TRIPOLI AND SPECIAL SILICA STONE

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This report covers tripoli and other fine-grained, porous silica materials that have similar properties and end uses (e.g., rottenstone and novaculite). It does not include certain fine-grained or porous silica materials, such as pumice, covered in the Minerals Yearbook published by the U.S. Geological Survey (USGS). Unless noted, all quantities reported below are in metric units.

Tripoli

Tripoli, as broadly defined, is composed of extremely fine-grained crystalline silica in various stages of aggregation. Grain sizes usually range from 1 to 10 micrometers, but particles as small as 0.1 to 0.2 micrometers are common. Commercial tripoli contains 98% to 99% silica and minor amounts of alumina (as clay) and iron oxide. Tripoli may be white or some shade of yellow, brown, or red depending on the percentage of iron oxide.

Production.—A USGS annual survey of producers indicates that the output of crude tripoli produced domestically in 1995 was 79,700 tons with an estimated value of $3.0 million. In the United States, four firms are known to produce and/or process tripoli. Malvern Minerals Co., Garland County, AR, produces crude and finished material. Malvern also produces a black material from novaculite. American Tripoli Co. produces crude material in Ottawa County, OK, and finished material in Newton County, MO. Unimin Specialty Minerals Inc. in Alexander County, IL, produces crude and finished material. Keystone Filler and Manufacturing Co. in Northumberland County, PA, processes rottenstone, a decomposed fine-grained siliceous shale purchased from local suppliers. All of the aforementioned firms responded to the USGS survey.

Consumption.—The USGS annual survey of producers indicates that sales/use of processed tripoli decreased 3% in quantity to 80,100 tons and decreased 4% in value to $10.5 million, compared with that of 1994.

Tripoli has unique applications as an abrasive due to its hardness and because its grain structure lacks distinct edges and corners. It is a mild abrasive, making it suitable for use in toothpaste and tooth polishing compounds, industrial soaps, and metal/jewelry polishing compounds. The automobile industry uses it in buffing and polishing compounds for lacquer finishing.

The end-use pattern for tripoli has changed significantly in the past 25 years. In 1970, nearly 70% of the processed tripoli was used as an abrasive. In 1995, over 75% of tripoli output was used as a filler and extender in paint, plastic, rubber, caulking compounds, and enamel.

Tripoli primarily is used as a filler and extender in paints. These applications may account for as much as 85% of the tripoli used as a filler and extender. In exterior latex paints, tripoli also aids in tint retention, durability, leveling, and flowability. In enamels, it eases application and improves sheen. The controlled grain/particle size of tripoli in paints improves dispersal and promotes a more uniform coating. Additionally, paints with tripoli resist chemical agents and wear better than those in which water-ground whitings and other softer or more reactive fillers are used.

Plastics, rubbers, and resins each account for about 5% of the tripoli used as a filler/extender. Tripoli is used extensively in plastics for electrical applications because of its dielectric characteristics and its effects on flexibility and compression properties. Its chemical resistance, weatherability, and resistance to salt spray also are important to its use in plastics. The physical properties of tripoli allow high loading in most compounds, but its abrasiveness results in high wear in extruding nozzles and molds. The same properties that make tripoli useful as a filler and extender in plastics makes it valuable to the rubber and resin industries.

Tripoli is almost entirely composed of crystalline silica, which can cause silicosis. Moreover, crystalline silica has been identified as a probable carcinogen by the International Agency for Research on Cancer and by other health research organizations. The Occupational Safety and Health Administration is required to regulate materials containing more than 0.1% crystalline silica in accordance with its Hazard Communication Standard. Consequently, all tripoli shipments must be labeled by producers in compliance with OSHA regulations.

Price.—The average reported value of all tripoli sold or used in the United States was $131 per ton in 1995, slightly less than in the previous year. The average reported value of abrasive tripoli sold or used in the United States during 1995 was $151 per ton; the average reported value of filler tripoli sold or used domestically was $125 per ton.

Special Silica Stone Products

Silica stone products are abrasive tools/materials such as hones, whetstones, oilstones, stone files, grindstones, grinding pebbles, tube-mill liners, and deburring media. These products are manufactured from novaculite, quartzite, and other microcrystalline quartz rock. However, this report excludes products fabricated from such materials by artificially bonding the abrasive grains.

Production.—In response to a USGS production survey, 13 domestic firms reported that they quarried certain silica materials and/or manufactured silica stone products during 1995. Arkansas accounted for most of the value and quantity of

production reported. Plants in Arkansas manufacture oilstones, whetstones, files, and deburring/tumbling media. Elsewhere, grindstones were manufactured in Ohio and tumbling/grinding media were produced in Wisconsin. Information on grinding pebbles and mill liners reportedly produced in Minnesota during 1994 was not available for 1995.

The industry has produced four main grades of Arkansas whetstone in recent years. The grades range from the high-quality Black Hard Arkansas Stone down to the Washita Stone. In general, the Black Hard has a porosity of 0.07% and a waxy luster, while Washita Stone has a porosity of 16% and resembles unglazed porcelain.

Consumption.—The domestic consumption of special silica stone products is a combination of household, industrial, leisure, and craft uses. Major household uses include the sharpening of knives and other cutlery such as scissors, shears, and lawn and garden tools. Leading industrial uses include the sharpening and honing of cutting surfaces, polishing of metal surfaces, and the deburring of metal and plastic castings. Recreational uses include the sharpening of sports knives, arrowheads, spear points, and fish hooks. Craft applications include sharping tools for wood carving, jewelry making, and engraving work. Also, silica stone files are used in the manufacture, repair, and modification of firearms.

Price.—The reported value of crude material suitable for cutting into finished products varied from $310 per ton to $1,140 per ton in 1995. The average value was $793 per ton. The average value of stone products made from crude material was $3.60 per pound.

Foreign Trade.—Silica stone products exported in 1995 had a value of at least $6.5 million. These exports were categorized as "hand sharpening and polishing stones" by the U.S. Department of Commerce, which collects trade data. This category accounted for most, if not all, of silica stone products exported in 1995.

The value of imported silica stone products in 1995 was at least $2.9 million. These imports were hand sharpening and polishing stones, which accounted for most or all of imported silica stone products in 1995. A portion of the finished products that were imported may have been made from crude novaculite produced within the United States and exported for processing.

Outlook

Consumption patterns for tripoli and special silica stone are not expected to change significantly over the next several years. Most of the existing markets are well defined and the probability of new uses is low.

OTHER SOURCES OF INFORMATION

U.S. Geological Survey Publications

Pumice, Mineral Industry Surveys, (annual).
Industrial Garnet, Mineral Industry Surveys, (annual).
Manufactured Abrasives, Mineral Industry Surveys (annual).
Manufactured Abrasives, Mineral Industry Surveys (quarterly).

TABLE 1
PROCESSED TRIPOLI 1/ 2/ SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY USE

Use		1991	1992	1993	1994	1995
Abrasives	metric tons	21,200	18,600	19,400	39,000	19,300
Value	thousands	$3,380	$2,780	$2,960	$5,170	$2,920
Filler	metric tons	52,300	57,600	58,900	42,800	60,700
Value	thousands	$10,000	$11,300	$12,600	$5,640	$7,580
Total quantity	metric tons	73,600	76,200	78,300	82,300	80,100
Total value	thousands	$13,400	$14,100	$15,500	$10,900	$10,500

1/ Includes amorphous silica and Pennsylvania rottenstone.
2/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 2
SALIENT U.S. SPECIAL SILICA STONE STATISTICS 1/

	Crude production		Sold or used	
Year	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1991	2,210	$161	272	$3,600
1992	1,730	239	340	4,550
1993	528	240	267	3,770
1994	873 r/	821 r/	487 r/	W
1995	979	777	374	W

r/ Revised. W Withheld to avoid disclosing company proprietary data.
1/ Data are rounded to three significant digitis.

TABLE 3
U.S. PRODUCERS OF SPECIAL SILICA STONE PRODUCTS IN 1995

Company and location	Type of operation	Product
Arkansas Abrasives, Inc.:		
Hot Springs, AR	Stone cutting and finishing	Whetstones and oilstones.
Blue Mountain Whetstone Co.:		
Hot Springs, AR	Stone cutting and finishing	Whetstones and oilstones.
Buffalo Stone Corp.:		
Hot Springs, AR	Tumbling and sizing novaculite	Metal finishing media deburring media.
Cleveland Quarries Co.:		
Amherst, OH	Stone cutting and finishing	Grindstones.
Gary Coleman:		
Jessieville, AR	Quarry	Crude novaculite.
Crow Stone Co.:		
Pearcy, AR	do.	Whetstones and oilstones.
Do.	do.	Crude novaculite.
Dan's Whetstone Co., Inc.:		
Hot Springs, AR	Stone cutting and finishing	Whetstones and oilstones.
Do.	Quarry	Crude novaculite.
Hall's Arkansas Oilstones, Inc.:		
Pearcy, AR	Stone cutting and finishing	Whetstones and oilstones.
Ed Kraemer and Sons Inc.:		
Baraboo, WI	Crushing and sizing	Deburring media.
Do.	Quarry	Crude silica stone.
Norton Company Oilstones:		
Hot Springs, AR	do.	Do.
Littleton, NH	Stone cutting and finishing	Whetstones and oilstones.
Robert Parker Stone Co.:		
Malvern, AR	Quarry	Crude novaculite.
Smith Abrasives, Inc.:		
Hot Springs, AR	Stone cutting and finishing	Whetstones and oilstones.
Do.	Quarry	Crude novaculite.
Taylor Made Crafts:		
Lake Hamilton, AR	Stone cutting and finishing	Whetstones and oilstones.