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GEOLOGICAL SURVEY OF KENTUCKY.

N. S. SHALER, DIRECTOR.

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REPORT

ON THE

CHINN'S BRANCH CANNEL COAL DISTRICT.

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## REPORT ON THE CHINN'S BRANCH CANNEL COAL DISTRICT.

The Chinn's Branch and Indian Run Cannel Coal Region is one of a number of areas in Eastern Kentucky in which is found a cannel coal of workable thickness. As these cannel beds are not continuous over large areas, like the beds of common bituminous coal, it seems desirable to consider somewhat in detail those areas in which cannel coal is prominent, to call attention to them as suitable fields for business enterprise, and to furnish a ready means of comparison of the cannel coal regions when the work shall have been completed.

The Chinn's Branch district is most likely to receive early attention, from the fact that it is the most easily accessible of any of the cannel regions, though in extent it is much less than some others, and though the coal ranks second in quality to the deposits of some of the interior counties. It is the nearest coal region to be reached by the lower Ohio river trade, being but 130 miles from Cincinnati, and at the westernmost outcrop along the river of workable beds of coal. Indeed, it seems unaccountable that so little should have been done to develop this locality. It appears, however, that as early as 1859 the Maysville Manufacturing and Mining Company was formed to develop the cannel coal of what was known as the Caroline tract, including the greater part of the cannel coal area of this region, for the purpose of manufacturing illuminating oil. But the discovery of petroleum deposits in Pennsylvania operated to break up this enterprise; and what with the breaking out of the civil war, and the want of method since, the property has not been made profitable to the company.

An examination of the region shows that it occupies, geologically, that part of the vertical section which includes nearly all of the valuable beds, both of coal and of iron ore, of this eastern field. (See General Section, Report on the Geology of Greenup, Boyd, &c., Vol. II, New Series.) Some of these

beds are too thin in this locality to be of any economic value at present. Coal No. 1, of the series above the conglomerate, is below the drainage, and though nothing is known of its value here, yet it may properly be left out of the list of workable beds, as also may Coal No. 2, which is too thin, where exposed, to interest any one except the geologist. Both beds are important in any comparison with other localities. The highest beds in this locality are the "Red Kidney" iron ore and Coal No. 7, the former near the top of the hills at the head of Chinn's Branch, in its ordinary relation to the latter, or separated from it by twenty to twenty-five feet of greenish shaly rock.

The cannel of this district is No. 4 of the series. The beds above and below are so well marked and so regular as to leave no doubt as to its place in the general section. Coal 4 is ordinarily a common bituminous bed. In this region this is replaced, wholly or in part, by cannel coal. The same is true of Coal No. 4 in the Hunnewell and the Stinson Creek regions. There are, however, other beds that exhibit local changes to cannel coal, and, considering this and the local character of the cannel coals, there would seem to be very little antecedent reason for supposing that the beds found at considerable intervals in the eastern coal field of Kentucky are also the equivalent of the Chinn's Branch and the Hunnewell deposits. The evidence at hand goes to show that in Morgan county the Pierat coal, and the upper cannel near West Liberty, and also the Breathitt county cannel, are the equivalent of the Chinn's Branch cannel seam, though the sections in the several localities differ very much as a whole; and further study of those regions may not sustain this conclusion.

The vertical section in the Chinn's Branch region differs in no very important respect from the typical section of Greenup, Boyd, and Carter counties already referred to, all the horizons of coal and of iron ore in that portion of the general section represented by the rocks of this region being well defined. The beds of economic value are of Coals 3, 4, and 7, with the possible addition of Coal 6, and of iron ores, the

limestone ore, and two kidney ores of the upper part of the section; the block ore near the horizon of Coal 4 being of little value, as is usual where that bed is prominent, either as cannel or a common bituminous coal.

Coal 3 is perhaps the most reliable bed in this region. It has an average thickness of about three feet, separated into two parts by about ten inches of clay shale or "draw-slate." It is overlaid by a few feet of shale, with thick sandstone above, and rests on the usual under-clay. This coal has not, until recently, come into favorable notice in this region, though the equivalent of this bed in Lawrence county, the Peach Orchard coal, has long been favorably known. By the enterprise of Mr. Bates, of the Eastern Kentucky Railway Company, this coal, as found in some parts of Greenup, has been shown to be a valuable bed, and on examination in the region in question, it is found that No. 3 is an exceptionally good coal, and that though it is not in great thickness, yet it is constant and easily mined. It is a splint coal, and bears transportation well, and is an excellent grate coal.

An analysis made for the Company by Dr. Peter shows the following, which may be regarded as an index of the quality of the coal:

Specific gravity . . . . .	1.319
Moisture . . . . .	5.00
Volatile combustible matter. . . . .	39.00
Fixed carbon . . . . .	49.88
Ash . . . . .	6.12
Sulphur. . . . .	1.986

The cannel coal of workable thickness appears to be limited in this region to an area oblong in outline, having its axis along a line from the old Fulton mines, near the landing, to a point on Indian Run, in the East Fork valley. How far beyond Indian Run, and how wide the area of cannel coal of workable thickness, has not been fully determined; but it may reasonably be estimated at from 1,500 to 2,000 acres. Several hundred acres of this area, belonging to the Fulton tract, have already been worked out, as also several narrow points in the valley of Chinn's Branch, on the Caroline tract;

but the great body of coal, covering a considerable portion of the latter tract, remains to be mined. The best information obtainable as to the thickness on the old Fulton tract gives it an average of about three feet. Further up, on Chinn's Branch, the bed has reached a thickness of four and a half feet. On Indian Run it is about two feet, but superior to the thicker part for gas-making. Like all cannel coals, it will probably be found variable in thickness and quality in the working of the bed. On the Indian Run the bed is accompanied by common bituminous coal, one foot on top and six to eight inches below, making the whole bed about the same in thickness as the average on Chinn's Branch, where the whole thickness is cannel.

In either case, the under-clay and the overlying rocks are essentially the same, and there are apparently no features on which more than a rough estimate of the quantity of cannel coal in this region could be based. A medium specific gravity would give about 1,500 tons, of 2,240 pounds to the acre, for each foot of thickness, or 4,500 tons for three feet, and 4,500,000 tons to the thousand acres. At the very smallest estimate, both as to the area and the thickness of the bed, the amount of cannel coal in this field, and lying within three to six miles of the Ohio river, is sufficient to warrant a systematic development of the territory, to say nothing of Coal 3, already described, and the coals above.

The only analyses of the cannel of this locality on record are two made for the Company by Dr. Peter, as follows :

	Chinn's Branch.	Indian Run.
Specific gravity . . . . .	1.331	1.286
Moisture . . . . .	4.80	2.00
Volatile combustible matter . . . . .	36.90	47.36
Fixed carbon . . . . .	51.20	38.24
Ash . . . . .	7.10	12.40
Sulphur . . . . .	3.977	1.554

Coal 6 has not been opened sufficiently to show its thickness and value. The evidence goes to show that it is present

at its proper level, 125 to 130 feet above Coal 4, probably over the whole region.

Coal 7, 45 feet higher up, has a thickness of three to three and one half feet of excellent coal, though the area is reduced to a comparatively small limit, the bed being near the top of the hill. This is the Coalton coal. In quality it is about the same as elsewhere. Entries have been driven, and a considerable amount of coal shipped from the ridge between Indian Run and Wolfpen Branch of Ash Creek. The two lower parts of the bed are uniformly present, separated by the usual thin parting. The upper part is said to be represented at some points by a few inches of coal, inferior in quality to the lower parts, as is usual with this bed elsewhere. The following measurements made at one entry agree substantially with those made at several others along the ridge :

	Feet.	Inches.
Overlying shaly rock, thickness not shown.		
Coal . . . . .	2	
Slate parting . . . . .		1
Coal . . . . .	1	6
Under-clay, thickness not shown.		

The following analysis of an average sample from stock pile, together with that of the Coalton coal, as mined on Dry Branch by the Ashland Company, will serve to indicate the value of the bed, as to quality, in this region. (See remarks on the iron-making qualities of Coal 7, Part V, Vol. 1, New Series, Kentucky Reports.) :

	COAL 7.	COAL 7.
	Head of Chinn's Branch.	Coalton, Dry Branch.
Specific gravity . . . . .	1.324	1.340
Moisture . . . . .	6.00	4.40
Volatile combustible matter . . . . .	33.48	31.10
Fixed carbon . . . . .	56.14	57.90
Ash . . . . .	4.38	6.60
Sulphur . . . . .	2.33	2.098

The iron ores of this locality are those of the Hanging Rock Region, including all the beds that are relied on for a supply of ore for the greater number of furnaces in this iron district. (For an intelligent account of these ores, see Mr. Moore's Report on the Iron Ores of Greenup, Carter, &c., Part III, Vol. 1, New Series, Reports on the Geology of Kentucky.)

The accompanying map will serve to give a more definite notion of the location of the cannel coal district in question. The dotted outline is only intended to give an approximate boundary, as sufficient work has not been done to make a definite boundary possible. The profile section gives a good notion of the place of the various beds of coal and of iron ore, in their relation to the drainage, and in their relation one to another.



## APPENDIX.

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The equivalency of the upper beds of the general section of Northeast Kentucky with those of Ohio is pretty well established. Coal 9, as shown opposite the mouth of Garner Creek, is the same as the Bagley's Run coal, or No. 7 of the Ohio report. Coal No. 8, Hatcher and Garner Creek, is also the Hatcher coal of Ohio, or No. 6B. No. 7, the Coalton seam, is in Ohio the Sheridan, the Nelsonville,\* &c., or No. 6.

Coal 6, the Keyes Creek seam, is known in Ohio as the New Castle coal.

The ores and limestones associated with these coals are also readily recognized as equivalent beds; but below the horizon of the ferriferous limestone the correspondence with the beds of the Ohio section is not so clear, and, indeed, not so well defined as would be expected from the relation of the two fields, and from the comparatively slight variation from the typical section over a wide extent in Kentucky in the belt representing the lower part of the coal-measures. This is doubtless owing somewhat to the fact that the Ohio coal field has been more carefully studied in its northward extension, and that the general section is a better type of the geology northward than along the Ohio river.

It is probable that a general correspondence with the Kentucky beds exists for a considerable distance into Ohio, though less definite and probably more limited in its northward extension than that of the series above Coal 5. The Conway coal, No. 3C of Ohio, probably represents Coal No. 5 of Kentucky; and the Kelly coal, No. 3A, and the Wilbur coal, No. 3, may provisionally represent Coals 4 and 3 of Kentucky, the

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\* The Ohio Report of 1870 placed the Nelsonville seam immediately under the ferriferous limestone below Coal 6 of the Kentucky section; and in volume II, Report on the Geology of Greenup, Carter, &c., a thin coal, noted on Pea Ridge, at Pennsylvania Furnace, and at several points in the East Fork valley at this horizon, was spoken of as the equivalent of the Nelsonville coal. A subsequent visit to the Hocking valley made it clear that the Nelsonville and Straightsville coal seam occupies the place of the Coalton. The report of Professor Orton, of the Ohio Geological Survey, on the Geology of the Hanging Rock District (Vol. III), confirms this view.

Hunnewell or Chinn's Branch, and the Turkey Lick or Peach Orchard.

The place in our section of the Jackson shaft coal is a matter of considerable uncertainty. If, as is held in Volume III, *Geology of the Hanging Rock District*, this is an inter-conglomerate bed, then its probable equivalent in Kentucky is the Proctor coal of Lee county. If, as later observations seem to show, the conglomerate below this coal is a subcarboniferous deposit, and that above the true coal-measure conglomerate, then this coal is the probable equivalent of the Menifee coal, and of the thin bed found in Greenup and Carter below the conglomerate, when that is present, and closely associated with the great non plastic fire-clay bed of these counties. In either case, the Jackson Hill or the Wellston coal would be the same as No. 1 of the former Report on the Geology of Greenup, Carter, Boyd, and Lawrence.

If this view is correct, several thin beds, from two to four in number, between the Wellston and No. 3, the Wilbur of Ohio, would be set over against No. 2 and 2A of Kentucky. To this there is no special objection, since the additional beds are found at considerable distance from the Ohio river, and may be regarded as local beds.

