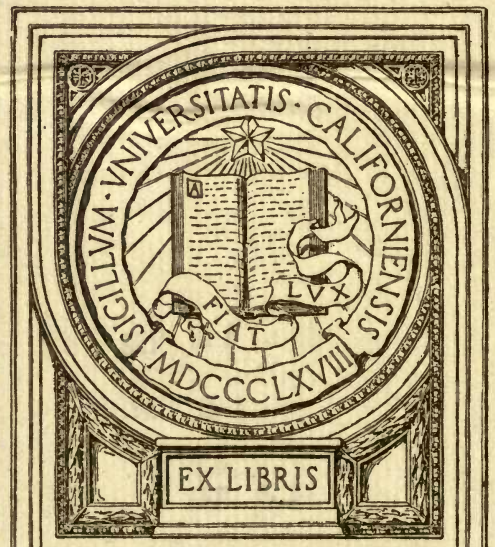

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CONTENTS

THE COALS OF GOOSE CREEK AND ITS TRIBUTARIES

BY

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THE COALS OF GOOSE CREEK AND ITS TRIBUTARIES.

This report follows a recent examination in detail of practically all coal openings which were open to inspection on Goose creek and its tributaries in Clay and Knox counties.

A general review of the field is first presented, after which follow details of the coal openings visited, including correlations where practicable, and other comments as they appear pertinent.

The accompanying map gives the principal streams as recently surveyed by the State Geological Survey, the location and altitude above tide of most of the coal openings visited and of some of the principal points along Goose creek and Collins fork, the latter as determined by lines of levels by the same survey. With these levels for use as a base, heights of coal openings were determined by barometer, and are considered sufficiently accurate for use in this report, being much more so than when reliance had to be placed on topographical contours for basic heights.

The topography of the basin, as elsewhere in this coal field consists of narrow valleys enclosed by steep ridges with sharp summits, the hills varying in height generally from 400 to 800 feet above the valleys, the highest being in Kentucky ridge at the head of the creek. A reduction of average height and steepness from the east toward the west seems to have resulted from more rapid weathering westward, due to replacement of sandstone by shales in that direction.

The measures exposed above drainage include nearly 200 feet of the measures below the Manchester coal, on Little Goose creek, and probably about 1,000 feet of strata above the same coal on the upper part of Goose creek, the highest part being exposed in Kentucky ridge.

Though many of the streams have had their course determined by the dip of strata along them, such is not the case with many others. The prevailing dip in the section south from Manchester to Hammond fork of Collins fork and to Mill creek is southeastward, but the

whole region is greatly diversified with irregularities both in direction and amount of dip, making especially careful examination necessary for correct correlation of strata. The dip is generally very slight, rarely exceeding 3% and then only for very short distances.

The measures below the Manchester coal have normally a hard sandstone near the top with soft shales overlying that. Cliffs are formed where the streams break through this sandstone, and broad benches or even plateaus are prominent above them.

The sandstone under the Fire-clay coal, which, on streams northeast from Goose creek, is hard and cliff-forming in narrow ravines where the streams have but lately broken through it, like the hard sandstones under the Manchester coal, is softer on Goose creek waters and its identity therefore is much less easily established excepting through the coal beds of the locality.

The sandstone between the Haddix and Hazard beds retains its propensity for cliff-making, but in general is too closely associated with other hard sandstones for identification. In a number of places, however, the flatter topography immediately above it serves as an excellent guide in that respect. On the whole the sandstones afford little aid to correlation, and reliance for that must be based on the coal beds.

The principal coal beds of the region are given in descending order in the following general section, with the intervals between them as approximately ascertained:

Hindman Coal Bed.
Interval 100 to 150 feet.
Flag Coal Bed.
Interval 40 to 80 feet.
Hazard Coal Bed.
Interval 50 to 60 feet.
Haddix Coal Bed.
Interval 160 to 190 feet.
Fire-clay Coal Bed.
Interval 30 to 60 feet.
Whitesburg Coal Bed.
Interval 250 feet.
Howard Coal Bed.
Interval 250 feet.
Manchester Coal Bed.

There is above the Hindman bed (probably about 50 feet) another coal which may become of importance about the head of Goose creek, but as yet neither that bed nor the Hindman has been positively identified in the region covered by this report; the areas of both, large enough to consider workable, are confined to the high ridges of Mill creek and the streams above it.

The Flag Coal Bed, with good areas extending considerably farther north and west, is of variable thickness and quality, notably in part cannel coal. The few openings where the coal could be seen to be of good thickness were too high in the hill to be attractive, but it is quite possible that the bed may have good areas of thick coal not yet discovered.

The Hazard Coal Bed has fewer openings now uncovered than the Flag bed, and those that have been abandoned indicate generally a poor bed. The approximate location of the bed is often shown by the flatter topography, and usually at such places a point can be found where the bed may be opened with little difficulty.

The Haddix Bed seems to be the most valuable of the higher ones, not only because of larger area, but apparently also because of usually workable, though variable, thickness. Its height in the series of strata renders it improbable that workable areas of the bed will be found farther north than the mouth of Otter creek.

The Fire-clay Coal Bed (and its rider) where fully identified are not of workable thickness, but a bed with 3 to 4 feet of coal near the hill-tops at the head of Buzzard creek and on Hammond fork, with some good areas there, is tentatively ascribed to the Fire-clay coal horizon. Also, with some doubt as to correlation, is the 4-foot coal at the main head of Goose creek at the base of Kentucky ridge.

The Whitesburg Bed, though found at a number of places, gives no satisfactory coal.

THE HOWARD BED, so called from the name of the owner of the best known entry into it on Goose creek, has good area of workable thickness between Lockhard and Otter creeks notwithstanding a split in it south of Martins creek. It appears to be at its best in the vicinity of Goose Rock Postoffice, and is found workable on lower Collins fork and Buzzard creek, but is split into rather thin parts elsewhere, excepting on Beech creek, near its head, where an apparently unimportant thickening has obtained.

About 100 feet above the Manchester bed is a thin coal which seems to be persistent, seen at a number of places above Horse creek and evidenced by its bench on streams below that creek, but apparently never opened.

THE MANCHESTER BED is the only known coal of consequence on Goose creek waters from its mouth to Collins fork, excepting the probably narrowly limited area of the Howard bed on Beech creek.

The variable dips and consequent heights of openings, distance of the bed from the hard rock under it (anywhere from 1 to perhaps 30 feet), change in character of roof from shale to sandstone, and, on Kincaid branch of Little Goose creek, change in the coal itself from common bituminous to cannel coal, have led to diverse views of correlation, which required thorough detailed study to correct. Nearly all old as well as new openings were therefore visited in order to get their altitudes, and a final and, for most of the region, conclusive check was obtained by measurement of the interval up to the Fire-clay coal at points where its flint clay parting rendered its identification certain. This was done near Oneida and again above Collins fork.

The absence of any other bed of consequence within 200 feet of the Manchester bed in the vicinity of Goose creek renders correlation of the bed in outlying districts sufficiently sure.

The bed lies near creek level along Goose creek to Laurel creek, dipping quickly under the eastern tributaries and rises with those on the west. From Laurel creek to Manchester there is a gradual rise excepting for a narrow sharp depression running from the mouth of

Bowling branch to and perhaps beyond Sedral postoffice on Beech creek.

On Laurel, Island and Little Goose creeks the bed rises to from 100 to nearly 200 feet above streams and continues above them nearly to their heads. On Horse creek it runs some 30 feet above creek level to near its head, and on Collins fork, dropping below water level near its mouth, is still within easy reach to near the mouth of Whites creek. It is below water level after the first quarter mile up Goose creek above Collins fork.

The coal of this bed varies in thickness from 1 to 4½ feet, but runs generally from 2½ to 3 feet thick, with partings rare and usually in the thicker coal, which is mostly not far from the main creek and on Horse creek and close above stream level, varying very little in quality, excepting where changed to cannel coal. Eighteen analyses from samples taken from points well distributed throughout the field show the following ranges of constituents:

(Analysis of one outcrop sample, high in ash, not included.)

Moisture	from 1.07 to 2.15%
Volatile combustible matter	from 33.20 to 38 10%
Fixed carbon	from 54.60 to 59.60%
Ash	from 2.94 to 7.52%
Sulphur	from 0.47 to 2.65%

Where local preference obtains for coal from one entry rather than another it may usually be explained by difference in distance from outcrop or by clean mining rather than by inherent difference in the coal. The numerous places where coal has been stripped under shale along the hill sides argues a coal well adapted to long weathering in storage.

The Beattyville Coal Bed, which at Beattyville has been estimated to be 200 feet below the Manchester bed, is below drainage throughout this field, but if the interval remains the same the bed is close below on Little Goose creek, and may be the one found in Gray fork near its mouth. A thickening of the lower measures southward from Beattyville and a consequent increased interval is, however, more probable.

The following pages are devoted to a description in detail of the openings visited, with notes of other items which should aid in an understanding of the geology of the region.

The description is arranged in geographical sequence from Oneida, at the mouth of Goose creek to its head, each tributary and its branches on which coal was found being taken up as they are met in progress up the main creek. The terms left and right are used as when looking up stream.

Surface distances given in miles were mostly obtained from the map. Those given from Oneida and from Manchester as bases give the approximate distances following the principal bends in the creek, and are therefore in excess of the corresponding distances by road. Underground distances in yards are given as rough approximations only. Entries are called long which were carried beyond the range of the examination made.

Thickness of strata given in feet are approximations; when given in inches they may be relied upon as correct.

Altitudes, given in multiples of five, unless otherwise stated, were obtained by barometer, or, in cases of mouths of branches by interpolation from known altitudes where available and in some instances from estimation of the rates of fall of the stream into which the branches flow. Other altitudes were obtained by spirit leveling.

ONEIDA.

In Oneida, on the right of the road up Goose creek, Prof. J. A. Burns has a long entry into the Manchester bed, which, where measured 5 yards in, has 31 inches of coal under a shale roof. It is 45 feet above Goose creek and at altitude 772. About 150 yards farther west than the above, the coal is 32 inches thick 3 yards into the entry. Altitude 775.

Coal delivered at Oneida from some of the entries in the neighborhood is complained of as being slaty while from other entries it comes clean. The defect appears to be due to inclusion of slate from the roof and not to impurity of the bed itself, although there is too much

ash in the coal for a first class fuel. The following analysis of the coal, 33 inches thick, from an entry on Goose creek near Oneida, obtained from a private source, shows this, as well as a percentage of sulphur unusually high for this coal:

Manchester Bed.

Moisture	1.07
Volatile combustible matter	36.51
Fixed carbon	55.82
Ash	6.60
	100.00
Sulphur	2.65

A quarter-mile farther up the road, on the right, ⅛ mile up a right branch, Arch Roberts has 27 inches of coal under 10 feet of shale, the coal being measured 4 yards in a long entry. Altitude, as obtained, 790.

LICK BRANCH.

On the right, ½ mile from Oneida.

On the left, ½ mile up the branch, 10 feet above it, is a closed entry at altitude 785.

SHARPER BRANCH.

On the right, 1 mile from Oneida.

In the branch, ¼ mile up it, is a pit giving about 2½ feet of coal at altitude 770.

On a left branch of Goose creek, 1⅜ miles from Oneida, on the right, ⅛ mile up the branch, Squire Hensley has, under 10 feet of shale, coal varying from 27 to 30 inches in thickness at 3 yards into the entry. Its altitude is 765.

On the right of Goose creek and of the road, 1½ miles from Oneida, G. W. Hyden has an entry with coal 28 inches thick 2 yards in. Altitude 760. On the coal is 5 feet of shale and 10 feet above that is 20 feet of sandstone.

FURNACE BRANCH.

On the right, 2½ miles from Oneida. Altitude of mouth, 730.

A quarter-mile up this branch the Manchester coal has been taken from a pit in the branch at altitude 750. The top of the first cliff above the coal by the mouth of the branch is at altitude 835. The top of a second cliff, 965.

LAUREL BRANCH.

On the left, 3¼ miles from Oneida. Altitude of mouth, 735. The top of the first cliff above the Manchester coal appears to be about on the level of the forks of the branch, ⅜ mile up it, at altitude 805, and the Manchester coal itself beneath drainage here.

A quarter-mile up the right fork and ⅛ mile up a right hollow, William Bowling has the Fire-clay coal opened with the following section at the face of the entry, 6 yards in:

Fire-Clay Coal.

Massive sandstone	5 ft.
Coal	10″
Flint fire-clay	5″
Coal	18″

Altitude, 1225.

While from creek level the top of the first cliff above the Manchester coal seems clearly defined at the mouth of Furnace branch and along the creek on the left to the mouth of Laurel branch and up the latter, the top of the sandstone, after it is reached, shows such variation in level that measurement of altitude cannot be exact. Nevertheless it is, perhaps, as accurate as barometric observations permit, and a dip from Furnace branch to the forks of Laurel is evident.

Assuming that this dip, amounting to 30 feet as ascertained, continues to a point under the Fire-clay coal opening and allowing 15 feet additional pitch in that distance from the forks of Laurel, would put the top of the sandstone at altitude 790 and the Manchester coal,

90 feet lower, at altitude 700. The Fire-clay coal is then here about 525 feet above the Manchester coal.

On Hacker branch, a half-mile above Laurel branch, the top of the first cliff appears to be at altitude 800 at the forks of the branch, ¼ mile up it.

WILDCAT BRANCH.

On the right, 4½ miles above Oneida: Altitude of mouth, 740.

On the left, ¼ mile up and 5 feet above the branch, at altitude 755, is 5 inches of coal, which at an old opening 50 yards farther up is said to have increased to 30 inches. The exposed rocks there indicate the presence of but one bed of coal.

A half-mile up to the forks and ¼ mile up the right fork a pit in the branch is said to have yielded 30 inches of coal.

On the left fork, ¼ and ½ mile up, are pits at altitudes 785 and 805, also reported with 30 inches of coal. These give a rise up stream of 60 to 80 feet per mile. The bed is reported in the branch a mile up the left fork, of like thickness, and to continue to rise above the branch farther up. All of these are of the Manchester bed.

CONOLLEY BRANCH.

On the left, 6 miles from Oneida: Altitude of mouth, 745.

At Daniel Davidson's, ¾ mile up the branch, is 8 inches of coal at altitude 865. In the branch, ⅞ mile up, is said to be a foot of coal at altitude 915.

In the branch a mile up is about 16 inches of coal, under 4 feet of shale, at altitude 1105. These coals may be of the lower and upper splits of the Howard bed and of the Whitesburg bed.

On the right of Goose creek at low water level, 6⅞ miles from Oneida, the Manchester coal has been opened, said to be 2 feet thick, at altitude 745.

On the left, 7⅛ miles from Oneida, T. Spurlock has an entry, under good shale roof, with 24 inches of coal 10 yards in. Its altitude, 765, gives a considerable rise from the coal in the creek, but the inclination of the rocks in the creek bank opposite the mouth of Little Wildcat shows that such a dip is probable.

On the right, 7½ miles from Oneida, a closed entry at altitude 780 shows the up-stream rise of strata continuing but at a less rate. Four inches of iron ore, in shale, lies 25 feet under the coal here.

BEECH CREEK.

On the left, 8 miles above Oneida: Altitude of mouth, 752.

On the left, ⅛ mile up Beech creek, the Manchester coal shows 26 inches thick, under shale, at altitude 775.

LITTLE BEECH CREEK.

On the left one mile up.

A mile up to the forks of Little Beech, on the left ¼ mile up the right fork, F. Desarn has a 4-yard entry into 23 inches of coal, under black-jack roof, at altitude 900. The strata apparently dip but slightly from the mouth of the creek to this point, making this of the Howard bed, probably the lower split.

On the right, ¼ mile up a left branch, 4 miles up Beech creek, near Cedral postoffice, Jefferson Jones has a 5-yard entry into 41 inches of coal at branch level, altitude 935, analysis of which (No. G 3582) from my sample taken from the face, 5 yards in, is given on a following page.

The bottom 5 inches is very heavy, but is said to burn finely; that, along with nearly a foot more coal in the bottom block, becoming a poor cannel coal nearby as shown below. Eight inches from the top is 3 inches of coal inclined to be bony. The roof is shaly sandstone.

On the right, 4⅛ miles up, Thomas Gregory has a 30 yard entry into the same bed giving 40 inches of coal at the face, with 15 feet or more massive sandstone

covering. An earlier visit to the J. M. Jones adjacent opening gave the following bed section:

Shaly sandstone.
Shale ..... 2″
Coal ..... 10″
Shale ..... 2″
Coal ..... 22″
Cannel coal ..... 15″
Black slate ..... 3″
Shale ..... 6″
Altitude, 955.

Analyses of the cannel and bituminous coals made by Dr. R. Peter from my samples follow. Both give results unduly high in ash because of included mud, but the cannel sample evidently included also black slate from the bottom of the bed, to which the cannel changes by imperceptible degrees. It is evident from the appearance of the coal at the Jefferson Jones entry that but about 10 inches of the cannel should have been sampled for favorable results, but to leave the bottom 5 inches would be impracticable in mining. The high ash of the sample from the Jefferson Jones entry is undoubtedly due to the poorer quality of the lower 10 inches of the bed and to the bony coal higher up.

The recent Jefferson Jones coal analysis is given under Laboratory No. G 3582, the J. M. Jones cannel under No. 2652 and of bituminous coal under No. 2651.

	Analyses.		
Laboratory No.	G 3582.	G 2652.	G 2651.
Moisture	0.94	0.42	0 92
Volatile combustible matter	40.38	32.38	37.54
Fixed carbon	45.27	35.20	53.44
Ash	13.41	32.00	8.10
	100.00	100.00	100.00
Sulphur	3.23	6.042	1.601
Coke	rather dense	dense	spongy
Specific gravity			1.313
Color of ash	gray	brown	light brownish gray

At this locality coals were formerly found as shown below, but owing to a quite strong easterly dip showing here the intervals between them are not very reliable.

Coal	16″	1195
Coal		1140
Coal	12″	1010
Coal	47″	955
Coal	13″	910
Beech creek at Cedral		895

The lowest coal has 10 feet of shale above and below it; all the others sandstone roof.

The lower two coals are undoubtedly the two splits of the Howard bed (found on Hart branch) and the upper coal near to the Fire-clay coal bed.

From Cedral to the Hart creek gap, along the road to Manchester, benches and rock exposures both show a rapid rise, which carries the thick coal nearly to the gap level at altitude 1020. This gives a rate of rise of about 120 feet per mile southwest, while the greatest rate, nearly west must be considerably more. Below Cedral strata appear to lie nearly level.

LAUREL CREEK.

On the right, 9¼ miles from Oneida: Altitude of mouth, 756.

On the right, ½ mile up the creek, John Coldiron has a long entry into the Manchester bed, giving, under 5 feet of shale, about 28 inches of coal measured 3 yards underground. More coal is reported close below, but it was not apparent. Its altitude is 835.

On the left, ⅞ mile up, 50 yards above Skull branch, is an entry, under shale, having 41 inches of coal at the face, 25 yards in: Altitude 865. Under the fire-clay is 30 feet of sandstone, this differing from the strata under the opening next below Beech creek. Old openings, not noted, between the two make correlation unquestionable, and the rise of strata up Laurel here shown continues to the head of Rader creek.

On the right, one mile up Laurel creek, Joseph L. Hornsby has an entry into the Manchester bed with the following section at its mouth:

Shale	10 ft.
Coal	2″
Shale	2″
Coal	12″
Splint coal	34″
Black slate.	
Altitude, 855.	

At the face, 80 yards in, the coal is 41 inches thick, all fine looking block coal.

Anlyses, by Dr. Peter (No. 2650) follow of my sample, taken from 3 yards in, where the coal is 45 inches thick, with 3 inches parting 2 inches from the top, and of a sample by the Pittsburg Testing Laboratory Co., taken from where the coal is 45 inches thick without parting, as reported:

Manchester Bed.

Analyses.

	No. 2650	By P. T. L. Co.
Moisture	1.46	1.80
Volatile combustible matter	34.84	33.60
Fixed carbon	57.70	59.60
Ash	6.00	5.00
	100.00	100.00
Sulphur	0.531	1.14
Coke (spongy)	63.70	
Specific gravity	1.292	
Color of ash	nearly white.	

Dr. Peter remarked of the sample: "Apparently a good splint coal. No apparent pyrites, but some ferruginous stains; seems to be a somewhat weathered sample."

CHICKEN BRANCH.

On the left, 1¾ miles up Laurel creek: Altitude of mouth, 825.

On the left, ¾ mile up the branch, Mrs. Hounschell has a long entry at branch level, from which the following

section was obtained, the lower coal and parting being given as reliably reported:

Manchester Bed.

Shale	15 ft.
Coal	30″
Fire-clay	7″
Coal	13″

Altitude, 925.

A private analysis of a coal sample from the same bed, 30 inches thick, farther up Laurel creek is given below:

Manchester Bed.

Moisture	1.60
Volatile combustible matter	38.00
Fixed carbon	54.60
Ash	5.80
	100.00
Sulphur	1.64

On the left, 2⅛ miles up Laurel creek, James Barnett has a closed entry, at altitude 930, said to have 3 feet of coal.

ORCHARD BRANCH.

On the right, 2¼ miles up Laurel creek: Altitude of mouth 830.

On the left, ½ mile up the branch, John Howard has a closed entry into the Manchester bed at altitude 965, having apparently 2 to 2½ feet of coal.

COLLINS BRANCH.

On the right, 2⅜ miles up Laurel.

On the right fork, one mile from Laurel creek, a pit on the right of stream and road, at water level, altitude 935, gives 2 feet of coal under black slate with 20 feet of shale upon that.

On the left fork at about the same height and distance from Laurel creek are former openings now covered, all of the Manchester bed.

On the right, 2¾ miles up Laurel creek, Hannibal Morgan has a long entry at altitude 945, with coal 32 inches thick 11 yards in. Sandstone lies close below and black slate immediately above it.

At Washington Craft's, 3 miles up are two entries, one on the right at altitude 985 with about 28 inches of coal at its mouth, under 6 feet of shale; the other on the right of a left branch, at altitude 975, and 110 feet above the creek, also with shale roof.

On the right, 3¼ miles up, Daniel Baker has a long entry into this same Manchester bed with the following section, the coal face being measured 12 yards in:

Manchester Bed.

Shale	5 ft.
Black slate	6″
Coal	9″
Bone Coal	1″
Coal	17″

Altitude, 1005.

On the left, 3⅞ miles up, George Hall has a long entry with the following section at its mouth:

Manchester Bed.

Shale.	
Coal	4″
Shale	1″
Coal	31″

Altitude, 995.

FALLS BRANCH.

On the left, 4 miles up Laurel creek: Altitude of mouth, 890.

On the left, 1¼ miles up the branch, Elijah Campbell has a long entry into the Manchester bed at altitude 1020, and 25 feet above the branch. At 3 yards in the coal measures 35 inches, under shale roof.

A pit in the branch at its head, 1¾ miles up, gives the altitude of the bed there, 1055.

HOGSKIN BRANCH.

On the left, 4½ miles up Laurel.

On the left, 1¾ miles up the branch, a pit gives the Manchester bed at altitude 1085, the gap to Rader creek being at 1180.

On the left of Goose creek, 9½ miles from Oneida, an opening in the point of a hill shows the Manchester coal 26 inches thick, under 10 feet of shale, at altitude 815.

On the left, 9⅞ miles up, the bed is reported as having two seams of coal, each 2 feet thick, 4 feet apart, but the openings are now covered. No evidence having been seen of more than one bed in this vicinity it is more than likely that the current reports of two almost in contact are derived from the finding of the one bed in two adjacent places at slightly differing altitudes, a not uncommon occurrence in this region.

On the right, 10 miles from Oneida, in front of the Morgan house, the stain of the coal shows at altitude 835. Cannel coal is said to have come from a slip at 930 but no sign of coal remains there now.

On the left of a right branch, ⅛ mile up it and 11⅛ miles from Oneida, James Townsend has a 10-yard entry into the Manchester coal at altitude 890. At 4 yards in the coal is 26 inches thick; 30 feet of shale and sandstone overlie it.

On the right, 11⅜ miles from Oneida, an old opening shows the coal at altitude 855, while 30 feet below it is a bench which shows almost continuously and prominently from Laurel creek to Manchester.

JACKS CREEK.

On the right, 11¾ miles from Oneida.

On the right, ⅛ mile up the creek, the stain of the Manchester bed shows in the road at altitude 840. Thirty feet under this is an iron ore stain, corresponding with the ore under the opening next below Beech creek.

On the left, ½ mile up, are pits at altitude about 840, 20 feet above the creek.

On the left of a right branch, ½ mile up and ¼ mile up the branch, James Keith has a long entry, at altitude 845, with about 3 feet of coal. Private analysis of coal 37 inches thick, presumably from this entry gave the following results:

Manchester Bed.

Moisture	1.80
Volatile combustible matter	33.75
Fixed carbon	58.85
Ash	5.60
	100.00
Sulphur	0.80

These three Jacks creek coal altitudes show the bed nearly level in this vicinity, but those farther up show a rapid rise. On the left, 1¼ miles up, a closed entry at altitude 865 is said to have coal 28 inches thick.

On the left, 1⅞ miles up, an old stripping lies at altitude 915.

On the right, 2 miles up, is an old stripping with coal, said to be 26 inches thick, at altitude 925. Forty feet or more of shale lies on this coal, as evidenced on the road over the divide to Island creek.

The clearly defined benches along Jacks creek, 70 and 100 feet, approximately, above the coal are especially to be noted, as they appear elsewhere over it, though nowhere so distinct. Here the lower one is most prominent, but on Island creek and especially on Little Goose creek, where it becomes the principal bench, the upper one is more conspicuous.

On the right, by the road up Goose creek, 12½ miles from Oneida, and again 12¾ miles, black shale appears at altitude 785, under heavy sandstone and about 70 feet below the place of the Manchester coal as judged by the plateau-like bench formed by the sandstone at the top of the conglomerate formation.

On the left, 13⅛ miles from Oneida, an old opening into the Manchester bed shows about 70 feet above the creek, at altitude 860.

On the right, 13⅜ miles above Oneida (⅛ mile above the oil-pump station) a closed entry under 15 feet of shale is at altitude 820.

On the left, 13¾ miles from Oneida, is a long entry into the Manchester bed with coal increasing from 51 to 53 inches at 5 to 15 yards in. Water in the entry prevented following farther; the maximum is reported 56 inches. Its altitude at its mouth is 795 and it dips in going in quite rapidly to the east.

A private analysis with coal given as 54½ inches, including ½ inch of bone coal in the middle, gives results as follows: (A.)

On the left, 14 miles from Oneida is a prospect, 5 feet above the creek, with coal, by the same authority, 33 inches thick and analysis as follows: (B.)

Manchester Bed.

	A.	B.
Moisture	1.44	7.00
Volatile combustible matter	35.50	34.40
Fixed carbon	55.54	50.30
Ash	7.52	8.30
	100.00	100.00
Sulphur	0.81	0.60

Comparison of altitudes of the Manchester bed shows a quite rapid dip to this point from down stream and up also, accounting for the sharp bend in the creek here. That this dip continues eastward to Beech creek is evidenced by the fact that the Manchester coal at Cedral is at a much lower altitude, estimated about 700.

On the left, 14½ miles from Oneida, on the late N. Cotton farm, old strippings show the bed at altitude 820.

On the right, 15 miles from Oneida, a closed entry shows the bed at altitude 835. A quarter mile farther up, black shale about 70 feet under the coal emerges from the creek at altitude 775; thence to Bolling branch it shows a gradual rise.

On the left, 15⅜ miles from Oneida, at Napoleon Cotton's, a cliff by the creek gives the following section:

	Feet	
Massive sandstone	3	0″
Sandy shale	12	0″
Coal		5″
Covered	5	0″
Thin bedded sandstone to creek	5	0″

Altitude, 785.

This coal is probably about 100 feet below the Manchester bed.

BOLLING BRANCH.

On the right, 15½ mlies from Oneida: Altitude of mouth, 775.

On the left, along the road for 100 yards up this branch, black shale shows with a strong southeast dip at altitudes 825 to 840. The strata are supposed to lie in a small wave here with the crest near where the shale disappears at altitude 840.

On the right, ¼ mile up, are closed pits into the Manchester bed at altitude 885.

On the right, ½ mile up, E. B. Treadway has a 3-yard entry, under 4 feet of shale, with 35 inches of coal at its mouth: It is 10 feet higher than the branch, and at altitude 890.

On the left, 15¾ miles from Oneida, an old prospect gives the Machester bed at altitude 915. This is higher than surrounding openings into the same bed and the uplift of strata at this point gives cause for the long western bend of Goose creek to the mouth of Island creek.

ISLAND CREEK.

On the right of Goose creek, 16¼ miles from Oneida: Altitude of mouth, 780.

Black and yellow shales belonging some 20 feet under the Manchester coal cover the long spur at the

school house on the right at the mouth of the creek, the altitude there being 900. Under these is the sandstone which, particularly conspicuous on Island creek and neighboring streams and at Manchester, provides the base for a considerable plateau, the streams having cut down through it into narrow gorges, usually short and not deep.

On the left, at the ford, ½ mile up, the black shale 70 feet under the coal, appears in the road at altitude 820.

On the left, ¾ mile up the creek, ¼ mile from it, opposite the head of Needmore branch, the Manchester coal has been taken from a pit at altitude 900.

The creek forks about 1½ miles up at altitude 830.

RIGHT FORK.

On the right, ½ mile up, at David Roark's, is 6 inches of coal under 5 feet of shale and on 3 feet of rough sandstone, at altitude 895, five feet above the creek. The coal is probably an offshoot from the Manchester bed.

On the left of a right branch there, ⅛ mile up it, Mr. Roark has a new opening into the Manchester bed with coal 26 inches thick and earth cover, at altitude 945. Allowing 20 feet for dip between these two coals brings them 20 feet apart.

On the right, ¾ mile up the fork, is an old stripping at altitude 975.

On the left, 1¼ miles up, on the road to the head of Jacks creek, a closed entry gives the Manchester bed at altitude 985.

LEFT FORK.

On the left, ¾ (?) mile up, Jones and Keith have a stripping, close above the cliff sandstone, with 26 inches of coal at altitude 955, 50 feet above the creek.

On the right of Goose creek, 16¾ miles above Oneida, George Robinson has strippings into the Manchester bed at altitude 875.

On a left branch, 18¼ miles from Oneida, on the right, ⅛ mile up the branch, at the back door of Harvey

Cotton's house, is his entry into coal 23 inches thick at the face 4 yards in. Fifteen feet of shale overlie the bed, which here is at altitude 875.

HART BRANCH.

On the left, 18¾ miles from Oneida: Altitude of mouth, 790.

In Hart branch, ¼ mile up it, at the mouth of the branch heading near Manchester, the black shale under the Manchester coal shows at altitude 805.

On the same little branch, ⅛ mile up it, and in the road to Manchester, the stain of the Manchester coal is at altitude 870.

COAL HOLLOW.

On the right, ⅝ mile up Hart Branch.

On the right, ¼ mile up, a closed entry, 5 feet above the branch, gives the Manchester coal at 875.

On the right, ¾ mile up Hart branch, is a stripping of the same bed with coal 24 inches thick and altitude 865.

A slight dip up stream carries that bed to about altitude 840 at the mouth of the branch leading to Beech creek, 1½ miles up Hart branch.

On the right of that left branch, ¼ mile up it, a thin coal under 5 feet of shale has been opened at altitude 980; the lower split of the Howard bed.

On the left, ⅜ mile up this branch, Mrs. Patrick has an 8-yard entry giving the following section:

Sandstone	4 ft.
Coal	12″
Bituminous shale	3″
Coal	11″
Black slate.	
Altitude, 1020.	

The bed is said to be 3 feet thick at the face of the entry.

It is undoubtedly of the same Howard bed as the Jones entry of Beech creek, though 65 feet higher, giving a northeasterly dip of over 80 feet to the mile.

The same bed is opened on the right, 2¼ miles up Hart branch, in a 15-yard entry giving the following section, the coal measured 3 yards in:

Massive sandstone	10 ft.
Shaly sandstone	1 ft.
Coal	16″
Bituminous shale	6″
Coal	10″

Altitude, 1080.

The strata appear to lie nearly level up from the mouth of the branch to Beech creek, this coal being then here 200 to 250 feet above the Manchester coal.

On the right of Goose creek, 19 miles from Oneida, the Manchester coal has been stripped, with thickness reported 24 to 26 inches, at altitude 915.

NEEDMORE BRANCH.

On the right 19½ miles from Oneida: Altitude of mouth, 790.

On the right, ¼ mile up the branch, C. D. Lyttle has a long entry, giving 24 inches of coal, 3 yards in, under shale, at altitude 885. A ledge of sandstone 35 feet thick lies 20 feet under it, and black shale, in the road, 70 feet under, altitude 815.

On the right, ⅜ mile up, the coal has been opened at altitude 890, and again, ½ mile up, at 875.

On the left, ¾ mile up, a long entry has 27 inches of coal 5 yards in, at altitude 880.

A private analysis of coal, 30 inches thick from this branch, is reported with the following results:

Manchester Bed.

Moisture	1.50
Volatile combustible matter	34.20
Fixed carbon	57.60
Ash	6.70
	100 00
Sulphur	1.95

LITTLE GOOSE CREEK.

On the right, 20 miles from Oneida: Altitude of mouth, 792.

GREENBRIER BRANCH.

On the right, ½ mile up Little Goose creek: Altitude of mouth, 795.

On the right, a mile up this branch, is a stripping of the Manchester bed at altitude 950, and again, 1¼ miles up, the latter with 25 inches of coal under 8 feet of shale, at altitude 960.

STONE COAL BRANCH.

On the right, 2 miles up Little Goose creek: Altitude of mouth, 810.

On the left, and left of road to Manchester, ¼ mile up the branch, an old opening shows the Manchester bed at altitude 890.

On the right, ¼ mile up, is 2 feet of black shale under a sandstone ledge, as on Island creek and Needmore branch, at altitude 850. In the branch, farther up, this shale shows again, rising to altitude 860 before it disappears.

On the left, ⅜ mile up, is an old opening into the Manchester bed at altitude 910, and on the right, ½ mile up, another at the same height.

On the left, ⅝ mile up, a pit in the branch gives the bed at altitude 915. These three openings are on S. B. Caudill's land.

Benches appear on this branch about 50, 75 and 95 feet above the coal.

On the right of a right branch, by the road to Ephraim creek, ¾ mile from Little Goose creek, S. A. Asher has a 3-yard entry into the same bed, with covering differing from those heretofore given, the section being:

Manchester Bed.

Sandstone.	
Clay	1″
Shale	6″
Coal	33″

Altitude, 940.

On the left of Little Goose creek, 3⅜ miles up it, Edward Garrison has a stripping into the same bed with 15 feet of shale, much of it black, over the hidden coal. Its altitude is 910.

ROARK (OR SHED) BRANCH.

On the right, 3⅜ miles up Little Goose creek: Altitude of mouth, 830.

On the left, ¼ mile up this branch, John Garrison has a stripping on coal of the Manchester bed, 30 inches thick with 8 feet of shale, part black, exposed above the coal at altitude 950.

By the road at the mouth of the branch is shale, part black, at altitude 840 to 870. Most of this shale appears to have replaced in part the sandstone along Goose creek, a change which seems to prevail to a large extent in going westward from that stream.

RADER CREEK.

On the right of Little Goose creek, 3½ miles up it: Altitude of mouth, 830.

On the right, ¼ mile up, Mrs. Lucy Ledford has a closed pit into the Manchester bed at altitude 980.

On a left branch, ½ mile up Rader creek, on the right ¼ mile up the branch, the Cotton heirs have a long entry into the same bed, with 30 inches of coal 5 yards in, at altitude 1035.

On the right, ½ mile up the branch, the coal is also 30 inches thick at the face of a 4-yard entry, at altitude 1055.

SPICE GAP BRANCH.—On the left, 1¾ miles up Rader creek: Altitude of mouth, 925.

On the right, ½ mile up, is a long entry into the Manchester bed with 35 inches of coal 12 yards in. Its altitude is 1045.

By William Ponder's mill, on the right, 1⅞ miles up Rader creek, the same bed has 32 inches of coal at the face of a 15-yard entry at altitude 1020.

RICH HOLLOW.—On the right, 2 miles up Rader creek.

On the left, ¼ mile up the hollow, William Ponder has a long entry into the Manchester bed with 30 inches of coal 5 yards in, under 5 feet of shale. Its altitude is 1035.

On the right, at Sidell postoffice, 2½ miles up Rader creek, James M. Baker has a 12-yard entry under shale into the same bed with 30 inches of coal at the face, at altitude 1030, 50 feet above the creek.

SANDLIN BRANCH.—On the right, 3 miles up Rader creek: Altitude of mouth, 1000.

At William Sandlin's, ½ mile up the branch, and in it, under 8 feet of shale, is a pit with Manchester coal said to be 30 inches thick, altitude 1070.

At John Gibson's, 3⅜ miles up Rader creek, on the left, ¼ mile up a left branch, is the same bed opened in a pit with coal reported 2 feet thick, at altitude 1080.

On the left, at Tip Barron's mill, 4 miles up the creek, it is again reported 2 feet thick; its altitude not taken.

On the right, 4¼ miles up Rader creek, James Lewis has a pit into the same bed at altitude 1090.

On the left, by the road, 4½ miles up the creek, Noah Resner has an opening into the same bed with 22 inches of coal, at altitude 1100.

Again it is opened in a pit in the creek, at its head, 4¾ miles up, at altitude 1100.

EPHRAIM BRANCH.

On the left of Little Goose creek, 4⅛ miles up it: Altitude of mouth, 840.

WALL BRANCH.—On the right, ¾ mile up Ephraim branch.

On the right, ⅜ mile up this branch, B. J. Finley has pits into the Manchester coal, said to be 2½ to 3 feet thick, at altitude 980.

Ephraim branch forks, ½ mile up: On the left of the right fork, ¼ mile up it, by the road, is an old entry into the same bed, at altitude 980.

The bed is opened again in a pit at Linda Smallwood's, ½ mile up, and in the right fork, with a foot of coal showing when visited, and probably 1½ feet more coal which was covered with mud. Its altitude is 985.

HOOKER BRANCH.

On the left, 4⅜ miles up Little Goose creek: Altitude of mouth, 845.

At M. V. Craft's, ¾ mile up Hooker branch, the Manchester coal, under 8 feet of shale, has been opened, 26 inches thick, at altitude 1015.

At Jasper Munsey's, 1⅜ miles up Hooker branch, on the right, ⅛ mile up a left branch, the same bed is opened in a 13-yard entry, under good shale roof, with 25 inches of coal at its mouth and face, at altitude 1015.

The principal bench of this vicinity lies 105 feet over this coal, at altitude 1120, and coal is reported at altitude 1175.

Hooker branch forks 1¾ miles up; on the left nearly at its level, ⅛ mile up the left fork, the Manchester bed is opened in a pit at altitude 995.

On the head of the right fork, ¼ mile up it, the bed has been opened at altitude 1010, with yellow shale 10 feet below it.

GRAY FORK.

On the right, 6¼ miles up Little Goose creek: Altitude of mouth, 870.

From the bed of this stream, ⅛ mile up it, coal has been taken having a thickness of not more than 1½ feet, if the rock at the bottom of the hole left is the limit of thickness of the coal bed and not a parting. The coal lies at altitude 875 about 185 feet below the Manchester bed, and is below drainage everywhere else on Goose creek waters. It has about a foot of hard black slate roof.

ROGERS BRANCH.—On the right, ¼ mile up Gray fork.

On the right, at U. S. Eagle's, ¼ mile up the branch, the Manchester bed has been opened, under shale, with about 27 inches of coal, at altitude 1070.

In the road, ⅜ mile up Gray fork, is 6 inches of coal stain at altitude 900. Enclosed in sandstone it is quite likely not to be of a continuous bed.

On the right branch, ¾ mile up Gray fork, on the left, ¼ mile up the branch, George Thomas has a wet entry, under 5 feet of shale, with coal 29 inches thick at its mouth, and a second entry beside it with about 34 inches of coal. These are in the Manchester bed at altitude 1060.

TINKERS BRANCH.—On the right, 1 mile up Gray fork.

On the right, ¼ mile up the branch, Henry Hounschell has a long entry into the Manchester bed, with 31 inches of coal, at altitude 1095. A private analysis of this coal, given as 30 inches thick, is reported with the following results:

Manchester Bed.

Moisture	1.40
Volatile combustible matter	33.80
Fixed carbon	59.00
Ash	5.80
	100.00
Sulphur	0.47

DRY BRANCH.—On the right, 2 miles up Gray fork.

On the right, ¼ mile up this branch, George Potter has an entry with the following section, the coal measured at the face, 12 yards in:

Manchester Bed.

Sandstone	5 ft.
Shale	10 ft.
Coal	22″

Altitude, 1110.

At the forks, 3 miles up Gray fork, the altitude is 990.

A quarter mile up the right fork is Wells branch on the right, and a mile up the branch is Wyatt's opening,

on the left at the head of the branch. The coal here is 20 inches thick, under 8 feet of shale, at altitude 1240. Apparently this coal is somewhat over 100 feet above the Manchester bed, but there was nothing definite found in the vicinity to aid in fixing its position. It seems to correspond with thin coal found on Goose creek, ⅛ mile above Collins fork.

KINKEAD BRANCH.

On the right, 7 miles up Little Goose creek: Altitude of mouth, 890.

On the right, ¼ mile up this branch, Mrs. Nancy J. Hibbard has a long entry into the Manchester bed, under good shale roof, with coal 32 inches thick 10 yards in. Its altitude is 1060.

A half-mile up to the Road fork, and ¾ mile up it, is a right branch. In this branch, ¼ mile up it, Hopper Bolling has pits 3 feet or more deep, with cannel coal reported 4 feet thick. Blocks of the cannel 10 inches thick were seen, apparently very good in quality, but said to be explosive. It also is of the Manchester bed at altitude 1060.

On the right, 1½ miles up the Road fork, and at its level, is the Benge long entry with about 40 inches of coal, under a bad shale roof, at altitude 1110. Following is a section of the bed and analysis of the coal, not including the cannel, as obtained from a private source:

Manchester Bed.

Coal	28″
Parting	1″
Coal	6″
Cannel coal	4″

Analysis.

Moisture	2.10
Volatile combustible matter	35.45
Fixed carbon	57.21
Ash	5.24
	100.00
Sulphur	1.15

On the left of Little Goose creek, 7¼ miles up it, at Timothy Young's, on the left, ⅛ mile up a left branch, an abandonded entry gives the Manchester coal about 28 inches thick, at altitude 990.

PHILPOT FORK.

On the left of Little Goose creek, 8 miles up it: Altitude of mouth, 910.

At the head of a left branch, ⅛ mile up Philpot fork, and ⅛ mile up the branch, R. T. Hayre has a 10-yard entry into the Manchester coal, 39 inches thick half way in, at altitude 1000. The roof is of sandstone, slightly shaly, showing 10 feet thick. In about 50 feet distance the coal rises southward nearly 10 feet; a continuous rise is not apparent.

On the right, one mile up the fork, at Urban post-office, Thomas Hayre has two long entries, under 5 feet of shale, with coal 30 inches thick at the mouth of the one open to measurement. The roof, soft at the mouth, seems to be fairly hard inside. These entries are of the Manchester bed at altitude 1070, 130 feet above the fork.

On the left of a right branch, 2 miles up Philpot fork, ¼ mile up the branch, Granville Philpot has a long entry into the same bed, under shale, with 33 inches of coal at its mouth. The coal is said to vary in thickness from 30 to 36 inches. Its altitude is 1060, 80 feet above the fork.

On the left, 2½ miles up the fork, on the road to main Little Goose creek, William Longworth has an entry into the same bed, under shale, with 37 inches of coal 8 yards in, 30 inches 12 yards in, and thence to the face, 35 yards in, 33 inches. It is 25 feet above the fork, at altitude 1045.

From a private report the following is given of coal on Minton branch doubtless of the same bed:

Coal	11″
Parting	2″
Coal	32″

Analysis.

Moisture	1.32
Volatile combustible matter	37.66
Fixed carbon	55.52
Ash	5.50
	100.00
Sulphur	2.25

ROCK GAP BRANCH.

On the left of Little Goose creek, 9 miles up it: Altitude of mouth, 950.

On the left, ¼ mile up the branch, Irvine Hoskins has an 8-yard entry into the Manchester coal 32 inches thick at the face. Upon it is 5 feet of shale and black shale lies 75 feet below it. Its altitude is 1075.

Mr. Hoskins has also an abandoned entry into the same bed on the right, 9¼ miles up Little Goose creek. Altitude not taken.

BROCK BRANCH.

On the left, 9¾ miles up Little Goose creek: Altitude of mouth, 980.

The Ponder abandoned entry, on the left, ¼ mile up the branch, is said to have a maximum thickness of 36 to 38 inches.

The Fisher entry on the right, ⅜ mile up, has 25 inches of coal at its face, 8 yards in.

A new Fisher stripping on the left, ½ mile up, gives 31 inches of coal under 4 feet of shale.

These three openings are of the Manchester bed at altitude 1080.

On the right, by the road, 10¼ miles up Little Goose creek, 10 feet above it, at altitude 1015, is 5 inches of coal under 5 feet of shaly and honeycomb sandstone and upon 5 feet of fire-clay. This coal, not seen elsewhere, unless near the head of Horse creek, is probably in the place of the usual black shale 70 feet under the Manchester bed, and not continuous.

MANCHESTER.

The formation below the Manchester coal, which has been clearly apparent over much of the region from Beech creek to this point, here makes its last appearance with characteristic cliffs, though the topography above the Collins fork is somewhat indicative of it. The black shale which lies about 70 feet below its top, noted on Stone Coal branch, is cut out by sandstone in the town, its place apparently indicated by the flat upon which the principal stores are built, the courthouse being upon the top of the formation at altitude 909, 114 feet above Goose creek.

On the right, ¼ mile up the left branch with mouth at the town ford, the Lucas heirs have a long entry into the Manchester bed with coal 27 inches thick at its mouth and altitude 885.

On the left of the town branch, opposite the Webb Hotel, J. A. Webb has an abandoned opening, said to have 2 feet of coal, at altitude 910.

Other openings on this branch show it to rise regularly to an abandoned one on the right, ¾ mile up, at altitude 930, with benches on the left, somewhat indistinct, where noted, 70 feet above the coal, but plain 100 feet above it.

At the upper end of Manchester, on the left, ⅛ mile up a right branch of Goose creek, Peter Halsey has an entry into the Manchester bed, under shale, with 17 inches of coal at the face 6 yards in. Altitude 885.

TANYARD BRANCH.

On the left, ¼ mile above the center of Manchester: Altitude of mouth, 795.

On the right, ¼ mile up the branch, an old pit gives the altitude of the same bed 845.

HORSE CREEK.

On the right, 1½ miles up Goose creek from Manchester: Altitude of mouth, 800.

MUDDY GAP BRANCH.

On the right of Horse creek, ¼ mile up it: Altitude of mouth, 805.

The Manchester bed lies above the sandstone which shows along the branch near its mouth, its altitude there being about 860.

At Samuel Howe's, on the right, ¾ mile up the branch, is a 45-yard entry under black shale, with 32 inches of coal 16 yards in. The entry rises rapidly northeastward. Its altitude at the mouth is 875.

On the right, 1 mile up the branch, a long entry under black shale gives the same bed, with 24 inches of coal at its mouth, at altitude 895.

On the left, 100 yards farther up, James Hyde has a long entry into the same bed, with 29 inches of coal 6 yards in, under shale, at altitude 880.

On the right, 1¼ miles up Horse creek, is a long entry into the Manchester bed, in the point of a hill, with 28 inches of coal 8 yards in, and altitude 845.

At William Horton's, 1⅞ miles up the creek, on the right, ⅛ mile up a right branch, a stripping gives the same bed, under 10 feet of shale, 39 inches of coal, at altitude 855.

CRAWFISH BRANCH.

On the left, 2 miles up Horse creek: Altitude of mouth, 820.

On the left, ½ mile up the branch, 10 feet above it, an abandoned entry gives the Manchester bed at altitude 860, while 100 yards farther up it has been opened at altitude 880.

This sharp rise is not continuous, however, for a mile up the branch a pit in it gives the bed at altitude 875.

At 1½ miles up, on the right of a left hollow, a thin coal under brown and black shale has been opened at altitude 990, probably about 100 feet above the Manchester bed.

On the left, 2½ miles up Horse creek, Moses Lewis has a stripping of the Manchester bed about 38 inches thick, the lower half buried in mud when visited, but presumably all coal. Its altitude is 865.

On the right, 2⅝ miles up, Daniel Sibert has a 5-yard entry into the same bed with 44 inches of coal at its mouth. Altitude, 860.

PAWPAW BRANCH.

On the right, 2¾ miles up Horse creek: Altitude of mouth, 830.

On the left, ¼ mile up the branch, Thomas Sibert has a long entry into the Manchester bed with coal 37, 39 and 36 inches thick at 5, 10 and 30 yards, respectively, from the mouth. Its altitude is 880.

YAGER BRANCH.—On the right, ½ mile up Pawpaw branch. The Manchester bed has been opened by a pit in this branch, ⅜ mile up it, at altitude 890.

On the right of Pawpaw branch, a mile up it, old entries give the same bed at altitude 920. It probably goes under the branch about 1½ miles up.

On the left, 3⅛ miles up Horse creek, Frank Garrison has a stripping of the Manchester bed with 29 inches of coal (in water) to hard bottom. The bed is said to be about 4 feet thick here, and the bottom, measured too, may have been coal not removed. Its altitude is 895.

HURD BRANCH.

On the right, 3¼ miles up Horse creek: Altitude of mouth, 850.

On the right, ¼ mile up the branch, and on the left of a right hollow, E. G. Hurd has an 80-yard entry into the Manchester bed, with 26 inches of coal 3 yards in, and altitude 900.

On the right, ⅜ mile up the branch, is a long entry, nearly meeting the preceding, at altitude 910. Both are reported to have 29 inches of coal.

On the left of Horse creek, 3⅜ miles up it, James Hensley has a long entry into the same bed with 40 inches of coal 3 yards in, at altitude 880.

In a left branch, 3½ miles up Horse creek, are pits, ⅛ mile up the branch, giving the same bed at altitude 890.

WEBB BRANCH.

On the right, 3¾ miles up Horse creek: Altitude of mouth, 865.

On the right, ⅛ mile up the branch, Bates Shackelford has a 4-yard entry with Manchester coal 30 inches thick at its mouth, and altitude 930.

JOHNSON BRANCH.

On the right, 4¼ miles up Horse creek: Altitude of mouth, 885.

In the branch, ½ mile up it, are pits giving the following, approximately:

Manchester Bed.

Shale.	
Coal	5″
Clay	2″
Coal	24″

Altitude, 955.

The upper seam of coal was not exposed to measurement and the lower seam was in water. Probably the parting would run out under good cover.

HOUSE BRANCH.

On the right, 4¾ miles up Horse creek: Altitude of mouth, 900.

On the right, ⅛ mile up the branch, on the right of a right hollow, Mrs. Alice Brown has a long entry into the Manchester bed with 24 inches of coal at its mouth and altitude 935. Ten feet of shale lie on the coal, the lower foot black. Sandstone shows one foot below the coal.

On the right, ½ mile up the branch, the same bed has been opened at altitude 950.

On the left, ¾ mile up the branch, and again on the left, 100 yards farther up, the same bed has been opened by Washington Owens and James Brown, respectively, with the following sections:

Owens.

	Ft.	In.
Yellow shale	5	0
Black shale	3	0
Coal		12
Shale		6
Coal		26
Fire clay	1½ to 2	

Altitude, 980.

Brown.

	Ft.	In.
Yellow shale	7	0
Brown shale	1	0
Coal		4
Shale		3
Coal		21
Fire Clay	1½ to 2	

Altitude, 1000.

The Owens entry is given above as measured 3 yards in. At the face, 18 yards in, the bottom coal is 4 inches or more thicker. The Brown entry is given as measured at its mouth.

The two entries, seen from across the branch at different heights, appear to be in different seams of coal, but the similarity of sections proves them to be of one seam only.

On the right, 5 miles up Horse creek, in J. C. Brown's springhouse, is 14 inches of coal under 10 feet of shaly and thin-bedded sandstone at altitude 935. This is possibly of the Manchester bed, though it is probably in the place of the usual black shale 70 feet below that coal. In the latter case the Manchester bed lies on the broad bench 70 feet above the coal in the springhouse, and this bench can be traced, apparently, nearly to the coal mentioned next.

The Manchester bed shows as a stain in the road 6¼ miles up the creek, at altitude 985. Fifteen feet of shale, much of it black, lie over the coal and fifteen feet lie under it. Twenty-five feet under is the top of the hard sandstone only one foot below the coal at Mrs. Brown's on House branch.

The same bed shows again on the right of the creek and road, 6½ miles up, at altitude 1000.

PIGEON ROOST BRANCH.

On the right, 6¾ miles up Horse creek: Altitude of mouth, 950.

At the forks, ¾ mile up this branch, altitude 1000, the Manchester coal lies about 20 feet higher, on top of the sandstone cliffs which are conspicuous along the branch.

An eighth-mile up the right fork, on the right, ⅛ mile up a right branch, Mrs. Reed has a long entry into the Manchester bed, with 30 inches of coal at its mouth and 12 yards in, though the entry is in a roll. The 10 feet of cross-bedded sandstone on the coal is furrowed underneath, the furrows 6 inches deep, are filled with sandstone, which give a smooth top to the coal, but, coming down where the coal is removed, give a waving undersurface to the remaining sandstone. A foot or more of fire-clay underlies the coal, and sandstone is below that, as on House branch. The altitude of the entry is 1015.

In the left fork, ¼ mile up it, at altitude 1010, shale is exposed with a southwest dip of possibly 10 per cent, where, normally, it appears that nearly level sandstone should be. Nothing else seen in the vicinity except the roll in the Reed entry is indicative of any irregularity of the measures.

On the left, ½ mile up the left fork, James Bailey has a long entry with the following exhibit, the coal measured 2 yards in:

Manchester Bed.

Shale	3 ft.
Smooth clay sandstone	2 ft.
Black shale	1 ft.
Coal	28″

Altitude, 1035.

From the mouth of Pigeon Roost branch westward to the top of the hill on the London road the following section was obtained:

	Thickness. Feet.	Inches.	Altitude.
Summit			1220
Sandstone	65		1155
Covered	10		
Shaly sandstone	10		1135
Shale	10		1125
Shale or coal	2		
Coal stain		6	1120
Shale	15		1105
Probably sandstone	10		1095
Shale	30		1065
Mostly sandstone	45		1020
Covered	35		
Iron ore		3	985
Dark shale	10		975
Covered (Manchester coal)		5	970
Mostly shale (to creek)	20		950

The 15 feet of shale at altitude 1105, weathering rapidly, leaves a prominent bench which, if correctly traced, is at altitude 1055, 7¾ miles up the creek, giving a dip of strata southwest from Pigeon Roost branch, amounting to something like 2½ per cent. Shales in the creek at the upper point confirm this.

Following are private analyses of coal of the Manchester bed from Horse creek waters, thickness of coal being given, but location not definitely stated:

Inches of coal	30	40	43	27
Moisture	1.95	2.15	1.60	1.55
Volatile combustible matter	35.75	35.52	36.80	36.21
Fixed carbon	57.14	58.33	56.70	58.64
Ash	5.16	4.00	4.90	3.60
	100.00	100.00	100.00	100.00
Sulphur	1.01	0.94	1.18	0.82

On the left of Goose creek, about 2½ miles above Manchester, a Garrard mine gave 31 inches of coal 70 yards in. My sample from this point, analyzed by Dr. Peter, gave:

Manchester Bed—Chem. Report No. 2648.

Moisture	1.20
Volatile combustible matter	38 10
Fixed carbon	54.90
Ash	5.80
	100.00
Sulphur	1.793
Coke (spongy)	60.70
Specific gravity	1.287

"A pure-looking, pitch-black coal with very little fibrous coal and only a few specks of pyrites."

COLLINS FORK.

On the right of Goose creek, 2½ miles above Manchester: Altitude of mouth, 800.

On the right of Collins fork, ¼ mile up it, is the old Garrard mine, with coal hidden by gob to about ¼ mile in, where it is 35 inches thick; by former reports varying from 12 to 44 inches. Its altitude is 819.

Following is a private analysis of coal from this mine, where the coal is given as 36 inches thick:

Manchester Bed.

Moisture	1.60
Volatile combustible matter	37.30
Fixed carbon	58.16
Ash	2.94
	100.00
Sulphur	0.90

On the right, 1 mile up Collins fork, at the mouth of Engine branch and by the road, the Manchester coal was struck in a shaft reported 12 feet deep, making the altitude of the bed about 815. At this point the following section was obtained:

	Altitude.
Springs on shale	965
Bench (not distinct)	950
Bench (on 20 feet S. S.)	905
Black shale (2 to 3 feet)	
Fire-clay (1 foot)	865
Shale (10 feet)	855
Shaly sandstone	835
Road at shaft	815
Goose creek	805

The bench 100 feet over the coal is especially to be noted here, and the replacement by shale and shaly sandstone of hard sandstones below it seen farther down the creek. This is still more noticeable on Goose creek above Collins fork.

On a left branch, 1¾ miles up Collins fork, on the right, ⅜ mile up the branch, an old prospect shows what may possibly be 3 feet of coal or coal and partings, under 8 feet of shaly and thin-bedded sandstone, at altitude 1015. This is of the Howard bed, apparently about 240 feet above the Manchester coal.

A bench opposite the mouth of Buzzard creek, at altitude 880, marks the altitude of the Manchester bed there at about 780, or 35 feet below creek level. An old report gives it as 52 feet (below bottom land level).

BUZZARD CREEK.

On the left, 2¼ miles up Collins fork: Altitude of mouth, 815.

The light pitch of strata up Collins fork increases as the direction becomes more easterly along the lower part of Buzzard creek, the cliff sandstone forming the bench 100 feet above the Manchester coal going below drainage ¾ mile up the creek, at altitude 820.

FURNACE BRANCH (OR LITTLE BUZZARD CREEK).—On the left, 1⅜ miles up Buzzard creek: Altitude of mouth, 830.

On the left, at the head of this stream, Claiborne McCreary has openings into the Whitesburg and Fire-clay coals, the former a prospect and the latter an 8-yard entry, measured half-way in. These openings give:

Whitesburg Bed.
Altitude, 1200.

	Ft.	In.
Dark shale	8	0
Coal		2
Black shale		2
Coal		18

Fire-clay Coal.
Altitude, 1300.

	Ft.	In.
Hard sandstone	12	0
Shale	2	0
Coal		2
Shale		1
Coal		3
Shale		1
Coal		9
Clay		1
Coal		15

These correlations are based on an entry at altitude 890 into the Howard bed on Schoolhouse branch of main Goose creek. Reported coal at altitude 1020 in a well at Mr. McCreary's house is of the thin bed 100 feet above the Howard bed. A rise of strata from the house ⅛ mile southeast to the Whitesburg opening and sharper rise to that of the Fire-clay coal, 100 yards beyond, is indicated.

SAPLING BRANCH.—On the left, 1½ miles up Buzzard creek: Altitude of mouth, 830.

On the right, ¼ mile up this branch, the Howard coal is exposed at altitude 970. In former times the bed was mined to some extent in this vicinity, the coal having been used in evaporating brine from neighboring wells long since abandoned.

SWAFFORD BRANCH.—On the left, 2½ miles up Buzzard creek: Altitude of mouth, 860.

On the left, 2½ miles up this branch, Thomas Swafford has an entry into the Howard bed, with coal 31 inches thick at its mouth and 30 inches 20 yards in. In the point of the hill 100 yards beyond, an abandoned entry of the same bed gave 36 inches of coal under 20 feet of shale with line boulders. Directly under this is 3 feet of shale, coal and shale 9 inches and then 16 inches of coal, showing that the bed is split here as is the case on Otter creek and elsewhere. The altitude of the entry is 975.

On the left, 1¾ miles up the branch, the lower (?) seam, probably thin, has been opened at altitude 990.

On the right, 2 miles up, 15 inches of coal under 4 feet of rough sandstone is opened at altitude 1035. This appears to be the upper seam of the same bed, with sandstone roof instead of its usual shale.

A bench on massive sandstone above this coal, at altitude 1205, is said to carry about 2 feet of coal (the Whitesburg bed?), while a 40-foot cliff cresting the hilltop at altitude 1530 lies between the Haddix and Hazard beds.

On the left, 2¾ miles up Buzzard creek, 10 feet above it, is 6 inches of coal on one foot of fire-clay and between

massive sandstones. This coal at altitude 885 goes under Buzzard creek near the mouth of Sarvis branch, showing a very slight rise up the creek. It is doubtless 100 feet above the Manchester bed.

SARVIS BRANCH.—On the left, 4½ miles up Buzzard creek: Altitude of mouth, 910.

On the left, at Martin Smith's, 1 mile up and 20 feet above the branch, coal and black shale on sandstone indicate the upper seam of the Howard bed at altitude 1060.

On the right, at the same place, a wet entry, under shale, with 2½ feet of coal or coal with partings, is at altitude 1435. Cliffs crest the hills some 80 to 100 feet higher. This coal is probably of the Haddix bed.

On the left by the branch, 1½ miles up it, is 14 inches of coal of the Whitesburg bed in sandstone at altitude 1195.

On the left, 1¾ miles up the branch, 100 yards from the gap to Otter creek, Mrs. Margaret Swafford has a 2-yard entry, under 15 feet of sandstone, the lower half of which is somewhat shaly. The coal is 28 inches thick with a 1-inch parting 8 inches from the bottom. Its altitude is 1420, and the cliff capping the ridge is about 60 feet higher. This bed is evidently the same as that just recited at altitude 1435 as of the Haddix bed. It is (by barometer) 220 feet above the adjacent Fire-clay coal opening on Otter creek.

RUSSELL BRANCH.—On the left, 4¾ miles up Buzzard creek: Altitude of mouth, 930.

Coal at the mouth of this branch, 5 inches thick, may be of the same bed as that noted 10 feet above Buzzard creek, 3 miles up it, although here 30 feet of shale is exposed above it, while down the creek the bed is enclosed in massive sandstone. If the same, there is a rise of strata up the creek amounting to 55 feet in the 1¾ miles, whereas above and below these points the strata dip slightly up-stream.

On the left, ¾ mile up the branch, 20 feet above it, B. T. McCreary has an abandoned timbered prospect with a foot or two of coal at altitude 1040, about the horizon of the Howard coal.

On the right of a left hollow at the head of the branch, a mile up, he has an abandoned entry showing in the dump bituminous, splint and cannel coal. The entry, at altitude 1400, is on top of 30 feet of massive sandstone forming a cliff and 3 feet under shaly sandstone, 5 feet exposed. No cliff sandstone shows in the hill above, which is but about 70 feet higher. This indicates the coal as of the Hazard bed, but, as that bed is not known to have cannel elsewhere and its altitude is indicative of the Haddix, it is referred to that bed.

On the left, 6¾ miles up Buzzard creek, at its head, 150 yards from the gap to Horn branch, John Root has two entries into what is probably the Fire-clay coal. One of the entries is in a roll, but both have 34 inches of bottom coal and a fairly good shale roof. At 8 yards in, one of them has the following bed section:

Shale	15 ft.
Coal	3″
Shale	1″
Coal	1″
Shale	2″
Coal	34″
Fire-clay	2 ft.

Altitude, 1295.

The gap to Horn branch is but 60 feet higher, and the area of coal available is hardly sufficient to overcome the difficulty of transportation to railroad level.

JOE NASH BRANCH.

On the left of Collins fork, 4 miles up it: Altitude of ford near mouth of branch, 824.

James Adams formerly had an opening on the left, ¼ mile up this branch, which gave the following section:

Shale	5 ft.
Coal	9″
Shale	6″
Coal	24″

Altitude, 930.

This appears to be of the bed 100 feet above the Manchester coal.

AERY (OR AYRES) BRANCH.

On the right of Collins fork, 4¼ miles up it: Altitude of mouth, 825.

On the left, a half-mile up this branch, 9 inches of splint coal lies under 21 inches of black slate and 5 feet of shale, at altitude 930.

OLD STABLE BRANCH.

On the left, 4¾ miles up Collins fork: Altitude of mouth 830.

Old openings, ½ mile up this branch, at J. C. White's formerly L. A. Byron's, gave the following:

Altitude, 930.

Shaly sandstone.	
Dark shale	3 ft.
Coal	10″

Altitude, 1040.

Shaly sandstone	15 ft.
Shale	3 ft.
Coal	18″
Shale	17″
Coal and shale	12″
Coal	3″
Shale	3″
Coal	12″

INGRAM (COTTONGILL) BRANCH.

On the left, 5 miles up Collins fork: Altitude of mouth, 830.

A quarter mile up this branch on old opening gave 20 inches of coal, under 5 feet of dark shale, at altitude 925. From 1½ to 2 miles up the branch the following sections were obtained:

Sandstone	15 ft.
Coal	12″
Clay	1 ft.
Sandstone	8 ft.

Altitude, 1265.

Massive sandstone ....20 ft.
Dark shale ..... 5 ft.
Coal .....10″
Clay ..... 6″
Shale ..... 2 ft.
Sandstone .....20 ft.
Altitude, 1120.

Sandstone ..... 4 ft.
Black slate ..... 5″
Shale .....12″
Coal .....22″
Altitude, 1005.

Shale and shaly sandstone .....30 ft.
Black shale..... 1 ft.
Coal .....15″
Shale to the branch, 1½ miles up it..... 3 ft.
Altitude, 915.

The coals at altitudes 930 and 915 on the three preceding branches show that the strata lie almost level there, the bed next above, at altitudes 1040 and 1005, indicating a slight southeasterly dip. The latter are of the Howard bed, and as the Manchester bed is about 250 feet lower, it must be within 50 feet of the bed of Collins fork, and may possibly be found above it in the westerly bend of the fork above Aery branch. Its covering shales show at the ford below.

The 12 inches coal at altitude 1265 seems to represent the rider to the Fire-clay coal.

At John L. Cottongill's, 6 miles up Collins fork, on the right, ⅛ mile up the hollow on the right behind his house, an old opening gives the following:

Haddix Bed.

Shale ..... 3 ft.
Thin bedded sandstone ..... 1 ft.
Coal ..... 9″
Shale ..... 3 ft.
Coal (reported) ..18 to 22″
Altitude, 995.

A thick, hard sandstone lies close below the coal.

WHITE'S CREEK.

On the right, 6⅛ miles up Collins fork: Altitude of mouth, 840.

A half-mile up this creek the cliffs show the change in going westward remarked elsewhere, from sandstones to shales, the cliffs in this case being probably 100 to 200 feet above the Manchester coal.

The only coal reported opened on the creek is at Jack Collins', 2 miles up. Here, on the right, is 10 inches of coal, under shale, at altitude 960, fifteen feet above the creek. On the left a stripping gives the following:

Black slate	3 ft.
Sandstone	2 ft.
Coal	5″
Shale	1″
Coal	1″
Shale	7 ft.

Altitude, 960.

It appears likely that this is of the bed 100 feet above the Manchester bed.

COLD SPRING BRANCH.

On the left, 7½ miles up Collins fork: Altitude of mouth, 849.

A quarter-mile up to the forks of this branch, and on the left, ¼ mile up the left fork, is the following:

Howard Bed.

Massive sandstone	5 ft.
Black slate	2″
Coal	19 to 22″
Massive sandstone	5 ft.

Sandstones occupy most of the 145 feet from the creek to this coal and most of the next 80 feet above it. Strata lie nearly level along the creek, but on the branch they show an east or northeasterly dip.

On a left branch, 9¾ miles up Collins fork, ¼ mile up the branch, on the right, ⅛ mile up a right branch,

the same bed or a lower split from it, has 18 inches of coal, under 3 feet of shaly and massive sandstone, at altitude 980.

DISAPPOINTMENT BRANCH.

On the left, 10 miles up Collins fork: Altitude of mouth, 855.

On the right, ½ mile up the branch, John Riley has, in the point of the hill on the right by his house, a coal stain at altitude 950, and 65 feet higher, ⅛ mile up a right hollow there, the following:

Howard Bed.

Shale.
Massive sandstone....4 ft.
Coal .....24″
Black slate.
Altitude, 1015.

The lower coal is probably the lower split of the Howard bed, possibly a part of the interval between them being due to a surface slip.

A half-mile up the left fork from Riley's, and in a left branch, ⅛ mile up it, Charles Knuckles has a pit with coal, in water, probably 24 inches thick, under 2 feet of shaly sandstone, probably the lower split of the Howard bed. Its altitude is 990.

Up the right fork from Riley's the pitch of strata is southwesterly. At Jefferson Frost's, on the right, at the head, 1½ miles up, is the following, the bed section measured 10 yards into a long entry:

Shale ..... 8 ft.
Coal ..... 2″
Shale ..... 7″
Coal ..... 1″
Shale ..... 1″
Coal .....25″
Altitude, 1320.

This opening is so like those of John Root's at the head of Buzzard creek as to admit of no doubt of their correlation, but proof is not complete that they are of the Fire-clay coal bed.

WELLS BRANCH.

On the left, 11¼ miles up Collins fork: Altitude of mouth, 880.

Under a fall in the branch, ¼ mile up it, the Howard bed has 23 inches of coal under 10 feet of sandstone, and with 6 inches of shale between it and the fire-clay floor. Its altitude is 955.

On the right, ½ mile up the branch, an unfinished prospect, shows a considerable amount of squeezed coal under broken shale at altitude 1490. This is probably of the Hazard bed, too high in the hill to be of any value, but indicating a considerable area of the Fire-clay coal below available for delivery to Collins fork.

BULL CREEK.

On the right, 11¾ miles up Collins fork: Altitude of mouth, 860.

Following is a section taken at Mrs. Hopper's, near the mouth of this creek, reproduced from a former report, with altitudes corrected:

Black slate.
Coal ..... 2″
Clay.
Altitude, 1130.

Sandstone .....20 ft.
Black slate ..... 4″
Clay .....15″
Coal .....12″
Clay.
Altitude, 1020.

Sandstone .....45 ft.
Black slate ..... 3 ft.
Cannel coal .....26″
Sandstone .....10 ft.
Altitude, 950.

Sandstone ..... 5 ft.
Coal .....11″
Shale .....10 ft.
Altitude, 895.
Creek, 860.

TURKEY BRANCH.—On the left, 1¼ miles up Bull creek.

On the right, ½ mile up this branch, Wade Swafford has an entry into the Howard coal 24 inches thick, under 7 feet of shale, the lower foot dark, and with black slate floor. Its altitude is 1070. The coal is said to be 36 inches thick in an abandoned entry across the branch.

At about 2 miles up Bull creek, T. Jones has the cannel bed 26 inches thick, under 3 feet of shale, at altitude 990. The splinty cannel is 15 inches thick here, and at the bottom of the bed is block bituminous coal 7 inches thick. The intermediate 4 inches is shale with lime concretions varying up to 3 inches in thickness.

UPPER TURKEY BRANCH.—On the left, 1¾ miles up Bull creek.

On the right, 1¼ miles up the branch, Theophilus Hacker has an abandoned entry into the Howard bed with the following section, as obtained 2 yards in:

Shaly sandstone	3 ft.
Black slate	6″
Coal	12″
Shale	9″
Coal	4″

Altitude, 1150.

The Swafford and Hacker entries mark a change of strata from comparatively hard sandstones below to softer sandstones and shale above them. The pitch of strata as shown by their altitudes probably brings the Howard bed to altitude 1020 at the mouth of Bull creek, and the Manchester should lie about 100 feet below drainage there. The cannel bed appears to be not constant.

At 12⅛ miles up Collins fork the following section shows on the right in the road:

Coal stain.	
Yellow shale	10 ft.
Dark shale	5 ft.
Coal	1 ft.
Shaly sandstone	5 ft.

Altitude, 880.

Above these shales sandstones prevail, but with a much larger proportion of shales than on Bull creek. The slight up-stream dip of strata in evidence throughout most of Collins fork continues nearly to its head, the top of the sandstone under the Howard coal at 14 miles up the fork being at altitude about 950. Thence to the head the rise appears to be somewhat rapid.

No coal openings were found above Hammond fork, on Collins, but, across the divide, on the head of Little Richland creek, Eli Mills has the following, at the face of a 5-yard entry:

Howard Bed (?)

Shale	2 ft.
Coal	6″
Shale	4″
Coal	6″
Shale	3″
Coal	4″

Altitude, 1100.

HAMMOND FORK.

On the left, 12 miles up Collins fork: Altitude of mouth, 860.

This creek lies for most of its length in a syncline with rather rapid rise of strata on the north. No coal is opened on it below Horn branch.

While correlations of coal on this fork and its branches are given with a considerable degree of confidence, they are still left open to correction. The main evidence for the correlations adopted lies in the split bed, believed to be the Howard, found near the base of the hills at several points.

HORN BRANCH.—On the left, 2 miles up Hammond fork: Altitude of mouth, 880.

Opposite the mouth of a left branch, at John A. Riley's house, 1 mile up Horn branch, is a cliff 20 feet high, with top at altitude 930. An eighth mile up this left branch, and ⅛ mile up its left fork, the top of the sandstone, with 6 inches of coal upon it, is at altitude 960, giving a northwest rise of about 2½%.

Continuing up this left fork to ¼ mile up it, and thence ⅛ mile up a left branch to two entries at its head, where the following section was obtained, the coal measured in each 5 yards in:

Fire-clay Coal.

Shale	2 ft.
Shaly sandstone	2 ft.
Coal	3″
Shale	3″
Coal	1″
Shale	1″
Coal	34″

Altitude, 1260.

The same thin coal, 5 inches, between shaly sandstones, shows ⅛ mile up the right fork, at altitude 980.

At ¼ mile up the right fork, on the right, ¼ mile up a left hollow, John A. Riley has a long entry measured 33 yards in with the following results:

Fire-clay Coal.

Black shale	1½ ft.
Coal	3″
Shale with coal	3″
Coal	35″

Altitude, 1275.

As with the coal of the same bed on the head of Buzzard creek, the area here is small. The graded road up to the entry shows almost continuously thin-bedded and shaly sandstones.

At Fielding Hammond's, on the left, 2 miles up Horn branch, 15 feet above it, an old opening is said to have given 18 inches of coal. This appears to be the upper seam of the Howard coal, risen from the branch ¼ mile below. At 2¼ miles up the branch the lower seam shows, on 10 feet of massive sandstone, at altitude 985. This rapid rise of strata continues beyond probably only so far as to carry these seams over an anticline and to about 300 feet below the Root coal on the head of Buzzard creek.

SHOP BRANCH.—On the right, 4½ miles up Hammond fork: Altitude of mouth, 910.

On the left, ¼ mile up the branch, the two thin coals of the Howard bed appear as follows:

Coal	15″
Covered	10 ft.
Shale	10 ft.
Coal	19″

Altitude, 960.

Passing a thin stain in sandstone in the road, ¾ mile up the branch, at altitude 1035, and the gap to Mill (or Cole) creek at altitude 1130, southwest from the latter ⅛ mile is the following:

Fire-clay Coal.

Shaly sandstone	5 ft.
Coal	1″
Shale	6″
Coal	15″
Shale	1 ft.
Coal	6″

Altitude, 1200.

A 3-yard entry is driven into the 15 inches of coal, the 6 inches at the bottom apparently unknown until found by the writer.

An old entry on the right, 4¾ miles up Hammon fork, gives the lower of the Howard seams with 17 inches of coal, under 10 feet of shaly sandstone, at altitude 945, 30 feet above the creek.

On the left, 5 miles up the fork, the two seams of the same bed show as in the following section:

Howard Bed.

Massive and shaly sandstone	10 ft.
Coal	10″
Fire clay.	
Shaly sandstone	15 ft.
Coal.	
Shaly sandstone	10 ft.

Altitude, 945.

Fern impressions are abundant in the roof of one of these seams.

GARLAND BRANCH.—On the left, 5½ miles up Hammond fork: Altitude of mouth, 930.

The upper seam of the Howard bed has been opened on both sides of this branch, beside the road up Hammond fork. On the right, under shelly sandstone, are 20 inches of coal, with a shale parting 2 inches thick 5 inches from the bottom. Its altitude is 950.

On the left, at David Smith's, 1½ miles up the branch, and on the right, ¼ mile up the right branch there, the following coals were found:

Altitude, 1005.		Altitude, 1175.	
Shaly sandstone	7 ft.	Sandstone	2 ft.
Coal	4″	Shale	6 ft.
Shale	18″	Coal	1″
Coal	4″	Shale	5″
Shaly sandstone.		Coal	14″

The lower bed, 5 feet above the creek, is probably the same as the 6 inches coal found under the Riley coal on Horn branch. The upper is probably of the Whitesburg bed.

At the forks of Hammond fork, 6 miles up it, the altitude is 940.

LEFT FORK.—On the right, ¼ mile up this fork, is 5 inches of coal, under 30 feet of dark shale, at altitude 965. It lies on massive sandstone in the stream, under which is the Howard bed, at altitudes probably about 945 and 930.

An eighth-mile to the left from the above, Nelson Smith has a 25-yard entry with a rather strong southeasterly dip. Its bed section, 5 yards in, follows:

Fire-clay Coal.	
Sandy shale	10 ft.
Coal	1″
Shale	9″
Coal	30″
Altitude, 1250.	

The main seam is somewhat slaty in the middle. It is about 30 feet above a bench and 70 feet below a small cliff.

On the left, ½ mile up the left fork, James Smith has an entry into the same bed, under shale, with 29 inches of coal, all good, at altitude 1255.

On the left, at the head of the left fork, 1½ miles up it, Jabez Smith has entries into two beds, the lower measured at its mouth as given below, and the upper, closed, is given as reported:

Shaly sandstone	15 ft.
Coal	7″
Shale	11″
Coal	35″
Altitude, 1355.	

Shale	6 ft.
Coal	1″
Shale	14″
Coal	21″
Altitude, 1270.	

The lower bed seems to be at the right level for the Fire-clay coal, but in that case the Haddix bed is nearer to it than has been found elsewhere. The upper opening may be of the Fire-clay coal and the lower of the Whitesburg.

RIGHT FORK—HI SMITH BRANCH.—On the right, ⅛ mile up the right fork: Altitude of mouth, 945.

On the right, ¾ mile up this branch, is an entry with the following section, as measured at the face, 12 yards in:

Haddix Bed.

Sandstone	5 ft.
Shale	5 ft.
Coal	1″
Shale	3″
Coal	1″
Shale	2″
Coal	36″
Altitude, 1340.	

UPPER GOOSE CREEK.

On the right at the ford, ⅛ mile above Collins fork, 2⅝ miles above Manchester, the Manchester coal, 29 inches thick, under 8 feet of black shale, and on 3 feet of brown shale, lies at altitude 805, 3 feet above low water level.

On the left, 3⅛ miles above Manchester, behind the Joseph Jones house, a thin coal, said to be about 18 inches, between thick shales, lies at altitude 915. This is of the bed about 100 feet above the Manchester coal.

On the left, 3¼ miles above Manchester, Jeremiah Smith struck the stain of the Howard bed in digging a posthole, at altitude 1055. This gives the best opportunity found for determining the interval from it to the Manchester bed, which has just been noted at a point ¾ miles west at altitude 805. There is a slight up-stream dip here, but apparently none on an east-west line, and the Jones coal opening, about 100 feet above the Manchester bed, serves as additional evidence of nearly level strata on that line. The interval is, therefore, very near to 250 feet.

A quarter-mile to the left of Goose creek, 3½ miles above Manchester, Mr. Smith has an opening into 25 inches of coal under 3 feet of shale, at altitude 1130. The bench of the Howard coal below it is at altitude 1030, the coal itself probably a little higher.

SHOP-BOTTOM BRANCH.

On the right, 4 miles above Manchester: Altitude of mouth, 810.

On the left, ¾ mile up the branch, Henry Clay has an abandoned entry into the Howard bed, giving at its mouth 22 inches of coal, with 3 inches shale parting 4 inches from the bottom, and 8 feet of shale covering. Its altitude is 1030.

LOCKHART CREEK.

On the left, 4½ miles above Manchester: Altitude of mouth, 815.

On a left branch, 2 miles up the creek at Beverley White's, on the left of the branch, ¼ mile up it, a pit shows 18 inches of coal under 2 feet of black slate and of shale on that, at altitude 1035. This is of the Howard bed, but black slate is an unusual roof for it.

On the right, 2½ miles up, is 18 inches of coal in thick shales, at altitude 935, fifteen feet above the creek. The Manchester bed is 100 feet below this coal.

On the left of the road gap, ¼ mile above Lockhart creek, an old Howard bed opening lies at altitude 1015, and ¼ mile farther up, at altitude 980.

An eighth-mile farther, 5½ miles from Manchester, the following section was obtained:

	Feet	Altitude
Bench		995
Sandstone cliff	15	980
Shales	30	835
Thin slipped coal		835
Creek		825

At 5¾ miles up (50 yards above Free Hollow) the slipped coal from 100 feet above the Manchester bed appears again in the road at altitude 845, and 175 feet below the Howard bed bench.

From this point the dip is rapid to the house of the White heirs (formerly Mrs. S. R. White), 6 miles from Manchester, whence a line of openings and strippings fall, in less than a quarter mile, from altitude 980 to 925. Following is the bed-section at one of the entries and an analysis by Dr. Peter of my sample, omitting the bottom 4 inches, from 7 yards underground:

Howard Bed.

Shale.	
Coal	2″
Shale	1″
Coal	22″
Shale	5″
Coal	16″

Analysis.

Chemical Report No. 2649.

Moisture	1.48
Volatile combustible matter	35.92
Fixed carbon	54.70
Ash	7.90
	100.00
Sulphur	0.885
Coke (spongy)	62.60
Specific gravity	1.278

From these openings to Rocky branch the bed is conspicuous in and along the road at numerous points, its covering where noted being 5 feet of shale under 3 feet of thin-bedded sandstone, and beneath the coal 10 feet of hard sandstone on 30 feet of softer sandstone or shale.

ROCKY BRANCH.

On the left, 7½ miles from Manchester: Altitude of mouth, 825.

On the left, ½ mile up the branch, E. C. Howard has an 8-yard entry from which the Howard bed derives the name here given it. Half way in the entry it has the following bed-section:

Howard Bed.

Shale	2 ft.
Coal	2″
Shale	1″
Coal	3″
Shale	1″
Coal	16″
Shale	5″
Coal	16″

Altitude, 895.

GRANNY BRANCH.

On the left, 7¾ miles from Manchester: Altitude of mouth, 825.

A quarter-mile up this branch, on the left, ⅛ mile up a left hollow, J. B. Walker has a long entry into the

Howard bed at altitude 890, with the following bed-section and analysis of the coal, the latter from my sample excluding the upper 2 inches:

Howard Bed.

Sandy shale	8 ft.
Coal	2″
Shale	2″
Coal	3″
Knife-edge parting.	
Coal	18″
Shale	8″
Coal	16″
Black slate.	

Analysis.

Lab. No. 3583.	
Moisture	1.60
Volatile combustible matter	39.25
Fixed carbon	55.25
Ash	3.90
	100.00
Sulphur	1.33
Coke, cellular, brittle	59.15

The lower parting varies from 5 to 10 inches in thickness.

BILLY BRANCH.

On the left, 8 miles from Manchester: Altitude of mouth, 825.

A stain of the Howard bed is exposed in the road on the projecting spur at the mouth of this branch, at altitude 890. Two feet below the stain is 4 inches of iron ore on a hard sandstone forming a cliff quite down to Goose creek.

From the branch, 1¼ miles up it, coal from this bed has been taken at altitude 900, and, possibly, a higher seam of the same shows in the bank on the left just above.

At 1½ miles up, a pit in the branch is reported to have 18 inches of coal. Its altitude is 920. At the forks, 1¾ miles up, the bed is below drainage.

On the left, ½ mile up the right fork, a considerable stripping, abandoned, indicates moderate thickness only of coal, all covered except its top. Ten feet of clay shale overlie it and a hard sandstone cliff shows about 50 feet above it. It is of the Whitesburg bed at altitude 1080.

On the right of a left hollow, ¾ mile up the right fork, ¼ mile up the hollow, James Wages has two entries, 50 yards apart, the lower giving the following at its mouth:

Fire-clay Coal.

Sandstone	5 ft.
Shale	12 ft.
Lime rock	6 to 8″
Black shale	2″
Coal and 5 partings	34″
Altitude, 1145.	

At 2 yards into the upper entry the coal and partings, of which there are but three, are reduced to 31 inches. Under this is 2 inches of bituminous shale and then fire-clay to standstone beneath. Though apparently at about the right height for the Whitesburg bed, that bed having been found, as just mentioned, at a lower level, these openings resemble in their bed-sections and coverings the Fire-clay coal opening on Martin creek and they are confidently referred to the latter bed.

SCHOOLHOUSE BRANCH.

On the right, 8¾ miles from Manchester: Altitude of mouth, 830.

On the left, ½ mile up the branch, Joseph Keene has a long entry with section as given following, taken 3 yards in:

Howard Bed.

Sandstone	10 ft.
Shale	1 ft.
Coal	3″
Knife-edge parting.	
Coal	20″
Black shale	20″
Coal	9″
Altitude, 890.	

On the left, 9¼ miles up Goose creek, Elhannon Wilson had an entry which gave the following bed-section:

Howard Bed.

Shale	8 ft.
Coal	2″
Shale	1″
Coal	2″
Shale	1″
Coal	16″
Shale	10″
Coal	15″

Altitude, 900.

MARTIN CREEK.

On the left, 9½ miles from Manchester: Altitude of mouth, 830.

Outcrops of the Howard bed, split into two seams, show in and by the road, on the left, ⅛ to ¼ mile up this creek at altitudes 915 and 920; and again by the road, 1¼ miles up, where they are 15 feet apart, at altitude 905, and 920.

In a pit, ⅛ mile up a right branch and in it, 1¼ miles up Martin creek, the coal is reported 20 inches thick. At altitude 895, it is probably of the lower seam.

MOSES BRANCH.—On the right, 1¾ miles up Martin creek: Altitude of mouth, 905.

On the right, ¼ mile up this branch, Silas Wages has opened the Fire-clay coal with the following section:

Fire-clay Coal.

Sandstone	4 ft.
Shale	6 ft.
Coal	4″
Shale	1″
Coal	12″
Shale	1″
Coal	6″
Flint fire-clay	4″
Black-jack	4″

Altitude, 1225.

Next below the black-jack is said to be 30 inches of shale and then a foot more of coal.

The upper split of the Howard coal is probably about at altitude 925, giving the interval between the Howard and Fire-clay beds as 300 feet. Adding to this the 250 feet interval from the Howard bed to the Manchester, as found on Goose creek just above Collins fork, gives 550 feet interval between the Fire-clay coal and the Manchester bed; a close agreement with the 535 feet found between them near the mouth of Goose creek.

On the left, ½ mile up the branch, J. B. Walker has an entry with the following section, as measured at its mouth:

Haddix Bed.

Shale	5 ft.
Shale with coal	10″
Coal	9″
Shale	2″
Coal	22″
Shale	20″
Coal	8″
Cannel coal	10″

Altitude, 1405.

At the faces, 60 yards in, the bottom coals are reduced from 18 inches to 15 and 17 inches, the parting next above them is increased to 22 and 24 inches, and at one face the upper part is 37 inches thick, including a parting of 1 inch, 2 inches from the top.

Some 30 to 40 feet above the coal is a 15-foot cliff, a common attendant to the Haddix bed.

Assuming that strata lie level between this and the Fire-clay coal opening, as they probably nearly do, the interval between these two beds is 180 feet.

At Mr. Walker's house, on the left, 2 miles up Martin creek, the stain of the upper split of the Howard coal shows at altitude 940.

STEWART BRANCH.

On the left of Goose creek, 10¼ miles from Manchester.

On the left, ¼ mile up this branch, Laura R. White has a wet entry, under 5 feet of shale, into the upper split of the Howard bed, giving 24 inches of coal at altitude 905.

The same coal has been partly opened by the road up Goose creek, 10⅜ miles from Manchester, at altitude 892.

BROWN BRANCH (OR BLYTHE).

On the right, 11 miles from Manchester.

A prospect of Laura R. White's on the right, ¼ mile up this branch, gives 22 inches of coal, under 5 feet of shale and on a black slate and coal floor; again the upper split of the Howard bed with altitude of 885. The lower split is reported in the branch, 10 feet lower, with coal 24 inches thick.

OTTER CREEK.

On the right, 11¼ miles from Manchester: Altitude of mouth, 847.

On the right, ⅛ mile up this creek, Robert Wood has a long entry into the Howard bed, with 23 inches of coal measured 4 yards in, at altitude 875. Sandstone from its floor to the creek, 25 feet below, prove it of the lower seam of the bed. Over the coal are 2½ feet of shale and then 12 feet of sandstone and shale.

Of old entries on the right, 1¼ miles up the creek, in the lower split of the same bed, one gives 22 inches of coal under 7 inches of coal and shale, upon which is a laminated sandstone showing a tendency to honeycomb. This entry is at altitude 890.

At the forks, 1¾ miles up Otter creek, altitude 895, is a cliff on the left over the Howard bed, composed of shaly sandstone and shale, which can be recognized at frequent intervals, farther up the creek until it goes below drainage, and also on Goose creek for two miles above Otter creek.

On the right, at the Otter forks, 18 inches of coal, the upper seam of the Howard bed, is exposed at altitude 900.

RIGHT FORK.—At Vogel postoffice on the right, 1½ miles up this fork, is 10 inches of coal, under 8 feet of dark shale, and then a thick massive sandstone. Its altitude is 1005, 20 feet above the creek.

On the right, ⅛ mile up a right hollow at Vogel, is a long entry having 15 inches of coal at its mouth, 10 feet of hard sandstone under its 1½ feet of fire-clay floor, and above it 5 feet of shale under sandstone. Its altitude, 1200, makes it 300 feet above the Howard coal at the forks of Otter creek, and therefore the Fire-clay coal, as the strata lie nearly level along the creek to this point.

At the mouth of Swafford branch, 2½ miles up the fork, the lower coal at Vogel goes below drainage at altitude 995.

On the right, 3¼ miles up the fork, 20 feet above it, is 16 inches of coal under 3 feet of shale and 4 feet of sandstone, at altitude 1215. Probably again the Fire-clay coal.

On the right, ¼ mile up a right branch at this place, J. G. Matthews has a 10-yard closed entry at altitude 1515. Apparently the bed is about 3 feet thick, under 5 feet of shale and then sandstone. Black slate, bituminous and cannel coal were found in the dump, the latter in blocks 8 to 10 inches thick. Sandstone cliffs 15 feet high cap the hills 50 feet above the coal. The bed has the characteristics of the Flag bed, and, 300 feet above the supposed Fire-clay coal, is, with little doubt, so correlated.

LEFT FORK—KNOB LICK BRANCH.—On the left, ¼ mile up the left fork: Altitude of mouth, 910.

On the right, ¼ mile up the branch, John Duff has a long entry, measured 15 yards in, giving 42 inches of coal at altitude 1460. The bottom coal is an especially fine bright block without cleavage planes, and the whole looks good. Six inches of shale under 10 feet of sandstone overlie the coal, and a 15-foot sandstone caps the hill 50 feet higher, as on the head of the right fork. This, also, is about 600 feet above the Howard bed and is referred to the Flag bed.

On the left, ¾ mile up the branch, 10 feet above it, an entry 2 yards in gives 16 inches of coal, under 4 feet of shale, the upper 3 feet sandy, at altitude 1125. This is probably of the Fire-clay coal.

At a spring on the right, ½ mile up the left fork, is 3 inches of coal, probably of the Fire-clay coal bed, at

altitude 1120. An opening at the place would very likely uncover more coal below.

DRUM BRANCH.—On the left at Albert May's, ¾ mile up the left fork.

On the left, ¼ mile up the branch, is a stripping, 40 yards long, disclosing the following:

Fire-clay Coal (?)	
Shaly sandstone	12 ft.
Shale with calcareous concretions	3 ft.
Coal	7″
Shale	3½ ft.
Coal	16″
Fire-clay.	
Altitude, 1140.	

The left fork has forks 1¾ miles up it. Thence, on the left of the right fork, ¼ mile up it, John G. Matthews has a 5-yard entry, on shale and under sandstone, with 25 inches of coal at its mouth, and at altitude 1190. This is probably of the Haddix bed.

From the forks, 1¾ miles up, to a right branch ½ mile up the left fork, the sandstone over the coal last mentioned is passed over and a change met from a narrow valley to a comparatively open country with lighter slope to its hills. This is ascribed to the resistance to disintegration of the hard sandstone over the Haddix coal.

The mouth of the branch just referred to is at altitude, 1250. On the right ¼ mile up it is a covered opening into what is presumably the Hazard coal at altitude 1295, a rise of strata from the opening on the right fork of possibly 50 feet being assumed, though against the direction of the prevailing dip. The topography indicates a continued southwest rise to the Mill creek divide.

Both on the right and left of Goose creek, 11½ miles from Manchester, ¼ mile above Otter creek, Robert Wood has openings into the Howard bed; at altitude 870. On the right into the lower split with 22 inches or more of coal; and on the left into the upper split with the following section:

Howard Bed. Upper Split.

Shale	15 ft.
Coal	4″
Shale	3″
Coal	18″ or more.

Altitude, 870.

Both of these openings were in water and only the top of the coal seen.

The 50 feet of shale exposed at the mouth of Mud Lick shows that both parts of the Howard bed are at or below creek level there, which is at altitude 864.

TIMBERTREE BRANCH.

On the left, 12¾ miles above Manchester: Altitude of mouth, 865.

Following are the three coals found on this branch; none carried under roof: On left, ⅞ mile up:

Fire-clay Coal Rider.

Rough sandstone	5 ft.
Coal	7″
Clay	1″
Coal	5″

Altitude, 1245.

On the right, ⅝ mile up:

Whitesburg Bed.

	Feet
Laminated sandstone	5
Black shale with sandstone parting	1½
Shale and coal	5

Altitude, 1160.

On right, ¾ mile up:

Fire-clay Coal.

Shaly sandstone	12 ft.
Coal	6″
Flint fire-clay	6″
Coal	6″

Altitude, 1215.

All are on steep hillside within 30 feet of the branch. In the Whitesburg bed there are 3 seams of coal, the thickest not more than 12 inches.

The Howard bed being at altitude about 865 at the mouth of the branch, a rise of strata up the branch of some 50 feet is indicated, in order to bring that bed to 300 feet below the Fire-clay coal.

A bench on the right of the openings at altitude 1380 gives the approximate position of the Haddix bed, its attendant 20-feet cliff above it with top at altitude 1405. A bench at 1445 marks the place of the Hazard coal. With the hill rising 140 feet higher these coals have area for working here if found of sufficient thickness.

TOM'S BRANCH.

On the right, 13½ miles from Manchester: Altitude of mouth, 870.

In a former search for coal on this branch there was found the following at J. T. Smith's, near the mouth of the branch:

Sandstone cliff	50	ft.	Altitude, 1370.
Covered	15	ft.	
Shale	1	ft.	
Clay with lime concretions	1	ft.	
Shale	2	ft.	
Black slate	15″		
Shale	10″		
Coal	11″		Altitude, 1350.
Clay.			
Covered	20	ft.	
Massive sandstone	10	ft.	
Earth and thin iron ore	1½	ft.	
Massive sandstone	1½	ft.	
Coal	9″		Altitude, 1315.
Covered.			
Dark impure limestone	2	ft.	Altitude, 1275.
Covered.			
Shaly sandstone	10	ft.	
Coal	12″		Altitude, 1240.
Clay.			
Covered.			
Shale	5	ft.	
Iron ore	3″		
Shale	2	ft.	
Thin coal			Altitude, 1200.
Covered.			
Sandstone	20	ft.	
Coal	18″		Altitude, 1145.
Covered.			
Shaly sandstone	10	ft.	
Clay	6″		
Coal	21″		
Shale	1″		
Coal	1″		Altitude, 1075.
Clay	5″		
Shale and sandstone	20	ft.	
Covered.			
Shale	5	ft.	
Shaly sandstone	4	ft.	
Coal	30″		
Cannel coal	5″		Altitude, 915.

My sample of the 30 inches bituminous coal and a specimen of the cannel from a now abandoned entry into the lowest bed just noted, taken from 5 yards underground, yielded, on analysis by Dr. Peter:

J. T. Smith Entry.	No. 2653. Bituminous.	No. 2655. Cannel.
Moisture	2.80	0.30
Volatile combustible matter	29.40	44.16
Fixed carbon	57.00	43.74
Ash	10.80	11.80
	100.00	100.00
Sulphur	1.178	1.244
Coke	dense friable.	dense.
Color of ash	light brown.	dark gray.
Specific gravity		1.60

This bed is probably the same as that at Vogel, on Otter creek, altitude 1005, about 100 feet above the Howard bed. The Fire-clay coal may be between those of the preceding section at altitudes 1075 and 1145, the Haddix at 1240 and the two higher coals of the Hazard and Flag beds. The absence of any thick coal in this vicinity is almost conclusively proved by these seven coal beds found.

MILL BRANCH.

On the left, 13¾ miles from Manchester: Altitude of mouth, 875.

On the left, ¾ mile up this branch, and 15 feet above it, Anderson Smallwood has an entry in which the following bed-section was taken, necessarily at several points underground:

Rough cliff sandstone	20 ft.
Covered	20 ft.
Sandstone	10 ft.
Shale	1 ft.
Shale and coal	3″
Coal	4″
Shale	1″
Coal	20″
Sandstone	11″
Shale	6″
Coal	4″
Jack-rock	7″
Coal	23″

Altitude, 1060.

This brown jack-rock near the bottom of this bed, similar to that found on Timbertree branch beneath the flint fire-clay of the Fire-clay coal bed serves to correlate this as of the Fire-clay coal bed, the next parting above, of uniform thickness in the entry, but variable proportion of sandstone to shale, possibly being the only separation of the bed from its rider.

The Haddix bed is exposed in a rock house on the left, one mile up the branch, with the following section:

Sandstone	4 ft.
Coal	9″
Shale	4″
Coal	12″
Covered	5 ft.
Shale	10 ft.

Altitude, 1230.

A quarter-mile farther up the branch the flatter topography, due to the hard sandstone under the Hazard bed and soft shales above it, as on the left fork of Otter creek, is plainly evident.

In the left bank of Goose creek, 14½ miles from Manchester, a stripping has been made with 16 inches of coal under 3 feet of shale and 50 to 60 feet of sandstone. This, at altitude 886, is probably of the Whitesburg bed, involving a dip from Tom's creek of nearly 200 feet in about a mile, the maximum along the stream from Manchester where the southeasterly dip begins, and to Mill creek, near which it ends.

On the right branch, 14¾ miles from Manchester, on the right, ¾ mile up the branch, and 25 feet above it, Frank Wages has an opening into the Haddix bed with 19 inches of coal, at altitude 1110. The coal is in part "bird-eye" (showing smooth shiny black spots up to ½ inch diameter however any lump may be broken) with fine apparent granulation, like the Jellico coal, but impossible to be of that bed. Above and below the coal is an inch or two of black slate, and on the slate 10 feet of shale.

MILL CREEK.

On the right, 15 miles from Manchester: Altitude of mouth, 892.

With the Whitesburg bed supposedly 10 to 20 feet under the mouth of Mill creek, the Fire-clay coal should be found on one of the low cliffs opposite and not over 50 feet above it.

On the left, ½ mile up the creek, Thomas Smith has a 3-yard entry, under 10 feet of sandstone, with 18 inches of coal at altitude 1005; probably the Fire-clay coal rider.

A mile up Mill creek, on the right, ½ mile up a right branch there, the Bowen heirs have an opening, not driven to roof, in which the following appears:

Earth.
Coal ..... 18″
Knife-edge parting.
Coal ..... 3″
Shale ..... 1″
Splint coal ..... 9″
Altitude, 1400.

If, as appears to be the case, the Haddix bed is here at about altitude 1140, this must be of the Hindman or a still higher bed. It does not appear to have the soft shale covering which is almost, if not quite invariably, a marked feature of the Hindman bed.

Mill creek has forks 1¾ miles from its mouth.

RIGHT FORK.—On the right, ¼ mile up the fork, 10 feet above it, an entry shows about 2 feet of coal with 2 feet of shale and then 5 feet of laminated sandstone above it, of the Haddix bed, at altitude 1150.

A rapid rise of strata up the right fork is evident, and at 1 mile up the fork in the road on the right, the stain of the Hazard coal is exposed, at the base of yellow shales, at altitude 1300. The cliff-rock under the coal is conspicuous in the road a half-mile below and the country is more open after ascending it, as noted across the divide to Otter creek.

LEFT FORK.—On the right, ⅛ mile up this fork, the Bowen heirs have an entry into the Haddix bed with 22

inches of coal at the face, 10 yards in, under 15 feet of sandstone, the lower two feet of which is shaly. Its altitude is 1130.

On the right, ¼ mile up and at stream level, the same bed is opened with 24 inches of coal, under 2 feet of shale and then 10 feet of shaly sandstone, at altitude 1140.

From this opening the valley rises quickly over the sandstone to the Hazard bed level, where it is comparatively flat again.

ASHER FORK.

On the left, 16½ miles above Manchester: Altitude of mouth, 941.

On the left, ½ mile up the fork, at John Roark's, is 6 inches of coal (the Whitesburg bed?) at altitude 995, and an opening into about 3 feet of coal, with one inch shale parting in the middle and 3 feet of shale upon it, at altitude 1240. The same bed, probably the Haddix, shows on the right of the fork at the same height.

Coal has been taken from the fork, 1½ miles up it, at altitude 1295, probably from the Fire-clay coal rider as the strata rise rather rapidly after the first mile up the fork to this point.

At Charles Roark's, 2 miles up, 100 yards north of the road where it crosses the Red Bird divide, is a 10-yard entry with 25 inches of coal, under 5 feet of shale, possibly of the Hazard bed, at altitude 1485. Though level with the gap, a large area of this bed is present here, the hills rising 300 to 400 feet above it.

Opposite the mouth of Asher fork, on the right of Goose creek, an old opening of the late Woodson Mills gave the following section:

Fire-clay Coal (?).	
Shale	5 ft.
Coal	1″
Shale	5″
Coal	1″
Coal	4″
Shale	2″
Coal	18″
Black slate	3″
Coal	4″

Altitude, 1060.

The bottom coal, in water, was not fully seen.

This appears likely to be of the Fire-clay coal bed, but, as with other openings above Mill creek, there was found little more definite guide to correlation than their altitudes combined with the apparent rise or fall of strata.

STEWART BRANCH.

On the left, 17½ miles from Manchester: Altitude of mouth, 983.

On the right, ¼ mile up the branch, 10 feet above it, is 7 inches of coal, with a foot of shale and coal under it, and 10 feet of laminated sandstone upon it, which, at altitude 1025, may represent the Whitesburg bed.

On the left, ¾ mile up the branch, Bailey Stewart has an opening into the same bed as that of the Mills opening opposite the mouth of Asher fork, from which the following was obtained:

Fire-clay Coal (?).

Laminated sandstone	10 ft.
Clay sandstone	20 ft.
Shale	1 ft.
Coal	21 to 24″
Shale	2″
Coal	4″

Altitude, 1125.

Rise of strata up the branch is probably rapid. The shale roof has abundant fine bark impressions, said also to be frequent in the roof of the Mills opening.

Cliffs on the right of Goose creek, 17¾ miles from Manchester, seemed to offer a help to correlation and their altitudes were obtained. With the creek at this point at altitude 1000, slight benches were found at approximate altitudes of 1060, 1140 and 1165, indicating the locations of the Whitesburg and Fire-clay coals and the rider; a 10-foot cliff at 1455 near the top of the hill. Under these cliffs are probably the Haddix and Flag coals.

On the left of Goose creek at the Jackson mill site, 18½ miles from Manchester, the following section was formerly obtained from a now abandoned opening of the Smith heirs:

Fire-clay Coal (?).

Shale and shaly sandstone	5 ft.
Coal	4″
Shale	3″
Coal	27″
Shale	2″
Coal	15″

Altitude, 1120.

HUN JACKSON BRANCH.

On the right, 18¾ miles from Manchester: Altitude of mouth, 1050.

On the right, ¼ mile up the branch, Isaac Jackson has a long entry into the Fire-clay coal with a rider six feet above it as in the following section:

Fire-clay Coal (?).

Black slate	3 ft.
Cannel coal	10″
Shaly sandstone	6 ft.
Coal	51″

Black slate.

Altitude, 1145.

Analysis of my sample of the 51 inches of bituminous coal by Dr. Peter yielded:

Fire-clay Coal.

	No. 2647.
Moisture	1.10
Volatile combustible matter	35.60
Fixed carbon	56.90
Ash	6.40
	100.00
Sulphur	0.885
Coke (light spongy)	63.30
Specific gravity	1.288

"A pure-looking coal. No apparent pyrites and but little fibrous coal. Ferruginous stains on some of the pieces."

INDIAN GRAVE BRANCH.

On the left, 19¼ miles from Manchester: Altitude of mouth, 1073.

On the right, ⅛ mile up the branch, a 3-yard entry into what appears to be the Fire-clay coal gives 34 inches of coal, under sandstone, at altitude 1120. This bed goes below drainage ½ mile up the branch with 19 inches of coal, under 25 feet of sandstone, at altitude 1120.

Thirty feet above this last coal is 13 inches more coal under 7 feet of shale in which is about 6 inches of black slate. The coal is probably the rider showing as cannel coal on Hun Jackson branch.

On the left at the branch, 1¼ miles up, opposite Isaac Jackson's house, is an 8-yard entry into the Haddix(?) bed, which gave great improvement as it was advanced underground, as shown by early and recent measurements:

At Mouth.		At Face.	
Sandstone.		Sandstone.	
Coal	3″	Coal	8″
Shale	3″	Parting	1″
Coal	7″	Coal	7″
Clay	5″	Bone coal	1″
Coal	14″	Coal	20″

Altitude, 1370.

The coal is bituminous with a little splint, all apparently good, the former bright and rich-looking, with some in which the lamination is hardly perceptible. The upper parting at the face is a mixture of shale or clay and pyrites, which may be expected to disappear on farther entrance into the hill.

A half-mile up the right fork from Jackson's house the following was obtained which, in its abundance of shale and clay and height relative to the preceding coal, seems to identify the coal as of the Hazard bed:

Hazard Bed.

Shale	5 ft.
Coal	11″
Clay	1 ft.
Sandstone	5 ft.
Coal and shale	17″
Shale	5 ft.

Altitude, 1410.

On the right, 19¾ miles above Manchester, 100 yards below a schoolhouse, is 16 inches of coal in sandstone, at altitude 1150. This bed shows again, on the left, 20 miles above Manchester, 18 inches of coal, on 4 inches of black slate and under 15 feet of sandstone, at altitude 1185, and 35 feet above the creek. These two are probably of the Fire-clay coal bed.

BUCK SMITH BRANCH.

On the left, 20¾ miles from Manchester: Altitude of mouth, 1201.

On the right, ⅛ mile up the branch, is 11 inches of coal, under 5 feet of shaly sandstone, at altitude 1235. Strata appear to rise up the creek here faster than its bed, and this, therefore, is probably of the Whitesburg bed.

A mile up the branch to its forks at altitude 1360, on the right, ¼ mile up the right fork, is Darby Smith's entry with the following section:

Shale	2 ft.
Black slate with coal	2 ft.
Shale	1 ft.
Coal	16″
Shale	14″
Coal	29″

Altitude, 1715.

Strata doubtless rise rapidly from the mouth of the branch to this coal, which must be of the Flag or a higher bed, but no evidence was discovered as to which one of them it is. A large area of these coals is available here, as the hills rise to a height of over 2000 feet.

On the left, just above the mouth of Buck Smith branch, is 6 inches of coal under 6 feet of shale, the bottom half of which is black, at altitude 1215. This seems to be the same as the 11 inches coal ⅛ mile up the branch, and illustrates the variability of roof and weathering of sandstone into shale.

At Paint Gap to Stinking creek, 21½ miles from Manchester, the altitude is (exactly) 1645.

The foregoing cover practically all coal openings on Goose creek waters open to inspection, but on the head of the Right fork of Stinking creek some 2 or 3 miles southeastward from Paint Gap, is a 15-yard entry into what is probably the Fire-clay coal, which gives promise of that bed being workable in Kentucky ridge, possibly on the Goose creek side, and casts some doubt upon the correlation of the Fire-clay coal, as given, where thin above Hun Jackson branch.

This (Stinking creek) entry 25 feet above the creek, belonging to Mrs. Taylor, has the following section as measured, the top at the face and the bottom at the mouth of the entry:

Fire-clay Coal (?).

Massive sandstone	15 ft.
Coal	31″
Shale	4″
Coal	10″
Knife-edge parting.	
Coal	13″
Altitude, 1430.	

In a second entry, 100 yards farther up the creek, the upper parting is reduced to 3 inches and the lower is wholly absent. Twelve feet below is 16 inches more coal.

So far as learned there is no other opening of the bed on the headwaters of the right fork of the creek.

There is, however, good reason for belief in continued thickness of the bed southward to the Left fork of Straight creek.

On that fork, some 2 miles southward from the entry last given, C. C. Knuckles has entries into the Fire-clay coal giving the following sections:

On Left.		On Right.	
Sandstone	20 ft.	Sandstone	15 ft.
Coal	42″	Shale with coal	4 ft.
Shale	2″	Coal	33″
Coal	10″	Shale	1″
Shale	1″	Coal	5″
Coal	4″	Knife-edge parting.	
		Coal	3″
		Knife-edge parting.	
		Coal	3″
		Shale	6″
		Coal	10″

Altitude, 1435.

The flint fire-clay was found here 3 to 6 inches below the bottom coal instead of in its usual place as a parting.

A mile westward from these entries, on the left of the branch giving the road from Straight to Stinking creek, Brit Slusher has a long entry into the same bed with the following section at its mouth:

Fire-clay Coal.	
Shale	1 ft.
Coal	32″
Shale	8″
Coal	8″

Altitude, 1485.

THE COALS OF BULLSKIN AND REDBIRD CREEKS

BY

JAMES M. HODGE

THE COALS OF BULLSKIN AND REDBIRD CREEKS.

The following report on the coals of Bullskin and Redbird creeks is based mainly on data obtained in the fall of 1916, when nearly every coal opening accessible was examined, and also includes such other information as could be obtained from previous investigations.

The topography of the region consists of narrow valleys, steep hillsides and sharp ridges. The valleys are generally roughly proportionate in width to the size of the streams and probably nowhere so much as one-quarter mile wide. The serrated ridges rise to a height of 500 to 800 feet feet above the valleys of the main streams and usually, on their principal branches, the ridges on the west to a somewhat less height than those on the east. The range in height above sea level is from altitude 722 at the mouth of Bullskin creek to about 2200 at the head of Redbird creek.

Strata in outcrop in the region are from 25 feet under the Manchester coal to possibly 400 feet above the Hindman coal bed on Kentucky ridge. The normal distance between those two coal beds being about 930 feet, the total thickness of strata in outcrop is about 1350 feet.

The general direction of dip in the northern half of the field is southeast and in the southern half northwest, the syncline thus formed probably crossing Redbird creek above Big Double creek and Big creek near the mouth of Collins fork, the inclination of strata being too slight to define it more accurately by means of a barometer.

Subsidiary to the general dip a down-stream fall of strata has been frequently noted on main tributaries of Redbird creek even when in opposition to the prevailing dip. This involves a bending of strata over intervening ridges and was the original determinant of the course of those streams.

Numerous local variations of dip have been found in this field, but so far as discovered they are unim-

portant. At one point on Redbird creek a coal bed overlaps itself slightly without interference with the strata above it, and farther up the creek the same bed shows a fault of two feet apparently not affecting its bed-rock.

Excepting in local rolls, the maximum rate of dip is probably not over 40 feet per mile, and usually is likely to prove not more than half of that rate. The field, as a whole, or in any part, gives no indication of any serious obstacle or detriment to mining.

The principal coal beds in outcrop in the region and the approximate intervals between them are given following in descending order:

Hindman Coal Bed.
Interval, 50 feet or more.
Francis Coal Bed.
Interval, 50 to 70 feet.
Flag Coal Bed.
Interval, 30 to 50 feet.
Hazard Coal Bed.
Interval, 30 to 60 feet.
Haddix Coal Bed.
Interval, 90 to 110 feet.
Hamlin Coal Bed.
Interval, 70 to 90 feet.
Fire-clay Coal Rider.
Interval, 10 to 30 feet.
Fire-clay Coal Bed.
Interval, 30 to 60 feet.
Whitesburg Coal Bed.
Interval, 190 to 220 feet.
Howard Coal Bed.
Interval, 180 to 200 feet.
Burns Coal Bed.
Interval, 80 to 100 feet.
Manchester Coal Bed.

Seven of these eleven beds have been found of workable thickness in this region, but two of them so much cut up by partings, or of so little area where found thick, as to make them of little, if any value, and two contain only very small pockets of workable coal.

Cannel coal has been found in five beds, but in none of them in enough quantity to be of especial interest.

Besides the coal beds listed there have been found not less than eight other seams of coal, all thin, and not including what may be regarded as splits from a principal bed.

An unidentified bed containing cannel coal lies at the top of Kentucky ridge. Below this, down to the Hindman bed, is a succession of sandstones with possible coals and thin shales between.

HINDMAN COAL BED.—This bed is included among the principal coals of this region only because of possible future development, the bed having been found elsewhere of remarkable thickness. The bed cuts the high peaks about the heads of Big creek and thence southward to the head of Elisha creek, and its areas there must be small, but farther south they may increase in size materially. Thick coal, reported but not seen by the writer, on the heads of Big and Elisha creeks are probably of this bed.

On spurs running westward to Redbird creek this coal is thin unless a thickening of strata under the bed, such as has been found toward the head of Middle fork, places the bed above the tops of the ridges. Kentucky ridge is the most favorable section for finding a good area of this coal.

The bed usually lies under a thick soft shale and sometimes has a heavy clay parting, so that mining the coal is likely to be difficult.

The interval down to the Francis coal is mostly of sandstone.

FRANCIS COAL BED.—This bed is not of much importance anywhere and has been found only thin in this region. From this bed to the Flag coal the interval is again mostly sandstone.

FLAG COAL BED.—No workable coal of this bed has been found in this region. It has not been identified, however, in the main ridges where areas and thickness are most likely to be satisfactory.

Between the Flag and the Hazard bed is a cliff-forming sandstone varying from perhaps 20 to 40 feet in thickness, which causes a like variation in interval. Under

the sandstone is usually a bed of shale, ranging from one to possibly 10 feet thick, occassionally carrying thin iron ore and forming the roof to the Hazard coal.

HAZARD COAL BED.—This bed is too high in the northwestern half of the region to give satisfactory mining areas, and in the southeastern half it has been found only thin, quite contrary to its usual condition. Inasmuch as the bed frequently has considerable partings and search for it has not generally been intelligent, there is good reason for belief that, in cases where the bed showed only thin coal, more would have been found beneath what was regarded as the floor of the bed, or a thin coal which lies 10 to 20 feet below the main bed may have been mistaken for it. While developments so far made are not favorable, the importance of thorough investigation of this bed seems to have been overlooked. It has a large area of thick coal and is quite extensively mined in Perry county.

Close under the thin coal which lies 10 to 20 feet below the Hazard bed, is a hard sandstone 30 to 60 feet thick, often appearing in smooth cliffs, especially when its outcrop is near or at the tops of hills. Its resistance to erosion is so much greater than that of other strata that valleys near the sources of small streams frequently broaden on its top and give rise to miniature swamps along them. This is so marked a feature of the topography that the name "Flatwoods" has been applied where it occurs to valleys and hills above that sandstone, though the hills may be as steep as elsewhere. It is readily recognized on most of the streams flowing into Redbird creek from the east above Big creek.

THE HADDIX COAL BED lies usually directly under the cliff-making sandstone. It is generally thin in this region, so far as known, but by report maintains the superior quality it is known to possess in other fields. It is inclined to have pockets of thick coal, one of which seemingly extended from Elk to Big Double creek, but here it is badly cut up by partings. On the latter creek it includes a little cannel coal.

Under the Haddix coal is a comparatively soft sandstone perhaps 30 feet thick, and then shales and thinly

laminated sandstones to the Hamlin coal bed. A thin bed of fossil limestone lies close above the latter coal, but it has been noted in two places only.

Hamlin Coal Bed.—This bed is generally thin in this as in other regions, but on Spring creek it reaches a thickness of coal of 4 feet, and on Katy's creek 3 feet, and a good working area is indicated.

The laminated series, alternations of shales and sandstones, continues down to the Fire-clay coal rider.

Fire-clay Coal Rider.—This bed has been found generally thin in this region, but has workable thickness on Bullskin creek and in a considerable area centered near the mouth of Phillips fork of Redbird creek. In the former locality it appears little likely to prove valuable as it shows but 3 feet of coal with a parting and near the hilltop, and less coal with two partings where its area is sufficient.

Developments so far made in the Phillips fork vicinity indicate a strip of workable coal of this bed, three to four feet thick, but more or less cut by thin partings, extending northeast from the mouth of Blue-Hole branch four miles or more. The ends of the strip are limited by thin coal on Blue-Hole branch and by disappearance of the bed below drainage on Jacks creek. The strip is about two miles wide, limited on the northwest by lack of known openings on Bear creek and on the southeast by the bed going below drainage, but before going under Phillips fork it is badly cut by partings.

The interval between the Fire-clay coal and its rider, which on North fork, Kentucky river, is usually a very hard sandstone is in this region a continuation of thinly laminated strata, generally of shale.

Fire-clay Coal Bed.—This bed has been more thoroughly developed than any of the others not only because of its distinctive parting but also because of the fine quality of its coal and, in certain localities, its thickness, yet throughout most of the region it has less than 2½ feet of coal, as indicated by openings seen, but as the hard parting of the bed is frequently adopted as the

floor of entries the additional lower coal is consequently hidden. The probability is that in extensive mining the coal so left would add but little to the value of the bed.

On Bullskin creek it ranges in thickness of coal from 2½ to 4 feet, but in the thicker coal, partings nearly destroy its value.

On Big creek there is a fine field of this coal, which reaches a thickness of 5 feet above the flint clay parting, but it is rather irregular, especially on the lower half of the area. A very rough conservative estimate of the workable coal in the Big creek drainage basin gives 15 square miles of coal averaging 3½ feet thick. North and south of this basin the coal cannot now be counted as workable, though it is likely to be found so in some places when mining is in operation. Old openings on the head of Rockhouse creek give no promise of an extension of the field eastward.

On Elk creek this coal is 39 inches thick, without parting, but too high in the hill to be of much value, and this is the only place except one on Lick fork on the west of Redbird creek where the coal has been found to exceed 3 feet in thickness.

On Lick fork, near its mouth, the coal is 3½ feet thick, with three partings additional, and farther up the fork the bed is thin.

On Rich branch and at other places near the head of Redbird creek the bed, though variable in thickness and partings, provides a workable coal of indeterminate area, because of few openings and disappearance below drainage. Being near stream level erosion has had little effect on the area.

A rather hard massive sandstone usually lies 10 to 20 feet, sometimes directly below the Fire-clay coal; then alternating sandstones and shales to the Whitesburg bed.

WHITESBURG COAL BED.—This bed is generally split up into many thin seams with shale and sandstone between them, the total thickness varying much and even exceeding 30 feet in its maximum.

Only on Elisha creek does its main seam approach workable thickness and there it is less than 3 feet and of

small area. Being half good cannel coal it is much prized in the neighborhood and so has attained notoriety.

Sandstones prevail between the Whitesburg and Howard beds. They are usually covered, but are especially prominent on Spring creek from one to two miles up it, where cliffs on either side are 50 feet high or more. The ravine broadens immediately on getting to their top.

Howard Coal Bed.—Lying in cliffs near stream level this bed is conspicuous along Redbird creek from Big creek to Bowen creek. It is in two parts separated by sandstone, which occasionally cuts out the upper part completely. Neither part is known to have over two feet of coal in this region.

The bed-rock of the lower seam is a hard sandstone, below which to the Burns coal are softer sandstone and shales, generally covered.

Burns Coal Bed.—This bed, first designated by name in this report, is of workable thickness only on Bullskin creek and there only in an extremely small area.

The interval between the Burns and Manchester beds is mostly occupied by shales near the mouth of Bullskin creek and by sandstones near the mouth of Redbird creek.

Manchester Coal Bed.—This bed is about 3 feet thick on Bullskin creek to where it goes below that stream 1½ miles up it. The bed goes below Redbird creek about two miles up with coal reported 33 inches thick. Openings about Oneida develop a fairly uniform thickness of coal. The bed lies on a thick massive sandstone.

On the following pages are given details of openings visited recently and in former years, together with such additional information from other sources as has been acquired by the writer.

A line of precise levels up Redbird creek, in aid of this report, by the Kentucky Geological Survey, and occasional United States altitudes on streams coming into the creek from the east have enabled a close approach to accuracy in the altitudes of openings obtained by baro-

meter from those bases and consequently, in most cases, great confidence in correlations.

In the following pages distances given in miles are mostly taken from maps and follow roughly the principal sinuosities of the streams. Generally they vary little from distances by road, but in the first fifteen miles up Redbird creek the distance is increased over that by road about 3 miles.

Distances underground given in yards are approximate only. Thicknesses of strata given in feet are approximate, those given in inches are by measure.

Detailed descriptions of coal openings and matters pertaining thereto are arranged in geographical sequence, beginning farthest down stream and taking up each tributary where coal was found as arrived at in going up stream. The terms left and right are used as when looking up stream.

THE COALS OF BULLSKIN CREEK AND ITS TRIBUTARIES.

BULLSKIN CREEK.

Altitude of mouth about 722.

Strata lie nearly level the full length of this creek but probably form a slight northeast southwest syncline crossing the creek 2 to 3 miles up it. At 4 to 7 miles up a southerly dip across the stream is noted, which appears to diminish in rate up stream.

A prospect on the left at the mouth of the creek gives the following:

Manchester Coal.

Shale	10 ft.
Coal	34″
Altitude, 750.	

On a left branch, ½ mile up the creek, on the left, ¾ mile up the branch and 25 feet above it, is the following exposure:

Howard (?) Coal.

Shale	2 ft.
Black slate	1 ft.
Coal	42″
Shale	1 ft.
Altitude, 1110.	

The coal is especially fine-looking and a large part of it splint. The hills here, apparently 100 to 200 feet higher, give a good working area to the bed, but until opened elsewhere in the vicinity its value is wholly uncertain. Without allowance for dip (strata along the branch seem to be level), this coal would appear to be about midway between the Howard and Whitesburg beds. There is a pocket of similar workable coal of the Howard bed on Goose creek above Collins fork.

On the point of the hill on the left, ½ mile up the creek, is the following exposure:

Sandstone.	
Bench.	
Altitude, 845.	
Covered	5 ft.
Shale	5 ft.
Black slate.	
Shale	5 ft.
Sandstone	5 ft.
Shale	25 ft.
Black shale and thin iron ore.	
Shale	40 ft.

Manchester coal entry: Altitude 755.

The amount of shale in this section is in marked contrast to the strata over the coal along Redbird creek where sandstone cliffs predominate. The entry is abandoned, with 2 to 3 feet of coal still visible.

On the right, 1⅜ miles up Bullskin creek, a 23-yard entry 5 feet above the creek gave the following:

Manchester Coal.

At Mouth.		At Face.	
Shale	10 ft.	Coal	14″
Coal	26″	Shale	4″
		Coal	27″

Altitude, 750.

The coal runs uniformly at about 26 inches for nearly 20 yards in, and then the bottom of the bed dips quite rapidly and the parting and shelly coal above it come in.

LITTLE BULLSKIN CREEK.

On the left, 1¼ miles up Bullskin creek: Altitude of mouth, 745.

The Manchester bed goes below this creek at its mouth. All coal used by the inhabitants has come from that outcrop or from entries below, and only one opening on the creek was found.

OLD SUGAR CAMP BRANCH.

On the right, 1¼(?) miles up Little Bullskin creek.

A prospect on the right of the gap to Barn branch and 45 feet above it gave the following:

Fire-clay Coal Rider.

Coal .....19″
Shale ..... 6″
Coal .....16″
Soft Shale ..... 1″
Altitude, 1275.

BARN BRANCH.

On the left, 3¾ miles up Bullskin creek: Altitude of mouth, 810.

Dudley Burns has several entries in the point of the hill on the right here and to ⅛ mile up the branch giving coal thinning up stream from 36 inches to 30 inches, all without parting. Following is a representative section:

Burns Coal.

Shale .....10 ft.
Coal .....30″
Clay.
Sandstone ..... 8 ft.
Altitude (of coal), 835.

An entry in the point of the hill, fronting Bullskin creek, has 39 inches of coal, 4 yards in, with a 3-inch shale parting 3 inches from the top.

This coal probably lies on the bench 90 feet above the Manchester bed shown in the section given as ½ mile up Bullskin creek. Prospecting in the vicinity is reported to have found the bed elsewhere as thin.

This is the only place where this bed is known to be of workable thickness and to it now is given the name of "Burns." The bed has been identified elsewhere only in a few instances.

On the left, 4¼ miles up Bullskin creek, Irvine Davidson has a closed entry giving the following at its mouth:

Howard Coal.

Laminated sandstone .....10 ft.
Shale ..... 5 ft.
Coal reported .....26″
Altitude, 965.

Above the entry, at the head of a drain there, a prospect showed the following bed-section:

Fire-clay Coal.

Massive sandstone	20 ft.
Shaly sandstone	1 ft.
Coal	22″
Shale and flint fire-clay	8″
Coal	4″
Shale.	
Altitude, 1220.	

SHEEP HOLLOW.

On the right, 4¼ miles up Bullskin creek: Altitude of mouth, 815.

In this hollow the following was found, which may have been mistaken for the same bed as that in which is the preceding Burns entry, but more likely to be splits of the Howard bed, the southerly dip being considerable here:

Howard Coal.

Sandstone	3 ft.
Coal	12″
Shale and sandstone	10 ft.
Coal	4″
Shale	6″
Coal	7″
Shale	2½ ft.
Coal	11″
Bituminous shale	2″
Coal	2″
Sandstone	8 ft.
Altitude (of lowest coal), 915.	

The Burns coal apparently goes under Bullskin creek, about one foot thick and at altitude 825, near the former Samuel Davidson house, 4½ miles up the creek.

On the left at this place the following were found, the southerly dip causing the apparent intervals between the high and low coals to be greater than is actually the case:

Fire-clay Coal Rider.

Coal ..... 2″
Shale ..... 2″
Coal ..... 13″
Shale ..... 6″
Coal ..... 11″
Altitude, 1250.

Fire-clay Coal.

Coal ..... 21″
Flint fire-clay ..... 6″
Coal ..... 2″
Altitude, 1235.

Howard Coal.

Sandstone ..... 3 ft.
Coal ..... 12″
Shaly sandstone ..... 10 ft.
Coal ..... 11″
Shale ..... 8″
Coal ..... 4″
Shale ..... 3″
Coal ..... 4″
Altitude (of lowest coal), 895.

IVY BRANCH.

On the left, 6 miles up Bullskin creek: Altitude of mouth, 880.

Three-eighths mile up this branch to its forks and on the left, ⅛ mile up the right fork, is a stripping of the following:

Howard Coal.

Shale ..... 5 ft.
Coal ..... 24″
Altitude, 975.

On the right, ¼ mile up the right fork, Joseph Hignite has a 1-yard entry with the following section:

Fire-clay Coal Rider (?).

Shale ..... 4 ft.
Coal ..... 16″
Black slate ..... 2″
Coal ..... 8″
Clay ..... 1″
Coal ..... 4″
Altitude, 1255.

The difference in altitude of these two openings gives very nearly the vertical interval between the two beds. The entry may possibly be in the Fire-clay coal, but the indications are that that bed lies about 20 feet lower.

DANIELS (BIG) BRANCH.

On the right, 6½ miles up Bullskin creek: Altitude of mouth, 895.

On the right, ⅜ mile up this branch an outcrop shows the following:

Howard Coal.

Laminated sandstone	5 ft.
Shale	10 ft.
Coal	17″

Altitude, 965.

On a right branch with mouth at altitude 930, ¾ mile up Daniel branch, on the left, ⅛ mile up the right branch, the Daniel Davidson heirs have a 12-yard entry with the following bed-section at its face:

Fire-clay Coal.

Sandstone	4 ft.
Shale	4 ft.
Coal	26″
Flint fire-clay	5″
Coal	4″

Altitude, 1190.

Cliffs forming the crest of the hills along the branch are evidently of the sandstone between the Haddix and Hazard beds.

At the head of a left drain, 6⅝ miles up Bullskin creek, a 12-yard entry, beside five others abandoned, gives the following bed-section 3 yards in:

Fire-clay Coal.

Sandstone	8 ft.
Coal	25″
Flint fire-clay	4″
Coal	6″

Altitude, 1245.

The bottom coal is hard and bony.

LICK BRANCH.

On the right, 7¼ miles up Bullskin creek: Altitude of mouth, 915.

On the left, ½ mile up this branch, Harvey Hatton has a long entry with the following bed-section 3 yards in:

Fire-clay Coal.

Sandstone	10 ft.
Coal	28″
Flint fire-clay	5″
Coal	5″
Shale	6″
Coal	11″

Altitude, 1180.

At 7¾ miles up Bullskin creek the Howard bed goes below drainage at altitude 935.

TRACE BRANCH.

On the right, 8½ miles up Bullskin creek: Altitude of mouth, 950.

On the right, at the mouth of this branch, a thin coal crops out at altitude 985.

On the right, ¼ mile up the branch, Joseph Arnett has, with three others, abandoned an 8-yard entry with the following bed-section at its face:.

Fire-clay Coal.

Massive sandstone	5 ft.
Coal	33″
Flint fire-clay	5″
Coal	8″
Shale	7″
Coal	16″

Altitude, 1165.

A coal stain shows in the road under the entry at altitude 1045.

On a right branch, ¼ mile up Trace branch, on the right ¼ mile up the right branch, an abandoned entry gives the following bed-section 3 yards in:

Fire-clay Coal.

Sandstone ..... 5 ft.
Coal .....32″
Flint fire-clay ..... 4″
Shale .....14″
Coal .....(thin?)
Altitude, 1155.

On the right, ½ mile up Trace branch on the right at the mouth of the right branch, a 10-yard entry gives the following bed-section at its face:

Fire-clay Coal.

Sandstone ..... 5 ft.
Coal .....30″
Flint fire-clay ..... 5″
Coal ..... 7″
Shale over ..... 5″
Altitude, 1160.

SOURWOOD BRANCH.

On the right, 9¼ miles up Bullskin creek: Altitude of mouth, 980.

In a right drain, ¾ miles up this branch and on its left fork, Levi Bowling has an 8-yard entry with the following bed-section at its face:

Fire-clay Coal.

Massive sandstone .. 5 ft.
Coal .....20″
Flint fire-clay ..... 5″
Coal .....10″
Shale ..... 8″
Coal.
Fire-clay.
Altitude, 1160.

LEFT FORK.

On the left, 12 miles up Bullskin creek: Altitude of mouth, 1085.

On the right, ¾ mile up and 25 feet above the fork (on the road to Hell-for-Certain creek), a 4-yard entry gives the following bed-section:

Fire-clay Coal.

Sandstone	15 ft.
Coal	26″
Flint fire-clay	4″
Coal	6″

Altitude, 1195.

On the opposite side of the fork an 8-yard entry, at altitude 1200, has 30 inches of coal under sandstone and with flint-clay floor.

THE COALS OF REDBIRD CREEK AND ITS TRIBUTARIES.

REDBIRD CREEK.

The Manchester coal, 33 inches thick at the mouth of Bullskin creek, where it is about 30 feet above drainage and at altitude 750, is reported to be of about the same thickness where formerly raised from the bed of Redbird creek, ¾ and 1½ miles up it, at altitudes 725 to 730. The light southeasterly dip reverses to northwesterly near here, the latter clearly shown in the cliffs a mile or two farther up stream, but it does not continue farther.

A coal stain in the road, where it crosses a low spur, 2 miles up Redbird creek is at altitude 880, about 100 feet below the Howard coal. The road summit at altitude 929 is then perhaps 50 feet below that bed.

On a left branch, 6 miles up Redbird creek, but only about a mile by air line from the road summit just mentioned, on the right, ¼ mile up the branch, a partly closed 4-yard entry gives the following at its mouth:

Howard Coal.

Shaly sandstone	5 ft.
Coal	3″
Shale	3″
Coal	16″

Altitude, 945.

BEAR CREEK.

On the right, 6¼ miles up Redbird creek: Altitude of mouth, 752.

Strata rise southwestward up this creek at a rate of about 15 feet per mile, as shown by openings on the Fire-clay coal. An opening into the same bed across the ridge, on Laurel branch of Goose creek, indicates a line of strike northwestward here.

The Fire-clay coal rider is 36 inches thick toward the head of the creek, but the quality of the coal is not satisfactory. The Fire-clay coal is the best developed bed, but is nowhere workable except for local needs. Two or

three thin seams of coal have been opened below the Fire-clay coal, but none of them important, though one includes cannel coal.

LEFT BRANCH.

One mile up Bear creek: Altitude of mouth, 765.

On the right, ½ mile up the branch, a 15-yard entry has the following bed-section at its face:

Fire-clay Coal.

Sandstone	8 ft.
Coal	21″
Flint fire-clay	5″
Coal	3″
Shale	5″
Coal	7″

Altitude, 1230.

On the right, 1⅜ miles up the creek, a prospect gives 16 inches of coal under 1½ feet of shale and then sandstone. This is of the Howard bed, at altitude 940.

LEFT BRANCH.

One and one-half miles up Bear creek: Altitude of mouth, 780.

At the head of the branch, ¼ mile up, John Wilson has an 8-yard entry with the following bed-section at its face:

Fire-clay Coal.

Sandstone	8 ft.
Coal	24″
Flint fire-clay	4″
Coal	3″
Shale	5″
Coal	4″

Fire-clay.

Altitude, 1235.

LEFT BRANCH.

Two and one-quarter miles up Bear creek: Altitude of mouth, 825.

A prospect on the right of the branch at its mouth gives 12 inches of coal under 3 feet of shale, at altitude

840. This is of the Burns coal bed of Bullskin creek. Cannel coal may be 5 feet under it here.

On the left, ¼ mile up the branch, John Stubblefield has a 1-yard entry with the following bed-section:

Fire-clay Coal.

Massive sandstone	10 ft.
Coal	18″
Flint fire-clay	5″
Coal	3″
Shale	5″
Coal	7″

Altitude, 1260.

LEFT BRANCH.

Two and three-quarter miles up Bear creek: Altitude of mouth, 860.

A stripping on the left, ⅛ mile up this branch gives the following section:

Burns (?) Coal

Laminated sandstone.	
Shale	2 ft.
Black slate	1 ft.
Coal	9″
Fire-clay	6″
Shale	18″
Sandstone	2 ft.
Cannel coal	13″

Black slate.

Altitude, 920.

The cannel coal although of excellent appearance is evidently heavy in ash.

LEFT DRAIN.

Three miles up Bear creek: Altitude of mouth, 875.

A stripping in the drain at its mouth gives 10 inches of coal under 15 feet of shale, at altitude 890. Again the Burns coal with possible cannel coal under it.

BOWLING BRANCH.

On the right, 3¾ miles up Bear creek: Altitude of mouth, 925.

On the right, ½ mile up the branch, Daniel Bowling has the following in outcrop:

Fire-clay Coal.
Sandstone .....20 ft.
Coal .....22″
Flint fire-clay.
Altitude, 1270.

Whether or not there is more coal below the flint fire-clay is not known.

On the right of the branch, ⅝ mile up it, the Howard coal shows in outcrop, 18 inches thick under 5 feet of shale at altitude 990.

THREE FORKS.

Four and one-half miles up Bear creek: Altitude of mouths of upper two of the forks, 950.

On the left, ¼ mile up the right fork, Alfred Hacker has a 10-yard entry with the following bed-section at its face:

Fire-clay Coal Rider (?).
Shale .....10 ft.
Coal .....36″
Shale.
Altitude, 1325.

The lower half of the coal is bony and in part heavy. This entry may possibly be in the Fire-clay coal, but its altitude and shale floor are indicative of the rider, as is also the bench upon which it rests.

On a right branch, 8⅜ miles up Redbird creek (opposite Bar postoffice), on the left, ⅛ mile up the branch, a long entry gives the following bed-section 4 yards in:

Fire-clay Coal.
Sandstone ..... 8 ft.
Coal .....26″
Flint fire-clay.
Altitude, 1220.

The bench of the rider is clearly defined 45 feet above the entry, and 205 feet above the entry is the base of a 50-foot cliff forming the crest of the hill and the cap-rock of the Haddix coal.

BANKS BRANCH.

On the right, 8½ miles up Redbird creek: Altitude of mouth, 762.

A quarter mile up to a left branch and ½ mile up the latter to its head is a 12-yard entry of the following bed-section, 3 yards in:

Fire-clay Coal.

Sandstone	4 ft.
Coal	29″
Flint fire-clay	5″
Bituminous shale	2″ or more
Soft fire-clay.	

Altitude, 1205.

SAM BRANCH.

On the right, 10½ miles up Redbird creek: Altitude of mouth, 773.

A quarter mile up the branch to a right fork, ¼ mile up the latter, and ⅛ mile up a small right branch there and in it is a stripping of 22 inches of coal, under 3 feet of shale, at altitude 940. This, at 280 feet under the Banks branch Fire-clay coal, is of the Howard bed.

DRY BRANCH.

On the left, 10¾ miles up Redbird creek: Altitude of mouth, 774.

A quarter mile up a right branch, ⅜ mile up Dry branch, in a right drain, is a 1-yard entry into the Howard coal, 24 inches thick under 4 feet of shale, at altitude 930.

On the left, a mile up Dry branch is 10 inches of coal under 30 feet of shale, at altitude 885. This is probably of the lower split of the Howard bed.

Coal, of the Howard bed, is reported in Dry branch, 1½ miles up, at the mouth of Charlie fork, altitude 945.

At the head of Charlie fork, ½ mile up, the base of a 40-foot cliff, the crest of the hill and cap-rock of the Haddix coal is at altitude 1380.

HECTOR CREEK.

On the right, 11½ miles up Redbird creek: Altitude of mouth, 775.

As on Bear creek strata rise up stream, but with double the average rapidity or about 30 feet per mile. From a mile up Bear creek to a mile up Hector creek there is a fall of strata of 100 feet, or 40 feet per mile, so that the increased rate up Hector creek makes strata nearly level between the heads of the two streams.

The principal development on Hector creek, is in the Fire-clay coal, but its maximum thickness found is only 32 inches. Its excellent quality was particularly noted on this stream. The rider, the Howard and one bed 40 to 50 feet lower were also found.

BEN BRANCH.

On the left, one mile up Hector creek: Altitude of mouth, 800.

On the left, ½ mile up the branch (right fork), J. M. Hensley has a long entry with the following section, the coal measured 4 yards in:

Fire-clay Coal.

Sandstone	4 ft.
Coal	32″
Hard floor.	
Altitude, 1130.	

The quality of the coal and its hard floor, by which the opening and others of this region are corrected, as distinguished from the Rider, are not wholly reliable criteria, but such openings have been traced so nearly to similar ones where the flint clay is found as to leave little room for doubt as to the correlation.

A coal stain in the road, on the right, 1¼ miles up, is at altitude 840, probably about 50 feet below the Howard bed.

A right branch, 2 miles up Hector creek, has at its mouth an altitude of 830.

In a left drain, ¼ mile up this branch the Howard bed is opened in a prospect giving 24 inches of coal, under

6 feet of shale, at altitude 910. The coal shows about the same in a 2-yard partly closed entry in a drain across the branch from this prospect.

On a left branch, 2½ miles up the creek, on the left, ¼ mile up the branch, a 20-yard entry gives the following:

Fire-clay Coal.

Sandstone	10 ft.
Coal	32″

Altitude, 1180.

On a left branch, 3 miles up the creek, a stripping, ⅛ mile up the branch, gives the following:

Howard Coal.

Shale	4 ft.
Black slate	1 ft.
Coal	17″

Altitude, 930.

At the head of a left drain, 5 miles up Hector creek, Silas Hensley has an 8-yard entry with the following bed-section at its mouth:

Fire-clay Coal.

Sandstone	3 ft.
Coal	28″

Hard dark shale.

Altitude, 1265.

In an early investigation the rider was found at Addison Lewis' ("5 miles up the creek") and 15 feet above the Fire-clay coal. Following is the section obtained:

Fire-clay Coal Rider.

Coal	18″
Shale	2″
Coal	14″

Fire-clay.

This opening is now lost and, so far as known, none other on this creek has been made.

In a left drain, with mouth at altitude 985, 5½ miles up Hector creek, ¼ mile above the road to Lockhart

creek, Luther Bowling has an entry giving the following section:

Fire-clay Coal.

Sandstone ..... 5 ft.
Coal .....29″
Fire-clay.
Altitude, 1270.

JACKS CREEK.

On the left, 12¼ miles up Redbird creek: Altitude of mouth, 780.

Strata lie very nearly level on this creek, as evidenced by the several openings into the Fire-clay coal bed. The Howard bed, 240 feet below, and one 125 feet below the Fire-clay coal have also been opened.

On the left, ⅝ mile up Jacks creek the following bed-section was obtained at the mouth of an abandoned entry:

Fire-clay Coal.

Sandstone ..... 3 ft.
Coal .....27″
Flint fire-clay about 5″
Clay, over ..... 6″
Altitude, 1095.

On the right, one mile up Jacks creek, at its level, is the following:

Howard Coal.

Shale .....15 ft.
Coal .....14″
Altitude, 860.

On the left, 1⅜ miles up the creek, an abandoned long entry gives the following section at its mouth:

Massive sandstone ..15 ft.
Coal .....32″
Flint fire-clay ..... 3″
Shale ..... 7″
Coal ..... 1″
Shale ..... 1″
Coal ..... 5″
Altitude, 1105.

DAVE BOWLING (SPURLOCK) BRANCH.

On the left, 1⅝ miles up Jacks creek: Altitude of mouth, 910.

On the left of a left drain, ⅛ mile up the branch, a now abandoned entry of David Bowling's formerly gave the following bed-section at its face 6 yards in:

Fire-clay Coal.

Sandstone	5 ft.
Coal	32″
Flint fire-clay	5″
Coal	11″
Clay	1″
Coal	6″

Altitude, 1075.

From the branch, ¼ mile up, coal of excellent appearance, probably the Burns coal of Bullskin creek, has been extracted at altitude 955.

RIGHT FORK.—On the right, ½ mile up Dave Bowling branch: Altitude of mouth, 1065.

A prospect in this fork, ⅛ mile up it, gives the following:

Fire-clay Coal.

Shaly sandstone.	
Coal	25″ to 31″
Hard floor.	

Altitude, 1095.

The hard floor is unquestionably of flint fire-clay, some of which lies in the dump.

On the right, 3¼ miles up Jacks creek, H. J. Cornett has a long entry of the following bed-section 8 yards in:

Fire-clay Coal.

Sandstone	5 ft.
Shale	8 ft.
Coal	32″
Flint fire-clay	4″
Coal	4″

Altitude, 1090.

This entry is 40 feet above the mouth of Big Lick branch, ⅛ mile below.

COPES BRANCH.

On the left, 14½ miles up Redbird creek: Altitude of mouth, 788.

On the left, ¾ mile up the branch, C. O. Britton has a long entry with the following bed-section 6 yards in:

Fire-clay Coal.
Sandstone ..... 1 ft.
Coal .....36"
Altitude, 1100.

BIG CREEK.

On the left, 15 miles up Redbird creek: Altitude of mouth, 789.

Strata along this creek rise eastward almost imperceptibly on the lower half of its course and then dip at a like small rate to its head. Across the creek, from the head of Ulysses fork to the head of Bear branch about 3 miles in a direction nearly due south, the fall amounts to 45 feet.

The Fire-clay coal has been most extensively developed and toward the headwaters presents a fine mining field with clean coal in places more than 4 feet thick. There is some indication that its rider is also workable to slight extent.

Besides three thin coals above the rider, openings have been made in the Hazard bed giving four to five feet of clean coal, but it is doubtful if the bed has sufficient area for mining elsewhere than about the head of the creek, where still it is not far from the top of the main dividing ridge.

Three seams of coal have been found below the Fire-clay coal, but, though these include the Whitesburg and Howard beds, there is no prospect of finding any of them of workable thickness on this creek.

GRANNY BRANCH.

On the left, ½ mile up Big creek: Altitude of mouth, 810.

On the left, 1¼ mile up, 100 feet above the branch, P. D. Marcum has an 8-yard entry of the following bed-section at its face:

Fire-clay Coal.

Sandstone ..... 4 ft.
Coal .....25″
Fire-clay.
Altitude, 1120.

As on Copes branch, preceding, the quality of the coal, its sandstone roof and the absence of any bench at the opening are factors in determining the correlation. Flint fire-clay lies under coal of like thickness, 45 feet higher on Schoolhouse branch, less than a mile eastward, and some 225 feet below the Haddix coal, while this entry is 215 feet below the bench of that coal a quarter mile east of it on the trail to Jacks creek. The entry is clearly too low to be of the rider, 30 feet above the Fire-clay coal (on Ulysses fork) and the coal too thick to be of the Whitesburg bed 35 feet below that bed.

On the right, 5/8 mile up Big creek is 18 inches of coal under 15 feet of shaly sandstone at altitude 820, ten feet above the creek. This coal is of the Howard bed and is 280 feet below the Fire-clay coal and consequently 200 to 250 feet above the Manchester coal, assuming that intervals here are the same as on Laurel fork of Goose creek, the nearest point where a close approximation has been obtained of the interval between the Fire-clay coal and the Manchester bed.

SMITH BRANCH.

On the right, one mile up Big creek: Altitude of mouth, 825.

On a right branch, one mile up, on the right, 3/8 mile up this branch, a 1-yard entry gives the following section:

Fire-clay Coal (?).

Laminated sandstone 5 ft.
Coal .....15″
Black slate .....18″
Altitude, 1105.

The black slate floor is rather indicative of the Whitesburg bed, but the opening is high for that correlation. The roof appears to predicate the change to shale

eastward of the sandstone heretofore noted over the Fire-clay coal.

On a left branch, 1¼ miles up Big creek, on the left, ¼ mile up the branch, Wiley Spurlock has a 1-yard entry with 27 inches of coal under 8 feet of shale, at altitude 1120. The shale roof might lead to the correlation of this as of the Fire-clay coal rider, but the thickness of the coal is indicative of the main lower bed.

BEAR BRANCH.

On the right, 1⅞ miles up Big creek: Altitude of mouth, 850.

On a right branch, ⅛ mile up Bear branch, on the right, ⅛ mile up the right branch, Lee Crawford has a prospect partly covered, into the Fire-clay coal bed showing about 3 feet of coal, partly splint, on 6 inches or more of common fire-clay, at altitude 1120.

On the left, at stream level, ¼ mile up Bear branch, a thin coal of the Howard bed outcrops at altitude 870.

A mile up the branch, Mr. G. M. Sullivan, from extensive prospecting in 1891, reported one opening with coal 33 inches thick and another with coal 26 inches and a parting of 5 inches, 6 inches from the top. These are presumed to be in the Fire-clay coal bed.

The forks of Bear branch are ¾ mile up it. On a left branch, ¾ mile up the left fork, on the right, ⅛ mile up the left branch, the Thomas A. Bird entry has the following bed-section at its face 50 yards in:

Fire-clay Coal.

Shale	3 ft.
Coal	14″
Shale	2″
Coal	4″
Shale	2″
Coal	41″

Fire-clay.
Altitude, 1085.

Measurement at a former visit when the entry was but 6 yards in gave 61 inches of coal with a parting of

3 inches. The floor is of common fire-clay, very hard, under which is thick sandstone. In appearance and as seen in use the coal from this entry is believed to be equal to that from mines elsewhere in the same bed.

Between the forks of the left fork, 1¼ miles up it, a prospect formerly gave:

Fire-clay Coal.

Coal	16″
Shale	5″
Coal, about	24″

Altitude, 1085.

When seen the lower 6 inches was in water and the bottom, though nearly, was not quite found.

In a right drain, 2 miles up Big creek, Lee Crawford has an entry with the following bed-section at its face 6 yards in:

Fire-clay Coal.

Coal	23″
Clay	1″
Coal	30″

Altitude, 1130.

This is in good bright coal, similar to that in the Bear branch entry, but without the splint seen in Mr. Crawford's Bear branch prospect. He claimed that the latter is of a bed below the entry, but evidence of it is lacking.

On the left, 2⅜ miles up Big creek, Mr. Roberts had formerly an opening of the following section:

Fire-clay Coal.

Clay	3 ft.
Coal	14″
Clay	2″
Coal	26″

The altitude of the opening is not known. An upper bench of coal was hidden by timbering.

ULYSSES FORK.

On the left, 2½ miles up Big creek: Altitude of mouth, 860.

SCHOOLHOUSE BRANCH.—On the left, ⅜ mile up Ulysses fork: Altitude of mouth, 870.

Data of this branch are derived entirely from Mr. Sullivan's work, but correlations are now added.

On the left at the mouth of the branch is the following:

Fire-clay Coal.

Coal .....27″
Clay .....36″
Coal .....38″
Altitude, 1160 (?).

It is quite possible that the rider is represented in the 27 inches of coal of this section and that the thick coals of this vicinity result from its contact with the Fire-clay coal. At the head of Big creek, however, the rider is found over thick coal.

A sample from the badly weathered outcrop of the 38-inch seam on analysis gave over 11% of ash, a result so clearly due to outcrop that the analysis is discarded.

On a left branch, ¼ mile up Schoolhouse branch, on the right, ¼ mile up the left branch, is the following:

Fire-clay Coal.

Coal ..... 3″
Clay ..... 1″
Coal .....24″
Flint clay.
Altitude, 1160 (?).

On the head, ½ mile up a left branch, ½ mile up Schoolhouse branch, the same bed has but 24 inches of coal, lying on flint clay 4 inches thick at altitude 1160 (?). The coal here dips sharply N. 20 degrees W.

On the left, ½ mile up a left branch one mile up Schoolhouse branch, the Fire-clay coal was found thin.

Following is Mr. Sullivan's section of strata as found on this branch, the upper half probably on the small branch just mentioned:

Massive sandstone	50 ft.	
Slate.		
Coal (Haddix)	8″	Altitude, 1390
Sandstone	100 ft.	
Shale	15 ft.	
Coal	3″	Altitude, 1275
Shaly sandstone	15 ft.	
Coal	3″	
Clay	2″	
Coal (Hamlin)	15″	
Shale	2″	
Coal	6″	Altitude, 1255
Sandstone	55 ft.	
Shale	5 ft.	
Coal (Fire-clay Rider)	8″	Altitude, 1195
Shale	5 ft.	
Sandstone	20 ft.	
Coal (Fire-clay)	24″	Altitude, 1165
Flint fire-clay.		
Sandstone	25 ft.	
Shaly sandstone	5 ft.	
Slate	6″	
Clay (Whitesburg)	12″	
Coal	12″	Altitude, 1130
Sandstone	75 ft.	
Shale (with concretions)	40 ft.	
Thin coal		Altitude, 1015
Shale (with concretions)	25 ft.	
Sandstone	20 ft.	
Shale	15 ft.	
Sandstone	35 ft.	
Shale	25 ft.	
Coal (Howard)	10″	Altitude, 895
Shale	20 ft.	
Sandstone to mouth of Ulysses Fork	15 ft.	

It is probable that the section is stretched 20 to 30 feet through neglect to allow for up-stream rise of strata, so slight as to have been considered negligible.

On a left branch, ¾ mile up Ulysses fork, on the left, ⅛ mile up the branch, Thomas Hensley has a 5-yard entry with 30 inches of coal 1 yard in. He reports 2½ feet more coal four feet lower, and the exposure made and now partly covered at the mouth of the entry was probably for investigating such coal. The exposed section is:

Fire-clay Coal.

Sandstone	3 ft.
Coal	30″
Dark shale	4″
Black slate	6″
Shale	4″
Calc. sandstone	2″
Shale	12″

Altitude, 1155.

RIGHT FORK.—On the right, 1¾ miles up Ulysses fork: Altitude of mouth, 955.

On the right of a left branch, 1¾ miles up this fork, Felix Roberts has an 8-yard entry with the following bed-section at its face:

Fire-clay Coal.

Shale	5 ft.
Coal	26″
Bone coal	1″
Coal	20″

Altitude, 1165.

LEFT FORK.—On the left, 1¾ miles up Ulysses fork: Altitude of mouth, 955.

On a left branch, ¼ mile up this fork, on the left, ⅛ mile up the branch, Howell Bowling has a prospect showing the following:

Fire-clay Coal.

Clay.
Coal ..... 50″
Bituminous shale.
Altitude, 1140.

MEADOW FORK.—On the right, ½ mile up Left fork: Altitude of mouth, 1015.

On the right at the mouth of the fork, J. M. Finley has a small mine with the following section 100 yards in:

Fire-clay Coal.

Shale.
Coal ..... 48″
Hard black shale.
Altitude, 1145.

At 3 yards in the coal is 47 inches thick and at 30 yards in apparently only 43 inches, but the average thickness is very nearly if not quite 4 feet. An inch of cannel coal lies at the bottom in places, but is not constant. The excellence of the coal is attested by the fact that it is used not only by most of those living below on Big creek, but even so far as the schoolhouse on Elk creek, 9 miles away.

On the right, ¾ mile up Left fork, is another Finley mine not visited. Beside it is one formerly seen when 50 yards in, and of the following section at its mouth:

Fire-clay Coal.

Sandstone.
Coal ..... 46″
Bony coal ..... 8″
Bituminous shale.
Altitude, 1130.

At the face the bony coal was left as a floor and about 4 feet of coal was mined.

CHANDLER BRANCH.

On the left, 3½ miles up Big creek: Altitude of mouth, 875.

On the right at the branch, ⅛ mile up it, the Howard bed shows 9 inches of coal at altitude 890. Instead of the usual thick shale over it the shale here is 0 to 2 inches thick and then sandstone.

On a left branch, ⅜ mile up Chandler branch, in a left drain, ⅛ mile up the left branch, the face of a 4-yard entry gives the following bed-section:

Fire-clay Coal.

Sandstone.
Coal ..... 29″
Bony coal ..... 2″
Coal ..... 9″
Flint fire-clay ..... 5″ or more
Altitude, 1135.

An entry 5 yards to the left of the foregoing shows on one side of it the coal mostly squeezed out by a downward roll of the sandstone roof.

At Chandler branch, ¾ mile up it, 4 inches of coal shows under 20 feet of shaly sandstone at altitude 995, and again ⅞ mile up the branch at altitude 1025.

On the left, 10 feet above the branch, one mile up it, the following bed-section was obtained in a 2-yard entry:

Fire-clay Coal.
Shale ..... 8 ft.
Coal .....29″
Flint fire-clay ..... 4″
Coal (or black slate) 4″
Altitude, 1140.

The lower 4 inches was in water and not seen.

COLLINS FORK.

On the left, 4 miles up Big creek: Altitude of mouth, 895.

HOLLINS FORK.—On the left, ¾ mile up Collins fork: Altitude of mouth, 925.

BOB FORK.—On the left, ⅜ mile up Hollins fork: Altitude of mouth, 965.

On the left, ¼ mile up Bob fork, the following was obtained 5 yards in a 15-yard entry:

Fire-clay Coal.
Massive sandstone .. 3 ft.
Coal .....44″
Black flint fire clay.
Altitude, 1095.

On the right, one mile up, 10 feet above Bob fork, a 2-yard entry gives the following at its mouth:

Fire-clay Coal.
Massive sandstone ..20 ft.
Coal .....24″
Fire-clay.
Altitude, 1155.

The coal is so characteristic in appearance of the Fire-clay bed as to leave little doubt as to correlation, and the sandstone roof tends to confirm it.

HALF-WAY BRANCH.—On the right, 1¾ miles up Hollins fork: Altitude of mouth, 1070.

On a left branch, ¾ mile up Half-way branch at Obed postoffice, on the left (of a right fork), ⅛ mile up the left branch, H. B. Collins has a 10-yard entry with the following bed-section at its face:

Haddix Coal.

Massive sandstone	8 ft.
Shale	2 ft.
Coal	5″
Shale	9″
Coal, about	28″

Altitude, 1380.

The bed lies on a very promiment bench.

On the right, 2¼ miles up Hollins fork, 10 feet above it, a stripping gives the following:

Fire-clay Coal.

Sandstone	5 ft.
Shale	1 ft.
Coal	26″
Fire-clay	8″
Sandstone	3 ft.

Altitude, 1120.

On a right branch, 1½ miles up Collins fork, on the right of the branch at its mouth, a 3-yard entry has the following bed-section at its face:

Fire-clay Coal.

Shale	8 ft.
Coal	51″
Flint fire-clay	4″
Coal	4″

Fire-clay.

Altitude, 1105.

In Collins fork, 1⅞ miles up it, is the following:

Whitesburg Coal.

Shale.

Coal	6″

Soft fire-clay.

Sandstone.

Altitude, 1080.

On the right, 2 miles up the fork, a closed entry into the Fire-clay coal, 15 feet above the creek, is at altitude 1105 (U. S. levels).

On the left, 2¼ miles up the fork a prospect gives the following, 15 feet above the stream:

Fire-clay Coal Rider.

Shale ..... 5 ft.
Sandstone ..... 3 ft.
Coal .....18"
Soft fire-clay.
Altitude, 1145.

At the three forks, 3 miles up Collins fork, the altitude is 1210.

On the right, ¼ mile up the left fork, a stripping gives the following:

Hazard Coal.

Earth.
Coal stain.
Clay and shale (with iron ore) ..... 4 ft.
Coal ..... 3 ft.
Clay.
Altitude, 1450.

The opening lies on a broad bench at the base of a sandstone peak rising about 100 feet higher. The bench of the Haddix coal is also very prominent on the level of the gap to Half-way branch, 70 feet below. Probably the interval between the two beds is somewhat greater than the benches and barometer readings indicate, but there remains still a reduction of perhaps 50 feet from the interval as found on Middle fork waters near Hyden.

On a right branch, 4 miles up Big creek (opposite Collins fork), on the right, ¼ mile up the branch and on its right fork, 5 feet above it, Hiram Sizemore has a 2-yard entry giving the following:

Fire-clay Coal.

Laminated sandstone 8 ft.
Coal .....44"
Altitude, 1120.

HALLS FORK.

On the right, 4 miles up Big creek: Altitude of mouth, 895.

OLD HENRY FORK.—On the right, one mile up Halls fork: Altitude of mouth, 945.

MCFADDEN BRANCH.—On the right, ¾ mile up Old Henry fork: Altitude of mouth, 1000.

On the left, ½ mile (or more) up this branch, Wesley McFadden had an opening giving the following section:

Hazard (?) Coal.

Coal	49″
Shale	20″
Coal	12″

Altitude, 1410.

The altitude obtained makes the bed about 310 feet above the Fire-clay coal, some 60 feet more than it should be and even above the level of the Flag coal, which it may possibly represent. The bed-section, however, is too similar to other openings into the Hazard bed to admit of much doubt as to the latter correlation. The opening appears now to be lost and even the name McFadden almost forgotten in the neighborhood. Inclination of strata probably accounts for a considerable part of the excess of interval.

My sample of the 49-inch seam, part of which is splint coal, gave the following results to analysis by Dr. R. Peter:

Hazard (?) Coal.

Chemical Report No. 2740.

Moisture	1.60
Volatile combustible matter	34.94
Fixed carbon	55.46
Ash (lilac gray)	8.00
	100.00
Sulphur	1.066
Coke (spongy)	63.46
Specific gravity	1.322

"No pyrites apparent, and but little fibrous coal."

On the right of Old Henry fork, opposite the mouth of Patton branch, the Fire-clay coal formerly showed good thickness, with a streak of pyrites 2 inches thick 18 inches from the top, in a partly covered prospect.

PATTON BRANCH.—On the left, ¾ mile up Old Henry fork: Altitude of mouth, 1005.

At stream level, ½ mile up this branch, is the following:

Fire-clay Coal.

Sandstone	5 ft.
Shale	12″
Coal	53″
Flint fire-clay	5″
Coal	2″
Shale	2″
Coal	2″
Shale.	
Altitude, 1140.	

POPLAR GAP BRANCH.—On the right, ¾ mile up Old Henry fork: Altitude of mouth, 1005.

A prospect on the left, ¼ mile up this branch (or possibly up McFadden branch), formerly gave the following:

Fire-clay Coal.

Shale.	
Coal	18″
Shale	5″
Coal	26″
Fire-clay	6″
Clay.	
Altitude, 1100.	

The fire-clay is probably flint clay though not so noted.

Twenty feet above the opening with shale interval, is 2 inches of coal under 10 feet more of shale. This coal appears to represent the whole of the rider, but it thickens to several inches a short distance farther up stream.

On the right, 1⅛ miles up Halls fork a 5-yard entry gives the following bed-section at its face:

Fire-clay Coal.

Shale	4 ft.
Black slate	5″
Coal	43″
Flint fire-clay	5″
Shale.	
Altitude, 1100.	

In a left drain, 1½ miles up Halls fork, a 1-yard entry gives the following:

Fire-clay Coal.

Shaly sandstone	3 ft.
Shale	5 ft.
Coal	47″
Black-jack	2″
Flint fire-clay	2″ or more
Altitude, 1110.	

On the left, 5 feet above Halls fork, 2½ miles up it, the old Collins entry, now closed, but with another open beside it, gave the following bed-section:

Fire-clay Coal and Rider.

Sandstone	8 ft.
Coal	22″
Sandstone and shale	10 ft.
Coal (part splint)	53″
Flint fire-clay	7″
Coal	2″
Shale	2″
Coal	2″
Altitude, 1115.	

My sample of this coal, omitting the 2-inch seams, and Prof Crandall's sample of the same, reported from Howell's fork, analysed by Dr. R. Peter, gave results, respectively, as under Nos. 2741 and 3187:

Fire-clay Coal.

	Chemical Report	
	No. 2741	No. 3187
Moisture	1.40	2.98
Volatile combustible matter	35.68	33.98
Fixed carbon	58.92	59.98
Ash (light reddish gray)..		
(browning gray)	4.00	3.06
	100.00	100.00
Sulphur	0.667	0.404
Coke (spongy)	62.92	63.04
Specific gravity	1.285	.....

No. 2741. "No apparent pyrites, and but little fibrous coal."

On the left at Hiram Collins' house, 2½ miles up Halls fork and 15 feet above it, prospects seem to have resulted in nothing better than the following:

Hamlin Coal.

Shale	8 ft.
Coal	4″
Shale	18″
Coal	2″

Altitude, 1195.

Attempt was made to find an opening reported in thick coal at the head of a right branch, 3 miles up Halls fork. Only a closed prospect was found, having possibly 2 feet of coal, at altitude 1645. This is on a bench level with the gap at the head of the branch, with peaks rising to about altitude 1800, supposed, when visited, to be the bench of the Hindman bed. Its altitude and thickness, however, are more indicative of the Francis bed. A good working area is available if the thick coal lies no higher.

ELK CREEK.

On the right, 15¾ miles up Red Bird creek: Altitude of mouth, 794.

Strata rise for the first mile up the creek a little faster than its bed, but farther up stream the rate is reduced to 20 feet per mile or less. Across the stream they

lie nearly level, but probably dip very slightly to the south.

On the left, ¼ mile up the creek, is a stripping of the Howard coal, 24 inches thick, the lower half bony, at altitude 835. Eight feet of shale are exposed over the coal and 25 feet of shaly sandstone beneath it down to stream level.

On the left at water level, a mile up the creek, 6 inches of coal show, under 20 feet of shale containing sandstone, at altitude 850. Strata along the creek rising more rapidly than it does, makes this lower split of the Howard bed at least 25 feet below the preceding.

On a left branch with mouth at altitude 880, 1½ miles up the creek, on the right, ⅛ mile up the branch, John Morrison has a 3-yard entry with the following bed-section at its face:

Fire-clay Coal.

Sandstone	5 ft.
Coal	39″
Black slate	2″
Sandstone.	
Altitude, 1220.	

Clay up to 1 inch in thickness, 5 inches from the top, shows in part of the face. The coal looks fine but it is near the top of the ridge and so is narrow in area.

TOWN BRANCH.

On the right, 2½ miles up Elk creek: Altitude of mouth, 925.

On the right, ⅛ mile up the branch, the upper split of the Howard bed shows 18 inches of coal, in shale, at altitude 945.

On the left, one mile up the branch, Speed Lipps has a wet entry with the following bed-section at its mouth:

Fire-clay Coal.

Shale	8 ft.
Coal	6″
Shale	6″
Coal	24″
Black slate.	
Altitude, 1245.	

On the right, by the branch, 1¼ miles up it, is the following outcrop:

Whitesburg Coal.

Shale	5 ft.
Coal	2″
Shale	1″
Coal	12″

Altitude, 1180.

LEFT FORK.

On the left, 3½ miles up Elk creek: Altitude of mouth, 990.

On the right of a right drain at the head of the fork, 1¼ miles up it, George Hubbard has a partly covered prospect giving the following section:

Haddix Coal.

Earth.	
Coal stain	3″
Clay	12″
Coal stain	18″
Clay	6 to 12″
Coal (with 1″ to 2″ parting)	30″

Altitude, 1410.

Massive sandstone shows in a smooth cliff some 10 feet above the coal.

On the right, 4 miles up Elk creek, 15 feet above it, is 10 inches of coal, in shale, at altitude 1065.

On the right, 4½ miles up the creek, 15 feet above it, John Marcum has the following bed-section in a 2-yard entry:

Whitesburg (?) Coal.

Sandstone	15 ft.
Shale	5 ft.
Coal	20″
Fire-clay.	

Altitude, 1145.

On a left branch with mouth at altitude 1180, at the head of Elk creek, 5 miles up it, on the right, ¼ mile up the branch, Harvey Ely has an 8-yard entry, in which is the following approximate section:

Haddix Coal.

Shale.	
Coal	3″
Shale	4″
Coal	15″
Shale	12″
Coal	12″
Altitude, 1430.	

The bed rises westward in the entry at a rate of possibly 5%. Its correlation and that of the opening on the left fork of Elk creek are derived from openings on Big Double creek.

On the right, 17⅛ miles up Redbird creek, 40 feet above it, the Howard coal is exposed, 23 inches thick, under a 50-foot cliff at altitude 835. An almost continuous cliff extends down to stream level.

LITTLE DOUBLE CREEK.

On the right, 17¼ miles up Redbird creek: Altitude of mouth, about 804.

On a right branch, one mile up this creek, in a right drain and ¼ mile up the branch an entry gives the following section at its mouth:

Fire-clay Coal.

Shale	3 ft.
Coal	1″
Shale	3″
Coal	1″
Shale	3″
Coal	2″
Knife-edge parting.	
Block coal	4″
Knife-edge parting.	
Coal	13″
Bony coal	12″
Black slate.	
Altitude, 1175.	

This bed, though it has generally been found compact on streams below Little Double creek, shows more tendency to partings in several openings farther up Redbird creek. The hard black slate floor is considered a fairly reliable guide to correlation in this vicinity.

BIG DOUBLE CREEK.

On the right, 17½ miles up Redbird creek: Altitude of mouth, 805.

The few openings or exposures of strata along this creek give little indicative of their inclination. A slight northwesterly rise obtains, however.

RIGHT FORK.

On the right, 1¾ miles up the creek: Altitude of mouth, 885.

A pit in the fork, ½ mile up it, shows coal of the Howard bed with black slate covering, at altitude 905.

On the left, 1½ miles up the fork, James Arnett has a 10-yard entry with the following section at its face:

Haddix Coal.

Shale.	
Coal	4″
Shale	1″
Coal	6″
Shale	1″
Coal	20″
Knife-edge parting.	
Cannel coal	3″
Shale	18″
Coal	14″
Bone coal	2″
Coal	10″
Clay.	
Altitude, 1350.	

The 23-inch seam has 4 knife-edge partings, which would probably disappear under good cover, the face of the entry being still in muddy outcrop coal. The area is small.

LEFT FORK.

The following section was obtained, in the year 1885, on a left branch, ¼ mile up this fork, beginning at the top

of the ridge on the trail to Little creek near its mouth. Coals beds are now designated by name:

Top of ridge.
Altitude, 1415.
Cannel coal.
Altitude, 1400.
Sandstone.

Haddix Coal

Shale	4″
Coal	3″
Shale	3″
Coal	7″
Shale	3″
Coal	6″
Shale	1″
Coal	3″
Shale and coal	5″

Clay.
Altitude, 1370.

Hamlin Coal

Shale	2 ft.
Coal	17″
Shale	8″

Sandstone.
Altitude, 1275.

Fire-clay Rider

Shale	3 ft.
Coal	1″
Shale	4″
Coal	6″

Altitude, 1195.

Fire-clay Coal

Shaly sandstone	5 ft.
Coal	14″
Fire-clay	5″
Shale and coal	5″

Clay.
Altitude, 1185.

Shale	5 ft.
Coal and shale	7″
Clay	4″
Shaly sandstone	7 ft.

Altitude, 1050.

Howard Coal

Bituminous shale	10 ft.
Coal	12″
Clay	18″

Altitude, 900.

The cannel coal at the top of the section seems to be in the place of the Hazard bed, but as the latter is almost invariably destitute of cannel, the coal here is regarded as a local deposit.

On the left and in pits, one mile up the left fork, is the following:

Howard Coal.

Shale	2 ft.
Black slate	1 ft.
Coal	1 ft.

Altitude, 930.

On a right branch, 2¼ miles up the left fork, (⅛ mile below upper forks), on the right, ¼ mile up the branch, is the "Bowling" 6-yard entry having the following bed-section 2 yards in:

Fire-clay Coal.

Shale	3 ft.
Coal	9″
Knife-edge parting.	
Coal	10″
Clay	1″
Coal	19″

Hard floor.
Altitude, 1160.

On the right, 18½ miles up Redbird creek, is a stripping for 80 yards distance along a cliff with some 30 feet of shaly sandstone, including some shale above the coal and 30 feet of more massive sandstone on that. The cliff continues in sandstone to the creek 10 to 15 feet below the coal. The coal, which is of the Howard bed, at altitude 820, is 20 inches thick at the lower end of the stripping and 15 inches at the upper end, about its normal thickness in this region. But, uniform in thickness for some 20 feet at the lower end of the stripping, it then becomes 45 inches thick, with a wedge down stream about 4 feet long and with its upper edge about 2½ feet above the 20-inch seam, the intervening space occupied by a corresponding wedge of sandstone pointing up stream.

From the edge of the coal wedge the roof of the coal drops gradually to its normal position in, perhaps, 20 yards up stream, with the coal thinning correspondingly from 45 inches. It is as if a horizontal thrust had pushed the coal up upon and overlapping itself. The report current of thick coal at this place seems to require this description.

Coal in a pit on the left, 18¾ miles up Redbird creek, altitude 835, seems too high for correlation with the coal last described and it may be an upper split of that bed, but the absence of any sign of it in the cliff over the latter makes it probably of the main Howard bed.

Coal stripped in a cliff on the right, 19¼ miles up the creek, altitude 835, is evidently the same as that in the pit.

SUGAR CREEK.

On the left, 20½ miles up Redbird creek: Altitude of mouth, 824.

Strata along this creek lie nearly level and the southerly dip across Big creek does not continue to Sugar creek. The road formerly open up the creek is now closed to horses above Masters branch.

BOND HOLLOW.

On the right, 1¼ miles up Sugar creek: Altitude of mouth, 875.

On the right, ¼ mile up the hollow, a stripping gives the following:

Fire-clay Coal.

Massive sandstone ..	8 ft.
Coal	15″
Shale (with two thin coals)	8 ft.
Coal (and shale).....	10″
Coal, about	18″
Altitude, 1110.	

The lower half of the bottom coal was covered and not seen.

SPRUCE PINE BRANCH.

On the left, 1½ miles up Sugar creek: Altitude of mouth, 925.

On the right, ¼ mile up the branch, 10 feet above it, a 1-yard entry gives the following:

Fire-clay Coal.

Shale (with sandstone)	8 ft.
Coal	3″
Shale	3 ft.
Coal	26″
Hard floor.	
Altitude, 1105.	

Mr. Sullivan formerly reported a flint fire-clay floor in an adjacent entry.

On the left at the main head of the branch, ¾ miles up it, a 3-yard entry gives the following section:

Hazard Coal.

Clay with coal	2 ft.
Coal	6″
Shaly sandstone	4 ft.
Coal	5″
Coal, very impure	3″
Coal	35″
Attitude, 1410.	

This is about midway between the Bear branch, "Bird" entry, into the Fire-clay coal bed and the opening into the same bed on Spruce Pine branch. Assuming a uniform slope of strata between the two, the above opening is 310 feet above the Fire-clay coal bed. This corresponds with the apparent interval on McFadden branch of Big creek, little more than a mile east. Here, however, some evidence was obtained of a rather sharp rise of strata up Spruce Pine branch in the vicinity of the Asher house, ½ mile up it. The top of the thick sandstone over the Haddix coal appears to be on the grade of the road at the house, altitude 1340, possibly 20 feet above the road, and to rise towards the openings, which would easily reduce the interval between the beds to the 200 to 250 feet it is believed to be. A small anticline probably extends from the heads of Spruce Pine branch to the heads of McFadden branch.

MASTERS BRANCH.

On the right, 2¼ miles up Sugar creek: Altitude of mouth, 990.

A prospect on the left at the mouth of this branch gives the following:

Fire-clay Coal.

Earth.
Coal ..... 27″
Hard fire-clay.
Altitude, 1110.

In a rock-house on the left, 2⅝ miles up Sugar creek, 10 feet above it, is the following:

Whitesburg Coal.

Sandstone ..... 30 ft.
Coal ..... 1 ft.
Fire-clay.
Shaly sandstone ..... 5 ft.
Altitude, 1040.

SULPHUR SPRING BRANCH.

On the left, 2¾ miles up Sugar creek: Altitude of mouth, 1055.

The Whitesburg bed shows in this branch, at its mouth and also in Sugar creek at altitude 1060.

On the left at the main head, 1¼ miles up the branch (approached from Spruce Pine branch), the McCullom entry formerly gave the following:

Hazard Coal.

Sandstone.
Coal ..... 17″
Shale ..... 3″
Coal ..... 10″
Shale ..... 11″
Coal ..... 57″
Altitude, 1400.

There is little reason to doubt that this is of the same bed as the upper Spruce Pine opening, on the northerly side of the anticline. The area here is small.

Prof. A. R. Crandall's sample of the lower 55 inches of coal yielded the following results to analysis by Dr. R. Peter:

Hazard (?) Coal.
Chemical Report No. 3188.

Moisture	1.80
Volatile combustible matter	34.00
Fixed carbon	57.06
Ash (light gray)	7.14
	100.00
Sulphur	0.742
Specific gravity	64.20

The coal as seen at the face of the entry looks like a good coking coal.

In a rock-house on the left, 3 miles up Sugar creek, 15 feet above it, and close below the mouth of Laurel branch, is the following exposure:

Fire-clay Coal.

Sandstone	20 ft.
Coal	1″
Shale	3″
Coal	1″
Clay	½″
Coal	30″

Hard fire-clay.
Altitude, 1095.

Massive sandstone is exposed from the creek to within 5 feet of the coal bed, which is the top of the sandstone of the rock-house, 2⅝ miles up the creek.

On a right branch with mouth at altitude about 828, 21¼ miles up Redbird creek, at its head ¼ mile up the branch, Mrs. John E. Bowling's 2-yard entry has the following bed-section:

Fire-clay Coal.

Shaly sandstone	4 ft.
Coal	14″
Bituminous shale	4″
Coal	8″

Altitude, 1185.

GILBERT CREEK.

On the left, 22½ miles up Redbird creek: Altitude of mouth, 833.

The few coal exposures, natural or artificial, on this creek give little indication of the condition of the beds there, but with notes of Mr. Sullivan's former prospecting in addition, a general knowledge is obtained.

Strata lie nearly level along the lower half of the creek and then probably rise up stream about 75 feet in a mile, but are nearly level again toward the head. A slight southward rise is also noted, as compared with the streams on either side.

On the right, ¼ mile up the creek, the lower split of the Howard bed has been opened in pits, at altitude 845.

On the right, ⅜ mile up the creek the upper split is exposed in the following section:

Howard Coal; Upper Split.

Shale	5 ft.
Coal	17″
Shale	5 ft.
Laminated sandstone	10 ft.
Shale to creek	15 ft.

Altitude of coal, 880.

Although the two splits have been readily traced on Goose creek for several miles this is the only place on Redbird creek where the two are exposed close together. The upper split appears usually to be well hidden or altogether cut out. On the right, 100 yards farther up stream, the upper split is reduced to 2 inches, under 4 feet of massive sandstone which pinches out completely toward the preceding exposure.

Near its head on the right of a small right branch, 2 miles up the creek, Mr. Sullivan found the Fire-clay coal and rider, both thin. Coal from one of these beds appears to have been used at the house formerly at the mouth of the branch.

The Fire-clay coal was found also by Mr. Sullivan on the right of a small right branch, near its head, 3¼ miles up the creek.

The following section, excepting its lowest 100 feet, was apparently from a right branch, 3⅜ miles up the creek. Altitudes given are deduced from recent leveling and correlations from the known Fire-clay coal:

Gilbert Creek Section (Sullivan).

Massive sandstone		140 ft.	
Coal (Flag)		6″	Altitude, 1455
Massive sandstone		65 ft.	
Thin coal (Hazard)			Altitude, 1390
Shaly sandstone		30 ft.	
Slate		1″	
Coal	(Haddix)	10″	
Coal, Shale & S. S.		3″	Altitude, 1360
Sandstone		35 ft.	
Covered		20 ft.	
Sandstone		15 ft.	
Coal		3″	
Shale		20 ft.	
Shaly sandstone		30 ft.	
Coal		6″	
Clay	(Hamlin)	1″	
Coal		6″	Altitude, 1240
Shaly sandstone		15 ft.	
Coal		10″	
Shaly sandstone		30 ft.	
Covered		5 ft.	
Shale		10 ft.	
Coal and Clay (Rider)		12″	Altitude, 1180
Sandstone		30 ft.	
Coal		18″	
Flint fire-clay	(Fire-clay)	7″	Altitude, 1150
Sandstone		30 ft.	
Coal		14″	Altitude, 1120
Shale		15 ft.	
Coal and shale		8″	
Shale		10 ft.	
Coal	(Whitesburg)	1″	
Shale		15 ft.	
Coal		1″	Altitude, 1080
Massive sandstone		75 ft.	
Shale		30 ft.	
Covered		55 ft.	
Sandstone		25 ft.	
Shale		5 ft.	
Coal (upper Howard)		12″	Altitude, 890
Shale with calcareous concretions		35 ft.	
Coal (Lower Howard)		15″	Altitude, 855
Sandstone to mouth of creek		20 ft.	

The coal at altitude 1120 has been noted especially at several places on the Kentucky river between Krypton and Hazard, but is not generally recognized as a persistent bed. The three thin coals next below are probably splits of the Whitesburg bed, as evidenced in their development in the vicinity of Hazard and elsewhere. Similarly the seam next under the Hamlin bed may be a split from it. The section shows clearly the usual thin lamination up to the sandstone under the Haddix coal, but has more sandstone than usual higher up.

Mr. Sullivan found the Fire-clay coal also on the left of right and left branches, 4 miles up the creek and on the left at the mouth of a right branch, 4⅜ miles up, but the altitudes are not known. In the six openings into the Fire-clay coal the flint clay was found, but neither in these nor in the fourteen other seams of coal he found on the creek was there a thickness of coal of over 22 inches.

What is probably the Fire-clay coal goes under the creek 30 yards below a left branch, 4½ miles up the creek. Here it is under 6 inches of shale and then 10 feet of massive sandstone and at altitude 1215.

BOWLING BRANCH.

On the left, 4½ miles up Gilbert creek: Altitude of mouth, 1220.

In a left branch, ½ mile up Bowling branch, ⅛ mile up the left branch, below the trail to Rockhouse creek, Luther Bowling has a stripping of the Hazard bed giving 12 inches of coal, on clay and under shale, at altitude 1385. It is not unlikely that this is only the upper seam of the bed and that a workable thickness of coal may be close below.

On a right branch, ¾ mile up Bowling branch, ⅛ mile up the branch and 30 feet above its mouth, the Hazard bed has 6 inches or more of coal, under one foot of shale and then 2 feet of sandstone, at altitude 1415.

In Bowling branch, ⅞ mile up it, the Hazard bed shows 4 inches of coal, on 6 inches of shale and under one foot of sandstone, at altitude 1400.

The trail, 4½ to 5 miles up Gilbert creek, lies on the bench between the sandstone cliffs under the Haddix and over the Hazard coals. Iron ore, often associated with the latter, here 6 inches or more thick, crops out in the trail at altitude 1390.

Though very much indented a large area of the Hazard coal is available about the heads of Gilbert creek, and it merits far more investigation than appears yet to have been given it.

On the left, 23 miles up Redbird creek, 10 feet above it, the under-clay of the Howard bed shows in the road, lying on very hard sandstone similar to that on Gilbert creek under the lower split of the bed and again along the creek bed above Little creek.

LITTLE CREEK.

On the right, 23¼ miles up Redbird creek: Altitude of mouth, about 840.

Strata along this short creek lie nearly level. There is, however, a rise northward for a mile from its head of about 50 feet and this dip continues even more rapidly across the heads of the creek.

On the right at the mouth of Little creek the lower split of the Howard bed shows a foot of coal on 3 feet of fire-clay and under shale, at altitude 855.

In a left branch, ¼ mile up the creek, ⅛ mile up the branch, are pits in which the coal, under shale, is said to be 12 to 14 inches thick. These, at altitude 920, are probably in the upper split of the Howard bed.

RIGHT FORK.

On the right, ¾ mile up Little creek: Altitude of mouth, 950.

On the right, ⅛ mile up the fork a foot of coal outcrops at altitude 970, under 8 feet of laminated sandstone and then 20 feet of shale. This coal was found also on Big Double creek 135 feet below the Fire-clay coal.

On the left of a left branch, ⅛ mile up this fork and ⅛ mile up the branch Wilson Bowling has a 1-yard entry of the following bed-section.

Fire-clay Coal.

Shale	10 ft.
Coal	10″
Flint fire-clay	9″
Coal	9″
Shale	2″
Coal	12″

Altitude, 1130.

The fire-clay parting has a slight appearance of lamination unusual to it, but it has a chonchoidal fracture true to type.

LEFT FORK.

On the left, ¾ mile up Little creek: Altitude of mouth, 950.

On the right, ⅜ mile up this fork are two prospects, giving the following sections:

Fire-clay Coal.

Shale	2 ft.	Shale	8 ft.
Sandstone	1″	Coal	7″
Coal	10″	Shale	2″
Soft shale	4″	Coal	5″
Coal	2″	Shale	1″
Shale	1″	Coal	8″
Coal	3″	Shale (?)	
Shale	3″		
Coal	8″		

Altitude, 1085.

Although by barometer, 45 feet lower than the entry on the right fork the similarity of the sections admits of no doubt as to correlation. The change from flint to common fire-clay begun in the parting of the entry coal is complete here, but is not continuous, as the flint clay is found again on Martins fork of Goose creek.

On the right, 23¾ miles up Redbird creek a stripping at water level gives the following section:

Howard Coal; Lower Split.

Shale	6 ft.
Coal	18″

Fire-clay.
Hard sandstone.
Altitude, 845.

A two-foot fault, nearly or quite vertical, is shown here, strata up stream being higher than those down stream. No sign of the break, however, shows in the hard sandstone in the bed of the creek, which rises rapidly for two feet at this point.

ELISHA CREEK.

On the left, 24¼ miles up Redbird creek: Altitude of mouth, 851.

Strata rise up the left fork of this creek at the rate of about 25 feet to the mile, as determined by the altitude of the Hazard bed opened near its mouth and head. Data for determining the inclination on the other forks has not been acquired.

On the left, ¼ mile up the creek, is an exposure of the Howard upper split about one foot thick, under 5 feet of shaly sandstone, at altitude 880.

On a right branch one mile up the creek, on the left, ⅛ mile up the branch and 150 feet above its mouth, is a long entry having the following bed-section six yards in:

Whitesburg Coal.

Shale	5 ft.
Coal	15″
Cannel coal	17″

Altitude, 1060.

Here Mr. Sullivan obtained the following in a 50-foot entry and also the Fire-clay coal above it:

Whitesburg Coal.

Shale.	
Coal	1″
Slate	1″
Coal	17½″
Cannel coal	12″

So far as known the cannel coal is confined to this branch.

LEFT FORK.

On the left, 1¼ miles up Elisha creek: Altitude of mouth, 925.

On the left, ⅛ mile up this fork, an abandoned entry into the Whitesburg bed is at altitude 1065.

Mr. Sullivan found the Fire-clay coal on the right of a left branch, 1½ miles up the left fork, the Whitesburg coal on the right of the fork, just above the branch, and the Fire-clay coal again on the left of a right branch, 1¾ miles up the fork. His section of the Whitesburg coal opening follows:

Whitesburg Coal.

Coal	4″
Shale	2″
Coal	2″
Clay	11″
Coal	4″
Clay	25″
Coal	11″

The Fire-clay coal openings gave the flint clay and not more than 8 inches of coal.

The left fork has forks 5 miles up it, at the head of a swampy flat and at altitude 1420. The tops of cliffs in this vicinity, and the probable level of the Haddix coal, are about 20 feet higher. On the right of the left fork here, Mrs. Garrison has a stripping into the Hazard bed giving one foot of coal (in water when seen) under 6 feet of shale and at altitude 1500. As on Gilbert creek there is possibility of more coal below.

Mr. Sullivan found the Fire-clay coal on the right of the creek, 1⅜ miles up it, and again on a right branch, 2 miles up the creek and most of the section following to which correlations are added:

Elisha Creek Section (Sullivan).

Sandstone to top of hill	35 ft.	
Francis coal	6″	Altitude, 1500
Shale	10 ft.	
Covered	30 ft.	
Sandstone	25 ft.	
Covered	15 ft.	
Sandstone	5 ft.	
Shale.		
Coal	2″	
Clay (Flag)	6″	
Coal	2″	Altitude, 1410
Sandstone	45 ft.	
Hazard coal	6″	Altitude, 1365

Sandstone		30 ft.	
Slate		4″	
Coal	(Haddix)	24″	
Shale and sandstone		24″	
Coal		1″	Altitude, 1335
Sandstone		30 ft.	
Covered		25 ft.	
Sandstone		45 ft.	
Shale.			
Coal		18″	
Clay		10″	
Coal	(Hamlin)	4″	
Clay		10″	
Coal		2″	Altitude, 1230
Sandstone		45 ft.	
Covered		25 ft.	
Fire-clay Rider		3″	Altitude, 1160
Sandstone		10 ft.	
Shale.			
Coal		2″	
Flint fire-clay		2″	
Shale	(Fire-clay)	4″	
Coal		1″	Altitude, 1145
Sandstone		15 ft.	
Coal		15″	
Shale		5 ft.	
Sandstone		30 ft.	
Shale		10 ft.	
Coal		1′	
Shale		1″	
Coal	(Whitesburg)	18″	
Cannel coal		12″	Altitude, 1085
Sandstone		30 ft.	
Coal		1″	
Shale		3″	
Coal		2″	
Clay		9″	
Coal		1″	
Shale		20 ft.	
Sandstone		50 ft.	
Coal		6″	
Shale.			
Shaly sandstone		40 ft.	
Sandstone		50 ft.	
Coal (Hamlin, upper split)		18″	Altitude, 890
Shale		5 ft.	
Sandstone		10 ft.	
Shale.			
Coal (Hamlin, lower split)		15″	Altitude, 865
Sandstone to mouth of creek		15 ft.	

MIDDLE FORK.

On the left, 1¾ miles up Elisha creek: Altitude of mouth, 985.

On the right, ¼ mile up the fork, Samuel Hoskins has a 5-yard entry with the following bed-section:

Whitesburg Coal.

Sandstone	5 ft.
Shale	6 ft.
Sandstone	2 ft.
Coal	34″

Altitude, 1065.

Mr. Sullivan found the same coal, probably ⅛ mile farther up the fork, only 27½ inches thick and with an inch of clay ½ inch from the bottom, and over it the Fire-clay coal bed.

Of his six openings on Elisha creek into the latter bed all showed flint fire-clay and none coal more than 8 inches thick.

RIGHT FORK.

On the right, 1¾ miles up Elisha creek: Altitude of mouth, 985.

On the right, 1½ miles up this fork, the following section is exposed 5 feet above stream level:

Whitesburg Coal, Lower Split (?).

Shaly sandstone	2 ft.
Coal	15″
Fire-clay.	
Sandstone	4 ft.

Altitude, 1045.

The only opening reported on this fork is in thick coal at its head on top of the ridge. It is probably of the Hindman bed, but being closed it was not visited.

FLAT CREEK.

On the right, 25 miles up Redbird creek: Altitude of mouth, 855.

Strata on this creek lie nearly level with their strike about on an east and west line.

The recent discovery of carbonate iron ore 22 inches thick, beside the road ½ mile up Martin fork is encouragement for search for it on Redbird creek. The ore lies close to the upper split of the Howard bed in shale, which is frequently replaced by sandstone on Redbird creek.

The lower split of the Howard bed goes under the creek near its mouth, and the upper split is exposed on the right, ¾ mile up the creek with one foot of coal under 6 feet of shaly sandstone at altitude 890.

LITTLE FLAT CREEK.

On the right, ¾ mile up Flat creek: Altitude of mouth, 870.

From pits in this creek, one mile up it, coal has been taken from the unnamed bed between the Howard and Whitesburg beds, the altitude being 1020.

At the head of a left drain, 2¼ miles up Flat creek, Irvine Wambles has a 20-yard entry with the following bed-section at its face:

Hazard Coal.

Shale	1 ft.
Coal	12″
Bone coal	5″
Coal	18″

Altitude, 1335.

PANTHER BRANCH.

On the left, 3¼ miles up Flat creek: Altitude of mouth, 1160.

On the right, near the head of a right branch of Panther branch, below the road from Flat to Spring creek, the now closed James Short entry gave the following bed-section:

Hazard Coal.

Sandstone	3 ft.
Coal	6″
Shale	9″
Coal	17′
Bone coal	4″
Coal	17″

Altitude, 1380.

Two feet more of coal was reported in the bottom of the bed under a parting of 1½ feet, but it is nowhere in evidence in this region. The entry lies nearly on top of a prominent cliff below which is the Haddix bed, reported 40 feet lower and having 3 feet of coal. No opening into the bed has remained accessible in this vicinity.

On a left branch, one mile up Panther branch, on the left, ⅛ mile up the left branch, Mr. Hoskins has a 12-yard entry giving the following bed-section half way in:

Hazard Coal.

Laminated sandstone	8 ft.
Shale	3 ft.
Coal	9″
Clay	15″
Coal	15″
Bone coal	3″
Coal	15″

Fire-clay.

Altitude, 1380.

LEFT FORK.

On the left, 4 miles up Flat creek: Altitude of mouth, 1235.

On the left at the forks the following is exposed:

Hamlin Coal.

Sandstone	2 ft.
Coal	1 ft.

Altitude, 1245.

On the left, at the head of a left drain, ¼ mile up this fork, ⅛ mile up the drain, a 15-yard entry gives the following bed-section half way in:

Hazard Coal.

Laminated sandstone	2 ft.
Sandy shale	1 ft.
Clay shale	1 ft.
Coal	12″
Bone coal	3″
Coal	19″
Black slate and slaty coal	4″

Altitude, 1375.

At the head, 4½ miles up Flat creek, 100 yards to the right of the Martins fork gap and 25 feet above it an abandoned long entry formerly gave the following bed-section:

Hazard Coal.

Sandstone	2 ft.
Shale	3 ft.
Coal	1″
Shale	11″
Coal	2″
Shale	1″
Coal	39″

Altitude, 1355.

Bone coal similar to that in other openings into this bed on Flat creek was not noticed when the coal was measured but it still lies in the dump. The bed lies high in the hills about here and its areas are consequently narrow, but southward they increase.

In a cliff on the left, 25¼ miles up Redbird creek, the upper split of the Howard bed shows in a cliff, coal varying from 3 to 12 inches or more in thickness at altitude 880, 20 feet above the creek.

The same coal seam shows again under a 50-foot cliff on the right 26¼ miles up Redbird creek, at altitude 895.

BOWEN CREEK.

On the left, 26½ miles up Redbird creek: Altitude of mouth, 870.

The few coal openings and exposures on this creek give little indication of inclination of strata, but apparently there is a rise up the creek of 15 to 20 feet per mile and nearly level strata across it.

On the right, one mile up the creek and 30 feet above it, a prospect gives the following:

Howard Coal, Upper Split.

Shale and sandstone	35 ft.
Coal	19″
Clay	6″
Sandstone	25 ft.

Altitude of coal, 915.

Considerable prospecting is reported to have been done here in search for the cannel coal opposite on Elisha creek, but it was without success. Mr. Sullivan in prospecting here and elsewhere on the creek found only thin coals, details of which are not at hand.

The upper split was found 24 inches thick, 1¼ (?) miles up the creek, at altitude 925.

On a right branch, 1½ miles up the creek, ½ mile up the branch, 9 inches of coal lies between shales 5 feet or more thick at altitude 1130. This appears to be between the Whitesburg and Fire-clay coals.

DANIEL BRANCH.

On the right, 2¼ miles up Bowen creek: Altitude of mouth, 1030.

Three-eighths mile up to the forks and ¾ mile thence up the left fork to its head, a 5-yard entry gives the following section at its head:

Hindman (?) Coal.

Sandstone.	
Coal	18″
Shale	6″
Coal	9″
Shale	2″
Coal	4″
Splint coal	30″

Altitude, 1565.

The correlation assumed is given with much doubt, for though the height seems right for that bed, splint coal in it is unusual and also the sandstone roof. The splint coal appears to be particularly fine, but the area of the bed here is small.

On the right at the mouth of a right branch, 3 miles up Bowen creek, is the following exposure, probably just below the Fire-clay coal bed:

Shale	10 ft.
Black slate	1 ft.
Coal	12″
Shale and sandstone to creek	20 ft.

Altitude of coal, 1145.

In the creek, 6 miles up it, a thin coal under black slate, at altitude 1255, is probably of the Fire-clay coal bed or close to it.

BRUSHY FORK.

On the left, 6 miles up Bowen creek (¼ mile from the road summit): Altitude of mouth, 1265.

On the right, ¼ mile up this fork, Eli Collett has a stripping giving the following:

Flag (?) Coal.

Shale	5 ft.
Splint coal	12″
Coal	13″
Cannel coal	1″

Altitude, 1520.

The character of the coal, which is fine, is indicative of the Flag bed. More coal is reported 10 feet under the stripping, probably the top seam of the Hazard bed, but possibly the bottom seam and the above 26 inches the top seam.

SPRING CREEK.

Strata lie very nearly level along the lowest mile of this creek, but for the next 1¼ miles, where the course of the stream is northerly, they rise up the stream, but not so fast as its bed does. Beyond this, with an easterly course, the up-stream rise is slight.

On a left branch at the mouth of the creek, on the left, ¼ mile up the branch, Asbury Begley has a 6-yard entry of the following bed-section 1 yard in:

Hazard Coal.

Shale and shaly sandstone	5 ft.
Coal	15″
Clay	1″
Coal, about	25″

Altitude, 1340.

The coal is on a broad bench between the forks of the branch just above the entry.

In a right branch with mouth at altitude 900, ¼ mile up the creek, W. M. Helton has a stripping giving the following section:

Fire-clay Coal.

Shale	3 ft.
Black slate	8″
Coal	15″
Fire-clay.	
Sandstone.	
Altitude, 1095.	

On the left of the branch, 50 yards farther up it, a prospect gives the following:

Fire-clay Coal Rider.

Massive sandstone	20 ft.
Coal	18″
Shale	7″
Coal and shale	7″
Coal	8″
Altitude, 1120.	

Coal of the Hamlin bed shows in a slip on the left, ⅜ mile up the branch, at altitude 1190.

On a left branch with mouth at altitude 1160, 3 miles up Spring creek, on the left, ¼ mile up the branch and 5 feet above it, James Baker has a 1-yard entry with the following bed-section at its face:

Hamlin Coal.

Shale with 3 to 5 thin coals	3 to 5 ft.
Coal	21″
Shale	9″ to 11″
Coal	5″
Bone coal	3″
Coal	21″
Altitude, 1255.	

CANE KNOB BRANCH.

On the left, 4 miles up Spring creek: Altitude of mouth, 1210.

On the left, ¼ mile up this branch and at its level, J. B. Smith has a 5-yard entry with the following bed-section at its face:

Hamlin Coal.

Shaly sandstone	5 ft.
Shale	4 ft.
Coal	19″
Shale	4″
Coal	7″
Bone coal	3″
Coal	6″

Altitude, 1260.

On the left, 4¼ miles up the creek, a closed prospect into the Fire-clay coal rider shows one foot of coal with black slate under shale and at altitude 1260.

On a left drain, 4⅜ miles up Spring creek, a wet entry on the left shows the Hamlin bed 37 inches thick, and on the right a 1-yard entry with the following bed-section:

Hamlin Coal.

Sandstone	5 ft.
Coal	16″
Shale	2″
Coal	17″

Altitude, 1300.

RIGHT FORK.

On the right, 4¾ miles up Spring creek: Altitude of mouth, 1260.

On the right, ⅛ mile up this fork, a 12-yard entry gives the following bed-section at its mouth:

Hamlin Coal.

Massive sandstone	3 ft.
Coal	13″
Shale	3″
Coal	8″
Bone coal	3″
Coal	9″

Altitude, 1305.

The base of a 40-foot cliff between the Haddix and Hazard coals, on the right, ¼ mile up the fork, is at altitude 1380.

Coal of the Haddix bed shows in the road, ⅜ mile up the fork, at altitude 1360.

The striking resemblance of bed-sections of the Hamlin coal on Spring creek to those of the Hazard coal on Flat creek would ordinarily be regarded as almost conclusive evidence that they are all of one bed, but such correlation would predicate a southerly dip between the two creeks, whereas a northerly dip is indicated by the topography. Especially is this the case at the head of the creeks where the cliffs under the Hazard coal are prominent, and coals opened on the left fork of Spring creek are in themselves strong evidence in favor of the correlation adopted.

LEFT FORK.

On the left, 4¾ miles up Spring creek: Altitude of mouth, 1260.

On the left, at the mouth of a left branch, ¼ mile up this fork, James Delp has a 4-yard entry with the following bed-section at its face:

Hamlin Coal.

Sandstone	3 ft.
Shale	2 ft.
Coal	22″
Knife-edge parting.	
Coal	2″
Altitude, 1325.	

At the head of a right branch, ½ mile up the left fork, Mr. Delp has a wet entry giving the following bed-section two yards in:

Hazard Coal.

Sandstone	2 ft.
Shale	2 ft.
Coal	12″
Bituminous shale	2″
Coal	18″
Altitude, 1460.	

About 2 miles southeast of this entry is the Roark entry on Asher fork of Goose creek, into the Hazard bed with 25 inches of coal at altitude 1485.

Mr. Delp reports coal (of the Haddix bed) 60 feet lower, 18 to 20 inches thick, of extra fine quality (as usual) with cliff sandstone between the two beds varying from 25 to 40 feet in thickness.

RICH BRANCH.

On the right, 28¾ miles up Redbird creek: Altitude of mouth, about 900.

At the branch, ¼ mile up it, is a stripping of the unnamed bed here probably about 170 feet below the Fireclay coal. Here it has 20 inches of coal under 2 feet of shale and is at altitude 970.

KATY'S CREEK.

On the right, 29½ miles up Redbird creek: Altitude of mouth, 911.

Strata lie very nearly level along this creek for the lower three miles of its course, above which they have not been investigated. A somewhat rapid rise toward the head of the creek is probable.

On the right, ½ mile up the creek and 10 feet above it a stripping gives the following section of an unnamed bed:

Sandstone	3 ft.
Shale	5 ft.
Coal	12″
Bone coal	6″

Altitude, 970.

Along the creek, and up a left branch, 1¼ miles up the creek, the following nearly complete section was obtained, the correlations being now added:

Katy's Creek Section (Sullivan).

Sandstone to top of hill	35 ft.	
Covered	30 ft.	
Shale	5 ft.	
Coal	4″	Altitude, 1520
Shale	10 ft.	
Covered	10 ft.	
Shale	10 ft.	
Covered	10 ft.	
Shale	10 ft.	
Coal (Flag)	24″	Altitude, 1470

Sandstone		10 ft.	
Covered		30 ft.	
Coal and slate	(Hazard)	7″	
Coal	(Hazard)	9″	Altitude, 1430
Sandstone		50 ft.	
Coal	(Haddix)	12″	
Clay	(Haddix)	2″	
Coal	(Haddix)	7″	
Clay	(Haddix)	2″	
Coal	(Haddix)	9″	Altitude, 1380
Sandstone		10 ft.	
Covered		50 ft.	
Sandstone		10 ft.	
Covered		15 ft.	
Sandstone		10 ft.	
Slate		8″	
Shale		18″	
Coal		10″	Altitude, 1320
Shale		10 ft.	
Shaly sandstone		20 ft.	
Shale		10 ft.	
Coal	(Hamlin)	8″	
Clay	(Hamlin)	1″	
Coal	(Hamlin)	10″	Altitude, 1280
Shale		5 ft.	
Sandstone		40 ft.	
Shale		10 ft.	
Coal		6″	
Clay and coal		6″	
Coal		20″	Altitude, 1220
Shale		10 ft.	
Coal (Rider)		15″	Altitude, 1210
Sandstone		50 ft.	
Cannel slate	(Fire-clay)	18″	
Flint fire-clay	(Fire-clay)	5″	
Clay	(Fire-clay)	4″	
Coal	(Fire-clay)	6″	Altitude, 1160
Sandstone		30 ft.	
Covered		10 ft.	
Shaly sandstone		15 ft.	
Covered		15 ft.	
Sandstone		55 ft.	
Shale		30 ft.	
Sandstone		35 ft.	
Coal		10″	Altitude, 970
Shale		15 ft.	
Sandstone		30 ft.	
Shaly sandstone to mouth of creek		15 ft.	

The Fire-clay coal, found at several places on this branch, shows a unique section here, having cannel slate in place of the coal over the flint fire-clay.

The coal at altitude 1220, seems to be a split from the Fire-clay coal rider and that at altitude 1320 may be a split from the Hamlin bed. Probably the main seam of the Hazard bed is some 10 feet above the coal at altitude 1430, but it is possible that the coal at altitude 1470 represents it, unusually high above the under-coal. In that case the upper coal of the section would be the Flag coal.

The following vertical section was taken near the forks, 2 miles up the creek:

Sandstone		35 ft.	
Coal		18″	
Shale	(Hamlin)	6″	
Coal		9″	Altitude, 1260
Sandstone		50 ft.	
Coal		6″	Altitude, 1210
Covered		5 ft.	
Sandstone		5 ft.	
Shale		5 ft.	
Coal		7″	
Shale	(Rider)	4″	
Coal		6″	Altitude, 1195
Covered		15 ft.	
Sandstone		25 ft.	
Covered		25 ft.	
Shale		5 ft.	
Coal		15″	Altitude, 1125
Sandstone		35 ft.	
Coal		8″	
Shale	(Whitesburg)	8 ft.	
Coal		19″	Altitude, 1080
Shale		10 ft.	

The Fire-clay coal rider and thin coal above it correspond with those of the Sullivan section preceding, and the Fire-clay coal is about 50 feet lower. The Whitesburg coal, lacking in the Sullivan section, is supplied here.

LEFT FORK.

On the left, 2 miles up Katy's creek: Altitude of mouth, 1075 (?).

On a right branch with mouth at altitude 1200, ¾ mile up this fork, on the right, ¼ mile up the branch (on its left fork), Taylor Hubbard has a 1-yard entry in which is the following bed-section:

Hamlin Coal.

Sandstone	8 ft.
Coal	24″
Bone coal	2″
Coal	5″
Shale.	
Altitude, 1290.	

On the left, 3 miles up the main creek, above Alvis Hubbard's house and 80 feet higher than it, the following prospect was formerly made for the survey:

Hamlin Coal.

Sandstone.	
Coal	38″
Black slate	2″
Coal	2″
Clay.	
Altitude, 1265.	

My outcrop sample of the 38-inch seam of partly splint coal gave by Dr. R. Peter's analysis, the results of which follow, too high a percentage of ash to represent the coal fairly:

Hamlin Coal.

Chemical Report No. 2654.

Moisture	1.60
Volatile combustible matter	34.28
Fixed carbon	54.82
Ash	9.30
	100.00
Sulphur	1.766
Coke (dense spongy)	64.12
Specific gravity	1.290

"A somewhat weathered sample."

Above the preceding was found the following:

Haddix Coal.

Coal	8″
Clay	5″
Coal	4″
Clay	2″
Coal	20″

Altitude, 1370.

In view of the constant variation of the coal beds the close resemblance of this bed-section to that of the Haddix coal in the preceding Sullivan section is noteworthy.

JACKS CREEK.

On the left, 30¾ miles up Redbird creek: Altitude of mouth, 925.

Strata on this creek lie nearly level along its lowest mile and farther up rise at a rate of about 40 feet per mile. They lie nearly level northward, toward Bowen creek, and rise slightly toward Phillips fork.

The following section, without the correlations, embodies most of the results of Mr. Sullivan's work on this creek, of which he says: "A complete section was made near the mouth, and a partial one about three miles above, and near the forks of the creek. Thirteen coals were developed in this region and all of them were thin excepting one."

Jacks Creek Section (Sullivan).

Sandstone to top of hill		45 ft.	
Shale		5 ft.	
Coal		1″	
Clay	(Flag)	2″	
Coal		7″	Altitude, 1455
Sandstone		45 ft.	
Shale		5 ft.	
Coal		4″	
Shale		15 ft.	
Coal		18″	
Shale		5 ft.	
Covered	(Hazard)	5 ft.	
Coal		6″	
Shale		3″	
Coal		10″	Altitude, 1380

Shale		10 ft.	
Sandstone		20 ft.	
Shale		10 ft.	
Slate		8″	
Clay and coal	(Haddix)	12″	
Coal		12″	Altitude, 1340
Shale		10 ft.	
Sandstone		10 ft.	
Covered		15 ft.	
Sandstone		10 ft.	
Covered		25 ft.	
Shale		5 ft.	
Coal		6″	Altitude, 1265
Shale		5 ft.	
Sandstone		15 ft.	
Shale		10 ft.	
Coal		2″	Altitude, 1235
Sandstone		45 ft.	
Shale		5 ft.	
Coal		4″	Altitude, 1185
Sandstone		10 ft.	
Shale.			
Thick coal with partings (Rider)			Altitude, 1170
Sandstone		30 ft.	
Slate		3″	
Clay and coal	(Fire-clay)	6″	
Coal		6″	Altitude, 1140
Shaly sandstone		35 ft.	
Coal			Altitude, 1105
Sandstone		10 ft.	
Fossil limestone			Altitude, 1095
Sandstone		20 ft.	
Coal		8″	Altitude, 1075
Sandstone		80 ft.	
Covered		20 ft.	
Sandstone		10 ft.	
Shale		10 ft.	
Coal		18″	Altitude, 955
Shale		10 ft.	
Sandstone to mouth of creek		25 ft.	

OLD-HOUSE BRANCH.

On the left, ½ mile up Jacks creek: Altitude of mouth, 965.

On the right, ¼ mile up the branch, an abandoned entry gives the altitude of the Fire-clay coal Rider at 1160.

On the right, ½ mile up the branch (on its right fork), the face of a 10-yard entry gives the following bed-section:

Fire-clay Coal Rider.

Shale with sandstone	5 ft.
Coal	31″
Clay	3″
Coal.	

Altitude, 1160.

On the left, one mile up Jacks creek, the face of a 25-yard entry gives the following bed-section:

Fire-clay Coal Rider.

Shale	3 ft.
Coal	15″
Shale	2″
Coal	32″
Clay	4″
Coal	9″

Altitude, 1160.

Notwithstanding a fairly thick covering at the face the coal there in quite rusty. The roof of an old prospect beside the entry has only about 6 inches of shale on the coal, changing in the next foot higher to sandstone.

LEFT FORK.

On the left, 2¼ miles up Jacks creek: Altitude of mouth, 1085.

OAKLEY CAVE BRANCH.—On the right, ¼ mile up the left fork. Altitude of mouth, 1115.

On the right, ⅛ mile up this branch a 10-yard entry, and again on the right, ¼ mile up a 3-yard entry have the following bed-sections:

Fire-clay Coal Rider.

10-yd. Entry at Mouth.		3-yd. Entry at Face.	
Shale	5 ft.	Sandy shale	10 ft.
Coal	12″	Coal	13″
Shale	2″	Shale	2″
Coal	3″	Coal	4″
Shale	2″	Shale	2″
Coal, about	24″	Coal	24″(?)
Altitude, 1210.		Altitude, 1220.	

The upper entry is 30 feet above the branch and Mr. Sullivan found the Fire-clay coal about at this point. Analysis of the coal from one of these two openings is given on page 163.

On the right, ½ mile up the Left fork, the following bed-section was obtained half way into a 12-yard entry, 30 feet above the fork:

Fire-clay Coal Rider.

Shale ..... 3 ft.
Coal ..... 17″
Shale ..... 2″
Coal ..... 29″
Altitude, 1220.

On the right, ⅝ mile up the fork, a 3-yard entry, 5 feet higher, gives one inch less coal in the bottom seam, 12 feet of shale over the bed and sandstone on that.

Analysis of the coal from one of these two openings is given on page 163.

RIGHT FORK.

On the right, 2¼ miles up Jacks creek: Altitude of mouth, 1085.

On the left, ¼ mile up this fork, an entry has the following section:

Fire-clay Coal Rider.

Sandstone.
Shale ..... 3 ft.
Coal ..... 15″
Shale ..... 1″
Coal ..... 2″
Shale ..... 1″
Coal ..... 24″
Altitude, 1190.

On the right, ¾ mile up the fork the following is in outcrop:

Fire-clay Coal.

Shale.
Coal, about ..... 6″
Flint fire-clay ..... 2″
Coal, about ..... 12″
Fire-clay.
Altitude, 1175.

JESSE FORK.—On the right, ¾ mile up Right fork: Altitude of mouth, 1160.

On the right at the mouth of Jesse fork the following is exposed:

Laminated sandstone	10 ft.
Fire-clay coal (in spring-house)	5 ft.
Covered.	
Massive sandstone (to creek)	5 ft.

A covered prospect above the springhouse, gave to Mr. Sullivan the following section:

Fire-clay Coal Rider.	
Coal	10″
Clay	5″
Coal and clay	10″
Coal	5″
Clay	1″
Coal	4″
Clay	6″
Coal	25″
Clay	1″
Coal	1″
Clay	1″
Coal	6″

Altitude, 1210.

From the present appearance of the prospect it looks as though it had not been carried far enough to reach a fair condition of the bed.

On the left, ¼ mile up Jesse fork, an entry when first opened gave the following complete section, but on driving in, the lower two seams of coal were covered up and all knowledge of them lost but for the early measurement. The section at the face of the present 5-yard entry also follows:

Fire-clay Coal Rider.

Mouth of Entry.		Face of Entry.	
Sandstone	8 ft.	Sandstone.	
Coal	19″	Coal	17″
Shale	1″	Shale	1″
Coal	2″	Coal	1″
Clay	2″	Shale	3″
Coal	29″	Coal	30″
Clay	6″		
Coal	8″		
Bituminous shale	10″		
Coal	3″		

Altitude, 1210.

In the same way seams of coal under numerous other entries and prospects have been lost sight of or were never discovered.

Following are the results of Dr. R. Peters' analysis of Mr. Sullivan's samples of the firm coal from this latter opening and from two openings on the Left fork of Jacks creek:

Fire-clay Coal Rider.

Chemical Report	No. 3183 Left Fork	No. 3184 Oakley Cave	No. 3186 Right Fork
Moisture	1.20	1.04	0.74
Volatile combustible matter	27.88	33.36	33.86
Fixed carbon	64.92	59.68	57.48
Ash	6.00	5.92	7.92
	100.00	100.00	100.00
Sulphur	.721	.357	.532
Coke	70.92 dense	65.60 spongy	65.40 spongy
Color of ash	very light gray	gray	light gray

The coal of the Right fork entry looks especially clean and good and is somewhat hard.

Mr. Sullivan found a bituminous fossil limestone about 170 feet above the Fire-clay coal, presumably on a left branch, ½ mile up Jesse fork, where he did some prospecting. This corresponds closely with the estimated position of fossil limestone found to the east on Middle fork. The fossil limestone in the Jacks creek general section, 170 feet above the mouth of the creek, probably should have been placed 170 feet above the Fire-clay coal.

BEAR CREEK.

On the left, 31¾ miles up Redbird creek: Altitude of mouth, 935.

Only one coal opening is known to have been made on this creek, but from surrounding openings it appears that strata lie level along the creek and have a very slight southward rise across it.

On the right of a left branch with mouth at altitude 1220, 2 miles up the creek, Willet Sizemore has an opening giving the following section:

Hamlin Coal.

Sandstone	15 ft.
Coal	12″
Shale	3″
Coal	28″
Clay.	
Altitude, 1270.	

WHITEHEAD BRANCH.

On the left, 31¾ miles up Redbird creek: Altitude of mouth, about 942.

On the right, ¼ mile up this branch, a 15-yard entry gives the following bed-section at its face:

Fire-clay Coal Rider.

Sandstone	10 ft.
Shale	4 ft.
Coal	12″
Black slate	1″
Coal	6″
Clay	2″
Coal	33″
Altitude, 1130.	

The good roof is especially noticeable here.

On the right, 32½ miles up Redbird creek, a closed entry and stripping give the following section:

Fire-clay Coal Rider.

Clay shale	5 ft.
Coal	24″
Clay	3″
Coal	7″
Knife-edge parting.	
Coal	27″
Clay and coal	3″
Coal	7″

Altitude, 1160.

All the coal excepting that mixed with clay appears to be good and a little of it is splint coal.

PHILLIPS FORK.

On the left, 34¾ miles up Redbird creek: Altitude of mouth, 958.

So far as yet appears, strata lie nearly level throughout the length of this creek and for the lowest 3 miles of its course they certainly do so, but there is a slight rise across the fork, from Jacks creek to the head of Redbird creek, and a considerable rise eastward and southward from the head of the fork to Middle fork waters.

Although habitations are plentiful all along the main stream, in contrast to most of the branches of Redbird farther down it, little prospecting seems to have been done on the upper half of the fork and the two coal openings found there give no clue to correlation.

The Hindman (?) bed has been found with thick coal toward the head of Middle fork at about the height of the gap at the head of Phillips fork; altitude 2010.

On the left, ¼ mile up Phillips fork, the face of a 6-yard entry gives the following bed-section:

Fire-clay Coal Rider.

Sandstone	3 ft.
Shaly sandstone	2 ft.
Coal	16″
Clay	3″
Bituminous clay	4″
Coal	37″

Altitude, 1180.

The bituminous clay might readily be mistaken for coal.

SAW-PIT (STEEL TRAP?) BRANCH.

On the left, ¾ mile up Phillips fork: Altitude of mouth, 1010.

On the left, ¼ mile up this branch, a 25-yard entry gives the following section 2 yards in:

Fire-clay Coal Rider.

Sandstone.	
Shale	4″
Coal	6″
Bituminous shale	1″
Coal	2″
Bituminous shale	1″
Coal	2″
Shale	3″
Coal	2″
Shale	3″
Coal	2″
Shale	3″
Coal	28″
Shale	4″
Coal	9″

Altitude, 1200.

The upper two partings disappear near the face of the entry.

On the right of a left branch, 1¼ miles up the fork, "below the old Matilda Asher house," and on the left of a right branch opposite, Mr. Sullivan obtained the following:

Fire-clay Coal Rider.

Left Branch.		Right Branch.	
Coal	10″	Coal	15″
Shale	1″	Clay	1″
Coal	11″	Coal	8″
Clay	3″	Clay	1″
Coal	38″	Coal	3″
Clay	1″	Clay	1″
Coal	6″	Coal	5″
		Clay	2″
		Coal	36″

His sample from the left branch "from the outcrop, taken from the lower 44 inches, with one thin clay parting," "slightly weathered and containing infiltered clay," gave the following results to Dr. R. Peters' analysis:

Fire-clay Coal Rider.

Chemical Report No. 3185.

Moisture	0.74
Volatile combustible matter	32.90
Fixed carbon	58.44
Ash (light gray)	7.92
	100.00
Sulphur	.892
Coke (spongy)	66.36

The following general section, except correlations, appears to have been taken in part from the foregoing right branch, that part from the Fire-clay coal to the fossil limestone from branches 2 to 2½ miles up the fork:

Phillips Fork Section (Sullivan).

Sandstone to top of hill	50 ft.	
Coal	6″	Altitude, 1765
Sandstone	135 ft.	
Coal	8″	Altitude, 1630
Shale.		
Sandstone	25 ft.	
Shale.		
Coal	12″	Altitude, 1600
Shale.		
Sandstone	60 ft.	
Shale.		
Coal	18″	Altitude, 1530
Shale.		
Sandstone	40 ft.	
Shale.		
Coal	2″	
Clay (Hazard?)	5″	
Coal	8″	Altitude, 1485
Shale.		
Sandstone	10 ft.	
Shale.		
Coal	4″	Altitude, 1470
Shale.		
Covered	10 ft.	
Sandstone	25 ft.	
Covered	20 ft.	
Sandstone	10 ft.	
Shale	20 ft.	
Covered	20 ft.	
Sandstone	10 ft.	
Fossil limestone		Altitude, 1350

Coal		14″	Altitude, 1345
Sandstone		40 ft.	
Coal		8″	Altitude, 1305
Sandstone		10 ft.	
Coal (Hamlin)		19″	Altitude, 1295
Sandstone		45 ft.	
Shale		30 ft.	
Coal		10″	Altitude, 1220
Sandstone		15 ft.	
Coal		9″	
Clay		4″	
Coal	(Rider)	6″	
Clay		7″	
Coal		39″	Altitude, 1205
Shale		15 ft.	
Sandstone		10 ft.	
Shale		5 ft.	
Coal		6″	
Flint fire-clay	(Fire-clay)	4″	
Coal		12″	Altitude, 1175
Shale		5 ft.	
Sandstone		10 ft.	
Shale		5 ft.	
Coal		8″	
Shale		50 ft.	
Coal		9″	
Shale		10 ft.	
Coal and clay		20″	
Covered	(Whitesburg)	5 ft.	
Coal		6″	
Shale		5 ft.	
Coal and shale		8″	Altitude, 1075
Sandstone to bed of creek		20 ft.	

The Whitesburg bed is regarded as consisting of the four seams of coal near the bottom of the section. The Haddix bed appears not to have been found and the Hazard bed correlation is adopted with much uncertainty, largely because of its frequently having a thin coal 10 to 20 feet below it. The southward thickening of strata evidenced on Middle fork prevents identification of the higher coals without additional data.

On the left, 1⅜ miles up Phillips fork, Mrs. Asher has a now closed entry of the following bed-section:

Fire-clay Coal Rider.

Sandstone.	
Shale	4 ft.
Coal	7″
Shale	3″
Coal	9″
Shale	2″
Coal, about	40″

Altitude, 1190.

The bottom of the bed was in water and not seen when measured.

This same bed gives the first of the following two bed-sections on the right, 1⅜ miles up the fork, half way in a 5-yard entry, and the second on a right branch, 1½ miles up the fork, on the left, ⅛ mile up the branch, in a 4-yard entry at water level:

Fire-clay Coal Rider.

5-yd Entry.		4-yard Entry.	
Sandstone	2 ft.	Shale	3 ft.
Shale	4 ft.	Coal	9″
Coal	1″	Shale	3″
Shale	3 ft.	Coal	6″
Coal	9″	Shale with coal	8″
Coal and shale	14″	Coal	6″
Coal, over	30″	Knife-edge parting.	
		Coal	2″
		Knift-edge parting.	
		Coal	18″
		Knife-edge parting.	
		Coal	7″

Altitude, 1195.

PUPS BRANCH.

On the left, 1¾ miles up Phillips fork: Altitude of mouth, 1090.

On the right, ⅜ mile up and 5 feet above the branch, a 4-yard entry gives the following section at its mouth:

Fire-clay Coal Rider.

Shale	8 ft.
Coal	9″
Shale	23″
Coal	12″
Shale	18″
Coal	32″

Altitude, 1195.

On the left, 1⅞ miles up Phillips fork, 85 feet above it, at Wade Roark's, a former prospect gave the following:

Fire-clay Coal Rider (Sullivan).

Coal	12″
Shale	24″
Coal	10″
Shale	12″
Coal	5″
Clay	5″
Slate	4″
Coal	30″

Altitude, 1195.

The following coals found 2 miles up the fork, all seem to belong to one bed and are distributed through about 40 vertical feet:

Whitesburg Coal.

Shale with thin sandstones	30 ft.
Coal	3″
Sandstone	13″
Shale	10″
Coal	3″
Shale	11″
Coal	1″
Shale with siderite	8 ft.
Coal	13″
Shale	8 ft.
Coal	4″
Shale	1″
Coal	1″
Shale	6 ft.
Coal	5″
Shale	2½ ft.
Coal	3″
Shale	7″
Coal	1″
Shale	4 ft.
Shaly sandstone	3 ft.
Coal	12″

Shale to creek at altitude 1105.

At 2¼ miles up Phillips fork the following coals were found:

Hazard Coal.

Sandstone	3 ft.
Coal	6″
Shale	15″
Coal	3″
Shale	8″
Coal	4″

Altitude, 1465.

Hamlin (?) Coal.

Shale.

Coal	6″

Altitude, 1280.

Fire-clay Coal.

Shaly sandstone	35 ft.
Coal	15″
Flint fire-clay	6″
Coal	15″

Altitude, 1175.

The following, probably a part of the Fire-clay coal bed, was found near water level 3 miles up the fork:

Fire-clay (?) Coal.

Shale	2 ft.
Coal	8″
Cannel coal	11″

Altitude, 1205.

Mr. Sullivan prospected as far as Rocky Point branch, 3½ miles up the fork, near which the Fire-clay coal goes below drainage. He opened the bed in four places, all giving about 6 inches of coal above the flint clay parting and 13 inches below it. On the right, one mile up Rocky Point branch, he found the Rider, probably not in good condition, as knowledge of the opening seems now to be lacking.

At East Hilton branch, on the left, 4¼ miles up Phillips fork, with mouth at altitude 1440, a widening of the valley is probably due to the resistance of the hard

sandstone between the Haddix and Hazard coal beds, and the latter therefore may be close to creek level.

On the right of a left drain with mouth at altitude 1635, at Willis Colwell's, 7 miles up Phillips fork, an unfinished prospect gives the following:

Shale	1 ft.
Coal	1 ft.
Shale and black slate	1½ ft.
Coal	1 ft.
Shale and black slate	4 ft.

Altitude, 1835.

On the right of the fork, 20 feet above it, another prospect gives the following:

Sandstone	2 ft.
Clay	2 ft.
Black slate	½ ft.
Coal	1½ ft.

Altitude, 1660.

These possibly correspond to the coals at altitudes 1600 and 1765 of the general section.

The road gap at the head of the fork, 8 miles up it, altitude 2000, is probably about on the level of the Hindman coal.

On the left, 33¼ miles up Redbird creek, 235 feet above it, Deliel Jackson has an entry with the following bed-section, the bottom coal approximate only:

Fire-clay Coal Rider.

Shale	10 ft.
Coal	24″
Shale	2″
Coal	34″
Shale	2″
Coal	6″

Altitude, 1200.

On the right, 33½ miles up the creek, a 1-yard entry gives the following bed-section:

Fire-clay Coal.

Shale	4 ft.
Coal	9″
Shale	2″
Coal	9″
Shale	4″
Coal	5″
Shale	4″
Coal	23″
Shale	1″
Coal	5″
Fire-clay.	
Altitude, 1205.	

BLUE-HOLE BRANCH.

On the right, 33¾ miles up Redbird creek: Altitude of mouth, 991.

There is a slight rise of strata up this creek and also across it from Bear branch on the north, but toward Lick fork on the south they are about level.

Following is Mr. Sullivan's general section for this stream with correlation added:

Blue-Hole Section (Sullivan).

Sandstone to top of hill		200 ft.	
Covered		30 ft.	
Shale		25 ft.	
Coal	(Hindman)	6″	
Clay	(Hindman)	4″	
Coal	(Hindman)	3″	
Bituminous clay	(Hindman)	9″	
Coal	(Hindman)	12″	
Coal and slate	(Hindman)	5″	Altitude, 1670
Shale.			
Sandstone		35 ft.	
Coal (Francis)		6″	Altitude, 1630
Shale		10 ft.	
Covered		10 ft.	
Sandstone		35 ft.	
Shale		5 ft.	
Coal (Flag)		8″	Altitude, 1570
Sandstone		50 ft.	
Shale		10 ft.	

Coal	(Hazard)	9″	
Clay		22″	
Coal		2″	Altitude, 1510
Shale		20 ft.	
Coal		20″	
Sandstone		35 ft.	
Coal	(Haddix)	3″	
Clay		6″	
Coal		18″	Altitude, 1455
Sandstone		30 ft.	
Covered		40 ft.	
Shale		10 ft.	
Coal		15″	Altitude, 1375
Sandstone		25 ft.	
Coal	(Hamlin)	2″	
Shale		1″	
Coal		8″	
Clay		11″	
Coal		12″	Altitude, 1350
Shaly sandstone		45 ft.	
Shale		25 ft.	
Coal		1″	
Clay		1″	
Coal		5″	
Clay		2″	
Coal		4″	
Clay		2″	
Coal		2″	
Clay		5″	
Coal		4″	Altitude, 1280
Shale		20 ft.	
Coal (Rider)		32″	Altitude, 1260
Shale		10 ft.	
Sandstone		20 ft.	
Coal	(Fire-clay)	6″	
Flint fire-clay		8″	
Coal		11″	Altitude, 1230
Shale		5 ft.	
Sandstone		60 ft.	
Covered		55 ft.	
Sandstone		45 ft.	
Coal			Altitude, 1065
Sandstone		15 ft.	
Covered		30 ft.	
Sandstone to mouth of branch		30 ft.	

The thin coal seams at altitude 1280 are very likely split from the Rider below and the coal at altitude 1375 may be a part of the Hamlin bed. The coals of the whole section correspond well to the normal in intervals.

Near the mouth of Bear Wallow, 1½ miles up Blue-Hole branch, Mr. Sullivan obtained the following section and from his sample of the firm coal Dr. R. Peter's analysis gave the following results:

Fire-clay Coal Rider.

Coal	5½″
Clay	½″
Coal	26¼″

Analysis.

Chemical Report No. 3127.

Moisture	1.20
Volatile combustible matter	29.80
Fixed carbon	65.00
Ash (light brownish gray)	4.00
	100.00
Sulphur	.755
Coke (dense)	69.00

From the forks, 1¾ miles up the branch, one mile up the left fork to a left branch with mouth at altitude 1255, on the left at the mouth of this branch, Ambrose Collett has an 8-yard entry with the following bed-section at its face:

Fire-clay Coal Rider.

Sandstone	3 ft.
Coal	10″
Shale	1″
Coal	23″
Bituminous shale over	6″
Sandstone	3 ft.

Altitude, 1275.

LICK FORK.

On the right, 36 miles up Redbird creek: Altitude of mouth, 1064.

The data acquired are insufficient for determining the dip of strata on this stream. It is known, however, that there is a slight fall eastward to the head of Goose creek, and presumed that there is a slight rise southward.

One-half mile up the fork, 8 inches of coal shows under 60 feet of shaly and massive sandstone at altitude 1135. Above this coal A. J. Asher has the following:

Fire-clay Coal.

Shale	4 ft.
Coal	12″
Shale	3″
Coal	3″
Shale	2″
Coal	25″
Jack-rock	4″
Coal	2″
Altitude, 1225.	

The section here does not vary greatly from the two given as between Phillips fork and Blue-Hole branch, but the jack-rock seems to be a variation of the flint fire-clay and identifies the bed, as is clearly proved farther up Redbird creek.

One mile up Lick fork the following coals were found:

Fire-clay Coal Rider.

Sandstone	10 ft.
Coal	32″
Shale	1 ft.
Sandstone.	
Altitude, 1250.	
Shaly sandstone.	
Coal	4″
Altitude, 1240.	
Shaly sandstone	20 ft.

Fire-clay Coal.

Coal	9″
Impure fire-clay	6″
Coal	11″
Clay	8″
Coal	4″

Altitude, 1220.

And the following at the forks, 1½ miles up Lick fork:

Hamlin Coal.

Shale	3 ft.
Coal	5″
Shale	44″
Coal	9″
Shale	8″
Black slate	6″
Coal	2″

Altitude, 1315.

At Mr. Gambiel's, ¼ mile up the left fork:

Hamlin (?) Coal.

Shale	5 ft.
Sandstone	10 ft.
Shale	8″
Coal	16″
Clay about	6″
Shale	2 ft.
Coal	11″

Altitude, 1405.

One mile up the left fork and ½ mile up a hollow there:

Hindman Coal.

Shale.	
Coal	14″
Shale	3″
Coal	2″
Shale	1″
Coal	12″
Shale	11″
Coal and shale	8″
Shale	5 ft.
Coal	20″

Altitude, 1690.

At 1¼ miles up the left fork the following:

Flag Coal.

Coal	21″
Shale	2 ft.

Altitude, 1575.

Haddix Coal.

Sandstone	10 ft.
Shale	2 ft.
Coal	3″
Shale	8″
Coal (part splint)	34″

Altitude, 1380.

RICH BRANCH.

On the left, 38¼ miles up Redbird creek: Altitude of mouth, 1192.

On the right, ⅛ mile up this branch, R. W. Asher had an unfinished opening which gave the following section:

Fire-clay Coal.

Shale	4 ft.
Coal	4″
Shale	3 ft.
Coal	9″
Bone coal	6″
Coal	37″

Altitude, 1260.

MEADOW FORK.

On the right, 38½ miles up Redbird creek: Altitude of mouth, 1208.

The road to the left fork of Straight creek follows this stream and it is sometimes considered as the main stream or its right fork, with Cow fork branching off here to the left. The correct view seems to be that main Redbird creek (or its left fork) bears to the left here and that the mouth of Cow fork is ¼ mile farther up the creek. Strata up this fork rise southward for the first ¾ mile somewhat more rapidly than below the fork, and the rise probably continues through the ridge to Straight creek waters.

Opposite the mouth of Little creek, 3 inches of coal under one foot of shale and then sandstone, on the left ½ mile up Meadow fork, 5 feet above it, is a part of the Whitesburg bed at altitude 1245.

On the left, ¾ mile up the fork, 25 feet above it, B. S. Knuckles has a long entry which gave the following bed-section when 3 yards in:

Fire-clay Coal.

Argillaceous sandstone	15 ft.
Coal	34″
Clay	7″
Coal	4″
Shale	2″
Coal	23″
Jack-rock	7″

Altitude, 1300.

Brown flint fire-clay can now be seen in place of the jack-rock 10 yards in.

Beside the path a half mile to the left of the gap to Left fork of Straight creek, 180 feet higher than the gap and 40 feet under the top of Kentucky ridge, is an old opening of several feet thickness showing cannel coal. Its altitude, 2140, indicates a bed high above the Hindman, a sharp rise of strata from the Meadow fork entry, or a great increase of thickness of strata below the Hindman bed. It is likely that all these causes are combined, and the coal may be of the Francis or Flag beds.

COW FORK.

On the left, 38¾ miles up Redbird creek: Altitude of mouth, 1240.

On the left, ½ mile up this fork, the Knuckles heirs have an 80-yard entry, 15 feet above the fork, having the following bed-sections at its mouth and face:

Fire-clay Coal.

At Mouth.		At Face.	
Sandstone	30 ft.	Sandstone.	
Coal	23″	Coal	25″ to 28″
Clay	1″	Clay	1″
Coal	2″	Coal	2″
Clay	1″	Clay	1″
Coal	3″	Coal	8″
Flint fire-clay	4″	Clay	1″
Black slate	3″	Coal	3″
Coal	3″	Shale.	
Black slate over	18″		

Altitude, 1300.

The flint fire-clay, of the usual brown color and quality, is believed to be under the floor of the entry at its face. In a former visit, when the entry was 5 yards in, the flint clay was not seen, but jack-rock 6 inches thick was noted in its place.

On the left, 38⅞ miles up Redbird creek, John B. Knuckles has an abandoned 60-yard entry with rooms which give coal of varying thickness in a considerable roll. On the slope of the roll the bed has been mined where over 6 feet thick and elsewhere the top seam is reduced to 27 inches thickness. The bottom coal, not shown in the following section, which gives what appeared to be the normal of the bed, was not mined:

Fire-clay Coal.

Sandstone	20 ft.
Coal	42″
Shale	2″
Coal	10″
Shale	1″
Coal over	4″

Altitude, 1285.

On both sides of Redbird creek, 39½ miles up it, are several abandoned entries, of which that one farthest up on the left and at stream level gave the following bed-section 1 yard in:

Fire-clay Coal.

Sandstone	15 ft.
Coal	29″

Altitude, 1310.

Other seams of the bed doubtless lie underneath the floor of the entry.

The bed goes below drainage here, and, so far as known, no coal has been opened farther up the creek.

The following drill hole record begins at about 330 feet below the the Fire-clay coal and goes down nearly to the top of the Mississippian limestone. It shows the position and thickness of coals below drainage on the lower part of Redbird creek:

	Thickness	Depth
Sand and gravel	10′ 0″	10′ 0″
Hard sandstone	42′ 0″	52′ 0″
Slate	1′ 4″	53′ 4″
Coal	0′ 4″	53′ 8″
Hard slate	4′ 10″	58′ 6″
Hard sandstone	36′ 6″	95′ 0″
Hard gray slate	4′ 0″	99′ 0″
Coal	2′ 2″	101′ 2″
Hard fire-clay	0′ 10″	102′ 0″
Sandstone	4′ 0″	106′ 0″
Hard slate	25′ 0″	131′ 0″
Sandstone	15′ 4″	146′ 4″
Slate	8′ 8″	155′ 0″
Gray shale	47′ 6″	202′ 6″
Coal	1′ 6″	204′ 0″
Hard fire-clay	1′ 0″	205′ 0″
Hard sandy shale	10′ 0″	215′ 0″
Gray shale	13′ 10″	228′ 10″
Bony coal	0′ 5″	229′ 3″
Sandstone	23′ 9″	253′ 0″
Sandy shale	6′ 3″	259′ 3″
Slate	1′ 9″	261′ 0″
Black shale	32′ 7″	293′ 7″
Sandstone	2′ 5″	296′ 0″
Black shale	6′ 3″	302′ 3″
Sandy shale	12′ 1″	314′ 4″
Black shale	38′ 8″	353′ 0″
Sandy shale	18′ 4″	371′ 4″
Black shale	13′ 2″	384′ 6″

	Thickness		Depth	
Coal	0′	4″		
Shale	0′	2″		
Coal	1′	6″		
Fire-clay	2′	9″		
Coal	0′	3″	393′	10″
Shale	2′	0″		
Coal	0′	2″		
Shale	2′	0″		
Coal	0′	2″		
Sandy shale	7′	2″	401′	0″
Sandstone	19′	0″	420′	0″
Sandy shale	11′	6″	431′	6″
Black shale	9′	6″	441′	0″
Sandstone	22′	0″	463′	0″
Sandy shale	4′	0″	467′	0″
Sandstone	35′	6″	502′	6″
Conglomerate	0′	6″	503′	0″
Black shale	7′	8″	510′	8″
Sandstone	65′	4″	576′	0″
Trace of coal	0′	6″	576′	6″
Sandstone	4′	4″	580′	10″
Sandy shale	0′	10″	581′	8″
Sandstone	2′	6″	584′	2″
Sandy shale	1′	0″	585′	2″
Sandstone	35′	4″	620′	6″
Sandstone and coal mixed	2′	7″	623′	1″
Dark sandy shale	11′	11″	635′	0″
Sandstone	9′	6″	644′	6″
Hard sandstone	9′	6″	654′	0″
Light brown sandstone	5′	0″	659′	0″
Sandstone	17′	0″	676′	0″
Hard white stone	41′	0″	717′	0″
Hard broken stone	5′	0″	722′	0″
Dark shale	1′	3″	723′	3″
Hard sandstone	24′	5″	747′	8″
Coal	0′	1″	747′	9″
Hard sandstone	62′	7″	810′	4″
Conglomerate	1′	8″	812′	0″
Black slate	0′	1″	812′	1″
Coal	0′	9″	812′	10″
Conglomerate	1′	2″	814′	0″
Flint clay	3′	0″	817′	0″
Sandy shale	12′	0″	829′	0″
White sandstone	6′	0″	835′	0″
Hard sandy shale	6′	4″	841′	4″

	Thickness		Depth	
Black slate	1′	6″	842′	10″
Sandy shale	9′	8″	852′	6″
White sandstone	12′	0″	864′	6″
Dark shale	0′	6″	865′	0″
Broken white stone	2′	0″	867′	0″
Hard sandstone	29′	4″	896′	4″
Conglomerate	0′	2″	896′	6″
Hard banded slate	3′	8″	900′	2″
Coal	0′	10″	901′	0″
Flint clay	1′	0″	902′	0″
Hard sandstone	4′	6″	906′	6″
Hard dark slate	10′	6″	917′	0″
Broken shale	5′	0″	922′	0″
Sandy shale	5′	0″	927′	0″
White sandstone	28′	0″	955′	0″
Hard white stone	7′	0″	962′	0″
Sandstone	47′	0″	1009′	0″

THE COALS OF SEXTON CREEK AND THE TRIBUTARIES OF SOUTH FORK ON THE RIGHT BETWEEN THE MOUTH OF RED-BIRD CREEK AND THE MOUTH OF SEXTON CREEK

BY

PHILIP G. RUSSELL.

INTRODUCTORY.

This report follows a complete examination of coal exposures, artificial or natural, in the Sexton creek region.

Elevations of the mouths of the main creeks and the coals of the main branches of Sexton creek are from spirit levels run during June, 1917, by the Kentucky Geological Survey. The elevations of coal beds are barometric based on the spirit level datum and are believed to be correct within 10′.

Horizontal distances were obtained usually by pacing, as only the major features of the Manchester Reconnoissance sheet could be relied on for location.

The term long entry indicates a length exceeding the range of examination and usually means an entry over 30 yards long.

Where the character of the coal is not given it should be understood to be common black bituminous coal.

STRATIGRAPHY.

The strata exposed at the surface in the district covered by this report are included in that part of the Pottsville between 50′–100′ over the Fire-clay coal to approximately 200 feet below the Manchester coal. The higher formations are exposed toward the tops of the highest hills on Rooster branch, Road run and the mouth of Sexton creek. The larger portion of the Sexton creek region lies in the syncline immediately northwest of the anticline and where a considerable development of massive sandstone causes high hills; structure and stratigraphy therefore combine to make this the most favorable place for the occurrence of the higher strata.

The lowest strata exposed, are in the region of Burning Springs where the crest of the plunging anticline is highest in this region. The strata at the surface in the Sexton creek region are all of lower Pottsville age.

Some noteworthy features of the stratigraphy are:

(1) The predominance of shale over sandstone especially in the southwestern part of the area.

(2) The fineness of grain of the sandstone (the massive sandstone over the Burns coal alone is medium coarse-grained) and the total absence of pebbles even in sandstones over one hundred feet under the Manchester coal, the old No. 1 of the Kentucky Geological Survey.

(3) The relative absence of calcareous beds either concretionary or sedimentary.

(4) The great variation, often in short distances, of the thickness of sandstone beds and the abrupt transition of sandstone to shale and vice-versa.

(5) The prevalence of cross-bedding in sandstones below the Manchester coal.

STRUCTURE.

The crest of a southwest-northeast anticline, which approximately parallels Pine Mountain, passes just southeast of the left hand tributaries of Sexton creek.

Main Sexton creek lies approximately in a shallow syncline which plunges northeast. There are general northwest dips on the left hand branches of Sexton creek and a stratigraphic rise up the right hand branches to a poorly defined northwest-southeast anticline whose crest passes into Jackson county.

Crane creek and the two Teges creeks lie on the southeast slope of the main southwest-northeast anticline and Road run lies in the syncline.

The structure of the region covered in this report is shown by the elevations of the Manchester coal. This bed has a minimum elevation of approximately 680 feet at the mouth of Rooster branch of South fork of Kentucky river and a maximum elevation of about 1160 feet on Burning Springs branch, just above the town of Burning Springs, an air line distance of 11 miles. Dips as high as 230 feet to the mile, occur in a northwest direction in the vicinity of Burning Springs. The average dip for the region, however, is about 50 feet to the mile.

No faults have been found in this area or in fact to the writer's knowledge in Clay county. The elevations of the Manchester coal between Burning Springs and main

Sexton creek vary so greatly in a short distance that a fault might naturally be expected, but none could be found.

Joints also are notably absent in this region.

A combined structural and stratigraphic influence over relief and drainage shows in the area covered by this report.

A change in the character of strata for 150 feet over the Manchester coal from many resistant sandstone beds on Goose creek waters to nearly all non-resident shales with only a few thin sandstone beds in the northwest portion of Clay county, combined with a pronounced stratigraphic rise which keeps these rocks above drainage, is largely responsible for the low, gently sloping hills so conspicuous at the head waters of Sexton creek. This results in the peculiar condition of higher, steeper hills and narrower valley toward the mouth of Sexton creek than at its head.

A noteworthy thing about the drainage system of Sexton creek is the short tributaries on the southeast and the long, tortuous northwest tributaries. An explanation of this is to be found in the fact that the crest of the anticline coincides with the drainage divide between Sexton creek waters and the right hand tributaries of South fork and Goose creek.

Main Sexton creek occupying the synclinal axis the shortness of the northwest limb of the anticline accounts for the shortness of the tributaries flowing down this slope. The southeast dip of strata on the northwest side of the syncline is long and gentle and the tributaries of Sexton creek flowing down this slope are comparatively long and tortuous.

The drainage system of this region is an admirable example of what has been called subsequent drainage, that is a drainage system which is notably controlled in direction and extent by geologic structure.

Some resistant stratum now completely removed by erosion from the region probably is responsible for this relation between drainage and structure. The streams of the region on encountering this formation were controlled in their direction of flow by the altitude of this resistant formation.

COALS.

In the Sexton creek region only the lower coals of the Pottsville exist and these are all thin, the maximum thickness of the coal being 33 inches. There is but a very small portion of the Sexton creek area where coal beds are over 25 inches thick. A diamond core drill test on Redbird creek, at the mouth of Big creek, went over 200 feet below the Manchester coal without finding a coal of workable thickness. This fact, taken in conjunction with the thinness of coals reported in recent oil wells drilled in the northwest portion of Clay county and which passed entirely through the coal bearing rocks, indicates that the coals below drainage here are probably not of workable thickness.

The interval between the Manchester coal and the "Big Lime" of the oil well logs is 570 to 620 feet in the Sexton creek region. This interval appears to be thinning to the north and northwest and thickening to the south and southeast as it is over 800 feet on Redbird creek and is probably about 400 feet in the vicinity of McKee, in Jackson county.

Generally speaking the intervals between the coals are unusually constant in this area, the intervals between any two coals rarely varying as much as 30 feet in a distance of 18 miles or over. This statement holds for coals 150 feet or more apart as well as for beds nearer together.

Since the Fire-clay coal with its characteristic flint fire-clay parting was not found in this region it could not be used in the correlation of the coals.

The Manchester bed which is above drainage over much of the area and has a peculiar hard white fire-clay floor at times becoming a hard semi-quartzitic rock, was used as an index bed. The determination of the elevation of the Manchester coal over all points of the area enabled the correlation of higher and lower beds to be established by their intervals to the Manchester coal.

The coarse-grained massive sandstone over the Burns coal is another valuable aid in correlation, the first coal under that sandstone being invariably the Burns coal.

All coals found by J. M. Hodge in his study of the

coals of Goose creek and Redbird have been identified on Sexton creek and where possible the names used by Mr. Hodge were adopted. Several persistent coals either not found or not named by him are given local names.

Where possible a broader correlation of certain of the Sexton creek coals with coals of other portions of the Eastern Kentucky coal field has been suggested. Mostly these broader correlations mentioned in the following general section on the coals must of necessity be tentative.

The following is a list of the coal beds found in this region.

Name used in this report. Typical interval.	J. M. Hodge's Nomenclature.
Fire-clay coal (not found on Sexton creek)	Fire-clay coal
Whitesburg coal 53 ft.—(48–58)	Whitesburg coal
Bishop coal. 50 ft.—(44–56)	
Bowling coal 40 ft.—(32–43)	Bowling coal
Moore coal 45 ft.—(34-56)	Coal 100 ft. over Howard coal
Cool Spring coal 50 ft.—(32–52)	Sometimes called Upper Split of Howard
Upper Howard coal 50 ft.—(34–54)	Usually Howard
Lower Howard coal 70 ft.—(55–74)	Usually lower split Howard, sometimes Howard
Burns coal 65 ft.—(50–71)	Burns
Wyatt coal 65 ft.—(58–72)	Mentioned but not named
Manchester coal 40 ft.—(36–60)	Manchester coal
Huckleberry Branch coal 50 ft.—(30–50)	Mentioned but not named
Sacker Branch coal. 60 ft.—(40–60)	
Lower Teges coal	Mentioned but not named

All of the preceding coals are believed to be persistent coals not only in the Sexton creek area but pos-

sibly over Goose creek and Redbird drainage as well. By "persistent" coals is meant coal horizons at which, while the coal may at times be lacking, yet it will again reappear at widely distant points. Most if not all of these coals have been recognized in Clay county at points at least twenty miles distant.

All of the coals between and including the Fire-clay and the Manchester coals occasionally attain workable thickness in Clay county, with the exception of the Wyatt coal, which, although thin, is a notably persistent bed.

FIRE-CLAY COAL.

As no sign of this bed was found in the area under consideration nothing can be said of it, except that its interval to the Manchester coal is close to 550 feet and that it will have no commercial importance in the area, if found, its height being such as to bring it above the hills over all but the region about Road run and the mouth of Sexton creek.

The bed called Whitesburg in this report is surely not the Fire-clay bed, having too low an interval to the Manchester coal and having no flint fire-clay parting.

THE WHITESBURG COAL.

This bed is correlated with the Whitesburg coal mainly because of its interval of 490 feet to the Manchester coal. The validity of this correlation is strengthened by the occurrence of a thick massive sandstone over this bed on Road run. A thick massive sandstone is generally present in Clay county between the Whitesburg and the Fire-clay coals.

The thickness of the coal in the only place where the bed could be seen (on Cool Spring branch of Sexton creek) was 20½ inches and the roof light gray clay shale. In a completely caved opening on Road run the bed was reported to be 34 inches thick with about 3 feet of shaly sandstone parting under the upper 4 inches of the bed.

This coal over 95 per cent of the area is above the highest hills and where present in the higher hills, as in the region about Road run and the lower part of Sexton creek, is so high as to have little area. The absence of knowledge concerning this bed prevents reliable state-

ments as to its average thickness but it is probably about 24 inches.

THE BISHOP COAL.

This coal has been named from an occurrence on Columbus Bishop's land on Road run. The bloom of the bed was seen here and the reported thickness in a facing now caved was 36–40 inches. The bed here was reported to be a mostly cannel coal but with a little stone coal at the bottom of the bed. The only other knowledge concerning this bed in this region is a report of a coal less than 20 inches thick in a caved digging on Cool Spring branch, which is correlated with this coal.

The interval of the Bishop coal to the Manchester coal is 435–450 feet. This coal correlates with a coal showing in sections of the coals on Redbird and also correlates with a coal mentioned in Mr. J. M. Hodge's report on Goose creek coals, which has a 420 foot interval to the Manchester coal.

If the thickness of this bed is as reported on Road run there will be a small area of workable coal high in the hills there, but generally speaking this coal will have no economic promise in this region. What was said about the Whitesburg coal in regard to area and relation to drainage also applies to the Bishop coal.

THE BOWLING COAL.

The Bowling coal has an average interval of 395 feet to the Manchester coal in the Sexton creek region. It is correlated, by comparison of sections at intervening points, with the coal, called by Mr. J. M. Hodge the Bowling coal and which is with little doubt the Ambrgy coal. The Bowling coal is a persistent coal showing in several sections of the coals on branches of Redbird creek.

In the Sexton creek area this coal has been seen at only one place on Sadler branch of Sexton creek; but there is a caved opening into this bed on Anglin branch of Sexton creek and a coal bloom occurs at this horizon in a section on Road run. In two at least of the three occurrences in this area the bed has a black shale roof. This is the roof which the Ambrgy coal would be expected to have.

The interval of this bed to the Manchester coal in the area under description varies from 380–410 feet with an average of 395 feet.

In the opening on Sadler branch the coal was 23–24 inches thick immediately overlain by 1½ feet of black slaty shale followed by light gray shale. This coal is slightly over 26 inches thick in an opening on Anglin branch.

The thinness and height in the hills of this bed and its consequent small area is such that it is believed to be of little or no economic importance at the present time.

THE MOORE COAL.

This is believed to be one of the most persistent coals of this region. This coal, with an average interval of 350 feet to the Manchester coal, was mentioned by Mr. J. M. Hodge several times in his report on the coals of Goose creek. He refers to it as a coal coming 100 feet over the Howard but gives it no name. It can also be identified in several of the sections made on Redbird creek.

The thickness in the few openings made into this coal in the Sexton creek region varies from 18–27 inches, with an average of 22 inches. The interval to the Manchester coal varies from about 340 to about 360 feet.

The Moore coal should usually be present in the higher hills except in territory which is high structurally, where it will be above the highest hills. In regions where the Burns and Howard coals are thin this coal deserves more prospecting for local use than it has received.

Though locally this bed may be of some economic importance, possibly attaining a thickness of about 30 inches, generally speaking it will be found too thin to be of value at the present time.

So far as is known the Moore coal is thickest on lower Sexton creek and especially in the vicinity of Booger branch, where it has its maximum thickness in an opening from whose owner the coal is named.

THE COOL SPRING COAL.

This coal has an average interval of 300 feet to the Manchester coal. It is believed to be a fairly persistent bed over much of Clay county. A coal at this horizon shows in some of the sections made on Redbird and has also been found by Mr. Hodge on Goose creek waters where it was called the upper split of the Howard coal in one instance. The interval of this coal to the Manchester coal varies from 275–322 feet.

This coal has been named the Cool Spring coal because of its maximum observed thickness on Cool Spring branch of Sexton creek. It has been frequently opened here and is a cannel coal.

The observed thickness of this bed varies from a maximum 32½ inches (the lower 20½ inches being cannel coal) on Cool Spring branch (this bed was reported 46 inches thick, in an opening now completely caved) to a minimum of 8 inches under carbonaceous black slate in the head of Upper Teges. The average thickness of the bed is probably about 22 inches.

In the vicinity of Cool Spring branch of Sexton creek this coal is largely cannel, the lower two-thirds of the bed being cannel coal and the upper one-third bituminous coal. This cannel coal is somewhat impure and is a peculiar variety. It is further described in the detailed section of this report which follows.

Except in the immediate vicinity of Cool Spring branch, this coal is a bituminous coal.

At the mouth of Little Sexton creek the Cool Spring coal has thinned to 11 inches and has not been found above this point. It probably becomes a very thin coal at the base of a massive sandstone or possibly dies out entirely.

The Cool Spring coal is everywhere above drainage in the area treated of in this report and except near the crest of the anticline or where the hills are low, as at the head of Little Sexton, will be found with fair area on the higher hills. Generally speaking the Cool Spring coal has no partings of consequence.

A fine-grained massive sandstone is commonly found from 0–10 feet above the bed with gray shale, sometimes

dark gray to black immediately over the coal, and between the sandstone and the coal.

The Cool Spring coal is of some commercial value in the immediate vicinity of Cool Spring branch but is too thin elswhere to be of any value at the present time.

THE UPPER HOWARD COAL.

The coals called by Mr. Hodge, in his report on the coals of Goose creek, the Howard and the lower split of the Howard are called the Upper and the Lower Howard coals respectively in this report. In this region these coals vary from 25–100 feet apart. The coal here called Upper Howard is Hodge's typical Howard. At times, however, a coal at the horizon of the Upper Howard coal was called the Upper Split of the Howard, but it is possible that this meant the main Howard coal.

The Upper Howard coal has an average interval of 250 feet to the Manchester coal in this region. This interval varies from 216–260 feet but over much of the area is fairly constant at 245–255 feet.

The thickness of the Upper Howard coal varies from a maximum of 32 inches on the divide between Little Sexton creek and Chestnut branch of Main Sexton creek, to a minimum of 12 inches on Crooked branch of Main Sexton. The average thickness of this coal over the region under consideration is about 24 inches.

The Upper Howard coal is above drainage everywhere in this region and is in the higher hills everywhere except in the district about Burning Springs and where the hills are exceptionally low.

The Upper Howard bed never carries any cannel coal so far as known, but it is a very good quality block coal. The roof of the bed is usually light gray, sometimes yellowish clay shale. Massive sandstone does not show so frequently over the bed as it does in the case of the Lower Howard coal. Very rarely a thin bituminous shale comes over the coal but never a fine black slate. The bed is usually, if not always, unparted.

This coal is of no considerable economic importance in this area since it only attains workable thickness at one place and there has so small an area, because of its height in the hills as to be of little value. The coal has

been frequently opened from Anglin branch to Chestnut branch of Sexton creek. Where the Upper and Lower Howard coals have their best thickness in the region of Little Sexton creek they are but 30–35 feet apart and frequently have almost identical bed sections. Great care must be taken in this region not to confuse the two beds.

THE LOWER HOWARD COAL.

This bed has an average interval to the Manchester coal of 200 feet. It was called the lower split of the Howard coal by Mr. Hodge in his report on the coals of Goose creek.

The thickness of this bed varies from a maximum of 27–28 inches on Little Sexton creek to a minimum thickness of 14 inches on Spivey branch of Sexton creek. The interval of this coal to the Manchester coal varies from 210–185 feet. The coal of the Lower Howard bed is always bituminous coal so far as known and never cannel.

The bed is sometimes parted—as for instance on Chestnut branch of Sexton creek and again at the head of Nameless branch of Little Sexton, where it shows 27 inches of coal with 6 inches of shale parting distributed through the bed. The roof of the bed is very commonly light gray sandy shale 1 to 4 feet thick overlain by fine-grained massive sandstone. This massive sandstone sometimes lies directly on the coal and is a so much more common feature of the stratigraphy within 7 feet of the top of the Lower Howard coal than it is of a like interval over the Upper Howard bed that it often may aid in distinguishing the Upper from the Lower Howard coals.

The Lower Howard coal is above drainage throughout the Sexton creek area and is usually in the hills which rise to moderate height. On upper Sexton creek, however, and especially where the strata are high, due to the anticline, this coal lies shortly above all but the highest hills.

The Lower Howard coal never attains workable thickness (thirty inches) in the Sexton creek area, averaging about 22 inches throughout much of the area. At some later date it may be worked in conjunction with other thin beds, but is of no economic importance at the present time.

THE BURNS COAL.

This name is given this bed by Mr. J. M. Hodge in his report on the coals of Redbird creek. The Burns coal at the head of Sexton creek is called No. 2 in an older report and is given the correct interval of 125 feet to the Manchester coal. The interval of this coal to the Manchester coal in the Sexton creek region varies from 110–143 feet and is usually constant to an average interval of 130 feet. The Burns coal may possibly correlate with the Lower Blue Gem coal of the Jellico district.

This bed varies in thickness from a maximum of 29½ inches on Gum fork to a minimum of 12 inches on Crane creek. The average thickness is probably about 19 inches. The Burns coal is a very persistent bed in the Sexton creek region and in fact over Clay county as a whole.

This bed is everywhere above drainage in this region and is commonly 130–230 feet high in the hills. In the structurally high parts of this region, as for example in the Burning Springs locality, the bed is so high as to clear most of the hills.

The coal is of good quality, though quite commonly carrying considerable pyrite.

The bed, wherever seen in this region, was unparted. A thinner bed is frequently found 10–20 feet below the main coal especially toward the head of Sexton creek.

Along South fork and in the lower part of Sexton creek a conspicuous ledge of massive sandstone comes shortly under the coal and aids in its identification.

The only medium coarse-grained sandstone of the region lies from 5–20 feet over the Burns coal. This is a persistent feature of the stratigraphy and is an aid in the correlation of the coals.

The roof of the Burns coal is generally a gray to dark gray shale folowed by the above mentioned coarse-grained sandstone.

This coal is best developed in the area between Bray fork and the right fork of Gum fork of Sexton creek. It is frequently opened in this region where it is known as the Fuston coal and has a considerable local reputation as a good grade coal.

THE WYATT COAL.

This coal is named from an opening on Wells branch of Grays fork of Little Goose creek, where it attains its maximum thickness. It is quite a persistent coal bearing horizon in Clay county though it never attains workable thickness. Mr. Hodge visited the Wyatt branch opening and correlated it tentatively with the coal 100 feet above the Manchester coal (the Burns coal) but elsewhere gives it its true interval.

The interval of this coal to the Manchester coal in the Sexton creek region is 65 feet on the average, the interval varying from 58–72 feet. The thickness of the bed varies from a maximum of 20 inches near the mouth of Little Sexton creek to a minimum of 1 inch or even 0 inches near the mouth of Sexton creek. The Wyatt coal lies immediately under a massive sandstone ledge wherever found on Sexton creek.

It is above drainage everywhere in the Sexton creek region and is low in the hills, but is of no value whatsoever on account of the thinness of the coal.

THE MANCHESTER COAL.

There is a marked thinning of the Manchester coal in a northwesterly direction from Oneida.

The thickness of this bed in the area under consideration varies from a maximum of 33 inches near Oneida on South fork of Kentucky river to a minimum of 7 inches on Nameless branch of Little Sexton creek.

The coal of the Manchester bed is of excellent quality and is much used as a shop coal even where very thin. For analysis of the Manchester coal in adjoining parts of Clay county reference is made to the report on the coals of Goose creek by J. M. Hodge.

The upper part of the bed is sometimes semi-cannel varying from a cannel slate to nearly a true cannel coal. The coal has a peculiar way of weathering, splitting up into sheets and slabs.

The Manchester bed is unparted except in a small area near Oneida.

The roof of this coal varies greatly. It is at times a massive sandstone, a shaly sandstone, a sandy shale, a clay shale and a hard fissile black slate. All of these roofs

occur at similar stratigraphic positions above the coal at different points in the area. The floor of the coal is very characteristic and is a most valuable aid to correlation over the Sexton creek region. The floor varies from 1 to 2 feet of hard gray fire-clay with numerous root marks and weathering into angular fragments, to a hard white quartzitic sandstone 6 inches to 2 feet thick with the same root marks. The quartzitic phase of the floor is found in the region about the head of Sexton and Little Goose creeks. The quartzitic phase sets in on Sexton creek just below Chestnutburg postoffice, at the mouth of Chestnut branch. All gradations between the quartzitic phase and the normal hard fire-clay phase exist.

The Manchester coal is above drainage over all of the region under consideration except the area between the mouth of Rocky branch and near the mouth of Anglin branch on Sexton creek where it is below drainage on the main streams and also on the tributaries.

The Manchester coal is low in the hills over most of the area except about Burning Springs where it is well up on the hills due to the high structural position of this region.

The Manchester coal is of workable thickness in only a small portion of this region between the mouth of Crane creek and Oneida on South fork. On Crane creek it is not of workable thickness, averaging about 20–22 inches. Over the rest of the area under consideration this coal is yet thinner. Its average thickness in the region as a whole is about 15 inches.

THE HUCKLEBERRY BRANCH COAL.

This is a thin coal coming shortly under the Manchester coal. It is only fairly persistent but is found at three widely separated points. This coal is undoubtedly frequently cut out by the massive sandstone underlying the Manchester coal, as it lies immediately beneath this sandstone. The observed thickness varies from 3–5 inches. A maximum thickness of 26 inches was reported but is probably wrong.

The Huckleberry branch coal is mentioned twice by J. M. Hodge in the Goose creek region. It is called by

him "the coal in the place of the usual black slate which comes below the Manchester coal."

The interval below the Manchester obtained by him for this coal is somewhat greater than the average for the corresponding interval in the Sexton creek region.

The interval of this bed to the Manchester coal is 40 feet. The roof of this coal is massive sandstone sometimes separated from the coal by a few feet of black shale, as is the case on Crane creek.

This coal is of no economic importance.

THE SACKER BRANCH COAL.

This is believed to be a persistent coal and is named from an exposure on Sacker branch of Sexton creek, where its stratigraphic position can be most definitely established. This coal is on the average 85 feet below the Manchester coal.

The Sacker branch coal is separated from the Huckleberry branch coal and from the Lower Teges coal by beds of massive sandstone believed to be exceptionally persistent. The average thickness of this bed is about 7 inches and it is believed that 12 inches will be a maximum thickness in this region.

The floor of the Sacker branch coal on Sacker branch is a hard gray sandstone with root marks and somewhat resembles the floor of the Manchester coal in the same locality, but is not as hard or as white as the formation under the latter bed.

This coal is of no economic importance in this region.

THE LOWER TEGES COAL.

This is a very persistent coal found on an average 150 feet below the Manchester coal. It is believed to be persistent over the Sexton creek area, though generally under drainage except where brought above drainage by the anticline. It has been encountered in several oil wells. This bed is mentioned in two localities by Mr. J. M. Hodge in his report on the coals of Goose creek, but is not given a name. That it has not been found more frequently is undoubtedly due not to its lack of persistence, but rather to the fact that it is below drainage over by far the greater part of Clay county.

This bed probably correlates with the thin coal which occurs near drainage about Booneville. The writer agrees with Mr. Hodge in the belief that a thickening of the lower part of the Pottsville brings the Beattyville coal below this coal, although the interval of the Lower Teges coal to the Manchester coal is approximately the same as is the interval of the Beattyville coal to the Manchester coal at Beattyville. The Beattyville bed at McKee, in Jackson county, is 50--200 feet over the top of the limestone. The lower Teges coal is about 400 feet above the top of the "Big Lime" of the well records. For this reason the Lower Teges coal is thought to be a higher coal than the Beattyville coal.

Little can be said about the thickness of the Lower Teges coal in the Sexton creek area. The coal is 17½ inches thick at the mouth of Lower Teges creek, and is reported about that thick in two oil well logs, one at Oneida and the other on Sexton creek near the mouth of Gum fork. At the forks of Sacker branch it was reported 2½ feet thick in a caved digging but such a thickness is probably excessive. At Burning Springs this bed has a minimum thickness of 3½ inches. The average thickness for the Sexton creek area is probably 12 inches.

COALS BELOW THE LOWER TEGES COAL.

In an oil well drilled some years ago at Burning Springs the following coals were reported to have been encountered below the Lower Teges coal.

At 212 feet below the Manchester coal a "thin coal."

At 240 feet below the Manchester coal a "thick coal."

At 350 feet below the Manchester coal a "thick coal."

Several coals should exist below the Lower Teges coal but more recent oil wells reported none. The information given above is therefore questionable.

LOCAL COALS.

The following local coals occur in the area under description. The more important ones have been given names. They will be mentioned in descending stratigraphic order.

The Banks Coal.—A coal in a caved prospect on Booger branch of Sexton creek. This coal comes 20 feet over the Lower Howard coal and between that bed and the Upper Howard coal. The thickness of the bed is not known but it is undoubtedly thin.

The Stapleton Coal.—A two-foot bed found only on a portion of Little Sexton creek. This coal comes 45 feet over the Burns coal and between the Burns coal and the Lower Howard coal. This coal is probably the same bed as a 5-inch coal occupying the same stratigraphic position on Anglin branch of Sexton creek.

A thin coal on Nameless branch of Little Sexton creek comes 5 feet over the Burns coal and is separated from the main bed by the characteristic coarse-grained sandstone which lies over the Burns coal. The coal of this bed is reported 18 inches thick.

A low split of the Burns coal is very frequently present. The interval to the main bed varies from 8–20 feet. The thickness of this bed is always less than 14 inches.

The High Knob coal is a coal reported 21 inches thick coming 22 feet over the Sacker branch coal and between the Sacker branch coal and the Huckleberry branch coal. Its occurrence near High Knob postoffice on the right fork of Gum fork is the only known occurrence of this coal in the Sexton creek region.

The Jarrett coal is a bed of unknown thickness but probably thin, coming 24 feet below the Lower Teges coal on the Jarrett place near Burning Springs.

POSSIBLE OIL AND GAS STRUCTURE.

Under the section on structure mention has been made of a pronounced southwest-northeast plunging anticline whose crest follows approximately the drainage divide between the right hand tributaries of South fork of Kentucky river and Goose creek on the one hand, and the left hand tributaries of Sexton creek on the other. Possibly this structure could be better described as a marked reversal of dip on a conspicuous southeast regional dip. The structure is a marked crumple or wave transverse to the general dip and approximately paralleling the regional strike. The crest of this fold plunges northeast. This anticline has been traced as far as the

head of Grays fork of Little Goose creek where a reversal of the general dip of the axis of the anticline takes place and the crest line of the anticline inclines in a south or southwesterly direction, resulting in a domal structure at the head of Grays fork of Little Goose creek. It is possible that this reversal is only local and that the anticline continues in a southwesterly direction into Laurel county. The amount of dip of the crest of the anticline is shown by the elevation of the Manchester coal which is approximately 1160 feet at the head of Grays fork of Little Goose creek and falls to approximately 880 feet at the divide between Rocky branch of South fork and Road run near the mouth of Sexton creek.

The southeast flank of this anticline is a long slope extending with minor interruptions across Clay county into Perry and Leslie counties and whose maximum structural fall of about 1000 feet in the surface rocks is increased in lower rocks by a thickening of the lower part of the Pottsville in a southeasterly direction.

The gas well at Burning Springs is on the top of this anticline and good shows of oil as well as gas in commercial quantities in a sand immediately under the "Big Lime" and which is probably to be correlated with the "Big Injun," are reported in a number of wells drilled only to this sand both on the northwest and southeast sides of the anticline in the vicinity of Burning Springs.

So far as could be learned, up to the present time there have been only three deep wells drilled in Clay county.

One of these wells was drilled on the crest of the anticline at Burning Springs to a reported depth of 2002 feet, and was said to have encountered but small shows of oil and gas and no salt water in any sands below the "Big Lime."

A well recently drilled by the Dulin Oil and Gas Company near the mouth of Gum fork of Sexton creek encountered a small flow of gas at about 1250 feet depth, in a sand below the "Big Injun." Present knowledge makes it uncertain whether the gas was found in the Corniferous lime (the Irvine oil sand) or in a higher sand. A deep well reported to have been drilled at the

old salt works above Manchester some years ago was said to have encountered no oil or gas in paying quantities.

Of these wells only the Burning Springs well was favorably located from a structural standpoint and this one was probably drilled too high on the structure to encounter anything but gas in the lower sands.

The well of the Dulin Oil and Gas Company was drilled on the northwest side of the anticline, some 200 feet down the dip and in more or less of a cyncline.

The deep well drilled near the old Salt works above Manchester was located probably too low on the flank of the structure, being drilled some 300 feet structurally below the crest of the anticline.

The sands which are of promise in this region as possible repositories of oil or gas in commercial quantities are:

(1) A Pottsville sandstone lying shortly above the "Big Lime" which has given good shows of oil in this region.

(2) The "Big Injun" sand which has shown itself to be productive of gas in commercial quantities and has furnished good showings of oil in several wells and possibly a small oil well in one instance, which was reported as being good for 6 to 8 barrels, but ruined by overshooting.

Little or nothing can be said of the promise of sands below the "Big Injun" because of the paucity of tests.

In conclusion it may be stated that the structure is such as to warrant further testing, but little can be said of the probable location of oil or gas pools. The most favorable location for tests is somewhat down from the crest of the anticline on the southeastern flank where the crest is highest or somewhere down the plunging crest of the anticline. Test wells should be drilled to the "Corniferous" before abandoned, at least until further drilling indicates the lower sands as not to be worthy of test.

DETAILED DESCRIPTIONS.

SOUTH FORK OF KENTUCKY RIVER.

The Manchester coal has been opened on the right of the river 120 yards below Oneida. A 40-foot entry gives the following bed-section:

Manchester Coal.

Dark gray clay shale becoming sandy in the upper portion 5 ft.
Block coal ..... 5½"
Knife-edge parting.
Block coal ..... 27½"
Elevation, 781 ft.

Two hundred yards further down, an opening into the Manchester coal over 20 yards long affords this bed-section:

Manchester Coal.

Shaly sandstone ..... 20 ft.
Coal ..... 2¼"
Knife-edge parting.
Coal ..... 5"
Knife-edge parting.
Coal ..... 24"
Elevation, 779 ft.

About 1/3 mile below Oneida in a small right drain, Mart Doyle has a long entry into the Manchester bed which gives:

Manchester Coal.

Thin bedded shaly sandstone.. 4 ft.
Coal ..... 37½"
Elevation, 790 ft.

Two hundred yards below the last, Pleasant Wilson has a completely caved opening into the Manchester coal at elevation 781 feet. The coal was reported forty inches thick.

The Manchester coal has been dug from the stream 1/5 mile up a branch 1¼ miles below Oneida, at elevation 785 feet.

One-half mile up the branch a pronounced dip of over 1° S. 50° E. shows in the bed of the branch.

CRANE CREEK.

Two miles below Oneida on right: Elevation of mouth, 722.

The following section was obtained at the mouth of Crane creek:

Section.

Top of spur		Elevation, 1034 ft.
Covered	21 ft.	
Massive sandstone	14 ft.	
Covered	17 ft.	
Massive sandstone	3 ft.	
Covered interval with massive sandstone float in the lower part	40 ft.	
Covered interval	40 ft.	
Black shale	4 ft.	
Thin 3-inch fossiliferous sandstone bed, ferruginous and white specked with indeterminate fossil remains.		
Black shale	2 ft.	
Covered interval	5 ft.	
Thick bedded light gray shale, nearly a shaly sandstone in upper part	27 ft.	
Soft black argillaceous shale	7 ft.	
Massive sandstone	9 ft.	
Covered interval	3 ft.	
Light gray sandy shale with smooth level-bedding surfaces and thin interbedded beds of sandstone	7 ft.	
Massive sandstone	18 ft.	
(A brick red ferruginous cement is sparingly present in the lower portion of this sandstone.)		
Covered interval	44 ft.	
Water seep; probable place of Manchester coal		Elevation, 773 ft.
Black shale near a slate	10 ft.	
Massive sandstone—the sub Manchester coal sandstone	46 ft.	

The presence of small traces of red coloration in certain of the massive sandstone members of this section

is worthy of note, as such coloration is rare in the Pottsville sandstones and probably indicates peculiar local conditions of deposition.

The Manchester coal has been opened on the left of South fork opposite the mouth of Crane creek. The following section was obtained here in a 15-yard entry:

Manchester Coal.

Shaly sandstone	10 ft.
Coal	20½"

Elevation, 793 ft.

The Manchester coal has been opened by a 15-yard entry by Murray Gilbert, 130 yards up a right branch three-quarters of a mile up Crane creek. The bed section is:

Manchester Coal.

Shaly sandstone	2 ft.
Block coal	2"
Laminated block coal	18"

Elevation, 807 ft.

George Adams has a 15-yard entry into the same coal 130 yards up a left branch entering Crane creek opposite the above mentioned right branch. This opening —the upper one of three adjacent openings—gave the following section:

Manchester Coal.

Sandstone, slightly shaly	1 ft.
Visible coal	26"
Mud	3"

Hard bottom 29 inches from the top of the coal.

Elevation, 803 ft.

The Manchester coal has been prospected by Wiley and Dan Allen, ⅛ mile up Crane creek and 150 yards up a left branch. The bed-section is:

Manchester Coal.

Massive sandstone	5 ft.
Coal	20"

Elevation, 817 ft.

Eighty feet up the same branch this bed shows 25–27 inches of coal under the same roof.

Further up the branch are two more openings into the same coal, which are completely caved and show a dip up the branch.

Dan Allen has an opening into the Manchester coal 1¼ miles up Crane creek, on the left, opposite a large right branch up which the road to Upper Teges passes. The bed-section here is:

Manchester Coal.

Massive sandstone, slightly shaly	6 ft.
Coal	23″
Elevation, 813 ft.	

Job A. Allen has an opening into this coal 250 yards up this right branch of Crane creek on the left. A 15-foot entry shows:

Manchester Coal.

Massive sandstone	6 ft.
Coal	21″
Elevation, 855 ft.	

The Manchester coal has again been prospected by Job A. Allen, 80 yards up a right branch of this branch, on the right, by the side of the Upper Teges road. The bed-section is:

Manchester Coal.

Massive sandstone	4 ft.
Coal	18″
Elevation, 853 ft.	

Near the head of this branch, ¾ mile up it, the following section was obtained:

Section.

Coal bloom—Cool Spring Coal		Elevation, 1175 ft.
Covered interval	100 ft.	
Massive sandstone ledge	5 ft.+	
Covered interval	12 ft.	
Bench.		
Covered interval	45 ft.	
Coal float—Burns coal		Elevation, 1008 ft.

The elevation of the Manchester coal under drainage at this point is about 865 feet.

John Doyle has a 12-foot entry into the Cool Spring coal on a small right branch, 1/3 mile up the main branch above the point where the Upper Teges road turns off. The bed-section is:

Cool Spring Coal.

Shaly sandstone	3 ft.
Coal	20″
Elevation, 1175 ft.	

Below this opening the Burns coal shows 12 inches thick under shaly sandstone at approximately 1000 feet elevation.

From a point on the left of Crane creek, one-fourth mile above the above mentioned right branch, William Hensley has a number of openings into the Manchester coal extending for several hundred yards up the branch. A down stream one of these openings affords the following bed-section:

Manchester Coal.

Shaly sandstone	4 ft.
Coal	24½″
Elevation, 826 ft.	

Eighty yards further up Crane creek, William Hensley has a shallow prospect pit into the Burns coal in a left hollow. The bed section is:

Burns Coal.

Well bedded, light gray, argillaceous shale.	
Coal	13″
Elevation, 980 ft.	

An up stream long entry gives:

Manchester Coal.

Shaly sandstone	7 ft.
Block coal	4½″
Laminated coal	21″
Elevation, 835 ft.	

Two miles up Crane creek a road passes up a left branch over on to Wildcat branch of Goose creek. Jim McCallum has a prospect into the Manchester coal 150 yards up this branch on the left. The bed-section here is:

Manchester Coal.

Shaly sandstone	9 ft.
Coal	25″
Elevation, 855 ft.	

Two hundred and fifty yards up this branch the Manchester coal goes under drainage at elevation 850 feet, showing a S. 40° E. dip up the branch. This inclination shows also in the sandstones on the bank of the branch.

A black slate formation coming approximately 40 feet over the Manchester coal shows 200 yards further up this branch in the road. This black slate deserves mention as it elsewhere (Wells branch of Little Goose creek) is a coal-bearing horizon.

One-third of a mile up this branch, Steve Mobley has a prospect into the Burns coal on the left of the branch. A measurement here gave:

Burns Coal.

Dark gray thick-bedded argillaceous slate	1½ ft.
Coal	12½″
Elevation, 986 ft.	

One-half mile up this branch on the left of the gap to Wildcat branch, H. M. Hackett has a partially caved wet entry into the Cool Spring coal. The bed-section is:

Cool Spring Coal.

Thick-bedded clay shale	6 ft.
Coal	22″–23″
Elevation, 1133 ft.	

This coal shows considerable pyrite.

Forty-one feet below this bed a 4-inch bloom was reported which is at the horizon of the Upper Howard coal.

The following section was obtained on the road descending into Widcat branch from the gap:

Section.

Gap between the drainage of Crane creek and Wildcat branch	Elevation, 1020 ft.
Massive sandstone ..... 29 ft.	
Shaly sandstone ..... 6 ft.	
Thin bed of black shale.	
Light gray clay shale ..... 15 ft.	
Coal bloom—Burns coal	Elevation, 970 ft.
Covered interval ..... 15 ft.	
Black shale ..... 4 ft.+	
Covered sandstone float ..... 8 ft.+	

One hundred and seventy yards up Crane creek the Manchester coal shows in natural exposure on the left bank of the stream, as follows:

Manchester Coal.

Shaly sandstone ..... 8 ft.
Coal ..... 25″
Elevation, 853 ft.

The Manchester coal has been opened by John Henry Callahan, 1/3 mile further up Crane creek at the mouth of a small left branch. The following bed-section shows in a 10-yard entry:

Manchester Coal.

Massive sandstone ..... 3 ft.
Coal ..... 23½″
Elevation, 850 ft.

Two hundred yards up Crane creek above Callahan branch, a coal 5 inches thick coming below the Manchester coal and correlating with the Huckleberry branch coal has been dug from the bed of the creek, at elevation 826. Black slate comes immediately over the coal.

The Manchester coal has again been opened 3½ miles up Crane creek on the left, with the following bed-section showing in a shallow prospect:

Manchester Coal.

Shaly sandstone	10 ft.
Coal	20″

Elevation, 877 ft.

J. Robertson has an opening into the Manchester coal 4½ miles up Crane creek and 100 yards up a left branch, up which a road passes to the right fork of Collins fork of Laurel creek. The bed-section in a 14-foot entry here is:

Manchester Coal.

Shaly sandstone	4 ft.
Hard dark clay shale	1½ ft.
Coal	18½″

Elevation, 911 ft.

One-quarter of a mile further up Crane creek the Manchester coal has an elevation of 953 feet in a caved prospect.

The Burns coal has been prospected by William Poe, 1/3 mile up a right branch near the head of Crane creek and 5 miles up it. The bed-section is:

Burns Coal.

Light gray thin-bedded argillaceous shale	3 ft.
Black clay shale	1½ ft.
Block coal	12″

Elevation, 1125 ft.

One-quarter of a mile further up Crane creek the bloom of the Manchester coal has, at the forks of the road, an elevation of 1006 feet.

SOUTH FORK OF KENTUCKY RIVER BELOW THE MOUTH OF CRANE CREEK.

For several hundred yards below the mouth of Crane creek on the right of the river the Manchester coal is discontinuously exposed. The thickness of the bed varies from 17–18 inches and its elevation from 820–830 feet.

UPPER TEGES CREEK.

On the right of South fork, two miles below the mouth of Crane creek: Elevation of mouth, 715 feet.

George Bowling has a completely caved prospect into the Manchester coal, 1 1/3 miles up Upper Teges creek, at the mouth of a left branch up which the Crane creek road passes. The coal was reported 13 inches thick and is at elevation 859 feet.

The Cool Spring coal has been opened by Judge Ryan, ½ mile up a right branch, ¼ mile up this branch at the head. The opening, now completely caved, is at elevation 1168 feet.

T. Morris has a completely caved opening 250 yards up a left branch 1/3 mile up this branch of Upper Teges creek. This is the Lower Howard coal at elevation 1069 feet. The roof is massive sandstone underlain by dark gray shale.

The Cool Spring coal has been opened by A. B. Bowen, 280 yards up a right branch, ⅝ mile up this branch of Upper Teges. The bed-section in a 20-yard entry is:

Cool Spring Coal.

Fine grained somewhat shaly sandstone	6 ft.
Block coal, with a little hard dull coal at the base	22″

Elevation, 1159 ft.

Thomas Mabley has a completely caved opening into the Manchester coal two miles up Upper Teges creek on the left, at elevation 908 feet.

The Burns coal has been prospected by Bill Allen, 2¼ miles up the creek and 200 yards up a left branch. The bed-section is:

Burns Coal.

Massive sandstone ledge	15 ft.
Covered interval	12 ft.
Shale	3 ft.
Coal	12½″

Light gray shale floor.

Elevation, 1047 ft.

Winfield Allen has a 10-yard wet entry into the Cool Spring coal, 2 2/3 miles up Upper Teges near its head. The bed-section is:

Cool Spring Coal.

Shaly sandstone	3 ft.
Block coal	23″
Elevation, 1186 ft.	

The lower 9 inches of this bed was in water.

Winfield Allen has a prospect into the same coal, 1/6 mile up a middle fork of three forks, at the head of Upper Teges, the above mentioned opening being on a left fork. The bed-section here is:

Cool Spring Coal.

Light gray clay shale	4 ft.
Black slate	19″
Block coal	8″
Elevation, 1180 ft.	

J. R. Bishop has a completely caved prospect into the Manchester coal ¼ mile below the mouth of Upper Teges on the left of the river road. The coal is at elevation 847 feet and was reported 18–20 inches thick.

LOWER TEGES CREEK.

One-half mile below the mouth of Upper Teges creek, on the right of South fork: Elevation of mouth, 698 feet.

A coal which will be called the Lower Teges coal and which is probably the Beattyville coal, coming 150 feet below the Manchester coal, shows in natural exposure on the left at stream level 100 yards up Lower Teges. The bed-section here is:

Lower Teges Coal.

Light gray argillaceous shale	1 ft.
Coal	17½″
Light gray shale with root marks	1½ ft.
Shaly to massive sandstone	10″+
Elevation, 703 ft.	

The following section was obtained at the mouth of Lower Teges:

Section.

Base of massive sandstone		Elevation, 925 ft.
Covered interval	23 ft.	
Massive sandstone	31 ft.	
Covered interval	61 ft.	
Massive sandstone	40 ft.	
Covered interval	19 ft.	
Massive sandstone	28 ft.	
Covered interval	20 ft.	
Lower Teges coal		Elevation, 703 ft.

One mile up Lower Teges and 200 yards up a right branch on the right, the Manchester coal has been prospected by George Feldy. The bed-section is:

Manchester Coal.

Light gray shale	18 ft.
Heavy brittle blackish shale..	5″
Coal	11″

Elevation, 857 ft.

A strong up branch dip of 3° N. 40° W. shows at this point.

The following section was obtained here:

Section.

Bench		Elevation, 1063 ft.
Covered interval	80 ft.	
Massive sandstone ledge	4 ft.+	
Covered interval	34 ft.	
Bench.		
Hard, thin-bedded light gray shale float	22 ft.	
Black shale float	1 ft.	
Massive sandstone	11 ft.	
Fissile black shale	10 ft.	
Covered interval	8 ft.	
Shale becoming shaly sandstone at top	36 ft.	
Manchester coal		Elevation, 857 ft.
Light gray fire-clay shale	1 ft.	
Light, blue-gray shaly sandstone	8 ft.	

Two hundred and fifty yards up this branch a completely caved prospect shows into the Manchester coal, at elevation 840 feet.

One-quarter of a mile up a right branch, 1¾ miles up Lower Teges, the Manchester coal shows in natural exposure 8 inches thick, at elevation 903 feet.

Two miles up Lower Teges the elevation of the Manchester coal in a caved prospect is 910 feet.

Two and one-third miles up Lower Teges the bloom of the Manchester coal shows in the road, at elevation 937 feet.

ROCKY BRANCH.

Rocky branch enters the South fork 2¼ miles below the mouth of Lower Teges: Elevation of mouth, 682 feet.

The Manchester coal has been dug from the bed of the branch, ¾ mile up, at elevation 843 feet.

One mile up Rocky branch, in a left fork at the head, the Cool Spring coal has been opened at elevation 1112 feet, by Rutherton Allen. The opening is now completely caved. The coal was reported 12–14 inches thick. Brittle, coaly black slate shows on the dump. The pronounced westerly up branch dip which prevails at the head of Rocky branch would give this coal an interval of nearly 300 feet to the Manchester coal.

Three hundred yards southeast of this opening there is a prospect into the Upper Howard coal under massive sandstone, at elevation 1053 feet.

One-third of a mile northwest of this prospect, Rutherton Allen has a prospect into the Lower Howard coal with the following bed-section:

Lower Howard Coal.

Coal	7″+ or —
Shaly sandstone	12 ft.
Coal	20″
Elevation, 1035 ft.	

In a prospect on the right of the road, 1/5 mile below the mouth of Rocky branch, the Manchester coal is 13 inches thick, at elevation 773 feet.

ROOSTER BRANCH.

A small right branch, ¾ mile below the mouth of Rocky branch: Elevation of mouth, 678 feet.

The Manchester coal has been dug from the river at the mouth of Rooster branch, at elevation 678 feet.

The Lower Howard coal has been opened at elevation 842 feet, 1/5 mile up Rooster branch on a right branch of the right fork. The opening is completely caved, the roof alone showing as follows:

Massive sandstone	8 ft.
Light blue-gray argillaceous shale	3 ft.

The Upper Howard coal has been opened in a completely caved opening, at 897 feet elevation, ¼ mile up the right fork above this opening.

The bloom of the Lower Howard coal shows at elevation 874 feet, one-quarter of a mile below the mouth of Rooster branch, at the right of South fork on Turkey Gap.

The following section was obtained 2/3 mile below the mouth of Rooster branch on the right bank of South fork:

Section.

Massive sandstone	10 ft.+	
Covered interval	32 ft.	
Coal float and black slate (Cool Spring coal)		Elevation, 945 ft.
Covered interval	23 ft.	
Massive sandstone with wind caves in the lower portion	54 ft.	
Covered interval	13 ft.	
Coal bloom (Lower Howard coal)		Elevation, 855 ft.
Covered interval	46 ft.	
Coal bloom (upper split of Burns coal)		Elevation, 809 ft.
Covered interval	13 ft.	
Hard brittle light gray shale	10 ft.	
Coal 24 inches (Burns coal)		Elevation, 784 ft.
Covered interval	9 ft.	
Coal 13 inches (lower split of Burns coal)		Elevation, 775 ft.
Massive sandstone	13 ft.	
Covered interval	15 ft.	
Coal 11 inches (Wyatt bed)		Elevation, 747 ft.
Massive sandstone	10 ft.	
Covered interval	58 ft.	
Level of South fork		Elevation, 679 ft.
Place of Manchester coal		Elevation, 668 ft.

Four and one-half miles below the mouth of Rooster branch and on the north side of the big loop in the river, Wilson Bishop has a completely caved opening into the Upper Howard coal, at elevation 958 feet.

One-quarter of a mile down on the left of the river, the Fuston coal shows at elevation 800 feet, in natural exposure on the left of the river. The massive ledge-forming sandstone below the Burns coal in this region is well developed here.

The Burns coal shows in natural exposure 18 inches thick, at elevation 795 feet, on the right of South fork, ½ mile above the mouth of Road run. Twenty-four feet below the coal is a ledge of massive sandstone 23 feet thick.

ROAD RUN.

Enters South fork on the right, 6 miles below the mouth of Rooster branch: Elevation of mouth, 659 feet.

The Burns coal has been opened by Mr. Singleton in several adjacent openings, now completely caved, ½ mile up a left branch, ⅛ mile up Road run. The elevation of the Burns coal here is 827 feet.

The following combined section was obtained on this branch from the mouth to the head. The intervals are corrected for dip:

Section.

Bloom of the Upper Howard coal		Elevation, 970 ft.
Covered interval	143 ft.	
Opening into the Burns coal		Elevation, 827 ft.
Covered interval	27 ft.	
Massive ledge-forming sandstone	25 ft.	
Soft, dark blue-gray shale, inter-stratifications of sandy shale and black shale	16 ft.	
Shaly sandstone	11 ft.	
Coal bed 1 inch thick (local coal)		Elevation, 748 ft.
Shaly and massive sandstone	18 ft.	
Dark gray to black shale	28 ft.	

The place of the Manchester coal in this section is at elevation 690 feet.

Lucian Bird has a shallow prospect into the Burns coal, 2/3 mile up Road run and ¼ mile up a right branch.

The bed section is:

Burns Coal.

Hard, well-bedded blue-gray shale	2½ ft.
Dense light-gray thick-bedded clay shale	4 ft.
Massive sandstone	15 ft.
Dense, light-gray thick-bedded clay shale	4 ft.
Well-bedded, hard slaty blue-gray shale	2½ ft.
Coal	19½"
Elevation, 845 ft.	

There is considerable pyrite in this coal.

COLUMBUS BISHOP BRANCH of Road run is ¾ mile up the branch on the right.

Columbus Bishop has a completely caved prospect into the Burns coal here apparently thin, ⅛ mile up this branch and 100 yards up a right branch on the right. The elevation of the prospect is 813 feet.

The Cool Spring coal has been opened by Columbus Bishop 100 yards up this branch on the left. The bed section in a 12-yard entry is:

Cool Spring Coal.

Fissile black slaty shale	7 ft.
Block coal (relatively free from pyrite)	24½"
Hard, fine-grained white sandstone floor	16 ft.+
Elevation, 1012 ft.	

A dip of 2° to 3° S. 75° W. shows here.

One hundred yards down the branch a 1-inch bed of coal shows between massive sandstones at elevation 783 feet. This is a thin bed coming at the horizon of the Wyatt coal.

The following combined section was obtained on this (Columbus Bishop) branch. The intervals are corrected for dip:

Section.

Top of hill		Elevation, 1288 ft.
Covered interval, with sandstone float in the lower part	23 ft.	
Massive sandstone	20 ft.+	
Covered interval	40 ft.	
Caved opening into the Whitesburg coal		Elevation, 1205 ft.
Covered interval	49 ft.	
Cannel coal bloom—Bishop coal		Elevation, 1156 ft.
Covered interval	52 ft.	
Bloom of the Bowling coal		Elevation, 1104 ft.
Covered interval	79 ft.	
Cool Spring coal opening		Elevation, 1025 ft.
Covered interval	54 ft.	
Coal bloom 12 inches + thick (Upper Howard bed)		Elevation, 971 ft.
Covered interval	53 ft.	
Thin coal apparently 2–3 inches (Lower Howard bed)		Elevation, 918 ft.
Covered interval	43 ft.	
Coal reported 22 inches thick (local bed)		Elevation, 875 ft.
Covered interval	50 ft.	
Bloom of the Burns coal with coaly bituminous slate roof		Elevation, 825 ft.

The coal correlated with the Whitesburg bed at elevation 1205 feet in this section was reported 36 inches thick in an extensive old opening now completely caved. Flint fire-clay float was looked for on the dump but none was found.

The Bishop coal at elevation 1156 feet, has not been opened but the bloom was reported faced to show 36–40 inches of cannel coal.

The Cool Spring coal, at elevation 1025 feet, is 25 inches thick, where this section was taken.

From the mouth of Columbus Bishop branch to the head of Road run there is a stratigraphic rise of over 130 feet as determined by elevations on the base of the massive sandstone which comes below the Burns coal.

The Burns coal has been opened by J. C. Ball, 1/3 mile above the mouth of Sexton creek on the right of South fork. The following bed-section shows in a shallow entry:

Burns Coal.

Thick-bedded light brownish shale ..... 4 ft.
Block coal .....22"
Elevation, 837 ft.

What is apparently the top of the massive ledge-forming sandstone under this coal shows 34 feet below the opening.

The following section was obtained at the mouth of Sexton creek on the left:

Section.

Bloom of the Burns coal	Elevation, 830 ft.
Covered interval .....13 ft.	
Massive ledge-forming sandstone .....27 ft.	
Covered interval .....28 ft.	
Top of massive sandstone	Elevation, 762 ft.
Covered interval, massive sandstone in the upper part .....47 ft.	
Heavy black shale—place of Manchester coal....	Elevation, 715 ft.
Covered interval ..... 6 ft.	
Shaly sandstone .....21 ft.	
Covered interval .....38 ft.	
Level of Sexton creek, at ford	Elevation, 650 ft.

Bob Hensley has a prospect into what is known locally as the "splint" coal ¼ mile below the mouth of Sexton creek and ¼ mile up a right branch. The bed which is a coaly black slate rich in carbonaceous matter, but in no sense a coal, has the following section:

"Splint" Coal.

Light gray slaty shale.
Coaly black slate ..... 5 ft.
Elevation, 825 ft.

This bed occupies a stratigraphic position 10–15 feet over the Burns coal.

SEXTON CREEK.

Enters South fork on the right, 1⅞ miles below the mouth of Road run: Elevation of mouth, 648 feet.

BUNION BRANCH.

On the right, 2¼ miles up Sexton creek: Elevation of mouth, 667 feet.

From the mouth of Bunion branch to a point 2/3 of a mile up the branch, a stratigraphic rise of 45 feet shows in the massive sandstone under the Burns coal.

Five-sixths of a mile up Bunion branch, at the head, in the gap to the waters of Island creek, the Cool Spring coal has been opened by John Hensley. The bed-section in a 20-yard entry is:

Cool Spring Coal.

Semi-fissile black slaty shale.. 5 ft.
Block coal .....25″
Elevation, 1062 ft.

One hundred feet below this bed is a completely caved opening into the Lower Howard bed, at elevation 962 feet. The coal was reported 22 inches thick.

The Burns coal has been opened by J. R. Thompson and Jewell King directly opposite the mouth of Bunion branch on the left bank of Sexton creek.

Several adjacent excavations under a cliff give the following bed-sections:

Burns Coal.

Massive sandstone .....20 ft.
Hard, gray well-bedded slaty shale.
Hard laminated coal .....25½″
Dense, gray fissile clay shale floor.
Elevation, 832 ft.

Considerable pyrite shows in the coal.

Nineteen feet below the bed is the top of the characteristic massive ledge-forming sandstone here 18 feet thick.

This sandstone here and elsewhere in this vicinity has a conspicuous basal contact on hard gray shales, the massive sandstone ledge overhanging the softer shales.

The Upper Howard coal has been opened by J. R. Thompson, 2 2/3 miles up Sexton creek on the left. The bed section in a 10-yard entry partially caved and wet is:

Upper Howard Coal.

Massive to shaly sandstone	3 ft.
Black sandy shale	6″
Coal	24″

Elevation, 996 ft.

The coal bed dips notably to the south.

The following section was obtained here:

Section.

Upper Howard coal opening		Elevation, 996 ft.
Covered interval	45 ft.	
Black bituminous shale	5 ft.+	
Covered interval	25 ft.	
Completely caved prospect into the Lower Howard coal—reported 22 inches thick		Elevation, 921 ft.
Covered interval	133 ft.	
Reported coal (Wyatt bed)		Elevation, 788 ft.
Covered interval	57 ft.	
Hard black shale, nearly fissile; near horizon of Manchester coal		Elevation, 731 ft.

ANGLIN BRANCH.

Three miles up Sexton creek on the right: Elevation of mouth, 779 feet.

The Moore coal has been opened by Taylor Sizemore. The following bed-section was obtained in a 45-foot entry:

Moore Coal.

Bituminous clay shale, near a slate	3½ ft.
Laminated coal	4″
Block coal	20″

Shale floor.

Elevation, 1032 ft.

One hundred and fifty-one feet below this opening Taylor Sizemore has an 18-yard entry into the lower Howard coal. The bed-section is:

Lower Howard Coal.

Massive sandstone ..... 4 ft.
Block and splint coal.....20"–24"
Elevation, 881 ft.

There are two adjacent openings here 200 feet apart.

Sixty-seven feet below the Lower Howard coal the Burns coal is 10–12 inches thick in natural exposure under a massive sandstone ledge, at elevation 814 feet.

Eighteen feet below the Burns coal 5–6 inches of coal shows under massive sandstone.

The section below this coal at elevation 796 feet is:

Massive sandstone .....15 ft.
Covered interval with massive sandstone in the lower part ..... 44 ft.
Basal contact of massive sandstone ..... Elevation, 737 ft.
Covered interval, massive sandstone in the lower part .....19 ft.
Basal contact of massive sandstone on shale..... Elevation, 718 ft.

Taylor Sizemore has an old opening into the Manchester coal on the left of Sexton creek opposite the mouth of Anglin branch. The bed-section is:

Manchester Coal.

Massive sandstone ..... 2 ft.
Fissile, dark gray shale.
Coal .....13–14"
Massive sandstone ..... 5 ft.
Block coal .....20"
Massive sandstone .....11 ft.
Elevation, 727 ft.

Mr. McKinney has an opening into the Lower Howard coal, 1/5 mile up Anglin branch, on the left. The following bed-section was obtained in a 7-yard entry:

Lower Howard Coal.

Massive sandstone	3 ft.
Coal	22″
Hard, gray, fissile clay shale floor.	
Elevation, 892 ft.	

There is considerable pyrite in the middle of the bed.

The Lower Howard coal has been opened by William Wood, 1/3 mile up Anglin branch. The bed-section in an 8-yard entry is:

Lower Howard Coal.

Massive sandstone	2 ft.
Light blue gray shale	1 ft.
Coal	22″
Elevation, 913 feet.	

The "Splint" bed has been prospected by B. M. Hensley, ¾ mile up Anglin branch on a right branch. A section on this branch gives:

Section.

Bituminous black slate (the "Splint" coal)	6 ft.	Elevation. 890 ft.
Massive sandstone	18 ft.	
Sandy shale	13½ ft.	
Bituminous sandy shale	2½ ft.	
Burns coal	15″	Elevation, 867 ft.
Shaly to massive sandstone	20 ft.	
Splint coal	6″	Elevation, 847 ft.

James Hensley has a completely caved opening into the Upper Howard coal, ¼ mile up a right branch, 150 yards above the above mentioned branch. The opening is at 960 feet and the coal was reported 24–26 inches thick.

One hundred and forty-four feet over this opening and 250 yards up the branch, James Hensley has a completely caved opening into the Bowling coal at elevation 1104 feet. The coal was reported to be 27–28 inches thick. The bloom was measured to be 27 inches+.

Within ten feet of the top of this bed another coal was reported, said to be of better thickness than the lower

bed. No indication could be found of this bed, however, at the time of visit.

One-quater of a mile up a left branch, 1¼ miles up Anglin branch, J. S. Saylor has an opening into the Upper Howard coal. The bed-section in a 15-yard entry is:

Upper Howard Coal.

Massive sandstone	4 ft.
Smooth soft black slate	1″
Splint coal	17″
Elevation, 967 ft.	

One and two-thirds miles up Anglin branch, J. S. Sandlin has another opening into the Upper Howard coal 250 yards up a left branch. A 10-yard entry affords this section:

Upper Howard Coal.

Massive sandstone	2 ft.
Light gray shale	15″
Coal	17½″
Elevation, 979 ft.	

The Lower Howard coal has been opened at elevation 945 feet, by Will Edwards, 2¼ miles up Anglin branch, ¼ mile up a left branch on the left. The coal was reported 16–18 inches thick.

Lewis Sandlin has a prospect into the Lower Howard coal, ⅛ mile up a right branch opposite this left branch. The bed-section is:

Lower Howard Coal.

Light gray fissile shale	1 ft.
Black shale	2½ ft.
Coal	14″
Elevation, 938 ft.	

One-quarter of a mile up this branch the Cool Spring coal has been opened by Lewis Sandlin at elevation 1021 feet. The coal was reported 24 inches thick. The opening is completely caved.

Two and three-quarters miles up Anglin branch a 5-inch bed of coal shows in natural exposure, at elevation 913 feet, on the left of the branch. This is a local

bed coming between the lower Howard and the Burns coals.

Two hundred yards up Anglin branch and 1/7 mile up a right branch, the Moore coal has been opened by Charley Edwards. The section here is:

Moore Coal.

Hard, dense gray shale ..... 6 ft.
Dark blue, gray clay shale..... 1½ ft.
Coal .....18"
Elevation, 1077 ft.

BOOGER BRANCH.

Three and a half miles up Sexton creek on the right. Elevation of mouth 687 feet.

The Manchester coal has been dug from the bed of the stream at the boundary line between the land of Doc Sizemore and W. M. Moore, three hundred yards up Booger branch, and 100 yards up a right branch. The section here is:

Manchester Coal.

Light gray slaty shale ..... 1½ ft.
Hard black slate ..... 6"
Coal .....12"–16"
Elevation, 767 ft.

The coal is largely cannel in the upper part of the bed.

A coal which will be called here the Moore coal has been opened by W. M. Moore, ⅛ mile up this branch. The bed-section in a 4-yard entry is:

Moore Coal.

Gray granular compact shale 3 ft.
Black, bituminous sandy shale.
Block coal .....15"
Laminated block coal .....12"
Elevation, 1110 ft.

The Moore coal has an interval of 346 feet to the Manchester coal.

Twenty-two feet below this bed is the top of a 7-foot+ massive sandstone ledge.

The Manchester coal has been dug from the bank of the stream 1/3 mile up Booger branch, at elevation 785 feet.

The following section was obtained on the land of Mr. McDaniel, ½ mile up Booger branch in a right hollow:

Section.

Black slate		Elevation, 1057 ft.
Covered interval	24 ft.	
Bloom of the Upper Howard coal (reported 12 inches thick)		Elevation, 1033 ft.
Covered interval	54 ft.	
Bloom of the Lower Howard coal (apparently 18 inches thick)		Elevation, 979 ft.
Coal bed 4 inches thick between massive sandstones		Elevation, 888 ft.
Covered interval	101 ft.	
Manchester coal—completely caved digging in the bed of the branch		Elevation, 787 ft.

The thin coal at elevation 888 feet is a local coal coming between the Wyatt coal and the Burns coal and is probably to be considered a lower split of the Burns coal.

The following section was obtained ¾ mile up Booger branch, on the left:

Section.

Bloom of the Banks coal		Elevation, 1021 ft.
Covered interval	22 ft.	
Completely caved prospect into the McKinney coal, reported 20–22 inches thick		Elevation, 999 ft.

The Banks coal at elevation 1021 feet is an apparently local bed coming between the Lower and the Upper Howard coals.

One-fifth mile above Booger branch, on the right of the road, the following section was obtained which is of importance as giving the interval from the basal contact of a prominent massive sandstone which is of value as a horizon marker where the Manchester coal is below drainage or not opened. The basal contact of this sandstone

has been mentioned before and stands out prominently because of the relatively non-resistant shale which has allowed undercutting:

Section.

Prominent lower contact of ledge-forming sandstone		Elevation, 782 ft.
Covered interval	10 ft.	
Black slate (a few inches thick).		
Covered interval	40 ft.	
Manchester coal bloom		Elevation, 732 ft.

One-quarter of a mile above the mouth of Booger branch on the right of Sexton creek the following section was obtained:

Section.

Coarse grained sandstone. The characteristic sandstone lying over the Burns coal	27 ft.	
Covered interval	27 ft.	
Massive sandstone	7 ft.	
Block coal (a low split of the Burns coal)	4"+	Elevation, 836 ft.
Massive sandstone	20 ft.	
Covered interval	24 ft.	
Massive sandstone	29 ft.	
Characteristic lower contact of sandstone on shale		Elevation, 764 ft.
Covered interval	19 ft.	
Massive sandstone	5 ft.+	
Covered interval	26 ft.	
Place of Manchester coal		Elevation, 714 ft.

The bloom of the Manchester bed shows 3/5 of a mile above the mouth of Booger branch on the right of the road, showing 10 inches of coal at elevation 711 feet.

SPIVEY BRANCH.

On the right 1½ miles above the mouth of Booger branch: Elevation of mouth, 703 feet.

The Burns coal has been opened at elevation 993 feet, by Will Smith, ¼ mile up a right branch, ½ mile up Spivey branch. The opening is completely caved. The coal is reported to be less than 20 inches thick. The

characteristic coarse-grained massive sandstone shows over the Burns coal.

The Lower Howard coal has been opened by Will Smith, 2/5 mile up this branch, on the left. The bed-section in a 4-yard entry is as follows:

Lower Howard Coal.

Hard, thick, well-bedded gray shale grading into shaly sandstone	3 ft.
Coal	18″
Elevation, 1071 ft.	

The Lower Howard coal shows in a 3-foot prospect adjoining a completely caved opening, ¾ mile up Spivey branch, in a right hollow ¼ mile up. The bed-section is:

Lower Howard Coal.

Massive sandstone	3 ft.
Light gray, hard sandy shale	1 ft.
Coal	14″
Elevation, 1095 ft.	

The same coal shows in a new prospect by Andrew Peter at the right head of a left branch, ¼ mile up it. This left branch enters Spivey branch 250 yards above the last mentioned branch. The bed-section here is as follows:

Lower Howard Coal.

Massive sandstone	3 ft.
Coal	17″
Elevation, 1109 ft.	

On the left of this branch, 90 yards up it, is a completely caved opening into the Burns coal, at elevation 1018 feet.

The Lower Howard coal has been opened by Joe Huff, ¾ mile up a right branch on the right opposite the above mentioned right branch. The following bed-section was obtained here in a twelve-yard entry:

Lower Howard Coal.

Thin-bedded massive sandstone	1 ft.
Light gray sandy shale	2 ft.
Coal	19″
Elevation, 1072 ft.	

The same coal has been opened by Monroe King, 1 2/3 miles up Spivey branch, 150 yards up a left hollow. The following bed-section was obtained in one of three adjacent 15-yard entries:

Lower Howard Coal.

Massive sandstone.	
Coal	21–23″
Elevation, 1075 ft.	

The bloom of the Manchester coal shows at elevation 767 feet above and near the mouth of Sadler branch on the left of Sexton creek, ½ mile above the mouth of Spivey branch.

SADLER BRANCH.

On the left of Sexton creek, 1/3 mile above the mouth of Spivey branch and 2¼ miles below the mouth of Little Sexton creek: Elevation of mouth, 703 feet.

A completely caved opening into the Upper Howard coal shows 1/3 mile up Sadler branch and ¼ mile up a left branch on the right, at elevation 1005 feet.

Two hundred and fifty yards east of this opening is a 10-yard entry into the Bowling coal. The bed-section is:

Bowling Coal.

Soft clay shale	5 ft.
Dense, fissile black slate	1½ ft.
Block coal	23–24″
Elevation, 1169 ft.	

The Cool Spring coal has been opened by Marion Kelly, 1/5 mile above the mouth of Sadler branch, on the right of Sexton creek. The following section was obtained in a 2-yard prospect:

Cool Spring Coal.

Massive sandstone with carbonized plant remains in the base	5 ft.
Dense, thick-bedded, light gray clay shale	1½ ft.
Laminated coal	8¼"
Dull impure cannel coal	5¾"
Hard black slate	1"
Same cannel coal	7½"
Elevation, 1050 ft.	

COOL SPRING BRANCH.

On the left, two-fifths of a mile up Sexton creek from Sadler branch: Elevation of mouth, 717.5 feet.

Mrs. Martha J. Hunter has a 3-foot prospect into the Cool Spring coal, 1/3 mile up a right branch, ¾ mile up the first large right branch of Cool Spring branch. The bed-section is:

Cool Spring Coal.

Thick-bedded, hard, light gray shale	7 ft.
Shale and coal interlaminated	3½"
Laminated coal	7½"
Cannel coal	18"
Elevation, 1043 ft.	

One and a half miles up this right branch of Cool Spring branch, W. C. Campbell has a completely caved opening into the cannel coal bed of the Columbus Bishop section on Road run. The bed has an interval of 432 feet to the Manchester coal and is here at elevation 1175 feet.

On the opposite (right) side of the branch from the above mentioned opening a coal which corresponds to the highest coal of the Columbus Bishop section has been opened in a shallow prospect. The bed-section is:

Whitesburg Coal.

Light-gray clay shale	3 ft.
Coal	20½"
Elevation, 1238 ft.	

The Cool Spring coal has been opened on the land of J. C. Clark, 1/3 mile up Cool Spring branch and 200 yards up a left hollow. The bed-section in an extensive 30 yard opening is:

Cool Spring Coal.

Light-gray clay shale	5 ft.
Black slate with coal interlaminations toward the base.	
Block coal	8½"
Cannel coal	22"

Elevation, 1040 ft.

The same coal has been opened by Doctor Sparks, ½ mile up a left branch, opposite the above mentioned branch, on the right of the branch. The bed-section in a 20-yard entry is:

Cool Spring Coal.

Light-gray, hard, well-bedded shale	6 ft.
Block coal	7"
Cannel coal	24"

Elevation, 1080 ft.

R. A. Wood has an opening into the Cool Spring coal, 2/3 mile up Cool Spring branch and 250 yards up a left hollow on the left. The bed-section in a 25-yard opening is:

Cool Spring Coal.

Massive sandstone.	
Coal	7½"
Cannel coal	18"

Elevation, 1080 ft.

Three adjacent completely caved extensive openings show here. In one of these the coal is reported to be 50 inches thick. The length of one of the timbers supporting the roof was 46 inches and this is probably the maximum thickness of the coal in this entry.

At the mouth of this left hollow the Manchester coal has been dug from the bed of the branch. It is here 10½ inches thick, at elevation 780 feet, giving the Cool Spring

coal an interval of 300 feet to the Manchester coal. The interval is a typical one and is unusually constant over Sexton creek drainage.

The Cool Spring coal has been opened by John Clay, 1/3 mile above the mouth of Cool Spring branch on the left of Sexton creek. The bed-section in a 30-yard entry is:

Cool Spring Coal.

Hard, thick-bedded, arenaceous, light-gray shale	7½ ft.
Coal	12″
Cannel coal	10½″
Hard black slate	2½″
Cannel coal	10″
Elevation, 1028 ft.	

The cannel coal of the Cool Spring bed is a peculiar variety of cannel. It is impure, leaving a powdery reddish ash which preserves the form of the coal fragment but collapses on being touched however slightly. The cannel burns well and is apparently a better coal than its external appearance suggests. It frequently has a slaty fracture with bedding surfaces dull and resembling a fine black slate.

LITTLE SEXTON CREEK.

Seven and three-quarter miles up Sexton creek, on the right: Elevation of mouth, 726 feet.

The Manchester coal shows in natural exposure, at elevation 859 feet, on the right of the road going up Little Sexton creek and ¼ mile up, at the mouth of a right hollow. The following section was obtained here:

Section.

Completely caved opening into the Upper Howard coal		Elevation, 1100 ft.
Covered interval, coarse-grained massive sandstone in the lower part	103 ft.	
Lower shale contact of the coarse-grained sandstone coming over the Burns coal		Elevation, 997 ft.
Fine-grained massive sandstone	3 ft.	
Covered interval—massive sandstone in the lower part	18 ft.	
Lower shale contact of fine-grained, light, brownish, hard massive sandstone		Elevation, 976 ft.
Covered interval	117 ft.	
Bloom of Manchester coal		Elevation, 859 ft.

One-third mile up Little Sexton there is a large right branch of Little Sexton whose mouth is at Sexton creek, P. O., and which heads at a left branch of Island creek entering Island creek at Island City.

Rob Bowman has an old opening into the Wyatt coal, 1/5 mile up this branch of Little Sexton on the left. A large room gouged out under massive sandstone gives the following bed-section:

Wyatt Coal.

Massive sandstone	4 ft.
Coal	20″
Elevation, 917 ft.	

One-fourth mile up the branch and 200 feet up a left hollow on the left, the bloom of the Manchester coal shows at elevation 860 feet. At elevation 1106 feet in the same branch, the Upper Howard coal has been opened. The opening is now completely caved. This gives the Upper Howard-Manchester coal interval as 246 feet here.

One-half mile up the Island City branch of Little Sexton creek and 1/5 mile up a right branch the Manchester coal bloom shows at elevation 847 feet.

One-eighth mile up this branch the Lower Howard coal has been opened by Sam Saylor. The following bed-section was obtained here:

Lower Howard Coal.

Well-bedded shaly sandstone ..... 2 ft.
Coal ..... 22½–23½″
Elevation, 1058 ft.

The following section was obtained here:

Section.

Lower Howard coal opening ..... Elevation, 1058 ft.
Covered interval, massive sandstone in the lower part ..... 38 ft.
Apparent base of massive sandstone ..... Elevation, 1020 ft.
Covered interval with coarse-grained massive sandstone in the lower part ..... 24 ft.
Apparent base of massive sandstone ..... Elevation, 996 ft.
Covered interval ..... 12 ft.
Burns coal 9 inches thick ..... Elevation, 984 ft.
Covered interval, massive to shaly sandstone in lower part ..... 13 ft.
Massive to shaly sandstone ..... 5 ft.

The same coal has been opened by Morris Sandlin on a right branch further up this branch of Little Sexton and ¼ mile north of the Sam Saylor opening. The bed section in an old 12-yard entry is:

Lower Howard Coal.

Massive sandstone ..... 1½ ft.
Light gray shale ..... 24″
Coal ..... 20″
Elevation, 1060 ft.

Two hundred feet up the main branch, on the left, the same coal has been opened by Morris Sandlin. The following bed-section was obtained in an old wet entry:

Lower Howard Coal.

Massive sandstone ..... 4 ft.
Light gray shale ..... 10″
Block coal ..... 21″
Elevation, 1065 ft.

Four-fifths of a mile up Island City branch and 1/6 mile up a right branch on the left, the bloom of the Manchester coal shows in natural exposure, at elevation 870 feet.

One-fifth mile up a right branch of this branch, opposite this exposure of the Manchester coal, Sherman Stapleton has an opening into a local coal coming 165 feet over the Manchester coal and between the horizon of the Burns and Lower Howard coals. It will be termed the Stapleton coal. The bed-section in a shallow entry is:

Stapleton Coal.

Massive sandstone	4 ft.
Soft bituminous shale	2″
Block coal	21″
Elevation, 1028 ft.	

Seven inches from the top of this bed is a discontinuous black shale parting about ¼ inch in thickness.

One mile and a quarter up Island City branch, ⅛ mile up a left branch, Sherman Stapleton has an opening into the Stapleton coal, at elevation 1050 feet. The coal was reported to be 26 inches thick.

The Burns coal has been opened by Marion Smith two and a fifth miles up the main branch at the gap. The following bed-section was obtained in a 3-yard prospect:

Burns Coal.

Massive sandstone	8 ft.
Soft, light-gray clay shale	19″
Block coal	24″
Elevation, 1003 ft.	

Directly adjoining this opening is a completely caved opening into the same bed reported to have been over 40 feet long.

Twelve feet below this opening is 12 inches of coal under 4 inches of black shale. This bed represents the lower split of the Burns coal which is commonly reported in the region where the Burns coal is best developed.

The Burns coal has been opened 1¾ miles up Little Sexton creek just below the junction of the road to main Sexton creek, with the little Sexton creek road. The following section was obtained here:

Section.

Base of coarse-grained, massive sandstone 10 feet+ thick		Elevation, 1021 ft.
Thick-bedded clay shale	7 ft.	
Burns coal, reported 14 inches thick		Elevation, 1015 ft.
Covered interval	11½ ft.	
Massive sandstone	1½ ft.+	
Shaly sandstone	1 ft.	
Low split of Burns coal	4″	Elevation, 997 ft.

One-fifth of a mile along the road to Sexton creek, up a left branch of Little Sexton creek, the following section was obtained in a left branch on the land of Jim Campbell:

Section.

Coarse massive sandstone	3 ft.+	
Thick-bedded, dark gray shale	7 ft.	
Caved opening into Burns coal		Elevation, 1026 ft.
Covered interval	18 ft.	
Shaly sandstone	10″+	
Low split of Burns coal	6″	Elevation, 1007 ft.
Covered interval	108 ft.	
Bloom of Manchester coal		Elevation, 899 ft.

Three-quarters of a mile up this branch and ⅛ mile up a right branch, on the right, the Burns coal has been opened by Jim Grimes. A shallow prospect gave:

Burns Coal.

Massive sandstone	1½ ft.
Thick-bedded, dark gray clay shale	6 ft.
Laminated coal	12″

Elevation, 1026 ft.

The Lower Howard coal has been opened by H. J. Clark, 2 miles up Little Sexton creek on the right. The bed section in a long, partially caved entry is:

Lower Howard Coal.

Thin-bedded, brownish clay shale	5 ft.
Block coal	25″

Elevation, 1104 ft.

Two completely caved extensive entries adjoin this opening.

The base of the characteristic coarse-grained sandstone lying over the Burns coal comes 83 feet below this opening.

The bloom of the Manchester coal shows in natural exposure at elevation 912 feet, 2 1/5 miles up Little Sexton creek, on the right.

The Upper Howard bed has been opened by Jim Smith, 2 3/5 miles up Little Sexton creek in a right hollow, at his home. The bed-section in a 15-yard entry is:

Upper Howard Coal.

Thick-bedded, light-gray, dense clay shale, becomes sandy toward the upper portion	9 ft.
Coal	18″

Elevation, 1147 ft.

Adjoining this opening are two adjacent completely caved entries into the same bed. In driving the entry the lower 1½ feet of shale is stripped off to give head room. It is worthy of note that this coal and the H. J. Clark bed are different coal beds, this bed coming 30–40 feet over the Clark coal. In this locality the upper of the two beds is the thinner but generally the upper one is the thicker.

BUNCOMB BRANCH.—Three miles up Little Sexton creek on the right: Elevation of mouth, 787 feet.

The hard, brittle black slate, near a cannel slate, which comes over the Manchester coal in this region shows at elevation 1006 feet, on the right of the road, 2½ miles up Buncomb branch. At this point a marked dip of S. 55° E. is shown by massive sandstone ledges.

The following section was obtained in the road at the head of Buncomb branch:

Section.

Road crossing of divide between Sexton creek and Island creek waters		Elevation, 1271 ft.
Covered interval	61 ft.	
Heavy bloom of Lower Howard coal		Elevation, 1210 ft.
Interval	40 ft.	
Top of 33-foot massive coarse-grained sandstone		Elevation, 1170 ft.
Interval	33 ft.	
Bloom of Burns coal		Elevation, 1137 ft.
Interval	47 ft.	
Fissile black shale on soft white sandstone (the horizon of the Wyatt coal)		Elevation, 1090 ft.
Interval	80 ft.	
Place of Manchester coal		Elevation, 1010 ft.

The Lower Howard coal has been opened on the Island creek side of the divide. The bed-section in a 25-yard entry is:

Lower Howard Coal.

Well-bedded, soft, black clay shale	3 ft.	
Coal	8¼″	
Shale	1¼″	
Coal	1½″	
Shale	2″	
Coal	5½″	
Shale	2½″	
Coal	12″	Elevation, 1224 ft.

The following section was obtained on the Island creek side of the divide at the head of Buncomb branch:

Section.

Divide		Elevation, 1273 ft.
Covered interval, largely shaly sandstone	23 ft.	
Covered interval, apparently sandy shale	24 ft.	
Bloom of the Lower Howard coal		Elevation, 1226 ft.
Sandy shale with shaly sandstone in upper portion	15 ft.	
Fine-grained massive sandstone	1 ft.	
Covered interval	2 ft.	
Massive sandstone	2 ft.	
Shaly sandstone	2 ft.	
Thin-bedded, brownish, sandy shale	14 ft.	
Covered interval	18 ft.	
Local coal bloom, reported to be	18″	Elevation, 1171 ft.
Coarse-grained, massive sandstone	5 ft.	
Bloom of the Burns coal		Elevation, 1166 ft.
Covered interval	18 ft.	
Shaly sandstone and sandy shale	15 ft.	
White clay		Elevation, 1133 ft.
Light-gray, sandy shale	20 ft.	
Blue-black, well-bedded shale	1 ft.+	
Sandstone gray to white, horizon of Wyatt coal	1 ft.	Elevation, 1112 ft.
Light-gray sandstone at top and well-bedded clay shale	15½ ft.	
Hard, fine-grained, white sandstone	4″	
Brittle, carbonaceous black slate	1½ ft.	
Soft, light-gray, well-bedded, arenaceous shale	3 ft.	
Soft clay shale (light-gray at top—blue-gray at base)	19 ft.	

The Lower Howard coal has been opened by Manuel King ¾ mile up a left branch entering Little Sexton creek 100 yards above the mouth of Buncomb branch. The following bed-section was obtained in a 12-yard entry:

Lower Howard Coal.

Thick-bedded, medium-gray clay shale	6 ft.
Block coal	23½″
Elevation, 1070 ft.	

NAMELESS BRANCH.—Two and one-half miles up Little Sexton creek is a large right branch of about the same size as Buncomb branch. For want of a better name it will be termed Nameless branch.

The upper limit of the hard, quartzitic sandstone which underlies the Manchester coal was found at elevation 962 feet, three-fifths of a mile up Nameless branch and two hundred yards up a left hollow.

In the same hollow is a completely caved opening into the Burns coal at elevation 1079 feet. This gives an interval of 117 feet between the Burns coal and the Manchester coal, which is near the normal.

Three-fourths of a mile up Nameless branch are the main forks. The Manchester coal has been opened by Mr. Metcalf 120 yards up a right branch, ¾ mile up the left fork. The bed-section in a 3-foot prospect is:

Manchester Coal.

Massive sandstone	1 ft.
Thin, compact, light-gray shale	5 ft.
Semi-cannel slate	10″
Coal	7″
Black shale	½″

Elevation, 998 ft.

One and a quarter miles up this left fork the bloom of the Manchester coal shows in natural exposure in the road, at elevation 1007 feet.

The Burns coal has been opened 3/5 mile, S. 25° W. of the mouth of Nameless branch by J. W. Wilder in a small left branch. The opening at elevation 1018 feet is now completely caved. The coal was reported 17–20 inches thick. The bloom of the Manchester coal shows at elevation 907 feet on the same branch.

Three miles up Little Sexton creek the creek forks. The Lower Howard coal has been opened by John Will Reese 1/3 mile up the left fork and ⅛ mile up a left branch, in a left hollow. The bed-section in a 16-yard entry is:

Lower Howard Coal.

Massive sandstone	3 ft.
Coal	27–29″

Elevation, 1098 ft.

The following combined section was obtained ¼ mile above the mouth of Little Sexton creek on the right of Main Sexton creek:

Section.

Top of hill		Elevation, 1218 ft.
Covered, apparently massive sandstone	40 ft.	
Massive ledge-forming sandstone	45 ft.	
Soft, dark-gray bituminous shale	6″	
Laminated coal 12 inches (Cool Spring coal)		Eleva., 1131½ ft.
Covered interval	37½ ft.	
Shaly sandstone and soft, blue-black shale float	1 ft.	
Covered interval	6 ft.	
Massive sandstone. Light gray to white, fine-grained, hard sandstone with abundant wind caves in the lower portion	31 ft.	
Base of massive sandstone		Elevation, 1056 ft.
Covered interval. Place of the Lower Howard coal	9 ft.	Eleva., 1052½ ft
Black shale	6″+	
Covered interval	9 ft.	
Apparent top of massive sandstone		Eleva., 1037½ ft.
Massive sandstone, fine-grained	12 ft.	
Coarse-grained, massive sandstone	37½ ft.	
Base of coarse-grained, massive sandstone, the characteristic sandstone lying over the Burns coal		Elevation, 993 ft.
Fine-grained, brown, massive sandstone	22 ft.	
Covered interval	11 ft.	
Thin-bedded sandy shale	4 ft.+	
Covered interval	26 ft.	
Fine-grained, micaceous, light yellowish to brown massive sandstone with carbonized plant remains in the base	20 ft.+	
Base of massive sandstone		Elevation, 910 ft.
Gray, well-bedded shale	6″+	
Covered interval	75½ ft.	
Bloom of Manchester coal		Elevation, 834 ft.
Covered interval with massive sandstone probably in the lower part	9 ft.	
Lower contact of massive sandstone on shale.		
Covered interval	95 ft.	
Level of Sexton creek		Elevation, 730 ft.

CROOKED BRANCH.

One and one-half miles above the mouth of Little Sexton creek, on the left: Elevation of mouth 743 feet.

The bloom of the Manchester coal shows in natural exposure on the left of the branch, 1/5 mile up, at elevation 836 feet.

Three-fifths of a mile up Crooked branch at the gap, thin lenses of coal show interlaminated with sandstone under a massive sandstone ledge. This coal is at 1035 feet elevation and is the Lower Howard bed.

Two hundred yards further up the branch on the right, Car Hall has a shallow prospect into the Upper Howard coal showing the following section:

Upper Howard Coal.

Light-yellow clay shale..... 3 ft.
Coal .....12″
Elevation, 1057 ft.

CRADLEBOW BRANCH.

One-tenth of a mile above the mouth of Crooked branch on the left of Main Sexton creek: Elevation of mouth, 745 feet.

The bloom of the Manchester coal shows, at elevation 846 feet, in natural exposure on the right of the branch 1/3 mile up.

The Manchester coal is 11 inches thick 1 mile up Cradlebow branch, on the right, at elevation 888 feet.

The elevation of the same coal is 944 feet one a half miles up Cradlebow branch on the left.

There is a pronounced structural rise from the mouth of Cradlebow branch to the head.

The elevation of the Manchester coal in a completely caved opening by Tip Banks, 2 miles up Sexton creek above the mouth of Little Sexton creek, is 850 feet. In this opening, which is one hundred and fifty yards up a left hollow, the coal was reported to be 14 inches thick.

ELLS BRANCH.

On the left, 9¾ miles above the mouth of Sexton creek: Elevation of mouth about 750 feet.

The Manchester coal is at elevation 975 feet in a completely caved digging ½ mile up the branch on the right.

The Manchester coal has been opened ⅛ mile up a left branch heading to Crane creek, 1¾ miles up Ells

branch. The opening is now completely caved at elevation 985 feet.

The Upper Howard coal has been opened by Grant Days 2 miles up Ells branch and one-third mile up a left branch:

Upper Howard Coal.

Shaly sandstone	3 ft.
Hard, gray, arenaceaus shale	2½ ft.
Coal reported	30"
Elevation, 1223 ft.	

The opening was completely caved.

CAVE BRANCH.

Ten and a quarter miles up Sexton creek on the left: Elevation of mouth, 756 feet.

The elevation of the Manchester coal at the mouth of Cave branch on the right of the mouth is 916 feet.

The same bed is at elevation 976 feet in a fallen digging by Thomas Melton, one mile up Cave branch, 200 yards up a left hollow, ⅛ mile up a left fork, known as Ivy creek. The coal was reported 14 inches thick in this digging.

In a caved opening at elevation 1012 feet, one-tenth of a mile up Ivy creek, the same bed was reported to be 14–16 inches thick.

JIMS BRANCH.

Ten and three-quarters miles up Sexton creek, on the left: Elevation of mouth, 762 feet.

The elevation of a completely caved opening into the Manchester coal, ½ mile up the branch, on the left, is 938 feet.

One mile and a quarter up Jims branch, on the left, Bart Bowling reports the Manchester coal 12 inches thick 15 feet down in a well, at elevation 1000 feet.

Eleven and one-eighth miles up Sexton creek there is a right branch up which the road goes to Little Sexton creek.

The Manchester coal shows in natural exposure one-half mile up this branch on the right. The bed-section is:

Manchester Coal.

Yellowish clay shale	2 ft.	
Coal	10″	Elevation, 893 ft.
Brittle fire-clay shale.		

Three-quarters of a mile up this branch, on the right at the gap, is a completely caved opening into the lower Howard coal, at elevation 1100 feet.

The Manchester coal shows in natural exposure ¼ mile above the mouth of this branch, on the right of Sexton creek in the bend of the creek just below Chestnutburg P. O. The bed-section here is:

Manchester Coal.

Light-gray, shaly sandstone	3 ft.	
Slaty cannel coal	3″	
Block coal	8″	Elevation, 880 ft.
Light, fire-clay shale	2 ft.	

CHESTNUT BRANCH.

A right branch entering Sexton creek opposite Chestnutburg P. O., eleven and five-eighths miles up Sexton creek. Elevation of mouth, 774 feet.

The elevation of the Manchester coal ½ mile up a right branch, ¼ mile up Chestnut branch, is 878 feet.

Three-quarters of a mile up this right branch and one-sixth mile up a left hollow, the Upper Howard coal has been opened by Leander Chestnut with the following bed-section in an 8-yard entry:

Upper Howard Coal.

Light-gray to yellowish clay shale	3 ft.
Block coal	32″
Elevation, 1120 ft.	

The Upper Howard coal has an interval to the Manchester coal of 240 feet here.

The Manchester coal is at elevation 881 feet, two-thirds of a mile up Chestnut branch, on the left, in a drain. Directly under the coal here is the hard quartzite rock which is very characteristic of the floor of this bed west and southwest of a line drawn north and south through this point.

The quartzitic rock, here approximately 1½ feet thick, is hard (strikes fire with steel), dense, fine-grained and white. One of the most characteristic features of the rock is the rusty, yellow and brown root marks which are present in nearly every specimen. This is apparently the normal fire-clay shale which underlies this bed. Numerous fine flakes of muscovite mica are in evidence, including some degree of metamorphism and recrystallization of the fire-clay. This rock is an exceedingly valuable aid in identifying the Manchester coal. And by tracing float blocks of this rock up the hillsides the position of the Manchester coal can be ascertained where no exposures show.

The Lower Howard coal has been opened by Dr. Morris, ½ mile up a right branch, ¾ mile up Chestnut branch. The bed-section here in one of two badly caved openings is:

Lower Howard Coal.

Massive sandstone	4 ft.
Light-gray clay shale	4″
Block coal	2½″
Shale	2″
Block and splint coal	18″

Elevation, 1103 ft.

The Lower Howard coal is reported 15 inches thick in a completely caved opening by John Pennington at the head of Chestnut branch, 1¼ miles up, at elevation 1093 feet.

A coal, reported 42 inches thick, above this bed may be the Cool Spring coal.

SACKER BRANCH.

On the left, twelve and five-eighths miles up Sexton creek: Elevation of mouth, 785 feet.

The Manchester coal is at 968 feet elevation ½ mile up Sacker branch on the right.

The Lower Teges coal has been dug from the bed of the branch at the forks, ¾ mile up Sacker branch, at elevation 875 feet. The interval of the coal to the Manchester coal is approximately 140 feet here.

A coal less than 8 inches thick which will be known

as the Sacker branch coal has been prospected, at elevation 946 feet, on the right of the road, 1/3 mile up the left fork of Sacker branch. There is a white shaly sandstone under this coal which resembles the floor of the Manchester coal, but is not as hard or as white as is that sandstone. The place of the Manchester coal is over this coal, at elevation 1044 feet, giving an interval of 98 feet from the Manchester coal to the Sacker branch coal. This bed comes between the Manchester coal and the bed at drainage at the forks of Sacker branch, which is correlated with the Lower Teges coal.

The Manchester coal has been opened by Colonel Wood one-half mile up this fork of Sacker on the left of the road. The bed-section in a 3-foot prospect is:

Manchester Coal.

Shale	3 ft.	
Laminated block coal	10″	
Hard white sandstone	3″+	Elevation, 1036 ft.

A coal was reported 4–5 feet thick, at elevation 959 feet, 15 feet down in a well at Colonel Wood's house. This is the Sacker branch coal and such a thickness of course a mistake.

Two hundred yards above this coal opening, on the right of the stream is a completely caved opening into the Wyatt coal, at elevation 1103 feet. Black slate shows in the dump, undoubtedly from the roof of this bed, and a hard quartzitic sandstone lies below the bed. This hard rock is darker colored and the root marks are a dark brown, while the rock under the Manchester coal is white and the root marks a light brown even verging at times into a pink.

The bloom of the Manchester coal shows 73 feet below this opening.

The Manchester coal is at elevation 921 feet fourteen miles up Sexton creek, on the left, opposite the mouth of Gum fork.

GUM FORK OF SEXTON CREEK.

On the right of Sexton creek, fourteen miles up: Elevation of mouth, 804 feet.

The Manchester coal, at elevation 920 feet, has been

raised from a right branch one-half mile up it—the branch being ¼ mile up Gum fork.

J. M. Wilson has a completely caved digging into the Burns coal ⅛ mile up a left branch, ½ mile up Gum fork, at Malcom P. O. The coal is at elevation 1041 feet and was reported to be 14 inches thick.

One hundred and fifty yards up this left branch the Manchester coal was reported 14 inches thick where it was dug from the bed of the stream at elevation 902 feet.

The Manchester coal has been dug by A. B. Read at the forks of a small left branch, ¼ mile up a left branch, ½ mile up the left fork of Gum fork. The coal was reported 18 inches thick and is at elevation 929 feet.

The Burns coal has been prospected by A. B. Read directly above this point on the left of the branch. The section exposed here is:

Burns Coal.

Massive sandstone	2 ft.
Dark gray shale	3 ft.
Coal	18″
Soft, gray, clay shale.	
Elevation, 1046 ft.	

The same bed has been opened by A. B. Read, ¼ mile up a left fork of this branch and S. 20° E. of the last opening. The bed-section in a 25-yard entry is:

Burns Coal.

Shale	2½ ft.
Coal	26½″
Shale.	
Elevation, 1059 ft	

A marked thinning of the Burns coal in a direction N. 20° W. is here shown.

The Manchester coal shows in natural exposure, ½ mile up this left branch of the left fork of Gum fork. The bed-section here is:

Manchester Coal.

Shale	3 ft.
Coal	14″
Hard white quartzite.	
Elevation, 922 ft.	

The upper few inches of this coal is semi-cannel slate.

Three-quarters of a mile up this branch, near the divide as the road goes over to Brays fork of Sexton creek, on the right of the road, Tom Fuston has a 20-yard entry with a right branch of unknown length. The bed-section is:

Burns Coal.

Light-gray sandy shale	4 ft.
Thick-bedded, soft, black clay shale	2 ft.
Block coal	29½"
Elevation, 1054 ft.	

The bed has a considerable southerly inclination. The coal is a good quality block coal with conspicuous banding, some bands being bright and hard and some soft and dull. The latter are not bone coal however.

The Manchester coal is at elevation 946 feet, one mile up the left fork of Gum fork, on the right.

The Burns coal has been opened by C. K. York, one and a third miles up this fork of Gum fork, on the left. The bed-section in a 30-yard entry is:

Burns Coal.

Dark shale	8 ft.
Cannel slate	2¼"
Block coal	28½"
Elevation, 1049 ft.	

The Burns coal has been opened by Harvey Barnes ½ mile up a left hollow, one and two-thirds miles up this fork. The bed-section in a partially wet 25-yard entry is:

Burns Coal.

Thin-bedded dark shale	1 ft.
Block coal	29½"
Dark gray shale.	
Elevation, 1074 ft.	

Two and two-fifths miles up, this fork of Gum fork forks.

Three-fourths of a mile up the right fork the Burns

coal is at elevation 1112 feet, in a completely caved digging by George Robertson, ¼ mile up a right branch.

The bloom of the Manchester coal shows at elevation 1000 feet, one and a quarter miles up this fork, in the road.

The Manchester coal has an elevation of 998 feet, one mile up the left fork of the left fork of Gum fork.

The Manchester coal has been dug from the bed of the stream, one and a third miles up this left fork of Gum fork of Sexton creek. The elevation of the coal here is 1024 feet.

From the mouth of this fork to near its head there is a rise of 90 feet in the Manchester bed.

THE RIGHT FORK OF GUM FORK OF SEXTON CREEK.—Elevation of creek at the forks 823 feet. The following section was obtained on the right of the road, 1/3 mile up the right fork:

Section.

Well-bedded, light yellow to soft shale—rusty brown on fracture	3 ft.+	
Clay shale, with peach stone shaped ferruginous concretions	3 ft.	
Soft, black, well-bedded clay shale	7 ft.	
Soft, fine-grained light-gray sandstone float	21 ft.	
Hard, light yellowish fine quartzitic sandstone	4 ft.+	
Covered interval	7 ft.	
Hard, massive, thin-bedded light gray sandstone	11 ft.	
Soft, thin-bedded clay shale, light brown in color	5 ft.	
Top of light-gray, soft sandstone ledge		Elevation, 910 ft.

The elevation of the Manchester coal where this section was taken is about 940 feet and it apparently comes in the lower part of the 21 feet covered interval with sandstone float.

HUCKLEBERRY BRANCH.—A large left branch one mile up the right fork of Gum fork of Sexton creek.

The following section was obtained 100 yards up Huckleberry branch, on the right:

Section.

Apparent base of black shale		Elevation, 969 ft.
Covered interval	43 ft.	
Massive sandstone	12 ft.	
Hard laminated splint coal	4½″	Elevation, 914 ft.
Shaly sandstone	1 ft.+	

The approximate elevation of the Manchester coal at this point is 950 feet. The thin coal of the preceding section is a bed coming between the Manchester coal and the Sacker branch coal.

Three-quarters of a mile up Huckleberry branch a coal reported 13 inches thick was dug from the bed of the stream, at elevation 972 feet. The digging was completely caved at the time of visit. This is the Manchester coal.

The Burns coal has been opened by Steve Barnes one mile up Huckleberry branch, on the left. The bed-section in a long entry is:

Dark shale	9 ft.
Coal	25″

Elevation, 1130 ft.

The bed rises in a southwesterly direction.

The Burns coal has been opened by Lucian Bond one mile and three-quarters up a right branch, two miles up the right fork of Gum fork. A long entry at the divide where the road to Welchburg passes over the gap gives the following bed-section:

Burns Coal.

Massive sandstone	2½ ft.	
Soft, granular black shale	12 ft.	
Cannel slate, with fossil lingula	18″	
Impure cannel slate	2¾″	
High grade cannel slate, near cannel coal	2¼″	
Impure cannel slate	1½″	
Laminated block coal	2″	
Soft gray clay shale with thin coal interlaminations	6″	
Block coal	2½″	Elevation, 1168 ft.
Soft fissile black shale	10″	

Three hundred yards up the main fork above this right branch, James McQueen has a completely caved opening into the Manchester coal, on the left of the fork, at elevation 988 feet. The coal was reported 6–8 inches thick. The roof is light gray, clay shale.

Above this opening is a completely caved opening into the Burns coal, at elevation 1115 feet.

The Manchester coal is at elevation 1304 feet in a completely caved prospect, 2¾ miles up the right fork and ¼ mile up a right branch, on the left. Three feet below the coal is the top of a 3½+foot massive sandstone. Fissile black shale shows in the dump which probably came from immediately over the bed.

Three and three-quarters miles up the right fork of Gum fork the Manchester coal is at elevation 1052 feet in a completely caved opening by Elihu Ested, 250 yards below High Knob P. O.

A local coal which will be called the High Knob coal, has been prospected at elevation 1005 feet, 4¼ miles up the right fork of Gum fork, 200 yards up a left branch. The coal was reported 21 inches thick under shaly sandstone.

A 3-foot to 3½-foot bed was reported here, at elevation 982 feet, 15 feet down in a well. This is the Sacker branch coal.

The following section was obtained on the road from High Knob postoffice to Terrell creek:

Section.

Top massive sandstone		Elevation, 1155 ft.
Massive sandstone	3 ft.	
Light-gray, well-bedded sandy shale	9 ft.	
Thin-bedded sandstone, shaly at base	8 ft.	
Well-bedded sandy shale	5 ft.	
Covered interval	15 ft.	
White clay	4″	
Massive sandstone	5 ft.	
Well-bedded sandy shale	6 ft.	
Gray to light-gray clay shales	18 ft.	
Soft dark shale	13 ft.	
Light-gray, soft clay shale	10 ft.	
Bloom of Manchester coal		Elevation, 1073 ft.
Shale	2 ft.	
Massive sandstone	12 ft.	
Light-gray shale with dark shale interlaminations	30 ft.	
Dark-gray shale	14 ft.	
Hard, well-bedded, light-gray shale	2 ft.	
Dark-gray clay shale	12 ft.	
Covered interval	22 ft.	
Massive sandstone	6 ft.+	
Stream level.		

The Manchester coal is at elevation 1086 feet in the road to Welchburg, 6¼ miles up the right fork of Gum fork of Sexton, near the divide.

BRAY FORK OF SEXTON CREEK.

The left fork of Sexton creek considering Gum fork to be the right fork: Elevation of mouth, 804 feet.

The Manchester coal is at elevation 942 feet, one-fifth mile up Bray fork, on the right.

The following is a combined section for this locality:

Massive sandstone	19 ft.+	
Covered interval	3 ft.	
Manchester coal		Elevation, 942 ft.
Covered interval	173 ft.	
Massive sandstone	5 ft.+	
Base of massive sandstone		Elevation, 864 ft.
Covered interval	43 ft.	
Apparent top of 3-foot+ massive sandstone		Elevation, 821 ft.
Level of creek		Elevation, 818 ft.

The massive sandstone at drainage here is frequently a valuable key bed for working out the structure. It is the massive sandstone which shows at the mouth of Cave branch, at road level, in the road at Chestnutburg P. O. and above the Lower Teges coal at Burning Springs.

BURNING SPRINGS BRANCH.—One-half mile up Bray fork, on the left: Elevation of mouth, 821 feet.

Coal at elevation 865 feet has been dug from the Lower Teges bed at the mouth of Brushy fork, 2/3 mile up Burning Springs fork.

BRUSHY FORK.—Elevation of mouth, 865 feet.

The Manchester coal is at elevation 1078 feet in a completely caved opening, on the left, ¾ mile up Brushy fork. The coal was reported 12–14 inches thick.

The lower Teges coal has been dug from the bed of a left branch under a bridge, one mile up Burning Springs fork. The digging has completely fallen in at the time of visit. The coal here, at elevation 914 feet, was reported about 16 inches thick. Soft, well-bedded gray shales form the roof of the bed. Twenty-five feet over the coal is the apparent top of a massive sandstone 15+ feet thick. This is the sandstone mentioned on preceding pages.

At this point on Burning Springs branch, as is also the case lower on the branch, a marked inclination of strata N. 30° W. shows.

Coal has been dug from the Lower Teges bed, at elevation 928 feet, 9–11 inches thick, on the left of the road opposite a church in the town of Burning Springs.

A pronounced inclination in a direction N. 10° W. is shown by a massive sandstone underlying the Lower Teges coal in the town of Burning Springs.

The Lower Teges coal is 3–4 inches thick, at elevation 946 feet, in natural exposure, 150 feet up a left branch (Post Office branch), at the town of Burning Springs.

The apparent place of the characteristic hard, white, quartzitic sandstone which underlies the Manchester coal is 141 feet over the Lower Teges coal, at this point.

The Manchester coal is reported 16 inches thick in a completely caved digging by Doctor Webb, at elevation 1110 feet, ¼ mile up a left branch, 200 yards up Post Office branch of Burning Springs branch.

Ten to fifteen feet under this coal is the top of a massive sandstone.

One-sixth mile up this left branch, near the head, on the right, the following section was obtained:

Section.

Reported position of good coal bloom, probably the Lower Howard coal.		
Interval	50–70 ft.	
Reported 8+ inches coal (Burns coal).		
Interval	80 ft.+	
Manchester coal		Elevation, 1138 ft.
Hard, massive sandstone, ledge-forming	10 ft.+	
Interval	63 ft.	
Caved digging into the Sacker branch, coal reported 18 inches thick		Elevation, 1065 ft.

The strata show a slight but perceptible rise up Post Office branch of Burning Springs branch.

The following section was obtained on a right branch, on the land of J. H. Jarrett, 1/3 mile above Burning Springs:

Section.

Massive sandstone	25 ft.+	
Covered interval with light-yellow, sandy shale in the lower part	26 ft.	
Completely caved opening into the Manchester coal. Coal reported 21 inches thick		Elevation, 1158 ft.
Covered interval	153 ft.	
Completely caved prospect into the Lower Teges coal, reported 18 inches thick		Elevation, 1005 ft.
Covered interval	24 ft.	
Local coal bloom		Elevation, 981 ft.

The Manchester coal is at elevation 1132 feet in a completely caved opening on the left of Burning Springs branch, ½ mile above town, on the land of Luther Webb.

Immediately below this opening is the base of an 8+foot massive sandstone, at elevation 998 feet. This is the sandstone which lies immediately over the Lower Teges coal.

One hundred and seventy yards up a right branch at this point, the Manchester coal is at elevation 1100 feet. A strong west inclination of strata shows here.

Three-quarters of a mile above Burning Springs, on the left, the elevation of the Manchester coal in a completely caved digging is 1113 feet.

One mile up Burning Springs branch above the town, the Manchester coal is at elevation 1060 feet, in a right hollow, with a marked west dip showing.

The elevation of the same coal is 1113 feet, 1¾ miles above Burning Springs, at the gap to Rader creek.

The Manchester coal, reported 11 inches thick, has been dug from the bed of a right branch, ¼ mile up Bray fork, above the mouth of Burning Springs branch. The digging is 250 yards up the branch, at elevation 906 feet.

The Manchester coal is at elevation 956 feet in a completely caved prospect by G. G. Allen, ½ mile up Bray fork, on the left. The coal was reported 26 inches thick. The Huckleberry branch coal has also been dug into at this place, 39 feet below the Manchester coal. The coal was reported 30 inches thick but such a thickness is excessive as also is the reported thickness of the Manchester coal.

The Manchester coal is 10 inches thick, at elevation 935 feet, 1/5 mile up a left branch opposite the above locality and on the land of Elisha Rader. The characteristic hard, white quartzitic sandstone shows immediately beneath this coal. The Burns coal was reported 33 inches thick in a completely caved opening on the left of the branch, at elevation 1069 feet.

The following section was obtained on this branch:

Section.

Top of bench, light-gray, fine-grained, massive sandstone float		Elevation, 997 ft.
Covered interval, in which no coal bed exists	7 ft.	
Soft, thick-bedded, sandy, light-gray shale	19 ft.	
Soft gray clay shale, rusty brown on cross fracture	14 ft.	
Hard, light-gray clay shale	5 ft.	
Blue-gray, hard, thick-bedded shale	13 ft.	
Covered interval	4 ft.	
Manchester coal		Elevation, 935 ft.
Covered interval	7 ft.	
Massive sandstone	5 ft.	

The Manchester coal is at elevation 1015 feet in a

completely caved prospect, ¾ mile up Bray fork and 1/6 mile up a left branch.

Seven-eighths of a mile up Bray fork is a left branch, known as Sandlin branch. The Burns coal has been opened on the land of Mrs. Kate Potter, ¾ mile up Sandlin branch, at the head of the left fork. The bed-section is as follows:

Burns Coal.

Massive sandstone	4 ft.
Dark-gray, slaty shale	5"–20"
Coal	28"
Black shale	2"+

Elevation, 1054.

The bloom of the Manchester coal is at elevation 959 feet, 100 yards up the left fork of Sandlin branch.

The Burns coal has been opened by Tom Fuston, ¼ mile up this left fork, on the right. The bed-section here is:

Burns Coal.

Massive sandstone	3 ft.
Dark-gray shale	16"
Coal	24½–25"

Elevation, 1062 ft.

There are three adjacent openings here.

The Manchester coal is at elevation 1055 feet, ¼ mile up a left branch, on the right. The road to Burning Springs passes up this branch.

John Bull has an opening into the Manchester coal, ¼ mile up a left branch, 1½ miles up Bray fork. The bed-section here is reported as follows:

Manchester Coal.

Massive sandstone	3 ft.
Bituminous shale	16"
Coal	24"

Elevation, 1075 ft.

The Manchester coal is at elevation 1040 feet, one and five-sixths miles up Bray fork and 200 yards up a left branch, on the right. The coal appears thin.

Two miles up Bray fork forks, the Manchester coal shows, at elevation 980 feet, in natural exposure, in the bed of the road, 1/3 mile up the right fork.

The Burns coal has been opened 2/3 mile up the right fork, and 1/5 mile up a right hollow, on the land of Will Turner. The bed-section in a 12-yard entry here is:

Burns Coal.

Massive sandstone	3 ft.
Cannel slate	1½″
Coal	19½″

Elevation, 1097 ft.

A notable inclination of strata was noted here of 1½ feet in 25 feet in a direction N. 50° E.

One mile up this fork, on the right, the Burns coal is at elevation 1142 feet in a completely caved opening.

LEFT FORK OF BRAY FORK.—The road to Mill creek passes up this fork. The elevation of the creek at the forks is 935 feet.

The Manchester coal has been dug by John Murray from the bed of a right branch of the left fork, ½ mile up the left fork, and 1/5 mile up the right branch. The coal was reported 14–18 inches thick and is at 1042 feet elevation.

Three hundred and fifty yards south of this point is a completely caved prospect by James D. Murray into the Burns coal, at elevation 1156 feet. The coal was reported 18 inches thick.

Bill Briggman has a caved digging into the Manchester coal on the left of a left fork, ¾ mile up. The coal was reported 18–24 inches thick here and is at elevation 1072 feet.

The Manchester coal is at elevation 1087 feet, 1 mile up this fork, on the land of Buck Johnson. The coal was reported to have been 18 inches thick in a digging completely caved.

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