

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.

Legislation and Government Programs

In 1999, the U.S. Department of Defense authorized the disposal of 907 metric tons (t) of block and lump talc from the National Defense Stockpile, which is the entire uncommitted inventory in that category; 2 t was sold.

Production

Talc.—In 1999, 9 companies operating 13 mines in 6 States produced soapstone, steatite, and talc. All but one operation were open pit mines. The producers were, in decreasing order of production, Luzenac America Inc., Barrett's Minerals Inc., Dal Minerals Co., Gouverneur Talc Co., Milwhite Inc., Suzorite Mineral Products Inc. (Zemex Corp.), Unimin Texas Co. L.P. (formerly United Clays Inc. of Texas), Steatite of Southern Oregon, and NuTECH Minerals Inc. Barrett's Minerals, Dal Minerals, Gouverneur Talc, and Luzenac America were the largest domestic producers, accounting for more than 80% of the tonnage.

In 1999, U.S. mine production was 925,000 t valued at \$26.1 million, compared with 971,000 t valued at \$27.3 million in 1998 (tables 1 and 2). Production increased slightly in New York; decreased in California, Montana, Texas, and Vermont; and remained unchanged in Oregon. Montana led all States in the tonnage and value of talc produced, followed by Texas, Vermont, New York, Oregon, and California. Mines that operated in Montana, New York, Texas, and Vermont accounted for nearly all the domestic talc production.

Domestic production data were obtained through a voluntary U.S. Geological Survey (USGS) survey of U.S. mining companies. Survey forms were sent to 10 companies with responses accounting for approximately 80% of the data

presented in table 1; the remainder was estimated from reported prior-year data adjusted according to industry trends.

Pyrophyllite.—Standard Industrial Minerals Inc. operated one mine in California, and Piedmont Minerals Co. and Standard Mineral Co. Inc. operated three mines in North Carolina. Production of pyrophyllite decreased from that of 1998.

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

Consumption

Talc.—Approximately 881,000 t of talc valued at \$102 million was sold or used in 1999, an increase from 870,000 t valued at \$109 million in 1998. Sales or use of talc increased in Montana and Texas; decreased in California, New York, and Vermont; and remained essentially unchanged in Oregon. Of the 881,000 t of talc sold or used, producers reported that 771,000 t was sold for domestic use and approximately 110,000 t was exported.

Domestic markets included, in decreasing order of consumption, ceramics (pottery, sanitaryware, tiles, etc.), paper, paint, plastics, roofing, cosmetics, rubber, insecticides, and refractories (table 3). Domestic sales of talc did not change significantly between 1998 and 1999.

About 73,000 t of talc was reported under the "Other" category by respondents in 1999. Of this amount, 55,600 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 (17,400 t) was used in applications that were not identified by respondents.

Most of the imported talc was not included in the domestic end-use data listed in table 3. More than 80% of the imported talc was purchased 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 and refractories, 15,000 t; cosmetics, 8,000 t; paint, 31,000 t; paper, 12,000 t; plastics, 80,000 t; rubber, 9,000 t; and unknown, 23,000 t.

Pyrophyllite.—Domestic consumption of pyrophyllite decreased from that of 1998. Pyrophyllite was used, in decreasing order of consumption, in ceramics, refractories, paint, plastics, insecticides, and rubber. Sales increased for paint and plastics applications and decreased for the others. Ceramic and refractory uses accounted for 61% of domestic

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 11 companies operating 16 mills in 8 States for talc and 3 companies operating 3 mills in 2 States for pyrophyllite. Approximately 87% of the talc data presented in table 3 was reported by the companies; the remainder was estimated from reported prior-year data adjusted according to industry trends. All the pyrophyllite producers responded to the consumption survey.

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 \$28 per metric ton. More than 80% 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 \$116 per ton. The average unit values of crude and processed pyrophyllite increased slightly in 1999.

The average unit value for exports of unmilled talc was \$114 per ton, and that of milled talc was \$195 per ton. The average unit value for imports was \$83 per ton for unground talc, \$161 per ton for ground talc, and \$932 per ton for cut or sawed talc.

Bidding for export licenses on 250,000 t of Chinese talc took place in March 1999. Licenses, in general, increased about \$8 per ton to \$20 per ton. Industry experts believe that much of the increase in licensing costs could be absorbed through cost reductions by Chinese talc producers (Mineral PriceWatch, 1999).

Approximate prices for talc ranged from \$83 to \$371 per ton (table 4; Industrial Minerals, 1999d). 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 increased slightly in tonnage, to 147,000 t, and 5% in value, to \$27.2 million. Canada was the leading importer of U.S. talc, followed by Mexico, Belgium, Japan, Venezuela (7,220 t), and Taiwan (4,560 t) (table 5). Since 1990, data reported by domestic producers concerning exports to Mexico gradually have diverged from the Bureau of the Census data. On the basis of industry data, exports to Mexico are estimated to be more than three times those reported by the Bureau of the Census.

Talc imports reported by the Bureau of the Census increased by 26% in tonnage, to 208,000 t, and increased by 52% in value, to \$35.3 million. Such a large tonnage increase probably could not be absorbed by current talc markets and it is likely that much was processed and stockpiled for future sales. Cut and sawed talc, which has a unit value of \$932 per ton, contributed disproportionately to the large increase in the import value compared with import values for unmilled and milled talc. Canada, China, France, and Japan supplied 89% of

all talc imports (table 6). Some of the talc imported from Japan was likely to have been transshipments from other Southeast Asian countries or Australia.

Approximately 50% (103,000 t) of talc imported into the United States came through the port district of New Orleans, LA, almost all unmilled. Of this amount, 6,700 t was imported from Australia; 86,700 t from China; 68 t from France; 8,990 t from Hong Kong; and 244 t from Italy. The second leading port district was Detroit, MI, with 25,400 t (principally from Canada); followed by Boston, MA, with 21,000 t (principally from France); and Buffalo, NY, with 12,400 t (principally from Canada). The remaining imports were scattered among the many other port districts.

World Review

China remained the world's leading producer of talc, followed by the United States, Brazil, India, Finland, and France. 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 69% of the world's talc and pyrophyllite (table 7).

Australia.—WMC Resources Ltd. announced plans to build an \$11 million mill with a capacity of 35,000 to 40,000 metric tons per year (t/yr) at either its Three Springs or Kwinana site. The mill will permit WMC to use talc from its Three Springs mine for higher value applications. The paper and paint markets in Australia and Southeast Asia are being served by the company's Amsterdam plant (Industrial Minerals, 1999e).

Canada.—Highwood Resources Ltd. acquired a talc mine and mill from Canada Talc Ltd. The mine and mill are located in Madoc, Ontario. Highwood Resources is beginning underground development at the mine to improve access to higher grade ore. The company also is upgrading the mill facilities (Industrial Minerals, 1999b).

Trinity Resources and Energy Ltd. began preparing its pyrophyllite mine and mill, which have been idle since 1995, for operation. In 1998, the company acquired the mine and mill, located in Newfoundland, from Armstrong World Industries Canada Ltd. The purchase included the mine, mill, 1 million tons of reserves, and ceramic- and mixed-grade stocks. The company expects to be fully operational in 2000 and intends to diversify from ceramics into pigment and filler markets, such as paint, plastic, and roofing (North American Minerals News, 1999).

Italy.—Luzenac Val Chisone SpA opened an underground mine in Rodoretto. The deposit contains high-purity, white, macrocrystalline ore. Luzenac anticipates that production will be 60,000 t/yr. The talc will be sold for polymer, cosmetic, pharmaceutical, and coating applications (Industrial Minerals, 1999c).

Mexico.—Luzenac Europe acquired 51% ownership of Sierra Talc de Mexico, SA de CV. Sierra Talc is a toll grinding operation with an average output of 40,000 t/yr. It has mines in Guerrero and Puebla and mills in Monterrey and Mexico City. The company mines about 10% of its feed

material with the remainder obtained from other producers (Industrial Minerals, 1999a).

Outlook

Markets for talc should be stable and even slightly increasing for the next few years. Major markets for talc, such as ceramics, paint, paper, and plastics, are projected to grow slowly through 2003 as a result of the strong U.S. economy. The plastics market should continue to offer the greatest growth potential for talc, and imports will play a larger role in the U.S. talc market. No major changes are anticipated in pyrophyllite markets, and consumption probably will not change significantly for the next few years.

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GENERAL SOURCES OF INFORMATION

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¹Prior 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)

	1995	1996	1997	1998	1999	
United States:						
Mine production, crude:						
Talc	1,060	994	1,050	971 r/	925	
Pyrophyllite	W	W	W	W	W	
Total	1,060	994	1,050	971 r/	925	
Value:						
Talc	thousands	\$31,700	\$31,100	\$33,000	\$27,300 r/	\$26,100
Pyrophyllite	do.	W	W	W	W	W
Total	do.	\$31,700	\$31,100	\$33,000	\$27,300 r/	\$26,100
Sold by producers, crude and processed:						
Talc		901	909	942	870 r/	881
Pyrophyllite		W	W	W	W	W
Total		901	909	942	870 r/	881
Value:						
Talc	thousands	\$99,900	\$100,000	\$111,000	\$109,000	\$102,000
Pyrophyllite	do.	W	W	W	W	W
Total	do.	\$99,900	\$100,000	\$111,000	\$109,000	\$102,000
Exports (talc) 2/		183	192	179	146	147
Value	thousands	\$37,100	\$37,900	\$34,200	\$26,000	\$27,200
Imports for consumption		146	187	123	165	208
Value	thousands	\$14,800	\$20,500	\$21,100	\$23,300	\$35,300
Apparent consumption 3/		1,020	989	992	1,080	986
World, production		8,490 r/	9,880 r/	10,400 r/	9,430 r/	9,470 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	1998 r/		1999	
	Quantity	Value	Quantity	Value
Texas	245	5,230	220	5,000
Other 3/	725	22,000	705	21,100
Total	971	27,300	925	26,100

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/

(Thousand metric tons)

	1998	1999
Ceramics	212 r/	209
Cosmetics	32 r/	27
Insecticides	10 r/	8
Paint	135 r/	142
Paper	160 r/	167
Plastics	53 r/	64
Refractories	5	2
Roofing	55 r/	60
Rubber	23 r/	19
Other 2/	78 r/	73
Total	764 r/	771

r/ Revised.

1/ Excludes pyrophyllite.

2/ 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)

New York:	
Paint:	
200 mesh	100
400 mesh	180
Ceramic:	
200 mesh	83
325 mesh	92
Italian, cosmetic-grade	288
Chinese, normal (ex-store):	
UK 200 mesh	321-363
UK 350 mesh	338-371

Source: Industrial Minerals, December 1999.

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

(Thousand metric tons and thousand dollars)

Country	1998		1999	
	Quantity	Value	Quantity	Value
Belgium	15	1,960	14	1,780
Canada 3/	45	8,270	55	9,910
Japan	6	1,000	7	1,250
Mexico	18	2,290	17	1,780
Other 4/	61	12,500	54	12,500
Total	146	26,000	147	27,200

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/ Probably includes shipments in transit through Canadian ports.

4/ Includes 62 countries in 1998 and 47 countries in 1999.

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)
1998:								
Brazil	6	\$6	114	\$28	928	\$824	1,050	\$858
Canada	19	8	29,700	6,640	84	108	29,800	6,750
China	68,400	5,010	7,850	132	732	515	77,000	5,660
France	6,060	656	28,000	313	5,670	5,700	39,700	6,670
Japan	--	--	5,820	538	--	--	5,820	538
Other 2/	10,200	894	1,450	402	519	1,520	12,200	2,820
Total	84,700	6,580	72,900	8,050	7,930	8,660	165,000	23,300
1999:								
Brazil	2	5	75	19	1,230	1,070	1,310	1,090
Canada	89	37	44,100	11,400	6,220	4,980	50,400	16,500
China	91,900	7,380	1,070	251	579	387	93,500	8,020
France	175	235	21,300	384	5,060	5,180	26,600	5,800
Japan	--	--	15,100	869	6	19	15,100	888
Other 2/	20,000	1,600	892	357	508	1,040	21,400	3,000
Total	112,000	9,260	82,600	13,300	13,600	12,700	208,000	35,300

-- Zero.

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

2/ Includes 26 countries in 1998 and 18 countries in 1999.

Source: Bureau of the Census.

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

(Metric tons)

Country 3/	1995	1996	1997	1998	1999 e/
Argentina:					
Pyrophyllite	4,189	2,180	2,242 r/	4,000 r/ e/	4,000
Steatite e/	300	300	300	300	300
Talc	12,474	11,777	13,380 r/	13,500 r/	13,000
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	131,614	130,000 e/	155,730	156,000 e/	150,000
Brazil: Unspecified 4/	450,684	452,180	452,000 e/	452,000 e/	452,000
Canada: Pyrophyllite, soapstone, talc	116,000	77,000	73,000 r/	78,000 r/	79,000
Chile: Talc	4,107	4,276	3,986	3,772 r/	3,800
China: Unspecified e/	2,400,000	4,000,000 r/	4,100,000 r/	3,800,000 r/	3,900,000
Colombia: Pyrophyllite, soapstone, talc	19,248	14,800 e/	14,832	15,000 r/ e/	15,000
Egypt: Pyrophyllite, soapstone, steatite, talc	38,608 r/	41,227 r/	43,627 r/	39,720 r/	40,000
Finland: Talc	464,000	345,000	350,000 e/	350,000 e/	350,000
France: Talc, crude	322,300	349,270	350,000 e/	325,000 e/	350,000
Germany: Talc (marketable)	14,170	10,005	8,819	15,473 r/	15,000
Greece: Steatite e/	500	--	--	--	--
Hungary: Talc e/	1,150	1,200	1,200	1,200	1,200
India:					
Pyrophyllite	131,137	143,172	121,566 r/	79,951 r/	85,000
Steatite	469,692	472,001	417,613 r/	447,550 r/	450,000
Iran: Talc e/ 5/	20,000 r/	20,000 r/	20,000 r/	20,000 r/	20,000
Italy: Steatite and talc e/	136,000	168,000	142,000	140,000	140,000
Japan:					
Pyrophyllite	947,713	913,973	913,822	764,079 r/	750,000
Talc	57,269	56,153	53,000 e/	50,000 r/ e/	50,000
Korea, North: Unspecified e/	180,000	180,000	180,000	150,000	120,000
Korea, Republic of:					
Pyrophyllite	789,994	780,062	994,366	843,609 r/	850,000
Talc	29,364	19,066	25,751	24,411 r/	25,000
Macedonia: Talc e/	10,000	10,000	10,000	10,000	10,000
Mexico: Talc	11,134	10,100 r/	13,586	18,843 r/	20,000
Morocco	8,429 r/	13,053 r/	19,850 r/	20,000 r/	20,000
Nepal: Talc 6/	1,500 e/	5,323	6,809	6,500 e/	6,500
Norway: Talc e/	30,000	30,000	30,000	28,000	26,000
Pakistan: Pyrophyllite	35,043	34,095	45,414 r/	48,927 r/	50,000
Paraguay: Unspecified e/	200	200	200	200	200
Peru: e/					
Pyrophyllite	8,000	8,000	8,000	8,000	8,000
Talc	13,818 7/	12,985 7/	13,000	13,000	13,000
Portugal: Talc	8,400 e/	8,277	8,236 r/	8,400 e/	8,400
Romania: Talc	9,976	10,248	7,578	8,000 e/	8,000
Russia: Talc e/	100,000	100,000	90,000	90,000	90,000
South Africa:					
Pyrophyllite	5,519	2,140	2,129	2,532 r/	2,606 7/
Talc	9,173	16,397	24,400 r/	21,900 r/	18,249 7/
Spain: Steatite	112,341 r/	109,756 r/	110,000 r/ e/	110,000 r/ e/	110,000
Sweden: Talc e/	25,000	30,000 7/	25,000	25,000	25,000
Taiwan: Talc	3,500	1,500	1,331	73 r/	100
Thailand:					
Pyrophyllite	76,189	64,330	304,524	40,241 r/	42,000
Talc	4,252	7,238	7,139	1,972 r/	2,000
Turkey e/	4,000	4,000	4,000	5,000 r/	5,000
United Kingdom: Talc, soapstone, pyrophyllite	4,298	5,322	5,500 e/	5,000 e/	5,000
United States:					
Pyrophyllite	W	W	W	W	W
Talc	1,060,000	994,000	1,050,000	971,000 r/	925,000 7/
Uruguay: Talc, soapstone, pyrophyllite	1,000 e/	898	1,133	972 r/	950
Zambia: Talc e/	80	80	80	80	80

See footnotes at end of table.

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

(Metric tons)

Country 3/	1995	1996	1997	1998	1999 e/
Zimbabwe: Talc	2,080	1,076	1,023 r/	1,039 r/	1,000
Grand total	8,490,000 r/	9,880,000 r/	10,400,000 r/	9,430,000 r/	9,470,000
Of which:					
Pyrophyllite	2,000,000	1,950,000	2,390,000 r/	1,790,000 r/	1,790,000
Steatite	714,000	712,000 r/	684,000 r/	714,000 r/	710,000
Talc	2,420,000 r/	2,260,000 r/	2,320,000	2,220,000 r/	2,190,000
Unspecified	3,360,000 r/	4,960,000 r/	5,040,000 r/	4,710,000 r/	4,780,000

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 27, 2000.

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

4/ As reported in the Sumário Mineral 1999-2000.

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

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

7/ Reported figure.