

TALC AND PYROPHYLLITE

By Robert L. Virta

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Domestic production of talc decreased 12% from that of 1990 to 1,040,000 metric tons and increased 3% in value to \$32 million. Sales of crude and processed talc decreased 15% in tonnage to 864,000 tons and 23% in value to \$83 million. Imports for consumption increased 3% in tonnage to 67,000 tons and 8% in value to \$12 million. Exports decreased 25% in tonnage to 178,000 tons and 9% in value to \$30 million. Over the past 10 years, talc production averaged 1,060,000 tons; sales, 957,000 tons; domestic consumption (talc and pyrophyllite), 955,000 tons; exports, 232,000 tons; and imports, 53,000 tons. The major use for talc was in ceramics, which accounted for 31% of the domestic consumption, followed by paint, 17%; paper, 16%; roofing, 11%; and plastics, 6%. Other applications accounted for 19% of consumption. Production and sales of pyrophyllite decreased from those of 1990. The major uses for pyrophyllite were in ceramics, refractories, insecticides, paint, plastics, and rubber.

DOMESTIC DATA COVERAGE

Domestic production and sales data for talc and pyrophyllite are developed by the U.S. Bureau of Mines from a voluntary survey of U.S. mines and mills. Survey forms were sent to 17 companies that operated 47 mines and mills. Sixteen companies that account for approximately 96% of the domestic production responded to the survey. Production data for the nonrespondent was estimated from reported prior-year production levels

adjusted by trends in employment and other guidelines. (See table 1.)

ANNUAL REVIEW

Legislation and Government Programs

The Occupational Safety Health Administration (OSHA) issued a final rule on June 8, 1992, removing the nonasbestiform varieties of actinolite, anthophyllite, and tremolite from the scope of its asbestos standard. The nonasbestiform varieties will be regulated according to limits set for "particulates not otherwise regulated."¹

The Mine Safety and Health Administration (MSHA) continued to review its proposed revisions to its air quality, chemical substances, and respiratory protection standards. The proposed permissible 8-hour time-weighted average exposure limit is 2.5 milligrams per cubic meter (mg/m³) of air for talc (containing no asbestos), 3 mg/m³ for respirable soapstone, and 6 mg/m³ for total soapstone dust. The nonasbestiform varieties of tremolite, anthophyllite, and actinolite would be covered under the proposed respirable mine dust standard.²

MSHA continued reviewing its proposed rule that would create a hazard communication standard. Mine operators would be required to provide information to their employees through labeling, material safety data sheets, and employee training if hazardous chemicals were produced or used on the premises.

Issues

An issue that is attracting attention from some segments of the talc industry is the classification of crystalline silica as a probable human carcinogen by the International Agency for Research on Cancer, an agency of the World Health Organization. Additionally, OSHA-regulated sites that receive and/or use products containing more than 0.1% crystalline silica must comply with OSHA's Hazard Communication Standard (HCS). Both the classification of crystalline silica as a probable human carcinogen and the need to quantitatively analyze for crystalline silica at the 0.1% level to demonstrate exemption from the HCS are controversial.

Production

Talc.—Twelve companies operating 19 mines in 8 States produced talc, soapstone, and steatite. These companies generally were structured to cover all aspects of talc mining, from mining to processing. Only a few companies hired custom grinders to mill the ore. The largest of the domestic producers were Cyprus Minerals Co. Inc., Dal Minerals, Gouverneur Talc Co., Montana Talc Co., and Pfizer Inc. The major producing deposits were in Montana, New York, Texas, and Vermont.

Commercial talc production was from deposits that were formed through hydrothermal alteration of ultrabasic rocks and low-grade metamorphism of siliceous dolomites. They generally occur as lenses or pods in the country

rock. Magnesite, quartz, chlorite, magnetite, serpentine, anthophyllite, tremolite, dolomite, and actinolite may be present as accessory minerals.

Most of the domestic talc production was from open pit mining operations. Underground mining was used only when a large waste-rock-to-ore ratio made open pit mining uneconomical. Typically, overburden was removed and blasting was used to fracture the ore. The companies then used selective mining and manual or automated sorting to produce a high-grade feed for the mill. Jaw crushers were used to reduce the size of the mill feed, and ball mills or roller mills were used to produce the final product. Fluid-energy mills or pulverizing mills were used for ultrafine grinding of the talc ore. In a few instances, the ore was calcined prior to milling to increase its whiteness.

Flotation processes were used when the desired product purity was not obtained by using conventional processing. The milled ore was chemically treated, passed through rougher and cleaner cells to separate the talc from the gangue material, dried in a flash dryer, and ground in a pulverizer. Ore composition, reagent type, pulp density, pH of the flotation system, and residence time in the flotation circuits determined flotation efficiency.

Cyprus Minerals Co. signed a letter of intent to sell its talc operations to RTZ Corp. PLC, London. The sale includes talc operations in Alabama, California, Montana, Vermont, and Spain. Also included is a milling operation in Belgium and an interest in a talc operation in Japan.³

Southern Talc Co., a subsidiary of UCI, Louisville, KY, closed its mine in Georgia. The company recently built a flotation plant to improve the quality of its milled products but the ore could not be adequately upgraded for higher value markets.⁴

Pfizer Inc. completed its flotation mill at its Barretts, MT, operation. The \$8.6 million expansion will permit the company to produce a higher value talc product and extend the life of recoverable reserves.⁵

ECC Group PLC sold its U.S. subsidiary, Southern Clay Products Inc. Southern Clay Products' bentonite operations in Texas were sold to Laporte PLC.⁶ Its talc operations in Texas were sold to United Clays of Texas, a subsidiary of WBB Ltd., London.

U.S. mine production of crude talc decreased 12% in tonnage to 1,040,000 tons and increased 3% in value to \$32 million. Mines that operated in Montana, New York, Texas, and Vermont accounted for 96% of domestic talc production. Montana led all States in the tonnage and value of talc produced.

Pyrophyllite.—Pyrophyllite was mined by two companies operating three mines in North Carolina. Production was from hydrothermally altered volcanic deposits of acidic composition. The deposits consisted of pyrophyllite with sericite, andalusite, and/or quartz as accessory minerals. After removing the overburden, the ore was either stripped using dozers and scrapers or extracted using conventional open pit mining techniques. The ore was dried, and then jaw crushers and gyratory crushers were used to reduce the size of the mill feed. Ball, pebble, or roller mills were used to produce the final product.

U.S. mine production of crude pyrophyllite decreased in tonnage from that of 1990. (See table 2.)

Consumption and Uses

Talc.—Talc was used in a wide variety of products because of its softness (1 on the Mohs scale), purity, fragrance retention, whiteness, luster, moisture content, oil and grease adsorption, chemical inertness, low electrical conductivity, high dielectric strength, and high thermal conductivity. These properties were not universal to all talcose materials because of differences in their mineralogical composition and particle shape. Mineral content was extremely important because it determined the end use for the material. Generally, only two or three of these

properties were critical for any one application.

Domestic producers reported that overall sales (including exports by producers) declined 15% in tonnage to 864,000 tons and 23% in value to \$83 million in 1991. The major consumer of talc was the construction industry, with applications in ceramic tiles and sanitaryware, joint compounds, paint, and roofing. The end-use distribution was ceramics, 31%; paint, 17%; paper, 16%; roofing, 11%; plastics, 7%; cosmetics, 5%; and insecticides, refractories, rubber, and other, 14%. Reported sales to the ceramics and plastics industries increased in 1991. Sales to the paint, paper, and roofing industries declined as a result of the downturn in the building construction industry. More than 90% of the companies responded to the end-use portion of the 1991 annual survey, representing 91% of the data in table 3.

Pyrophyllite.—Pyrophyllite, being different in composition from talc, did not have the same applications as talc. Properties such as softness (1 to 2 on the Mohs scale), whiteness, chemical inertness, high melting point, low electrical conductivity, and high dielectric strength made pyrophyllitic materials useful for ceramics and refractories.

Domestic consumption of pyrophyllite decreased 3% in tonnage in 1991. The largest portion of domestically produced ground pyrophyllite was used in ceramics, followed by refractories, insecticides, paint, plastics, and rubber. (See table 3.)

Markets and Prices

Talc prices were based on the quality and on the degree and method of processing. The unit value of crude talc based on data reported by producers was \$32 per ton. The average reported unit value of processed talc was \$105 per ton. The average unit value of crude and processed pyrophyllite was unchanged from that of 1990. Unit values for imported crude and ground talc ranged from \$66 per ton to \$928 per ton for quantities greater than 100 tons. The

average unit value for all imported talc was \$178 per ton. Unit values for exported talc ranged from \$95 per ton to \$1,044 per ton for quantities greater than 100 tons and averaged \$169 per ton for all exports.

Prices, quoted by the American Paint & Coatings Journal, December 26, 1991, in U.S. dollars per metric ton for paint-grade talc in carload lots ranged from \$99 to \$226. Approximate equivalents, in dollars per metric ton, of price ranges quoted in Industrial Minerals (London), December 1991, for talc, c.i.f. main European ports, ranged from \$210 to \$385. (See table 4.)

Foreign Trade

Talc exports decreased 25% in tonnage to 178,000 tons and decreased 9% in value to \$30 million. Belgium-Luxembourg was the largest importer of talc, followed by Canada, Mexico, and Japan. Talc imports increased 3% in tonnage to 67,800 tons and 8% in value to \$12 million. Canada and China provided 86% of all talc imports. (See tables 5 and 6.)

World Review

China was the world's largest producer of talc. The United States remained the largest market economy talc producer, and Japan remained the largest pyrophyllite producer. China, Japan, and the United States accounted for 52% of the world's talc and pyrophyllite production.

Capacity.—The data in table 6 are annual rated capacity for mines and refineries as of December 31, 1991. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate, based on the physical equipment of the plant, and given acceptable routine operating procedures involving labor, energy, materials, and maintenance. Capacity includes both operating plants and plants temporarily closed that, in the judgment of the author, can be brought

into production within a short period of time with minimum capital expenditure. (See tables 7 and 8.)

Canada.—International Larder Minerals Inc. (ILM) evaluated a proposal to permit Bakertalc Inc. to mine ILM's undeveloped high-grade talc deposit near Thetford Mines, Quebec. The proposal also requested funding to upgrade Bakertalc's operations and reduce company debt.⁷

Finland.—Finnminerals operates three facilities in Finland. The flotation mill near Sotkamo is the largest of its operations. The facility produces approximately 180,000 tons of talc per year. The flotation process increases the purity of the talc to 97%. Talc is used by the paint, paper, and polymer industries. Its second facility, in northern Karelia, has an output of approximately 120,000 tons per year. Its third facility, in Luikonlahti, was acquired from the Partek Group in 1991. This operation produces approximately 75,000 tons per year for the fertilizer, paint, paper, and plastics industries.⁸

India.—Pyrophyllite is mined in Madhya Pradesh, Orissa, Rajasthan, Udaipur, and Uttar Pradesh. Approximately 46% of India's pyrophyllite production is from Madhya Pradesh. Talc is mined in Andhra Pradesh, Bihar, Madhya Pradesh, and Rajasthan. Production in Rajasthan accounts for 83% of India's talc production.⁹

Spain.—Three companies mine talc in Spain: Iberica de Talcos SA, Sdad Espanola de Talcos SA, and Distribuidora Malayuena de Talcos SA. Iberica de Talcos and Sdad Espanola de Talcos operate mines in the Pueblo de Lillo area. Sdad Espanola de Talcos produces 30,000 to 40,000 tons per year, one-half of which is cosmetic-grade talc. Distribuidora Malayuena, a subsidiary of Cyprus Minerals Co., operates mines near Mijas and Malaga. These facilities produce approximately 25,000 tons per

year for sale to the animal feed, chewing gum, fertilizer, olive oil, paint, paper, rubber industries.¹⁰

OUTLOOK

The average annual growth in domestic demand for talc and pyrophyllite was 1.2% between 1982 and 1991. Demand averaged between 900,000 and 1,000,000 tons per year for this period. Relative increases and decreases in demand have been the result of minor market fluctuations rather than long-term trends. Demand for talc and pyrophyllite is expected to continue to fluctuate about 1 million tons per year in the near future. With a slight improvement in the domestic economy predicted, talc markets affected by the current economic recession also should improve.

Ceramics will continue to be the major domestic end use for talc, followed by consumption in paint, paper, plastics, roofing, and cosmetics, in descending order. For pyrophyllite, the major domestic end uses will continue to be in ceramics and refractories.

⁷Federal Register. Occupational Safety and Health Administration. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite. V. 57, No. 110, June 8, 1992, pp. 24310-24331.

⁸_____. Mine Safety and Health Administration. Air Quality, Chemical Substances, and Respiratory Protection Standards. V. 56, No. 39, Feb. 27, 1991, pp. 8168-8171.

⁹Cyprus Minerals Co. News. Cyprus Minerals Plans Sale of Talc Business to RTZ. Dec. 19, 1991, p. 1.

¹⁰Ellis, J. \$25 Million Talc Facility To Close. Chatsworth Times, Jan. 30, 1991.

¹¹Chemical Marketing Reporter. Pfizer Talc Starts, v. 239, No. 17, Apr. 29, 1991, p. 9.

¹²Wall Street Journal. U.S. Unit Agrees to Sell Southern Clay to Laporte, Aug. 10, 1991, p. A8.

¹³Industrial Minerals (London). Bakertalc/International Larder Deal. No. 283, Apr. 1991, p. 82.

¹⁴Russell, A. India's Industrial Minerals. Ind. Miner. (London), No. 288, Sept. 1991, pp. 45-55.

¹⁵Benbow, J. Finland's Mineral Industry. Ind. Miner. (London), No. 283, Apr. 1991, pp. 19-37.

¹⁶Industrial Minerals (London). Finnminerals Acquires Partek Talc. No. 280, Jan. 1991, p. 70.

¹⁷Griffiths, J. Spain's Minerals. Ind. Miner. (London), No. 285, June 1991, pp. 23-47.

OTHER SOURCES OF INFORMATION

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Talc and Pyrophyllite. Ch. in Mineral Industry Surveys, annual.

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Other Sources

Company annual reports.

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Engineering and Mining Journal, monthly.

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TABLE 1
SALIENT TALC AND PYROPHYLLITE STATISTICS

(Thousand metric tons and thousand dollars)

	1987	1988	1989	1990	1991
United States:					
Mine production, crude:					
Talc	1,080	1,136	1,172	1,185	1,037
Pyrophyllite	83	97	81	82	W
Total	1,163	¹ 1,234	1,253	1,267	1,037
Value:					
Talc	\$27,265	\$29,364	\$27,731	\$31,068	\$32,051
Pyrophyllite	\$1,607	\$1,820	W	W	W
Total	\$28,872	\$31,184	\$27,731	\$31,184	\$32,051
Sold by producers, crude and processed:					
Talc	975	940	1,065	1,021	864
Pyrophyllite	82	93	79	80	W
Total	1,057	1,033	¹ 1,145	1,101	864
Value:					
Talc	\$113,394	\$115,899	\$114,453	\$110,585	\$82,579
Pyrophyllite	\$3,712	\$4,164	W	W	W
Total	¹ \$117,107	\$120,063	\$114,453	\$110,585	\$82,579
Exports² (talc)	255	260	319	238	178
Value	\$19,607	\$21,391	\$28,949	\$32,909	\$30,050
Imports for consumption (talc)	48	80	78	65	67
Value	\$10,348	\$12,268	\$12,128	\$11,056	\$11,925
Apparent consumption³	956	1,054	1,012	1,054	926
World: Production	8,490	⁸ 8,853	⁹ 9,359	⁹ 9,084	⁸ 8,932

⁸Estimated. ⁹Revised. W Withheld to avoid disclosing company proprietary data; not included in total.

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

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

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

TABLE 2
CRUDE TALC AND PYROPHYLLITE PRODUCED
IN THE UNITED STATES, BY STATE

(Thousand metric tons and thousand dollars)

State	1990		1991	
	Quantity	Value	Quantity	Value
Montana (talc)	474	18,883	365	15,741
Texas (talc)	250	4,844	213	4,561
Oregon (talc)	(¹)	72	(¹)	68
Other ² ³	543	7,270	459	11,682
Total ³ ⁴	1,267	31,068	1,037	32,051

¹Revised.

²Less than 1/2 unit.

³Includes Alabama, Arkansas, California, Georgia (1990), North Carolina, Vermont, and Virginia.

⁴Does not include quantity and value for pyrophyllite.

⁵Data may not add to totals because of independent rounding.

TABLE 3
END USES FOR GROUND TALC AND PYROPHYLLITE

(Thousand metric tons)

Use	1990			1991		
	Talc	Pyrophyllite	Total	Talc	Pyrophyllite	Total
Ceramics	235	W	235	255	W	255
Cosmetics ¹	36	—	36	37	—	37
Insecticides	6	W	6	14	W	14
Paint	155	W	155	135	W	135
Paper	143	—	143	133	—	133
Plastics	48	W	48	53	W	53
Refractories	3	W	3	4	W	4
Roofing	94	—	94	88	—	88
Rubber	20	W	20	16	W	16
Other ²	109	W	109	77	W	77
Total ³	849	4100	849	811	W	811

W Withheld to avoid disclosing company proprietary data.

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

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

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

⁴Includes imported pyrophyllite.

TABLE 4
PRICE OF TALC

(U.S. dollars per metric tons)

	Value
Canada: Fine micron, Hegman No. 6	226
Montana: Ultrafine grind, Hegman No. 6	243
New York:	
Nonfibrous, bags, mill:	
98% through 325 mesh	99
99.6% through 325 mesh	115
Trace retained on 325 mesh	182
Norwegian:	
Ground (ex store)	245-263
Micronized (ex store)	289-385
French, fine-ground	210-333
Finnish, micronised	228-280
Italian, cosmetic-grade	306
Chinese, normal (ex store):	
UK 200 mesh	252
UK 325 mesh	271
New York, paint, minimum 20-ton lot	165

Sources: American Paint & Coatings Journal, Dec. 1991, Industrial Minerals (London), Dec. 1991.

TABLE 5
U.S. EXPORTS OF TALC¹

(Thousand metric tons and thousand dollars)

Year	Belgium-Luxembourg		Canada ²		Japan		Mexico		Other ³		Total ⁴	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1987	27	2,482	55	5,000	24	2,405	101	4,182	47	5,538	255	19,607
1988	27	3,942	62	5,079	30	3,849	97	3,225	44	5,296	260	21,391
1989	30	4,766	81	5,614	35	4,710	107	6,601	65	7,258	319	28,949
1990	45	6,109	43	6,995	31	4,233	*82	*8,006	37	7,566	238	32,909
1991	46	6,023	42	7,767	20	2,338	28	3,791	42	17,898	178	30,050

*Estimated.

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

²Probably includes shipments in transit through Canadian ports.

³Includes 57 countries in 1991.

⁴Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census.

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

Country	Not crushed or powdered		Crushed or powdered		Cut and sawed		Total unmanufactured ¹	
	Quantity (metric tons)	Value (thou-sands)	Quantity (metric tons)	Value (thou-sands)	Quantity (metric tons)	Value (thou-sands)	Quantity (metric tons)	Value (thou-sands)
1989:	16,416	\$1,460	60,115	\$9,265	1,185	\$1,404	77,716	\$12,128
1990:								
Australia	5,449	554	7,014	373	—	—	12,463	927
Brazil	37	17	190	30	35	25	262	72
Canada	76	12	39,665	5,880	895	857	40,636	6,750
China	6,364	486	58	7	706	446	7,128	939
Italy	2,625	677	7	6	—	—	2,632	683
Korea, Republic of	—	—	527	122	—	—	527	122
Other ²	102	19	1,141	1,015	208	531	1,451	1,564
Total ¹	16,652	1,765	48,602	7,432	1,844	1,859	65,099	11,056
1991:								
Brazil	—	—	182	36	192	139	374	175
Canada	75	20	33,689	5,185	2,658	2,424	36,422	7,629
China	20,255	1,346	18	2	533	349	20,806	1,698
Italy	4,660	365	423	162	—	—	5,083	526
Korea, Republic of	—	—	546	116	—	—	546	116
Other ³	31	28	3,283	1,183	246	571	3,560	1,782
Total	25,061	1,758	38,141	6,683	3,629	3,484	66,791	11,925

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

²Includes 24 countries.

³Includes 17 countries.

Source: Bureau of the Census.

TABLE 7
WORLD TALC AND
PYROPHYLLITE ANNUAL
PRODUCTION CAPACITY,
DECEMBER 31, 1991

(Thousand metric tons)

Country	Rated capacity ¹
North America:	
Canada	299
United States	1,361
Total	<u>1,660</u>
Latin America:	
Argentina	45
Brazil	454
Mexico	36
Other	36
Total	<u>571</u>
Europe:	
Austria	136
Finland	363
France	363
Italy	163
Norway	136
U.S.S.R.	544
Other	236
Total	<u>1,941</u>
Africa:	
Egypt	13
South Africa, Republic of	18
Other	1
Total	<u>32</u>
Asia:	
China	1,179
India	454
Iran	32
Japan	1,633
Korea, North	1
Korea, Republic of	998
Other	82
Total	<u>4,379</u>
Oceania:	
Australia	<u>227</u>
World total	<u>8,810</u>

¹Includes capacities of operating plants as well as plants on standby basis.

TABLE 8
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT¹

(Metric tons)

Country ²	1987	1988	1989	1990	1991*
Argentina:					
Pyrophyllite	1,260	671	1,310	*1,300	1,200
Steatite*	300	250	250	250	250
Talc	27,103	26,108	26,658	*26,000	25,000
Australia:					
Pyrophyllite	6,036	5,750	*5,000	*5,000	6,000
Talc	206,865	199,631	*195,000	*200,000	210,000
Austria: Steatite	129,959	132,974	133,078	*133,971	133,000
Brazil:³					
Agalmatolite	104,536	122,531	*120,000	*120,000	120,000
Pyrophyllite	51,114	60,070	162,000	*120,000	120,000
Talc	425,513	378,463	433,000	*330,000	330,000
Burma: Steatite	22	*25	*20	*20	20
Canada (shipments): Pyrophyllite, soapstone, talc	136,418	*146,443	*144,828	*137,290	130,000
Chile: Talc	980	1,070	835	*898	900
China: Unspecified*	*1,700,000	*1,900,000	*2,100,000	*2,200,000	2,300,000
Colombia: Pyrophyllite, soapstone, talc	11,927	12,800	9,196	*10,113	10,000
Egypt: Pyrophyllite, talc, soapstone, steatite	*6,600	7,268	7,146	*6,340	6,000
Finland: Talc	*324,000	379,000	*398,000	*385,000	375,000
France: Talc	*328,800	*320,000	329,960	*284,000	300,000
Federal Republic of Germany, Western states: Talc (marketable)	19,785	19,500	13,000	*12,000	12,000
Greece: Steatite	1,507	*1,587	*1,600	*1,600	1,600
Hungary: Talc*	15,000	13,000	12,000	12,000	10,000
India:					
Pyrophyllite	51,724	64,923	97,264	*80,000	80,000
Steatite	359,448	417,493	414,268	*390,000	400,000
Iran: Talc*	*16,975	*29,261	*11,039	*31,087	30,000
Italy: Steatite and talc	150,718	158,722	146,000	*158,851	158,500
Japan:					
Pyrophyllite	1,241,069	1,244,491	1,233,600	*1,213,036	*1,229,287
Talc	55,899	49,797	55,665	61,550	*65,625
Korea, North: Unspecified*	170,000	170,000	170,000	170,000	170,000
Korea, Republic of:					
Pyrophyllite	690,819	673,776	770,298	*657,611	660,000
Talc	161,052	146,478	162,098	*181,600	180,000
Mexico: Talc	17,469	13,645	13,908	*13,590	*14,368
Nepal: Talc*	3,359	4,430	6,728	*1,798	2,000
Norway: Talc*	100,000	100,000	100,000	100,000	100,000
Pakistan: Pyrophyllite	23,278	37,429	38,290	*30,177	30,000
Paraguay: Unspecified	180	150	200	*200	200
Peru:					
Pyrophyllite	705	*9,200	*7,500	*7,500	7,500
Talc	1,447	*1,450	*1,500	*1,500	1,500
Philippines: Talc	—	27	—	—	—
Portugal: Talc	7,292	7,187	8,063	7,926	8,000

See footnotes at end of table.

TABLE 8—Continued
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT¹

(Metric tons)

Country ²	1987	1988	1989	1990	1991 ³
Romania: Talc ⁴	'50,000	'50,000	'45,638	'40,000	40,000
South Africa, Republic of:					
Pyrophyllite	3,467	3,162	3,942	2,759	'4,448
Talc	8,005	10,111	11,596	11,179	'6,235
Spain: Steatite	75,307	68,979	'75,000	'75,000	70,000
Sweden: Talc and steatite ⁵	'16,981	16,000	16,000	16,000	16,000
Taiwan: Talc	22,102	21,603	22,559	'22,123	22,000
Thailand:					
Pyrophyllite	37,749	37,285	39,799	'29,290	30,000
Talc	4,101	4,843	7,242	'4,360	4,000
Turkey	'15,000	5,397	5,614	'6,000	6,000
U.S.S.R.: Talc ⁶	530,000	530,000	530,000	500,000	450,000
United Kingdom: Talc	12,529	14,182	15,413	'14,781	15,000
United States:					
Pyrophyllite	83,000	97,000	81,301	82,025	W
Talc	1,080,000	1,136,347	1,171,871	1,185,142	'1,037,196
Uruguay: Talc ⁷	'1,648	1,600	1,600	'1,600	1,600
Zambia: Talc	258	73	114	'160	180
Zimbabwe: Talc	516	976	1,513	'1,787	1,500
Total	'8,489,822	'8,853,158	'9,358,504	'9,084,414	8,848,235
Of which:					
Pyrophyllite	2,190,221	'2,233,757	'2,440,304	'2,228,698	2,168,435
Steatite	566,543	'621,308	'624,216	'600,841	604,870
Talc	'3,420,698	'3,458,782	'3,575,000	'3,430,081	3,242,104
Unspecified	'2,297,360	'2,533,914	'2,713,370	'2,818,794	2,910,700

¹Estimated. ²Revised.

³Table includes data available through May 11, 1992.

⁴In addition to the countries listed, Czechoslovakia produces talc, but information is inadequate to make reliable estimates of output levels.

⁵Total of beneficiated production, salable direct shipping production, and that consumed by producers.

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

⁷Reported figure.

⁸Data based on Nepalese fiscal year beginning mid-July of year stated.