

GEOLOGIC REPORT ON PETERSON BENTONITE DEPOSIT,

WESTON COUNTY, WYOMING

DAVID LOVE

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By

David Love, Geologist

LOCATION AND ACCESSIBILITY

The area discussed in this report is a forty acre tract of land in north-central Weston County, approximately eight miles southeast of the town of Upton. This tract is a placer claim embracing the whole of the NE₄¹, NE₄¹, sec. 27, T. 47 N., R 64 W. The area lies a quarter of a mile north of the main highway between Newcastle and Upton, and is easily accessible by car. The nearest shipping point by rail is Upton, on the Chicago, Burlington and Quincy Railroad. The highway between the claim and Upton is oiled for about five miles and gravelled about two and one-half miles, and the road from the highway to the claim is an unimproved trail over soft shales.

SCOPE OF THE REPORT

This report is concerned only with the tonnage of bentonite and overburden which would have to be removed. No analyses of the character and quality of either bentonite or overburden were made, and the lithology of neither was studied in detail. The geological work done pertained just to the actual deposit of bentonite and that amount of overburden which could profitably be removed under present methods used in the region.

FIELD AND LABORATORY WORK

The work on which this report is based was done for the Niagara Sprayer and Chemical Co., Inc., Middleport, New York. Field work was carried on from June 21 to June 24 inclusive, 1935. Laboratory work, drafting and writing the report, was done on June 25 and June 26, 1935.

Boundaries were determined from a stake, said by the owner of the land to have been established by Mr. Bernard Howell, County Surveyor of Weston County, at the northwest corner of the forty acre tract. No other corner marks were found. The boundary lines, position of outcrops, gullies and ridges were plotted on a plane table with a telescopic alidade. A topographic map of that portion of the tract underlain by bentonite beds was made with a contour interval of five feet, for the purpose of determining the tonnage of overburden and bentonite available. The stake at the northwest corner of the tract was given the arbitrary elevation of 4300 feet and all other elevations were determined with respect to it. Twenty bore holes were sunk through the bentonite beds with a hand auger in various parts of the area in order to determine the depth of the overburden and thickness of the bentonite beds.

TOPOGRAPHY AND DRAINAGE

The bentonite claim is drained by an intermittent stream, a small tributary of Pine Creek, which flows about half a mile west of the area. All the drainage is to the west and southwest. Nowhere in the area is the relief high, but the topography is rough in the eastern part where the pine-covered ridge of soft shales has been dissected by

erosion (Fig. 2). The western part of the area is a very gently rolling and has no prominent ridges or valleys.

GEOLOGY

No attempt was made to do any detailed geological work. The tract lies entirely in a sequence of soft shales in the upper part of the Benton Group of Upper Cretaceous age. Below the lower bentonite bed the shales are very fine grained, soft, pure, and of a uniform dark gray color.

At the base of the lower bentonite bed are a few inches of gray phosphatic material, usually overlain by three or four inches of impure sandy bentonite which is not of commercial value. Overlying this are several feet of pure gray to pale greenish bentonite, apparently of good quality. This bed varies in thickness up to six feet but never thins to less than two feet. The average thickness of the workable part of this bed is about forty-five inches. Overlying the pure bentonite are from six to ten inches of impure bentonite mixed with shale, mud and sand which has been derived from the overburden. This part of the bed is not of commercial value and was not included in the tonnage estimates.

Immediately above the bentonite bed is a gray to black sandy shale containing numerous large and small "turtleback" concretions. These are rounded irregular masses varying in size up to fifteen feet in length and three feet in thickness. They consist mainly of a hard ferruginous sandstone, and due to their resistant character and abundance immediately above the bentonite bed must be seriously considered when dealing with

the economic aspects of stripping the overburden. Above the concretionary zone are from twenty to fifty feet of soft, dark gray, fine shale containing a few scattered "turtleback" concretions. Immediately below the upper bentonite bed these concretions become more numerous.

The lithology of the upper bentonite bed is the same as that of the lower one, except that the thickness of the marketable bentonite is only about thirty inches. Above the bentonite is a soft, fine, dark gray shale containing more of the abundant "turtleback" concretions. This zone is rather thin and most of the overburden above the upper bentonite bed is free from the concretions.

The structure of this area is simple, for the beds have a low monoclinial dip to the south, with few variations and no structural complications. The dip and strike of the beds were measured in a number of places and they appeared to be constant throughout the area, except at the southern boundary of the claim where they flattened out a little. The strike is North 5° east, and the dip is 4° to the south.

ESTIMATES OF TONNAGE

Twenty bore holes were put down through the bentonite beds, seventeen in the lower one, and three in the upper one. The thickness of the marketable bentonite encountered in these holes is shown in the following table:

LOWER BENTONITE BED:

Hole No.	Overburden	Bentonite
1	3'6"	4'4"
2	7'2"	3'11"
3	2'6"	4'
4	3'8"	3'
5	2'8"	3'
6	1'	6'
7	7'	4'
8	0'	4'
9	8"	2'10"
10	8"	1'6"
11	0'	3'
12	3'9"	5'6"
13	0'	3'5"
14	0'	3'
15	2'5"	4'2"
16	1'6"	3'4"
17	4"	3'3"

UPPER BENTONITE BED:

Hole No 18	10"	3'
19	3'4"	3'
20	0'	2'

Data obtained from these bore holes, and from a study of the outcrops of the bentonite beds on the surface served to establish the average thickness of the beds. The relative position of the top of each bentonite bed, where it reached a depth of fifteen feet below the surface was computed and lines were drawn connecting these points. Stripping is not usually carried on to a greater depth than fifteen feet in the mines now operating in the region so this depth was arbitrarily chosen as the maximum in estimating tonnage. The specific gravity of the bentonite in other deposits of this region is about 2.00 so this figure was used in computing tonnage, as there was no time to run the necessary series of tests for determination of the specific gravity in this particular deposit. The tonnage of both bentonite seams was figured conservatively

and as an additional precaution against over-estimating, 10% of the total tonnage was deducted from the final figure. The tonnage of both seams is as follows:

Lower bentonite bed:	Total tonnage of bentonite	81,175 tons
	Total tonnage less 10%	73,000 tons
Upper bentonite bed:	Total tonnage of bentonite	48,415 tons
	Total tonnage less 10%	43,575 tons

It must be clearly understood that these figures are not exact, but are only approximations, as there was no time for the complete topographic survey necessary for an accurate estimate.

The tonnage of the over-

burden was computed in much the same way.

The figure 2.50 was used for the average specific gravity of the overburden and the maximum tonnage was figured to a fifteen foot depth. In order to compensate for under-estimation of tonnage of overburden, an additional 10% of the total tonnage was added on to the final figure.

Overburden which would have to be stripped to a fifteen foot depth

from the lower bentonite bed:	Total tonnage	166,960 tons
	Total tonnage plus 10%	183,650 tons

Overburden which would have to be stripped to a fifteen foot depth

from the upper bentonite bed:	Total tonnage	167,895 tons
	Total tonnage plus 10%	184,685 tons

CONCLUSIONS AND RECOMMENDATIONS

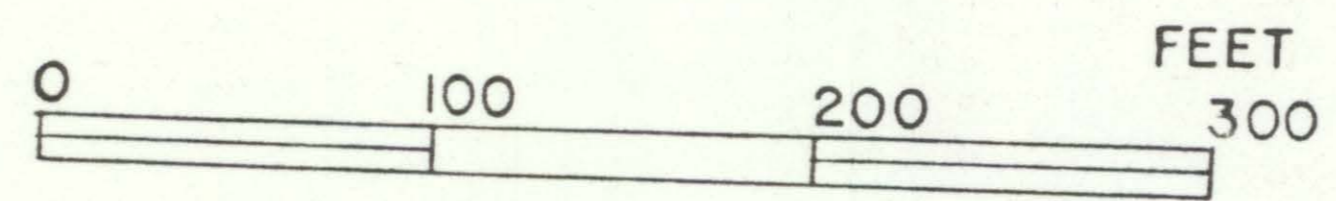
1. It is recommended that the boundaries of the claim be located with respect to at least two section corners as they are hard to find in this country, and those whose locations are known have often been misplaced.

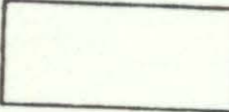
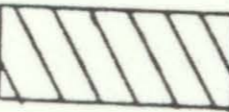
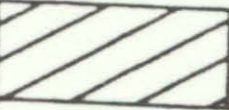


2. It is recommended that a complete topographic survey be made and analyses of the bentonite, shale, and concretions be run to determine their specific gravity and character, if an accurate report on tonnage is desired.

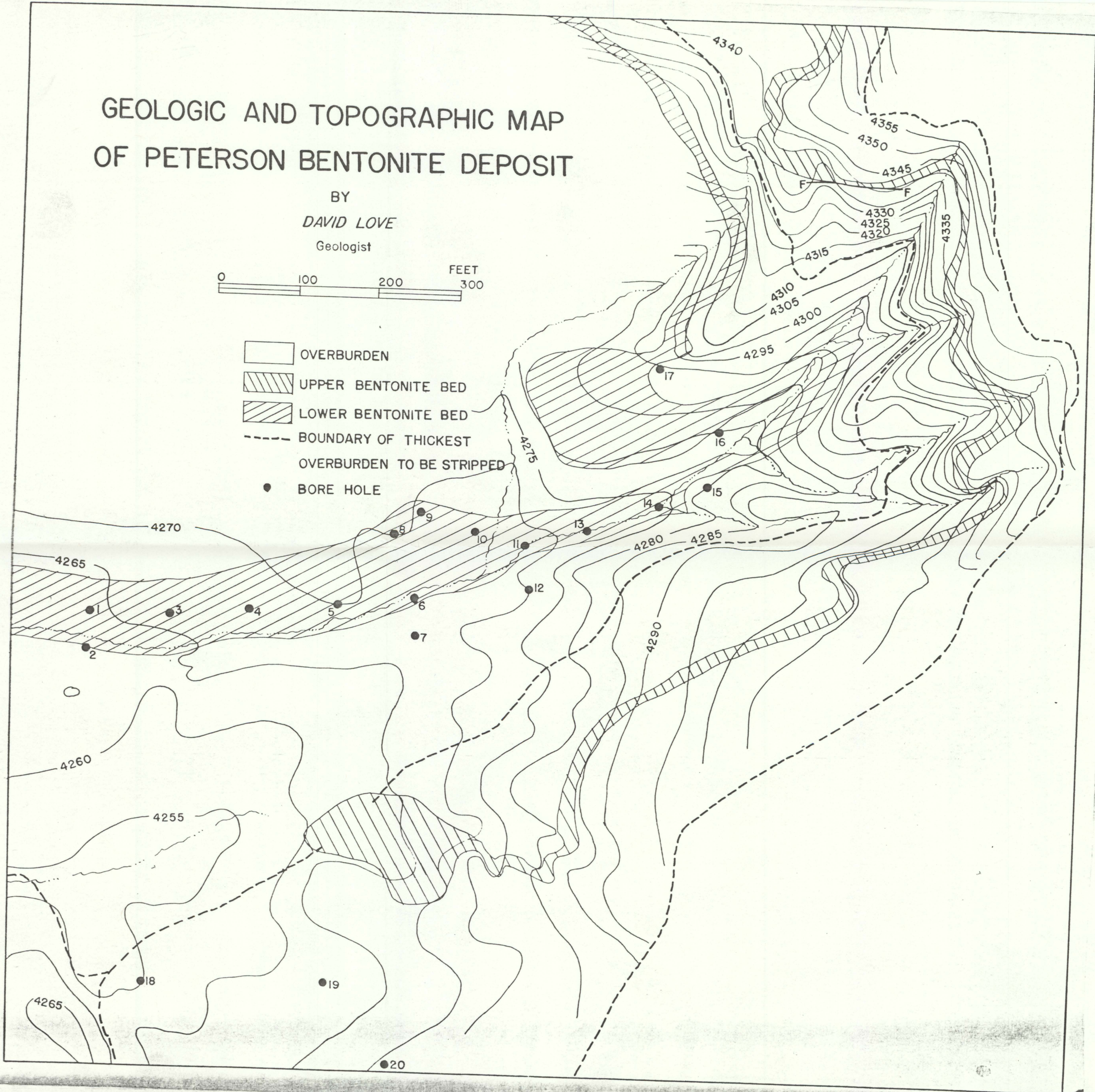
DAVID LOVE,
Geologist

GEOLOGIC AND TOPOGRAPHIC MAP OF PETERSON BENTONITE DEPOSIT

BY
DAVID LOVE
Geologist



-  OVERBURDEN
-  UPPER BENTONITE BED
-  LOWER BENTONITE BED
-  BOUNDARY OF THICKEST OVERBURDEN TO BE STRIPPED
-  BORE HOLE



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