

**THE CLAY DEPOSITS OF KENTUCKY. AN
ECONOMIC CONSIDERATION OF THE
POTTERY, BRICK, AND
TILE CLAYS, FIRE CLAYS, AND SHALES
OF KENTUCKY, WITH NOTES ON THEIR
INDUSTRIAL DEVELOPMENT**

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The Clay Deposits of Kentucky. An Economic Consideration of the Pottery, Brick, and Tile Clays, Fire Clays, and Shales of Kentucky, with Notes on Their Industrial Development by Heinrich Ries

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HEINRICH RIES

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General view of Harhison-Walker Refractories Company plant, Olive Hill.

Letter of Transmission

DR. W. R. JILLSON,
State Geologist,
The Kentucky Geological Survey,
Frankfort, Ky.

DEAR SIR:

I beg to transmit herewith my report on the Clay deposits of Kentucky, which is based on field work carried on during the summer of 1921 and laboratory work in the autumn following.

While neither time nor funds were available to make either the field or laboratory work as complete as desirable, still it is felt that the results given will serve to give a fairly clear conception of the clay resources of the state, and also indicate in what regions further search should be made. To the data collected I have added such other previously published information as it seemed desirable to incorporate. The arrangement of the report has been made in accordance with your suggestions.

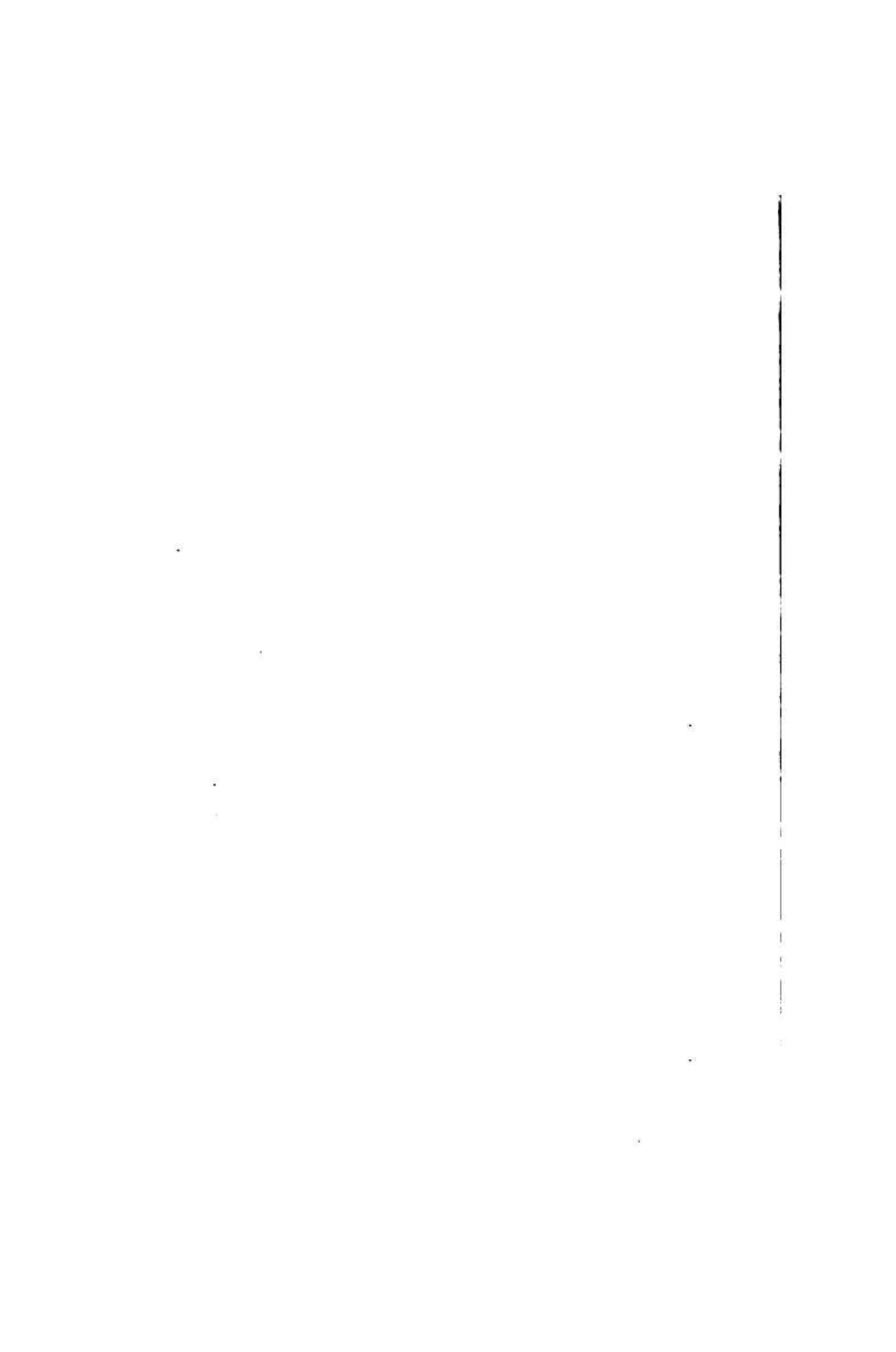
Throughout the field and laboratory work I have been most efficiently and conscientiously assisted by Mr. Floyd Hodson, whose services deserve special acknowledgment. Mr. C. E. Bales also rendered considerable assistance during a portion of the field season. It is likewise proper at this time to acknowledge the many courtesies that we received from the clay working firms and their representatives in all parts of the state, and to Prof. A. M. Miller of the University of Kentucky.

Respectfully submitted,

H. RIES,

Cornell University,
Dept. of Geology,
Ithaca, N. Y.,
Nov. 19, 1921.

CLAY DEPOSITS *of* KENTUCKY



CHAPTER I.

CLAY BEARING FORMATIONS IN KENTUCKY

Before taking up the clay and shale deposits in the different parts of the state it may be well to note briefly which of the geological formations found in Kentucky are likely to contain materials of value to the manufacturer of clay products. Additional data on their general distribution can be obtained by reference to the geological map of Kentucky and a number of the special or regional reports issued by the Kentucky Geological Survey which are listed in the appended bibliography.

From what follows it will be noted that there are a number of clay or shale-bearing formations but that all do not occur in sufficient thickness to be workable, nor are all of them of the proper character. However, even without these there remain a number of deposits of commercial value, which can be used to produce a variety of clay products.

The formations noted below are referred to in the order of ascending geological age.

Eden Shale. The Eden formation of the Ordovician (Ref. 22) was named from Eden Park in Cincinnati, Ohio, and there consists largely of shale with some interbedded limestone layers. On account of the nature of the shale it is sometimes called "blue clay" and "soapstone."

Because of the predominance of shaly beds at Cincinnati the Eden shale formation has been used there for brick manufacture, but as it extends southward into Kentucky the limestone layers increase and the shale layers decrease so that while it underlies a considerable area within the state, it is of no value to the clay worker in its fresh condition. It forms a belt of hilly country from 5 to 15 miles wide which has to be traversed in passing from the outer margin of the Bluegrass region to the inner part of that district.

Plum Creek Shale. This lies near the base of the Silurian system of rocks, and is named from its occurrence on a creek in Madison County. It might do for the manufacture of clay

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products if it were thicker, but it is nowhere over 5 feet. (Ref. 22.)

Osgood Shale. This formation is a subdivision of the Niagara series of the Silurian system of rocks, which includes several shale formations that are prominent on the east side of the Cincinnati arch but which do not appear to have been subdivided on the west side.

The subdivisions on the east side of the Bluegrass region include the Estill and Lulbehrad shales mentioned below.

In Jefferson County (Ref. 2, p. 78) the Osgood formation contains a shale 15 to 20 feet thick which lies between limestones. It is mostly a coarse, lumpy, gray shale running high in lime and magnesium carbonates. It weathers to a clay which forms white banks beneath the limestone beds.

It is probably of little commercial value as better shales occur in abundance in the general area in which it is found.

Lulbehrad Shale. This shale is named from Lulbehrad Creek, on the boundary of Clark and Powell counties. (Ref. 11.)

It rests on the Oldham limestone, and underlies the Estill shale, being sometimes separated from it by the Waco limestone, which is of great aid in distinguishing the two shales in the field as they resemble each other very closely.

The Lulbehrad which outcrops around the Bluegrass region is a light, smooth, bluish-gray shale which weathers somewhat readily to a very plastic clay. The chief impurities in it seem to be scattered crystals and rosettes of gypsum that can be seen lying on the weathered surface.

It is a good material for the manufacture of brick and tile, but does not form a deep deposit, being rarely over 15 feet thick. However, on account of its close association with the Estill shale it could often be worked in connection with it.

The Lulbehrad shale can be seen at a number of different points. There are excellent exposures along the tributaries of Lulbehrad Creek in Clark and Powell counties. Other outcrops are found south of Bardstown, Nelson County; in the lower part of the barren hills known as Knob Licks north of Olympia, Bath County; in the territory between Irvine, Clay City, Indiana Fields and Brassfield, in Estill and Powell counties, where it is 13 feet thick; at Abner's Mill, Powell county; near Vienna

on the Red River, Powell County; 1 mile east of College Hill, Madison County; just north of Waco, Madison County; east of Panola, Madison County, between the wagon road and railroad; southeast of Brassfield, Madison County; 3 miles slightly north of east of Bobtown, Madison County; $1\frac{1}{2}$ miles south of east of Bobtown, Madison; and 2 miles northeast of Berea, Madison County.

The Waco limestone which lies above the Lulbehrud occasionally contains shale layers, but they cannot be commercially separated from the limestone.

Estill Shale. This is a light, bluish gray, smooth shale, which may be gypsiferous, but not so much so as the Lulbehrud. It may reach a maximum thickness of 100 or more feet and is well worthy of consideration by the manufacturer of brick and tile. While it is overlain stratigraphically by the Onondaga limestone, it is not difficult to find exposures of it where the overburden is limited. The material weathers easily to a very plastic clay.

It works up to a very plastic mass and fires to a red body which should prove of value for the manufacture of brick, tile, and hollow blocks. (See Chapter V.)

Excellent exposures of this shale may be seen on the Irvine-Winchester Branch of the Louisville and Nashville Railway east of Howard Creek, the type exposures being around Irvine. (Ref. 11.) Other good ones can be seen just north of Crab Orchard, where along the pike to Lancaster, a continuous section of shale 65 feet thick is exposed on the west side of the road. Further north in Lewis and Fleming counties even thicker sections of the bluish-white clay are seen.

Waldron Shale. This is also of Silurian age, and forms deposits up to 15 feet in thickness. It is not found on the east side of Bluegrass region. The material is high in lime and magnesium carbonates. It weathers easily to a greenish clay. In Jefferson County, for example, where it occurs, (Ref. 2, p. 84) other and better shales can be found.

Ohio, New Albany and Sunbury Shales. These are black shales which are quite extensively developed in certain parts of Kentucky and easily recognizable. The first two are of Devonian age, while the third is of Waverly age or higher up geologically.