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CLAY, NEAR NENANA, ALASKA

by

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This manuscript is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

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ILLUSTRATIONS

INTRODUCTION

The clay deposit here described is located on the west side of the Alaska Railroad about 3.7 miles south of Nenana in N.E. 1/4 Sec. 3, T. 5 S., R. 8 W. (see figure 1). The surface of the deposit has a relief of less than 10 feet and is covered by grasses, brush, and trees of various species.

In 1946, George Hellerich, a mining engineer from Fairbanks, collected samples from a pit at the southeast corner of the deposit (at hole 1 in figure 2). These samples were subsequently tested for the manufacture of brick by the U. S. Bureau of Mines. The results of the tests are given on page 4. It is not known whether or not Mr. Hellerich was the first to locate the deposit.

On September 9, 1951, a Geological Survey field party examined the deposit and gathered the data presented here. Five auger holes were drilled to determine the extent and thickness of the clay. Seven clay samples were collectad from the auger holes.

A claim marker representing the northeast corner of a placer claim on the creek south of the clay deposit was found at the pit. The claim was filed on July 31, 1951 by B. W. Alexander and William Bethis.

GENERAL GEOLOGY

The clay constitutes part of the flood plain of the Nenana River and owes its origin to that body of water. Figure 2 shows the limits of the deposit and the distribution of the various clay units described below as inferred from auger holes. No holes were drilled east of the railroad or south of the creek. On the basis of the data obtained from hole 2 (see figure 3), sand and gravel border the deposit on the southwest.

The clay comprising the deposit may be divided into 4 units on the basis of color and lithology. These units, from top to bottom, are: tan clay, upper gray clay, dark clay, and lower gray clay. All of the units are flat-laying and probably lenticular. Vegetation and a dark, somewhat clayey soil less than 3 feet thick, overlie the units. Gray sand, probably underlain by gravel, lies beneath the basal clay. Westward, the lower 3 clay units either lens out or grade into a reddish brown sand which in turn is underlain by the gray sand.

Tan clay--This clay lies below the vegetation and soil. It contains abundant fine flakes of mica and, in its middle and lower portions, thin streaks of light gray clay. The unit has a thickness of 2.4 to 3 feet in the eastern part of the deposit and about 6.5 feet in the northwestern part (see figure 3). Thus, the unit thickens to the northwest and probably extends beyond the limits of the deposit shown in figure 2.

Upper gray clay--This clay is light gray to blue gray in color. It lies beneath the tan clay and appears to be very pure. No grit can be felt in it. The unit has a thickness of 2.6 to at least 3.8 feet (see page 3) in the eastern part of the deposit but is believed to lens out westward.

Dark clay--This clay is nearly black and contains considerable mica and a small amount of grit. It lies beneath the upper gray clay. The unit was found only in hole 1, where it is 1 foot thick, but it probably also occurs in the area near hole 3 (see below). However, westward, the unit either lenses out or grades into a reddish brown sand.

Lower gray clay--This clay is the basal clay unit and lies between the dark clay above and the gray sand below. It is very similar to the upper gray clay but is distinguished from that clay by its low sand content. The unit was found only in holes 1 and 5 but probably also occurs in the area around hole 3 (see below). The unit lenses out west of hole 5.

ECONOMIC GEOLOGY

Auger holes--The logs of the 5 auger holes drilled are shown in figure 4. An Iwan auger capable of bringing a sample to the surface was used in drilling except below a depth of 7.6 feet in hole 3. The wet overburden constricted the opening of this hole and necessitated the use of a small spiral auger below 7.6 feet. No reliable samples can be obtained with the small auger and, therefore, the log of hole 3 between depths of 7.6 feet and 10.0 feet is generalized. The basal clay units identified in hole 1 could not be accurately identified in hole 3, although it is believed that these units occur in the area around hole 3.

Tests--Mr. Skinner, U. S. Bureau of Mines, Northwest Experiment Station, Seattle, Washington performed preliminary tests on the clay samples collected by Mr. Hellerich (Letter from H. F. Yancey, U. S. Bureau of

Mines dated July 23, 1946). Mr. Skinner summarizes his results as follows:

> Preliminary drying and firing tests of the 4 clays submitted from Nenana, Alaska, indicate that the center horizon sample would be the best for brick manufacture. However, properly proportioned mixtures of the 3 lower horizon samples would probably produce a better brick and would be easier to manufacture than using the center clay alone. The clays were fired to cone 03 (about 2000° F.) which is slightly higher than that used in some of the common brick plants. However, the physical results reported for given temperatures in the laboratory may be obtained in commercial firings at lower temperature due to the long soaking heat.
>
> The small weight of the samples received made it impossible to obtain accurate results and the data given in the following table should be considered only as an indication as to what might be expected from the clays.

Preliminary tests of Nenana, Alaska, clays

Sample	Total shrinkage at cone 03* percent	Fired hardness	Fired strength, modulus of rupture	Remarks
Top	3.5	Softer than steel	Broken by hand	Micaceous
Center	11.9	Harder than steel	4470 p.s.i.	---
Below center	10.4	Softer than steel	1830 p.s.i.	Sandy
Bottom	1.6	Softer than steel	Broken by hand	Sandy

*Plastic rupture

> Small hand made bars were used to obtain the above data. The modulus of rupture for the center sample corresponds to that obtained for clays used in the Pacific Northwest for brick and tile manufacture.
>
> The deposit should be thoroughly sampled again and tests made not only on the individual samples but also on mixtures before starting a brick plant.

The relationship of the 4 samples tested by Mr. Skinner to the 4 clay units of this report is not definitely known. However, it seems certain that the top sample referred to in his tabular data came from the tan clay. If this is true, his center sample probably came from the upper gray clay; below center sample from the dark clay; bottom sample from the lower gray clay. This relationship is corroborated by the brief description of the samples under "Remarks" in Mr. Skinner's table.

Results of tests and analyses on samples collected on September 9, 1951 by the author are not yet available.

Tonnage-- Reserves of the deposit were calculated from figure 3 and the logs of the auger holes. The specific gravity of the clay is assumed to be 2.65, i. e. 12 cubic feet of clay weighs one short ton.

Inferred reserves:

tan clay unit	8,100 short tons
combined lower 3 clay units	4,900 short tons
combined 4 clay units	13,000 short tons

Overburden--The vegetation and soil overlying the clay units are less than 3 feet thick. However, if only the lower 3 clay units were to be used in the manufacture of brick, the tan clay would also have to be considered as part of the overburden.

CONCLUSIONS

The small reserves of the 3 lower clay units in the area examined preclude their exploitation for the manufacture of brick.

However, it appears entirely possible that the clay units may extend east of the railroad and south of the creek. Additional auger holes or trenches would be required to determine the extent of the material in these directions.

The clay units, either individually or in various combinations, might yield a satisfactory haydite product (heat-expanded lightweight aggregate). This possible use of the clays should be investigated, if larger reserves are proven.

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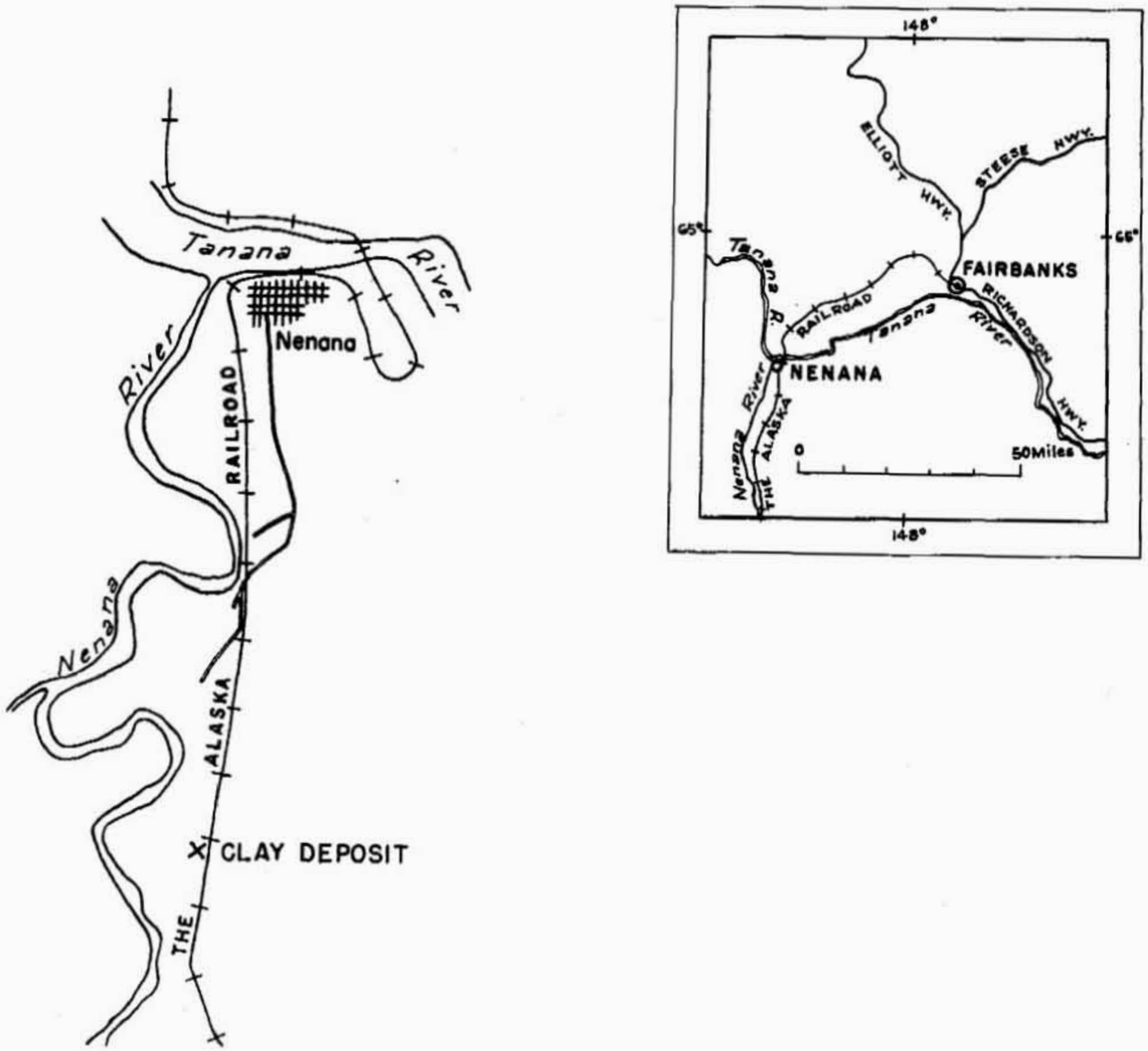
FIGURE 1



MAP SHOWING LOCATION OF
CLAY DEPOSIT NEAR NENANA,
ALASKA

Scale

1 0 1 2 MILES

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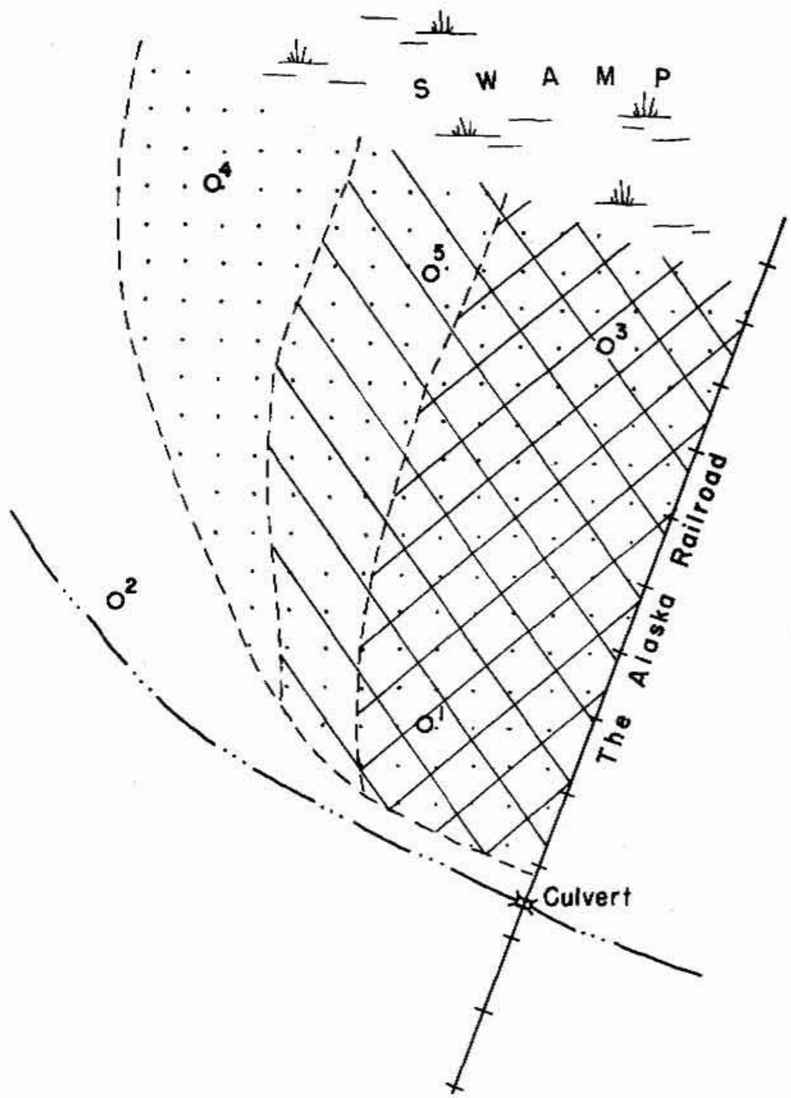
FIGURE 2

GEOLOGIC MAP OF CLAY DEPOSIT NEAR NENANA, ALASKA



100 0 100 200 FT.

TRUE NORTH

EXPLANATION

Area probably underlain by tan clay

Area probably underlain by upper gray clay and dark clay

Area probably underlain by lower gray clay

Indefinite contact

O2
Auger hole

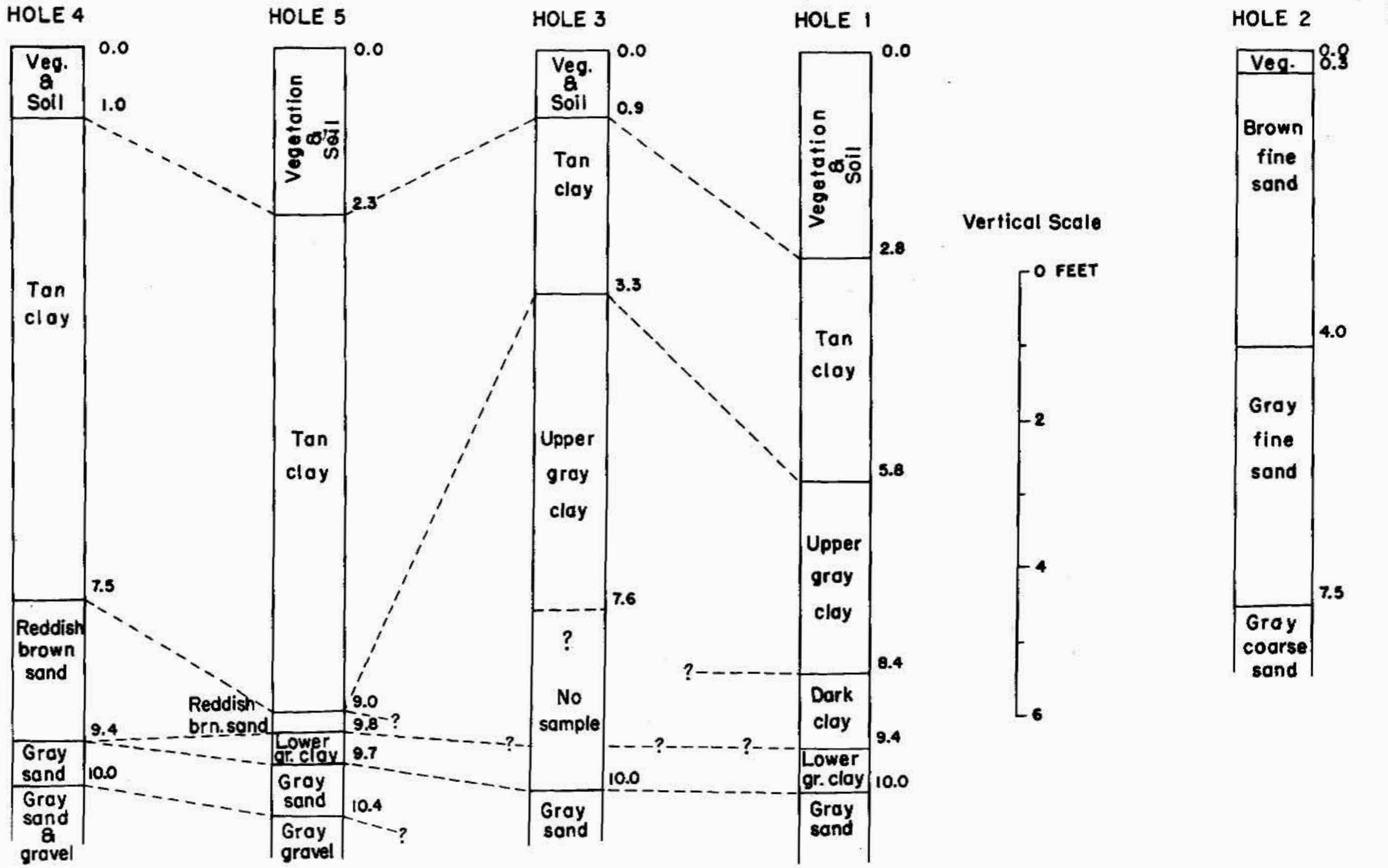


Figure 3: Logs of auger holes in clay deposit near Nenana, Alaska

(See figure 2 for locations, and text for explanation of lower part of Hole 3.)