

Talc and Pyrophyllite

By Robert L. Virta¹

Total domestic production and sales of crude and processed talc and pyrophyllite increased slightly from those of 1985. Exports of talc decreased slightly in tonnage and increased 14% in value.

Domestic Data Coverage.—Domestic production and sales data for talc and pyrophyllite are developed by the Bureau of Mines from a voluntary survey of U.S.

mines and mills. Of the 98 mines and mills to which a survey request was sent, 83 responded, representing 85% of the U.S. production data shown in table 1. Production for the 15 nonrespondents was estimated using reported prior year production levels adjusted by trends in employment and other guidelines.

Table 1.—Salient talc and pyrophyllite statistics

(Thousand short tons and thousand dollars)

	1982	1983	1984	1985	1986
United States:					
Mine production, crude:					
Talc	1,049	980	1,042	1,188	1,219
Pyrophyllite	87	87	85	81	83
Total	¹ 1,135	¹ 1,066	1,127	1,269	1,302
Value:					
Talc	\$19,540	\$18,998	\$21,755	\$27,768	\$29,687
Pyrophyllite	1,131	1,282	1,412	1,420	1,540
Total	20,671	20,280	23,167	29,188	31,227
Sold by producers, crude and processed:					
Talc	915	1,038	1,101	1,067	1,070
Pyrophyllite	110	125	97	^r 81	83
Total	1,025	1,163	1,198	^r 1,148	1,153
Value:					
Talc	\$82,104	\$104,739	\$112,515	\$114,542	\$111,924
Pyrophyllite	3,557	4,057	3,578	^r 3,273	3,366
Total	85,661	108,796	116,093	^r 117,815	115,290
Exports ² (talc)	232	218	256	237	234
Value	\$12,957	\$12,916	\$16,162	\$14,282	\$16,302
Imports for consumption (talc) ³	27	44	45	47	52
Value	\$6,264	\$7,691	\$9,156	\$9,532	\$8,715
Apparent consumption ⁴	820	989	1,009	1,079	1,120
World: Production	^r 7,785	^r 7,781	8,396	^p 8,661	^e 8,529

^eEstimated. ^pPreliminary. ^rRevised.

¹Data do not add to total shown because of independent rounding.

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

³Does not include imported pyrophyllite.

⁴Production, plus imports, minus exports, plus adjustments in Government and industry stock changes.

Legislation and Government Programs.—The Occupational Safety and Health Administration (OSHA) enacted a ruling, effective July 21, 1986, that limits worker exposure to actinolite, anthophyllite, asbestos, and tremolite to 0.2 fiber per cubic centimeter per 8-hour work period.² OSHA also required employee training and medical surveillance when exposure levels exceed 0.1 fiber per cubic centimeter. A 9-month administrative stay was placed on that portion of the ruling covering the nonasbestiform varieties of actinolite, anthophyllite, and tremolite.³ Worker exposure to the nonasbestiform varieties was limited to 2.0 fibers per cubic centimeter by the administrative stay.

The Environmental Protection Agency proposed standards under Section 3 of the Clean Air Act to limit particulate emissions from new, modified, and reconstructed calciners and dryers at mineral processing plants. Seventeen minerals and concen-

trates including talc are covered under the proposal. The proposed standard would limit particulate emissions to 0.09 gram per dry standard cubic meter for calciners and dryers installed in series, and 0.025 for dryers alone.⁴

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

U.S. import duties on talc minerals from most favored nations were crude and unground, 0.02 cent per pound; ground, washed, powdered, and/or pulverized, 3.8% ad valorem; cut, sawed, or in blanks, crayons, cubes, disks, or other forms, free; and other not specifically provided for, 4.8% ad valorem.

The stockpile inventories of 1,081 short tons for block or lump talc and 1,809 tons for ground talc at yearend were unchanged from those of 1985.

DOMESTIC PRODUCTION

Talc.—U.S. mine production of crude talc increased slightly in tonnage and 7% in value. Talc, including soapstone, was produced at 34 mines in 9 States. Ten mines that operated in California, Montana, New York, Texas, and Vermont accounted for 71% of domestic talc production. Montana led all States in the tonnage and value of talc produced.

The largest domestic producers of talc, listed alphabetically, are Cyprus Industrial Minerals Co. and Pfizer Inc., Minerals, Pigments & Metals Div., with mines in California and Montana; R. T. Vanderbilt Co. Inc. in New York; and Windsor Minerals Inc. in Vermont and California.

The Clay and Mineral Div. of United Catalysts Inc., a subsidiary of the Federal Republic of Germany's Süd-Chemie AG, purchased Southern Talc Co. of Chatsworth, GA. Southern Talc's Rock Cliff Mine was closed, and its Earnest Mine was reopened. A higher-quality talc was produced at the Earnest Mine than at the Rock Cliff Mine by using selective mining techniques.⁵

The Montana Talc Co., a joint venture between NICOR Mineral Ventures and Meridian Land and Minerals Co., began operating its mine and mill facilities near Ennis, MT. The talc was used primarily in paint, paper, and plastics.⁶

The Alberene Stone Co. of Schuyler, VA, was purchased by Suomen Vuolukivi Oy of

Finland. The purchase included the 27-acre plantsite, machinery, buildings, and a lease on the extraction rights for the quarries. Suomen Vuolukivi plans to make fireplaces, wood stoves, cooking ware, and other soapstone products. The plant will operate as the New Alberene Stone Co.⁷

Cyprus obtained surface and mineral rights to 3,000 acres of land near Alpine, AL, including a mine that previously supplied the Alpine mill facilities with cosmetic-grade talc. In addition, drilling indicated large reserves of high quality talc. Talc mined from Cyprus' Montana talc operations will continue to be processed at the Alpine mill.⁸ The company also announced a reorganization of its four industrial minerals divisions into one organization. Several regional offices will be closed, and its international marketing group will be expanded.⁹

Acqui-Tal Inc. merged with Vermont Talc Co. The Acqui-Tal mill facilities at Johnson, VT, were upgraded and new milling equipment installed. Production from the Johnson mill, which uses flotation processing, will supplement output from Vermont Talc's Chester mill.¹⁰ Vermont Talc also planned to open a mine near Troy to supply talc to the Johnson mill. Drilling on the 600-acre parcel indicated a large reserve of asbestos-free talc.¹¹

The Pennsylvania Bureau of Mines and

Reclamation issued mining and mine drainage permits for a talc mine in Fulton Township. The open pit has a proposed depth of 300 feet.¹²

Pyrophyllite.—Pyrophyllite was produced by four companies operating six mines in California and North Carolina. Total production increased slightly from that of 1985.

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

(Thousand short tons and thousand dollars)

State	1985		1986	
	Quantity	Value	Quantity	Value
California -----	100	2,493	64	1,528
Georgia (talc) -----	16	111	9	61
North Carolina -----	85	1,604	83	1,552
Texas (talc) -----	261	5,245	283	6,456
Other ¹ (talc) -----	807	19,735	863	21,630
Total -----	1,269	29,188	1,302	31,227

¹Includes Arkansas, Montana, New York, Oregon, Vermont, Virginia (1985), and Washington.

CONSUMPTION AND USES

Apparent domestic consumption of crude and processed talc and pyrophyllite increased slightly. Sales of talc and pyrophyllite increased slightly in tonnage and decreased slightly in value.

End-use distribution of ground talc was ceramics, 35%; paint, 17%; paper, 13%;

roofing, 11%; plastics, 7%; cosmetics, 5%; rubber, 3%; insecticides, 1%; and other 8%.

The largest portion, 55%, of domestically produced ground pyrophyllite was used in ceramics, 17% was used in refractories, 11% in insecticides, and 17% other.

Table 3.—End uses for ground talc and pyrophyllite

(Thousand short tons)

Use	1985			1986		
	Talc	Pyrophyllite	Total	Talc	Pyrophyllite	Total ¹
Ceramics -----	296	72	368	343	64	407
Cosmetics ² -----	46	3	49	46	3	49
Insecticides -----	7	12	19	6	13	18
Paint -----	144	2	146	168	2	170
Paper -----	125	--	125	127	--	127
Plastics -----	70	1	71	69	1	69
Refractories -----	5	20	25	3	20	22
Roofing -----	100	2	102	106	2	108
Rubber -----	27	--	27	25	(³)	25
Other ⁴ -----	101	12	113	90	13	103
Total ¹ -----	921	124	1,045	983	116	1,099

¹Data may not add to totals shown because of independent rounding.

²Incomplete data. Some cosmetic talc known to be included with "Other."

³Less than 1/2 unit.

⁴Includes art sculpture, asphalt filler and coatings, crayons, floor tile, foundry facings, rice polishing, stucco, and uses not specified.

PRICES

Talc prices varied depending on the quality and on the degree and method of processing.

Prices, quoted by the Engineering and

Mining Journal, December 1986, per short ton of domestic ground talc, in carload lots, f.o.b. mine or mill, including containers follow:

New Jersey:	
Mineral pulp, bags extra	\$18.50-\$20.50
Vermont:	
98% through 325 mesh, bulk	70.00
99.99% through 325 mesh, bags:	
Dry processed	147.00
Water beneficiated	213.00-228.00
New York:	
96% through 200 mesh	62.00- 75.00
98% to 99.25% through 325 mesh ..	83.00-100.00
100% through 325 mesh,	
fluid-energy ground	165.00
California:	
Standard	130.00
Fractionated	37.00- 71.00
Micronized	150.00-220.00
Cosmetic steatite	44.00- 65.00
Georgia:	
98% through 200 mesh	50.00
99% through 325 mesh	60.00
100% through 325 mesh,	
fluid-energy ground	100.00

Approximate equivalents, in dollars per short ton, of price ranges quoted in Industrial Minerals (London), December 1986, for talc, c.i.f. main European ports, follow:

Norwegian:	
Ground (ex store)	\$126-\$140
Micronized (ex store)	161- 224
French, fine-ground	168- 266
Italian, cosmetic-grade	245
Chinese, normal (ex store):	
UK 200 mesh	197
UK 325 mesh	206
New York, paint, minimum 20-ton lot ..	175

FOREIGN TRADE

Exports.—Talc exports decreased slightly, although its value increased 14%. Prices ranged from \$31 to \$530 per ton, averaging \$70 per ton.

Mexico was the major importer of U.S. talc, accounting for 48% of the tonnage shipped, followed by Canada, 25%; Japan, 9%; and Belgium-Luxembourg, 6%. Canada and Mexico led in value of imports, each

with 27% of the total. Sixty countries imported U.S. talc.

Imports.—U.S. imports for consumption of talc increased 11%. Imports from Canada increased 26%. Canada was the leading source of imported talc with 72%, followed by Australia with 18%. Canada and China accounted for 67% of the value of all imported talc.

Table 4.—U.S. exports of talc¹

(Thousand short tons and thousand dollars)

Year	Belgium-Luxembourg		Canada ²		Japan		Mexico		Other ³		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1982	18	1,263	63	4,208	9	439	102	3,083	40	3,964	232	12,957
1983	1	55	74	4,629	16	1,077	86	2,805	41	4,350	218	12,916
1984	11	722	76	5,265	22	1,518	107	3,696	40	4,961	256	16,162
1985	6	373	81	4,864	18	1,422	108	4,492	24	3,131	237	14,282
1986	15	1,273	59	4,411	22	1,707	112	4,464	27	4,447	⁴ 234	16,302

¹Excludes powders—talcum (in package), face, and compact.

²Probably includes shipments in transit through Canadian ports.

³Includes 56 countries.

⁴Data do not add to total shown because of independent rounding.

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

Country	Crude and unground		Ground, washed, powdered, or pulverized		Cut and sawed		Talc, n.s.p.f.	Total unmanufactured ¹	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)	Value (thousands)	Quantity (short tons)	Value (thousands)
1984 -----	14,868	\$2,040	27,978	\$5,126	1,807	\$1,030	\$960	44,653	\$9,156
1985:									
Brazil -----	--	--	143	23	1,220	464	16	1,363	503
Canada -----	10	2	29,524	4,111	131	180	29	29,665	4,322
China -----	--	--	--	--	1,013	889	271	1,013	1,160
France -----	4,217	240	838	130	--	--	--	5,055	370
Italy -----	5,511	1,025	84	21	155	251	--	5,750	1,297
Korea, Republic of -----	437	44	1,672	344	92	54	--	2,201	442
Other ² -----	597	39	973	511	278	259	629	1,848	1,438
Total -----	10,772	1,350	33,234	5,140	2,889	2,097	945	46,895	9,532
1986:									
Australia -----	9,353	569	--	--	--	--	--	9,353	569
Brazil -----	--	--	112	39	750	334	50	862	423
Canada -----	54	4	37,307	4,949	116	153	46	37,475	5,152
China -----	418	25	--	--	485	438	237	903	699
Italy -----	6	2	141	37	--	--	5	147	44
Korea, Republic of -----	--	50	1,077	240	53	26	3	1,130	319
Other ³ -----	256	66	1,616	685	230	304	454	2,102	1,509
Total ¹ -----	10,086	715	40,253	5,951	1,634	1,254	795	51,973	8,715

¹Data may not add to totals shown because of independent rounding.²Includes 15 countries.³Includes 17 countries.

Source: Bureau of the Census.

WORLD REVIEW

The United States remained the world's largest talc producer, and Japan remained the largest pyrophyllite producer. China, Japan, and the United States accounted for 45% of the world's talc and pyrophyllite production.

Australia.—Thames Mining NL acquired the Mount Seabrook talc mine in Western Australia following settlement of a dispute over the legal ownership of the mine. Thames Mining also began mapping and drilling at its Livingstone talc deposit, near Mount Seabrook, to determine reserves and potential mining sites.¹³

Thames Mining granted Cyprus exclusive rights to purchase all cosmetic-grade talc produced at the Mount Seabrook Mine and a 1-year option to be the exclusive purchaser of its industrial-grade talc.¹⁴

Canada.—International Larder Minerals Inc. acquired the Harvey Hill Copper Mine near Quebec and began modifying existing mine and mill facilities for talc production. Proven talc reserves were estimated at 4 million tons, with additional probable reserves of 2.2 million tons.¹⁵

Steetley Talc Ltd. continued a multiyear

expansion program for its Timmons Mine and mill facilities. The expansion plans included installing a ball mill, cyclone classifiers, and flotation cells. These upgrades would double production to approximately 60,000 tons and increase its product line. Steetley Talc produced talc for use in cosmetics, paint, paper, plastics, and rubber.¹⁶

Bakertalc Inc. planned an expansion of its Highwater mill facilities in Quebec. The expansion was to include the purchase of a pebble mill to wet-grind talc ore for feed to a flotation circuit, doubling production capacity to 20,000 tons per year.¹⁷

United Kingdom.—Shetland Talc Ltd., jointly owned by Dalriada Mineral Ventures Ltd. and Anglo-European Minerals Ltd., obtained permission for exploratory drilling in a talc-magnesite deposit near Cunningsburgh in the Shetland Islands.¹⁸

A/S Norwegian Talc modified facilities at Hartlepool for milling dolomite, mica, and talc. The company previously had processed the ore in Norway and shipped it to distribution facilities in Europe. Nortalc Milling Ltd. operated the mill facility, and Norwegian Talc (UK) Ltd. directed sales.¹⁹

Table 6.—Talc and pyrophyllite: World production, by country¹

(Short tons)

Country ²	1982	1983	1984	1985 ^p	1986 ^e
Argentina (talc, steatite, pyrophyllite) ---	31,849	32,729	30,629	^e 29,000	28,000
Australia -----	168,424	^r 194,644	265,844	^e 276,000	276,000
Austria (unground talc) -----	129,072	134,623	147,722	144,903	132,000
Brazil (talc and pyrophyllite) ³ -----	446,731	437,025	455,637	⁴ 468,500	468,500
Burma -----	^r 182	141	100	141	143
Canada (shipments) -----	79,567	106,924	138,891	139,993	138,000
Chile -----	312	702	465	1,432	2,400
China ^e -----	1,050,000	1,050,000	1,050,000	1,100,000	1,100,000
Colombia -----	6,878	7,318	7,479	9,492	8,800
Egypt -----	9,139	4,981	13,463	8,488	9,400
Finland -----	358,251	351,009	360,976	^e 364,000	364,000
France (ground talc) -----	304,723	315,812	322,315	342,705	353,000
Germany, Federal Republic of (marketable) -----	16,789	15,773	19,030	22,835	22,000
Greece (steatite) -----	2,973	2,388	1,887	1,901	2,000
Hungary ^e -----	18,700	18,700	19,300	18,700	17,700
India (pyrophyllite and steatite) -----	379,129	389,162	460,473	422,111	419,000
Italy (talc and steatite) -----	180,746	175,239	157,329	142,875	⁴ 166,676
Japan ⁵ -----	1,644,982	1,615,791	1,652,303	1,580,978	⁴ 1,470,889
Korea, North ^e -----	185,000	185,000	185,000	185,000	185,000
Korea, Republic of (talc and pyrophyllite) -----	651,594	696,810	935,475	1,027,880	992,000
Mexico -----	13,525	12,161	9,811	32,959	22,000
Nepal ⁶ -----	3,310	16,825	8,372	6,630	7,700
Norway ^e -----	110,000	110,000	⁴ 157,554	^r 165,000	165,000
Pakistan (pyrophyllite) -----	22,669	17,588	17,161	22,248	23,000
Paraguay -----	165	132	165	^r ^e 132	132
Peru (talc and pyrophyllite) -----	^e 9,500	⁴ 5,767	10,183	551	1,100
Philippines -----	1,111	968	1,022	380	1,100
Portugal -----	5,445	6,018	6,838	3,976	4,400
Romania ^e -----	66,000	66,000	72,000	72,000	72,000
South Africa, Republic of ⁷ -----	15,226	12,337	15,886	15,925	15,000
Spain (steatite) -----	^r 76,816	76,574	79,628	97,859	94,000
Sweden -----	19,569	23,210	19,712	15,432	⁴ 2,205
Taiwan -----	33,798	29,821	20,591	19,357	⁴ 23,757
Thailand (talc and pyrophyllite) -----	24,249	22,209	31,393	47,926	45,000
U.S.S.R. ^e -----	560,000	560,000	570,000	570,000	570,000
United Kingdom ^e -----	21,000	17,600	^r 21,000	⁴ 22,046	22,000
United States (talc and pyrophyllite) -----	1,135,415	1,066,400	1,127,421	1,268,750	⁴ 1,302,179
Uruguay -----	1,262	755	1,828	^r ^e 1,700	1,700
Zambia -----	299	1,447	405	10,504	⁴ 293
Zimbabwe -----	298	607	314	482	440
Total -----	^r 7,784,698	^r 7,781,190	8,395,602	8,660,791	8,528,514

^eEstimated. ^pPreliminary. ^rRevised.¹Table includes data available through May 26, 1987.²In addition to the countries listed, Czechoslovakia produces talc, but available information is inadequate to make reliable estimates of output levels.³Total of beneficiated and salable direct-shipping production of talc and pyrophyllite.⁴Reported figure.⁵Includes talc, pyrophyllite, and pyrophyllite clay.⁶Data based on Nepalese fiscal year beginning mid-July of year stated.⁷Includes talc and wonderstone.

TECHNOLOGY

The National Institute of Occupational Safety and Health conducted a study of respirable crystalline silica exposures at a wall and floor tile manufacturing plant. The silica content of the pyrophyllite used in manufacturing the tile was estimated to be 13% by weight. Total dust and respirable dust samples were collected at work stations and at various locations within the raw materials storage building and processing building. Low employee exposures to dust were maintained through proper plant design, automated material transfer, effective ventilation, and good maintenance.²⁰

Talc crayons have been used by industry to mark steel for cutting and welding and, traditionally, were cut from block talc. This technique is no longer cost effective because of competition from imports. Research was conducted on fabricating talc crayons from ground talc using mixtures of ball clay, binders, kaolin, and talc. Crayons formed using a mixture of talc containing 6% organic binder had good physical characteristics in both uncured and cured states and had excellent marking properties.²¹

A transmission electron microscope study of talc-containing fibers was conducted.

Three fiber types were observed—talc fibers, anthophyllite fibers, and anthophyllite fibers intergrown with talc. The fibrous morphology was attributed to crystal structure defects.²²

A study was conducted on the dust reduction capabilities of five commercially available bag valves—paper, polyethylene, extended polyethylene, double trap, and foam. Dust levels were monitored during bagging, conveying, and pallet loading. The extended polyethylene valve was the most effective valve type. It reduced dust exposures 62% relative to the standard paper valve at the operator location and 66% at the bag stocker location. The length of the bag valve and the valve material were the most important factors in determining valve effectiveness.²³

A survey of mineral filler and extender consumption by the paint, paper, and plastics industries was conducted for the period 1972 to 1984. In general, the market for fillers and extenders in North America, including talc, grew at a rate of 1.2% for paint, 4.5% for paper, and 6.3% for plastics. In Western Europe, these rates were 5.3%, 3.1%, and 7.4%, respectively. Talc accounted for a small segment of the markets, ranging from 2% to approximately 15% of the total consumption. Talc consumption was affected primarily by the geographic distribution of talc deposits and by the cost and availability of talc relative to other filler and extender minerals.²⁴

Mineral fillers and coating pigments were used by the European paper industry to improve paper gloss, smoothness, brightness, opacity, and ink receptivity. Since 1976, the use of mineral fillers has increased 5%, and the use of mineral coating pigments has increased 44%. Minerals were chosen as fillers and coating pigments according to the type of paper being produced, the chemistry of the processing solutions, the equipment used to make the paper, the process used for printing, and the ink type. Talc competed with kaolin and calcium carbonate as a mineral filler. Its share of

the European market increased from 16% in 1974 to 22% in 1984. Despite this increase, the use of talc continued to be influenced by the geographic distribution of talc deposits.²⁵

¹Physical scientist, Division of Industrial Minerals.

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³Occupational Safety and Health Administration. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite. V. 51, No. 201, Oct. 17, 1986, pp. 37002-37007.

⁴Environmental Reporter. EPA Proposed New Source Performance Standard To Control Particulate Emissions From Mineral Calciners, Dryer Under Air Act. V. 16, No. 52, Apr. 25, 1986, pp. 2330-2331.

⁵Rock Products. United Catalysts Buys Southern Talc. V. 89, No. 4, Apr. 1986, p. 10.

⁶Montana Standard (Butte). Talc Plant Opens at Three Forks. June 28, 1986.

⁷The Daily Progress (Charlottesville). Schuyler. Finds Hope in "Fire Stone." Aug. 17, 1986, p. 1.

⁸Industrial Minerals (London). Cyprus Talc in Alabama. No. 229, Oct. 1986, p. 68.

⁹Cyprus Consolidates. No. 231, Dec. 1986, p. 83.

¹⁰Vermont Business. Consolidated Talc Operation Recaptures Markets. Feb. 1986, p. 10.

¹¹Burlington Free Press. Vermont Talc Hopes To Open New Mine. Dec. 10, 1986.

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¹³Industrial Minerals (London). Thames Buys Mount Seabrook Talc. No. 220, Jan. 1986, p. 8.

¹⁴Cyprus Gets Mount Seabrook Agency. No. 231, Dec. 1986, p. 8.

¹⁵Mining Magazine. ILM To Open Talc Mine. Dec. 1986, p. 548.

¹⁶Industrial Minerals (London). Steetley Talc. No. 220, Jan. 1986, pp. 36-38.

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¹⁹Industrial Minerals (London). Milling Facility for Norwegian Talc. No. 221, Feb. 1986, p. 12.

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