OKLAHOMA GEOLOGICAL SURVEY

Robert H. Dott, Director

Mineral Report No. 1

VOLCANIC ASH AND TRIPOLI

Compiled by

J. O. Beach

Data obtained from State Mineral Survey, WPA Project 65-65-538, 1936-37; FERA Materials Survey, 1934; Okla. Geol. Survey Bulletin 13, 1914; and Bulletin 28, 1917.

NORMAN

August 1938

(Reprinted February, 1941)

FOREWORD

The purpose of this report is to make available for general distribution a summary of known data on volcanic ash and bentonite deposits of Oklahoma. It is believed that a series of pamphlets giving brief descriptions of various materials, their uses, locations of known deposits in Oklahoma, marketing possibilities, and other data regarding development possibilities will serve a useful purpose.

This information is essentially a compilation of data obtained by the State Mineral Survey, WPA project 65-65-538, sponsored and directed by the Oklahoma Geological Survey, 1936-37;and from previous publications, especially Oklahoma Geological Survey Bulletin 13 and a report entitled Volcanic Ash or Pumicite in Oklahoma by Beckstrom. This report is not intended as a complete or final publication on the subject of volcanic ash and bentonitic materials in Oklahoma.

Additional details on many deposits of these materials are available in the offices of the Oklahoma Geological Survey at Norman. Persons interested in particular deposits or in locating particular types of materials for special purposes, may secure additional information so far as it is available by writing or visiting the Survey offices.

Reprinted, February, 1941, with slight revision of Table III, Production Figures, and names of producers.

VOLCANIC ASH

Volcanic ash is the extremely fine material hurled from explosive volcanoes during eruptions of silicic lavas (1,2). Volcanic dust, pumicite, and geyserite are other terms sometimes used to designate this material. It is usually white to light gray in color and is composed of very fine angular, sharp fragments which resemble shattered glass when viewed under the microscope. In chemical composition volcanic ash is dominantly silica with varying amounts of other constituents.

The source of the volcanic ash deposits in Oklahoma and adjoining states of the Great Plains is believed to have been ancient explosive volcanoes, probably the Capulin group of northeastern New Mexico, in the mountain areas to the west, which were active during Pleistocene time (1,3). Prevailing winds probably carried the fine material considerable distances to the east and northeast, and covered wide areas with a blanket of volcanic ash. The finer materials were carried farthest and the coarser particles were dropped nearer the source of eruption. Later, action of wind and water concentrated some of the material in deposits of considerable thickness and those deposits which were protected from erosion have been preserved to the present time.

General Uses

Volcanic ash finds its greatest present use as an abrasive. The individual particles are angular with a number of sharp points, and so fine that visible scratches are not made. In 1937 Minerals Yearbook (4) lists about 80 percent of the United States production of volcanic ash as being used for cleansing and scouring compounds and hand soaps. Some of these compounds are composed almost entirely of volcanic ash, others use larger amounts of other materials and soaps. Some of the finer ash is used in toothpastes and powders, in

References are to bibliography at back of this report.

silver polishes,abrasive hand soaps and mechanics paste soaps. It is also prepared and marketed as floor sweeps especially for use in removing grease and oils from garage and shop floors. Raw volcanic ash is an efficient scouring material.

Another use which seems to offer a chance for expansion and perhaps furnish a market for some of the Oklahoma volcanic ash is for cement admixture, which use has increased in recent years (2). Two types of cement are made in which volcanic ash, ground pumice or ground volcanic tuff are utilized. Puzzolan cement is made of two parts volcanic ash and one part slaked lime. This cement has the property of setting when mixed with water and was used by the Romans in constructing sea walls. Trass or Tufa cement is made by mixing the finely ground volcanic material with Portland cement, giving a better wearing and quicker setting product (1). Used in concrete, the finer volcanic ash is reported to increase workability, density, water tightness, and strength, and to reduce honeycombing and checking in drying, and requires less water for curing.

There are a large number of other uses, some of which include road surfacing; chicken litter;filtering; rock gardens and landscaping; insecticide; filler in paints and other materials, fine material in asphalt road topping; insulation,especially for steam and water pipes, and for lining cold storage rooms; and as abrasive agent in rubber erasers. It is suitable for use in sound-proofing buildings and as a catalytic agent in chemistry, and can be used as an absorbent for manure and liquid wastes which can later be used as a fertilizer. Volcanic ash also has been reported as used for absorbing nitroglycerine in the manufacture of dynamite.

Uses of Oklahoma Volcanic Ash

Figures are not available on the amount of volcanic ash produced in Oklahoma. Total production of volcanic ash and pumice for the United States in 1939 was 89,159 tons, valued at $424,780 (4).

At least three Oklahoma deposits of volcanic ash are being worked,and others have been opened and operated at various times in the past. Oklahoma deposits for the most part are too far removed from the large packing plants and other manufacturers of scouring compounds and other similar abrasives to compete for that market. Mid-Co Products Company, of Kansas City, is operating a quarry near Gate in Beaver County, from which the raw material is dried, screened, and bagged for the market.

Tulsa Earth Products Company, Tulsa, Muskogee Silica Company, Muskogee, and Sol. H. Williams, Dustin, are operating quarries and processing volcanic ash. The Tulsa Earth Products Company has its quarry in a deposit of ash near Tullahassee, Wagoner County, producing a fine-grained material, 325 mesh, for concrete admix. The Muskogee Silica Company also operates in the Tullahassee deposit, and has prepared the ash for use in topping asphalt paving. Mr. Williams operates a quarry near Dustin, preparing floor cleaner and grease remover and other articles marketed as "Sols 101 Products."

Volcanite Products Company of Okemah formerly operated a quarry in the volcanic ash deposit in section 19, T 10 N, R 10 E, Okfuskee County, listed in Table III as deposit No. 53. The material was used in the manufacture of "Lightnin' Cleanser",and other products.

Table showing volcanic ash sold or used by producers in United States, by uses, for 1939*

Uses	Short tons	Value	
		Total	Average
Cleansing and scouring compounds and hand soaps	52,521	$227,447	$4.35
Concrete admixture and concrete aggregate	20,719	24,852	1.20
Acoustic plaster	5,444	97,181	17.85
Miscellaneous uses	10,475	75,300	7.19
	89,159	424,780	4.76

*Minerals Yearbook, U.S. Bureau of Mines, p. 1280, 1940

Following is a list of producers and users of volcanic ash from this area, taken mostly from the Minerals Yearbook; 1937, p. 1295.

Barnsdall Tripoli Corporation, Seneca, Mo. Deposit at Grants, Valencia County, N. Mex.

The Cudahy Packing Co., 221 North La Salle Street, Chicago, Ill. Deposits at Fowler, Meade County, Kans., and at Saltdale, Kern County, Calif.

The Davidson Pumice Co., Norton, Kans. Deposits at Calvert, Norton County, Meade, Meade County, and Natoma, Osborne County, Kans.

Dodson Concrete Board Co., 1463 Barwise Avenue, Wichita, Kans. Deposit at Wilson, Ellsworth County, Kansas.

Mid-Co Products Co., 238 Railway Exchange Building, Kansas City, Mo. Deposits at Meade, Meade County, and in Grant County near Satanta (Haskell County), Kans., and near Gate, Beaver County, Okla.

Pumicite Co., 4025 Clara Avenue, St. Louis, Mo.; deposit at Fowler, Meade County, Kans.

Following is a list of chief users, taken from R. C. Beckstrom's report on Volcanic Ash, published by Emergency Relief Administration, December, 1934:

Proctor and Gamble, Cincinnati; Colgate Palmolive Peet Company, Milwaukee; John T. Stanley and Company, Chicago; Whittaker, Clark and Daniels, Inc., New York; Charles A. Wagoner and Company, Philadelphia; Cudahay Packing Company, Chicago; Matchless Metal Polish Company, Chicago.

Bentonitic Materials

Under certain conditions volcanic ash may alter to other substances which have different properties. Bentonite is generally regarded as being altered volcanic ash. The term bentonite originally was applied to a material found in the Black Hills of Wyoming and South Dakota, and later in adjoining regions. It has the property of absorbing large quantities of water, and

of swelling several times (reported as high as fifteen times) their original volume in water. The Wyoming type bentonite finds its chief use as an ingredient in molding sands, in drilling muds in oil wells, and for stopping water leakage in subsurface buildings, mines, dams and other engineering works, with other minor uses.

A material having different properties, but believed to be altered volcanic ash and having some characteristics relating it to the bentonites was later found in the southwest, and the term bentonites was generally applied to the material. This type material does not absorb water or swell in water to the extent the true bentonites do. Davis and Vacher (7) have designated the southwestern bentonitic material as subbentonite. The distinction is based on action of sulphuric acid on the alumina content; "Bentonites may be divided into two groups according to the difference in the action of sulphuric acid on their alumina content. The Wyoming-type bentonite which contains alumina resistant to the action of sulphuric acid will be called 'bentonite', while the type in which the alumina is mostly dissolved by sulphuric acid will be termed 'subbentonite'". In a revision of the above report, Conley uses the term metabentonite to designate the low swelling, bleaching type bentonitic material (17).

The terms Bentonite, bentonitic clay, and bleaching clay are most commonly used to designate the bentonitic type materials of the southwest although they exhibit marked differences from the true Wyoming-type bentonite. In this report, the term subbentonite will be used, following Davis and Vacher, to designate the type of bentonitic materials as found in Oklahoma.

Subbentonites absorb some water and may swell in water but to a much less degree than Wyoming-type bentonites. When treated with acid, many of the subbentonites are activated and become efficient bleaching clays, while the true bentonites are not easily activated.

General Uses

The most important industrial uses for subbentonites are in petroleum refining where they are used as filter to remove color and undesireable constituents from lubricating oils, and for bleaching vegetable and animal oils such as cotton seed, soya bean, linseed, lard, coconut, palm and tallow (2). When activated with acid, many of the subbentonites are reported to be more efficient than the naturally active fullers earth bleaching clays, and have replaced fullers earth for that purpose to a considerable extent.

Some of the subbentonites can probably be utilized for many of the general uses of bentonites. These uses include:manufacture of heat and sound insulating blocks, plasters and cements; sprays and insecticides; as an ingredient in the manufacture of some clay products; foundry partings; in laundries; in cosmetics and preparation of beauty clays; in wetmash poultry foods; admixtures in concrete; in dewatering paper pulp; and in some medicinal preparations. Clay from the Woodward, Oklahoma, deposits is reported to be suitable as an admix for plaster to retard drying and improve the slip and as an admix to cement for water proofing.

OKLAHOMA DEPOSITS

The most important known deposits of subbentonites in Oklahoma are near Woodward in Woodward County, and Vici, Dewey County. Tests on material from the Woodward Deposit have shown that at least part of this material is suitable for use as a bleaching clay when activated with acid. No information is available to indicate whether the other subbentonites of Oklahoma will activate when treated with acid.

The Woodward deposit was formerly utilized by the Thurber Earthen Products Company, Fort Worth, Texas,and marketed for refinery use. The plant was reported to have been closed during the latter part of 1937.

Woodward Earthen Products, Inc., is operating a plant using the Woodward deposits. This company is marketing a drilling mud for use in oil well drilling under the trade name Woodite Drilling Mud;and bleaching clay for oil refining purposes. The company also reports sales of its bleaching clays to machine shops and garages for use in reclaiming used oils.

Summary information on volcanic ash and bentonitic deposits in Oklahoma is given in the following tables. Table I gives chemical analyses of samples from several deposits, by A. C. Shead, taken from Bulletin 14, Oklahoma Geological Survey, 1929. The numbers at the top correspond to the numbers in Table II,and the same numbers are used in Table III to indicate the deposits from which the samples came. Table II gives mechanical characteristics of several deposits, indicating the size and shape of grains. Determinations were made by Dr. C. A. Merritt, associate professor of mineralogy, University of Oklahoma and associate member of staff of the Oklahoma Geological Survey, for publication in the F. E. R. A. report by Beckstrom,referred to above. Most of the identifications in Table III are by Dr. Merritt.

Table I

CHEMICAL ANALYSES*

	Gate 4	Rosston 38	Alva 70	Custer City 12	Porter 59	Okeene 9	Burns 6
SiO_3	72.96	72.50	79.52	70.12	68.61	68.823	10.68
Al_2O_3	12.91	12.08	11.56	15.80	19.23	13.21	23.49
Fe_2O_3	0.60	0.42					
FeO	0.90	0.97					
MgO	trace	0.00		0.23		0.192	
CaO	0.73	1.08	1.08	0.52	.56	0.96	35.55
Na_2O	2.96	2.91		4.42		3.23	
K_2O	4.40	5.67		3.01		3.57	
H_2O	0.41	0.62					(below 110° C)
H_2O	4.33	3.75	3.06	6.42	8.01	8.223	(above 110° C)
TiO_2	0.14	0.12					
P_2O_5	trace	0.00					
MnO	0.04	0.02					
SO_3			.78	1.168		2.13	
Total	100.38	100.14	96.00	101.7	96.41	100.44	69.72

*Shead, A. C., Chemical Analyses of Oklahoma Mineral Raw Materials, Okla. Geol. Surv. Bull. 14, 1929.

Table II

VOLCANIC ASH MECHANICAL ANALYSES*

Locality	Max. Size	Min. Size	Approx. Average	Shape of Grain
No. 7	0.20	0.02	0.04	Angular
No. 38	0.20	0.01	0.04	Elongated Angular Numerous
No. 39	0.20	0.02	0.04	Angular
No. 72	0.24	0.01	0.07	Many large fragments
No. 17	0.06	0.005	0.03	Angular Numerous fragments 0.03
No. 37	0.1	0.01	0.03	Mainly angular some rectangular. Few large grains.
No. 12	0.25	0.02	0.05	Angular many pieces 0.05
No. 8		0.05		
No. 46	0.14	0.01	0.03	Few large grains.
No. 70	0.14	0.01	0.05	Few large grains are 0.05

Notes: The volcanic ashes are all high in silica, and contain numerous cavities and tubes. Maximum and minimum sizes of the grains were carefully measured. The average size was estimated by the use of a cross-ruled eye piece, and is only approximate. The shape of the grains recorded do not cover all types present.

Locality	Max. Size	Min. Size	Approx. Average	Shape of Grain
No. 9	0.25	0.02	0.07	Angular fragments
No. 32	0.1	0.01	0.03	Angular to sub-angular
No. 59	0.08	0.005	0.015	Angular; few large fragments
	0.15	0.01	0.03 to 0.07	At 15 ft. depth
No. 47	0.20	0.01	0.06	Angular, numerous large fragments
No. 53	0.15	0.02	0.04	Angular
No. 44	0.16	0.01	0.05	Angular; numerous large fragments 0.8 to 0.1
No. 41	0.10	0.005	0.03	Angular; few large grains
No. 45	0.12	0.02	0.05	Few large grains

*Beckstrom, R. C.; Chapter on Volcanic Ash or Pumicite in Oklahoma, Construction Materials of Oklahoma, F. E. R. A., December, 1934.

Table III

VOLCANIC ASH AND BENTONITIC DEPOSITS IN OKLAHOMA

No.	Location	Lab. No.	Thickness	Overburden	Estimated Cu. Yds.	Remarks
	BEAVER COUNTY					
1.	Sec. 29, 30, 1N, 26E, CM	4708 4709	2-10	2-10	1,500,000	Contains sand, carbonates, poor bentonite.
2.	25-2N-26E CM	4702 4703 4704	2-6	2-6	15,000	Volcanic ash.
3.	4-2N-21E CM	4711	15	2	120,000	Volcanic ash.
4.	Secs. 5, 8, 5N, 28E, CM	4699 4700	35-70	4-25	500,000	Volcanic ash. Is being quarried.
5.	Secs. 3, 10, 5N, 28E, CM		7	3		Volcanic ash.
6.	1-5N-27E CM		12			Lake deposit, volcanic ash, few diatoms, quartz and other impurities.
7.	2-4N-21E CM		2	1-8		Volcanic ash,

Table III (continued)

No.	Location	Lab. No.	Thickness	Overburden	Estimated Cu. Yds.	Remarks
	BLAINE COUNTY					
8.	4-18N-12W	5428	3-5	4-8	250,000	Volcanic ash. Some bentonitic clay. Swells twice its volume in water.
9.	28-20N-10W					Volcanic ash.
	COTTON COUNTY					
10.	Secs. 9-10, 2S, 11W	469	6-15	1-15		Poor grade bentonite.
	CUSTER COUNTY					
11.	14-14N-16W	630 to 638	3-15	2-4	11,000	Volcanic ash, some carbonates.
12.	15-14N-16W		12	3-8		Volcanic ash easily accessible; has been quarried.
13.	Secs. 27-34, 15N-16W					Volcanic ash reported.
14.	6, 15N, 15W		10-15			Volcanic ash.
	DEWEY COUNTY					
15.	13, 16N, 16W	2678-9	4-5	4	500	Volcanic ash.
16.	25, 16N, 16W	2680 2681	1-3	1-4	1,500	Volcanic ash.
17.	19, 20, 21, 28, 29, 30, 19N, 19W	3222 4785 to 4877 & 3231	2-5	1-20	650,000	Deposits appear to be largely bentonitic, swell to 3 times normal volume in water. Classed as subbentonite.
	ELLIS COUNTY					
18.	SW2,16N,23W	1376	2-3	½-3	1,500	Low grade bentonite.
19.	SE 2,16N,23W	1374	2-3	1-8	4,000	Bentonite.
20.	Secs. 11-12, 16N, 24W	1372 1373 1375	2-4	1-7	35,000	Deposits include low grade bentonite and volcanic ash.
21.	11, 17N, 24W	1377	1-3	4-40	125,000	Low grade bentonite.
22.	35, 18N, 23W		3	4-8	5,000	Reported; no samples for identification.
23.	23, 18N, 26W					Deposit reported.
24.	3, 20N, 25W	620	5	1-2		Volcanic ash

14

15

Table III (continued)

No.	Location	Lab. No.	Thick-ness	Over-burden	Estimated Cu. Yds.	Remarks
25.	28, 21N, 24W					Deposits reported.
	GARFIELD COUNTY					
26.	7, 20N, 6W		1-12	1-6	1,000,000	Reported mixture of fine sand-volcanic ash.
27.	33, 20N, 7W		6	1-5	20,000	Sandy volcanic ash.
28.	36, 20N, 7W		2-10	1-2	400,000	Sand and volcanic ash.
29.	8, 22N, 3W					Volcanic ash reported.
30.	5, 23N, 7W		4-6	2-6	10,000	Reported volcanic ash.
31.	25, 24N, 6W		1			Small amount volcanic ash reported overlying shale bed.
	GARVIN COUNTY					
32.	20, 4N, 3E	4813	3	3	180,000	Volcanic ash.
33.	NW NE 29,4N,3E	4812	3	3	3,000	Volcanic ash.
34.	NE NE 29,4N,3E	4814	2½	6	32,000	Volcanic ash.

Table III (continued)

No.	Location	Lab. No.	Thick-ness	Over-burden	Estimated Cu. Yds.	Remarks
35.	29-32, 4N,3E	4815	2½	3	8,000	Volcanic ash.
	GRANT COUNTY					
36.	3-27N,4W		3-4	2-6	40,000	Volcanic ash. F. S. 286.
	GREER COUNTY					
37.	5, 7N, 22W		7	10		Mostly volcanic glass. Slight iron staining in some of the grains. A few anisotropic grains. Carbonate trace. Some feldspar grains.
	HARPER COUNTY					
38.	10, 28N, 26W	811 to 817	1-15	3-8	25 acres	Mostly volcanic glass. Carbonate-trace; some anisotropic grains. Few feldspar grains.
39.	Secs. 28-33, 26N, 26W	1011 1012	2-5	1-2	10,000	Volcanic ash.
	HASKELL COUNTY					
40.	Secs. 3-4-33-34	880-881				Impure material, contains

Table III (continued)

No.	Location	Lab. No.	Thickness	Overburden	Estimated Cu. Yds.	Remarks
	9, 10N, 18E	882-866	1½-2	½-2½	2,000	some clay, small amount bentonite, and sand.
41.	7, 9N, 21E	3597-3598 3599-3601 3602-3603 6280	½-5	2-10		Some samples are volcanic ash, two are volcanic ash and bentonite, swelling 29 and 47%, some sandy clay and volcanic ash, and sandy clay. Carbonate trace in some samples.
42.	8, 9N, 21E	3617	3-6	1-2		Bentonite and sand mixture. With water, 3617 swells 45%; 3618, 31%.
43.	17, 9N, 21E	1655 to 1665	1-5 or more	1-14	75,000 including others in same area.	Data sheets indicate beds of volcanic ash interbedded with mixed beds of sand and ash. Lab. No. 1664 contains subbentonite and sand and swells 51% in water.
	HUGHES COUNTY					
44.	Secs. 3, 4-9, 9N, 12E	4326 to 4330	10-20	2-10	4,000,000	Volcanic ash. Carbonate trace. Material is being mined.
	KAY COUNTY					
45.	2, 28N, 1W		4-6	3		Small deposit volcanic ash. Few anisotropic grains. Carbonate trace.
	KINGFISHER COUNTY					
46.	27, 17N, 9W		2	4-6		Mostly volcanic ash. Few anisotropic grains. Carbonate trace.
47.	1, 15N, 5W		1-4	2-3		Volcanic ash. Carbonate trace. Reported thicker in wells near by.
48.	6, 16N, 7W	?	1½	30		Sample from well. Volcanic ash.
	MAJOR COUNTY					
49.	6, 20N, 10W	1469 1470 1471 1473 1474	1-10	0-7	75,000	Volcanic ash.
	McCURTAIN CO.					
50.	25, 26, 36, 2S, 25E	7242	40	0		Volcanic tuff, hard, consolidated. Older than other deposits. Also found in other parts of county.

Table III (Continued)

No.	Location	Lab. No.	Thickness	Overburden	Estimated Cu. Yds.	Remarks
	NOBLE COUNTY					
51.	15 22N, 1W					Volcanic ash. No information as to quantity.
52.	14, 23N, 1W		6	6		Fine Volcanic ash.
	OKFUSKEE CO.					
53.	19, 20, 10N, 10E	6860 6861	9	2-3	10,000,000	Volcanic ash. Carbonate trace.
54.	34, 11N, 10E	6138	2	1-3	10,000	Volcanic ash.
	ROGER MILLS					
55.	10, 12N, 21W	5431	10-12	2-3		Bentonite and carbonate. mixture composed one of samples from this deposit. Other samples are calcareous sands.
56.	16, 12N, 21W	5433	5-6	3		Similar to above, part of deposit probably contains
	(continued)					some bentonite, but not samples enough to determine extent of bentonitic clays.
57.	16, 15N, 23W	5436	10	4		Carbonate and bentonite.
	TEXAS COUNTY					
58.	26, 2N, 11E CM	6022	1-3	1-3		Volcanic ash reported.
	WAGONER COUNTY					
59.	Secs. 19, 20	3244 to 3260	1-13	1-20	1,000,000	Outcrops between secs. 19 & 20 N. of Tullahassee and extends into both sections. Samples from parts of deposits are partly bentonitic, some clean volcanic ash, and some sandy bentonite. Ash particles are very fine. Some of material has been quarried. Carbonate trace in some samples; some anisotropic grains.
	WASHITA COUNTY					
60.	15, 8N, 17W	1281 1281A 1282	2-3	1-3	4,000	Volcanic ash. Some carbonate.

Table III (continued)

No.	Location	Lab. No.	Thickness	Overburden	Estimated Cu. Yds.	Remarks
61.	16, 8N, 17W	1248 1283 1284	1-5	1-8	10,000	Volcanic ash. Several deposits mostly in west half of section.
62.	4, 10N, 19W	1391 4795 4796	1-4	1-5		Volcanic ash. Amount not estimated.
63.	18, 8N, 20W					Fine sand -- some bentonite
	WOODS COUNTY					
64.	3, 27N, 16W	3021	½-1	20-30		Thin irregular bed, also present in other sections in this area.
65.	19, 30, 27N, 17W	3019 3020				Volcanic ash in several small deposits, mostly in SE of sec. 19. Some carbonates present.
66.	20, 27N, 17W	3016 3017	1-9	1-3	3,000	Volcanic ash, some with carbonates, in small deposits.
67.	27, 27N, 17W	3028	1-4	0	400	Small deposit volcanic ash in NE corner of section.
68.	23, 27N, 17W	3027	1-5	0-3	3,600	Volcanic ash.
69.	35, 27N, 17W	3026	3-7	1-10	500	Volcanic ash.
70.	32, 29N, 15W	3035	5	10-15	6,000	Mostly volcanic ash. carbonate trace. Few anisotropic grains.
	WOODWARD CO.					
71.	11, 14, 21N, 17W.	4737	4-6	1-2	6,000	Bentonitic clay, fair grade.
72.	13, 24, 25, 23N, 22W	1381			large quantity	Bentonitic, swells 3 times. Some sand and part of deposit volcanic ash.
73.	30, 31, 32. 23N, 21W	1383 1384 to 1386	1-4	2-6	5,000	Bentonitic material contains some carbonates.
74.	23, 23N, 18W	4138 4746	3-4	3-5	5,000	Volcanic ash.
75.	32, 23N, 17W	4735 4736	3-5	5-10	12,000	Bentonitic, contains some carbonate.

TRIPOLI

The term tripoli was first given to a diatomaceous earth from Tripoli, northern Africa. When deposits of a material supposed to be similar to the African material were first exploited in southwestern Missouri, the term tripoli was applied (1). As now used, tripoli may be defined as soft, friable, porous, double refracting siliceous rock of the chalcedony variety. The individual grains are very small, most of them not over .01 mm (4/1000 inch) in diameter (2). Chief deposits of tripoli in the United States are: Missouri-Oklahoma district, Illinois district, Tennessee-Georgia-Alabama district, western Tennessee district, and Arkansas (3). Commercially, the term tripoli applies chiefly to the Missouri Oklahoma deposits, which have characteristics differing from other known deposits, and the terms "soft silica", and "silica" are applied to other types.

General uses of tripoli produced in the United States are indicated in the following table, taken from U. S. Bureau of Mines Minerals Yearbook for 1940, page 1275.

Use	Short Tons	Value as sold (crude and finished)
Abrasives	10,953	$169,370
Concrete admixture	1,653	24,580
Filler	9,061	120,284
Miscellaneous	11,852	152,146
Total	33,474	$466,380

The Missouri-Oklahoma tripoli was formerly in demand for water filters, but demand for this purpose has practically ceased. Chief market uses at present are for abrasives in buffing and polishing trade, concrete admixture, for foundry facing, filler, and in oil well drilling mud.

The Oklahoma deposits are in northeastern Oklahoma, chiefly in Ottawa County. Descriptions of deposits, discussion of their origin, analyses, and other data on tripoli are contained in Bulletin 28 of the Oklahoma Geological Survey, by E. S. Perry, 1917. This bulletin sells for 57 cents.

The following producers of tripoli are reported in the 1937 Minerals Yearbook:

Barnsdall Tripoli Corporation, Seneca, Mo. Deposits at Seneca, Newton County, Mo., and in Ottawa County, Okla., near Seneca, Mo.

Corona Products, Inc. Deposit and office at Rogers, Benton County, Ark.

Friend, D. N., and Wheeler, H. R., Joplin, Mo. Deposit near Peoria, Ottawa County, Okla.

Independent Gravel Co., 220½ West Fourth Street, Joplin, Mo. Deposits at Racine, Newton County, Mo., and in Ottawa County, Oklahoma, near Seneca, Mo.

Olive Branch Minerals Co., 333 Third Street, Cairo, Ill. Deposit at Olive Branch, Alexander County, Ill.

Ozark Minerals Co., 807½ Washington Avenue, Cairo, Ill. Deposit at Elco, Alexander County, Ill.

Pen Paint & Filler Co., Antes Fort, Pa. Deposit near Oriole, Lycoming County, Pa.

Western Talc Co., 1901 East Slauson Avenue, Los Angeles, Calif. Deposit near Barstow, San Bernardino County, Calif.

BIBLIOGRAPHY

Volcanic Ash

1. Landes, Kenneth K.;Volcanic Ash Resources of Kansas, Kansas Geological Survey, Bulletin 14, 1928.

2. Industrial Minerals; Am. Inst. Min. & Met. Engr., New York; pp. 129-148, 601-608, 1937.

3. Buttram, Frank; Volcanic Dust in Oklahoma, Oklahoma Geological Survey Bulletin 13, 1914.

4. Minerals Yearbook, U. S. Bureau of Mines, 1940.

5. Nutting, P. G.; Technical Basis of Bleaching-Clay Industry, Bull. A.A.P.G. vol. XIX, pt. 2, pp. 1043-1052, 1935.

6. Beckstrom, R. C.; Volcanic Ash or Pumicite in Oklahoma, (Construction Materials of Oklahoma) Emergency Relief Administration of Oklahoma, 1934.

7. Davis, C. W. and Vacher, H. C.; Bentonite--Its Properties, Mining, Preparation and Utilization, U. S. Bureau Mines Tech. Paper 438, 1928.

8. Bearce, H. E.; Some Historical Notes on the Origin of Contact Filtration. Nat. Petr. News, vol. 19, December, 1927.

9. Baker, C. L.;Volcanic Ash in Texas, Texas University Bur. Econ. Geol. Mineral Resources Circ. 2, December 1931.

10. Barbour, E. H.; Nebraska Pumicite, Nebraska Geol. Survey, vol. 4, pt. 27, pp. 357-401, 1916.

11. Hatmaker, P.; Pumice and Pumicite, U. S. Bureau of Mines Information Circular 6560, 1932.

12. Spence, H. S.; Bentonite, Canada Dept. Mines Report 626, 1924.

13. Spence, H. S. and Light, M.; Possible Industrial Applications for Bentonite, Canada Dept. of Mines Report 723-2, 1931.

14. Baker, C. L.; Fullers Earth and Bentonite in Texas, University of Texas Pamphlet 3.

15. Funsten, S. R.; Recent Developments in the Use of Contact Clays, Oil and Gas Journal, June, 1937.

16. Plummer, Norman; Ceramic Uses of Volcanic Ash; Bull. Am. Chem. Soc., vol. 18, No. 1, pp. 8-11, Jan. 1939.

17. Davis, C. W. and Vacher, H. C., revised by John E. Conley; Bentonite: Its Properties, Mining, Preparation and Utilization, U. S. Bur. Mines Tech. Paper 609, 1940.

Tripoli

1. Whitlatch, George I.; Tripoli, Tenn. Geol. Survey Markets Circular 1, September, 1937.

2. Perry, E. S.; Tripoli Deposits in Oklahoma, Oklahoma Geological Survey. Bull. 28, 1917.

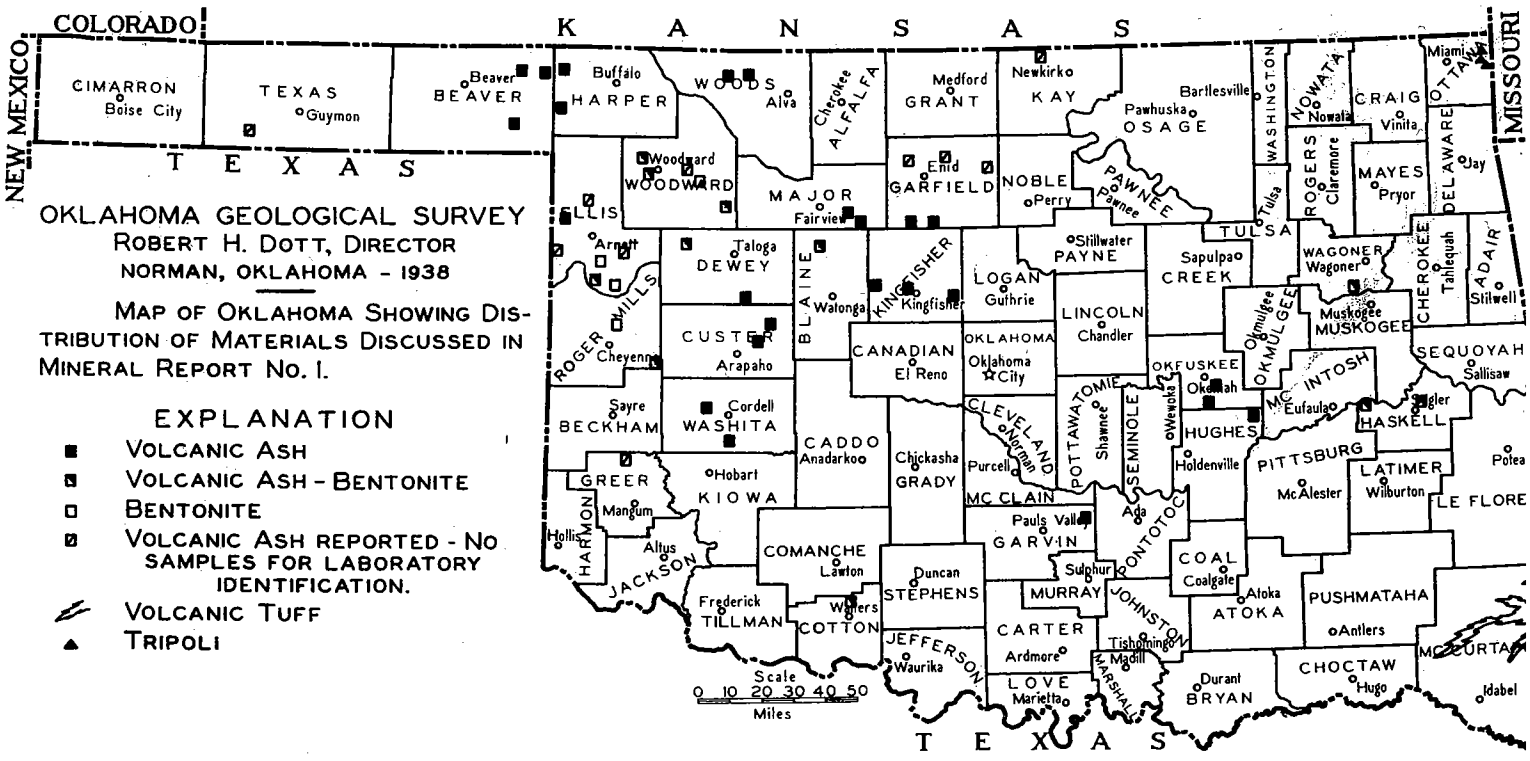
3. U. S. Bureau of Mines; Minerals Yearbook, 1937.

4. Ladoo, R. B.; Non-Metallic Minerals, McGraw-Hill Book Co., 1925.

5. Weigel, W. M.; Technology and Uses of Silica, U. S. Bureau of Mines Bull. 266, 1927.

6. Santmyers, R. M.; Quartz and Silica, U. S. Bureau of Mines, Information Circulars 6472, 6473 and 6474.

7. Heinz, C. W.; Tripoli, Industrial Minerals and Rocks, A.I.M.E. pp. 911-922, 1937.



OKLAHOMA GEOLOGICAL SURVEY
ROBERT H. DOTT, DIRECTOR
NORMAN, OKLAHOMA - 1938

MAP OF OKLAHOMA SHOWING DISTRIBUTION OF MATERIALS DISCUSSED IN MINERAL REPORT NO. 1.

EXPLANATION

- ■ VOLCANIC ASH
- ◪ VOLCANIC ASH - BENTONITE
- □ BENTONITE
- ▨ VOLCANIC ASH REPORTED - NO SAMPLES FOR LABORATORY IDENTIFICATION.
- VOLCANIC TUFF
- ▲ TRIPOLI