

# Talc, Soapstone, and Pyrophyllite

By J. Robert Wells<sup>1</sup>

Total U.S. production of talc, soapstone, and pyrophyllite (known collectively as the talc-group minerals) was greater in 1972 than in any previous year, almost half again as much as a decade ago in regard to both tonnage and total value.

American Talc Co., Inc., previously operating only in Alabama, extended its talc mining to Montana with the acquisition in 1972 of the Willow Creek mine in Madison County. Johns-Manville Corp. (headquarters now in Denver, Colo.) acquired the California properties of L. Grantham Corp. at midyear. Grantham, operating the Warm Springs mine and grinding facilities in the southwestern part of Death Valley, Inyo County, was for many years one of the largest producers of high-quality talc in the United States.

Talcum powder, the familiar and best known form in which talc is used, was unjustly stigmatized in the August 1972 deaths of a number of infants in France. After investigation, it was determined that the tragedy was the result of an excessive quantity of a bactericide that had been added to the powder.

Some industrial talc producers and users were experiencing an increasingly difficult situation in 1972 because of the close mineralogical relationship between talc and a group of other minerals, some of which

may become carcinogenic under conditions involving long-continued inhalation. No authoritative distinction has ever been drawn between talc and tremolite, a substantial proportion of which is known to be present in some grades of fibrous talc. That ambiguity and a tendency to regard tremolite as a form of asbestos, in combination with growing emphasis on environmental and health considerations, began to plant doubts concerning industrial talc's hitherto unquestioned classification as an essentially harmless and unrestrictedly usable raw material.

**Legislation and Government Programs.**—The Defense Materials Inventories prepared by General Services Administration (GSA) showed that Government holdings as of December 31, 1972, included 1,180 short tons of talc (steatite, block or lump), with a market value of \$383,500, and 3,900 short tons of talc (steatite, ground) valued at \$21,400. Of the block or lump steatite, 980 short tons was listed as excess inventory, as was also the entire quantity of ground material. During calendar 1972, 24 tons of block material, valued at \$7,800, was sold from stockpile inventory, but none of the ground talc was disposed of.

<sup>1</sup> Physical scientist, Division of Nonmetallic Minerals.

Table 1.—Salient talc, soapstone, and pyrophyllite statistics

(Thousand short tons and thousand dollars)

	1968	1969	1970	1971	1972
<b>United States:</b>					
Mine production .....	958	1,029	1,028	1,037	1,107
Value .....	6,656	7,508	7,773	7,634	7,835
Sold by producers .....	886	985	948	979	1,084
Value .....	22,968	26,294	25,980	26,936	33,709
Exports <sup>1</sup> .....	66	69	105	136	171
Value .....	3,521	3,713	5,739	4,844	5,791
Imports for consumption .....	24	20	30	17	29
Value .....	973	749	1,294	745	1,669
Apparent consumption .....	844	936	873	860	942
World: Production .....	4,796	5,162	5,316	5,207	5,252

<sup>1</sup> Excludes powders—talcum (in package), face, and compact.

In June 1972 the Occupational Safety and Health Administration (OSHA) published regulations governing the size and number of fibers of asbestiform minerals (genetically related to talc and often accompanying it in its ores) that may enter the atmosphere at mineral processing plants. Some restraint on industrial utilization of talc, especially of the tremolitic type, was foreseen as a consequence of

these controls. The Food and Drug Administration (FDA) set forth a proposal calling for complete elimination of asbestos particles from talc used in the preparation or packaging of all foods and/or cosmetic and drug products. No suggestion was offered concerning sampling and analytical procedures capable of establishing the complete absence of such particles.

## DOMESTIC PRODUCTION

The total tonnage of U.S. mine production of talc-group minerals in 1972 was 7% greater than the previous high mark set in 1971, and the corresponding total value was nearly 1% above the then alltime high reached in 1970.

Talc-group minerals were produced in the United States from a total of 54 mines distributed throughout Alabama, Arkansas, California, Georgia, Maryland, Montana, Nevada, New York, North Carolina, Oregon, Texas, Vermont, Virginia, and Washington. Talc or soapstone was mined at one or more locations (48 in all) in each of those 14 States. Domestic production of pyrophyllite consisted, for the first time in more than 20 years, of the output of just one State, North Carolina, where six mines supplied that mineral.

Five States, led by New York and with Texas, Vermont, California, and Montana following in descending order, provided 86% of the total 1972 talc-group tonnage; the same States, in nearly the same order except with Vermont nosing out Texas for second place, also made up 86% of the

corresponding total value. The largest domestic producers of talc-group minerals in 1972, accounting jointly for three-quarters of the total tonnage and two-thirds of the total value, were (in alphabetical order) Cyprus Mines Corp., United Sierra Division, with operations in California, Montana, and Texas; Eastern Magnesia Talc Co. in Vermont; L. Grantham Corp. in California; International Talc Co., Inc. in New York; Pfizer Inc., Minerals, Pigments & Metals Division, in California and Montana; Southern Clay Products, Inc. in Texas; R. T. Vanderbilt Co., Inc., with subsidiaries Gouverneur Talc Co., Inc. in New York and Western Talc Co., Inc. in California; and Windsor Minerals, Inc., in Vermont.

Talc minerals were ground for sale or industrial use in 1972 at approximately 40 mills operated by 30 companies in 12 States. Talc or soapstone mined in Arkansas, Nevada and Washington was ground elsewhere, while talc that originated in another State was ground in Nebraska, where there was no mine production.

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

(Short tons and thousand dollars)

State	1971		1972	
	Quantity	Value	Quantity	Value
California.....	153,227	2,084	155,155	1,186
Georgia.....	53,000	334	45,842	338
North Carolina.....	85,289	522	89,334	594
Texas.....	193,880	1,024	221,022	1,262
Vermont.....	176,104	925	180,239	1,326
Other States <sup>1</sup> .....	375,847	2,745	415,812	3,129
Total.....	1,097,297	7,634	1,107,404	7,835

<sup>1</sup> Includes Alabama, Arkansas, Maryland, Montana, Nevada (1972), New York, Oregon, Virginia, and Washington.

**Table 3.—Talc, soapstone, and pyrophyllite sold or used by producers in the United States, by class**  
(Short tons and thousand dollars)

Year	Crude		Ground		Total <sup>1</sup>	
	Quantity	Value	Quantity	Value	Quantity	Value
1968.....	64,877	331	821,601	22,637	886,478	22,968
1969.....	81,015	362	904,318	25,931	985,333	26,294
1970.....	95,561	572	851,956	25,407	947,517	25,980
1971.....	131,961	789	847,309	26,147	979,270	26,986
1972.....	89,949	521	994,263	33,188	1,084,212	33,709

<sup>1</sup> Data may not add to totals shown because of independent rounding.

### CONSUMPTION AND USES

Apparent consumption of talc-group minerals in the United States in 1972 (total sales plus imports minus exports) amounted to 942,000 short tons (compared with 860,000 tons in 1971 and 873,000 tons in 1970), setting a new high mark for this figure, almost 1% above the previous record established in 1969.

Reported sales of ground material totaled 17% more in tonnage than in 1971, and the total value was 27% higher, with especially large gains in tonnage being scored by California, New York, and Texas and in value by California, Georgia, New York, North Carolina, and Texas.

Thirty percent of the total quantity of talc, soapstone, and pyrophyllite sold or

used by domestic producers in 1972 was consumed in the manufacture of ceramics and 16% in paints. A salient feature of the 1972 end-use distribution of these materials was the marked difference in the proportion allocated to toilet preparations (12%, compared with 3% in 1971 and 2% in 1970), a divergence that is thought to be more a reflection of anomalous reporting in previous years than an indication of an abrupt upsurge in this utilization. The shares of the 1972 total that were taken by the other major consumption categories (insecticides, paper, roofing, and rubber products) were no more than fractionally different from the respective 1971 figures.

**Table 4.—Pyrophyllite <sup>1</sup> produced and sold by producers in the United States**

Year	Production		Total sales
	Short tons	Short tons	Value (thousands)
1968.....	130,624	120,319	\$1,748
1969.....	104,347	110,816	1,632
1970.....	120,077	95,735	1,317
1971.....	101,080	90,477	1,155
1972.....	W	90,482	1,236

W Withheld to avoid disclosing individual company confidential data.

<sup>1</sup> Includes sericite schist (1968-70).

**Table 5.—Talc, soapstone, and pyrophyllite sold or used by producers in the United States, by use**  
(Short tons)

Use	1971	1972
Ceramics.....	270,358	329,406
Paint.....	155,140	173,663
Toilet preparations.....	31,249	132,000
Exports.....	101,797	100,746
Insecticides.....	63,381	65,465
Paper.....	52,886	58,505
Refractories.....	27,795	40,119
Rubber.....	27,098	36,215
Roofing.....	35,189	32,913
Textiles.....	4,985	12,010
Asphalt filler.....	35,259	11,769
Other uses <sup>1</sup> .....	174,133	91,401
Total.....	979,270	1,084,212

<sup>1</sup> Includes plastics, stucco, floor tile, foundry facings, rice polishing, crayons, art sculpture, and other uses.

## STOCKS

It was estimated, on the basis of a comparison of the figures reported in 1972 for domestic production of talc-group minerals and for the quantity of those materials sold or used, that U.S. producers may have

had 167,000 short tons of mined talc, soapstone, and pyrophyllite on hand (crude, ground, or in process) on December 31, 1972, compared with 144,000 tons on that date in 1971 and 205,000 tons in 1970.

## PRICES

The average of unit values reported by domestic producers of crude talc, soapstone, and pyrophyllite in 1972 was \$7.08 per short ton, compared with \$7.36 in 1971 and \$7.56 in 1970. In contrast to that decline, the average unit value reported for all talc-group minerals sold or used by domestic producers (mostly processed material but not including finished cosmetic preparations) increased sharply to \$31.09 per ton, compared with \$27.51 in 1971 and \$27.42 in 1970.

Engineering and Mining Journal, December 1972, quoted prices for domestic ground talc in carload lots, f.o.b. mine or mill, containers included, per short ton, as follows:

<b>Vermont:</b>	
98% through 325 mesh, bulk.....	\$20.00
99.99% through 325 mesh, bags:	
Dry processed.....	55.00
Water beneficiated.....	81.00
<b>New York:</b>	
96% through 200 mesh.....	28.00
99.9% through 325 mesh.....	44.50
100% through 325 mesh, fluid energy ground.....	80.00-90.00

<b>California:</b>	
Standard.....	37.00- 53.00
Fractionated.....	37.00- 71.00
Micronized.....	62.00-104.00
Cosmetic/steatite.....	44.00- 65.00
<b>Georgia:</b>	
98% through 200 mesh.....	14.00
99% through 325 mesh.....	25.00
100% through 325 mesh, fluid energy ground.....	75.00

The price range quoted in Chemical Marketing Reporter, December 25, 1972, for carload lots of imported Canadian talc, ground, in bags, was from \$20 to \$35 per ton, f.o.b. works.

American Paint Journal, November 27, 1972, listed the following prices per ton for paint-grade talcs in carload lots:

<b>California: 325 mesh, bags, mill:</b>	
Fibrous, white, high oil absorption.....	\$34.00-\$37.00
Semifibrous, medium oil absorption.....	32.00- 73.95
<b>Montana:</b>	
Ultrafine grind, f.o.b. mill.....	70.00
<b>New York: Fibrous and semifibrous, bags, mill:</b>	
98% through 325 mesh.....	31.00
99.4% through 325 mesh.....	40.00
Trace retained on 325 mesh.....	80.00
Fine micron talcs (origin not specified).....	68.00-111.50

## FOREIGN TRADE

**Exports.**—The United States exported a greater quantity of talc-group materials in 1972 than in any previous year, topping the former record for tonnage (1971) by 26% and for value (1970) by 1%. The exported material went to a total of 57 countries, 18 in the Western Hemisphere, 17 in Asia/Oceania, 16 in Europe, and six in Africa. Sharply increased shipments to two major recipients, Canada and Mexico (up 54% and 25%, respectively, from 1971 figures), were the most notable factors contributing to the new record total.

**Imports.**—In 1972 the total value of U.S. imports of talc minerals for consumption reached the highest level on record, 29% above the mark set in 1970, and the 1972 tonnage was exceeded only by that of 1970, (3% higher). Outstandingly in first place among 1972 talc imports were receipts from Italy which added up to the largest

tonnage from there since 1963 and to the highest total value ever recorded from any one country in any one year.

**Tariffs.**—Schedules applicable throughout 1972 provided for import duties on the various classifications of talc as follows: Crude and not ground, 0.02 cent per pound; ground, washed, powdered, or pulverized, 6% ad valorem; cut or sawed, or in blanks, crayons, cubes, disks, or other forms, 0.2 cent per pound; and other, not specially provided for, 12% ad valorem.

**Table 6.—U.S. exports of talc, soapstone, and pyrophyllite, crude and ground**  
(Thousand short tons and thousand dollars)

Year	Quantity	Value
1970.....	105	5,739
1971.....	136	4,844
1972.....	171	5,791

Table 7.—U.S. imports for consumption of talc, steatite or soapstone, by class and country

(Short tons and thousand dollars)

Year and country	Crude and unground		Ground, washed, powdered or pulverized		Cut and sawed		Total unmanufactured	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value <sup>1</sup>
1970.....	18,426	697	11,207	408	355	189	29,988	1,294
1971:								
Canada.....	4,821	48	3,200	85	4	3	8,025	136
France.....	--	--	4,225	137	--	--	4,225	137
Germany, West.....	--	--	2	( <sup>2</sup> )	--	--	2	( <sup>2</sup> )
India.....	--	--	--	--	2	1	2	1
Italy.....	2,756	142	1,462	123	6	5	4,224	270
Japan.....	--	--	--	--	282	167	282	167
Korea, Republic of.....	--	--	622	34	--	--	622	34
Total.....	7,577	190	9,511	379	294	176	17,382	745
1972:								
Canada.....	3,639	37	3,027	93	7	4	6,673	134
France.....	--	--	3,652	135	--	--	3,652	135
Hong Kong.....	--	--	--	--	171	92	171	92
India.....	--	--	--	--	3	1	3	1
Italy.....	15,102	833	743	73	--	--	15,850	906
Japan.....	--	--	--	--	502	324	502	324
Korea, Republic of.....	--	--	2,044	43	52	28	2,096	76
Thailand.....	133	1	--	--	--	--	133	1
Total.....	18,879	871	9,471	349	735	449	29,085	1,669

<sup>1</sup> Does not include talc, n.s.p.f.: 1970, \$5,651; 1971, \$17,997; 1972, \$128,925.<sup>2</sup> Less than 1/2 unit.

## WORLD REVIEW

A private firm of marketing consultants, C. H. Kline & Co., of Fairfield, N.J., scheduled for completion in late 1972 two new surveys of the current and projected marketing situation, both domestic and international, of a number of filler and extender pigments, among which talc is a prominent example. The announced objective of the first study was a review of new developments and future trends in the U.S. market for those commodities; that of the second was an analysis of the factors and sometimes complex interrelationships affecting that market in parts of Europe, specifically Spain and the countries of the European Economic Community and the European Free Trade Association.

**Australia.**—Talc reserves at the Seabrook deposit near Meekatharra, West Australia, property of Westside Minerals, N.L., were estimated at 1 to 2 million tons of 76% ore easily extractable by selective open pit methods. Preparations were made to begin mining at an initial rate of 100,000 tons per year, and plans were revealed to process the output in a milling plant to be constructed especially for that purpose at the Indian Ocean port of Perth. Australia's

total annual production of talc has ranged in recent years from less than 20,000 tons to over 140,000 tons.

**Brazil.**—Although no official quantitative data are published, Brazil has a substantial yearly output of talc and soapstone, mostly from Paraná and Minas Gerais, while lesser quantities are mined in Rio de Janeiro, São Paulo, and Bahia. There is a significant export trade in talc, and a growing cottage industry utilizes important quantities of soapstone in the production of hand-carved art objects.

**Canada.**—Three companies produce talc in Canada, one in Ontario and two in Quebec. The leader, Baker Talc Ltd., with properties near South Bolton, Quebec, has developed beneficiation procedures for upgrading its talc product to paint and paper grade; that process, involving both froth flotation and high-intensity wet magnetic separation, was placed in limited-scale operation in 1970 and went to full-scale in 1972.

Pyrophyllite was found to make up the bulk of an intrusive body of relatively recent geological age at the west end of the working pit of the newly developed Island

Copper Mine on Vancouver Island, British Columbia. Plans for commercializing the discovery were not mentioned.<sup>2</sup>

**China, People's Republic of.**—Talc-group minerals are among China's more important export items, and as much as half the yearly output of high-quality material from the Ta-ling deposit at Liaoning, southern Manchuria, may be sold overseas. Japan received about two-thirds of the approximately 80,000 tons exported in 1970, and lesser quantities went to destinations in Poland, the United Kingdom, and the U.S.S.R.

**Egypt, Arab Republic of.**—The most important sources of talc in Egypt are the Darhib and El Atshan mines in the Eastern Desert, the region bordering on the Gulf of Suez and the Red Sea. Large-scale production of ceramic and pharmaceutical-grade talc from that area was curtailed in 1968 because of a heavy accumulation of stocks in the preceding years.

**France.**—An apparent outbreak of encephalitis in northern France that was accompanied by symptoms of acute skin irritation and which affected only small infants, resulted in at least 20 deaths. The illness was traced to the use in each case of one particular brand of baby powder, and statements were made that the fatalities had been caused by talcum powder. The French government's investigation showed that the tragic episode was attributable, rather, to an error in the formulation of the product. The preparation had been allowed to go on sale containing a lethal concentration (as high as 6%) of an effective but dangerous antibacterial agent, hexachlorophene.

**Germany, West.**—Talc imports in 1971 amounted to 10,300 short tons, 4% less than in the previous year. Austria was the principal source of the 1971 imports with 39% of the total (up from 36% in 1970). Other major suppliers in 1971 were Italy with 17%, France with 13% and Norway with 11%. The United States furnished 3% of West Germany's imported talc in 1970 but only a fraction over 1% in 1971.

**India.**—Recent mineral discoveries in northwest and north-central Kashmir State included talc deposits in the districts of Gilgit and Baltistan. Prospecting licenses were being granted seekers of talc and other specified minerals in that region

with the understanding that such licenses will be convertible to 20- or 30-year mining leases in the event of successful exploration.

**Italy.**—Italian exports of talc-group minerals in 1971 amounted to nearly one-third of the total quantity produced, only fractionally different from the previous year's proportion. Among the principal recipients of the material exported in 1971 were West Germany, the United Kingdom, and the United States.

**Korea, Republic of.**—The government-controlled Korea Mining Promotion Corporation announced that a \$4.8 million loan from the Asian Development Bank was being negotiated for the procurement of new mining equipment. The stated objective of this procurement and related modernization activities was the establishment of a situation to encourage production and use of an extensive list of domestic mineral raw materials. Among the products mentioned, talc and pyrophyllite (from the Tongyang and Sungsan mines, respectively) are rapidly attaining major importance as earners of foreign exchange.

**South Africa, Republic of.**—Figures for 1972 mineral production included 9,656 short tons of talc and 2,270 short tons of "wonderstone," the name given to a special variety of pyrophyllite that is mined locally. Exports accounted for only 2% of the tonnage of talc and 12% of the pyrophyllite, but the unit values of the exported materials (equivalent respectively to \$51.00 per short ton and \$213.00 per short ton) were indicative of the exceptional grades involved.

**Swaziland.**—A group of Japanese companies, headed by a Mitsubishi subsidiary, held discussions with Swaziland Industries (Pty), Ltd., with a view to initiating exploitation of a newly discovered deposit of pyrophyllite in the southwestern Highveld area, presumably to supply material for shipment to Japan. Swaziland Industries currently mines pyrophyllite from a deposit near Sicunusa in the Manzini district, but the entire output of that operation is exported to the Republic of South Africa.

**Sweden.**—Production of talc and soapstone in Sweden has averaged about 30,000

<sup>2</sup> Mining Magazine (London). Island Copper Project. V. 127, No. 4, October 1972, pp. 344-345, 347.

short tons annually throughout the last decade, but consumption of those materials has consistently exceeded the domestic output, and imports (chiefly from Austria and Norway) have substantially outweighed ex-

ports. In 1972 Sweden's mines yielded 26,450 tons of talc-group minerals, and 24,000 tons was imported at a total cost of \$1.5 million. Only 1,800 tons, valued at \$38,000, was exported.

Table 8.—Talc, soapstone, and pyrophyllite: World production by country

(Short tons)

Country <sup>1</sup>	1970	1971	1972 <sup>p</sup>
<b>North America:</b>			
Canada (shipments).....	72,055	65,562	80,000
Mexico.....	2,320	1,889	* 1,870
United States.....	1,027,929	1,037,297	1,107,404
<b>South America:</b>			
Argentina.....	34,066	38,705	* 38,600
Brazil (talc) °.....	143,000	143,000	143,000
Chile.....	r 2,315	1,988	2,021
Colombia.....	1,899	2,177	2,477
Paraguay.....	132	176	243
Peru (pyrophyllite).....	702	* 660	* 660
Uruguay (ground talc).....	1,801	989	1,458
<b>Europe:</b>			
Austria.....	110,406	100,995	91,725
Finland.....	69,140	110,979	99,568
France.....	r 241,538	279,579	* 280,000
Germany, West (marketable).....	37,265	32,692	34,743
Greece.....	6,614	2,045	* 2,200
Hungary.....	17,801	* 17,600	* 17,600
Italy (talc and steatite).....	170,657	151,973	163,607
Norway (ground talc).....	77,771	* r 78,000	* 78,000
Portugal.....	1,992	1,405	1,327
Romania.....	62,532	* 65,000	65,000
Spain.....	43,665	44,911	* 45,200
Sweden.....	r 35,688	26,505	* 26,450
U.S.S.R.°.....	r 420,000	r 420,000	* 430,000
United Kingdom.....	12,074	* 12,000	* 12,000
<b>Africa:</b>			
Botswana.....	r 40	143	--
Egypt, Arab Republic of.....	7,151	6,968	* 6,940
Morocco.....	249	(2)	--
South Africa, Republic of <sup>3</sup> .....	13,657	12,975	11,926
Swaziland (pyrophyllite).....	280	225	* 220
Zambia.....	(4)	160	4,905
<b>Asia:</b>			
Burma.....	235	237	* 240
China, People's Republic of °.....	165,000	165,000	165,000
India.....	185,641	208,094	209,189
Japan <sup>5</sup> .....	r 1,847,855	1,781,827	1,661,114
Korea, North °.....	83,000	99,000	110,000
Korea, Republic of (talc and pyrophyllite).....	224,952	234,185	259,867
Pakistan (soapstone).....	3,900	* 5,200	4,846
Philippines.....	1,753	1,452	1,110
Taiwan (soapstone).....	42,678	43,036	27,328
Thailand (pyrophyllite).....	--	55	1,709
<b>Oceania: Australia (talc).....</b>			
	141,253	62,186	* 62,000
<b>Total.....</b>	<b>r 5,316,006</b>	<b>5,206,770</b>	<b>5,251,547</b>

° Estimate.    p Preliminary.    r Revised.

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

<sup>2</sup> Revised to zero.

<sup>3</sup> Includes talc and wonderstone (pyrophyllite).

<sup>4</sup> Less than 1/2 unit.

<sup>5</sup> Includes talc and pyrophyllite; in addition, pyrophyllite clay is produced as follows in short tons: 1970—507,112; 1971—354,160; 1972—343,180.

## TECHNOLOGY

In an annual review of materials used for ceramic processing, an industrial journal presented informative summaries on the nature, occurrence, and applications of a number of talc-group minerals and related materials.<sup>3</sup> Research was successfully concluded in an effort to develop an advantageous method for beneficiating western talc ores in which the mineral is present in the soft, platy form. The procedure finally selected was characterized as an attrition-scrubbing sedimentation process.<sup>4</sup> The research program of the Bureau of Mines included experiments to evaluate the possible use of talc, glass fiber, and dicyclopentadiene in a sulfur matrix for building purposes. No expedient was discovered for combating destructive changes found to take place in the composites upon aging, and the outlook was considered to be unfavorable.

The raw materials (including talc and pyrophyllite), as well as the technologically advanced methods and equipment recommended for efficiently fabricating them into ceramic tile were discussed in a journal article,<sup>5</sup> and another article reviewed operations of a specific installation where those materials and techniques similar to those advocated are being employed.<sup>6</sup> Some of the technologic considerations involved in the utilization of a particular type of talc in a specified application were the subject of an article.<sup>7</sup> A detailed description of the emission-abatement program at facilities of a major talc producer was presented at a professional society meeting and was made available in booklet form.<sup>8</sup>

Particles of platy talc ore of cosmetic grade are effectually delaminated in a patented procedure by being subjected to a variety of selective forces that achieve maximum reduction in the thickness of the particles while leaving their lengths and widths relatively unchanged. The resulting low-density, high-slip product is described as lustrous and possessing optimum texture and lubricity so as to be exceptionally suitable for use in body powders.<sup>9</sup> Talc and graphite were specified to serve as thickeners for mixing with finely divided polytetrafluoroethylene and colloidal chrysotile asbestos to be combined with a major proportion of a lubricating oil in a

patented formulation for a high-pressure lubricating grease.<sup>10</sup> A patent was issued for an improved printing ink, composed of ground talc, a pigment, and polyamide epichlorohydrin dispersed in a solvent.<sup>11</sup>

A process and equipment were patented for accelerating granules of talc, or other mineral substances, through a nozzle to supersonic velocities in order to pulverize the material by the standing shock wave so produced.<sup>12</sup> Finely divided talc, either micaceous or granular and amounting to as much as 50% of the total weight, can be added to a specified organic material to produce a patented substrate that will receive a metal surface suitable for electroplating.<sup>13</sup> A process was patented for reacting talc, lithium carbonate, sodium carbonate, and aqueous sodium silicate to produce a substance that can be dried for use in catalytic applications normally served by certain naturally occurring materials of the montmorillonite clays group.<sup>14</sup>

<sup>3</sup> Ceramic Industry Magazine. Steatite. V. 100, No. 1, January 1973, p. 28.

\_\_\_\_\_. Cordierite V. 100, No. 1, January 1973, p. 58.

\_\_\_\_\_. Pyrophyllite. V. 100, No. 1, January 1973, p. 96.

\_\_\_\_\_. Sericite. V. 100, No. 1, January 1973, p. 99.

\_\_\_\_\_. Talc. V. 100, No. 1, January 1973, p. 107.

\_\_\_\_\_. Wonderstone. V. 100, No. 1, January 1973, p. 112.

<sup>4</sup> Roe, Lawrence A. High Purity Talc From Western Ores. Pres. at Fall Meeting, Soc. Min. Eng. AIME, Birmingham, Ala., Oct. 18-20, 1972, Preprint 72-H-312, 16 pp.

<sup>5</sup> Altschuler, Otto. The Ideal Tile Plant. Ceram. Ind. Mag., v. 99, No. 2, July 1972, pp. 36-37.

<sup>6</sup> Jordan, Roy, Jr. Flamingo Tile: Maverick Methods, Rewarding Results. Ceram. Age, v. 88, No. 5, May 1972, pp. 15, 18-19.

<sup>7</sup> O'Shaughnessy, James G. Reformulating Calcium Base Pigments With New York State Talc. Amer. Paint J., v. 56, No. 34, Feb. 7, 1972, pp. 15-17.

<sup>8</sup> Erdman, G. R. Dust Control at Gouverneur Talc Company, Inc. Pres. at Fall Meeting, Soc. Min. Eng., AIME, Birmingham, Ala., Oct. 18-20, 1972, Preprint 72-H-39, 16 pp.

<sup>9</sup> Ashton, W. H., and R. S. Russell. Talc Beneficiation. U.S. Pat. 3,684,197, Aug. 15, 1972.

<sup>10</sup> Curtis, G. C. (assigned to Esso Research and Engineering Co.). Extreme Pressure Grease. U.S. Pat. 3,639,237, Feb. 1, 1972.

<sup>11</sup> Schneider, D. J. (assigned to Howard Paper Co.). Bleed Resistant Ink. U.S. Pat. 3,642,502, Feb. 15, 1972.

<sup>12</sup> Dille, R.M., and W. C. Schlinger (assigned to Texaco, Inc.). Fluid Energy Grinding Method and System. U.S. Pat. 3,643,875, Feb. 22, 1972.

<sup>13</sup> Peppe, W., H. M. Khelghatian, and A. J. Lutz, Jr. (assigned to Standard Oil Co.). Talc Filled Metallizable Polyolefins. U.S. Pat. 3,663,260, May 16, 1972.

<sup>14</sup> Orlemann, J. K. (assigned to Pfizer, Inc.). Process for Producing Synthetic Hectorite-Type Clays. U.S. Pat. 3,666,407, May 30, 1972.



A patent was granted for a process in which talc, clay, feldspar, wollastonite, or other ceramic materials are combined in an aqueous mixture with an approximately equal quantity of exfoliated vermiculite, and that mixture is pressed into shapes that are then dried, fired, and glazed to produce strong and lightweight disposable containers.<sup>15</sup> In a process for which a patent was granted, an aqueous dispersion of pyrophyllite is applied to one surface of a paper form, after which the object is

dried, coated with a glazing material, and fired to vitrify the glaze and consume the combustible base, thus producing inexpensive, thin-walled ceramic ware to be discarded after a single use.<sup>16</sup>

---

<sup>15</sup> Hardy, P. W., and O. M. Peterson (assigned to American Can Co.). Method of Making Glazed Ceramic Bonded Expanded Vermiculite Articles. U.S. Pat. 3,689,611, Sept. 5, 1972.

<sup>16</sup> Simmen, F. G. (assigned to Hall China Co.). Manufacture of Disposable Ceramic Dishes From High-Alkali Pyrophyllite. U.S. Pat. 3,655,843, Apr. 11, 1972.

