KLAMATH DIATOMITE DEPOSITS

Geology

The rocks of the Klamath diatomite district are all of Tertiary and Quaternary age and with the exception of the diatomite and alluvium are directly or indirectly of volcanic origin. The greater part of the region is occupied by lava flows of several ages, which form the higher areas, whereas the valleys are commonly underlain by diatomite. The oldest exposed rocks are andesites, which are presumably correlatives of the rocks of the Payette formation, to the east. Overlying these rocks is a series of Pliocene (?) basalts and andesites with intercalated diatomite and lake beds, which in turn are covered in places by Pleistocene (?) lavas and Recent alluvium.

Klamath Falls

Diatomite occurs in large amounts in and around the town of Klamath Falls. The railroad and highway cuts north of the town expose considerable thicknesses of material, and the low hill and sagebrush country east of the town is an area of prospective deposits. During the stay of the party in Klamath Falls it was noted that trenches being dug for the installation of the gas pipes were in diatomite. Though the samples collected in this district, which are described below, are not of very good quality, it is possible that prospecting might reveal valuable deposits. A deposit of high-grade diatomite in this vicinity would be insured the advantages of transportation by two large railroads and of an abundance of good labor.

Locality 192 is 1.45 miles south of Klamath Falls on the Ashland highway. The diatomite is exposed in a cut on the west side of the road. The strike, which is parallel to the road, is N. 45° W., and the dip 17° E. At the northwest end of the exposure the diatomite rests against a basaltic lava flow, large boulders of which are incorporated in the beds of massive diatomite. A short distance to the south the following section was measured:

Soil.	Ft.	In.
Diatomite, massively bedded	3	
Coarse volcanic ash, cemented	1	4
Diatomite, massively bedded (sample 192) . . .	7	
Volcanic ash, cemented, thickness as much as .	1	
Diatomite, massively bedded	2	6
Volcanic ash, cemented.		
	14	10

The volcanic ash in this section is irregular in thickness. The diatomite appears to be of fair quality. No chemical or microscopic examination was made of the sample, but its value is problematic.

Locality 191 is on the Ashland highway 1.6 miles from the Link River bridge in Klamath Falls. A series of diatomite beds is exposed on the east side of the road in a cut. It is 32 feet thick and has three seams of gray volcanic ash or dust near the middle. The beds strike N. 50° W. and dip 18° NE. The diatomite is of poor quality. Although large amounts of this material are available, it is of no economic use.

Locality 185 is in a road cut on the east side of the Ashland highway 3.9 miles southwest of Klamath Falls. Here 5 feet of diatomite is exposed under the soil cover. A sample of diatomite collected at this place was found to be of poor quality. This material is of no economic value, though part of a large and extensive deposit.

A rather thick section of diatomite is exposed on the north side of the Ashland highway 4.5 miles southwest of Klamath Falls. It occurs as a series of beds which strike N. 25°-27° W. and dip 30°-45° W. A section was paced off, and from the rough measurements made the following thickness were calculated:

	Ft.	In.
Soil cover.		
Diatomite, massive, thick-bedded, with a few ashy partings	35	
Coarse yellow volcanic ash		1
Diatomite, massive, thick-bedded, with a few very thin ash partings (sample 187 from center)	42	
Coarse yellow volcanic ash		4
Diatomite, massive	3	
Interbedded volcanic ash and diatomite	2	
Diatomite, massive, thick-bedded, with a few thin ash partings	15	
Coarse yellow volcanic ash	1	6
Diatomite, massive (sample 186)	4	
Coarse yellow volcanic ash	2	6
Diatomite, massive	3	
Diatomite and volcanic ash, soil-covered	139	
Pink volcanic ash	73	
Red agglomerate	80	
Basalt scoria.		
	400	5

Samples 186 and 187, collected from this section, were of fair quality. An analysis of sample 187 was made in the chemical laboratory of the United States Geological Survey with the following results:

Analysis of diatomite 4.5 miles southwest of Klamath Falls

SiO_2	75.56
TiO_2	.64
Fe_2O_3	2.66
Al_2O_3	8.64
CaO	1.20
MgO	.37
Na_2O	1.08
K_2O	.26
SO_3	.06
Cl	None
CO_2	.11
	89.25

Though this material compares favorably with material from some other localities, it is not of the highest quality.

A portion of this sample was submitted to Kenneth E. Lohman, of the Geological Survey, who reports as follows:

Sample 1014, Klamath Falls, Klamath County, Oregon, sec. 12, T. 18 S., R. 8 E.; B. N. Moore, no. 187.

This sample contains a fair amount of clay, some volcanic ash, and considerable fine material composed of minute fragments of diatoms. It is largely composed of small flat disks having diameters ranging between 0.015 and 0.110 millimeter. The larger forms are usually broken; the smaller forms are whole. Many of the diatoms have a "dirty" appearance, due largely to the clay present, which is trapped in the uneven surface of the diatoms.

The principal species of diatoms are as follows:

Stephanodiscus carconensis Grunow. Dominant.
Stephanodiscus astraea (Ehrenberg) Grunow. Abundant.
Stephanodiscus niagarae Ehrenberg. Common.
Cyclotella pygmaea Pantocsek. Common.
Fragilaria construens (Ehrenberg) Grunow. Common.
Cocconeis californica var. monilitica Pantocsek. Common.
Epithemia sorex Kutzing. Few.
Navicula radiosa Kutzing. Few.
Rhoicosphenia curvata (Kutzing) Grunow. Few.

There are also 14 other species, most of which occur rarely."

With proper treatment this diatomite might possibly be utilized. In its present state it is suitable for clay-bonded insulating bricks and possibly for insulation material.

Locality 188 is 6.1 miles southwest of Klamath Falls on the Ashland highway. Here diatomite is exposed in two road cuts across narrow spurs. The sample collected was taken from the easterly cut, which showed a face of the earth 7 feet high between road and soil cover and 188 feet long. The bedding of the material was obscured, but is believed to be essentially flat-lying save for minor wrinkles.

The diatomite from this locality has the lowest apparent density of all the samples collected in the Klamath district and is of good quality. A large tonnage of this earth occurs here, and it is possible that under favorable conditions some use might be made of it for concrete admixture, for insulation, and for insulating brick.

Nonmetallic Mineral Resources of Eastern Oregon: U.S.G.S. Bull. 875, by B. N. Moore, pp. 35-36, 41-43, 1937.

Notes on Aggregate from sec. 32, T. 36 S., R. 7½ E., near Klamath Falls, Oregon. Samples collected by Hollis M. Dole, April 1947. - Examined by W. D. Lowry, April 1947.

Sample HG-75 (P-5887) - sand fraction

Minerals and rock particles identified:

1. Opal (sponge spicule) - - - uncommon
2. Hypersthene, 0.5± mm - - - common
3. Plagioclase, probably basic andesine or acid labradorite - - - common
4. Volcanic glass, brown, n slightly > 1.53 - fairly common
5. Augite - - - " "
6. Basic lava grains - - - - common
   a. matrix has intersertal texture with plagioclase laths and pyroxene (augite?) prisms
   b. The smaller grains, for the most part, crush easily. The larger grains have a higher percentage of strong grains. Whether this is the result of their greater dimensions primarily is not known.

Remarks: This sand appears to have a relatively high percentage of structurally weak grains. The mineral grains are strong.

Sample HG-76 (P-5888) - consisted of 8 pebbles - 1 angular, 6 subangular, and 1 subrounded.

Composition: Gray basic andesites, mainly porphyritic but included one dense and one slightly vesicular andesite. Plagioclase (n > 1.55) is present as phenocrysts in all but the dense rock and hypersthene occurs as phenocrysts in several of them.

Remarks: All except the angular pebble were hard to break with a hammer.

Sample HG-77 (P-5889) - consisted of 19 rock fragments

Composition: All are gray basic andesites. Two are gray highly vesicular porphyritic (plagioclase phenocrysts) basic andesites. Seven are gray vesicular porphyritic basic andesites. Of them, two have phenocrysts of hypersthene and all have plagioclase (n > 1.55) phenocrysts. Three are dense gray basic andesites with

an intersertal texture characterized by plagioclase laths and pyroxene prisms. The remaining seven are gray porphyritic basic andesites characterized by plagioclase phenocrysts. Several of them have, in addition, hypersthene phenocrysts.

Remarks: The nonvesicular varieties are fairly strong. Apparently the weakness of the highly vesicular varieties accounts for their absence in the smaller sizes (as mentioned by Dole.)

Sample HG-78 (P-5890) - sand fraction

Minerals and rocks identified:

1. Hypersthene, 0.6± mm - - - common
2. Plagioclase ($n > + < 1.55$), 0.55± mm - - - common
3. Basic lava fragments - - - common
   a. porphyritic with intersertal texture
   b. plagioclase, $n > 1.55$

Remarks: The smaller grains of basic lava crush rather easily for the most part. The mineral grains are sound.

Comments on aggregate in general:

This aggregate because of its high percentage of basic andesite components should be used with a low-alkali cement. The sand fraction is likely to be the cause of weakness if test blocks of concrete made with it do not meet specifications. It would appear that the coarser fractions such as represented by samples HG-76 and HG-77 would be satisfactory. Whether or not the coarser fragments can be crushed to form a satisfactory fine aggregate is problematic. The intersertal texture of these basic andesites casts serious doubt on this possibility.