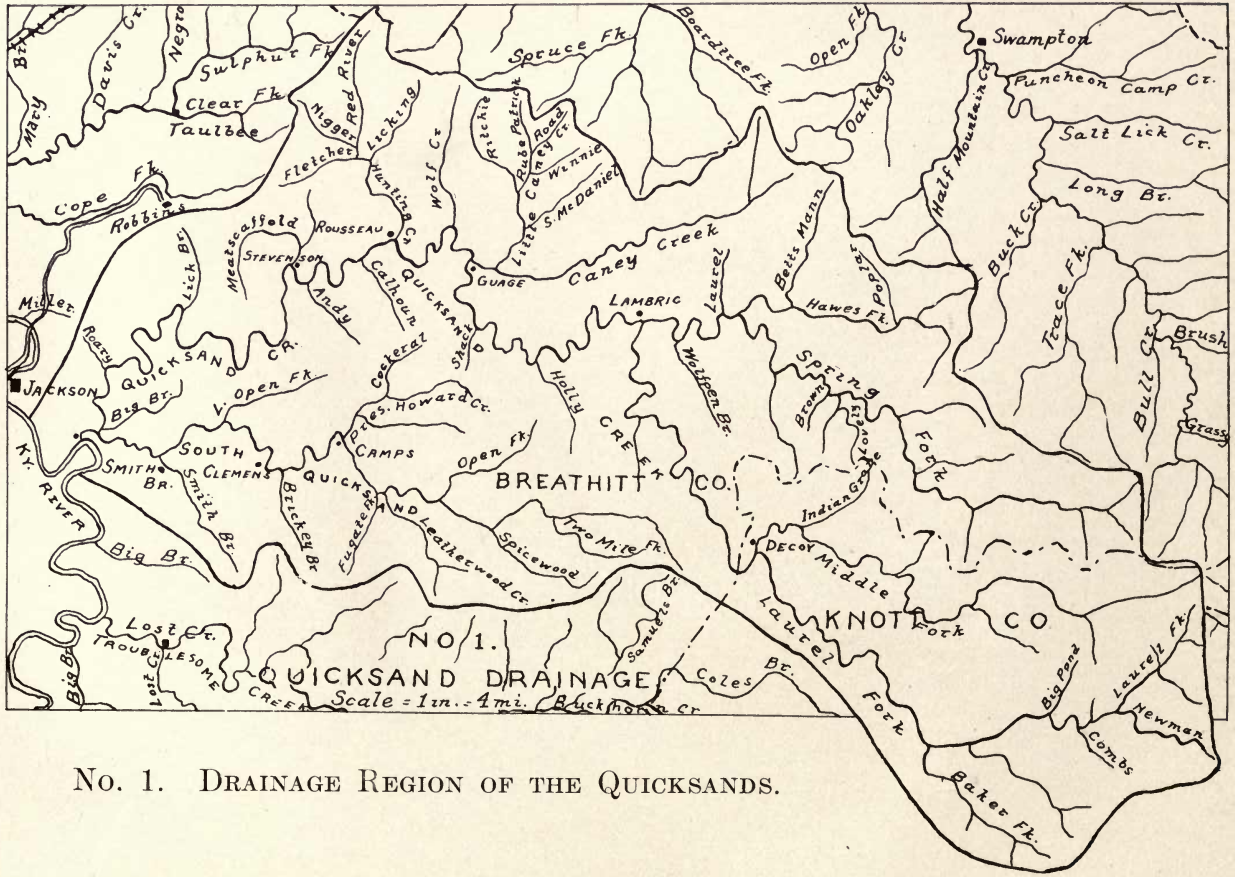
Kentucky Geological Survey.

Bulletin No. 18
Serial No. 25

COALS OF THE REGION DRAINED BY THE QUICKSAND CREEKS

1912



No. 1. Drainage Region of the Quicksands.

Kentucky Geological Survey

CHARLES J. NORWOOD, Director.

BULLETIN No. 18
SERIAL No. 25

Coals of the Region

DRAINED BY THE QUICKSAND CREEKS

IN

Breathitt, Floyd, and Knott Counties

By F. JULIUS FOHS.

Field Work Done in 1910.

Printed by the Interstate Publishing Co.
1912.

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LETTER OF TRANSMITTAL.

His Excellency, AUGUSTUS E. WILLSON,

Governor of Kentucky.

Sir: I have the honor to transmit for publication a report on the coals of the region drained by the Quicksand creeks in Breathitt, Floyd and Knott counties, within the valley of the North Fork of the Kentucky River. The report has been ready for the printer since December 1910. The maps were drawn by J. W. Norwood.

Very respectfully,

C. J. NORWOOD,

Director, State Geological Survey.

January 2, 1911.

LETTER OF SUBMITTAL.

Prof. Charles J. Norwood,

Director, Kentucky Geological Survey.

Dear Sir:—

I have the honor to submit herewith a report on the coals of the region drained by the Quicksand creeks, which embraces an area of 204 square miles lying east and southeast of the town of Jackson, chiefly in Breathitt county, but also partly in Floyd and Scott counties.

I have been able to correlate the coals for the greater part with the seams as described by Mr. James M. Hodge in his report on the coals of the region drained by the Three Forks of the Kentucky River,* and to such extent as possible the nomenclature used by him has been followed in this report, with the exception that the older name "Dean" (first proposed by Crandall) is used for what Hodge terms the "Fireclay or Hyden" coal. I was not able to definitely correlate all the coals in accordance with the system of numbers originally used by Prof. Crandall, but with further study of comparative sections this would no doubt be possible in most instances, were it deemed of importance. There are four fairly persistent coals that could not be correlated in accordance with Mr. Hodge's nomenclature; for these, I have used local names, i. e., Leatherwood, Wilson-fork, Big-branch, and Round-bottom. The Wilson-fork bed carries 3 feet of net (i. e., recoverable) coal over much of the region, and all of the seams are of workable thickness locally.

The designation, relative position, total thickness and net (recoverable) thickness, average altitude for the Lower and South Quicksand drainage, and the total acreage and tonnage of the beds above drainage for the whole Quicksand drainage, are given in the following table:

*Bulletin 11, Ky. Geological Survey (C. J. Norwood, Director) 1910.

Name	Altitude Ft.	Thickness. In.	Net Coal. In.	Interval. Ft.	Thousand Acres	Million Tons.
Hindman.....	1400	81	72	..	1.5	9
				65		
Flag.....	1335	36	36	..	4.0	12
				60		
Hazard.....	1275	78	72	..	18.4	110
				145		
Leatherwood...	1130	22	..	..	..	..
				47		
Haddix.....	1093	45	36	..	68.9	206
				68		
Dean.....	1025	60	36	..	79.6	195
				45		
Wilson-fork....	980	42	36	..	90.8	200
				12		
Whitesburg....	968	37	30	..	94.0	224
				70		
Big-branch....	898	30	24	..	..	...
				58		
Round-bottom.	840	24	24	..	..	..
				30		
Elkhorn.....	810	30	24	..	..	..

While no test holes have been bored to determine the question, it is probable that two coals, the Rockhouse and the Beattyville, occur below rainage. According to Mr. Hodge, these coals occur at depths of 200 feet and 400 feet, respectively, below the Elkhorn coal in the Three Forks region, and they may be expected in this area at similar depths.

Field work was based on a topographic map made up of parts of the Salyersville, Hazard, Prestonburg, and Whitesburg "reconnoissance" sheets, together with aneroid barometer readings checked as far as possible by second readings. The altitudes given in the

sections are all barometrical. There was only one precisely established bench-mark, that at Jackson, with which to tie. The altitude at the mouth of each large branch has been estimated from the topographic sheets named. The areas of the several coals have been estimated on the basis of the contour lines on the same sheets.

Very respectfully,

F. Julius Fohs,

Assistant Geologist.

December 7, 1910.

COALS OF THE REGION DRAINED BY THE QUICK-SAND CREEKS IN BREATHITT, FLOYD AND KNOTT COUNTIES.

PART I. OCCURRENCE OF THE COALS.

Kinds of Coal.—The coal is all bituminous, of which three varieties are easily recognized: 1. Soft or block coal (breaking into small cubical blocks) which is either coking or non-coking. 2. Splint, the most common coal of the region, which is easily cleaved into thin sheets, thin layers of natural charcoal separating the harder layers; this coal breaks into large flat rectangular blocks (sometimes called "block," but always designated as "splint" in this report); it is higher in ash than soft coal and grades from it into cannel. 3. Cannel is a hard coal usually with a conchoidal fracture and a dull satin luster; it differs chemically from the other varieties in having a high content of volatile matter as well as containing more ash. When not too greatly weathered it will blaze very much like pine upon being lighted with a match. There are three varieties of cannel; the smooth slick variety, another which breaks with a series of oval depressions known as "birdeye," and a third which breaks with a hackly fracture. The cannel is very irregular in occurrence and in the same bed may grade into splint on one side, and into soft coal or cannel slate on the other. Cannel slate is a bituminous slate which, while too high in ash for use as domestic fuel, is of value for gas-making where its content of volatile constituents is sufficiently high. With the possible exception of the Hindman coal, all the beds contain cannel.

Impurities in the Coal.—The most noticeable impurities in the coal beds are the following: Pyrite (or marcas-

ite) commonly called "sulphur"; a slick black bituminous shale which may grade into rash which is a sort of rotten coal; gray shale, a soft clay-like shale containing more or less free sand which often grades into ganister rock consisting largely of fine-grained sand; black slate grading into "bone" coal (slate as here used is hard in comparison with shale, and there is very little of it in these coal beds); and sandstone. While some other impurities, such as gypsum, etc., occur they were not noticed in the outcrops and coal openings.

"Sulphur" except in a few instances, was not seen in the coals in appreciable quantity. Gray shale in the form of partings is the chief inpurity, while black shale, rash and bone coal come next in about equal quantity.

Description of the Coal Beds.—The following are generalized descriptions of the principal beds, beginning with the lowest:

Elkhorn Coal.—This coal has a thickness of from 2 feet 6 inches to 4 feet 2 inches, the average being probably 2 feet 9 inches. There is an average of 2 feet 6 inches net coal, say 2 feet recoverable. The coal is usually soft and good for steam, shop or domestic use. It has one main shale parting, usually near the bottom and several minor rash, shale, or bone partings. Near Jackson its roof is a sandy micaceous slate but eastward it changes in places to a slaty sandstone. Where the roof is slate it weathers slowly but eventually it requires timbering. The altitude ranges from 745 to 816, about 810 on the average, except on the head of Quicksand where it rises from 810 to 1100 feet going eastward. A general section of the coal giving the minimum, maximum, and average thickness is as follows

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Dark gray micaceous slate or slaty sandstone 20 to	..	..	30	..	25	..
Coal, soft, with thin rash or bone coal partings	..	10	2	9	2	..
Shale with thin coal partings	..	8	1	6	..	8
Coal with thin shale partings	..	8	1	6	..	6
Gray micaceous sandy shale	..	..	..	..	..	..

The coal is present over most of the region, being eroded only along the lower stream courses. It was known as No. 3 in most of the old reports but according to Prof. Crandall's latest correlation it is in fact No. 1. It is considered by Mr. Hodge the equivalent of the Elkhorn 8-foot seam in Pike county, hence the name. It is also known as the Hazel Bed coal in the vicinity of Jackson.

The statement on Page 3, Line 2 is rather misleadi
Prof. Crandall formerly correlated the Lower Elkhorn
as corresponding to the No. 3 of the old reports, but
regards the Lower Elkhorn as correlating with No.1.
does not say, as Mr. Fohs has it, that the coal Mr. F
is here discussing is No.1: this coal is No.3. Whet
it is really the Lower Elkhorn also, or whether the l
should be correlated as corresponding to No.1 and the
fore considerably below No. 3, is still uncertain.

J. B. Hoeing,

Director, Kentucky Geological Sur

Big-branch Coal.—The thickness varies from 3 feet to 9 inches to 7 feet but contains usually a slaty sandstone parting of 2 to 4 feet. The net coal averages about 2 feet 6 inches, the recoverable coal about 2 feet. The coal is chiefly splint, but partly cannel. The roof is sandstone with usually a thin scale of draw slate. Only the coal

ite) commonly called "sulphur"; a slick black bituminous shale which may grade into rash which is a sort of rotten coal; gray shale, a soft clay-like shale containing more or less free sand which often

Dark gray micaceous slate or slaty sandstone 20 to	..	..	30	..	25	..
Coal, soft, with thin rash or bone coal partings	..	10	2	9	2	..
Shale with thin coal partings	..	8	1	6	..	8
Coal with thin shale partings	..	8	1	6	..	6
Gray micaceous sandy shale	..	..	..	..	..	..

The coal is present over most of the region, being eroded only along the lower stream courses. It was known as No. 3 in most of the old reports but according to Prof. Crandall's latest correlation it is in fact No. 1. It is considered by Mr. Hodge the equivalent of the Elkhorn 8-foot seam in Pike county, hence the name. It is also known as the River Hill coal in the vicinity of Jackson.

Round-bottom Coal.—The thickness varies from 6 inches to 2 feet 10 inches. Where workable it will average 2 feet thick. It is characterized by a soft upper layer and a fine cannel basal layer, with little or no rash between. The roof is good, a hard dark sandy slate. The altitude of this coal is from 830 to 853, the average being 840 feet, except on the head of Quicksand.

The general section is about as follows:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Dark gray sandy slate	..	..	..	..	30	..
Coal, soft	..	8	..	11	..	9
Rash	..	0	..	2½	..	0
Cannel Coal	1	3	1	11	1	6
Shale, probably	..	..	..	..	2	..
Slaty sandstone	..	..	..	..	..	..

It covers an area but little less in extent than the Elkhorn coal, but it is only known to be of workable thickness from Round-bottom to Big-branch on Quicksand and on lower South Quicksand. Further east up the creeks it is too thin to work. In the Round-bottom vicinity it has been almost exhausted, so that but little workable area remains. This coal has been designated No. 3a by Mr. Hodge. I have called it Round-bottom after the round bottom which occurs just above Roark branch on Quicksand, opposite Mr. James R. Back's house.

Big-branch Coal.—The thickness varies from 3 feet to 9 inches to 7 feet but contains usually a slaty sandstone parting of 2 to 4 feet. The net coal averages about 2 feet 6 inches, the recoverable coal about 2 feet. The coal is chiefly splint, but partly cannel. The roof is sandstone with usually a thin scale of draw slate. Only the coal

beneath the sandstone parting can be recovered, except where the upper layer is unusually thick and the parting thin. The altitude varies from 860 to 913 feet, the average being about 898 feet. Of course on the head of Quicksand, this coal rises as do the others. The general section is as follows:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Sandstone	..	..	..	..	..	..
Sandy shale	..	0	1	..	..	6
Coal	..	8	2	..	..	10
Soft yellow sandstone or sandy micaceous slate	..	6	4	..	..	3
Black slate	..	0	..	10	..	8
Splint, semisplint, or cannel, sometimes a little "sulphur"	2	..	4	..	2	..
Underclay	..	..	..	..	..	..
Slaty sandstone	..	..	..	..	..	..

This coal is fairly persistent over the entire region except where eroded in the stream courses, but was chiefly opened on Big Branch, Smith branch and Hunting creek. I have named it the Big-branch coal because it was best developed at Mr. Clemens' on Big branch of Quicksand creek. While there are many Big branches in the mountains, since the coal is only of local importance, it was thought it would not matter so much about the name.

Whitesburg Coal.—This coal varies in thickness from 2 feet 6 inches to 5 feet or more, the average being about 4 feet 1 inch. The net coal is 3 feet 1 inch average, say 3 feet recoverable. The coal is generally splint but on South Quicksand the lower layer is excellent cannel. There is a shale parting 1 foot thick near the top of the bed on South Quicksand, which either thins greatly or is absent in the majority of cases elsewhere. The roof is usually black slate, or sandstone where the slate thins. The coal is generally of excellent quality. The altitude on Lower and South Quicksand varies between 948 and 997, the average being 968 feet. The following is a general section of the coal:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Sandstone	..	..	..	..	..	..
Black slate	..	6	11	..	1	..
Rash	..	0	..	4	..	2
Coal, splint, sometimes some cannel, with rash and shale	..	4	1	..	..	7
Shale or rash	..	1	1	11	1	..
Coal, soft, semisplint, or splint	1	..	1	11	1	6
Cannel	..	0	..	4	..	..
Cannel, splint, or partly semicannel	1	3	1	8	1	3
Shale or ganister rock	..	..	..	..	2	..
Soft black shale	..	..	..	..	7	..
Sandstone	..	..	..	..	..	..

This coal has the largest workable area, being present under 94,000 out of 130,000 acres of the Quicksand drainage equivalent to a recoverable tonnage of about 224 million tons.

This is the coal which Mr. Hodge has designated the Whitesburg, being named after the county seat of Letcher county where it has been most mined.

Wilson-fork Coal.—This bed is chiefly developed on South Quicksand and upper Quicksand, where it is from 2 feet 9 inches to 5 feet thick, about 4 feet on the average, the net coal being 3 feet 6 inches, say 3 feet recoverable. This coal is either splint, or cannel and splint, cannel being common in the bottom layer on South Quicksand creek. It is characterized by one main shale parting shortly above the middle of the bed. The roof is usually a slaty sandstone and therefore good. It varies in altitude from 948 to 993, the average being 980 feet. On lower Quicksand, especially on Caney and Hunting creeks, either this coal has not been opened or it is represented by a thin coal. On Meat-scaffold branch it is normal. The following is a general section of this bed:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Sandstone	..	..	..	..	..	..
Slaty sandstone, sometimes containing or largely iron ore	..	..	..	..	..	..
Coal, usually splint, sometimes includes 5-inch shale	1	4	2	..	1	10
Shale	..	3	1	..	..	9
Cannel or cannel and splint	1	..	2	..	1	8
Blue Slate	2	..	4	..	..	..
Slaty sandstone	..	..	..	..	..	..

This coal covers a little less area than the Whitesburg, that is about 90,800 acres, and the recoverable tonnage is probably near 200 million tons. I have named this coal after Wilson-fork of Press Horard creek of South Quicksand where a good section was obtained and its relation to the Whitesburg coal established.

Dean Coal.—This coal varies in thickness from 6 to 15 feet, including a shale parting from 2 to 7 feet thick. This is an extremely variable coal and both beds are rarely opened at the same place. The coal also varies greatly in character and the altitude varies more than for any of the other coals. However, both above and below the parting there is excellent coal, usually splint and 3 feet thick. The average altitude (except on the head of Quicksand), is 1025, the extremes being 1001 and 1092 feet. The roof of the upper bed is usually sandstone with a thin draw slate, and therefore good; that of the lower bed, however, being the gray shale parting is rarely good. The following is a general section of this coal:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Sandstone	..	..	..	..	..	..
Slaty sandstone	..	0	..	8	..	6
Bituminous or semi-cannel slate	..	3	..	6	..	6
Coal, a little rash	..	1	..	8	..	6
Shale(sometimes replaced by 2 to 3 inches cannel)	..	0	1	6	1	5
Splint or semisplint, rarely cannel	1	3	3	2	2	..
Gray shale with plant impressions, rarely includes a thin sandstone	..	2	7	..	7	..
Black slat or rash and coal	..	4	..	10	..	6
Coal, with up to 10 inches of shale included	..	9	1	4	..	..
Splint coal, occasionally cannel at top	1	8	3	6	3	..
Slate	..	0	2	..	..	..
Sandstone	..	..	..	..	..	..

This coal covers about 79,600 acres, and figured at the low average of 3 feet under just part of the acreage there would be 195 million tons of coal recoverable.

I consider this the equivalent of the Fireclay or Hyden coal of Hodge, which is the Dean coal of Crandall, and No. 4 of the Old Survey reports. There is a question in my mind whether the coal I have named the Wilson-fork may not be the Dean coal, and the latter the Fireclay coal

rider mentioned by Hodge, but considering the character of the thick parting, and that at least in one case (on Shack branch) a flint-like fireclay was obtained in connection with this coal and certainly above what I call the Wilson-fork coal, I feel that I have assigned the proper position to the Dean coal, and that the rider is represented either by a thin coal or not at all in the Quicksand drainage, the Haddix coal coming above the Dean coal at a less interval than elsewhere in the Three Forks region. A little further work I feel would determine the facts.

Haddix Coal.—This is a very persistent bed and is from 5 to 7 feet thick, the average being 5 feet 10 inches, of which 3 feet 9 inches is net coal, say 3 feet recoverable. There are usually two shale partings sometimes more having an average total thickness of 2 feet 1 inch, the upper being usually black, the lower, gray shale. A massive or laminated sandstone with a thin draw slate forms the roof except above the mouth of Little Caney on Quicksand creek and above the mouth of Stacy branch on South Quicksand creek, where there are 6 feet of gray slate which separates the sandstone from the coal. How good a roof this will be could not be determined from the weathered exposures. The coal is with few exceptions splint, soft coal replaces the splint in the two upper layers of coal, whereas cannel sometimes replaces the lower layer in whole or part. The altitude varies from 143 to 1132, being rarely lower than 1073, the average being 1093 feet. The following is a general section of this bed:

	Minimum		Maximum		Average	
	Ft.	In.	Ft.	In.	Ft.	In.
Massive or laminated sandstone	..	..	..	..	..	..
Sandy slate or slaty sandstone	..	3	6	..	1	..
Coal, soft or splint, rarely some cannel includes 1 to 7 inches of gray to black shale about the middle	..	11	2	9	1	6
Gray to black, commonly black slick shale	..	4	2	6	..	10½
Coal, splint, rarely soft, sometimes cannel, or last and splint	..	4	2	..	1	2
Gray soft shale (layer to be mined)	..	7	2	..	1	..
Splint, or cannel, semicannel or part cannel	..	4	2	3	1	4
Gray shale	1	..	2	..	1	3
Massive sandstone or slaty sandstone or sandstone slate	..	..	..	..	..	..

Over half of about 68,900 acres of the Quicksand drainage is underlaid by the Haddix coal, and estimated at 3 feet of recoverable coal, there would be 206 million tons. This coal is named the Haddix by Mr. Hodge after the Haddix mine opposite the mouth of Troublesome creek on the North Fork of the Kentucky river where it was first extensively worked. It is probably the equivalent of No. 5 of the old Survey reports.

Leatherwood Coal.—This coal varies from 1 foot 4 to 2 feet 6 inches thick, the net average being 1 foot 10 inches. There are no partings in this coal, and it is either a soft excellent shop coal or a splint, although on Little Caney the rotten coal in the outcrops suggests some cannel. The roof is a massive sandstone separated by 1 foot of sandy shale on South Quicksand but over on Little Caney it is a gray shale several feet thick, above which comes the heavy massive sandstone. From 1 to 5 feet below the coal is a massive sandstone. The altitude of this coal varies from 1105 to 1157 feet, about 1130 on the average. It has been opened at very few points, but covers an area but little less than the Haddix. It will no doubt prove a workable coal locally. I have given it the local name after Leatherwood branch of South Quicksand where it has been most worked.

Hazard Coal.—The thickness of this coal is from 6 feet 2 to 7 feet 4 inches, the average being about 6 feet 8 inches, there being on the average about 6 feet 4 inches of net coal, say 6 feet recoverable. This makes it one of the thickest net coals of the region. It is usually a soft coal, probably a coking coal; rarely there is a layer of splint, and more rarely, as on Lovely fork of Spring fork a layer of good cannel 20 inches thick shortly above the bottom. This coal has two or more thin shale, black slate, or sandstone partings never over 1 to 2 inches thick and aggregating 4 to 12 inches, about 4 inches usually. The roof is a gray shale or black slate, the latter sometimes occurring with and under the former; these are from 6 to 15 feet thick, a sandstone resting above. A bituminous shale occurs beneath the coal from 5 to 15 feet thick, beneath which is a massive sandstone. The altitude of this coal on Lower Quicksand

and South Quicksand drainage is from 1265 to 1283, about 1275 feet average; on lower Spring Fork and lower Middle Fork two readings give 1190 and 1175 feet, while on the head of Quicksand the altitude would rise from these last figures to about 1450 to 1475 feet going eastward to Yellow mountain.

This coal because of the high altitude at which it occurs is found in only restricted areas near the tops of the highest ridges. A small area occurs at the head of Meatscaffold and Hunting Creeks on Quicksand, in the ridges surrounding South Quicksand above the mouth of Press Howard creek, in the ridges surrounding Big Caney creek, lower Spring, Middle, and Laurel Forks, while at the head of Quicksand, owing to the rise in the strata, there is but little of this coal, and it is either absent or almost so. It underlies only about 18,400 acres equivalent to 110 million tons of recoverable coal. It derives its name from Hazard, Perry county, and was named by Mr. Hodge. There is question as to whether this is No. 6 or No. 7 of the old Survey, as it is possible that the coal next described may be No. 7.

Coal above Hazard.—Mr. Charles Hendrie has described a coal (see notes on detailed section of Leatherwood branch of South Quicksand) as occurring above the Hazard, the section given by him being the following:

	Ft.	In.
Coal	1	6
Slate	..	1¼
Coal	2	6
Coal, bone	1	2½
Coal	..	3

The altitude would be about 1318 feet in this instance. I did not see this coal and Mr. Hodge seems not to have seen it either. I did not know of it at the time of my visit to Leatherwood nor did the guide I had with me, so we may have overlooked it. This coal may be the equiva-

lent of No. 7 of the old nomenclature, and the Hazard actually No. 6, but these are points which must be decided later.

Flag Coal.—This coal has been opened at very few points in the Quicksand drainage. It varies in thickness on South Quicksand from 3 feet 9 to 4 feet 9 inches, but on Newman branch of Laurel Fork it is only 2 feet 6 inches. It will probably net 3 feet of coal on the average. It is usually a splint or cannel coal; a part of the bed is rarely soft coal. It is either solid or has two or more thin partings aggregating about 9 inches. The roof is sandstone, while 5 feet below the coal is a sandstone bench, underclay or shale separating the coal from the rock. The altitude varies from 1320 to 1354, probably 1335 feet is near average, except on upper Quicksand. This coal is important on only the highest ridges and has less than one-fourth the area of the Hazard coal; it has an area of about 4,000 acres, equivalent to 12 million tons of coal. It is to be found in the ridges above the mouth of Caney creek on Quicksand and in the ridges bordering Press Howard, Leatherwood and other higher branches of South Quicksand creek. The name was given by Mr. Hodge from the fact that it is found as cannel having the appearance of flagstone where seen in weathered outcrops near the mouth of Troublesome creek.

Hindman Coal.—This coal has been opened at one point only at the head of Leatherwood branch of South Quicksand where according to Hodge it showed the following section:

	Ft.	In.
Flint and limestone (sheely on outcrop but probably makes a good roof.)	35	..
Coal	3	6
Slate	..	½
Coal	1	6
Slate	..	6
Coal	1	9¼
Underclay	..	..
Sandstone	..	..

The coal amounts to 6 feet 9 inches, the slate to 6½

inches, and according to Mr. Hodge, it is usually a good coking coal, and elsewhere in the Three Forks of the Kentucky region is fairly free from partings and from 4 to 9½ feet thick. The altitude is about 1400 feet on the average, though it is much higher on the head of Quicksand. The roof is liable to protect the coal well from weathering near the outcrop.

The area of this coal is extremely restricted as it occurs shortly beneath the tops of only the highest ridges. It will probably prove workable on the head of Leatherwood, head of South Quicksand and in the ridges above Lambric on Quicksand, but not at the head of Quicksand. There are probably not exceeding 1500 acres of this coal, some 9 million tons. The name was given by Mr. Hodge from Hindman, Knott county, where the coal is principally worked.

Acreage and tonnage: In the table which follows details are given of the estimated acreage and tonnage of Quicksand coals. The estimates are based on the contour interval nearest the altitude of the coal, and the area determined by polar planimeter for the 1000, 1100, 1300, and 1400-foot contours on the U. S. reconaissance topographic sheets of parts of the Salyersville, Hazard, Prestonburg, and Whitesburg quadrangles, the contours representing the Wilson-fork, Haddix, Hazard, and Hindman coals; estimates for the other coals were based on these. In estimating the tonnage 1,000 tons of coal was considered recoverable per acre-foot, and it is believed that the recoverable thickness for each coal as given in a previous table is conservative. The actual tonnage of solid bituminous coal per acre-foot averages about 1580 tons. The Dean and Wilson-fork coals were not figured for their full acreage, since they are probably not fully developed in some instances. Allowances were made for the rise of the coals in the head of Quicksand drainage (16 feet per 1,000 feet). In the table below, the acreage is expressed in units of 1,000 acres and the tonnage in millions of tons. In addition to the tonnage shown in the table, there is the coal of the Leatherwood, Big-branch, Round-bottom and Elkhorn beds.

Acreage and Tonnage of Coals in Quicksand Drainage.

Name of Bed.	Recoverable Thickness	Lower Quicksand Drain.		South Quicksand Drain.		Head Quicksand Drain.		Total Quicksand Drain.		Ridges S. Quicksand *	
	Feet.	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons	Acres	Tons
Hindman	6	1	6	.5	3	0	0	1.5	9	.75	4.5
Flag	3	2	6	1.	3	1	3	4.	12	1.5	4.5
Hazard	6	9	54	4.4	26	5	30	18.4	110	6.5	39.
Haddix	3	38	114	15.9	47.9	15	45	68.9	206	23.8	71.8
Dean	3	43	86	20.	60.	16.6	49.8	79.6	195	30.	90.
Wilson-fork	3	48	72	24.8	74.4	18	54	90.8	200	37	111
Whitesburg	2.5	49	112	26	65	19	47.5	94.	224	38	95
Total	26.5	77	450	27.	278	26	228	130	956		415

*This covers part of the Quicksand, all South Quicksand and part of the Troublesome creek drainage, covering as it does all the coal in the ridges on either side of South Quicksand creek.

Structure.—The structure of the Quicksand region is, with few exceptions, extremely simple. From Jackson eastward to the mouth of Quicksand creek, the Elkhorn coal dips east more than 6 feet per 1,000 feet for about one mile and a fourth, after which the dip is less to the mouth of Quicksand, and from thence the coal rises slightly going eastward. Aside from minor variations in the altitudes of the various coal beds due to irregularities in the basin in which they were laid down, the strata of Quicksand drainage, with the exception of within six or eight miles from the head of the creek at Yellow mountain, is nearly horizontal with a southeasterly dip of 1½ feet per 1,000 feet. All Lower Quicksand and South Quicksand is, therefore, nearly horizontal with the exception of slight dips up the branches on the left of Quicksand and on the right of South Quicksand. The most marked of the southeasterly dips is that noted from the head of Big branch of Quicksand creek, to the head of Smith branch, the dip being 3¾ feet per 1,000 feet. Beginning about three miles up Middle Fork of Quicksand, the strata begin to rise going eastward, the rise becoming considerable when it reaches the mouth of Baker fork of Laurel fork of Quicksand, and from thence to the head of Laurel at Yellow

mountain the strata rise 287 feet or about 16 feet per 1,000 feet. This would give the Elkhorn coal an elevation of at least 1097 feet at the head of Laurel. Just over the mountain (which has a south-southeast axis at the head of Middle and Laurel forks, but a more northerly trend further north) Prof. Crandall reports the Elkhorn coal at the head of the Right and Left forks of Beaver at altitudes of 1000 to 1050 feet, while in the valley at the mouth of Jones fork of Right Beaver, it has an altitude of only 700 feet. The inference is plain; Yellow mountain represents an anticlinal fold, whose axis corresponds to the trend of the mountain; the long limb of the fold is the gradual rise toward the head of Quicksand, the short limb is to the east of the mountain, and probably a short distance east of the axis is a fault, which explains the sudden drop in the altitude of the coal. Boring for oil is suggested by these conditions near the crest of the long limb, especially since east of this fold in Floyd and Knott counties, the conglomerate sands which underly the Lower coal measures have proven productive of oil and gas. Before this is done however, a detailed field study of the fold here suggested is desirable.

Locating the Coals.—This is a relatively simple matter if advantage is taken of the following indications: 1. Coal stains or blossoms consisting of brown or black smut-like stains are likely to represent soft or splint coal, while in the case of cannel coal, either weathered cannel flags or a light reddish slate resulting from the greatly weathered cannel may outcrop. 2. Water seeps, especially those stained reddish and tasting bitter (chalybeate water). These usually come from the coal bed, and the coal must be sought at the highest point from which the water is seen to come. Such seeps are often referred to by the natives as "deer licks". Only at one point a seep was found where no coal showed. Small land slides (called "slips" by the natives) are occasioned by these seepages, and often uncover the coals. 3. Benches or terraces commonly occur at the place of many of the coals, especially such as have heavy sandstones a few feet below the coal. The coal should be sought at the back of the bench and

within the number of feet above the bench suggested by notes previously given on the coal bed likely to be found at or near the altitude of the bench. 4. Beneath projecting cliffs, usually a few feet below, a coal may occur (here the intervals between the top of the coal and the sandstone above, as given in the general sections of the coals, may be used to advantage). 5. Grayish shale, underclay, or ganister rock outcrops. Since the underclays are sometimes transported and redeposited along the course of the streams, care must be taken not to confuse such new sedimentary clay with the clay or shale in place. It is always well to sink through supposed underclays, etc., a few feet as another layer of coal may therby be brought to light. 6. Covered intervals, especially narrow intervals between sandstones which are near the right altitude for a particular coal. 7. Altitudes may be obtained approximately from the mouth of the stream by the aid of a barometer or hand level, or in the absence of these a hand level may be improvised by tying an ordinary carpenter's level upon a stick cut 5 feet long, advancing each time the height of the stick. 8. If a particular coal has been determined, the other coals may be approximately located by setting off the intervals above and below suggested by the table previously given of general intervals between the coals. For any particular part of the region the intervals may be more exactly determined by a study of the sections of that vicinity, which follow in Part II of this report.

Working Narrow Ridges.—Since the ridges are much cut by streams, many narrow spurs necessarily occur, and since the upper parts of the ridges are narrow and contain thick coals such as the Hazard, Flag, and Hindman, the question arises as to how a ridge may be profitably worked. Figured on a maximum cost of 70 cents and a sale price f. o. b. mine of 80 cents per ton, ridges having a maximum width of 125 feet on the level of the coal can be worked on a basis of 10 per cent. return on the cost of mining the coal. This was figured on the assumption that where narrow ridges were worked, the coals would be gained by a small single entry from which rooms

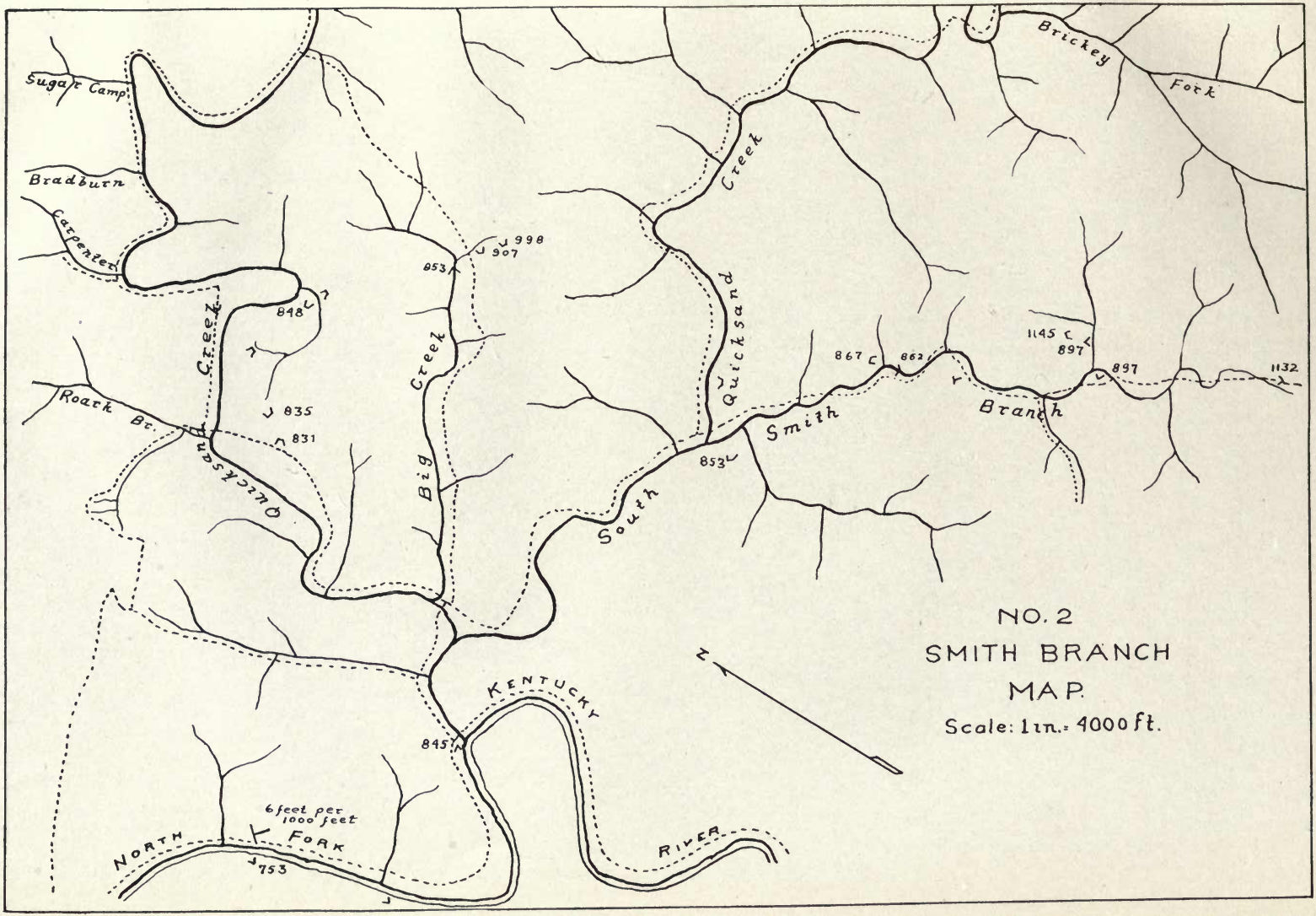
would be driven 27 feet wide and 250 feet deep, the centers of the rooms to be 42 feet apart, making a minimum of four such rooms. Such entries may be driven every 525 feet along the side of the ridge, thus leaving a pillar of 25 feet between the backs of rooms of parallel entries. Each entry would constitute a single small mine working 9 or 10 men and ventilation could be supplied by a small furnace placed at the mouth of the entry. This allows for only 25 feet of driving to reach good coal and good roof at a cost not to exceed $50.

Three factors enter into the question of the distance to good coal and good roof: 1. A weather-resisting rock such as sandstone, hard slate, flint, or limestone a short distance above the coal, and to a far less extent a resisting rock is helpful beneath the coal. 2. Depth of cover over coal; and 3, Steep hillsides, since long gradual slopes are liable to have weathered coal and roof. To a less extent the hardness and resistance of the coal itself to weathering may enter the problem. Generally, if a massive sandstone occurs shortly above the coal and the hillside is steep, coals can be worked profitably on very narrow ridges; usually a width of 200 feet is sufficient.

Cost and Selling Price of Coal.—The cost of mining would be between 46 and 65 cents per ton, say 60 cents maximum average, and the cost of cleaning the coal about 5 cents additional. Hand picking will be necessary especially in those veins or portions of veins which carry cannel coal or shale partings. It is believed that by the aid of a washing plant of proper design, the coal even in such veins as carry much shale, can be cleaned so there will be a maximum recovery. A plant to clean 1000 tons per day would cost about $12,500. The soft splint coal would bring a minimum of 80 cents per ton f. o. b. mine though picking and washing will raise the value for some purposes, while the cannel coal will bring at least $2.25 per ton. The average selling price in 1909 in the Southeastern Kentucky coal district, of which the Quicksand drainage would form a part, for soft and splint coal was $1.088 and for cannel coal $1.458 according to the preliminary statement recently issued by Prof. Norwood.

Other Resources.—Aside from the coal, some of the underclays may prove valuable. There are some beautiful sandstone slates which may possibly be found of economic value. The possibilities for oil and gas on the head of Quicksand have been discussed under the head of Structure. The soils on the hillsides are above the average of those of the State and the crops are of even tenor in both wet and dry years owing to the steep terraced hillsides being evenly watered by the seepage from the coals. The tops of the ridges are sandy and adapted for fruit raising. But a small acreage is under cultivation and farm rents are very cheap.

Transportation.—The Lexington and Eastern railroad's new three mile extension goes to the mouth of Quicksand creek. A narrow guage railroad has been built up South Quicksand by the Kentucky River Hardwood Co. which at the time of investigation extended as far as the head of Leatherwood branch and was being extended further up the creek. The wagon roads in the Quicksand drainage are few and usually very poor, made worse in places by seepages from the coals; usually they simply follow in the stream beds and extend over the low gaps; in most of instances they are only cattle trails. The region is sparsely populated especially toward the head of Quicksand.


Sugar Camp
Bradburn
Carpenter
Creek
Roark Br.
Quicksand
Big Creek
Quicksand Creek
Brickey Fork
Smith Branch
South
KENTUCKY
RIVER
NORTH FORK
6 feet per 1000 feet
998
907
853
848
835
831
867
862
1145
897
1132
753
845
N
NO. 2
SMITH BRANCH
MAP
Scale: 1 in. = 4000 ft.

PART II. DETAILED SECTIONS.

South Quicksand Drainage.

Smith branch of South Quicksand Creek.—Smith branch is the first large branch on the right two miles and a half above the mouth of the creek. On this branch a very good section was obtained with outcrops or openings on coals from the Round-bottom to Haddix inclusive. Only three openings have been made. (1) Finlay Hounshell entry on the Round-bottom coal, 300 yards above the mouth of the branch and 100 yards up a right drain showing the following section:

	Ft.	In.
Sandstone	..	..
Coal, soft block	1	..
Rash	..	2½
Semi-cannel	..	8

(2) Jesse Thorp entry on the Big-branch coal, one mile up Smith branch and three hundred yards up a left branch (A. T. 867 feet); and (3) John Terry entry (A. T. 1145 feet) two miles up Smith branch, up a left branch 200 yards, on the left of the latter, high up on the hill near a dead tree, and in the Haddix coal. The last two openings are on the land of the Continental Realty Co. The combined section on Smith branch is as follows:

	Smith Branch Section.	Ft.	In.
1332	Top or ridge	..	..
	Covered except for some massive sandstone outcrops	198	..
1142	Top of gap, with massive sandstone above and below	..	..
1132	Haddix coal	4	8
	Underclay	..	..
	Slaty sandstone	17	..
1117	Coal	..	..
	Slaty sandstone	25	..

	SMITH BRANCH SECTION. (Continued.)	Ft.	In.
1092	Dean (?) Coal stain	..	..
	Massive sandstone	15	..
	Slaty sandstone	30	..
1047	Thin coal in shale	..	..
	Covered interval	40	..
	Massive sandstone	25	..
	Covered interval	10	..
997	Whitesburg (?) Coal	..	..
	Covered interval	3	..
	Sandstone	4	..
	Slate with water seep, no coal	6	..
	Massive sandstone and slate	17	..
	Covered interval, probably includes a coal	40	..
	Covered interval with sandstone slate at base	20	..
	Black slate with limestone	5	..
897	Coal, 4 in.; slate, 6 in.; coal, 3 in.; total	1	1
	Shale	1	..
	Slaty sandstone	10	..
	Slaty sandstone, cross-bedded	10	..
	Black slate	3	..
	Sandstone	5	..
	Sandy shale	1	..
	Coal, 8 to	..	10
	Sandy slate	4	..
	Black slate	..	6
862	Big-branch Coal	3	4
	Slaty sandstone and sandstone slate	30	..
837	Round-bottom coal	1	9
	Slaty sandstone	30	..
	Black slate with clay ironstone concretions	2	..
	Slaty sandstone calcareous at the top	8	..
787	Coal	..	11
	Covered interval	5	..
	Massive slaty sandstone	30	..
	Covered interval	5	..
747	Mouth of Smith branch	..	..

The bed-sections of the coals shown in the foregoing section are as follows:

The Haddix Coal.

	In.
Coal, soft	11
Rash	1
Coal, soft	4½
Cannel	3
Shale	¾
Coal	1
Black Shale	5
Splint coal, semi-cannel	14
Gray shale	8
Splint coal, semi-cannel	8
	56¼

The Big Branch Coal. (Thorpe entry.)

	In.
Coal, partly good cannel, 15 to	24
Gray to black slate	8
Coal	8
	40

The Round-bottom Coal.

	In.
Coal	4
Shale	12
Coal	5
	21

Three-fourths of a mile up Bricky branch, on the Hugh Clemens land, 1 foot 8 inches of cannel outcrops under sandstone according to Goodloe Hudson.

High in the hill up the right hand branch at Goodloe Hudson's house on the Fletcher tract (Dan S. C. Davis land) one mile below the mouth of Press Howard creek a coal is said to have been opened the equivalent of the Haddix coal and according to Goodloe Hudson, has a 1 foot shale parting, 1 foot 6 inches above the bottom.

Press Howard Camps, South Quicksand Creek.—One hundred and fifty yards below the mouth of Press Howard creek, is an entry on the left of South Quicksand, 310 feet above the creek, which has been driven on the Haddix coal to supply the Camps. See Analysis No. 3510. The section here is as follows:

	Press Howard Camps Section.	Ft.	In.
	Covered to top of ridge	..	..
	Massive sandstone, includes small covered interval	105	..
1108	Haddix coal	5	..
	Covered interval	310	..
798	Mouth of Press Howard creek	...	..

The bed-section of the Haddix coal shown in the foregoing is as follows:

	In.
Coal, usually containing pyrite	2
Coal	3¾
Shale	2
Coal	10¾
Shale	3¾
Coal	11
Shale	9½
Splint coal	17½
	60¼

Press Howard Creek of South Quicksand creek.—Press Howard creek (mouth 798 feet A. T.) is about ten miles up South Quicksand, on the left of the creek. It is, in itself, a considerable creek and coals ranging from the Whitesburg to the Hazard have been opened on its various forks.

Sam McDaniels fork of Press Howard creek.—This is a little less than a mile up and on the right of Press Howard creek. Two miles and a fourth up the branch, there is a left drain, one half mile up which, on the right, the Haddix coal has been opened which according to McDaniels has the following section:

	Ft.	In.
Coal	1	9
Shale	..	3
Coal	1	8
Shale	..	6
Coal	1	6

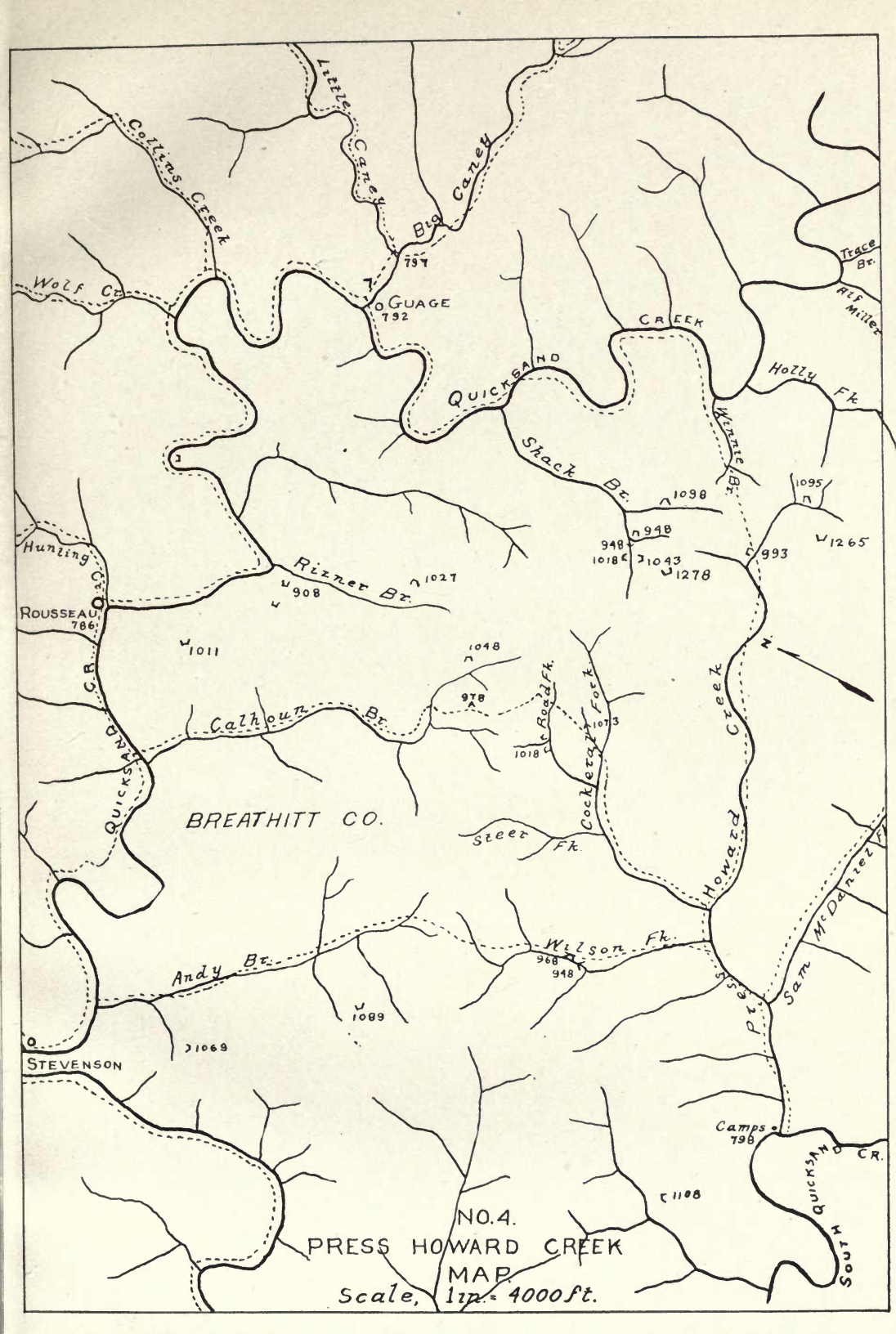
Wilson Fork of Press Howard creek.—One mile and a fourth above the mouth of the creek, the first fork to the left is Wilson fork (mouth 838 feet A. T.). About one mile up the fork where the trail again intersects the fork, it branches and a few hundred yards up the right fork I obtained the following sections of the Wilson-fork (type section) and Whitesburg coals:

	Wilson Fork Section.	Ft.	In.
	Sandstone	..	..
	Slaty sandstone	..	..
964	Wilson-fork coal	4	9
	Covered interval	13	9
948	Whitesburg coal	1	10
	Underclay	..	..
	Slaty sandstone	..	..
848	Mouth of Wilson fork	..	..

The bed-sections of the coals shown in the foregoing section are as follows:

The Wilson-fork Coal.

	In.
Coal	9
Shale	5½
Coal	8¾
Shale	12
Coal	21½
	56¾


Little Caney
Big Caney
Collins Creek
Wolf Ck.
797
GUAGE
792
QUICKSAND CREEK
Trace Br.
Alf Miller
Holly Fk.
Wennie Br.
Shack Br.
1098
948
948
1018
1043
1278
993
1095
1265
Hunting
Rizner Br.
1027
908
ROUSSEAU
786
1011
1048
978
Calhoun Br.
QUICKSAND C.R.
Road Fk.
Cockeram Fork
1073
1018
Howard Creek
N.
BREATHITT CO.
Steer Fk.
Wilson Fk.
968
948
Andy Br.
1089
1069
STEVENSON
Sam McDaniel Fk.
Camps
798
1188
QUICKSAND CR.
South Fork
NO. 4.
PRESS HOWARD CREEK
MAP.
Scale, 1in. = 4000ft.

The Whitesburg Coal.

	In.
Coal	5
Cannel coal	4
Semi-cannel coal	13
	22

What are probably these same veins have been opened about one-fourth mile up the left fork.

Cockerel fork of Press Howard creek.—Cockerel fork branches to the left just above Wilson fork about 35 yards. Coals have been opened on the Steer, Road, and Rattlesnake forks. Steer fork is the first fork on the left, and a coal has been opened on the left hillside, one-half mile up the branch. Road fork is next on the left and just beyond where Joe Lovely built a new boxed house; in this branch right near and just beyond in the right fork a coal presumably the Dean has been opened in the road leading over the ridge to Calhoun branch, stains are seen of several coals up to the Hazard, the lowest (the Whitesburg) being in Cockerel fork just at the foot of the road. One fourth mile up the main fork on the left just beyond another new boxed house is the Rattlesnake fork; up this fork 200 yards both in the drain and to the right, is a coal probably the Haddix. A combined section on Cockerel fork is the following:

	Cockerel Fork Section.	Ft.	In.
1263	Top of hill in road	..	..
	Covered interval	50	..
	Massive sandstone, exposed	..	8
1205	Water probably from Hazard coal	..	..
	Covered interval	92	..
1113	Leatherwood coal	..	..
	Sandstone	5	..
	Covered interval	35	..
	Sandstone	..	..
	Slaty sandstone	..	3½
1073	Haddix coal	7	1

	COCKEREL FORK SECTION. (Continued.)	Ft.	In
	Gray shale	2	..
	Massive sandstone	45	..
	Slate	12	..
1018	Dean coal, lower bed; partings if any indistinct	2	10
	Covered interval	13	..
	Bedded sandstone	20	..
985	Wilson-fork coal stain	..	..
	Covered interval	12	..
973	Whitesburg coal	..	..
	Covered interval	65	..
903	Coal	..	8
	Plastic underclay	3	..
	Covered interval	..	..
	Sandstone	50	..
855	Coal	..	6
	Sandstone	5	..
850	Mouth of Cockerel fork	..	..

The bed-section of the Haddix coal of the foregoing section is as follows:

	In.
Coal, good soft	5½
Black slate	5½
Splint coal	8
Black slate	13
Splint coal	23½
Gray shale	6
Cannel slate	1
Dull cannel coal with slickensides	8
Cannel and common coal in alternate layers	15
	85½

Main Fork of Press Howard creek.—From the mouth of Cockerel fork to the top of the ridge to the right of John McDaniel's house including the coals he opened on the land upon which he lives but owned by Mr. Sam Stevenson, and including also the section on the road to the top of Winnie branch gap, the following combined section gives a fair idea of the coals and the intervals on the main fork of Press Howard Creek:

SECTION FOR MAIN FORK, PRESS HOWARD CREEK.	Ft.	In.
Covered to the top of the ridge	..	..
Sandstone exposed	2	..
Gray slate	5	..
Black slate	3	7
Gray shale	..	1

	SECTION FOR MAIN FORK, PRESS HOWARD CREEK. (Continued.)	Ft.	In.
1265	Hazard coal	7	..
	Underclay and covered	5	..
	Sandstone	..	..
	Covered interval, includes top of Winnie Gap at 1233	..	..
	Sandstone	136	..
	Covered interval	10	..
	Sandstone	..	..
	Slate	6	..
1095	Haddix coal	7	..
	Slate	..	..
	Covered interval	30	..
	Sandstone	9	..
	Slate	6	..
1058	Dean coal	..	..
	Slate	6	..
	Laminated sandstone	9	..
	Slate	..	..
	Covered interval	50	..
	Sandstone contains pebbles.		
993	Wilson-fork coal	2	5
	Sandstone	..	..
	Covered interval	63	..
	Large limestone concretions in slate	15	..
	Black slate, chiefly	35	..
880	Coal	..	..
	Covered interval	30	..
850	Mouth of Cockerel fork	..	..

The bed-sections of the coals shown in the foregoing section are as follows:

The Hazard Coal; upper opening, John McDaniels' land.

	In.
Coal, 1½ to	2
Gray shale, 1½ to	2
Splint coal of excellent quality	7
Rash	½
Coal	11
Black slate	2
Coal	8½
Shale	3
Coal	1
Shale	1
Coal	21
Shale	1
Coal	19
Shale	1
Coal	7
	87

The Haddix Coal; lower entry, John McDaniels' land.

	In.
Coal	11
Black slate	30
Coal	13¼
Gray shale	9½
Soft semi-cannel	20
	83¾

The Wilson-fork coal.

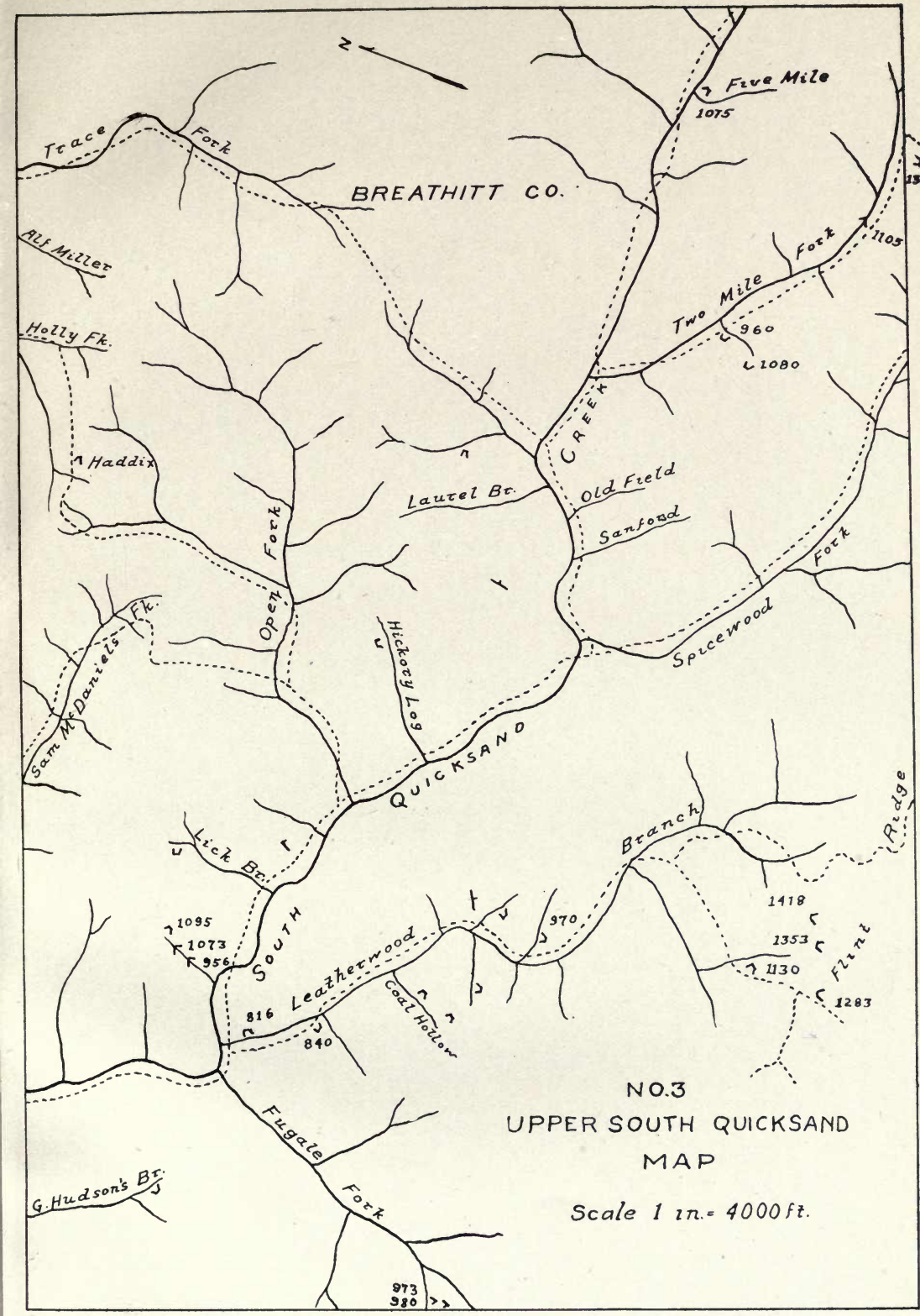
	In.
Soft coal	0 to 7
Slate, thickening to sandstone	8 to 1½
Soft coal	20½
	29

Fugate branch of South Quicksand creek.—Fugate (Jones branch (mouth 813 feet A. T.) is two miles above the mouth of Press Howard creek, on the right of South Quicksand and just below the mouth of Leatherwood. One mile and a half from the branch in the head of the second right fork, I examined an outcrop of the Whitesburg coal (973 feet A. T.). It was bituminous (soft block) and only two feet thick. Below the under slate is a massive sandstone 50 feet thick, while 15 feet above the Whitesburg coal is the Wilson fork coal (990 feet A. T.) under a heavy sandstone. On the first left fork, just over the spur south from Coal hollow of Leatherwood, Mr. Charles Hendrie found the Whitesburg coal, also thin and bituminous only, indicating that the pocket of cannel is limited on the south by this dividing spur. The following is a section of the Haddix coal seen by Hendrie on this branch, and given in the report of the State Inspector of Mines, 1893:

	Ft.	In.
Coal	2	..
Slate	..	4
Coal	..	6
Rough cannel	1	10
Coal	..	5

Following is a Section obtained by Mr. J. M. Hodge on Russell branch of Troublesome creek, and given in Bulletin No. 11, Ky. Geological Survey, 1910:

	SECTION ON RUSSELL BRANCH OF TROUBLESOME CREEK.	Ft.	In.
	Covered to top of ridge	..	..
	Flint, ahout	25	..
	Interval	65	..
1320	Flag Coal, splint	3	9
	Interval	40	..
	Coal	1	4
	Shale	..	1
	Sandstone	2	10
1280	Hazard Coal	1	1


N
Five Mile
1075
Trace
Fork
BREATHITT CO.
Alf Miller
Holly Fk.
Haddix
Open Fork
Laurel Br.
Old Field
Sanford
Two Mile
Fork
1105
960
1080
CREEK
Spicewood
Fork
Hickory Log
Sam McDaniels
Fk.
QUICKSAND
Lick Br.
SOUTH
1095
1073
956
Leatherwood
816
840
Coal Hollow
970
Branch
Ridge
1418
1353
1130
Flint
1283
Fugate
Fork
G. Hudson's Br.
973
980
NO.3
UPPER SOUTH QUICKSAND
MAP
Scale 1 in.= 4000 ft.

	SECTION ON RUSSELL BRANCH OF TROUBLESOME CREEK (Con'd.):	Ft.	In.
	Interval	160	..
	Slate	..	2
1120	Haddix coal	6	2
	Interval	60	..
1040	Splint coal (fireclay rider)	..	..
	Interval	50	..
990	Coal, thin—Dean	..	..
	Interval	100	..
890	Coal, thin	..	..
	Interval	80	..
810	Coal	2	6
	Interval	30	..
780	Coal	1	7
	Interval	20	..
760	Mouth of branch	..	..

The bed-section of the Haddix coal shown in the foregoing section is as follows:

	In.
Coal	20
Shale	4
Coal	16
Shale	9
Coal	6
Shale	3
Coal	16
	74

Leatherwood Branch of South Quicksand Creek.—This is a right hand prong, two miles above the mouth of Press Howard creek. Many openings have been made in the numerous hollows of this long fork, chiefly by Mr. George Miller years ago. In 1893 Mr. Charles Hendrie made a section on this branch which my recent investigation has for the most part verified.* He has, however, confounded and called No. 4, two coals which are clearly the Whitesburg and Wilson-fork. I did not see that opening on Leatherwood which contains the Wilson-fork coal but from his description I am sure it is the Wilson-fork. Again, he saw only the lower section of the Whitesburg coal on this branch. I examined the latter coal 100 yards up Coal Hollow which is one mile up the second hollow on the right of the branch. I found this same coal had been opened (opening caved) near the mouth of, but in the Devil's Nose hollow which is on the left of the branch, beyond the fourth right hollow, and about one mile beyond Coal Hollow. I

*Report of State Inspector of Mines (C. J. Norwood), 1893.

also examined a partial outcrop of the Haddix coal on the left of Coal hollow, further up than the Whitesburg coal; Hendrie describes a slightly different section of the Haddix coal (called by him No. 5) occurring at George Miller's house. His sections of the Flag and Hazard coals obtained at the head of the branch are also slightly different from those I obtained, proving the variability of these coals. The Hindman coal was completely covered at the time of my visit so the section I give below is that taken by Mr. Hendrie. Between the Flag and the Hazard coals, Mr. Hendrie reports a coal which I did not see, and which he states occurs 35 feet above the Hazard coal. As I have found no evidence of this coal elsewhere in this vicinity and as Mr. Hodge seems to have failed to note it on the Troublesome side of the ridge, I am not including it in my section of the Leatherwood coals; this may be No. 7 coal, and the Hazard really No. 6. The section of this coal as given by Mr. Hendrie is as follows:

Coal above the Hazard.

	In.
Coal	18
Slate	1¼
Coal	30
Coal, bony	14½
Coal	3
	66¾

Numerous openings have been made on Leatherwood, many of which I did not visit as most are caved, but the position of these are indicated on the sketch map. Below is given a combined section with details of the coals opened on this branch:

	Leatherwood Section.	Ft.	In.
1478	Approximately top of the ridge	..	..
	Covered interval	25	..
	Flint and Limestone	35	..
1418	Hindman Coal	7	4
	Covered interval and sandstone	60	..
1353	Flag coal	4	9
	Underclay	5	..
	Covered, includes a coal at 1318 according to Hendrie	52	..
	Slate	6	..

	LEATHERWOOD SECTION. (Continued.)	Ft.	In.
1283	Hazard coal	6	7
	Covered interval	5	..
	Sandstone	20	..
	Covered interval	20	..
	Massive bedded sandstone	115	..
	Sandy shale	1	..
1130	Leatherwood coal, soft	1	4
	Covered interval 15 to	25	..
1105	Haddix coal	6	2
	Massive sandstone, 50 to	40	..
1055	Covered interval, should include Dean coal	35	..
	Shale	5	..
	Covered interval	26	28
992	Wilson-fork coal	1	9
	Blue slate	4	..
	Slaty sandstone	12	..
	Gray slate	..	5
970	Whitesburg coal	5	10
	Shale	2	..
	Massive sandstone	30	..
	Laminated sandstone about	13	..
	Gray and black slate	10	..
	Laminated sandstone 39 to	35	..
	Black slate	6	..
	Covered interval about	19	..
	Massive and slaty sandstone	15	..
840	Round-bottom coal	..	8
	Slaty sandstone about	22	6
	Coal	..	10
	Slate	1	1½
816	Elkhorn coal	1	6
	Covered interval about	2	..
814	Mouth of Leatherwood branch	..	..

The bed-sections of the coals shown in the foregoing section are as follows:

The Hindman Coal, (Section by Hendrie.)

	In.
Coal	42
Slate	½
Coal	18
Slate	6
Coal	21¼
	87¾

The Flag Coal.

	In.
Block coal	17
Gray shale	4
Splint coal	12¾
Black slate and coal	5
Splint coal	18
	56¾

The Hazard Coal.

	In.
Coal	5¼
Slate	1
Coal	15
Black slate	1¾
Coal	12
Shale	¾
Coal	2
Shale	¾
Coal	4¾
Coal with pyrite	1½
Coal	35
	79¾

The Haddix Coal.

	In.
Block coal	18
Gray shale	1
Splint coal	15
Gray shale	15
Coal, probably splint	15
	74

The Wilson-fork Coal, (Section by Hendrie).

	In.
Coal, mainly splint	24
Slate	11
Cannel coal	21
	56

The Whitesburg Coal.

	In.
Coal	3
Cannel coal, 4 to	5
Coal	1
Gray shale	23
Block coal, some splint	23
Good smooth cannel coal	15
	70

The Elkhorn Coal, (Section by Hendrie).

	In.
Coal	10
Slate	13½
Coal	18
	41½

Stacy branch of South Quicksand creek.—This is a left branch entering South Quicksand less than one-fourth mile beyond the mouth of Leatherwood. It is on the farm of Henry Williams, which Mr. Charles Hendrie examined in 1893. He examined two veins here, the upper of which, the Haddix, I examined, but the lower one described I did not see as the branch had covered it. I did see, how-

ever, a coal shortly below the Haddix, probably the Dean, and was told of an opening still higher than the Haddix which I did not find but which must be the Hazard. The following is a partial section giving as far as possible the details of these several coals:

	STACY BRANCH SECTION.	Ft.	In.
	Covered to top of ridge	..	..
	Hazard coal, according to J. McDaniels 3-inch parting near middle	7	..
	Covered interval	..	..
	Laminated sandstone	..	..
	Sandy slate	1	..
1095	Haddix coal	5	10
	Under clay	1	3
	Sandstone slate	18	8
1073	Dean (?) Coal	1	11
	Covered interval	67	..
	Massive sandstone	20	..
	Covered interval about	25	..
956	Wilson-fork coal	4	8
	Blue slate	4	..
	Covered interval	140	..
816	Mouth of Stacy branch	..	..

The bed-sections of the coals shown in the foregoing section are as follows:

The Haddix Coal.

	In.
Splint coal	9¾
Soft black slate	4
Splint coal	9
Black shale	5
Splint coal	14½
Gray shale	12¾
Splint coal	15¼
	70¼

The Dean Coal.

	In.
Cannel coal, upper part "birdseye"	14
Soft coal, 8 to	9
	23

The Wilson-fork Coal, (Hendrie).

	In.
Coal, mainly splint	24
Slate	11
Cannel coal	21
	56

The cannel of the Wilson-fork coal on the Henry Williams place, according to Hendrie, is bright and slick in appear-

ance, ignites readily with a match, and is of excellent quality. An analysis by Prof. Eggleston of Columbia College gives the following excellent results from a sample of this coal:

Water	0.935
Volatile combustion	66.28
Fixed carbon	29.73
Ash	3.64
	100.00

Two-Mile Branch of South Quicksand Creek.—Two Mile is about four miles beyond Leatherwood on the right of the creek. A number of openings have been made on this branch, chief among which are those on the second right fork which is at Alfred Fugate's house, one on Walnut fork, and two or more at or near the head of the branch. The coals seen near the head of the branch and near Alfred Fugate's house are shown in the following section:

	Two-Mile Branch Section.	Ft.	In.
	Covered to top of ridge	..	..
1350	Hindman (?) Coal, said to be very thick	..	..
	Massive sandstone	..	..
	Covered interval	180	..
	Sandstone slate	15	..
	Massive sandstone, about	47	..
	Slate, 7 or	..	8
1105	Leatherwood coal	2	6
	Underclay	..	..
	Massive sandstone and covered interval	35	..
1080	Haddix coal	5	..
	Massive sandstone	..	..
	Covered interval	..	..
960	Whitesburg coal, said to be solid	3	6
	Covered interval	..	..
	Mouth of Two Mile Branch	..	..

Following is the bed-section of the Haddix coal of the foregoing section:

	In.
Coal	8½
Black slate	2
Coal	6
Black shale	5
Cannel	14
Slate	8½
Splint coal	16
	60

The following are notes on coals further up South Fork adapted from Hendrie's report;* the parentheses are my own:

"Going up South Fork, three-fourths of a mile from the mouth of Leatherwood, this bed (Wilson-fork) is again exposed in an outcrop:

WILSON-FORK COAL.	Ft.	In.
Coal	1	11
Slate	..	7½
Cannel coal	1	8

"At an opening on the opposite of the creek, in a small branch the bed again shows: (Wilson-fork coal)

WILSON-FORK COAL.	Ft.	In.
Coal	2	..
Slate	..	9
Coal, cannel	1	1

"On Wilson Fugate's branch still higher up on South Quicksand, another opening shows: (Wilson-fork coal.)

WILSON-FORK COAL.	Ft.	In.
Coal, mainly splint	2	..
Slate	1	..
Cannel block	1	8

(He gives the following section of the Haddix bed on this branch):

*In report of Ky. State Inspector of Mines for 1893.

HADDIX COAL.	Ft.	In.
Coal	..	10
Slate	..	2½
Coal	..	6¼
Slate	..	3¾
Coal, bony	..	7¾
Slate	1	½
Cannel	..	11
Semi-cannel	..	2
Coal	..	3

"On the John Clemmons farm the following section (Whitesburg coal) was found:

WHITESBURG COAL.	Ft.	In.
Coal	..	5
Cannel coal	..	6
Coal	..	3
Cannel coal	..	6
Coal	1	2

"Twenty feet higher and immediately above the last opening, another bed (Wilson-fork) is found, an iron ore of considerable thickness forming the roof, in a regular stratified form:

WILSON-FORK COAL.	Ft.	In.
Iron ore	..	..
Coal	1	4
Slate	..	5
Cannel	1	..

"The exact identity of these two beds is not determined but the first one alluded to is probably No. 4 coal, although the section of the second coal might indicate otherwise. (That these are two distinct beds has already been indicated; his No. 4 was not equivalent to the Dean coal.)

(The following is the section of the Haddix vein on

the Dan Williams branch, one mile above the mouth of Leatherwood on the left of South Quicksand):

	Haddix Coal.	Ft.	In.
	Cannel coal	..	2½
	Coal	..	5
	Coal, bony	..	2½
	Shale	1	..
	Coal	..	7½
	Shale	..	2½
	Coal	..	11

(He also gives the following as the section of the Haddix vein on the McIntosh farm on South Quicksand creek):

	Haddix Coal.	Ft.	In.
	Coal	1	3
	Slate	..	5
	Splint coal	1	1
	Slate	..	10
	Coal	..	11

Numerous other openings have been made on South Quicksand higher up the creek on Ten-acre, Jim, Laurel, Open Fork, Spring hollow, Six-mile, and other branches, chiefly on the Whitesburg, Wilson-fork, and Haddix coals. At the mouth of Five-mile branch which is on the right of the creek, near the head where the road descends from the ridge from Miller branch, Quicksand creek, I examined an opening in the Haddix coal which showed a thickness of 75¾ inches as in the following section:

	Haddix Coal.	Ft.	In.
	Slate	..	..
	Coal	..	5¾
	Rash	..	2½
	Coal	..	5
	Rash or black slate	..	1¾
	Coal	..	8
	Black shale	..	5
	Splint coal	1	6
	Gray shale	..	11¾
1075	Splint coal	1	6
	Gray shale	1	..
	Sandstone	..	..

Lower Quicksand Drainage.

In the lower Quicksand drainage there is included all that part of Quicksand and its branches except South, Middle, and Laurel Forks.

Section between Jackson and the mouth of Quicksand Creek.—The following section of the Elkhorn coal, showing a thickness of 49 inches, was obtained in the Jackson entry about 50 yards from the entrance and on the right of the entry:

	Elkhorn Bed-Section.	Ft.	In.
	Dark slate	..	..
	Coal	1	11
	Rash	..	1½
	Coal	..	5½
	Bone coal	..	2
	Shale	..	3½
	Coal	..	1
	Shale	..	3½
	Coal	..	2½
	Shale	..	1½
	Coal	..	2
	Shale	..	2
983	Coal	..	1
	Shale	..	..

The following approximate section was obtained along the line of the new three miles of extension of the L. & E. R. R. from Jackson to Quicksand creek:

From Jackson to Quicksand.	Ft.	In.
Massive sandstone	20	..
Black shale	4	..
Hard, sandy, black slate	16	..
Draw slate 0 to 4 inches to	1	..
Round-bottom coal (dip ESE, 30°), ¾ mi. from Quicksand; a splint coal containing some pyrite, 1 to	1	5
Hard, gray micaceous plant bearing sandstone 3 to	5	..
Sandstone slate, 8 to	..	10
Grey sandstone, 6 to	..	10
Gray micaceous sandy slate	6	..
Hard sandstone, 8 to	..	10
Gray micaceous, sandy slate and shale	30	..
Elkhorn coal; 1.1 mile from Jackson on line of L. & E. extension; dips 6 ft. per 1,000 ft. S. E.	4	7

The bed-section of the Elkhorn coal of the foregoing section is as follows:

	In.
Coal	32
Rash	1
Shale	4
Coal	1
Shale	2
Coal	1½
Shale and coal	6
Coal	8
	55½

Micaceous, Sandy underclay.

Hendrie makes the following statement concerning cannel coal near the mouth of Quicksand creek:

"Near the mouth of Quicksand creek, cannel is found, but thin, and extremely limited in area. Within a mile of Jackson, on the north bank of the river on the Joe Little farm, a remarkable deposit is found in No. 4 (Whitesburg) on a high knob. The cannel bed is thin, with only a covering of from 10 to 50 feet, and caps the knob, running in thickness from 10 to 16 inches, with a thin bituminous parting on top. This cannel is remarkable, owing to its quality, as the following analysis made by the Consolidated Gas Co., of New York will show:

Volatile matters	68.0
Fixed carbon	28.2
Ash	3.8
	100.00

"This coal has a bright slick, satiny appearance, and on being burned goes entirely in to a fine red ash. This is the richest and purest cannel coal that the writer has found in Kentucky, and is probably unsurpassed anywhere. Sad to relate, a close and careful investigation of the pocket and adjoining hills reveals the existence of only three acres of this remarkable coal; another commentary to which the searcher for this elusive mineral is subject."

Big Branch of Quicksand Creek.—This branch is a left branch of the creek and leaves it less than a mile above South Quicksand. A section is presented below which is

interesting in that it shows a coal which has been opened to which I have given the local name Big-branch:

		Ft.	In.
	Covered to top of ridge	..	..
998	Wilson-fork coal	..	..
	Covered interval, including sandstone and slate, estimated	70	..
	Gray slate	6	..
907	Big-branch coal	8	10
	Slaty sandstone	10	..
	Covered interval	21	..
	Massive sandstone	20	..
853	Round-bottom coal	..	..
	Gray slate probably contains limestone	9	..
843	Coal	1	2
	Covered interval	64	..
	Sandstone	6	..
	Black slate	10	..
763	Elkhorn coal	..	..
	Ganister rock	5	..
	Slate and sandstone	12	..
746	Mouth of Big branch	..	..

Following is the bed-section of the Big-branch coal shown in the foregoing:

	In.
Coal	8
Gray clay	24
Gray sandstone	24
Black slate	10
Splint coal	36
Shale, with coal below	4
	106

Between Round Bottom and Big Branch, Quicksand Creek.—This region on the right of Quicksand creek from one to four miles above its mouth, is chiefly of interest for its development of what may be called the Round-bottom coal, the Round-bottom being just on the opposite side of the creek. The following combined section was obtained showing the position of this coal:

		Ft.	In.
	Massive sandstone	..	..
	Hard sandstone beds alternating with softer beds	6	..
	Sandy slate	30	..
	Coal, soft, 8 to	..	11
848	Cannel coal, 1 foot 3 inches to	1	11
	Round-bottom coal. (Brown 835; Combs 831: J. R. Back 848).		
	Covered	2	..
	Slaty sandstone	20	..
	Covered interval	15	..
	Gray sandy slate	..	..
	Coal	1	6
	Gray shale and ganister rock	3	..
	Laminated sandstone	8	..
	Sandstone slate	34	..
	Covered interval, includes slate with limestone concretions	20	..

This coal, bottom layer, generally a very fine cannel, was worked years ago and barged to the Kentucky river and thence to market. The area in which it has been found as cannel and of workable thickness is rather restricted, not having been worked except in the region just described and on Smith branch of South Quicksand creek where the lower layer is semi-cannel. It has been almost exhausted in the Round-bottom region.

Combined section on Miller branch of North Fork of the Kentucky river and Roark branch of Quicksand creek.

	MILLER BRANCH—ROARK BRANCH.	Ft.	In.
	Covered to top of the ridge more than	100	..
	Massive cliff-forming sandstone	30	..
	Covered interval about	25	..
	Slaty sandstone	..	..
	Slate	..	..
	Covered interval	28	..
	Limestone blocks	1	..
1110	Haddix coal and covered interval	11	..
	Covered interval	5	..
	Slaty sandstone, more solid toward top	30	..
	Calcareous sandstone and shale	15	..
1061	Dean coal (according to Hodge the outcrop thickness is)	..	10
	Shale	2	..

	MILLER BRANCH—ROARK BRANCH. (Continued.)	Ft.	In.
	Sandstone slate	..	..
	Bedded sandstone	60	..
994	Wilson-fork coal	5	3
	Gray shale	1	6
	Ganister rock	1	..
	Massive sandstone	14	..
988	Coal	..	6
	Massive sandstone	10	..
	Black shale	..	10
975	Whitesburg coal	1	9
	Underclay	2	..
	Slaty sandstone grading into hard rounded ledges	6	..
	Covered interval	3	..
	Slaty sandstone, grading into compact layers below	17	..
	Sandy slate with rounded concretions	18	..
	Slate	18	..
	Covered interval	12	..
	Slate	10	..
905	Big-branch coal, (outcrop thickness given by Hodge)	..	11
	Clay, thin	..	..
	Massive, slaty and thin bedded sandstone	20	..
	Slate and unconformity of erosion	1	..
	Laminated sandstone	20	..
864	Coal	..	..
	Laminated sandstone and black slate	12	..
852	Round-bottom coal (exposed thickness according to Hodge)	..	5
	Covered interval	2	..
	Sandstone slate and black slate	16	..
834	Coal	1	8
	Underclay grading into ganister rock beneath	2	..
	Slaty sandstone	18	..
	Massive sandstone	1	..
	Sandstone slate	20	..
793	Coal, thin	..	..
	Calcarious sandstone, lower part rippled	5	..
	Black slate	25	..
	Heavy bedded calcarious sandstone rippled at the top	10	..
	Covered interval	5	..
748	Mouth of Roark branch	..	..

The bed-sections of the coals of the foregoing section are as follows:

The Wilson-fork Coal.

	In.
Splint coal	24
Sandy slate, over	24
Coal	15
	63

The Whitesburg Coal, (Section by J. M. Hodge).

	In.
Coal	11
Shale	6
Coal	4
	21

Lick Branch and Meatscaffold Creek of Quicksand creek.—Lick branch is about three miles above the mouth of Roark branch on the left of Quicksand, while also on the left, three miles further up the creek, Meatscaffold enters Quicksand.

On Bradburn branch, which is the middle branch of three left branches which enter Quicksand between Lick branch and Roark branch an opening was made on a coal, but I did not examine it.

On Lick branch only two openings have been made, one in the branch at Eli Back's house where the Elkhorn coal (see section of this coal in section below) was dug, and the other on Calvin Back's land on the ridge between Lick branch and Quicksand where what is probably the Wilson fork coal has been opened.

On Meatscaffold creek there are a number of openings. About one mile up the branch on the right and above a little cabin is the Pearl Back entry (see section of Whitesburg coal below), where a sample was collected for analysis. (See No. 3511.) Higher up, about 30 feet an opening (now caved) was made in the Wilson-fork coal. One half mile further up the creek, also on the right of the creek and in each case several hundred yards from the road, openings have been made on what is probably the Wilson-fork coal on the Delilah Hall and Logan Back lands; I did not get to examine these openings. One mile up Licking fork of Meatscaffold which is a right fork leaving Meatscaffold a few hundred yards from Stevenson, an opening was made on the John Caudill land on what is probably the Whitesburg coal, but which was caved so I could not examine it. The section of the ridge between Lick (Hounshell) branch and Meatscaffold creek on the left of Quicksand creek is as follows:

	Ridge between Lick Br. and Meatscaffold.	Ft.	In.
1227	Top of gap in road	..	..
	Covered interval	3	..
	Sandstone	2	..
1220	Hazard (?) coal	..	..
	Slaty sandstone and covered	15	..
	Covered interval	5	..
1200	Coal	..	..
	Ganister rock and massive sandstone	30	..

	RIDGE BETWEEN LICK BR. AND MEATSCAFFOLD. (Continued.)	Ft.	In.
1170	Chalybeate seep and stain	..	..
	Slate	10	..
	Sandstone, 3-inch bed and covered	5	..
1155	Leatherwood coal and water seep	..	..
	Covered interval	4	..
	Massive sandstone	20	..
	Covered interval, massive sandstone near base	31	..
1100	Haddix coal	..	..
	Sandstone, sheety at the top	27	..
1073	Coal, more than	..	6
	Underclay	..	..
	Slate grading into slaty sandstone	6	..
	Massive sandstone	19	..
	Covered interval	5	..
	Slaty sandstone	3	..
1040	Dean coal	..	..
	Massive sandstone, slaty at the top	22	..
1018	Coal	..	6
	Sandstone and slaty sandstone	19	..
	Gray slate	5	..
990	Wilson-fork coal	6	2
	Covered interval	14	6
	Slaty sandstone	4	..
	Slate	11	6
956	Whitesburg coal	3	6
	Slate, 7 to	6	..
	Limestone	1	4
	Covered interval	9	..
	Sandstone	6	..
	Slate, some massive sandstone	21	..
	Coal, more than	..	6
	Slaty. sandstone	2	..
905	Big branch coal	2	..
	Covered interval	4	6
	Covered interval and sandstone	20	..
	Slaty sandstone, some layers rippled and covered above	61	..
	Slate	..	10
815	Elkhorn coal	8	2
	Slaty sandstone	10	..
	Calcareous sandstone 2 to	3	..
802	Coal	..	8
	Black slate containing some sulphur	13	..
	Coal	..	6
	Covered interval	35	..
754	Mouth of Lick branch	..	..

The bed-sections of the Whitesburg and Elkhorn coals of the foregoing section are as follows:

The Whitesburg Coal, (Pearl Back entry.)	In.
Rash	4
Coal	4
Rash	1
Coal	10
Coal	22½
Rash	1
	42½

The Elkhorn Coal.

	In.
Coal	6
Slate	60
Coal	4
Slate	1
Coal	27
	98

Andy Branch of Quicksand Creek.—Andy branch is on the right of the creek just above Stevenson. One-eighth mile up the branch, up a right-hand hollow on the left hillside an entry has been made on the James Back land which shows a thickness of 62¼ inches and the following section of the upper bed of the Dean coal:

	Dean Coal, Upper Bed.	Ft.	In.
	Shale	..	..
	Coal and rash 2 to	..	3
	Gray shale	..	11
	Coal	..	1
	Shale	..	2½
	Coal	..	¼
	Shale	..	2½
1069	Splint coal	3	6
	Underclay	..	..

One and a fourth miles up and on the right of the branch, about 200 yards from the Calhoun house, the Haddix coal has been opened on T. E. Calhoun's land (entry partly caved) showing the following section:

	Haddix Coal.	Ft.	In.
	Slate	..	..
	Coal	..	9
	Shale	..	4½
	Coal 5 to	..	6
	Shale	..	9
1089	Coal; some thin flat seams of "sulphur"; exposed for	1	10

Calhoun Branch of Quicksand Creek.—This is on the right of the creek, one mile and a half above Andy branch. About one mile and a half up Calhoun branch a left fork, turns off, one-fourth mile up which on the left side near the head, an opening was made on the Dean coal on the

R. L. Back land showing a thickness of 78 inches and the following section:

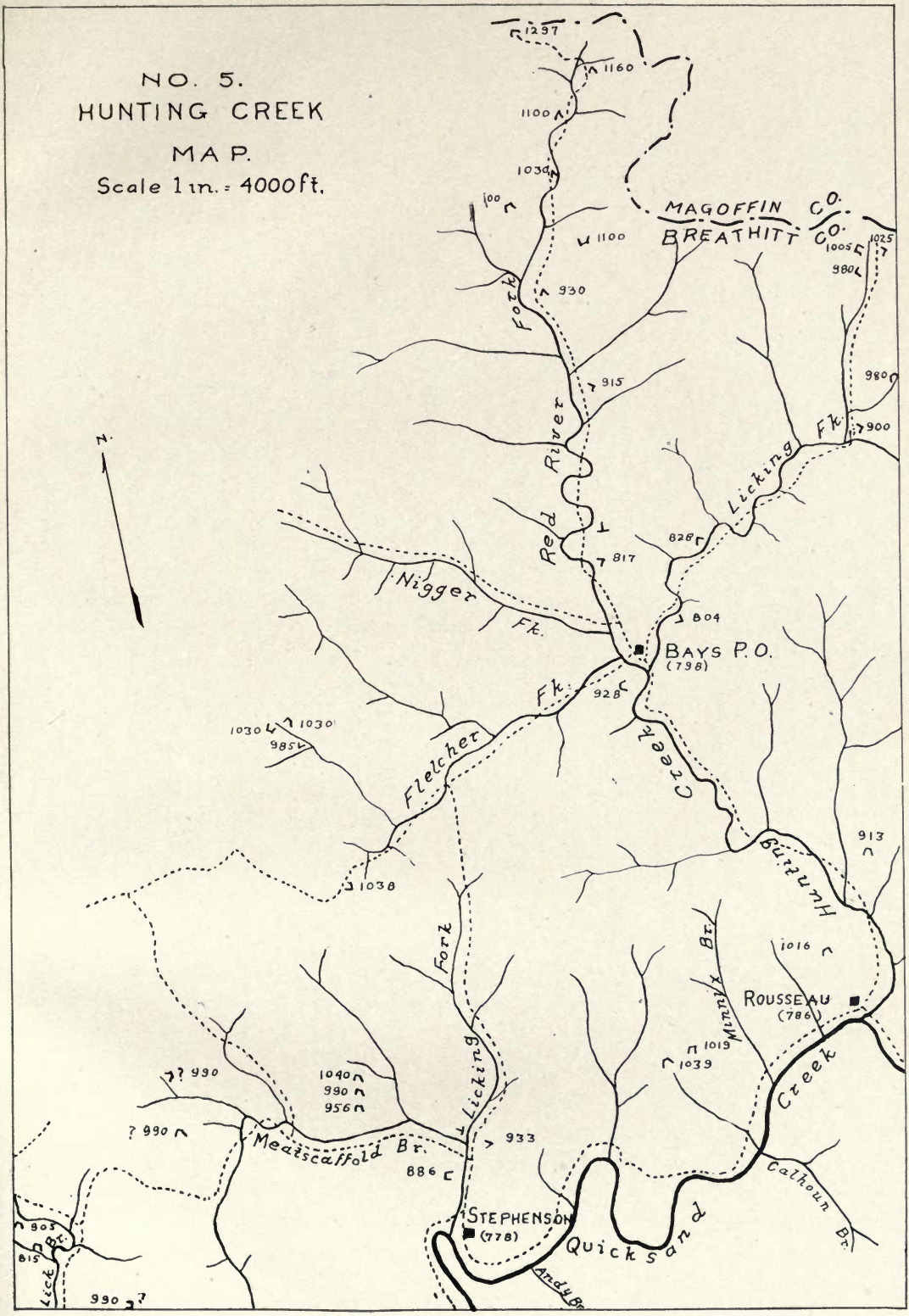
	Dean Coal.	Ft.	In
	Sandstone	..	..
	Coal	1	6
	Shale	..	10
1048	Coal (See analysis 3512)	2	..
	Shale	..	..
	Coal, said to be	2	2
778	Stevenson	..	..

On this branch a number of thin coals are exposed in the black slate within a fourth of a mile from the mouth, but it is not thought necessary to give details here except to state that the Elkhorn coal has a sandstone parting of from 6 to 24 inches, the coal having a thickness of one foot and a half. (816 feet A. T.)

Quicksand Creek near and above Rousseau.—Above Sydney Minnix's house up a small left drain, the first below Minnix branch, one-fourth mile below Rousseau and 150 yards from the road, the following section, showing a thickness of 45¾ inches, was obtained of the upper bed of the Dean coal:

	Dean Coal, Upper Bed.	Ft.	In.
	Sandstone	..	..
	Black slate	..	6
	Coal 1 to	..	1½
	Rash 1 to	..	1½
	Coal	..	2¾
	Shale	1	4
1039	Coal, semi-splint, good quality	2	..

On the opposite side of the drain about 50 yards distant on the same land, openings are said to have shown the following section of the Dean coal:


NO. 5.
HUNTING CREEK
MAP.
Scale 1 in. = 4000 ft.
MAGOFFIN CO.
BREATHITT CO.
Fork
Red River
Licking
Nigger Fk.
Fk.
Fletcher
Creek
Bays P.O.
(798)
Rousseau
(786)
Stephenson
(778)
Meadscaffold Br.
Quicksand
Creek
Calhoun Br.
Andy Br.
Licking
Fork
Hurricane Br.
Muncy Br.
1297
1160
1100
1030
930
915
900
828
817
804
928
1038
1016
1019
1039
1040
990
956
933
886
913
985
903
815

		Ft.	In.
	Heavy sandstone	10	..
	Slaty sandstone	..	8
	Semi-cannel slate	..	8
1019	Dean coal	8	9
	Sandstone	..	..
786	Rousseau	..	..

The bed-section of the Dean coal shown in the foregoing is as follows:

	In.
Coal, 2 to	3
Shale, 16 to	18
Splint coal, some "sulphur"	36
Slate, 7 to	8
Black slate	4
Coal	36
	105

One-fourth mile to the left of the creek on the ridge immediately back of Rousseau is the E. H. Minnix entry driven on the Dean coal, which shows the following section:

	Minnix Entry—Dean Coal.	Ft.	In.
	Sandstone	..	..
	Draw slate	..	3
	Coal partly rash and splint	..	8
	Gray shale	1	5
	Coal, good splint	1	..
	Gray-white shale	7	..
	Coal including 10 inches of shale	1	4
1016	Coal	1	8

Hunting Creek of Quicksand Creek.—A short distance beyond Rousseau, which is three miles beyond Stevenson, and on the left of the creek, Hunting creek enters Quicksand. Hunting creek (mouth 780 feet A. T.) has three forks about two miles and a fourth from the mouth, and at this point Bays postoffice is located. A number of coals have been opened on this creek. The forks are known as the Fletcher, Red river, and Licking forks; good sections were obtained on them which are given in detail below.

Mr. Charles J. Little reports opening a bed about 60 feet above the creek, which was soft coal 4 feet 2 inches

thick. This opening is about one-fourth mile up Hunting creek on the right of the creek, three-fourths mile up a branch back of where George Hensley lives.

On the right one mile from the mouth, on the Jeff Hensley land the following section was obtained of the Big-branch coal; the coal is semi-splint, cokes well but contains a little "sulphur".

	BIG-BRANCH COAL. J. HENSLEY.	Ft.	In.
	Sandstone	..	..
	Coal	2	..
	Micacious slate 6 to	..	8
913	Coal	2	..
	Soft underclay	..	..

The same coal has been opened on the Willie Holbrooks land on the left of the creek about 150 yards from Bays postoffice. Mr. Holbrooks says the coal was 2 feet 6 inches thick, hard, but without roof. (928 feet A. T.)

Licking Fork of Hunting Creek.—Coals have been opened on this fork only at two points both on the land of Marion Walters. One of these openings is on what is probably the Whitesburg bed, but has not been driven to roof and showed only 1 foot 3 inches of splint coal. This opening was on the left, one-half mile up a right hand branch, and three-fourth miles from the mouth of the fork. The other opening was three miles up the fork, 300 yards beyond the house and 300 yards from the gap in the hill, and up a left drain, there being obtained 2 feet 6 inches of cannel with a soft coal top, but neither floor nor roof. This probably represents the Wilson-fork bed. Coals noted on the road up the fork are shown in the section which follows:

	Section on Licking Fork of Hunting Creek.	Ft.	In.
	Covered to top of hill	..	..
1100	Haddix coal blossom	..	..
	Laminated sandstone and covered interval	35	..
	Massive sandstone	20	..
	Coal stain	..	..
	Covered	20	..
1025	Dean coal (Lower bed)	2	..
	Underclay	1	..
	Covered interval includes 8-inch coal	25	..
1005	Wilson-fork cannel coal with soft coal top, said to be	3	..
	Covered interval	15	..
980	Whitesburg coal, said to be	3	..
	Covered interval, chiefly slate	18	..
	Sandstone and black slate	2	..
900	Big-branch coal (on H. H. Holbrooks' land opposite his sons' house)	..	8
	Covered interval and massive sandstone	71	..
828	Coal, 6 to	..	10
	Ganister rock	..	..
	Slate	22	..
	Black slate	2	..
804	Coal	..	8
	Underclay and slaty sandstone	5	..
	Calcareous sandstone	..	..
798	Mouth of Licking fork	..	..

Following is the bed-section of the lower bed of the Dean coal shown in the foregoing:

	In.
Coal	6
Shale	9
Coal	9
	24

At the head of the left fork of Johnson creek just over the ridge in Magoffin county, three-eights mile from the gap, on the J. A. Wedges land two coals were opened on the right of the branch going up. The uppermost was the lower bed of the Dean coal, 1020 feet A. T. said to be 4 feet 7 inches solid (I measured 3 feet 8 inches capped with 2 inches of rash, the bottom of the bed not being exposed). Beneath the coal is 1 to 2 feet of underclay then ganister rock. The roof is blue slate. Forty feet lower was an opening on the Whitesburg bed (980 feet A. T.), containing three feet solid coal with hard shale roof, above which is sandstone

Prof. Crandall sent me a section he made at the head of this fork of Johnson creek but as I did not know the altitude of the base of his section I was unable to correlate the coals.

Fletcher fork of Hunting Creek.—On this fork the only openings made are on the Dean coal on the Louis Back land. This is up a right hand hollow, about one-fourth mile from where the road starts up the hill toward Meatscaffold creek, and to the right of Back's house. The section of the Dean coal shown in the following section was obtained at the opening on the left of the drain. The following is a partial section on this fork:

	Partial Section on Fletcher Fork of Hunting Creek.	Ft.	In.
1320	Top of ridge	..	..
	Massive sandstone, estimated	15	..
	Slaty sandstone and covered	20	..
	Slaty sandstone alternating with solid beds capped by 18-inch bed at top	30	..
	Soft massive sandstone	15	..
	Covered interval	..	..
1235	Coal, clay, and water	..	..
	Probably soft sandstone	30	..
	Covered interval	20	..
	Sandstone	..	..
1185	Coal and underclay	..	..
	Covered interval and laminated sandstone	20	..
1167	Underclay suggestive of coal	..	..
	Slaty sandstone	10	..
	Sandstone beds between beds of sandstone shale	30	..
1125	Leatherwood coal stain	..	..
	Underclay	1	6
	Laminated sandstone	18	6
	Massive sandstone	20	..
1085	Place of Haddix coal	..	..
	Covered interval	40	..
	Sandstone	..	..
	Micacious slaty bituminous sandstone	..	..
1033	Dean coal	2	5
	Shale	..	3
	Massive sandstone, slaty toward top	30	..
	Covered interval	20	..
985	Wilson- fork (?) coal, exposed	..	8
	Shale	15	..
	Slaty sandstone alternating with heavier sandstone	30	..
	Slaty sandstone	..	..
	Coal	..	..
940	At branch of forks of Fletcher fork where start up hill and fork leads to Louis Back's house	..	..

The bed-section of the Dean coal (Louis Back opening) of the foregoing section is as follows:

	In.
Soft coal	1
Shale	4
Soft coal, 36 to	24
	29

Red River fork of Hunting creek.—This is the main or middle fork and from it extends another large fork to the left, known as Nigger fork. On Red river fork only two openings have been made, both on the Haddix coal, and near the head of the fork. The French Miller entry is on the left of the fork above the house in which Mr. Sallie lives, and the coal shows a thickness of 43 inches and the following section:

	HADDIX COAL; FRENCH MILLER ENTRY.	Ft.	In.
	Slate	..	..
	Coal, soft	..	3
	Shale	..	4
1100	Coal, over 2 feet perhaps	3	..
	Gray slate	..	..

On the right of the fork and on the right of a right drain on the land on which Wm. Joseph lives an opening was made showing the following section:

	HADDIX COAL; JOSEPH OPENING.	Ft.	In.
	Gray shale	..	..
	Rash	..	3
	Clay	..	1½
	Rash	..	4½
1100	Coal, soft, said to be	3	4

On the Eli Williams and Lige Miller lands, I was told that a vein lower than the Haddix was opened which was 5 feet thick, the lower half being peacock coal; this is on the opposite side of the ridge on the waters of Johnson fork of Licking. Prof. Crandall has kindly sent me his

section of that side of the ridge and it tallies very well with the section given below, except that it shows the Big-branch coal to have a thickness of 2 feet 9 inches. The following is a section on Red River fork of Hunting creek from the mouth of the fork to the top of the dividing ridge:

	Section on Red River Fork of Hunting Creek.	Ft.	In.
1325	Top of hill	..	..
	Covered interval	25	..
1297	Flag coal. Cannel slate about	3	..
	Sandstone	17	..
	Covered interval	10	..
1270	Hazard coal stain	..	..
	Covered interval including sandstone	5	..
	Covered interval	10	..
	Massive sandstone, soft and shelly toward top	30	..
	Shale	5	..
	Massive sandstone	20	..
	Slaty sandstone and covered	16	..
	Sandstone	14	..
	Slate and slaty sandstone	9	..
1160	Leatherwood coal, more than	1	..
	Underclay	..	..
	Slaty sandstone and shale	16	..
	Coal	..	2
	Shale	4	..
	Laminated sandstone	5	..
	Covered interval	5	..
1129	Coal stain	..	..
	Covered interval	4	..
	Laminated sandstone	3	..
	Covered interval	12	..
1112	Coal	..	..
	Slaty sandstone, much sheeted	8	..
1100	Haddix coal	4	3
	Covered interval	2	..
	Shale, with 4-inch sandstone at base	10	..
1090	Coal outcrop, partly covered	..	..
	Slaty sandstone	..	..
	Plastic clay shale and shale with layers of iron carbonate concretions 6 feet from bottom	20	..
	Massive sandstone, laminated toward top	30	..
	Covered interval	10	..
1030	Dean coal, exposed	..	1
	Shale and slaty sandstone	10	..
	Soft shelly sandstone	50	..
	Covered interval	40	..
	Coal, slaty, some "sulphur"	..	4
930	Splint coal	..	10
	Shale	1	3
	Sandstone shale	..	9

	SECTION ON RED RIVER FORK OF HUNTING CREEK. (Continued.)	Ft.	In.
	Sandstone and covered interval	5	..
	Sandstone	5	..
	Black slate	2	..
915	Big-branch coal; cannel slate, coal, and rash	1	1
	Slaty sandstone, chiefly	61	..
	Gray and black slate	2	6
850	Round-bottom coal; 3 in. cannel on top	1	4
	Slaty sandstone and black slate	13	..
	Calcarious sandstone	2	..
	Sandstone with rippled surface, black slate with layers of calcareous, micacious, bituminous sandstone	12	..
817	Elkhorn coal	10	..
	Sandy slate	12	..
	Slaty calcareous sandstone	2	6
802	Covered to mouth of fork	5	..
798	Bays postoffice	..	..

Quicksand Creek above Hunting Creek, and on Rizner Branch.—One half mile above the mouth of Hunting creek and 200 yards from Quicksand on the right ridge is the Daniel McIntosh entry with the following section showing the upper bed of the Dean coal:

	UPPER DEAN COAL; MCINTOSH ENTRY.	Ft.	In.
	Sandstone and slaty sandstone	..	..
	Sandstone slate	1	2
	Sandstone	1	6
	Slate	..	4
	Coal	..	1
	Clay 1 to	..	3
	Rash and coal, 6 to	..	8
1011	Splint coal	2	..
	Underclay	..	..
781	Quicksand creek	..	..

On the left of Quicksand one-half mile beyond McIntosh's on the same ridge but on the right of a right drain, what may be the Haddix coal (78 inches) has been opened and showed according to Mr. Bud Rizner, the owner, the following section:

	HADDIX COAL. BUD RIZNER OPENING.	Ft	In.
	Blue fine-grained sandstone	..	..
	Coal	1	..
	Shale	1	..
	Coal	1	3
	Shale	1	3
	Coal	2	..

On the point to the right of the Rizner branch, which is a right branch of Quicksand Creek, one mile above the mouth of Hunting creek, at the back of a cornfield on the Bud Rizner land about 100 yards from the mouth of the branch, is an opening (now caved) which according to the owner showed the following section:

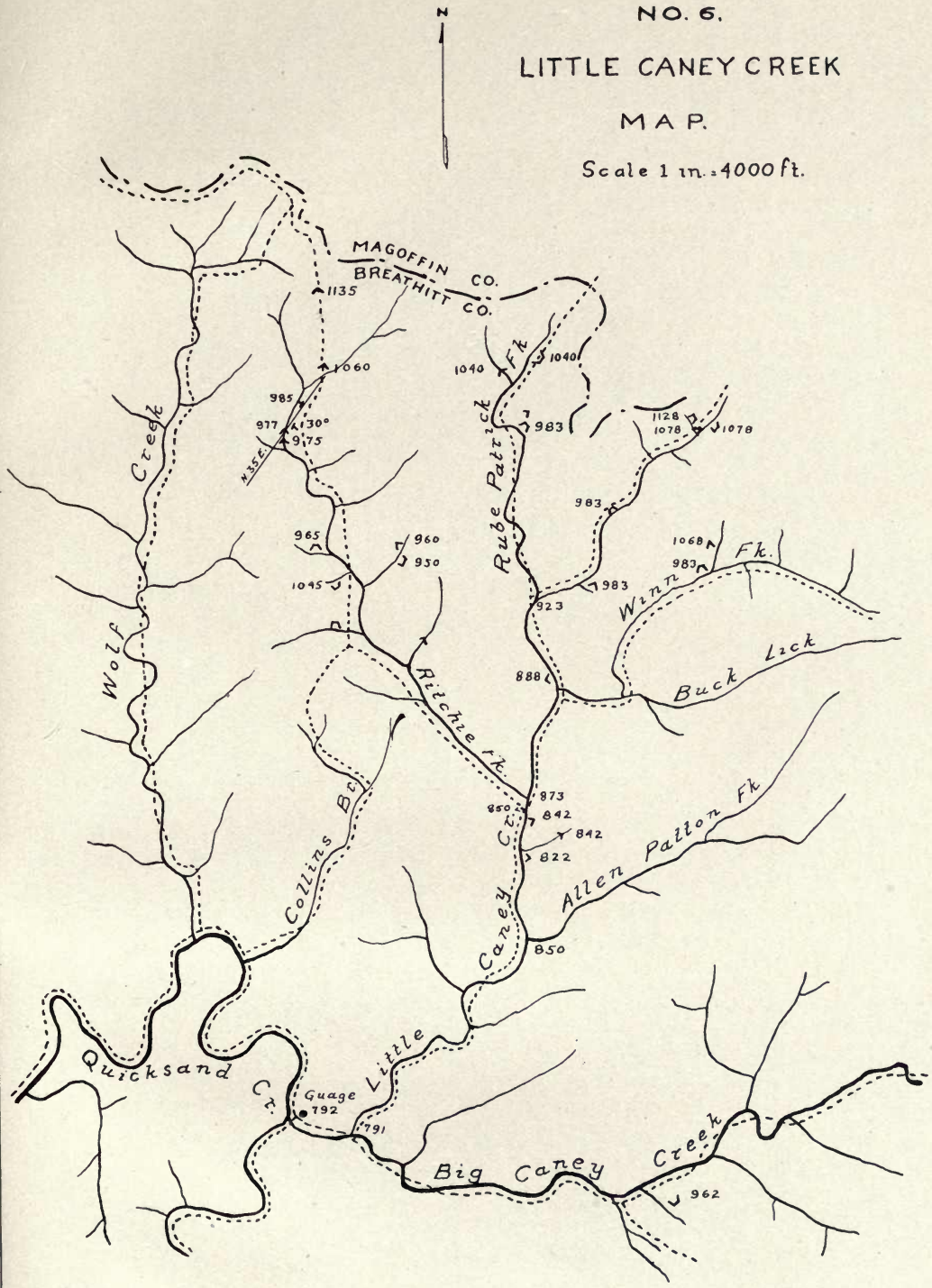
	BIG-BRANCH COAL. RIZNER OPENING.	Ft.	In.
	Soft yellow sandstone	..	..
	Black slate	1	..
908	Coal, splint, solid	4	..
783	Mouth of Rizner branch	..	..

One mile up Rizner branch about 100 yards up on the left hillside is the McKinley Rizner entry, in the Dean coal, which while partly filled at the time of my visit, was sufficiently open to show the following section:

	DEAN COAL. MCKINLEY RIZNER ENTRY.	Ft.	In.
	Covered	..	..
	Coal	..	..
	Gray shale with plant impressions	..	..
	Rash and 4 inches of coal	..	10½
1027	Coal	3	..

In the branch, coals were noted at altitudes of 848, 818, and 803 feet.

Caney Creek of Quicksand Creek.—This is the creek which enters Quicksand creek about 18 miles east of Jack-


N
NO. 6.
LITTLE CANEY CREEK
MAP.
Scale 1 in. = 4000 ft.
MAGOFFIN CO.
BREATHITT CO.
1135
1060
1040
1040
Fk
985
977
1130°
975
N35E
983
1128
1078
1078
983
965
960
950
1045
1068
983
983
923
Rube Patrick
Fk.
Winn
Buck Lick
Wolf Creek
Ritchie Fk.
888
873
850
842
842
822
850
Collins Br.
Caney Cr.
Allen Patton Fk
Quicksand Cr.
Guage
792
791
Little
Big Caney Creek
962

son at the postoffice called Gauge. It branches about one-fourth of a mile above the mouth, Little Caney on the left, the main creek being called Big Caney. Little Caney has a number of forks, the Ritchie and Rube Patrick on the left, main Little Caney being known as the Road fork beyond the Rube Patrick, while on the right are the Winn and Allen Patton forks. Coal has been opened on all except the last. On Big Caney, which is at least nine miles long there are numerous forks but few coal openings, one being two miles from the mouth and some near the head. I devoted my time to Little Caney studying it in considerable detail, hence I present below a number of sections of the coals and a good combined section.

Rube Patrick Fork of Little Caney Creek.—Just above the level of the fork, to the right, and one-half mile up, the Whitesburg coal has been opened on the Sam Patton land, which shows the following section:

WHITESBURG COAL. SAM PATTON.	Ft.	In.
Slaty sandstone	..	..
Slate	..	..
Coal, semisplint, contains a little cannel shortly above the middle	2	9½
Gray shale	..	..

Analysis No. 3513 shows the quality of the coal here.

One mile and a half up, near the head of the fork, the fork divides, and about 20 and 30 yards respectively up the forks, the Dean coal is exposed and has been worked by Sam Patton on the right fork. Here the coal dips south west and gave the following section:

	In.
Coal, with two to three ½-inch rash partings	7
Cannel coal, 2 to	3
Excellent splint coal, 39 to	38
	48

For quality of the coal, see analysis No. 3514.

Ritchie fork of Little Caney creek.—Three hundred yards above the mouth of the fork is a coal stain on the left, 874 feet A. T. probably the Round-bottom coal. A chalybeate stain shows at 910 A. T., probably the Big-branch coal. In branches on both left and right three-

fourths mile up the fork, and about 200 yards from the fork a 15- to 18-inch coal has been worked slightly.

About one-fourth mile beyond up the second right-hand School-house branch on the right of the branch, the following section was obtained at a small opening on Taylor and Crate's land:

	WHITESBURG COAL. TAYLOR AND CRATE'S LAND.	Ft.	In.
	Black slate	..	..
950	Good splint coal	2	..
	Shale	..	..
	Soft black shale	7	..
	Slaty sandstone	..	..

Just beyond on the left of the branch 10 feet higher is a 10-inch coal below a massive sandstone, 960 feet A. T.

About one and a fourth miles up on the left of the fork on the hillside on the left of a little drain on the land of John Golf, a coal has been opened, but the opening is now caved. According to Mr. Sam Patton the following section was obtained:

	DEAN COAL; UPPER BED. JOHN GOLF LAND.	Ft.	In.
	Massive sandstone	..	..
	Coal	..	9
	Shale	..	3
1045	Coal	2	..

About 200 yards beyond there is a left hand branch and on the right 50 yards up there is another opening on the Sam Patton land. The coal was 3 feet thick and the elevation about 965. This is the Whitesburg coal.

Road fork of Little Caney creek.—Two hundred yards up Road fork from the mouth of Rube Patrick fork, thirty yards up a right drain coal (the Whitesburg?) is exposed on the left side on Taylor and Crate land as follows:

		Ft.	In.
	Slaty sandstone	..	..
	Black slate	..	6
	Coal, bituminous	1	2
	Cannel coal	..	2
983	Coal	1	8
	Fine-grained (ganister) sandstone	2	..

Sam Patton opening.—One half mile up Road fork immediately to the left of the fork is a caved opening on Sam Patton's land, said to have shown 30 inches of coal (the Whitesburg?) and to have a slate roof (983 feet A. T.)

About one mile and a quarter up the Road fork just before the road takes up the hill there is a small hollow on the left a short distance up which there has been a coal prospected beneath a sandstone (base of coal 1078 feet A. T) similar to the Haddix coal. Further up this left hollow, about 40 yards, is a still higher coal, the Leatherwood, which shows as follows on outcrop:

	LEATHERWOOD COAL.	Ft.	In.
	Massive sandstone	..	..
	Gray shale	..	..
1128	Coal, semi-cannel	1	11

About 50 yards up the Road Fork from this left hand hollow, on the right of the fork, immediately up on the hillside the Haddix coal has been prospected which according to Mr. John McDaniels showed the thickness given below:

	HADDIX COAL.	Ft	In.
	Slaty sandstone	..	..
	Slate	..	6
	Coal and rash	..	6
	Gray shale	1	..
1078	Good splint coal	1	6

Winn fork of Little Caney creek.—About one mile and a fourth up the fork immediately to the left a small entry has been driven into the Whitesburg coal which shows the following section:

	WHITESBURG COAL.	Ft.	In.
	Slaty sandstone	..	..
	Slate, thin scale	..	..
	Coal	..	5
	Rash 1½ inches to	..	1
983	Coal with two or three thin rash partings, which are not persistent.	2	8
	Shale	..	..

This coal dips west-northwest, less than 3 degrees.

About forty yards further up the fork there is a little drain on the left near the house in which Dave McDaniels lives, and on the left of this drain on the hillside at the root of a blown down tree, the Haddix coal is exposed (1068 feet A. T.).

	Combined Section on Little Caney Creek.	Ft.	In.
1385	Covered to top of ridge	35	..
	Black slate	..	..
1340	Place of Flag coal?	..	..
	Covered interval	70	..
	Sandstone	..	..
1270	Place of Hazard coal?	..	..
	Covered interval	30	..
	Massive pitted sandstone	40	..
	Covered interval	70	..
	Gray shale	..	..
1128	Leatherwood coal, semi-cannel	1	11
	Massive sandstone	45	..
1078	Haddix coal with two partings about	5	..
	Sandstone	34	..
	Slate, 2 to	..	3
1040	Dean coal	4	..
	Soft black slate	5	..
	Slaty sandstone	40	..
	Shale	..	2
994	Coal	..	6
	Gray shale and slaty sandstone 5 to	8	..
	Slate	..	..
983	Whitesburg (?) coal; altitude ranges from 950 to 985; 2 ft. to	3	..
	Covered, including a calcareous, fossiliferous sandstone	83	..
900	Slate (suggestion of coal—perhaps Big-branch coal)	..	..
	Limestone	1	6
	Black slate	8	..
888	Coal, thin	..	..
	Large concretions in slate	31	..
	Sandstone slate	7	..
850	Round-bottom (?) coal	..	..
	Black shale	8	..
842	Coal, splint (Sam Patton's land)	1	6
	Slate	20	..
822	Coal	..	..
	Blue shale	8	..
	Slaty sandstone with large rounded concretions	14	..
800	Cannel coal or slate, dip 3° west-northwest	..	..
	Covered interval	6	..
794	Coal	..	..
792	Mouth of Caney creek	2	6

Big Caney creek.—A number of small coals outcrop in the creek bed, but the only opening on lower Big Caney is the Hoskins bank on the Whitesburg coal. This is about two miles up the creek, up the first little road to the right beyond the Gauge-Lambric mail trail, and on the land of the Kentucky Union Company. The bed, 57 inches thick, dips 3°, Northeast. As the opening to the entry had partly caved I was unable to safely sample the coal, which showed the following section:

	Hoskins Bank. Whitesburg Coal.	Ft.	In.
	Shale	..	..
	Rash	..	1
	Rock	..	1
	Coal	..	4
	Rash	..	½
	Coal	..	2½
	Rash	..	½
	Coal	2	4
	Rash	..	½
962	Coal	1	7

Other openings have been made on Jim branch which is on the left 5½ miles up Caney on the left of the creek but two miles further up; in both instances the Whitesburg coal has been opened on the Kentucky Union Co.'s land.

Near the head of the creek, Prof. Crandall obtained the following section of a coal probably the Haddix a short distance beneath a sandstone:

	Haddix (?) Coal.	Ft.	In.
	Coal	1	..
	Shale	2	3
	Coal	1	8
	Shale	4	..
	Coal	1	..
	Shale	1	6
	Coal	2	9

Quicksand Creek above Gauge.—One-half mile above Guage, on the ridge one-fourth mile to the left of Quicksand is the Floyd Craft entry on the Haddix coal (68¼ inches thick). I sampled this coal for analysis (15 feet from the mouth of the entry). See Analysis 3515. The section was as follows:

	HADDIX COAL. FLOYD CRAFT ENTRY.	Ft.	In.
	Laminated sandstone	..	..
	Slate	..	6
	Coal	..	1½
	Gray slate 0 to	..	7
	Splint coal	1	7
	Shale	..	7½
	Coal, soft, with a little "sulphur"	..	4½
	Gray shale	1	1¾
1043	Coal, excellent splint	1	3
	Gray shale and interval	20	..
	Massive sandstone and covered	50	..
973	Bench	..	..

One-fourth mile further up the creek, one half mile to the left is the Adam Craft opening, which gave the following outcrop section of the Haddix bed:

	HADDIX COAL. ADAM CRAFT'S.	Ft.	In.
	Heavy slate	..	..
	Thin slate	..	..
	Coal, irregular	..	1
	Slate	..	7
	Coal	2	1
	Shale	..	9¾
	Coal	..	4
	Shale	1	3¾
1088	Coal, estimated	1	3
	Covered	..	..

Following is a section obtained at Rizner trail point, three-fourths of a mile above Caney creek and on the right of Quicksand creek:

	Rizner Trail Section.	Ft.	In.
1311	Covered interval to top of ridge	16	..
	Massive sandstone partly covered	22	..
1283	Place of Hazard coal?	..	..
	Covered interval	14	..
	Massive sandstone	10	..
	Covered interval	22	..
	Massive sandstone	5	..
	Covered interval	29	..
	Massive sandstone	28	..
	Doubtful interval	..	..
	Soft massive sandstone	16	..
	Doubtful interval	..	..
	Soft massive sandstone	72	..
1076	Place of Haddix coal?	..	..
	Covered interval	9	..
	Bedded sandstone	12	..
	Covered interval	14	..
1042	Dean coal stain	..	..
	Massive sandstone, micacious at top	30	..
	Covered nterval, probably sandstone	10	..
	Massive sandstone, lower part shaly	6	..
	Covered interval	5	..
	Slaty sandstone	10	..
	Covered interval	11	..
	Slaty sandstone	..	..
964	Coal stain and covered	2	9
	Slaty sandstone containing yellow mica	3	..
	Covered interval	3	..
951	Whitesburg coal, middle of interval covered	7	..
	Covered interval	2	6
	Slaty sandstone, part massive	14	..
	Covered interval	2	..
931	Coal, exposed over	1	..
	Covered interval, includes 1 foot of sandstone	6	6
925	Coal bloom	..	..
	Covered interval	1	8
	Sandstone	2	..
922	Coal stain	..	..
	Slaty sandstone	8	..
	Covered interval, probably sandstone	6	6
904	Covered interval, probably holding the Big-branch coal	4	6
	Shale	6	..
	Limestone	1	4
	Shale	1	..
	Fossiliferous silicious limestone	..	2
	Shale; sandstone, 4 inches; and covered space	8	..
886	Shale and coal stain	1	7
	Massive sandstone	5	..
874	Covered interval includes coal stain	7	..
	Fine grained micacious sandstone with rootlets	1	5
	Black slate	5	..
867	Round-bottom coal stain	..	6

	Rizner Trail Section. (Continued).	Ft.	In.
	Gray shale	1	3
	Slaty sandstone	17	..
	Covered interval	7	..
842	Coal	..	6
	Micaceous slaty sandstone	23	..
810	Elkhorn (?) coal, solid, said to be	2	6
	Covered interval at or near base, a spring issuing from above the sandstone	21	..
795	Quicksand creek	..	..
792	Mouth of Caney creek	..	..

Incomplete Section on Shack Branch of Quicksand Creek.—On the right one-half mile up the middle fork of the branch which is one-half mile from the mouth of the branch, the following section was obtained:

	Shack Branch.	Ft.	In.
	Sandstone	3	4
	Black slate	1	3
	Ganister rock	..	2
	Black slate	..	..
1278	Hazard splint coal exposed	1	8

Up the branch one-half mile, thence up a left fork a similar distance, 30 yards up a small left drain on the right of the drain, the Haddix coal (87¼ inches thick) has been opened with the following section:

	Haddix Coal. Shack Branch.	Ft.	In
	Gray slate	6	..
	Coal	2	10
	Rash or black shale	..	5¾
	Coal said to be cannel	1	1½
	Black shale	..	11½
1098	Coal	1	10½
	Underclay	..	..
	Sandstone	..	..

Up the main branch three-fourths mile, one-fourth mile beyond the left fork, a right fork turns off, and up this 300 yards on the left of the fork the Dean and the Wilson-fork coals have been opened with the following section:

	Dean and Wilson-fork Coals.	Ft.	In.
	Dean coal	..	..
	Red flint clay about	2	10
	Coal	..	7
	Bone coal	..	2
1043	Coal a few inches cannel near top	2	..
	Slate, over	2	..
	Sandstone	20	..
	Wilson-fork coal	..	..
	Coal	..	5
	Shale	..	..
1018	Coal	..	..

The Whitesburg coal is exposed for 16 inches in the branch and this same coal is exposed up the main fork a few yards, where the following section was obtained:

	Whitesburg Coal.	Ft.	In.
	No roof	..	..
	Coal	..	8
	Shale	1	6
948	Coal	..	..
	Micaceous slaty sandstone	..	..
903	Mouth of left fork (where shanty used to stand)	..	..
803	Mouth of Shack branch	..	..

Following is a section made on Winnie branch, the first branch above Shack branch, on right side of Quicksand creek:

	Winnie Branch Section.	Ft.	In.
1253	At gap between Winnie branch and Press Howard creek	..	..
	Massive sandstone	35	..
	Covered interval	73	..
1145	Leatherwood coal	..	..
	Covered nterval	67	..
	Laminated sandstone	10	..
	Covered interval	50	..
1018	Wilson-fork (?) coal	..	..

	WINNIE BRANCH SECTION. (Continued).	Ft.	In.
	Covered interval including sandstone	50	..
968	Coal	..	..
	Slaty sandstone and slate	..	..
948	Whitesburg coal, thin exposure	..	..
	Slaty sandstone	20	..
	Slate	10	..
918	Coal	..	..
	Covered interval	20	..
898	Big-branch coal stain	..	..
	Black slate	33	..
865	Round-bottom coal	1	..
	Black slate and sandstone	47	..
818	Elkhorn (?) coal, exposed	..	5
	Covered interval	5	..
813	Mouth of Winnie branch	..	..

Holly Fork of Quicksand Creek.—Holly fork branches to the right about three miles above Gauge. Two miles up the fork on the right the Haddix coal was opened which Mr. Henry Shepherd measured as follows. (It is on what was the John Cardwell land):

	HADDIX COAL.	Ft.	In.
	Shale	..	..
	Coal	1	6
	Slate	..	3½
	Coal	1	2
	Slate	..	8½
	Coal	1	7
	Shale	..	..

Spring Fork of Quicksand Creek.—Spring Fork is on the left of and joins Quicksand Creek above Lambric about 300 yards which is seven miles above Caney creek. The altitude of the mouth is 850 feet. The chief coals of interest are those opened on Laurel branch, Hawes fork, Cloverfield branch, Brown branch and Lovely fork, although some coal has been opened still higher up on Spring fork.

Laurel Branch of Spring Fork.—This branch is on the left of the Fork. One-fourth mile up the branch and a like distance up a left fork, to the right of the latter on the land of the Breathitt Coal, Land & Iron Co., is an opening

in what is probably both beds of the Dean coal. The opening shows a thickness of 11 ft. 5¼ in. and the following section:

	Dean Coals.	Ft.	In.
	Sandstone	..	..
	Coal, contains a little pyrite	..	10¼
	Shale	..	2
	Coal, 1 foot to	1	1¾
	Rash 1¼ to	..	2
	Coal, contains a little pyrite	1	8
	Rash	..	2
	Gray shale, includes a 2-inch sandstone	2	1¾
	Coal, good soft	..	8¾
	Shale	..	4¾
	Coal, good soft	..	11¼
	Gray shale	1	¾
	Splint coal	1	2
1028	Coal, good soft	..	10
	Dark gray shale	..	..
	Massive sandstone	..	..
888	Mouth of Laurel branch	..	..

Samples for analysis were taken from the lower, middle, and upper parts of this bed. See analysis No. 3516, No. 3517, and No. 3518.

Hawes Fork of Spring Fork.—Hawes fork (altitude at mouth 895 feet), enters from the left, three and four miles above the mouth of Spring Fork. A number of coals have been opened on Hawes fork, chief among which are those on the Betts Mann and the Poplar forks.

Betts Mann Fork of Hawes Fork.—This is a left branch. Some coal has been raised in the branch shortly above the first house, while the Whitesburg and Wilson-fork coals have been opened on the right one-half mile up the branch and beyond the second house. The section from these coals to shortly below the mouth of Hawes is as follows:

	Betts Mann Section.	Ft.	In.
	Sandstone	..	..
	Slaty sandstone	..	3
992	Wilson-fork coal	2	4
	Slaty sandstone, about	7	..
	Slate	1	..
980	Whitesburg coal	3	4
	Massive sandstone, lower part slaty	18	..
	Softer sandstone, 2 feet 6 inches to	1	2
	Coal 0 to	..	4
	Underclay 0 to	1	..
938	Slaty sandstone	21	3
	Black slate	5	..
932	Coal 7 to	..	9
	Black slate	6	..
	Sandstone	1	..
	Black slate	2	6
	Slaty sandstone	4	6
	Slate	1	..
	Coal	1	..
	Slate	1	..
	Slaty sandstone	3	..
912	Mouth of Betts Mann fork	..	..
910	Covered interval includes a coal at 910 said to be Big-branch coal 2 ft. 6 in. thick	17	..
895	Mouth of Hawes fork	..	..
	Black slate	..	..
	Coal	..	6
	Slaty sandstone	8	..
886	Coal	1	..

The bed-sections of the Wilson-fork and Whitesburg coals of the foregoing section are as follows:

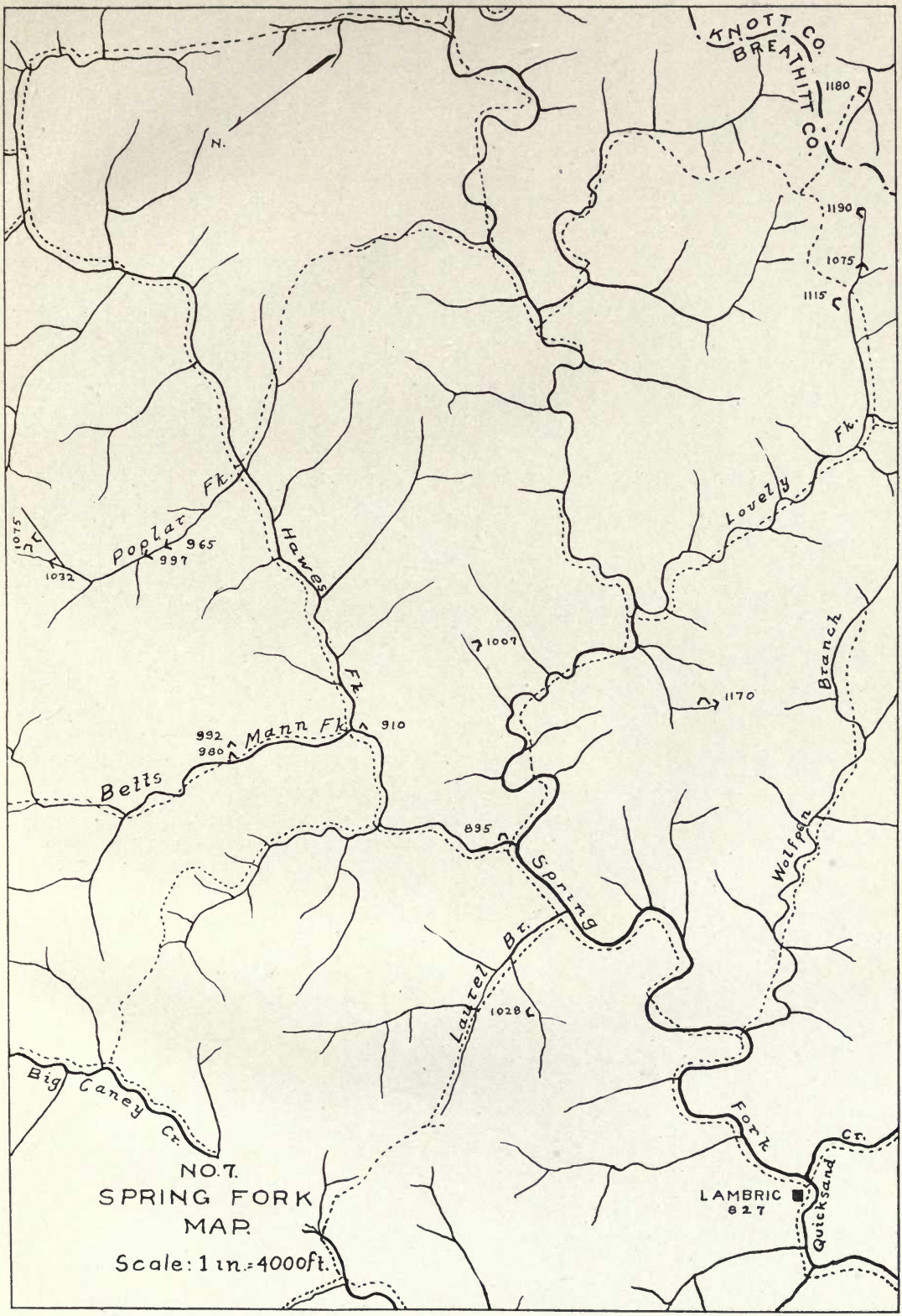
The Wilson-fork Coal.

	In.
Coal	18
Slate	3
Coal	7
	28

The Whitesburg Coal.

	In.
Coal, partly splint	8
Gray shale	4
Coal	12
Shale	4
Coal	12½
	40½

Poplar Fork of Hawes Fork.—This also is a left hand fork, and enters two miles and a half above the mouth of Hawes fork. The Haddix and Dean coals have both been


KNOTT CO.
BREATHITT CO.
1180
1190
1075
1115
N.
Fk.
Lovely
Branch
Poplat Fk.
1075
1032
965
997
Hawes
Fk.
1007
1170
992
980
Mann Fk.
910
Bells
895
Spring
Wolfpen
Laurel Br.
1028
Big Caney Cr.
Fork
Cr.
Quicksand
LAMBRIC
827
NO.7.
SPRING FORK
MAP.
Scale: 1 in.=4000ft.

opened on this fork, the Dean coal three-eighths mile above the mouth, the Haddix coal about one-eighth mile further up the fork. The section which follows shows the details as well as the position of these coals:

	Poplar Fork of Hawes.	Ft.	In.
	Sandstone	..	..
	Sandstone and slate, 2½ inch layers alternating about	2	..
1075	Haddix coal	6	10
	Gray shale	1	6
	Sandstone about	8	..
	Coa	..	6
	Sandstone slate	4	..
	Limestone	1	6
	Covered space and sandstone	25	..
	Covered interval	3	6
1032	Dean coal, soft, exposed	1	5
	Covered space and massive sandstone	32	..
997	Wilson-fork coal bloom thick, probably	3	..
	Massive sandstone, black slate, and slaty sandstone	20	..
965	Whitesburg coal with 3 ft. shale parting	5	3
	Limestone	1	..
	Covered interval	12	..
952	Mouth of Poplar fork	..	..

The bed-sections of the Haddix and Whitesburg coals of the foregoing section are as follows:

The Haddix Coal.

	In.
Splint coal	15½
Shale	15½
Coal	9
Cannel coal	15½
Gray shale	24
Coal	4
	82½

The Whitesburg Coal.

Coal	9
Shale	36
Coal	18
	63

Cloverfield Branch of Spring Fork.—This is a short left fork, three miles and a half above the mouth of Spring Fork, and is only a short distance below Wilson Tincher's house. About 100 yards up the branch on the right hill-

side is the Moss Noble entry on the Wilson-fork coal (1007 feet) which is solid soft coal 3 feet 11 inches thick. See analysis No. 3522.

John Brown Branch of Spring Fork.—This branch is on the right of the fork two miles above the mouth of Hawes fork. Three-fourths mile up the branch the Hazard coal (6 feet) has been opened, and shows the following section:

	Hazard Coal.	Ft.	In.
	Gray shale	4	..
	Coal, soft	..	6
	Slate	..	1
	Coal, soft	..	10
	Black shale	..	10
	Splint coal, fine	1	4
	Black shale	..	10
1170	Coal, splint, good, includes occasional thin pyrite concretions	1	7
	Slate	..	..
898	Mouth of John Brown branch	..	..

Analysis No. 3523 shows the quality of the coal here.

Lovely (Rob Davis) Fork of Spring Fork.—Lovely fork is about 100 yards beyond the John Brown branch, and is also on the right of Spring Fork. On Lovely and its branches I have found evidence of the Flag, Hazard, Leatherwood and Haddix coals. The Flag coal occurs just below the top of the right road fork gap where it goes over to Millstone branch of Middle Fork. One mile and a half up Lovely, up a left drain, a coal has been opened which is probably the Hazard coal. Shortly below this on the left what is probably the Leatherwood coal has been opened. Still below near the mouth of the left fork, a coal outcrops which I consider part of the Haddix bed. The details of these coals as well as their positions are shown in the following section:

	Lovely Fork Section.	Ft.	In.
1364	Top of right fork of Lovely-Millstone branch gap (hill extends higher on either side)	..	..
1354	Flag cannel coal	..	..

	LOVELY FORK SECTION. (Continued).	Ft.	In.
	Covered interval	6	..
	Sandstone, space, and sandstone	136	..
	Covered interval about	9	..
	Gray shale	6	..
1190	Hazard coal	6	8
	Black shale	15	..
	Massive sandstone	58	..
	Blue clay	..	6
1115	Leatherwood coal, splint	1	6
	Covered interval, including slate	57	..
1075	Haddix coal	2	7
	Shale	..	..
	Interval covered	59	..
	Limestone	1	plus
	Interval about	25	..
	Laminated sandstone	30	..
	Coal	..	6
	Slate	10	..
	Coal	..	8
	Slate	7	..
	Sandstone	..	6
941	Coal 1 foot 2 inches to	.. 1	8
	Slate	4	..
	Coal	..	6
933	Slate	4	..
898	Covered to mouth of Lovely fork	35	..

The bed-section of the Hazard and Haddix coals of the foregoing section are as follows:

The Hazard Coal.

	In.
Coal	11
Black shale, 1 to	2
Coal	17
Shale	1¾
Soft coal	22
Cannel coal	20
Soft coal	7
	80¾

The Haddix Coal.

	In.
Coal	6
Shale	1
Coal	24
	31

Ten miles up Spring Fork, the Haddix and Wilson-fork coals show in a section made by A. R. Crandall, as follows:

	Ten Miles up Spring Fork.	Ft.	In.
	Sandstone	..	..
	Slate	..	..
1105	Haddix coal	3	7
	Slate	..	..
	Covered interval, including sandstone	75	..
1020	Wilson-fork coal	3	7
	Covered interval including sandstones	135	..
985	Creek (estimated from topographic map)	..	..

The bed-sections of the coals of the foregoing section are as follows:

The Haddix Coal.

	In.
Coal	17
Slate	10
Coal	16
	43

The Wilson-fork Coal.

	In.
Coal	31
Slate	6
Coal	6
	43

Twin Branch of Quicksand Creek.—Twin branch is on the left about two and a half miles above Lambric. Up a right hand fork of the Upper Twin, two hundred yards above the mouth of the fork on the left side, and one mile from the mouth of the branch on the land of J. M. Howard (Mr. Koemerer, present owner), Mr. Shepherd obtained the following section from the bank opened on the Haddix coal:

	Haddix Coal. Twin Branch.	Ft.	In.
	Shale	..	..
	Coal	..	11
	Bone coal	..	1½
	Coal	..	9½
	Black slate	..	4½
	Coal	1	5
	Slate	..	10
	Coal	1	8
	Gray-white shale	..	..

Horsemill Branch of Quicksand Creek.—About one mile up the branch on the left-hand side about 350 yards up a right fork of the right fork, the Haddix coal shows the following section according to Mr. Shepherd:

HADDIX COAL. HORSEMILL BRANCH.	Ft.	In.
Slate	..	..
Coal	1	8
Slate	..	3½
Coal	1	5
Slate	..	9½
Cannel	1	2
Coal	..	8

Bill Shepherd's (Sugar Camp) Branch of Quicksand Creek.—This branch is about four miles above Lambric. Three-fourths mile up the branch on the second left fork, the following section was measured by Mr. Shepherd on opening the coal (Haddix coal):

HADDIX COAL.	Ft.	In.
Sandstone	..	..
Coal	1	4
Shale	..	3¾
Coal	1	2¼
Shale	..	8½
Coal	1	9
Mixed coal and clay	..	..

Quicksand Creek, below Kates Branch.—One hundred yards below Kates branch on the right of Quicksand according to Henry Shepherd, the following section was obtained on what I consider the Dean coal:

DEAN COAL.	Ft.	In.
Sandstone	..	..
Coal	1	6½
Shale	..	8¾
Coal	..	8½
Shale	..	1
Coal	..	3

Kates Branch of Quicksand Creek.—This branch is on the left about six miles above Lambric, and just below Henry Shepherd's house. About one-fourth mile up the branch on the left the following section was obtained on an opening in the Dean coal:

	DEAN COAL. KATES BRANCH.	Ft.	In.
	Sandstone	..	..
	Coal, lower 4 inches splint, some pyrite	2	1
	Rash	..	3
	Coal	..	1
	Gray shale	..	..
1020	Coal	..	5
	Sandstone	..	..

About one-half mile up the branch at the head of the first right fork, Mr. Shepherd opened a coal with two partings one 1½ and the other 4 inches thick, which was over 5 feet thick. This coal is about 70 feet higher than that previously described, and probably represents the Haddix coal.

Head of Quicksand Drainage; Middle and Laurel Forks.

Middle Fork of Quicksand Creek.—Middle Fork (930 feet A. T. at mouth) is one of three head forks of Quicksand creek, and lies between Spring Fork on the north and Laurel Fork on the south. It intersects main Quicksand creek about one-half mile below Decoy postoffice, and eight miles and a half above Lambric, the main creek above this point being known as the Laurel Fork.

On Cabin Log branch, which is one-half mile above the mouth of Middle fork, an opening has been made on a coal said to be 3½ feet thick, the upper part of this coal contains some clay. This opening is one-half to three-fourths of a mile up, on the right of the branch.

Three-fourths of a mile from the mouth of and on the left of Middle Fork, about 350 feet up the hill on the left a bed has been opened by James Stone. It is probably the Dean coal, and it is said to be over three feet solid cannel. The cannel appears to be a good quality. The altitude is about 1040 feet.

Indian Grave (Cole) Branch of Middle Fork.—This is on the left one mile and a half from the mouth. Prof. Crandall gives the following section made by him on this branch:

	INDIAN GRAVE BRANCH.	Ft.	In.
	Covered interval to top of ridge, including some sandstone	..	..
1180	Hazard coal	..	..
	Covered space and sandstone	95	..
1085	Haddix coal in branch	..	..
	Slate, sandstone, and covered interval	85	..
1000	Bed of branch at John Stone's house	..	..

Near the mouth of Indian Grave branch well up on the ridge Mr. Henry Shepherd opened a coal on the Robert Howard land, where he obtained the following section of the Hazard coal:

HAZARD COAL. ROBERT HOWARD'S LAND.	Ft.	In.
Sandstone	..	..
Coal	..	7½
Shale	..	5½
Coal	..	11½
Cannel	..	11
Black shale	1	..
White shale	2	3½
Coal	..	10
White shale	..	2½
Coal	..	2

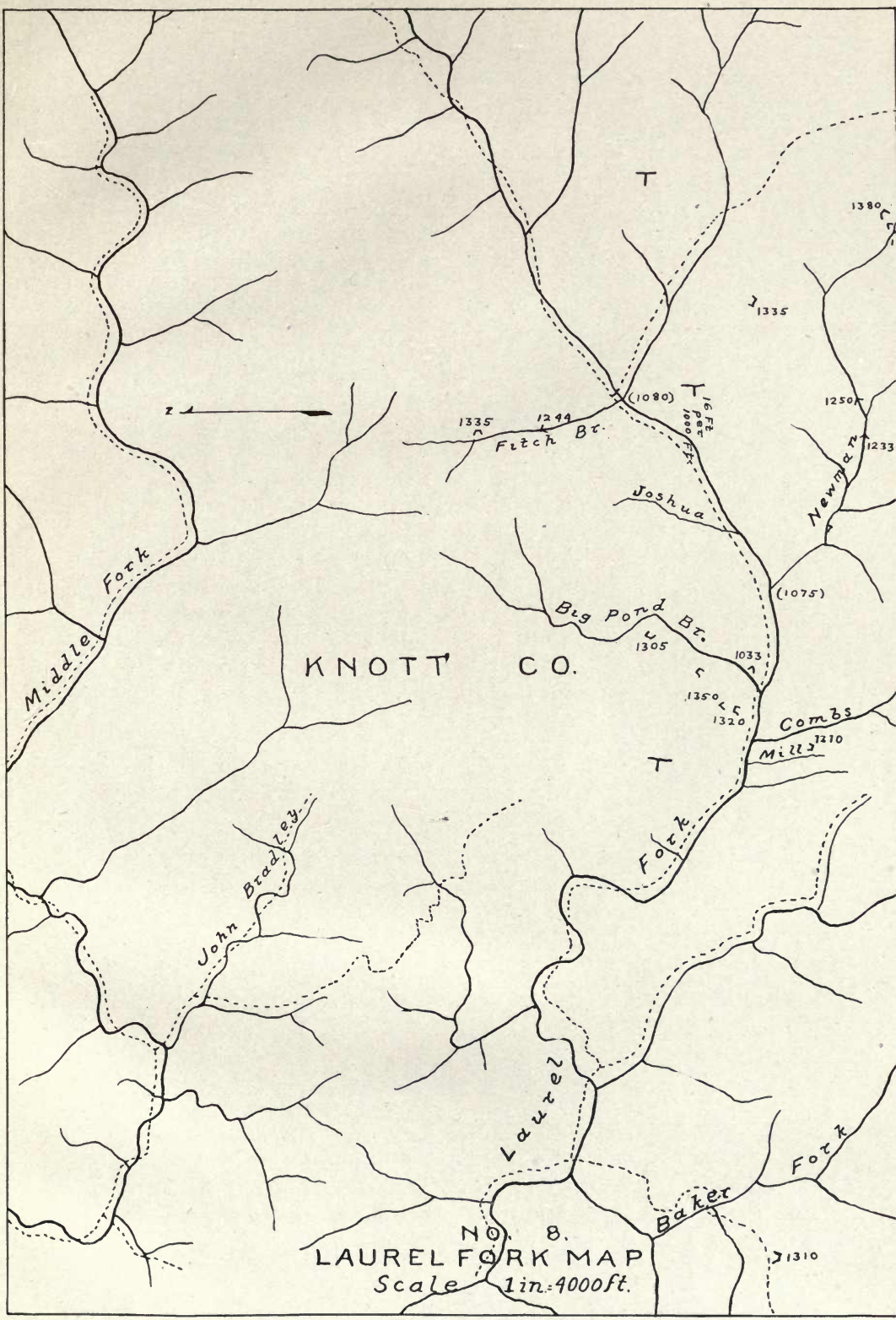
Mr. Shepherd also opened the same bed on Schoolhouse fork of Indian Grave branch on the land of the Kentucky Coal Land Co., near John Stone's house. The opening is 400 yards up the fork 100 yards to the left, Mr. Shepherd gives the following section:

	Ft.	In.
Sandstone	..	..
Coal	..	4½
Coal and clay	..	6½
Coal	1	..
Cannel	1	10
Clay	..	2
Coal	1	1½

About three miles up Middle Fork, about one-fourth mile above S. L. Stacy's house there is a coal outcropping in the creek from which much coal has been raised and which is probably the Whitesburg coal (943 feet A. T.). On the hillside below on the right up, there is evidence of at least three coals, the lowest of which is the Dean. Higher on the same ridge, but just beyond a drain which enters where the coal has been raised in the creek, a coal (now caved) was opened at an old deer lick (1175), Hazard coal. The position of these coals is shown in the following incomplete section:

	SECTION ABOVE STACY'S.	Ft.	In.
	Covered to top of ridge	..	..
	Slate	3	..
1275	Hazard coal, partings 2 and 5 inches, said to be	6	2
	Sandstone and covered interval	195	..
1080	Haddix coal, splint	..	..
	Covered interval	10	..
1060	Dean coal, with cannel at 7 ft. above	3	..
	Covered interval	..	..
	Slaty sandstone	115	..
943	Whitesburg coal	1	11
	Slaty sandstone containing rounded calcareous masses and much cross-bedded	..	..

The bed-sections of the Dean and Whitesburg coals of the foregoing section are as follows:


KNOTT CO.
Middle Fork
Fitch Br.
1335
1249
(1080)
16 Ft per 1000 Ft.
Joshua
Big Pond Br.
1305
1033
(1075)
1350
1320
Combs
Mill
1210
Fork
John Bradley
Laurel
Baker
Fork
1380
1335
1250
1233
Newman
1310
NO. 8.
LAUREL FORK MAP
Scale 1 in. = 4000 ft.

The Dean Coal.

	In.
Coal, partly cannel	..
Covered interval	84
Fine bituminous coal	36
	120

The Whitesburg Coal.

	In.
Coal	6
Shale	1
Coal	6
Shale	2
Coal	8
	23

Near the head of Middle Fork in a left drain of the Knob Bottom branch, a coal has been opened 4 feet 8 inches thick. Another bed 4 feet 9 inches thick has been opened fully 400 feet higher in the head of the Fork just over from Salt Lick. Some openings were made in the main head of Middle Fork on the old John Connely farm. I tried to find the openings previously mentioned in this paragraph but without success. I was told about them by Mr. John McDaniel and Mr. Leck Connelly who made the openings.

Laurel Fork of Quicksand Creek.—This is in fact the main creek above where Middle Fork enters Quicksand. Altitude at the mouth of the Fork 930 feet.

Old House Branch of Laurel Fork.—Two miles above the mouth of Laurel on the right is the Old House branch, one half mile up on the right of which an opening has been made on the Haddix coal.

Baker Fork of Laurel Fork.—Six miles above the mouth of Laurel Fork, one mile up Baker and three-fourths of a mile up the right fork an opening on the Haddix coal (66 inches) has been made, which was caved when I visited it, but Prof. Crandall has kindly supplied the following section of this coal:

	HADDIX COAL. BAKER FORK.	Ft.	In.
	Sandstone	..	..
	Coal	..	11
	Slate	..	2
	Coal	2	1
	Slate	..	9
1310	Coal	1	7
	Interval covered	..	..
	Sandstone	..	..
1000	Laurel Fork	..	..

The same coal has been opened three-fourths of a mile up the main fork of Baker fork. About two miles from the mouth up a right drain one-half mile a coal 22 inches thick has been opened.

Laurel Fork above Baker Fork.—On the Ben Smith farm (owned by the Kentucky Coal Land Co., R. D. Baker, Mgr.), the following section was obtained of the lower bed of the Dean coal. This is on the right ridge one mile and three-fourths above Baker and immediately beyond Mill drain.

	LOWER DEAN COAL. BEN SMITH FARM.	Ft.	In.
	Slate	..	..
	Coal	1	..
	Shale	..	4
	Coal	1	7½
	Gray shale	..	11
1310	Splint coal	2	6
1005	Mouth of Baker fork	..	..

On the left ridge about a mile further up the Fork, openings have been made on Andy Shepherd's land but were caved at the time of my visit. The altitude and approximate section are as follows:

	ON A. SHEPHERD'S LAND.	Ft.	In.
1350	Haddix bloom of coal	..	..
	Sandy slate	26	..
	Hard sandstone	1	3
1320	Upper Dean coal	3	..

What is probably the Dean coal was opened about a half-mile above Shepherd's in the same ridge on Wilson Handshoe's land just below the mouth of Little Pond branch.

Big Pond Branch of Laurel Fork.—This is about a mile above Andy Shepherd's house. About three-eighths of a mile up the branch, a hundred yards to the left of the house an opening has been made on the Dean coal, which together with some lower coals are given in the following section:

	SECTION OF BIG POND BRANCH OF LAUREL FORK.	Ft.	In.
	Slate	7	..
1305	Dean coal, lower bed	3	..
	Covered interval	235	..
1070	Limestone in slate	2	..
1068	Coal	..	2
	Slate	8	..
1060	Coal	..	..
	Covered interval	27	..
1033	Coal raised	..	..
1030	Slaty sandstone to mouth of branch	3	..

Following is the bed-section of the Dean coal (lower bed) shown in the foregoing:

	In.
Splint coal	15
Shale	4
Solid splint coal	36
	55

Newman Branch of Laurel Fork.—Newman is fully eleven miles from the mouth of the Fork. A very good section was obtained including the Flag cool near the top.

	NEWMAN BRANCH SECTION.	Ft.	In.
1507	Top of hill at road	..	..
	Covered interval	..	..
	Massive sandstone	24	6
	Gray slate	10	..
1470	Flag cannel coal	2	6
	Blue slate and massive pitted sandstone	35	..
	Covered interval	42	..
	Slate (roof poor)	8	..
	Black slate	..	4
1380	Haddix (?) coal	4	8
	Covered interval	25	..
1355	Dean coal; upper bed	..	..
	Covered interval	49	..
	Slaty sandstone and covered space	56	..
1250	Wilson-fork coal, probably	..	..
	Sandstone	10	..
	Coal	..	6
	Underclay	..	..
	Sandstone	7	..
1233	Whitesburg coal	..	..
	Massive sandstone	27	..
	Beautiful sandstone slate	40	..
	Slate	5	..
	Slaty sandstone	23	..
	Gray slate with large limestone concretions	12	..
1125	Coal about	1	..
	Slaty sandstone, cross-bedded, weathers into rounded masses	42	..
	Slate	5	..
1075	Mouth of Newman branch	..	..

The bed-section of the Haddix coal shown in the foregoing section is as follows:

	In.
Soft coal	9¾
Black slate	8
Soft coal	15
Gray shale	12½
Splint coal	11
	56¼

Fitch Branch of Laurel Fork.—This is about one-half mile above Newman, but on the left of the creek, two miles and a half below the extreme head. The strata have risen coming eastward from the head of South Quicksand, about

three hundred feet. The Dean coal is the chief coal prospected on the upper part of Laurel Fork. The following section shows the coals exposed on Fitch branch:

	Fitch Branch Section.	Ft.	In.
	Covered to top of ridge	..	..
1335	Dean coal; lower bed	6	10
	Slaty sandstone	14	1
	Shale	..	..
	Coal	..	8
	Underclay	..	..
	Covered interval	15	..
	Massive sandstone	25	..
1275	Wilson-fork coal, probably, at heavy chalybeate seep	..	..
	Covered interval including slate	35	..
1244	Whitesburg coal, good soft block, more than (exposed)	1	3
	Covered interval	4	..
	Massive sandstone, mainly exposed	60	..
	Slate	6	..
1174	Probably coal	..	..
	Slaty sandstone	19	..
	Slate	15	..
	Sandstone, partly slaty	20	..
	Gray slate with concretions and limestone boulders	15	..
	Massive, micaceous, slaty coal-bearing sandstone	25	..
1080	Mouth of Fitch branch	..	..

Following is the bed-section of the Dean bed of the foregoing:

	In.
Good splint coal, said to measure	57
Shale	12
Soft block coal	13
	82

One-half mile beyond the mouth of Fitch branch on a point of the right ridge below Alvin Patrick's house an opening (now caved) was made on the Dean coal (1355 feet A. T.). There are two or three other openings on the main head of Laurel.

Part III. Analyses of Some Quicksand Coals.

While the number of analyses and tests on coals of this region presented below are few, sufficient is gathered to reach some general idea of their uses and quality. Nearly all of the beds supply coal suitable for steam and producer gas purposes. Some parts of the Dean and Haddix beds are suitable either for by-product coke or illuminating gas, and some sections of the Whitesburg, Dean, Haddix, Hazard, and Hindman beds are good coking coals. The Whitesburg, Wilson-fork, Haddix and Flag beds afford excellent cannels for domestic purposes while nearly all the beds would supply first class splint coal for the same purpose. The quality of all the coals could be greatly improved by washing.

The high ash content of many of the coals is explained both by the inclusion of thin partings and the fact that nearly all were sampled at or near the outcrop, weathering of the coal having decreased at such points the volatile constituents and increased greatly the percentage of ash. The low sulphur content in all the coals except 3518 and 3523 is especially notable and favorable. Unfortunately, circumstances prevented obtention of calorimeter and other practical tests or ultimate analyses of these coals, so that the value must be judged from the proximate analyses only.

For steam and producer gas purposes all of the coals, excepting the cannels Nos. A., B., and 3519, are satisfactory. Nos. 2530, 3512, and 3521 probably fill all requirements for either by-product coke or illuminating gas. For domestic use, any of the coals excepting the three last mentioned will answer, while the cannels Nos. A., B., and 3519 are especially desirable for this purpose. These cannels are unusually high grade, ranging from 53 to 66 per cent. volatile matter, with only 3 to 10.5 per cent. ash.

Nos. 2530, 2531, and A, were analyzed by Dr. R. Peter, the first two having been collected by Mr. James M. Hodge, and the third by Mr. Charles Hendrie. The latter also collected sample B, which was analyzed by

Prof. Thos. Eggleston, of Columbia University. Nos. 3510 to 3523 inclusive were analyzed by the Survey chemist, Mr. J. H. McHargue, and were collected by the writer. Owing to the fact that they were collected in canvas bags and that almost one year and a half elapsed after they were collected before they were analyzed, some error exists on account of loss of volatile constituents, but as the coals were all necessarily collected from near or at the outcrop, this error is probably small. The samples are all from Breathitt county.

Analyses.

No. 3510. Partly splint from Press Howard camps, South Quicksand Creek. The Haddix coal.

No. B. Cannel section of bed only. Joe Little land near mouth of main Quicksand but on North Fork of Kentucky river. Whitesburg bed.

No. A. Cannel section of bed only. Henry Williams land, Stacy branch of South Quicksand Creek. Wilson-fork coal.

No. 2530. All seams as far as possible exclusive of partings. Fairly solid outcrop but weathered. Russell branch of Troublesome Creek, just over the ridge from the head of Leatherwood branch of South Quicksand Creek. Haddix coal bed.

No. 2531. All coal inclusive of some foreign matter; badly weathered and soft outcrop. Splint coal. Locality same as 2530 except higher in ridge. Hazard coal.

Number	3510	B.	A.	2530	2531
Moisture	1.73	0.10	....	3.80	4.20
Volatile comb. matter	39.62	62.42	66.28	35.60	32.40
Fixed carbon	48.00	31.48	29.73	54.80	52.26
Ash	10.65	6.00	3.64	5.80	11.14
Total	100.00	100.00	100.00	100.00	100.00
Sulphur	1.39	0.97	....	0.88	0.85
Coke	58.65	37.48	33.37	60.60	63.40
Specific Gravity	1.308	....	....	1.345	1.426
Color of ash	Yellow	Red-brown	....	Salmon	Light gray
Character of coke	....	Dense	....	Dense	Dense
Thickness of coal sampled	45 in.	21 in.	21 in.	58 in.	62 in.
Total coal	45 in.	28 in.	45 in.	58 in.	62 in.
Bed	Haddix	Whitesb'rg	Wilson-fork	Haddix	Hazard

No. 3511. Whitesburg coal. Pearl Back land, on Meatscaffold branch of Quicksand Creek.

No. 3512. Upper bed of Dean coal, R. L. Back land, Calhoun branch of Quicksand Creek.

No. 3513. Semi-splint coal, Sam Patton land, Rube Patrick fork of Little Caney creek of Quicksand Creek. Whitesburg coal.

No. 3514. Splint coal inclusive of thin bone coal parting. Sam Patton land, Rube Patrick fork of Little Caney creek of Quicksand Creek. Dean coal.

No. 3515. Floyd Craft entry, short distance above Gauge on the left of Quicksand Creek. Haddix coal.

Number	3511	3512	3513	3514	3515
Moisture	2.04	2.24	1.38	1.79	1.80
Volatile comb. matter	39.09	37.62	35.19	33.40	38.22
Fixed carbon	52.38	53.26	54.08	45.66	50.26
Ash	6.49	6.88	9.35	19.15	9.72
Total	100.00	100.00	100.00	100.00	100.00
Sulphur	.88	.59	.72	1.10	1.28
Coke	58.87	60.14	63.43	64.81	59.98
Spec. Gravity	1.25	1 285	1.33	1.393	1 282
Color of ash	Brown	Brown	Brown	Reddish	Brown
Character of coke	Porous & firm	Dense	Dense	Dense	Small cells Dense
Thickness of coal sampled	36.5 in.	24 in.	33 in.	48 in.	46.5 in.
Total coal	36.5 in.	50 in.	33 in.	48 in.	46.5 in.
Bed	Whitesburg	Dean	Whitesburg	Dean	Haddix

No. 3516. Dean seam. Coal in three beds with two heavy partings, total aggregating 11 feet thick. Sample of basal bed. Opening on Laurel branch of Hawes fork of Spring Fork of Quicksand Creek.

3517. Middle bed at same opening as No. 3516. Dean seam.

3518. Upper bed at same opening as No. 3516. Dean seam.

3519. Haddix coal in four beds with two partings, total aggregating about 7 feet, inclusive of 39½ inches of shale. Sample from upper bed, splint coal. Poplar fork of Hawes fork of Spring Fork of Quicksand Creek.

3520. Haddix coal. Common coal of middle bed, same opening as 3519.

Number	3516	3517	3518	3519	3520
Moisture	1.98	1.74	1.51	0.68	1.49
Volatile comb. matter	39.26	37.38	40.24	53.09	37.02
Fixed carbon	54.96	49.26	43.46	35.73	52.20
Ash	3.80	11.62	14.79	10.50	9.29
Total	100.00	100.00	100.00	100.00	100.00

Sulphur	0.60	0.68	3.82	1.53	0.64
Coke	58.73	60.88	58.25	46.23	61.49
Spec. Gravity	1.282	1.33	1.436	1.416	1.33
Color of ash	Reddish	Brown	Purple	Reddish	Brown
Character of coke	Porous & friable	Porous & friable	Dense	Dense	Dense & friable
Thickness of coal sampled	24 in.	20 in.	50 in.	15.5 in.	9.5 in.
Total coal	94 in.	94 in.	94 in.	40.5 in.	40.5 in.
Bed	Dean	Dean	Dean	Haddix	Haddix

No. 3521. Haddix coal, lower bed, same opening as No. 3519.

No. 3522. Wilson-fork coal, Solid soft coal, Moss Noble land, Cloverfield branch, of Spring Fork of Quicksand Creek.

No. 3523. Hazard coal. Partly soft and partly splint coal. John Brown branch of Spring Fork of Quicksand Creek.

Number	3521	3522	3523
Moisture	1.97	1.75	1.73
Volatile comb. matter	36.09	37.59	39.55
Fixed carbon	54.97	52.26	49.97
Ash	6.97	8.40	8.75
Total	100.00	100.00	100.00

Sulphur	0.65	0.70	2.49
Coke	61.94	60.66	58.72
Spec. Gravity	1.316	1.316	1.305
Color of ash	Gray	Brown	Brown
Character of coke	Dense	Pores small Dense	Dense
Thickness of coal sampled	15.5 in.	45 in.	69 in.
Total coal	40.5 in.	45 in.	69 in.
Bed	Haddix	Wilson-fork	Hazard

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