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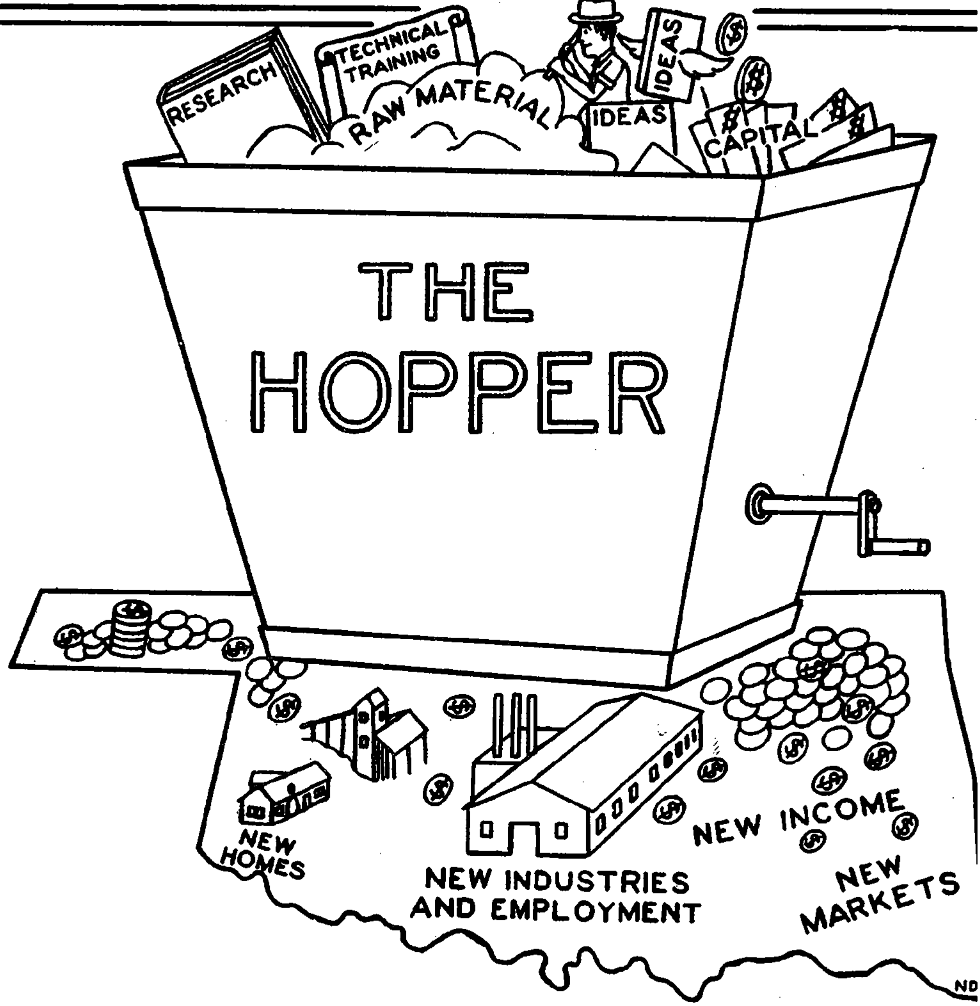

PUBLISHED IN THE OFFICE OF THE
OKLAHOMA GEOLOGICAL SURVEY
NORMAN, OKLA.

Vol. 11, No. 6 June, 1951

TRIPOLI

Introduction

Tripoli, little known outside the trade and mineralogists' handbook, is a mineral of several specific uses. True Tripoli, as defined by the authorities, is mined only in a small area in northeastern Oklahoma and southwestern Missouri. Pulverized and graded into specific sizes suitable for buffing and polishing it has been shipped to many countries of the world. (Information Circular 7371, United States Department of Interior, 1946) "The largest tonnage is said to have been consumed in the United Kingdom and smaller amounts are shipped to Germany, Netherlands, France, and other European countries. Shipments also have been made to South America, Canada, India, and the Far East. In normal times, it is understood that total exports may aggregate several thousand tons a year. Deposits of tripoli and rottenstone in foreign countries are not extensive. The former, however, has been produced on a small scale in France, Spain, and Germany."

Dates for early operations of the tripoli quarries of Oklahoma and Missouri are in conflict in published literature. Nelson, 1908, Oklahoma Geological Survey Bulletin No. 1, Preliminary Report on the Mineral Resources of Oklahoma, pp. 72, 73: "There are two mills at Seneca owned by the same company. One is for the grinding of tripoli flour and the other is for the manufacture of filter stones. At the present time this company is the only one operating in the field. * * * The Oklahoma tripoli is not suitable for the manufacture of filters because it is full of cracks and contains frequent bedding planes. The flour is used for a variety of purposes but the larger part of it is used as an abrasive or polisher in the metal working trades. The very finest grades are used as a jewelry polish, while the coarser ones are used as brass and steel polishes. A large part of the output of this particular mill is shipped abroad. * * * The value of the output of the two mills at Seneca is about $50,000 per year. These are the largest works of the kind in the United States and a large percent of their material comes from Oklahoma. Oklahoma, is therefore, the largest producer of tripoli in the Union, and in view of the fact that she has unparalleled resources in that material, there appears to be no reason why she should relinquish her supremacy in the tripoli industry."

Siebenthal and Mesler, 1908, U.S.G.S. Bulletin 340, p.436: "The American Tripoli Company is the largest as well as the pioneer company in the industry, having erected a grinding mill in 1887, to which was soon added machinery for the manufacture of filter stones. This grinding mill, variously enlarged and remodeled, is in use today, and has a daily capacity of 15 tons of tripoli flour. It is situated on the highland just east of the Missouri-Oklahoma state line, a mile north of Seneca, and the quarries are near by on each side of the line."

Perry, 1917, Bulletin 28, Oklahoma Geological Survey, p. 6: "The most important localities where deposits have been worked and proved of value are (1) about three miles south of Racine, Missouri, (2) about one and one-half miles north of Seneca, Missouri, partly in Oklahoma and partly in Missouri, and (3) about two miles south of Peoria, Oklahoma. p. 5: Various articles and papers have been printed, describing the deposits in Missouri, but as these deposits are at present less important than those now being worked in Oklahoma, the need for the present report is obvious. * * * The manufacture of filters is far less important than the production of tripoli flour. Filter production is less important now than it was a few years ago. The reason for this is the installation of improved water systems throughout the cities of the United States. p. 31: The American Tripoli Company was the first to do active work in the production of tripoli, having commenced operations as early as 1887. * * * The Seneca Tripoli Company is the only other firm operating in Oklahoma. The mill is situated on 120 acres of land two miles south of Peoria, and most of this land is underlaid with tripoli. Machinery is installed for the manufacture of filters, but the principal product of the mill is the tripoli flour. * * * There are one or two smaller companies which ship some tripoli from the neighborhood of Racine, Missouri, but their output is negligible."

Metcalf, 1949, Revised Edition of Industrial Minerals and Rocks, p. 1086: "Aside from scattered small output in the 1890's in Georgia, Virginia, and possibly Alabama, mining and preparation of Tripoli up to 1914 were confined to Missouri."

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The following paragraphs are excerpted by permission from a brochure on Tripoli published by the American Tripoli Corporation, Seneca, Missouri.

Limited to a small area in the foothills of the Ozark Mountains in the southwest corner of Missouri and the northeast corner of Oklahoma, within a radius of ten miles of Seneca, Missouri, U.S.A.—formerly the home of the Seneca Indians, nature has furnished the world one of its strangest non-metallic minerals. So far as known, in no other place on earth on any continent has this material, called "Seneca Standard" Tripoli, been discovered.

Here is the story of this strange material and its service to mankind.

As long ago as 1850, Tripoli was said to be an earth of gray, red, or yellow color found in Tripoli, North Africa; hence, its name. "Seneca Standard" Tripoli deposits were discovered in 1869, and as the material had an appearance similar to the material in Tripoli, North Africa, it was called "Tripoli." Later, it was found when compared with "Seneca Standard" Tripoli, the material from Tripoli, North Africa, was a diatomaceous earth with an entirely different particle structure. Consequently, authorities reclassified the two materials, renaming the diatomaceous earth in Tripoli, North Africa, as "Tripolite" and confining the name "Tripoli" to the material within the immediate vicinity of Seneca, Missouri, U.S.A.

Since that time, however, many non-metallic minerals with chemical analyses similar to "Seneca Standard" Tripoli have been termed "Tripoli," although they are entirely different in physical particle structure.

"Seneca Standard" Tripoli is an unusual physical form of silica which is double refracting and of the chalcedony variety. It varies from 90% to 98% SiO_2 containing fractional percentages of iron, alumina, etc., and has less than ½ of 1% free silica in the form of quartz.

Its outstanding characteristic is the physical structure of the individual particle. It is soft, porous, and has a fibrous structure, with no sharp edges or corners and an average size of less than .01 millimeter. All of these account for its high oil absorption. The specific gravity varies from 2.15 to 2.62. The porosity of the crude is 45% and the powdered material 63% to 68%, according to fineness. bsorption of water (by weight) for the crude stone is 35% and for the powdered 52%. Oil absorption (by weight) varies from 48% to 52%, depending on fineness.

Origin, Physical Properties

The Tripoli deposits are of sedimentary origin found in the Boone formation of the lower Mississippian. They occur as horizontal beds, varying in thickness up to approximately twelve feet. They have not been subjected to any appreciable faulting, folding or crushing. They remain in their original state, except where conditions have been favorable the soluble alkaline salts have been removed by percolating surface waters.

From the structure and general appearance of "Seneca Standard" Tripoli, it seems evident it was deposited, not as a settling of small crystalline particles, but as a flocculent collodial silica, together with alkaline salts which were much more soluble than those in the neighboring siliceous limes. This would explain the wavy, porous structure of the particle. As more pressure was gradually exerted by increasing thickness of the deposits and the overlaying strata, the flocculent collodial silica was compressed into a smaller volume, with a tendency at least to develop a microscopic wavy, flow-like structure. The minute pores or capillaries could easily have been formed by the pressing out of the excess moisture in the flocculent collodial silica.

Both primary and secondary chert are found in many of the deposits, and in some instances they destroy the commercial value of the deposits. The primary chert occurs as interbedded layers and nodules, and the secondary chert is the result of a later deposition of silica (held in solution in the deposits) in the more or less verticle cracks and fissures of sufficient age. Occasionally it partially fills voids of irregular shape.

It is in no sense an altered chert, as was once assumed from the fact that primary chert occurs in the deposits. The chert occurrences are identical with those in the neighboring siliceous limes. X-ray spectra and polarized light examinations show the two particles to be quite distinct, although they may be found side by side. The present "Seneca Standard" Tripoli is not a product of alteration, decomposition, or disintegration; it is simply the original silica remaining after the soluble alkalies, which constitute a considerable portion of the original mass, have been removed. It has very evidently experienced little change from its original condition other than an evident hardening of an increased density.

The American Tripoli Corporation deposits at Seneca are large and very uniform in quality, and the continuity and uniformity of "Seneca Standard" Tripoli are matters of common knowledge with the trade in all leading industrial countries of the world.

In recent studies of "Seneca Standard" Tripoli by Battelle Memorial Institute, they report as follows:

"Examination by the electron microscope at 15,000 diameter magnification shows differences, in amount of very fine material present, between Rose and Cream varieties. The Rose variety, both Once Ground and Double Ground, had fine particles down to .02 micron in size, having the appearance of a gel or skeleton structure. By comparison, the Cream variety for ground and Air-Floated samples, showed a much smaller fraction of fine particles, .01 micron or less in diameter. Both varieties had particles up to five microns in size. The very fine particles are probably only a small weight per cent of the bulk material.

"This relative difference is borne out by the specific surface area measurements determined by the nitrogen-absorption method. Here the Rose variety has approximately twice the specific surface areas of the Cream variety. The equivalent spherical particle diameter determined from the specific surface areas is in agreement in order of magnitude of electron microscope studies. Therefore, there is probably no great degree of fine pore structure for the bulk material.

"A comparison of the particle size distribution determined with the Haultrain air-classifier and the other data indicates that the Infra-sizer cuts are classifications of aggregate."

"Seneca Standard" Tripoli exhibits the characteristic silica adsorption, but due to its greater surface area, it is correspondingly more active than the denser silicas. Its adsorption of iron from descending surface water causes a variation in color in the deposits, from a light "cream" to a dark "rose." It also adsorbs manganese, but where this has occurred it is confined to the lower part of the deposits, which may indicate the manganese was not derived from the overlaying soil.

It is the physical properties, especially the particle structure, of "Seneca Standard" Tripoli which give it its value. In various abrasive fields, particles break down at the proper rate as pressure is applied and the material produces the maximum results with the minimum of harshness and resistance.

In these fields the porosity and the absorptive quality of "Seneca Standard" Tripoli permit it to be bound firmly by stearic acid, tallow, paraffin, petrolatum, and oils, with which it is mixed in various formulations.

In the manufacture of the waterproofed dust (Foundry Parting) "Seneca Standard" Tripoli spreads out in a thin film over the surface of water much as oil does. This film has the resistance to permit a sharp pencil to be gradually pushed to the bottom of a glass of water without puncturing the film and completely protects the pencil from becoming wet by the water. Again, the physical structure of the particles, which are impregnated with oils and greases, accounts for this.

Research continues in developing additional uses for this unusual material, one being a catalyst agent carrier in the field of petroleum cracking and other industries.

Another development which is creating considerable interest is a new superfine product in which a great percentage of the particles are five microns in size (2500 mesh). This is known as Micronized Tripoli.

History of the Company

The deposits from which "Seneca Standard" Tripoli is now produced were first worked in 1871 by Husband Brothers of St. Louis. They organized the Monarch Tripoli Company and built a small mill for sawing the stone into brick, which were called American Bath Brick, used for scouring and polishing purposes.

The first grinding mill was built in 1885 and used the oil style horizontal flour mill grinding stones. The American Tripoli Company was organized in 1888, at which time another improved mill was built. In 1892 the Company was incorporated. In 1919-1920 the American Tripoli Company and the Seneca Tripoli Company were combined, and a new mill was built which operated until December, 1938, when the mill burned. A new all-steel mill was then built, and the latest grinding and screening equipment installed and put into operation in April, 1939. This mill and equipment has since been expanded and improved until today it is one of the most modern dry grinding mills in America.

The first important use of "Seneca Standard" Tripoli was in the manufacture of Tripoli filter stones, for which it was particularly well suited. This production constituted the principal activity until about 1915, when, as a result of improved water systems, the use of filter stones in the larger communities began a gradual decline. Production was discontinued early in 1924.

For a number of years, the major use for powdered Tripoli has been in buffing compositions, both in this country and Europe. Exports had started about 1894. In 1905, it was discovered that "Seneca Standard" Tripoli could be suitably waterproofed and used as foundry parting in the place of a very expensive material--Lycopodeum. Since 1925, "Seneca Standard" Tripoli has been the outstanding abrasive base for most of the leading automobile polishes and Lacquer Finishing Compounds.

Some other applications for "Seneca Standard" Tripoli are: metal polishes, foundry parting, core wash, fillers, detergents, dry cleaning and laundries, cleaners, floor sweep, button polishing, wood finishing, polishing cloth, gem polishing, drill mud, soaps, insecticides, building blocks, putty, admixture for concrete, and water filters.

A Glance at Processing

The first step is to clear the land, which usually is not suitable for agriculture as it is heavily wooded. The overburden is then stripped. About one ton of overburden is removed for each ton of Tripoli produced, and the surface of the exposed Tripoli is cleaned to prevent contamination by earth or clay. Churn drill holes are put down in the Tripoli bed, chambered with dynamite, and shot with black powder to prevent undue production of fines.

Being highly absorbent, the crude stone as it comes from the quarries contains from 20% to 35% moisture, depending on weather conditions and the time of year. Consequently, the crude stone is stored on drying sheds after it has been sorted for color and grade. From the sheds it is trucked to the mill where it is given a coarse crushing before final artificial drying. From the dryer the material flows through a hammer mill, then to a tube mill and through screens and air separators, after which it is packed in 100 lb. paper bags.

Technical Data

Colors --- Rose and Cream

Grades --- Once Ground--Double Ground--Air Float

SCREEN ANALYSES (Average), (Tyler Standard):

Mesh	Once Ground	Double Ground	Air Float
35	.000%	.000%	.000%
48	.500	.001	.001
65	4.000	.009	.009
100	6.000	.100	.010
150	4.000	.500	.500
200	5.000	4.000	1.000
Thru 200	80.500	95.390	98.480

CHEMICAL ANALYSES:

	Rose	Cream
Silica	94.40%	97.50%
Alumina	2.73	.63
Iron Oxide	1.87	.35
Lime	None	.15
Magnesia	Trace	.15
Ignition Loss	1.00	1.20

FREE SILICA IN FORM OF QUARTZ: Less than 1/2 of 1%

OIL ABSORPTION (by weight) AVERAGE:

Grade	Rose	Cream
Once Ground	48.01	48.80
Double Ground	49.12	49.75
Air Float	49.90	50.40

SP GR: Variously reported at from 2.15 to 2.62.

FUSION POINT: Rose 3225° F. Cream 3300° F.

WEIGHT PER CU FT: Powdered 55 lbs. Crude 35 lbs.

REFRACTIVE INDEX: 1.54