

# TRIPOLI AND SPECIAL SILICA STONE

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## Tripoli

The category of tripoli, as broadly defined, is composed of extremely fine-grained crystalline silica in various stages of aggregation. The particle 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. The U.S. Bureau of Mines (USBM) includes not only tripoli, but other fine-grained, porous silica materials that have similar properties and end uses such as rottenstone and novaculite. It does not include fine-grained or porous silica materials included in other Annual Mineral Industry Survey reports, such as pumice.

**Production.**—In 1994, the quantity of crude tripoli produced decreased 6% to 88,700 tons and the value of production decreased 3% to \$3.4 million. In the United States, four firms produced tripoli. Malvern Minerals Co., Garland County, AR, produced crude and finished material. Malvern also produces a black material from novaculite. American Tripoli Co. produced crude material in Ottawa County, OK, and finished material in Newton County, MO. Unimin Specialty Minerals Inc.'s Alco and Tamms plants, in Alexander County, IL, produced crude and finished material. Keystone Filler and Manufacturing Co. in Northumberland County, PA, processed rottenstone, a decomposed fine-grained siliceous shale, produced by B. J. Ulrich & Sons, also in Northumberland County, PA. All of the firms responded to the USBM voluntary survey.

**Consumption.**—Processed tripoli, sold or used, increased 5% in quantity to 82,300 tons and decreased 30% in value to \$10.9 million, compared with those of 1993. (See table 1.)

Tripoli has had unique uses as an abrasive because of its hardness and its grains lack distinct edges and corners. It is a mild abrasive, making it suitable for use in toothpaste and tooth polishing compounds, industrial soaps, and metal and jewelry polishing compounds. The automobile industry uses it in buffing and polishing compounds in lacquer finishing.

The end-use pattern for tripoli has change

significantly in the past 20 years. In 1970, nearly 70% of the processed tripoli was used as an abrasive. Today, 76% is used as a filler and extender in paint, plastic, rubber, caulking compounds, and enamel.

The largest use of tripoli is as a filler and extender in paints. These uses are estimated to account for as much as 85% of the tripoli used as filler and extender. Its use in exterior latex paints is as a low-micrometer grade micronized product. In these paints, tripoli aids in tint retention, durability, leveling, and flowability. In enamels, it permits higher loading with no appreciable increase in vehicle demand and improves sheen. Because of its controlled grain or particle size, paints containing tripoli disperse easier and result in a uniform film. Additionally, because of its abrasive qualities the paints are more resistive to wear, and more resistive to chemicals than those in which water-ground whittings and other reactive fillers are used.

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

Tripoli contains essentially 100% crystalline silica, so its use can cause silicosis and falls under the jurisdiction of the Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard. The International Agency for Research on Cancer and other independent studies have determined that crystalline silica is a probable carcinogen for humans. As a result, OSHA is required to regulate materials containing more than 0.1% crystalline silica. To date, it does not appear that these regulations have adversely affected the use of tripoli, but all tripoli must be labeled in compliance with OSHA regulations.

**Price.**—The average reported value of abrasive tripoli, sold or used, in the United States was about \$133 per ton. This was a 13%

decrease in the average value after 11 years of continuous increases. The average reported value of filler tripoli, sold or used, in the United States was \$132 per ton. This was a 38% decrease after 11 consecutive years of increases in the average reported value.

## Special Silica Stone

Special silica stone products include hones, whetstones, oilstones, stone files, grindstones, grinding pebbles, tube-mill liners, deburring media, and certain specialty products. These do not include products made from artificially bonded abrasive grains. Manufacture of these products was from novaculite, quartzite, or other quarried microcrystalline quartz rock.

**Production.**—Plants manufactured oilstones, hones, whetstones, and files in Arkansas. Additional production includes grindstones in Ohio, deburring media in Arkansas and Wisconsin, and grinding pebbles and mill liners in Minnesota. Production of the crude materials was in the same State as the products manufactured. (See tables 2 and 3.)

The industry manufactured four main grades of Arkansas whetstone. They ranged in grade from the high-quality Black Hard Arkansas Stone down to the Washita Stone. 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.

Arkansas accounted for essentially 100% of the value and total quantity of special silica stone products reported as sold or used by U.S. producers.

**Consumption.**—The domestic consumption of special silica stone products is a combination of residential, industrial, leisure, and craft uses. The major residential uses were the sharpening of knives and other cutlery such as scissors, shears, and lawn and garden tools. Major industrial uses were the sharpening and honing of cutting surfaces, polishing of metal surfaces, and the deburring of metal and plastic castings. The manufacture, repair, and modification of guns also make use of stone files. The recreational uses were the sharpening of sports knives, arrowheads, spear points, fish hooks, and other recreational items. Craft applications included uses in sharpening tools for wood carving, gun engraving, jewelry making, and other engraving work.

**Prices.**—The value of crude novaculite suitable for cutting into finished products varied from \$13 per ton to \$895 per ton. The low value was for Washita grade and the high for Black Hard Arkansas grade. The manufacture of deburring media or special-purpose crushed stone is from material not suited for making oilstones, hones, or whetstones. The value of these materials ranged from \$469 per ton to \$1,176 per ton.

**Foreign Trade.**—The value of exported special silica stone products was \$8.6 million, an increase of 30% compared with that of 1993.

The value of imported products was \$2.4 million, the same as for 1993. The United States continues to be a net exporter of special silica stone products. A portion of the finished products imported was from crude novaculite produced within the United States and exported for processing. In 1994, the trade surplus in special silica stone products was \$6.2 million, an increase of about 29%.

## **Outlook**

The use patterns for tripoli and special silica stone will not change significantly in the next 5 years. Most of the markets are well defined and the chance of developing new markets are limited.

## **OTHER SOURCES OF INFORMATION**

### **U.S. Bureau of Mines Publication**

Abrasive Materials Annual Report, 1993.

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

Use		1990	1991	1992	1993	1994
Abrasives	metric tons	24,100	21,200	18,600	19,400	39,000
Value	thousands	\$3,080	\$3,380	\$2,780	\$2,960	\$5,170
Filler	metric tons	56,500	52,300	57,600	58,900	42,800
Value	thousands	\$11,000	\$10,000	\$11,300	\$12,600	\$5,640
Total quantity	metric tons	80,600	73,600	76,200	78,300	82,300
Total value	thousands	\$14,100	\$13,400	\$14,100	\$15,500	\$10,900

1/ Includes amorphous silica and Pennsylvania rottenstone.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

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

Year	Crude production		Sold or used	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1990	3,710	\$230	450	\$6,330
1991	2,210	161	272	3,600
1992	1,730	239	340	4,550
1993	528	240	267	3,770
1994	W	242	514	W

W Withheld to avoid disclosing company proprietary data.

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits.

TABLE 3  
U.S. PRODUCERS OF SPECIAL SILICA STONE PRODUCTS IN 1994

Company and location	Type of operation	Product
Arkansas Abrasives, Inc.:		
Hot Springs, AR	Stone cutting and finishing	Whetstones and oilstones.
Do.	Quarry	Crude novaculite.
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.
Do.	Quarry	Crude silica stone.
Gary Coleman:		
Jessieville, AR	do.	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 Spring, 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.