

Talc and Pyrophyllite

By Robert A. Clifton¹

Increasing demand for talc on the world market led to a 10% increase in total domestic production of talc and pyrophyllite. Production of talc increased, while that of pyrophyllite declined. The value of crude talc and pyrophyllite produced increased 32% and averaged \$10.86 per ton.

Table 1 shows a 24% increase in total sales of crude and processed talc and pyrophyllite and a 54% increase in value. Apparent domestic consumption increased minimally over that of 1976, but exports increased 52% in tonnage and 1% in value.

Cyprus Industrial Minerals Co. announced plans to double the capacity of its

Ghent, Belgium, talc-processing facility.

A new organization, the Scientific and Technical Association of the European Talc Industry (EUROTALC), was founded on May 3, 1977. The association membership is open to any company mining its own talc and grinding it in Europe. The six charter members established EUROTALC's headquarters at 22 Rue du Musee, 1000 Brussels, Belgium. One of the first acts of the association was to initiate a physiological and epidermoidal survey among European talc workers. This survey follows the association's announced aim of encouraging fundamental research for the promotion of the

Table 1.—Salient talc and pyrophyllite statistics

(Thousand short tons and thousand dollars)

	1973	1974	1975	1976	1977
United States:					
Mine production, crude:					
Talc -----	W	1,183	873	W	1,099
Pyrophyllite -----	W	106	92	W	106
Total -----	1,247	1,289	965	1,092	1,205
Value:					
Talc -----	W	\$8,022	\$7,454	\$9,542	\$12,524
Pyrophyllite -----	W	1,547	1,475	360	561
Total -----	\$9,144	9,569	8,929	9,902	13,085
Sold by producers, crude and processed:					
Talc -----	1,071	963	845	794	996
Pyrophyllite -----	113	101	86	107	118
Total -----	1,184	1,064	931	901	1,114
Value:					
Talc -----	\$30,757	\$31,125	\$16,496	\$33,014	\$50,647
Pyrophyllite -----	1,469	1,474	1,379	934	1,708
Total -----	32,226	32,599	17,875	33,948	52,355
Exports ¹ -----	180	183	158	212	322
Value -----	\$6,618	\$6,711	\$6,338	\$9,034	\$9,166
Imports for consumption -----	23	30	23	20	22
Value -----	\$1,658	\$2,233	\$1,471	\$1,861	\$2,094
Apparent consumption -----	1,027	911	796	709	814
World: Production -----	5,957	6,406	5,403	5,976	6,331

¹Revised. W Withheld to avoid disclosing company proprietary data.

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

technology of talc and on problems more specifically related to public health and environment.

Legislation and Government Programs.—On January 19, the day before he left office, Dr. Morton Corn, Assistant Secretary of Labor and head of the Occupational Safety and Health Administration (OSHA), rescinded OSHA Field Information Memorandum No. 74-92, issued in 1974, that set forth scientific criteria for the detection and identification of mineral fibers for the purpose of differentiating between asbestiform and nonasbestiform minerals. Also rescinded was a 1974 letter from John Stender, then OSHA chief, that allowed the Vanderbilt Co. to certify to its customers, after testing, that its talc contained no asbestos. In April, in an Atlanta, Ga., court, a citation against a Vanderbilt customer accused of using asbestos-containing talc was dismissed for insufficient evidence.

DOMESTIC PRODUCTION

Talc.—Production from U.S. talc mines in 1977 was significantly higher than in 1976 but still only 93% of that in the record year, 1974. The value of the mine production established another record high, 32% above the 1976 record.

Talc, including soapstone, was produced at 36 mines in 12 States in 1977, with California's 12 mines being by far the largest number for any State. Mines in four States produced 80% of the tonnage and 70% of the value of talc in 1977. Eight States produced the remainder. The States producing the the highest tonnage in decreasing order are Vermont, Texas, Montana, and New York. Montana again led all States in the value of the talc produced. Of the talc-producing States, only Nevada had no milling facilities. One company milled Montana talcs in Nebraska.

The seven largest domestic producers of talc in 1977, listed alphabetically, were Cyprus Industrial Minerals Co., with mines in California, Montana, and Texas; Eastern Magnesia Talc Co. in Vermont; Pfizer Inc., Minerals, Pigments & Metals Div., in California and Montana; Southern Clay Products, Inc., in Texas; R. T. Vanderbilt Co., Inc., in New York; Western Minerals, Inc., in Texas; and Windsor Minerals, Inc., in Vermont. Those firms supplied 40% of the 1977 tonnage, and the combined output of about 14 smaller producers made up the remainder.

At yearend, demand for Montana talcs

Talc was one of the materials listed in the Federal Register on October 28, 1977, when the National Institute of Occupational Safety and Health (NIOSH) asked for information on certain "Chemical Agents and Processes" prior to writing criteria for exposure.

The national stockpile inventory of steatite, block or lump, was reduced by 6 tons to 1,113 tons during 1977. During that year the ground steatite inventory was reduced by 527 tons to 2,389 tons.

The allowable depletion rates established under the Tax Reform Act of 1969 remained at 22% for domestic block steatite and 14% for foreign through 1977.

Tariff rates on imported talc minerals follow: Crude and unground, 0.02 cent per pound; ground, washed, powdered and/or pulverized, 6% ad valorem; cut, sawed, or in blanks, crayons, cubes, disks or other forms, 0.2 cent per pound; other not specifically provided for, 12% ad valorem.

was so strong that shipping delays of several weeks were common.

Pyrophyllite.—The pyrophyllite-producing mines of the United States in 1977 were again all in North Carolina. The slight reduction in production still left the total at the second highest level ever. Four companies operated seven mines during the year.

There was mining activity for talc and pyrophyllite in 1976 at 42 sites, including 2 where assessment work only was done. Three mines shipped only from stockpiles, three were idle all year, and one was abandoned.

Table 2.—Talc and pyrophyllite produced in the United States, by State

(Thousand short tons and thousand dollars)

State	1976		1977	
	Quantity	Value	Quantity	Value
California (talc) ---	57	1,513	96	2,373
Georgia (talc) ----	W	W	24	63
Montana (talc) ---	225	2,960	226	2,947
North Carolina ¹ ---	114	1,087	111	1,267
Texas (talc) -----	200	1,071	233	2,191
Vermont (talc) ----	252	1,685	310	2,006
Other States ² (talc) -	245	1,586	205	2,238
Total -----	³ 1,092	9,902	1,205	13,085

W Withheld to avoid disclosing company proprietary data.

¹Talc and pyrophyllite produced, pyrophyllite only reported in 1977.

²Includes Arkansas, Nevada, New York, North Carolina (talc, 1977), Oregon, Virginia, and Washington.

³Data do not add to total shown because of independent rounding.

Of the 42 active mines, 7 were underground and 35 were open pit. The underground mines produced 7% of the talc but 12% of the value, because their talc was

valued at an average of \$15.30 per ton while that from the open pits brought only \$8.44 per ton.

CONSUMPTION AND USES

The apparent domestic consumption of talc and pyrophyllite increased in 1977 and was 79% of the 1973 record. The \$50 million sales value set a new record high.

The 1977 end use distribution showed 32% of the ground talc used in ceramics, 22% in paint, 13% in plastics, 8% in cosmetics, 7% in paper, 6% in rubber, 2% each in insecticides and roofing, 1% in refractories, and the remainder in other uses.

The largest portion, 52%, of the pyrophyllite was used in refractories, 25% was used in insecticides, 18% in ceramics, and 5% in other uses.

Table 3.—End uses for ground talc and pyrophyllite, 1977

(Thousand short tons)

Use	Talc	Pyro- phyllite	Total
Ceramics -----	300	17	317
Cosmetics ¹ -----	75	--	75
Insecticides -----	23	24	47
Paint -----	211	--	211
Paper -----	69	--	69
Plastics -----	120	--	120
Refractories -----	13	50	63
Roofing -----	25	1	26
Rubber -----	52	--	52
Other uses ² -----	55	4	59
Total³ -----	943	96	1,039

¹Incomplete data. Some cosmetic talc known to be included in "Other."

²Includes art sculpture, asphalt filler, crayons, floor tile, foundry facings, rice polishing, stucco, and other uses not specified.

³Data may not add to totals shown because of independent rounding.

PRICES

Depending on quality and degree and method of processing, talc prices vary over a wide range. Engineering and Mining Journal, December 1977, quoted prices for domestic talc, ground, in carload lots, f.o.b. mine or mill, containers included, per short ton, as follows:

Vermont:	
98% through 325 mesh, bulk -----	\$51.00
99.99% through 325 mesh, bags:	
Dry processed -----	91.00
Water beneficiated -----	\$141.00-151.00
New York:	
96% through 200 mesh -----	36.00-38.00
98% to 99.25% through 325 mesh -----	48.00
100% through 325 mesh, fluid-energy ground -----	75.00-105.00
California:	
Standard -----	69.50
Fractionated -----	37.00-71.00
Micronized -----	62.00-104.00
Cosmetic steatite -----	44.00-65.00
Georgia:	
98% through 200 mesh -----	20.00
99% through 325 mesh -----	35.00
100% through 325 mesh, fluid-energy ground -----	85.00

American Paint & Coatings Journal, December 26, 1977, listed the following

prices per ton for paint-grade talcs in carload lots:

California:	
325 mesh, bags, mill:	
Fibrous, white, high oil absorption -----	\$34.00-\$37.00
Semifibrous, medium oil absorption -----	32.00-73.95
Montana: Ultrafine grind, f.o.b. mill -----	70.00
New York:	
Nonfibrous, bags, mill:	
98% through 325 mesh -----	46.50-50.50
99.4% through 325 mesh -----	55.50
Trace retained on 325 mesh -----	105.00
Fine micron talcs (origin not specified) -----	68.00-111.50

The approximate equivalents, in dollars per short ton, of the price ranges quoted in Industrial Minerals (London), December 1977, for steatite talc, c.i.f. main European ports, were as follows:

Norwegian:	
Ground (ex store) -----	\$76.50
Micronized (ex store) -----	127.50
French, fine-ground -----	161.50
Italian, cosmetic-grade -----	212.50
Chinese -----	\$153.00-170.00

FOREIGN TRADE

Exports.—There was another dramatic increase in talc exports during 1977. The 52% rise in tonnage over 1976 established a new record. However, the value of exported talc rose less than 2% and averaged \$28.47 per ton compared with \$42.61 per ton in 1976. The great increase of lower priced talc exported to Canada was a major factor in the lower export unit value, as was a decrease in value of exports to Mexico.

Canada was the major importer of U.S. talc in 1977 with 41% of the exports at an average value of \$21.49 per ton, followed by Mexico with 39% of the exports at \$14.56 per ton, Belgium with 6% at \$35.94 per ton, Japan with 6%, at \$46.42 per ton, and Venezuela with 2% at \$133.63 per ton. A

total of 61 countries imported U.S. talc.

Imports.—U.S. imports of talc increased 10% in 1977 over those in 1976. The average value of imports was \$94.79 per ton. The cosmetic grades accounted for the high price. Italy with 38% was the leading source of imported talc, followed by Canada with 31% and France with 23%.

Table 4.—U.S. exports of talc, crude and ground

(Thousand short tons and thousand dollars)

Year	Quantity	Value
1975	158	6,338
1976	212	9,034
1977	322	9,166

Table 5.—U.S. imports for consumption of talc, by class and country

Year and country	Crude and unground		Ground, washed, powdered, or pulverized		Cut and sawed		Total unmanufactured	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value ¹ (thousands)
1975	13,942	\$663	9,004	\$494	432	\$314	23,378	\$1,471
1976:								
Australia	--	--	1	1	--	--	1	1
Belgium-Luxembourg	--	--	17	6	--	--	17	6
Canada	3,840	92	2,873	162	6	3	6,719	257
Finland	--	--	4	(²)	--	--	4	(²)
France	--	--	592	54	--	--	592	54
Hong Kong	--	--	--	--	218	119	218	119
India	--	--	22	2	3	1	25	3
Israel	--	--	137	9	--	--	137	9
Italy	10,913	926	287	57	--	--	11,200	983
Japan	--	--	67	8	246	208	313	216
Kenya	(²)	1	--	--	--	--	(²)	1
Korea, Republic of	55	3	505	54	244	150	804	207
Netherlands	--	--	2	1	--	--	2	1
Spain	6	1	--	--	--	--	6	1
United Kingdom	--	--	33	3	--	--	33	3
Total	14,814	1,023	4,540	357	717	481	20,071	1,861
1977:								
Belgium-Luxembourg	--	--	42	9	--	--	42	9
Canada	--	--	6,760	391	5	2	6,765	393
China, People's Republic of	--	--	8	1	--	--	8	1
Dominican Republic	--	--	20	2	--	--	20	2
France	4,537	159	595	58	--	--	5,132	217
Hong Kong	--	--	--	--	91	40	91	40
India	28	2	11	1	1	1	40	4
Israel	--	--	218	46	--	--	218	46
Italy	8,047	739	290	58	--	--	8,337	797
Japan	--	--	8	4	435	346	443	350
Korea, Republic of	--	--	729	85	264	149	993	234
Nepal	--	--	1	1	--	--	1	1
Total	12,612	900	8,682	656	796	538	22,090	2,094

¹Does not include talc, n.s.p.f.; 1975—\$198,090; 1976—\$302,455; 1977—\$593,240.

²Less than 1/2 unit.

WORLD REVIEW

Belgium.—Cyprus Industrial Minerals Co. of Los Angeles announced that it planned to spend \$3 million on expansion of its Ghent, Belgium, talc-processing plant. The planned expansion was expected to double the facility's capacity and to be completed early in 1978.

Canada.—Johns-Manville Corp. closed its talc mine and processing facilities near Timmins, Ontario. Also in the Timmins area, Rosario Resources Corp. announced its investigation of another promising talc-magnesite deposit. Broughton Soapstone & Quarry Co., Ltd., Quebec, continued as a major source of soapstone for sculpture.

Finland.—The new Oy Lohja A. B. talc plant became operational and produced filler-grade talc for the paper industry. The 99% less-than-20-micron product was 96% talc with an 86 brightness. Plans for a less-than-10-micron product should be realized in 1978.

France.—Société des Talcs de Luzenac with recent acquisitions has become the largest talc producer among the market economy countries. The acquisitions were 49% of Spain's Compañía Talcos Pirenaicos, which has about 20,000 tons' annual production and an 80% share of Austria's Talkumwerke Naintsch GmbH's Graz mine, which has a 100,000-ton-per-year capacity. Luzenac now controls about 400,000 tons per year of capacity.

Japan.—Japan is a leading producer of talc with an estimated 149,000-short-ton production and a major consumer using approximately 480,000 short tons per year. In 1976 the major supplying countries to Japan were the People's Republic of China, with 55% of the imports, the Republic of South Korea with 16%, North Korea with 13%; and Australia with 9%. The United States supplied 0.6% of the imports.²

Japan is also the world's largest producer and consumer of pyrophyllite. The pro-

duction, with no reported exports, is a nominal 1.1 to 1.3 million short tons per year but did reach 1.7 million short tons in 1970. Roseki (a pyrophyllite-kaolin mixture reported under clays) is also mined in great quantities. In 1975 Japan produced 2.2 million short tons of roseki and another 0.4 million short tons of "Roseki concentrate." Fifty to sixty percent of pyrophyllite production is used in refractories, and the remainder in paper, china and tiles, and cement products.³

Pakistan.—A deposit with an estimated 1 million tons of good-quality soapstone was found in the Swat district.

South Africa, Republic of.—There are thought to be several million tons of industrial grades (no cosmetic grades) of talc in South Africa. At present four companies are mining a nominal 8,000 tons per year for domestic use.

Thailand.—Pyrophyllite production in Thailand exceeded 10,000 tons per year for the first time in 1975. Small-scale production from a new mine in Chiang Rai with reportedly large reserves was started, but lack of appropriate infrastructure will probably inhibit production. A new talc discovery in Chiang Rai was awaiting a Government mining concession.

United Kingdom.—The building of a barite processing plant in the Shetland Islands opened the possibility of processing other indigenous Shetland minerals such as talc. Unst, the northernmost of the Shetlands, is the site of the United Kingdom's only talc mine; its 20,000-ton-per-year production is shipped all the way to Sharpness, Gloucestershire, for milling.

The United Kingdom imported 66,769 short tons of talc in 1977. Norway led the supplying countries with 26% of the imports. France and the People's Republic of China each had 17%, and Italy had 16%.

Table 6.—Talc, soapstone, and pyrophyllite: World production, by country
(Short tons)

Country ¹	1975	1976	1977 ²
North America:			
Canada (shipments) -----	72,784	75,877	80,470
Mexico -----	1,631	212	180
United States -----	[†] 964,609	1,092,433	1,204,835
South America:			
Argentina -----	[‡] 53,394	59,698	62,141
Brazil (talc and pyrophyllite) -----	243,248	243,394	[*] 250,000
Chile -----	524	143	471
Colombia -----	1,102	[‡] 1,100	1,268
Paraguay -----	[‡] 280	155	144
Peru (talc and pyrophyllite) ⁶ -----	15,400	15,400	15,400
Uruguay -----	1,398	1,398	1,829
Europe:			
Austria -----	95,363	110,947	114,357
Finland -----	136,973	163,728	172,605
France (ground talc) -----	265,800	281,971	316,664
Germany, Federal Republic of (marketable) ⁶ -----	33,000	33,000	33,000
Greece (steatite) -----	[‡] 6,468	[‡] 6,600	[‡] 6,600
Hungary ⁶ -----	17,600	17,600	17,600
Italy (talc and steatite) -----	158,823	169,575	179,056
Norway -----	115,735	[‡] 110,000	[‡] 110,000
Portugal -----	1,731	1,264	1,662
Romania ⁶ -----	66,000	66,000	66,000
Spain -----	52,159	[‡] 55,000	[‡] 55,000
Sweden -----	26,286	22,534	[‡] 22,000
U.S.S.R. ⁶ -----	460,000	485,000	500,000
United Kingdom -----	21,054	16,315	16,540
Africa:			
Angola ⁶ -----	110	110	110
Botswana -----	248	[‡] 159	318
Egypt -----	[‡] 4,858	6,213	7,709
Ethiopia -----	28	[‡] 30	[‡] 30
South Africa, Republic of ⁶ -----	17,667	14,135	8,883
Sudan ⁶ -----	5,500	5,500	5,500
Zambia -----	181	117	[‡] 110
Asia:			
Afghanistan ⁴ -----	6,945	9,574	[‡] 10,000
Burma -----	383	462	--
China, People's Republic of ⁶ -----	300,000	330,000	330,000
India -----	[‡] 220,985	266,460	268,831
Japan ⁵ -----	1,313,489	1,482,875	1,492,302
Korea, North ⁶ -----	140,000	140,000	140,000
Korea, Republic of (talc and pyrophyllite) -----	458,422	547,262	667,151
Nepal ⁶ -----	571	58	85
Pakistan (pyrophyllite) -----	[‡] 5,318	5,551	[‡] 8,700
Philippines -----	[‡] 1,480	1,556	1,323
Taiwan -----	13,283	17,065	11,200
Thailand (talc and pyrophyllite) -----	[‡] 11,737	[‡] 11,000	10,859
Oceania: Australia -----	90,816	104,017	139,597
Total -----	[‡] 5,403,373	5,976,488	6,330,530

⁶Estimate. [‡]Preliminary. [†]Revised.

¹In addition to the countries listed, Southern Rhodesia is believed to produce talc, but available information is inadequate to make reliable estimates of output levels.

²Exports.

³Includes talc and soapstone.

⁴Data are for calendar year beginning March 20 of that stated.

⁵Includes talc and pyrophyllite; in addition, pyrophyllite clay is produced as follows in short tons: 1975—483,857; 1976—497,912; 1977—492,043.

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

TECHNOLOGY

A new citizens' group, "Preserve Soapstone" was formed in Atlanta to protect and save a site on Soapstone Ridge, south of Atlanta, where Indian miners and artificers produced utensils, pipes, beads, and weapons many centuries ago.

The large tailings piles of impure magnesite discarded by the Finnish talc industry

have been under investigation as a possible source of high-purity magnesia for several years. Kimira Oy, Finland's leading chemical company, has now developed a process tested through the pilot plant stage, capable of producing high-purity magnesium hydroxide filter cake suitable for calcination and dead burning. The process, which in-

volves acid dissolution and base precipitation, is reported to be economically viable only if connected with a nitrogen fertilizer plant so that nitric acid and ammonia are cheaply available, as at Kimira's Oulu plant.

Americ Mines, Ltd., of Canada purchased world rights to a process for making an inexpensive home insulating material from talc.

The health hazards of exposure to talc are the subject of both controversy and research. A conference paper⁴ reporting on work by Harvard University and NIOSH stated that there was no asbestos in Vermont talcs, and that using the OSHA method for asbestos identification would give erroneous measurements indicating high hazard in some mine and mill areas.

Testing cosmetic-grade talc aerosols on hamsters at exposures that exceeded weekly infant exposures by some 30 to 1,700 times revealed no influence on body weight, survival, or the type incidence or degree of

histopathological change in the exposed groups when compared with the controls.⁵

Another work correlating this hamster study with humans concluded that there was no reason to believe that normal consumer exposure to cosmetic talc has in the past led either to cancer or to measurable loss of lung function.⁶ Both of these papers deal with cosmetic talcs, the highest purity talcs marketed, and strongly infer that if any health hazards are present, they are not related to talc but to another component.

¹Physical scientist, Division of Nonmetallic Minerals.

²Industrial Minerals (London). Japan's Industrial Minerals. No. 118, July 1977, pp. 18-33.

³Work cited in footnote 2.

⁴Boudy, M. G., K. G. Gold, W. A. Burgess, and J. M. Dement. Exposure to Industrial Talc in Vermont Mines and Mills. Pres. at American Industrial Hygienist Assoc. Conference, New Orleans, La., May 26, 1977.

⁵Wehner, A. P., G. M. Zwicker, W. C. Cannon, C. R. Watson, and W. W. Carlton. Inhalation of Baby Powder by Hamsters. *Fd. Cosmet. Toxicol.*, v. 15, 1977, pp. 121-129. Pergamon Press, 1977. (Printed in Great Britain).

⁶The Lancet. Cosmetic Talc Powder. V. 6, June 25, 1977, pp. 1348-1349.

