

RESULTS OF A TEST FOR FULLER'S EARTH MADE ON TWENTY-
FOUR SAMPLES OF CLAY FROM THE VICINITY OF SEATTLE

The quality which makes Fuller's Earth of importance is its great power of absorbing different substances. This property is due to the colloidal nature of the earth, and is possessed to a greater or less extent by all clays. In the testing of the clays of this region for Fuller's earth, the fairly simple case of the absorption of a strong dye was used, it being assumed that the relative absorption would be the same whatever the substance used. This may not be necessarily true however, and the results should be viewed with this reservation in mind. In the realm of the dyes, the absorption for basic dyes is great, while the absorption for acidic dyes is practically nil. In these investigations, four dyes were tried out on a sample of Fuller's Earth. The basic ones, methyl violet, malachite green, and congo red showed very great absorption; the only acid dye tried, eosin, gave practically no absorption. Of this group, malachite green was chosen as the most suitable, although the other two basic dyes should give practically the same results.

Procedure.- A deep blue solution of the dye was made up, and two-gram samples of each specimen, after being put through the same drying process, were shaken up with 50 c.c. of the solution at intervals for two days, and then allowed to settle for a day. The clear liquid at the top of each bottle was

then pipetted off, and the intensity of the color left determined in a Duboseq colorimeter. This type of colorimeter is based on the principle that when the depth of two different solutions are so adjusted that the color intensity is the same, the concentrations of the solutions are inversely proportional to the depths. The concentration of the solution from the Fuller's earth was determined and all the other samples compared with it. Due to the fact that practically all the clay solutions gave colloidal solutions with varying degrees of translucency, considerable trouble was encountered in the least colored samples in distinguishing depth of color from intensity of light; the colloidal clay also tended to blend with the blue giving an olive colored solution in those cases which showed the greatest presence of colloidal matter.

Solution Com- pared with Fuller's Earth	Depth Fuller's Earth Solution	Depth Com- pared Sol'n.	Conc.	% Absorp- tion
Standard, un- treated	14.5	1.5	.0094	99.06
(Conc. diluted to 1/11)			(Conc. of F.E. sol'n.)	(% ads. F.E. sol'n.)
No. 1	25	17	.0138	98.62
2	32	5	.0602	93.98
3	42	40	.0099	99.01
4	42	18	.0219	97.81
5	44	27	.0153	98.47
6	18	58	.0029	99.71
7	21	51	.0039	99.61
8	32	9	.0334	96.66
9	22	15	.0138	98.62
10	32	4	.0752	92.48
11	23	13	.0166	98.34
12	38	64	.0056	99.44
13	28	48	.0055	99.45
14	23	35	.0062	99.38
15	23	16	.0135	98.65
16	25	60	.0039	99.61
17	21	26	.0076	99.24
18	24	34	.0066	99.34
19	32	21	.0143	98.57
20	11	31	.0033	99.67
21	24	18	.0125	98.75
22	33	11	.0282	97.18
23	44	28	.0148	98.52
24	44	38	.0109	98.91

Location and Descriptions of Outcrops

From Which Samples Were Taken

(For general locations, see map.)

1. On new road cut from reservoir on hill at Everett west toward sound - 500 ft. from reservoir. Cuts are shallow but clay apparently has a rather large horizontal and vertical extent.
 2. In low bank - clay interstratified with sand and gravel - deposit small.
 - 3, 4, 5, 6. Deposits all small, consisting of thin (average, 5 to 10 ft.) clay lenses with overlying and underlying sandy clay and sand into which they grade. They generally grade into sand and sandy clay within 300 ft. horizontally, though exact extent very hard to determine due to profuse growth of weeds.
- No clay between 6 and 7.
- 7, 8, 9. Extensive clay bed, 40 to 50 ft. thick as exposed and possibly thicker, and lying about 50 ft. above the railroad. Clay is uniform between points as near as could be told from what exposures occur.
 10. Very small thin (3 ft.) lense of clay in sandy clay on road, 25 ft. above track - horizontal extent 20 ft. plus.
 - 11, 12. Small apparently local lenses in sandy shale.
 13. Variable in quality but covers a considerable extent near top of bank.
 14. Large clay bank, 20 ft. thick, 1000 ft. long.
 15. Like 13.

16. Very large sandy clay deposit, 50 ft. thick.
- 17, 18. Clays are clean, but rather thin, and are interstratified with sands. Outcrops in bank along railroad. Clay seams 10 ft. thick or less.
19. S.W. of Harbor road 250 ft. and opposite Novelty Mill, West Seattle.
20. From above pottery works at Riverside, West Seattle - used by pottery works.
21. From lower part of brick yard, Builders' Brick Co. Deposit is rather sandy and contains some isolated pebbles. Extent about 500 ft. horizontally and 40 to 50 ft. vertically.
22. Small clay lense in a sandy clay and sand bank, in cut on highway about 500 ft. N. of mill between Rainier Beach and Bryn Mawr.
23. North end of Beacon Hill, where sluicing away of hill is going on at present time. This is the largest, best stratified, purest, and most uniform clay deposit examined. Extent is about 1000 ft. horizontally and 100-ft. vertically.
24. Upper part of brick yard at Renton. Clay is rather sandy, and contains pebbles. Extent about 500 ft. horizontally and 50 ft. thick.

Pure clay deposits of considerable size were not found to be so abundant in the region covered in collecting these samples as was at first supposed. Most of the clays are

decidedly sandy clays with here and there a few thin lenses of clean clay; in only a few places are deposits of commercial size present. The clay beds from which samples 7, 8, and 9, 16, 20, 21, 23, and 24 were taken are the most promising, and of these number 23 is by far the most extensive.

Every sample taken was from the Admiralty sediments apparently; all the Vashon till was found to be too sandy. The clay deposits are nearly all overlain by sand and gravel which would have to be removed in case the deposits should be worked.

Edwin T. McKnight,

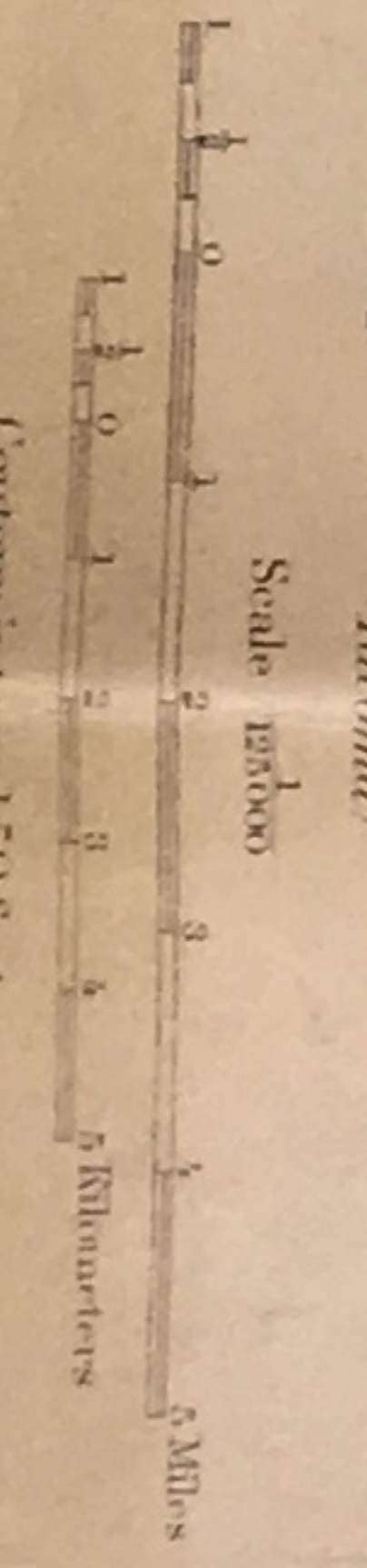
June, 1924.

TOPOGRAPHY

WASHINGTON
SNOHOMISH QUADRANGLE
R. 3 E. T. 28 N.



Color	Symbol
Blue	Water
Green	Vegetation
Brown	Contours
Black	Streets
Red	Railroads
Grey	Buildings



Contour Interval	Color
6.5	4
7.5	5
8.5	6
9.5	7
10.5	8
11.5	9
12.5	10
13.5	11
14.5	12
15.5	13
16.5	14
17.5	15
18.5	16
19.5	17
20.5	18
21.5	19
22.5	20
23.5	21
24.5	22
25.5	23
26.5	24
27.5	25
28.5	26
29.5	27
30.5	28
31.5	29
32.5	30
33.5	31
34.5	32
35.5	33

Published Oct. 1897, reprinted July 1912.
Note: The smaller sheet from later and more detailed surveys of the S. W. quarter of this area is published on scale of 1:25,000.
SNOHOMISH
(formerly called SEATTLE)

Day Report Map

DESCRIPTION OF THE TOPOGRAPHIC MAP OF THE UNITED STATES

The United States Geological Survey is making a topographic map of the United States. This work has been in progress since 1882, and more than one-third of the area of the country, excluding outlying possessions, has been mapped. The mapped areas are widely scattered, nearly every State being represented, as shown on the progress maps accompanying each annual report of the Director.

This great map is being published in atlas sheets of convenient size, which are bounded by parallels and meridians. The four-cornered division of land corresponding to an atlas sheet is called a *quadrangle*. The sheets are of approximately the same size: the paper dimensions are 20 by 16 1/2 inches; the map occupies about 17 1/2 inches of height and 14 1/2 inches of width, the latter varying with latitude. Three scales, however, are employed. The largest scale is 1:62,500, or very nearly one mile to one inch; i. e., one linear mile on the ground is represented by one linear inch on the map. This scale is used for the thickly settled or industrially important parts of the country. For the greater part of the country in intermediate scale of 1:125,000, or about two miles to one inch, is employed. A third and still smaller scale of 1:250,000, or about four miles to one inch, has been used in the desert regions of the far West. A few special maps on larger scales are made of limited areas in mining districts. The sheets on the largest scale cover 15' of latitude by 15' of longitude; those on the intermediate scale, 30' of latitude by 30' of longitude; and those on the smallest scale, 1° of latitude by 1° of longitude.

The features shown on this map may, for convenience, be classed in three groups: (1) *waters*, including seas, lakes, ponds, rivers and other streams, canals, swamps, etc.; (2) *relief*, including mountains, hills, valleys, cliffs, etc.; (3) *culture*, i. e., works of man, such as towns, cities, roads, railroads, boundaries, etc. The conventional signs used for these features are grouped below. Variations appear in some maps of earlier dates.

All water features are shown in *blue*, the smaller streams and canals in full blue lines, and the larger streams, lakes, and the sea by blue water-lining. Certain streams, however, which flow during only a part of the year, their beds being dry at other

times, are shown, not by full lines, but by lines of dots and dashes. Ponds which are dry during a part of the year are shown by oblique parallel lines. Salt-water marshes are shown by horizontal ruling interspersed with lines of blue, and freshwater marshes and swamps by blue tufts with broken horizontal lines.

Relief is shown by contour lines in *brown*. Each contour passes through points which have the same altitude. One will follow a contour on the ground and will go neither uphill nor downhill, but on a level. By the use of contours not only are the shapes of the plain hills, and mountains shown, but also the elevations. The line of the seawest islet is a contour line, the datum or zero of elevation being mean level. The contour line at, say, 20 feet above level is the line that would be the contour if it were a way to rise 62 feet to sink 20 feet. Such lines are laid into the valleys and forward toward the points of hills and spurs. On a gentle slope the contour line is far from the present coast line, while on a steep slope it is near it. Thus a succession of these contour lines far apart on the map indicates a gentle slope; if close together, a steep slope; and if the contours run together in one line, as if each were vertically under the one above it, they indicate a cliff. In many parts of the country are depressions or hollows with no outlets. The contours of course surround these, just as they surround hills. Those small hollows known as *shoals* are usually indicated by hachures, or short dashes, on the inside of the curve. The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval varies according to the character of the area mapped; in a flat country it may be as small as 5 feet; in a mountainous region it may be 200 feet.

Certain contours, usually every fifth one, are accompanied by figures stating elevation above sea level. The heights of many definite points, such as road corners, railroad crossings, railroad stations, summits, water surfaces, triangulation stations, and bench marks, are also given. The figures in each case are placed close to the point to which they apply, and express the elevation to the nearest foot only. The *exact* elevations of bench marks and

their descriptions, as well as the descriptions and geodetic coordinates of triangulation stations, are published in the annual reports and bulletins of the Survey. The publications pertaining to specified localities may be had on application.

The works of man are shown in *black*, in which color all lettering also is printed. Boundaries, such as State, county, city, land-grant, reservation, etc., are shown by broken lines of different kinds and weights. Houses are shown by small black squares which in the densely built portions of cities and towns merge into blocks. Roads are shown by fine double lines (full for the better roads, dotted for the inferior ones), trails by single dotted lines, and railroads by full black lines with cross lines. Other cultural features are represented by conventions which are easily understood.

The sheets composing the topographic atlas are designated by the name of a principal town or of some prominent natural feature within the quadrangle and the names of adjoining published sheets are printed on the margins. They are sold at five cents each when fewer than 100 copies are purchased, but when ordered in lots of 100 or more copies, whether of the same or of different sheets, the price is three cents each.

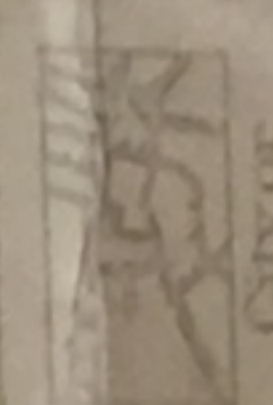
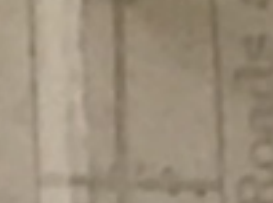

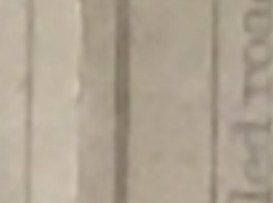
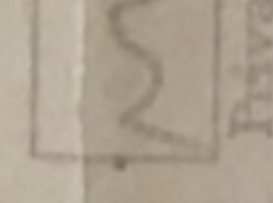
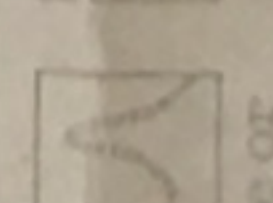
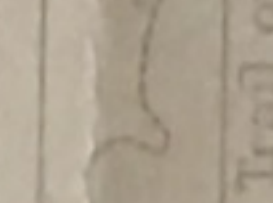
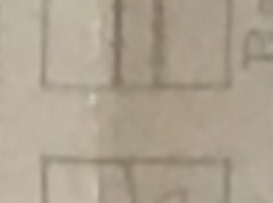
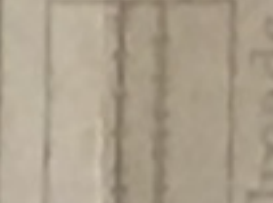
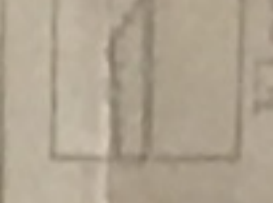
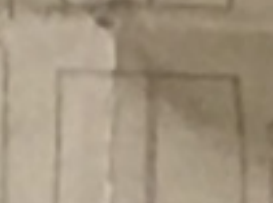
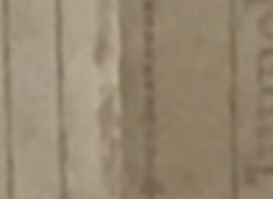
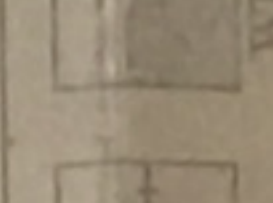

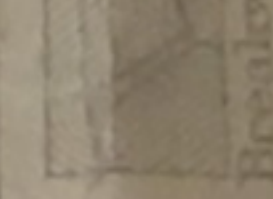
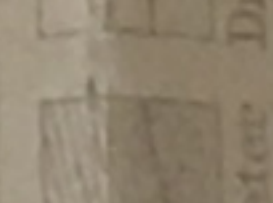
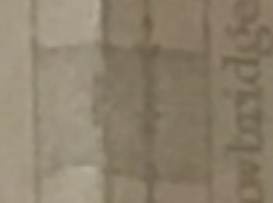
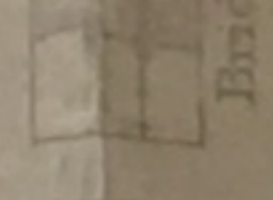
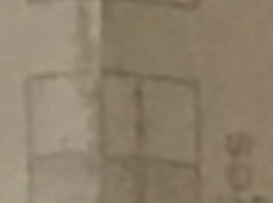
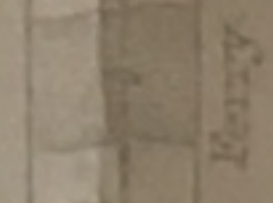
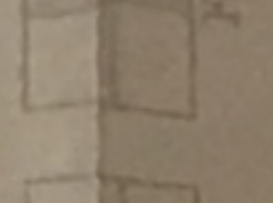
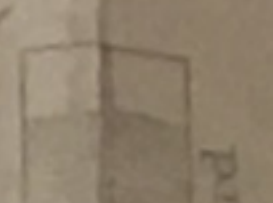
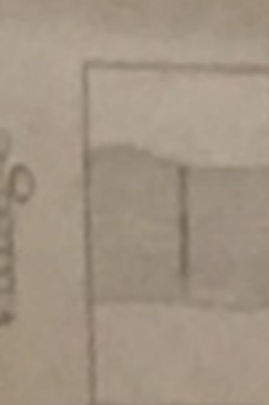
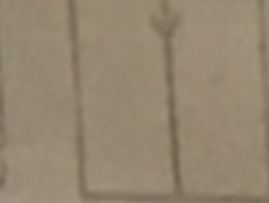
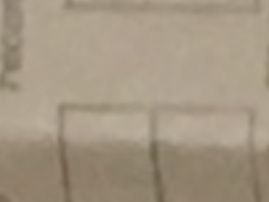
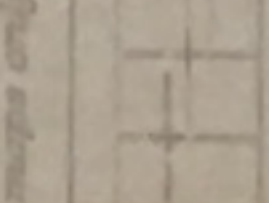
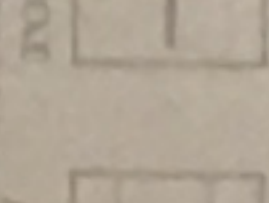
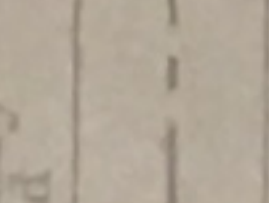
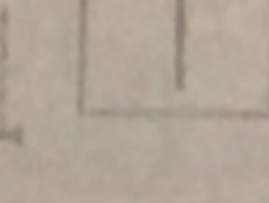
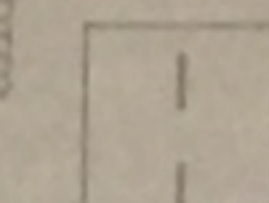
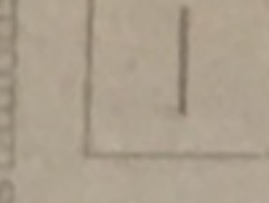
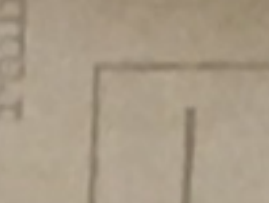
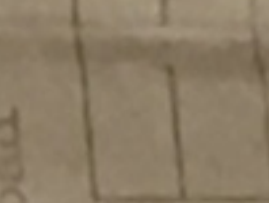
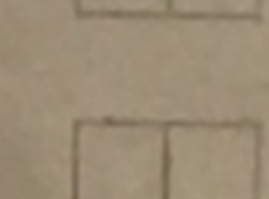
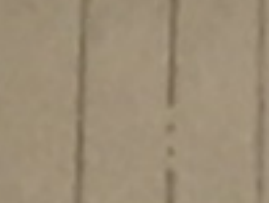
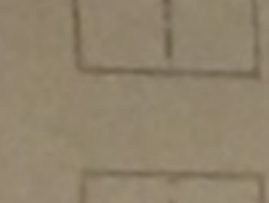
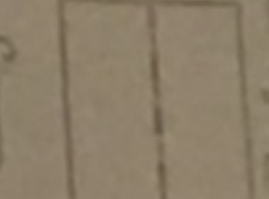
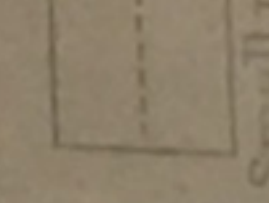
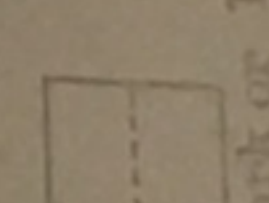
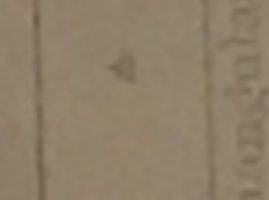
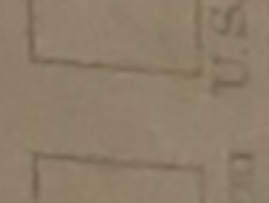
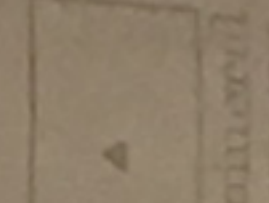
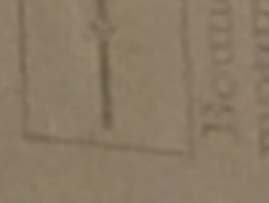
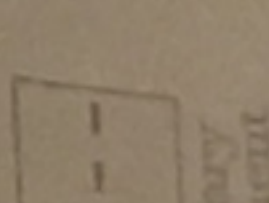
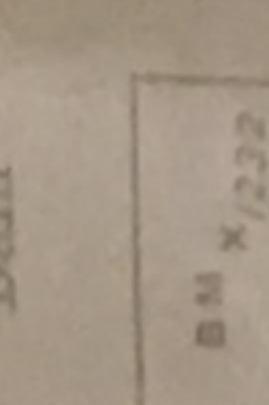
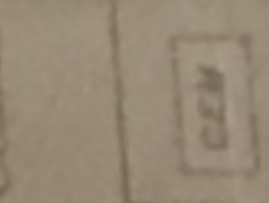
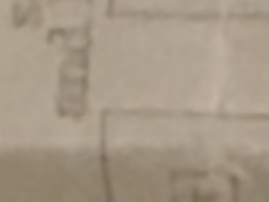
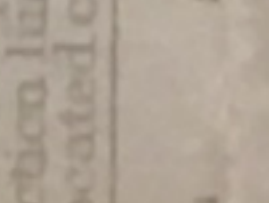
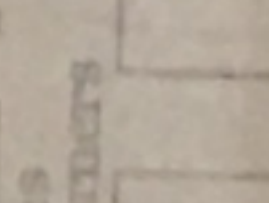
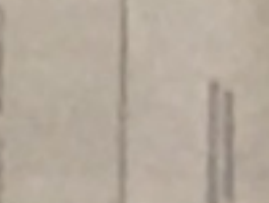
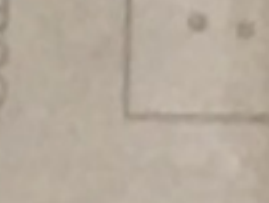
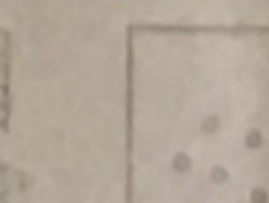
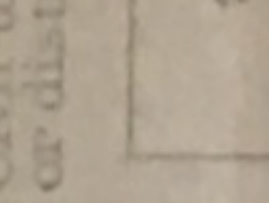
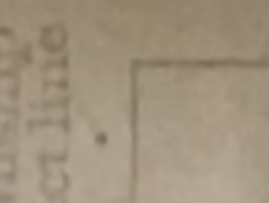
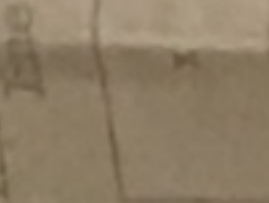
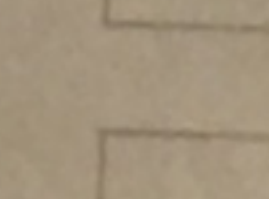
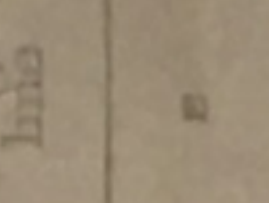
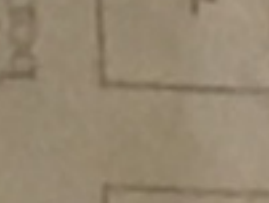
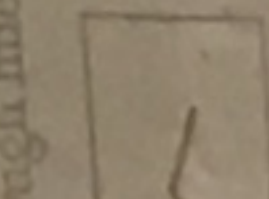
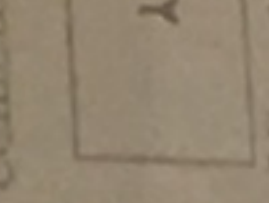
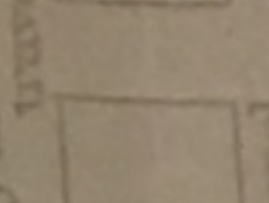
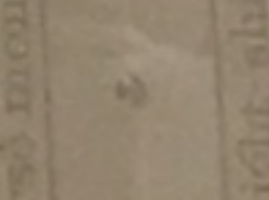
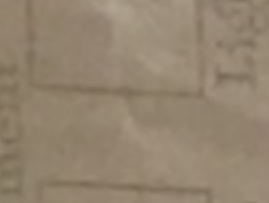
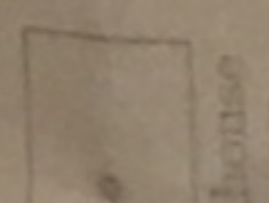
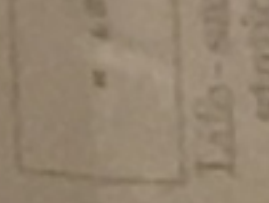
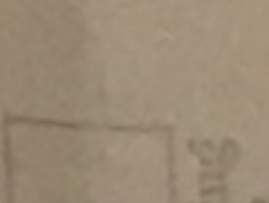
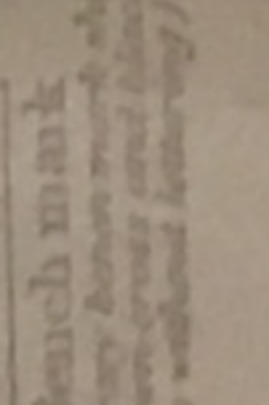
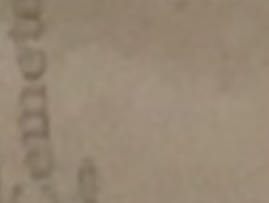
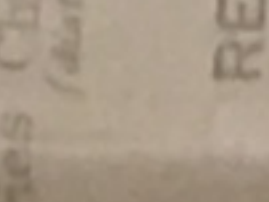
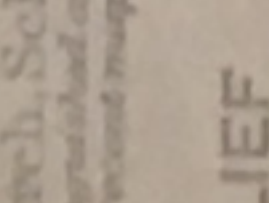
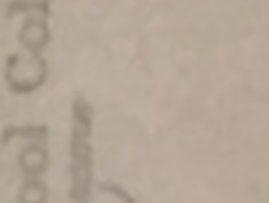
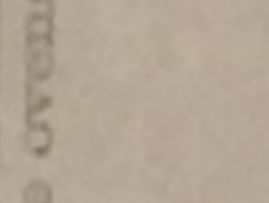
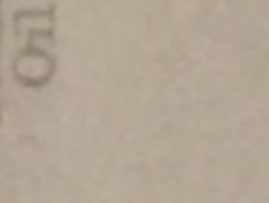
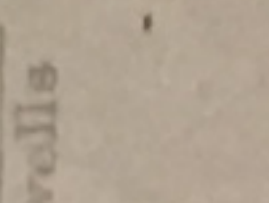
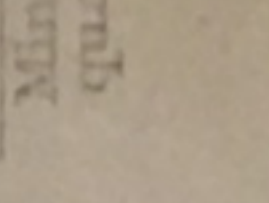
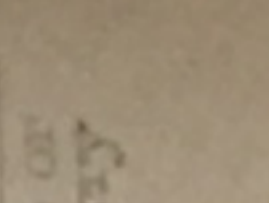
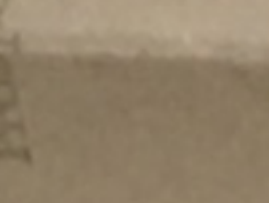
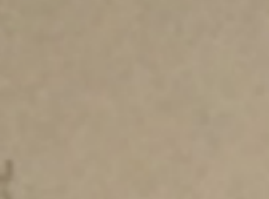
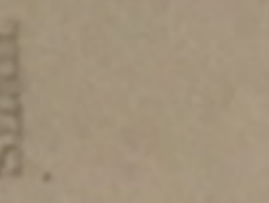
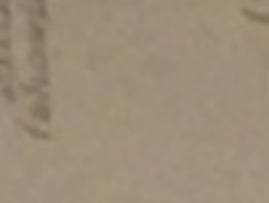
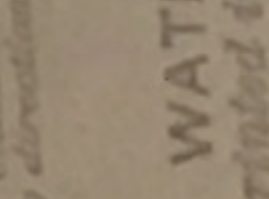
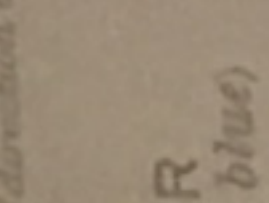
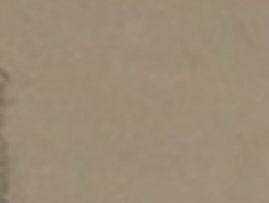
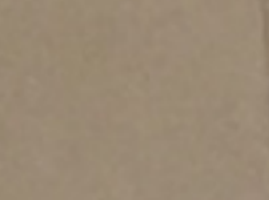
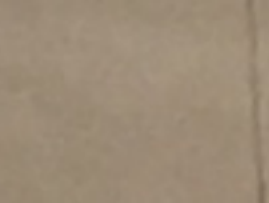
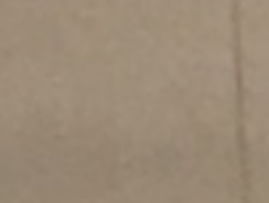
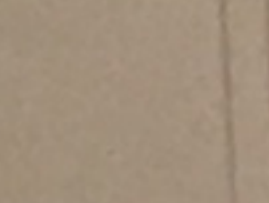
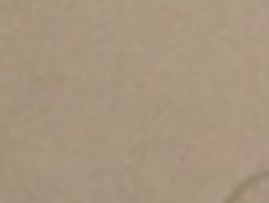
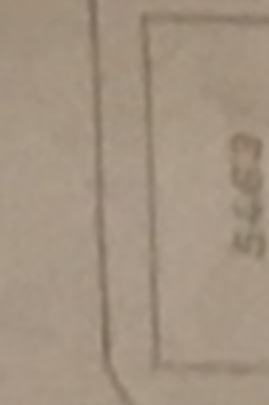
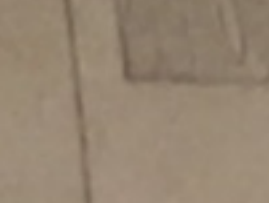
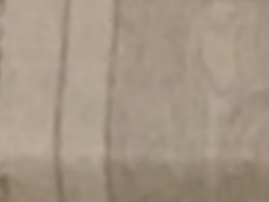
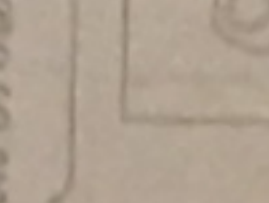
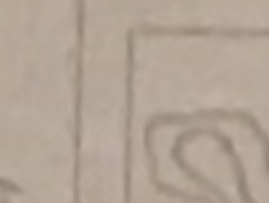
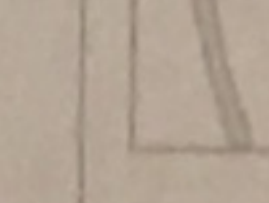
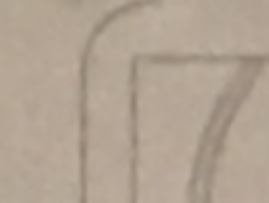
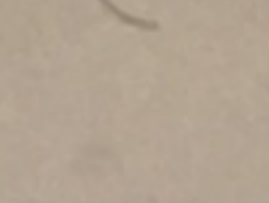
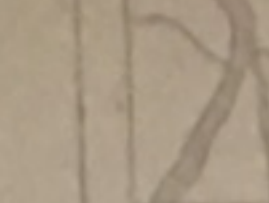
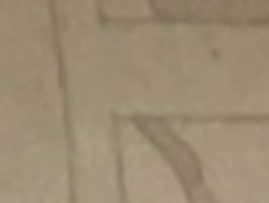
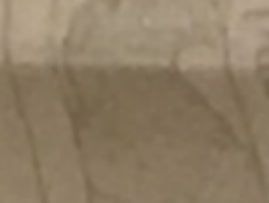
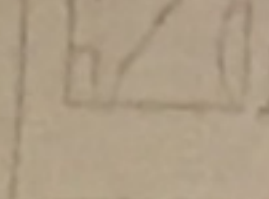
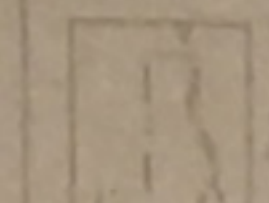
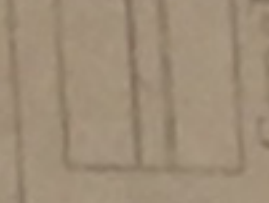
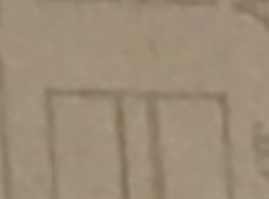
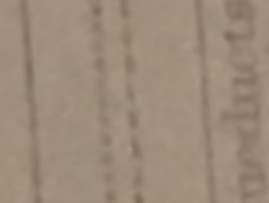
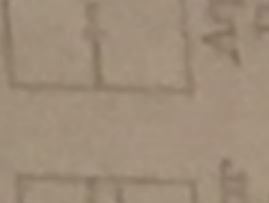
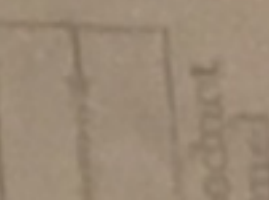
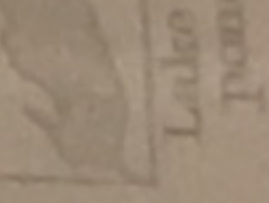
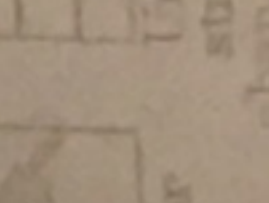
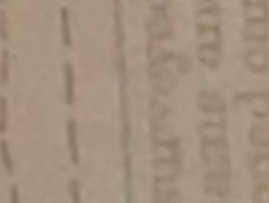
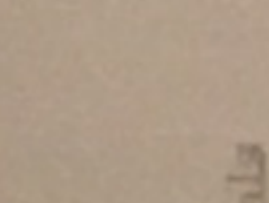
The topographic map is the basis on which the facts of geology and the mineral resources of a quadrangle are represented. The topographic and geologic maps of a quadrangle are finally bound together, accompanied by a description of the district, to form a folio of the Geologic Atlas of the United States. The folios are sold at twenty-five cents each, excepting that such as are unusually comprehensive are priced accordingly.

Applications for the separate topographic maps accompanied by cash—the exact amount—or by post-office money order, and should be addressed to—

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

February, 1911

CONVENTIONAL SIGNS

	CULTURE <i>(printed in black)</i>	RELIEF <i>(printed in brown)</i>	WATER <i>(printed in blue)</i>	WOODS <i>(taken where printed in green)</i>
 City or village  Ditch  Bench mark  Road  Railroad  Tunnel  Wharves  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater  Breakwater	 Mountain  Hill  Valley  Cliff  Canyon  Pass  Plateau  Tributary  Stream  River  Lake  Pond  Swamp  Marsh  Salt marsh  Tidal flat  Grassy field  Field  Forest  Wood  Wood  Wood	 Contour  Depression contour  Cliff  Mile dunes  Ledge  Sand and sand dunes  Succasun  Lake and stream  Spring  Glacier  Ice  Ice  Ice  Ice  Ice  Ice  Ice  Ice  Ice  Ice  Ice  Ice	 Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal  Canal	 Forest  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood  Wood