
Pakistan, pyrophyllite	45,414	48,927	67,670	54,365 r/	55,000
Paraguay, talc, soapstone, pyrophyllite e/	200	200	200	200	200
Peru:					
Pyrophyllite e/	8,000	8,000	8,000	8,000	8,000
Talc	5,750 r/	11,165 r/	12,085 r/	9,668 r/	9,700
Portugal, talc	8,236	8,400	8,200 r/ e/	8,200 r/ e/	8,200
Romania, talc	7,578	8,134	8,289	7,850 r/	7,850
Russia, talc e/	90,000	79,000	90,000	100,000	100,000
Slovakia, talc	6,100	2,820	1,900	1,800	2,000
South Africa:					
Pyrophyllite	10,610	11,500	13,277	11,989 r/	14,386 5/
Talc	12,574 r/	11,328 r/	7,873 r/	5,600	3,218 5/
Spain, steatite and talc e/	110,000	110,000	110,000	100,000	100,000
Sweden, talc and soapstone e/	25,000	25,000	25,000	26,000	26,000
Taiwan, talc	1,331	73	201	-- r/	--
Thailand:					
Pyrophyllite	304,524	40,241	38,053 r/	46,011 r/	41,000
Talc	7,139	2,172	4,960 r/	7,390 r/	6,000
Turkey	4,000 e/	5,000 e/	48,378 r/	54,278 r/	50,000
United Kingdom, talc, soapstone, pyrophyllite e/	5,500	4,937 r/ 5/	5,000	5,000	5,000
United States:					
Pyrophyllite	W	W	W	W	W
Talc	1,050,000	971,000	925,000	851,000	853,000 5/
Uruguay, talc, soapstone, pyrophyllite	1,133	972	2,905	2,900 r/ e/	2,800
Zambia, talc e/	80	80	80	80	80
Zimbabwe, talc	1,023	1,039	1,000	1,000 e/	1,000
Grand total	10,400,000 r/	9,400,000 r/	9,460,000 r/	9,020,000 r/	8,920,000
Of which:					
Pyrophyllite	2,560,000 r/	1,960,000 r/	1,820,000 r/	1,970,000 r/	1,840,000
Steatite	418,000 r/	448,000 r/	450,000 r/	460,000 r/	460,000
Talc	2,510,000 r/	2,450,000 r/	2,530,000 r/	2,320,000 r/	2,350,000
Unspecified	4,910,000 r/	4,540,000 r/	4,660,000 r/	4,270,000 r/	4,280,000

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

1/ World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through April 24, 2002.

3/ Data based on Australian fiscal year ending June 30 of year stated.

4/ Direct sales and/or beneficiated (marketable product).

5/ Reported figure.

6/ Data based on Iranian fiscal year beginning March 21 of year stated.

7/ Data based on Nepalese fiscal year beginning mid-July of year stated.