

# TALC AND PYROPHYLLITE

By Robert L. Virta

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

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

## Legislation and Government Programs

The Department of Defense authorized the disposal of 974 metric tons of block and lump talc and 988 tons of ground talc from the National Defense Stockpile.

## Production

**Talc.**—Ten companies operating 13 mines in 7 States produced talc, soapstone, and steatite. All operations were open pit mines except for two. The producers, listed in decreasing order of production, were Luzenac America Inc., Barrett's Minerals Inc., Gouverneur Talc Co., Dal Minerals Co., Milwhite Inc., United Clays of Texas, Suzorite Mineral Products Inc., Richmark Resources Ltd., New Alberene Stone Co., and Steatite of Southern Oregon. Luzenac America, Barrett's Minerals, Gouverneur Talc, and Dal Minerals were the largest domestic producers, accounting for over 70% of the market.

U.S. mine production was 994,000 tons valued at \$31.1 million in 1996, down from 1,060,000 tons in 1995. (See tables 1 and 2.) Production increased in Montana and Virginia and decreased in California, New York, Texas, and Vermont. Montana led all States in the tonnage and value of talc produced, followed by Texas, Vermont, New York, California, Virginia, and Oregon in decreasing order of production. Mines that operated in Montana, New York, Texas, and Vermont accounted for nearly all of the domestic talc production.

Domestic production data for talc were developed by the U.S. Geological Survey (USGS) from a voluntary survey of U.S. mines. Survey forms were sent to 10 companies. All companies responded to the survey.

**Pyrophyllite.**—Pyrophyllite was mined by two companies operating three mines in North Carolina and one company operating one mine in California. Piedmont Minerals Co. Inc.

and Standard Mineral Co. Inc. operated in North Carolina and Standard Industrial Minerals Inc. mined pyrophyllite in California. Production of pyrophyllite increased slightly from that of 1995. North Carolina accounted for most of the domestic pyrophyllite production.

Domestic production for pyrophyllite was developed by the USGS from a voluntary survey of U.S. mines. Survey forms were sent to three companies. All companies responded to the survey.

## Consumption

**Talc.**—Slightly more than 909,000 tons of talc valued at \$100 million was sold or used in 1996, up from 901,000 in 1995. Sales or use of talc increased in Alabama, Montana, Texas, and Virginia and decreased in California, New York, and Vermont. Of the 909,000 tons of talc sold or used, 791,000 tons reportedly was sold for domestic use and approximately 118,000 tons was exported.

Domestic markets include ceramics (pottery, sanitaryware, tiles, etc.), paper, paint, plastics, roofing, cosmetics, insecticides, rubber, and refractories, in decreasing order of consumption. (See table 3.) Domestic sales to the paint, paper, plastic, and refractories increased in 1996. The largest increase was for the paper market, where reported sales increased from 139,000 tons in 1995 to 180,000 tons in 1996. Some of the increase was attributed to the growing pitch control market for primary and secondary (recycled) paper production. However, an estimated 35,000 tons reported under domestic paper sales was exported to Canadian paper mills rather than used domestically. Domestic sales to the paper industry are estimated to be 145,000 tons rather than 180,000 tons. Sales to the plastics markets also increased, corresponding to an increased use of talc as a filler and extender in plastic products. Increases in other markets were relatively minor.

Approximately 83,600 tons of talc were reported under the "Other" category by respondents. Of this amount, 8,310 tons were used in asphalt and automobile body filler applications, 70 tons for sculpture media, and 74,000 tons were used in caulks, joint compounds, paint and putties, vinyl sheet flooring, and tile flooring. The remainder of the "Other" category (1,220 tons) was used in applications that were not identified by respondents. More than 99% of the data presented in table 3 was reported by the companies; the remainder was estimated from reported prior-year data adjusted according to industry trends.

Most of the imported talc was not included in the domestic end-use data shown in table 3. Approximately two-thirds of the imported talc was purchased primarily by mineral brokers who

do not participate in the USGS canvass. An estimate of the end-use breakdown based on countries of origin, ports of entry, importing companies, and regional end-use patterns is ceramics-refractories, 9,000 tons; cosmetics, 8,000 tons; paint, 10,000 tons; paper, 4,000 tons; plastics, 44,000 tons; rubber, 8,000 tons; and unknown 15,000 tons.

**Pyrophyllite.**—Domestic consumption of pyrophyllite increased 5% from that of 1995. Sales in California and North Carolina increased in 1996. Pyrophyllite was used in ceramics, refractories, paint, insecticides, plastics, and rubber applications in decreasing order of consumption. Sales increased for ceramic, insecticide, and paint applications, decreased for plastic and refractory applications, and remained unchanged for rubber applications. The largest increase in consumption was for ceramics uses. Ceramic and refractory uses accounted for over 70% of the pyrophyllite sales.

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 18 mills in 11 States for talc and 3 companies operating 3 mills in 2 States for pyrophyllite. All companies responded to the survey.

### Prices

Talc prices varied depending on the quality and on the degree and method of processing. The unit value of crude talc was estimated to be \$31 per ton. Over 50% of the crude ore value included in table 1 was estimated because most producers do not sell crude talc and could not provide a crude ore value. The average reported unit value of processed talc was \$111 per ton. The average unit value of crude and processed pyrophyllite was essentially unchanged from that of 1995.

Unit values for imported crude and ground talc ranged from \$7 per ton to \$585 per ton for shipments exceeding 100 tons. Unit values for cut or sawed talc ranged from \$517 per ton to \$1,241 per ton for shipments exceeding 100 tons. The average unit value for all shipments, including those of 100 tons or less, was \$60 per ton for crude talc; \$100 per ton for ground talc; and \$997 per ton for cut or sawed talc. The average unit value for imported crude talc decreased 30% because of increased imports of lower valued talc from Australia and China in 1996. Imports of Australian crude talc increased from 10,300 tons to 21,700 tons with the value decreasing from \$78 per ton to \$63 per ton. Imports of Chinese crude talc increased from 48,700 tons to 75,400 tons with the value decreasing from \$79 per ton to \$59 per ton. The average unit value for ground talc increased 16%. In general, the values of larger tonnage shipments were unchanged from those of 1995. There were, however, more small shipments (1 to 10 tons) of talc whose unit value exceeded \$500 per ton in 1996 than in 1995. A few shipments were extremely high, exceeding \$2,000 per ton. These were likely to have been shipments of finished products such as talcum powder, sculpture-grade material, or possibly surface-treated talc. The average unit value for all imported talc was \$110 per ton.

Unit values for exports of unground talc ranged from \$80 per

ton to \$212 per ton for shipments exceeding 100 tons. The average value was \$183 per ton. Unit values for exports of ground talc ranged from \$48 per ton to \$599 per ton with an average of \$199 per ton. The average unit value for all exported talc was \$197 per ton for all exports. The unit values for the crude talc decreased because fewer low tonnage-high value (exceeding \$600 per ton) shipments were reported in 1996. The unit value for ground talc exports decreased 2%. As with imports, some of the high value talc exports probably were finished products such as talcum powder and sculpture-grade material.

Approximate equivalents, in dollars per metric ton, of price ranges for talc ranged from \$92 to \$450 per ton (Industrial Minerals, 1996). (See table 4.) Quoted prices should be used only as a guideline because they depend on the terms of the contract between seller and buyer.

### Foreign Trade

Talc exports increased 5% in tonnage to 192,000 tons and 2% in value to \$37.9 million. Canada was the largest importer of U.S. talc, followed by Mexico, Singapore (18,500 tons), Brazil (10,000 tons), Venezuela (9,070 tons), Japan, Belgium, and the Republic of Korea (7,350 tons). (See table 5.) Since 1990, data reported by domestic producers concerning exports to Mexico gradually has diverged from the Bureau of the Census data. Based on industry data, exports to Mexico are estimated to be two to three times those reported by the Bureau of the Census.

Talc imports increased 28% in tonnage to 187,000 tons and increased 39% in value to \$20.5 million. Canada, China, and Japan supplied 74% of all talc imports. (See table 6.) Most of the talc imported from Japan was likely to have been either transshipments from other Southeast Asian countries or Australia or processed in Japan and reexported.

Imports listed by tonnage, source, and port district are: 87,600 tons from China through New Orleans-Baton Rouge, LA; 23,800 tons (mainly from Japan and France) through New York-New Jersey; 14,000 tons from Australia and China through Houston, TX; 13,800 tons (mainly from Japan) through Los Angeles, CA; 11,500 tons (mainly from Canada) through Buffalo, NY; 10,300 tons (mainly from Canada) through Detroit, MI; 8,800 tons (mainly from China and Hong Kong) through Brownsville, TX; and 5,280 tons (mainly from Australia) through Mobile, AL. The remaining imports were scattered among the many other port districts.

The large tonnages of talc imported in recent years appear to conflict with historical and industry trends. Most talc markets have been relatively stable with minor fluctuations corresponding to the domestic economy. The exception is the plastics market, which has grown at a faster pace. With domestic producers reporting declining sales to the plastics industry, it appears that the industry has turned to imported talc to meet those increased demands. Despite this, it does not appear that the domestic markets have expanded sufficiently to accommodate an increase from 48,000 tons in 1987 to 187,000

tons in 1996, particularly considering that exports and sales by domestic producers have not declined significantly during that same period. It is likely that the imports reported by the U.S. Bureau of the Census contain other materials in addition to talc. Domestic talc producers are estimated to have imported between 20,000 and 30,000 tons in 1996. It is estimated that brokers, toll grinders, etc. imported an additional 60,000 to 70,000 tons for domestic use, based on Bureau of the Census and Journal of Commerce Port Import/Export Reporting Service data. A small amount (perhaps 5,000 to 7,000 tons) of the talc imports probably was reexported without entering U.S. markets.

### World Review

China remained the world's leading producer of talc, followed by the United States, India, Finland, and Brazil in decreasing order of production. Japan was the largest producer of pyrophyllite, followed by the Republic of Korea, Brazil, and India. China, Japan, the Republic of Korea, and the United States produced 72% of the world's talc and pyrophyllite. (*See table 7.*)

### Outlook

The past 10 years have been a period of change for the talc industry. The major talc producers pulled out of California, many small companies withdrew from the talc market, and several large talc producers were purchased by a single corporation and then sold to a foreign company. During this time, domestic production has declined slightly while consumption levels have been maintained. Exports decreased in the early 1990's but have rebounded since then. Imports have risen during this time but appear to be filling new markets or meeting the demands of expanding markets rather than displacing domestic talc from most markets.

Demand for domestic talc should continue at its current pace. Talc imports are expected to continue to increase gradually. Ceramics will continue to be the major domestic end use for

talc, while plastics should offer the greatest potential for growth. The pyrophyllite industry has been stable for many years and this trend is expected to continue. Major domestic end-use markets will continue to be in ceramics and refractories.

### Reference Cited

Industrial Minerals, 1996, Prices: Industrial Minerals, no. 351, p. 72.

### SOURCES OF INFORMATION

#### U.S. Geological Survey Publications

Talc and Pyrophyllite. Ch. in Mineral Commodity Summaries, annual.<sup>1</sup>

Talc and Pyrophyllite. Directory of Companies Mining Talc and Pyrophyllite in the United States in 1995.

Talc. Ch. in United States Mineral Resources, U.S. Geological Survey Professional Paper 820.

#### Other

American Ceramic Society.

American Forest and Paper Association.

Cosmetic, Toiletry, and Fragrance Association.

Engineering and Mining Journal.

Mining Engineering.

Mining Journal (London).

National Paint and Coatings Association.

Society of the Plastics Industry.

Talc and Pyrophyllite. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675.

Talc. The Talc Industry—An Overview, U.S. Bureau of Mines Information Circular 9220.

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<sup>1</sup>Prior to January 1996, published by the U.S. Bureau of Mines.

TABLE 1  
SALIENT TALC AND PYROPHYLLITE STATISTICS 1/

(Thousand metric tons unless otherwise specified)

	1992	1993	1994	1995	1996	
<b>United States:</b>						
<b>Mine production, crude:</b>						
Talc	997	968	935	1,060	994	
Pyrophyllite	W	W	W	W	W	
Total	997	968	935	1,060	994	
<b>Value:</b>						
Talc	thousands	\$31,300	\$27,800	\$30,400	\$31,700	\$31,100
Pyrophyllite	do.	W	W	W	W	W
Total	do.	\$31,300	\$27,800	\$30,400	\$31,700	\$31,100
<b>Sold by producers, crude and processed:</b>						
Talc		817	900	923	901	909
Pyrophyllite		W	W	W	W	W
Total		817	900	923	901	909
<b>Value:</b>						
Talc	thousands	\$94,700	\$104,000	\$116,000	\$99,900	\$100,000
Pyrophyllite	do.	W	W	W	W	W
Total	do.	\$94,700	\$104,000	\$116,000	\$99,900	\$100,000
Exports 2/ (talc)		175	135	154	183	192
Value	thousands	\$30,100	\$27,200	\$29,800	\$37,100	\$37,900
Imports for consumption		80	100	155	146	187
Value	thousands	\$12,400	\$10,800	\$14,900	\$14,800	\$20,500
Apparent consumption 3/		902	933	936	1,020	989
World: Production		8,490 r/	8,410 r/	8,090 r/	8,400 r/	8,190 e/

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

1/ Data are rounded to 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	1995		1996	
	Quantity	Value	Quantity	Value
Oregon	W	W	(3/)	84
Texas	294	5,840	225	5,100
Other 4/	765	25,800	769	25,900
Total	1,060	31,700	994	31,100

W Withheld to avoid disclosing company proprietary data.

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

2/ Excludes pyrophyllite.

3/ Less than 1/2 unit.

4/ Includes California, Montana, New York, Oregon (1995), Vermont, and Virginia (1996).

TABLE 3  
END USES FOR GROUND TALC 1/ 2/

(Thousand metric tons)

Country	1995	1996
Ceramics	270	267
Cosmetics	23	19
Insecticides	7	7
Paint	146	148
Paper	139	180
Plastics	33	42
Refractories	--	1
Roofing	43	39
Rubber	18	3
Other 3/	94	84
Total	772	791

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

2/ Excludes pyrophyllite.

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

TABLE 4  
PRICE OF TALC

(U.S. dollars per metric ton)

New York:	
Paint:	
200 mesh	110
400 mesh	198
Ceramic:	
200 mesh	91
325 mesh	101
Italian, cosmetic-grade	263
Chinese, normal (ex-store):	
UK 200 mesh	285-323
UK 350 mesh	300-330

Sources: Industrial Minerals (London), Dec. 1996.

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

(Thousand metric tons and thousand dollars)

Country	1995		1996	
	Quantity	Value	Quantity	Value
Belgium	2	323	8	1,680
Canada 3/	61	10,800	65	12,200
Japan	10	1,600	8	1,280
Mexico	11	1,600	27	3,300
Other 4/	99	22,800	84	19,400
Total	183	37,100	192	37,900

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

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

3/ Probably includes shipments in transit through Canadian ports.

4/ Includes 70 countries in 1995 and 62 countries in 1996.

Source: Bureau of the Census.

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)
1995:								
Brazil	--	--	80	\$25	324	\$271	404	\$296
Canada	137	\$27	25,400	4,750	499	375	26,000	5,150
China	48,700	3,850	2,130	289	643	363	51,500	4,500
France	6,020	595	6,530	328	602	584	13,100	1,510
Japan	--	--	42,100	792	55	14	42,200	807
Other 2/	10,900	1,160	879	258	509	1,160	12,300	2,580
Total	65,800	5,630	77,100	6,440	2,630	2,770	146,000	14,800
1996:								
Brazil	--	--	76	17	427	371	503	387
Canada	197	41	25,400	5,170	406	322	26,000	5,530
China	75,400	4,460	7,580	572	782	438	83,800	5,480
France	42	37	6,470	352	4,870	4,850	11,400	5,240
Japan	1	2	28,800	571	1	3	28,800	575
Other 2/	34,000	2,030	1,700	322	475	951	36,200	3,300
Total	110,000	6,570	70,100	7,000	6,960	6,930	187,000	20,500

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

2/ Includes 24 countries in 1995 and 27 countries in 1996.

Source: Bureau of the Census.

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

(Metric tons)

Country 3/	1992	1993	1994	1995	1996 e/
Argentina:					
Steatite	425	840	500 e/	300 r/ e/	300
Talc	21,155	17,244	17,350 r/	17,300 e/	17,000
Australia: e/					
Pyrophyllite	5,000	5,000	5,000	5,000	5,000
Talc	210,000	210,000	210,000	210,000	210,000
Austria: Steatite					
	145,664	136,640	130,602	131,614 r/	130,000
Brazil:					
Pyrophyllite	144,000 r/	160,000 r/	148,000 r/	150,000 r/	150,000
Talc	286,000 r/	320,000 r/	360,000 r/	360,000 r/	360,000
Canada: Pyrophyllite, soapstone, talc					
	104,000 e/	108,000 e/	130,000	116,000	75,000 p/
Chile: Talc					
	1,493	5,058	5,351	5,000 e/	5,000
China: Unspecified e/					
	2,650,000	2,700,000	2,400,000	2,400,000	2,400,000
Colombia: Pyrophyllite, soapstone, talc					
	13,340	19,550	18,000	19,248 r/	20,000
Egypt: Pyrophyllite, soapstone, steatite, talc					
	8,319	4,746	4,125	4,000 e/	4,000
Eritrea: Talc 4/					
	XX	XX	3	--	--
Finland: Talc					
	371,000	399,000	453,000	450,000 e/	400,000
France: Talc					
	350,500 r/	299,900 r/	306,300	322,300 r/	300,000
Germany: Talc (marketable)					
	23,509	21,152	11,583	12,000 e/	12,000
Greece: Steatite e/					
	700	700	500	500	500
Hungary: Talc e/					
	10,000	10,000	10,000	10,000	10,000
India:					
Pyrophyllite	79,197	82,269	85,335 r/	131,137 r/	130,000
Steatite	368,003	385,121	398,006 r/	439,509 r/	450,000
Iran: Talc 5/					
	23,707	18,000	27,000 r/ e/	25,000 r/ e/	25,000
Italy: Steatite and talc e/					
	183,530 6/	142,000	139,000	130,000	130,000
Japan:					
Pyrophyllite	1,055,897	1,028,399	934,007	947,713 r/	911,700
Talc	61,120	57,229	56,120	57,269 r/	53,700
Korea, North: Unspecified e/					
	170,000	180,000	180,000	180,000	180,000
Korea, Republic of:					
Pyrophyllite	602,580	644,890	707,951	789,994 r/	790,000
Talc	149,862	53,923	35,340	29,364 r/	30,000

See footnotes at end of table.

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

(Metric tons)

Country 3/	1992	1993	1994	1995	1996 e/
Macedonia: Talc e/	15,000	10,000	10,000	10,000	10,000
Mexico: Talc	19,559	14,400	14,900 r/	15,443 r/	16,000
Nepal: Talc 7/	3,820	1,340	1,500 e/	1,500 e/	1,500
Norway: Talc e/	60,000	50,000	28,000 r/	30,000 r/	30,000
Pakistan: Pyrophyllite	23,676	46,846	37,151 r/	35,043 r/	35,000
Paraguay: Unspecified e/	200	200	200	200	200
Peru: e/					
Pyrophyllite	8,000	8,000	8,000	8,000	8,000
Talc	2,000	1,200	1,200	1,200	1,200
Portugal: Talc	9,166	9,349	8,367 r/	8,400 r/ e/	8,400
Romania: Talc	6,330	9,000	8,952	9,976	10,000
Russia: Talc e/ 8/	150,000	131,688 6/	100,000	100,000	100,000
South Africa					
Pyrophyllite	3,053	4,287	5,507	5,519 r/	5,500
Talc	13,882	8,798	8,202	9,173 r/	9,000
Spain: Steatite e/	70,000	65,000	65,000	65,000	65,000
Sweden: Talc e/	10,000	--	--	--	--
Taiwan: Talc	6,085	5,015	4,290	4,000 e/	4,000
Thailand:					
Pyrophyllite	34,638	43,404	55,326	76,189 r/	75,000
Talc	4,786	7,007	8,950	4,252 r/	4,000
Turkey e/	3,918 6/	4,000	4,000	4,000	4,000
United Kingdom: Talc, soapstone, pyrophyllite	5,216	5,317	5,275 r/	5,000	4,000
United States:					
Pyrophyllite	W	W	W	W	W
Talc	997,000	968,000	935,000	1,060,000	994,000 6/
Uruguay: Talc, soapstone, pyrophyllite e/	1,500	1,500	1,500	1,000	1,000
Zambia: Talc	366	62	76	70 e/	70
Zimbabwe: Talc	2,203	1,349	2,049	2,080 r/	2,100
Grand total	8,490,000 r/	8,410,000 r/	8,090,000 r/	8,400,000 r/	8,190,000
Of which:					
Pyrophyllite	1,960,000 r/	2,020,000 r/	1,990,000 r/	2,150,000 r/	2,110,000
Steatite	585,000	588,000	595,000 r/	637,000 r/	646,000
Talc	2,810,000 r/	2,630,000 r/	2,620,000 r/	2,750,000 r/	2,610,000
Unspecified	3,140,000	3,170,000	2,880,000	2,860,000	2,820,000

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

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

2/ Table includes data available through May 12, 1997.

3/ In addition to the countries listed, the former Czechoslovakia produces talc, but information is inadequate to make reliable estimates of output levels.

4/ Eritrea became independent from Ethiopia in May 1993; however, information is inadequate to formulate reliable estimates prior to 1994.

5/ Data based on Iranian fiscal year beginning Mar. 21 of year stated.

6/ Reported figure.

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

8/ U.S.S.R. dissolved in Dec. 1991; however, information is inadequate to formulate reliable estimates for individual countries, except Russia.