

GEOLOGICAL SURVEY OF OHIO

WILBER STOUT, State Geologist

Fourth Series, Bulletin 43

**THE COAL BEDS OF WESTERN
CARROLL COUNTY**

and

**THE COAL BEDS IN SOUTHEASTERN
MAHONING COUNTY**

by

RAYMOND E. LAMBORN

COLUMBUS

1942

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THE COAL BEDS OF WESTERN CARROLL COUNTY

BY
RAYMOND E. LAMBORN

INTRODUCTION

During the summer of 1934 some time was spent by the writer in field work in the upper Tuscarawas Valley of eastern Ohio. Chief attention was directed at that time to the western half of Carroll County although some scattered data were secured in the eastern half of the county and in adjoining areas in Stark and Tuscarawas counties to the north and west. The immediate purpose of the work was to secure such information as would be necessary to construct a structural contour map of the area. As many of the important members of the coal measures of western Carroll County are notably patchy and discontinuous, it was necessary to examine all rock exposures possible in this area and to study the stratigraphic succession in much detail in order to avoid errors in the identification of members. As a result of this field work much data were secured on the character, thickness, and distribution of the various members the coal beds of which are of some economic importance and concerning which there is very little published data of recent date. The stratigraphic sequence occurring in the western half of Carroll County and the nature and distribution of the various coal beds outcropping there are briefly described in the following pages.

GEOLOGIC SETTING

The rocks outcropping in Carroll County embrace the upper two-thirds of the Allegheny series and practically all of the Conemaugh series of the Pennsylvanian system. The total thickness of the outcrops is approximately 600 feet. The attitude of the rock strata is by no means horizontal or regularly sloping. In general the eastern component of the dip is slight and the slope to the south the most marked, but the regularity of the dip is broken by the presence of many structural noses and ridges which pitch in a southern direction. Structural terraces are also common. The axis of the most prominent nose extends from Magnolia south to the mouth of Indian Creek, Warren Township, Tuscarawas County. Similar structural features pitch to the southwest in south-central Harrison Township, to the southeast in Fox Township, to the southwest in Perry Township, whereas much of west-central Union Township is a broad terrace-like feature on the flank of the southern slope.

Physiographically Carroll County is located in the unglaciated portion of the Appalachian plateau, and the surface is decidedly hilly. The streams have carved their channels to depths of 200 to 250 feet below the divides, which represent the remnants of the old plateau. Due in part to the hilly condition of the land surface and in part to the structural conditions which prevail in this territory, the oldest beds outcrop near stream level in the northern and northwestern parts of the county and successively younger strata outcrop higher along the hillsides to the southward. Outcrops of the Allegheny series thus occur along the deepest stream valleys in the northwestern half of the county whereas the rocks exposed in the southeastern half of the county are almost entirely of Conemaugh age.

The coal beds of any economic importance, with the exception of the Harlem coal near Harlem Springs and a few outliers of the Pittsburgh coal in the southeastern corner of the county, are confined for the most part to the upper 150 feet of the Allegheny series and to the lower 50 feet of the Conemaugh series. Five coal beds occur in this series all of which have been mined to some extent for fuel. Outcrops of one or more of these beds are found in Rose, Brown, Monroe, Orange, Harrison, Center, and Union townships. The stratigraphic succession and the average thickness of the members as they occur on the outcrops in the western half of Carroll County are given in the following table.

GENERAL SECTION OF THE COAL-BEARING SERIES IN THE WESTERN HALF OF CARROLL COUNTY

	<i>Feet</i>	<i>Inches</i>
Conemaugh series		
Shale, carbonaceous, bony in places, persistent.....	..	7
Shale, gray	1	10
Coal, generally one bench, relatively persistent <i>Mahoning</i>	1	8
Clay, gray, plastic, <i>Mahoning</i> or <i>Thornton</i>	4	7
Shale and sandstone	23	3
Allegheny series		
Coal }	2	5½
Parting } <i>Upper Freeport</i>.....	..	1½
Coal } .....	..	11
Clay, gray, arenaceous, short.....	8	8
Limestone, discontinuous, nodular in places, <i>Upper Freeport</i> ...	1	0
Clay, flinty, discontinuous, <i>Bolivar</i>	6	0
Sandstone and shale, <i>Upper Freeport</i>	33	0
Coal }	1	6
Parting } <i>Lower Freeport</i> .....	..	1
Coal } .....	..	10
Clay, impure <i>Lower Freeport</i>	5	0
Shale and sandstone, <i>Lower Freeport</i>	39	10
Coal }	1	4½
Parting } <i>Middle Kittanning</i> .....	..	1
Coal }	1	7
Clay, dark blue, arenaceous, <i>Middle Kittanning</i>	5	0
Sandstone and shale	36	6
Coal }	1	4
Pyrite band } <i>Lower Kittanning</i> .....	..	1
Coal }	1	8
Clay, gray, plastic, <i>Lower Kittanning</i>	7	0±

LOWER KITTANNING OR No. 5 COAL

The Lower Kittanning coal is a persistent bed in Carroll County for it is present wherever it is due on the outcrop. The thickness of the coal varies from 2 feet to 3 feet 9 inches but the average is about 3 feet. The coal has good burning qualities but it is rather high in sulphur. The bed generally occurs in two benches separated by a thin sulphur band an inch or less in thickness. The upper bench is the more regular of the two as the observed limits of its variation in thickness are from 1 foot to 1 foot 7 inches. Outcrops of Lower Kittanning coal occur near drainage level along the major streams in Brown and Rose townships.

ROSE TOWNSHIP

The Lindentree structure holds the Lower Kittanning coal above drainage level along the larger valleys in the western part of Rose Township. The bed is above drainage along Beggar Run from its mouth to the central part of Section 26. The coal has been mined in a small way on the T. E. Simonds property in the north central part of Section 26, where it has the thickness and structure as described below :

	<i>Feet</i>	<i>Inches</i>
Sandstone .....	..	..
Clay shale, dark.....	3	0
Coal, good }	1	4
Parting } <i>Lower Kittanning</i> , altitude 1,010 feet.....	..	½
Coal, good }	2	0
Clay	1	0

Lower Kittanning coal is above drainage along Huff Run from the county line to a point about one mile east of Lindentree. It is well exposed in the open pit of the Hoover Coal & Clay Company located about one-fourth mile south of Lindentree, where it has the thickness and structure as represented in the following section :

Coal }	1	6
Bone band } <i>Lower Kittanning</i> , altitude 1,015 feet.....	..	½
Coal }	1	1
Clay, plastic }	3	0
Clay, flint } <i>Lower Kittanning</i>	2	6
Clay, plastic }	4	0

About three-fourths mile east of Lindentree, where the bed has an altitude of 975 feet, Lower Kittanning coal has been worked in a small way. It has also been mined by shafting on Huff Run in the southwest quarter of Section 22. Here the bed is reported to occur about 40 feet below drainage.

The Lower Kittanning coal is above drainage along the Big Sandy Valley in the northwest corner of Rose Township. It occurs at an altitude of about 1,050 feet in the central part of Section 35, where it has been mined in a small way for local use. The coal is well exposed in the pit of Plant No. 5 of the National Fireproofing Company and in the pit at the plant of the Whitacre-Greer Fireproofing Company, both of which are located in Section 29. A measurement of the coal at the latter plant is given below :

	<i>Feet</i>	<i>Inches</i>
Shale .....		..
Coal	1	7
Sulphur band } <i>Lower Kittanning, altitude 1,005 feet</i>.....	..	1
Coal	1	1
Clay .....		..

The bottom of the coal bed at this location lies about 38 feet below the Middle Kittanning coal, which is exposed in the same pit.

BROWN TOWNSHIP

Along the Big Sandy Valley and its northern tributaries in Brown Township the Lower Kittanning coal bed is close to drainage level. At Plant No. 3 of the Whitacre-Greer Fireproofing Company, the coal occurs a few feet above drainage and about 30 feet below the Middle Kittanning coal. This bed is a few feet below drainage at Malvern, but its altitude increases to the northeast for it lies within easy shafting distance at Minerva. Wilber Stout reports 3 feet 6 inches of Lower Kittanning coal at the mine of the Consolidated Clay Products Company near Oneida and 3 feet of coal on this horizon at the plant of the Metropolitan Paving Brick Company at Pekin.¹ Where it is being mined for truck delivery in the northeastern corner of Section 13, the Lower Kittanning coal has unusual quality and thickness for this region. A measurement of the exposures near the mouth of the mine is given below.

	<i>Feet</i>	<i>Inches</i>
Coal	1	2
Sulphur band .....	..	1
Coal	2	0
Sulphur band, discontinuous } <i>Lower Kittanning, altitude 995 feet</i>..	..	..
Coal .....	..	6

Lower Kittanning coal has been worked in the northeastern corner of Section 14, but the mine has been abandoned. The bed has good quality and thickness in the southeastern part of Section 11, where it is being mined by the Dublin Coal Company of Waynesburg, Ohio. The coal which

¹ Geological Survey Ohio, 4th Ser., Bull. 26, p. 331. 1923.

lies near drainage level is reached by a short slope. A generalized section of the bed as reported by the mine foreman is as follows:

	<i>Feet</i>	<i>Inches</i>
Shale soft, carbonaceous.....	..	..
Coal, good	1	2
Sulphur band	..	1
Coal, good	1	11

} *Lower Kittanning*, altitude 1,025 feet.....

Having an altitude of 1,025 feet, Lower Kittanning coal is mined for truck delivery in the west central part of Section 2. At this place the coal lies about 30 feet below the Middle Kittanning coal and 122 feet below the Upper Freeport coal, which outcrops along the road to the east.

Lower Kittanning coal is within easy shafting distance along the valley which extends from the central part of Section 1 southeastward in the direction of Malvern. It has been prospected to some extent along Armstrong Run in Section 7, where it occurs near drainage level, but the coal is reported to be thin. It is likewise close to drainage level along the valleys in sections 4 and 9, but no data are available on the character, thickness, or structure of the coal.

MIDDLE KITTANNING OR No. 6 COAL

The Middle Kittanning coal lies on an average about 41 feet above the Lower Kittanning coal. This interval varies, however, from 30 to 60 feet, the greatest vertical distance occurring in the western part of Rose Township. The average thickness of the exposures of Middle Kittanning coal measured in Carroll County is 3 feet 2 inches, although variations occur ranging from 2 feet 6 inches to slightly more than 4 feet. The coal bed generally occurs in two benches separated by a thin shale parting, both benches varying in thickness. Outcrops of Middle Kittanning coal occur in Rose, Brown, and Monroe townships.

ROSE TOWNSHIP

The Middle Kittanning coal occurs in minable thickness a short distance above drainage level in sections 13 and 14. It has been worked in a small way for local use in the central part of Section 14, where the bed has an altitude of 970 feet. The thickness and structure of the coal, as exposed in a prospect hole in the west central part of Section 19, are represented in the following section:

		<i>Feet</i>	<i>Inches</i>
Coal	} <i>Middle Kittanning</i> , altitude 970 feet.....	..	7
Parting		..	½
Coal		1	8

In Sections 26 and 32 the Middle Kittanning coal ranges in altitude from 1,030 to 1,040 feet. It has been mined along Huff Run in Rose Township for many years but many of the early openings have been worked out and abandoned. The coal is reported to have a thickness of 3 feet 6 inches in an opening on the property of the Hoover Coal and Clay Company, located one-half mile south of Lindentree. At this locality the bed has an altitude of 1,048 feet and lies 30 feet above the Lower Kittanning coal. One mile southeast of Lindentree the Middle Kittanning coal is being mined for truck delivery by the Maple Hill Coal Company of Massillon, Ohio. A description of the exposures at the mouth of the mine is as follows:

		<i>Feet</i>	<i>Inches</i>
Clay shale, gray.....		3	0
Coal	} <i>Middle Kittanning</i> , altitude 995 feet.....	1	4
Shale parting		..	1
Coal		2	5
Clay, bluish gray, short.....		1	0

Middle Kittanning coal was formerly mined in the northeastern corner of Section 27. It has a thickness of 3 feet where it is exposed in the pit of Plant No. 5 of the Whitacre-Greer Fireproofing Company in Section 29. Coal having the same thickness is exposed on the Middle Kittanning horizon at an altitude of 1,030 feet in the central part of Section 23. In the southern part of Section 24, Middle Kittanning coal is worked at the Wilkinson mine where it has the thickness and structure as indicated in the following section:

Sandstone .....	..	..
Shale	1	2
Coal	1	4
Shale parting } <i>Middle Kittanning</i> , altitude, 1,030 feet.....	..	$\frac{1}{2}$
Coal	1	7
Clay .....	..	..

The capacity of the mine is about 10 tons of coal per day.

MONROE TOWNSHIP

The Middle Kittanning coal horizon is above drainage along the valley of Indian Fork from the western edge of the township to Dellroy. The coal has been mined in a small way for local use in the northwestern corner of Section 18, where it occurs at an altitude of 953 feet. This bed has also been mined to some extent in the north central part of Section 17. At the Hiram Walton mine, located in the northeastern corner of Section 17, the coal has a thickness of 3 feet 6 inches. The structure at this locality is given in the following section:

	<i>Feet</i>	<i>Inches</i>
Shale	2	0
Coal	2	5
Sulphur band } <i>Middle Kittanning</i> , altitude 915 feet.....	..	1
Coal	1	0
Clay	1	0

At this locality the Middle Kittanning coal lies about 90 feet below the Upper Freeport coal, which outcrops along the hillside to the south. Middle Kittanning coal has been mined by drifting in the central part of Section 6, but the operations have been abandoned. It was also formerly mined by shafting in the southwestern part of Dellroy, where the coal is reported to have a thickness of 4 feet and to have a high sulphur content. The shaft had a depth of 40 feet. Other openings in Middle Kittanning coal include a slope mine, now abandoned, in the northwest corner of Section 36, and a slope mine in the western part of Section 30, now operated by the Merrick Coal Company of Dellroy. At the Merrick mine the bed lies about 40 feet below drainage and is reported to vary in thickness from 3 feet 8 inches to 4 feet 4 inches. A thin sulphur band an inch or so in thickness occurs about the middle of the bed. The coal has a high sulphur content.

BROWN TOWNSHIP

The Middle Kittanning coal is above drainage along Sandy Valley and its major tributaries from the north and along the lower courses of the tributary valleys from the south. Near Pekin in the southeastern part of Section 10, this coal outcrops along the road at an altitude of 1,048 feet, has a thickness of 1 feet 6 inches, and is overlain by 8 inches of black shale and shaly coal. The structure of the coal and its stratigraphic relations to overlying beds are shown in the following section secured in the south-central part of Section 18.

	<i>Feet</i>	<i>Inches</i>
Clay, <i>Lower Freeport</i>	3	0
Covered	47	0
Clay shale, gray.....	2	0
Clay shale, dark.....	..	6
Coal	..	9
Bone shale and sulphur } <i>Middle Kittanning</i> , altitude 1,075 feet.....	..	1
Coal	1	8

Along the Little Sandy Valley in sections 2 and 11, the Middle Kittanning coal is above drainage, the altitude of the bed ranging from 1,055 to 1,075 feet.

ORANGE TOWNSHIP

The Middle Kittanning coal is below drainage in Orange Township. The bed was mined for many years by the Somers Coal Company about three-fourths mile southwest of Sherrodsville in Section 13, where the coal was reached by a shaft 80 feet in depth. The thickness and structure of the coal in this mine as reported by Bownocker are as follows:¹

	<i>Feet</i>	<i>Inches</i>
Shale .....	..	..
Coal, upper bench } <i>Middle Kittanning</i>	1	8
Pyrite	..	1½
Coal, lower bench } ..	2	4
Fire clay .....	..	..

The coal in this mine was sampled in 1902 by B. A. Eisenlohr. The sample cut was 20 inches by 3 inches. Analysis was made by Lord and Somermeier.

Proximate analysis

	<i>As received</i>	<i>Moisture free</i>
Moisture	3.76	0.00
Volatile matter	39.11	40.64
Fixed carbon	50.34	52.31
Ash	6.79	7.05
	100.00	100.00

¹ Bownocker, J. A., Geol. Survey Ohio. 4th Ser., Bull. 9, pp. 243-244. 1908.

	<i>Ultimate analysis</i>	<i>As received</i>	<i>Moisture free</i>
Carbon		71.99	74.80
Hydrogen		5.36	5.13
Oxygen		11.40	8.38
Nitrogen		1.40	1.46
Sulphur		3.06	3.18
Ash		6.79	7.05
		<hr/>	<hr/>
		100.00	100.00
Heating value }	Calories	7,238	7,521
	B. t. u.	13,028	13,537

LOWER FREEPORT COAL

The Lower Freeport coal horizon is above drainage over a large area in western Carroll County, including parts of Rose, Brown, Monroe, Harrison, Union, and Center townships, but the field of minable coal is limited for the most part to small areas along the valley of Indian Fork. Along this valley the coal ranges in thickness from 1 foot 8 inches to 4 feet with an average of 2 feet 6 inches. The bed normally occurs in two benches, separated by a thin shale parting which generally occurs about one foot from the bottom of the coal bed. The stratigraphic position of the Lower Freeport coal horizon is on an average about 48 feet above the base of the Middle Kittanning coal, but this interval varies from 21 to 77 feet.

MONROE TOWNSHIP

The Lower Freeport coal bed outcrops along the valley of Indian Fork at altitudes ranging from 975 feet in the northeastern corner of Section 11, to 1,007 feet at the northern edge of Section 24. The member is being mined for local use at an opening on the W. F. Farber property in the southeastern part of Section 6, where the thickness and structure of the bed are as follows:

	<i>Feet</i>	<i>Inches</i>
Clay shale.....	1	0
Coal, bony } ..	..	3
Coal, good } ..	2	11
Parting } <i>Lower Freeport, altitude 975 feet.....</i>	..	1
Coal } ..	..	9
Clay	1	0

Formerly mined in the southwestern quarter of Section 36, the Lower Freeport coal bed is reported to have there a thickness of 2 feet 6 inches. The stratigraphic position of the horizon is shown in the following section exposed along the road at the northern boundary of Section 24.

	<i>Feet</i>	<i>Inches</i>
Shale .....	..	6
Coal blossom, <i>Mahoning</i>	2	0
Sandstone and covered.....	37	0
Coal blossom, <i>Upper Freeport</i>	1	6
Covered	3	4
Limestone, nodular, <i>Upper Freeport</i>.....	..	6
Shale and covered.....	6	10
Sandstone, shaly.....	10	0
Coal blossom, <i>Lower Freeport, altitude 1,007 feet</i>.....	..	4

HARRISON TOWNSHIP

The Lower Freeport coal horizon is above drainage along Pleasant Valley in sections 13, 14, 19, and 20, and along Middle Run in Section 36. The bed has a thickness of 2 feet 5 inches where it outcrops at an altitude of 977 feet near the crossroads in the southwestern corner of Section 14.

In the northwestern corner of Section 36, this coal occurs at an altitude for 1,055 feet and has a thickness of 1 foot 8 inches.

CENTER TOWNSHIP

In a small way the Lower Freeport coal is being mined at the G. W. Crawford mine in the southern part of Section 7, where it lies close to drainage level. The thickness and structure of the coal are as follows:

		<i>Feet</i>	<i>Inches</i>
Bone coal and shale. Varies in thickness from 4 inches to 6 inches....	..		5
Coal	} <i>Lower Freeport</i> , altitude 960 feet.....	..	9
Parting		..	1
Coal		1	2

ROSE TOWNSHIP

The Lower Freeport coal horizon outcrops over a large area in Rose Township but it is everywhere thin and it is not worked extensively for fuel. The coal has a thickness of 2 feet 1 inch where it has been prospected in the northeastern quarter of Section 1, and where it has an altitude of 987 feet and lies 30 feet below the Upper Freeport coal. A thin blossom of Lower Freeport coal is found along the road in the central part of Section 7, at an altitude of about 1,020 feet. The bed rises to the north from Section 7, for in Section 8 it outcrops along the road at an altitude of 1,043 feet. It appears again above drainage on Huff Run in the west-central part of Section 11, at an altitude of 1,075 feet.

The horizon of Lower Freeport coal is above drainage over a large area in the western half of Rose Township as every stream of any size has cut its channel below it. No prospect openings have been observed in this area, but outcrops show the coal to be either wanting or to be represented by a thin smut streak a few inches thick. In the east-central part of Section 26, the Lower Freeport coal outcrops along the road at an altitude of 1,111 feet and lies 37 feet below the Upper Freeport clay. It appears at the surface again in the northeastern corner of Section 20, at an altitude of 1,050 feet. North of Huff Run the coal is apparently wanting at many places where it is due on the outcrop.

BROWN TOWNSHIP

As the larger streams of Brown Township have carved their valleys as low as the Middle Kittanning coal, it is evident that the Lower Freeport coal horizon is above drainage over a large area. This coal, however, is generally wanting and at many localities there is no evidence of its underlying clay. At the pit of the Medal Brick and Tile Company at Malvern the Lower Freeport coal and clay are wanting but in the central part of Section 18, a short distance northwest of Malvern, the clay outcrops at an altitude of 1,130 feet, or 55 feet above the horizon of the Middle Kittanning coal.

The Lower Freeport coal is of slight economic importance in Carroll County.

UPPER FREEPORT OR No. 7 COAL

The Upper Freeport coal horizon is above drainage over a large area in western Carroll County but coal of minable thickness is found only in Monroe, Union, southern Harrison, southwestern Center, and Orange townships. The bed is either represented by a thin blossom or is wanting in Rose and western Brown townships. The coal varies in thickness from 2 feet to 5 feet 4 inches, but an average of ten measurements of minable coal is 3 feet 8 inches. Great variation in the thickness of the bed occurs over small areas and this irregularity is most marked where sandstone forms the roof of the coal. The position of the Upper Freeport is on an average about 100 feet above the Middle Kittanning coal and about 42 feet above the Lower Freeport coal.

BROWN TOWNSHIP

The only area of minable Upper Freeport coal in Brown Township occurs south of Minerva in sections 23, 24, and 25, where the bed has been opened at a number of places and has been mined on a small scale. A measurement of coal in the Davis mine, located in the west-central part of Section 24, is given below :

	<i>Feet</i>	<i>Inches</i>
Sandstone	2	0
Coal, good	} <i>Upper Freeport</i> , altitude 1,137 feet.....	11
Coal, bony		1
Coal, good		3
Clay parting		½
Coal		3
Clay, bluish gray, short.....		1	0

In the Davies mine in the southeastern quarter of Section 23, the coal has a thickness of 3 feet 1 inch and occurs at an altitude of 1,135 feet. Upper Freeport coal has also been mined on the Shaw property in the south central part of Section 24, where it reaches its greatest thickness for this vicinity.

	<i>Feet</i>	<i>Inches</i>
Coal, good, varies from 2 feet	} <i>Upper Freeport</i> , altitude 1,085 feet... ..	0
9 inches to 3 feet 3 inches		2
Shale parting		7
Coal, good, varies from 6		..
inches to 8 inches		..
Clay .....		..

The Upper Freeport coal has been mined on the Schaudel property in the central part of Section 25, where it has a thickness of a little more than 3 feet. This bed was likewise mined in the eastern part of Section 24, but the opening has been abandoned.

North of Sandy Creek the Upper Freeport coal horizon occurs near the top of the hills at altitudes ranging from 1,100 to 1,180 feet. The coal is generally wanting but the horizon is usually marked on the outcrop by a few feet of clay. Southwest of Malvern the Upper Freeport horizon occurs at altitudes ranging from 1,085 feet to 1,100 feet. Coal, 12 to 16 inches in thickness, is generally found on the horizon in this portion of Brown Township.

ROSE TOWNSHIP

The Upper Freeport coal is generally thin or wanting in Rose Township except in the southeastern corner. The slope of the bed is irregular as the structure is by no means uniformly dipping. In general the altitudes range from 1,168 feet at the western edge of Section 28, to 1,028 feet in Section 1. A few inches of coal occurs on the Upper Freeport horizon where it outcrops at an altitude of 1,100 feet in the northern part of Section 22. The stratigraphic succession in Rose Township is illustrated by the following measurements of outcrops along the east-west road in Section 26.

	<i>Feet</i>	<i>Inches</i>
Coal blossom, <i>Mahoning</i>	1	0
Clay, bluish gray.....	4	0
Covered	14	0
Horizon of <i>Upper Freeport</i> coal.....	..	..
Limestone, nodular, <i>Upper Freeport</i>	1	0
Clay, bluish gray, arenaceous.....	9	0
Shale, gray, arenaceous.....	25	8
Coal blossom, <i>Lower Freeport</i>	1	6
Clay and covered.....	5	0
Sandstone, shale and covered.....	75	2
Coal blossom, <i>Middle Kittanning</i> , altitude 1,030 feet.....	1	0
Clay, bluish gray, arenaceous.....	5	0

No coal is present on the Upper Freeport horizon in Section 10. The coal is likewise wanting in the southeastern part of Section 9, where the Upper Freeport clay is exposed at an elevation of 1,095 feet. The coal bed occurs in good thickness in the southeastern part of Section 1, where it is mined for truck delivery at the Elliott mine. The thickness and structure of the coal in this mine are described below:

	<i>Feet</i>	<i>Inches</i>
Coal, left for roof. Reported thickness.....	..	8
Coal, good	1	10
Sulphur band	..	$\frac{1}{4}$
Coal	..	11
Shale parting	..	2
Coal	2	0
Clay .....	..	..

HARRISON TOWNSHIP

The Upper Freeport coal is generally wanting on the outcrop in Harrison Township except for a few local areas in the southwestern part. The bed has been mined from a number of openings in sections 25 and 31, and the available supply has been practically exhausted. The Lower Mahoning sandstone generally occurs close above the coal and in the western part of the township this sandstone has replaced the coal. The coal horizon is represented by a few feet of clay at an altitude of 1,077 feet in the central part of Section 33. The Upper Freeport coal horizon is above drainage along Pleasant Valley in sections 13, 14, 19, and 20, but the coal is generally wanting.

CENTER TOWNSHIP

The Upper Freeport coal horizon is above drainage in sections 1 and 7 in the southwestern part of Center Township. The coal is apparently wanting in Section 7, but it is present in the southwestern part of Section 1, where it was mined for a number of years near the plant of the Medal Brick & Tile Company. The altitude of the horizon at this locality is about 990 feet.

UNION TOWNSHIP

In Union Township the Upper Freeport coal horizon is above drainage along the valley of Indian Fork in sections 18, 12, and 6, and along the North Fork of McGuire Creek in sections 15, 16, 9, and 3. Coal on this horizon occurs in both areas. The bed was formerly mined in the southwestern and south-central parts of Section 18, but in the latter place the 5 to 6 foot coal bed has been practically exhausted. The coal is apparently wanting in Section 12 but it appears again at an altitude of 1,000 feet in the northeastern quarter of Section 6, where it has been prospected to some extent but has never been mined extensively.

Upper Freeport coal is above drainage along the North Fork of McGuire Creek from the southwestern quarter of Section 15, where it has an altitude of 985 feet, to a point about one-fourth mile east of Petersburg. The bed has a thickness of 3 feet 6 inches where it is being mined near McGuire School in Section 15. It has also been mined to some extent along Bear Hole Run in Section 16. The coal has likewise been prospected in sections 9 and 3, but the bed is too thin for profitable mining.

MONROE TOWNSHIP

An important source of fuel in Monroe Township is the Upper Freeport coal. It is generally present in good development south of Indian Fork and as far east as Dellroy. It has been mined extensively in Section 11, but the mines are now abandoned. In the southern part of Section 6, the Upper Freeport coal is being mined for truck delivery by Thorley Brothers of Dellroy. The coal, which is of good quality, has the thickness and structure as given below.

	<i>Feet</i>	<i>Inches</i>
Clay shale.....	2	0
Coal, good } ..	3	2
Clay shale } <i>Upper Freeport</i> , altitude 1,020 feet.....	..	3
Coal, good } ..	1	2

The light clay shale parting in the coal in this mine is characteristic of the Upper Freeport along Indian Fork. The bed occurs in good development north of Indian Fork and east of Dellroy, but it is apparently wanting along the south side of the valley in sections 23 and 29. The coal was formerly mined from a number of openings in the northeastern part of Section 36 and in the northwestern part of Section 30. At the Easterday mine in the northeastern quarter of Section 30 the bed has the thickness and structure as described below.

	<i>Feet</i>	<i>Inches</i>
Coal, left for roof.....	..	..
Coal, good } ..	2	6
Clay shale parting } <i>Upper Freeport</i> , altitude 1,001 feet.....	..	2
Coal } ..	1	6

Upper Freeport coal is mined for local consumption on the property of W. S. Shotwell just north of Tabor. The coal has a thickness of about 4 feet and occurs at an altitude of 1,020 feet.

This coal bed is generally present in the southern part of Monroe Township where it has been mined at a number of places. In the southwestern part of Section 9, it has an elevation of about 1,000 feet. The coal was formerly mined near Queensboro, where its altitude is 1,005 feet, and to some extent along Holmes Run southwest of Leavittsville but the openings have in large part been abandoned.

ORANGE TOWNSHIP

The Upper Freeport coal is above drainage along Conotton Creek and its chief tributary, McGuire Creek, in Orange Township. The altitude of the bed varies from 980 feet near Sherrodsville to 940 feet near Bowerston, where the member passes below water level on Conotton Creek. Upper Freeport coal has been mined extensively in Orange Township for many years and it has been a valuable source of fuel. It was formerly worked near Sherrodsville where the bed is reported to have a thickness of 4 feet. Mines have also operated in this coal at Leesville and Bowerston.

MAHONING COAL

The position of the Mahoning coal in the western part of Carroll County varies from 16 to 60 feet above the Upper Freeport coal but the average interval between these beds is about 31½ feet. The coal is regularly underlain by the Mahoning clay, which is of exceptional quality in parts of Union and Monroe townships. The thickness of the coal varies from a few inches to 2 feet 3 inches, but the average of thirteen measurements is 1 foot 8 inches. The bed generally occurs as a single bench although at some localities a thin parting is found near the middle of the seam. The one feature of the Mahoning coal horizon which serves to distinguish it from the Upper Freeport coal at many localities is the presence of a few inches of carbonaceous or bone shale lying about a foot above the coal and separated from it by gray shale. The Mahoning coal horizon is above drainage in Union, Center, Harrison, Brown, Rose, Monroe, and Orange townships. It is more uniform in thickness in Carroll County than the Upper Freeport coal and has been mined in a small way in Union, Center, and Harrison townships.

UNION TOWNSHIP

The Mahoning coal is regularly present along the valley of Indian Fork in the southwestern part of the township. The bed is mined for local use in the northwestern part of Section 12, where it has a thickness of 2 feet and occurs at an altitude of 1,040 feet. The thickness and stratigraphic position of the bed are shown in the following section secured in the south-central part of Section 18:

	Feet	Inches
Sandstone	10	0
Shale, dark, sandy, fossiliferous, <i>Brush Creek</i>	6	0
Clay, siliceous, and covered.....	13	4
Sandstone, shaly.....	6	10
Clay shale, dark, sandy.....	20	0
Bone shale.....	..	5
Clay shale, dark.....	..	10
Shale, bony.....	..	6
Coal, <i>Mahoning</i> , altitude 1,060 feet.....	1	6
Clay, dark, plastic	2	6
Clay, light, plastic	1	6
Clay, sandy, ferruginous	1	6
} <i>Mahoning clay</i>		
Covered interval	55	0
Coal, <i>Upper Freeport</i> , varies in thickness from 5 to 6 feet.....	5	6

At this locality the plastic portion of the Mahoning clay with a thickness of 4 feet is mined and trucked to the potteries at Carrollton, where it is utilized in the production of cream-colored ceramic bodies. No evidence

of the Mahoning coal has been secured along the valley of the North Fork of McGuire Creek in the southern part of Union Township.

CENTER TOWNSHIP

The Mahoning coal is above drainage in sections 1, 2, 3, 7, and 8. This coal, as described in the following section, is mined for local use in the south-central part of Section 2.

	<i>Feet</i>	<i>Inches</i>
Bone shale, appears in roof of mine.....	..	..
Clay shale, dark.....	2	6
Coal, one block, <i>Mahoning</i> , altitude 1,040 feet.....	2	0
Clay, bluish gray.....	3	0

HARRISON TOWNSHIP

The Mahoning coal is widely distributed in its occurrence above drainage in Harrison Township. The altitude of the bed varies from 1,060 feet in Section 13, to 1,120 feet in sections 35 and 36. Along the east-west road near the southwestern corner of Section 14, the Mahoning coal has a thickness of 1 foot 10 inches and outcrops at an elevation of 1,060 feet. In the north-central part of Section 20, the coal has a thickness of 1 foot 6 inches and occurs at an elevation of 1,100 feet. Mahoning coal outcrops in the southeastern part of Section 24, at an altitude of 1,124 feet, and was formerly mined in the south-central part of Section 36 for local consumption. The structure and thickness of the coal at the locality last named are described below.

	<i>Feet</i>	<i>Inches</i>
Bone shale.....	..	6
Coal	..	10
Clay shale parting } <i>Mahoning</i> , altitude 1,120 feet.....	..	1½
Coal	1	3

Near Macedonia Church in Section 34, the Mahoning horizon is represented by a thin blossom at an altitude of about 1,120 feet.

ROSE TOWNSHIP

The Mahoning coal is generally present in the southeastern half of Rose Township but the coal is everywhere thin and in some localities clay is all that is present to mark the horizon. The altitude of the Mahoning coal varies from 1,150 feet in the central part of Section 12, to 1,161 feet in the central part of Section 26. The following is a measurement of the outcrops in the west-central part of Section 6.

	<i>Feet</i>	<i>Inches</i>
Bone shale.....	..	4
Clay shale, dark.....	1	2
Shale, black, and shaly coal } <i>Mahoning</i> , altitude 1,125 feet.....	..	5
Clay shale parting	..	6
Shale, black, and shaly coal }	..	3

	<i>Feet</i>	<i>Inches</i>
Clay shale and covered.....	11	6
Limestone } ..	2	0
Shale } <i>Mahoning</i> ..	..	4
Limestone } ..	..	6

The stratigraphic relations of the Mahoning coal are shown by the following section measured along the northeast-southwest road in the central part of Section 20:

	<i>Feet</i>	<i>Inches</i>
Shale, black, carbonaceous.....	..	6
Clay shale, dark.....	2	0
Coal blossom, <i>Mahoning</i> , altitude 1,160 feet.....	1	0
Clay, gray, short.....	5	0
Shale and covered.....	25	0
Coal horizon, <i>Upper Freeport</i>.....	..	..
Clay, dark, gray, short, with nodules of limestone not definitely placed, <i>Upper Freeport</i>	10	0
Shale, sandy, and thin sandstone.....	36	0
Coal blossom, <i>Lower Freeport</i> , altitude 1,083 feet.....	1	0
Clay, <i>Lower Freeport</i>.....	..	..

BROWN TOWNSHIP

The horizon of the Mahoning coal should occur near the summit of the highest ridges in that part of Brown Township which lies north of Sandy Creek, but outcrops of neither the coal nor its accompanying clay have been observed in this area. Just south of Malvern the Upper Freeport horizon is overlain by many feet of massive sandstone and the Mahoning coal horizon is apparently wanting. Outcrops of the horizon are also wanting in the southeastern and southwestern quarters of Brown Township.

The Mahoning coal is of little economic importance in the eastern half of Carroll County. It has been worked on a small scale at a few localities in the vicinity of Carrollton but the bed is everywhere thin.

REFERENCES

Descriptive material on different phases of the geology of Carroll County is given in the following publications of the Geological Survey of Ohio.

1. Geology, Vol. II, Part I. 1878.
2. Economic Geology, Vol. V. 1884
3. Oil and Gas. Fourth Series, Bull. 1. 1903.
4. Coal, Fourth Series, Bull. 9. 1908.
5. Conemaugh Formation, Fourth Series, Bull. 17. 1912.
6. Building Stones of Ohio, Fourth Series, Bull. 18. 1915.
7. Coal Formation Clays of Ohio, Fourth Series, Bull. 26. 1923.
8. Analyses of Coals, Fourth Series, Bull. 34. 1930.
9. Shales and Surface Clays of Ohio, Fourth Series, Bull. 39. 1938.

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THE COAL BEDS IN SOUTHEASTERN MAHONING COUNTY

BY

RAYMOND E. LAMBORN

INTRODUCTION

A field study of the geology of southeastern Mahoning County was made by the writer in 1935. As this region is covered with glacial deposits, bed rock exposures produced by natural means occur. Prospect pits dug for coal at a few places and the presence of several small mines have afforded places where the character, thickness, and elevation of the various coal beds can be determined. Little definite information regarding the character and thickness of the intervening strata can be secured from outcrops. In view of the demand for information regarding the minable coal beds, especially within easy trucking distance of ready markets, it seems advisable to record the data at hand relative to the coals in this area.

GENERAL FEATURES

The area included in this report comprises Springfield and Beaver townships and a portion of Green Township, all of which are located in the southern part of Mahoning County and are adjoined by Columbiana County on the south. The area as a whole is a rolling upland which includes in part the headwaters of Yellow Creek, Mill Creek, and Meander Creek which flow to the north; Bull Creek, Cherry Valley, and the Middle Fork of Little Beaver Creek which flow to the south; and Honey Creek which flows to the southeast. The altitude of the surface ranges from 1,020 feet to 1,320 feet. Deeply incised valleys are wanting with the possible exception of the valley of Little Beaver Creek in Green Township, where the walls rise steeply for 200 feet or more above a somewhat restricted valley flat. The maximum relief of the area does not exceed 300 feet and the average is much less. As this area lies within that part of the State covered by the continental glacier, drift deposits mantle the surface and permit few rock outcrops. The Lower Kittanning coal, which is the lowest coal bed exposed in this area, lies near drainage level in southern Green Township and along Honey Creek in Springfield Township. The 300 feet of strata above this coal horizon includes the Middle Kittanning and the Lower and Upper Freeport coal horizons and some 150 feet of barren strata of Conemaugh age above the Upper Freeport. The Lower Kittanning is the only coal bed of much economic importance in this area although the Middle Kittanning is a source of fuel at a few localities.

LOWER KITTANNING COAL

The Lower Kittanning is the chief coal bed mined in Springfield, Beaver and Green townships, where it is a persistent horizon but at no place attains great thickness. Along the southern border of the area the altitude of the bed ranges from 1,050 feet in the valley of Little Beaver Creek in Section 34, Green Township, to 1,080 feet along Honey Creek in Section 25, Springfield Township. In general, the Lower Kittanning coal bed rises to the north for in Section 4, Springfield Township, the altitude is 1,122 feet, and in Section 5, Beaver Township, it occurs at an altitude of 1,120 feet. An average of fourteen mine measurements of the thickness of the coal is 2 feet 7 inches, but variations occur from 1 foot 8 inches to 3 feet 6 inches. The bed is generally free from partings. Cannel coal, however, is of common occurrence on this horizon, especially in Springfield and Beaver townships. Where cannel coal occurs at the top of the bed, it thickens irregularly at the expense of the underlying bituminous block and in places the entire bed is of the cannel variety. There is no noticeable thickening of the member as the percentage of cannel coal increases. Over sizable areas in Springfield and Beaver townships the cannel occurs as a block 5 inches to 8 inches in thickness at the top of the seam.

SPRINGFIELD TOWNSHIP

The horizon of the Lower Kittanning coal is above drainage along Honey Creek in the southeastern part of Springfield Township as far as the central part of Section 22; along the North Fork of Little Beaver Creek in sections 33 and 34; and along Yellow Creek in the northwestern part. The bed is mined by drifting along the outcrop and by shafts in the north-central part of the township.

Lower Kittanning coal has been worked in the northwestern corner of Section 4. The coal, having a thickness ranging from 2 feet 6 inches to 2 feet 8 inches, is reached by a shaft 60 feet in depth. The bed is now being mined by shafting in the north-central part of Section 9. The coal, which is of the bituminous variety, has a thickness of 2 feet 9 inches and is of excellent quality. A shaft sunk to the Lower Kittanning coal on the Vitro property in Section 18 reached the coal at a depth of about 50 feet or at an altitude of 1,088 feet.

In a slope mine in the west-central part of Section 7, Lower Kittanning coal has the thickness and structure indicated below.

	<i>Feet</i>	<i>Inches</i>
Shale, bluish gray.....	10	0
Coal, cannel } <i>Lower Kittanning</i> , altitude 1,100 feet.....	..	6
Coal, bituminous }	2	8

Lower Kittanning coal was formerly mined by a slope on the Sedlock property in the central part of Section 17. The altitude of the bed at this place is about 1,070 feet. This coal bed has been mined from several slopes along the valley of Honey Creek to the north and northeast of Petersburg. During the summer of 1935 the Bituminous Coal Company

was opening a mine in Lower Kittanning coal at the southern edge of Section 24. The coal, having an altitude of 1,080 feet and a reported thickness of 26 inches, is all of the bituminous nature. At the mine of the Petersville Coal Company located one-half mile farther north, the character, thickness, and succession of strata are as given below.

	<i>Feet</i>	<i>Inches</i>
Shale, gray.....	1	0
Coal and black shale } Coal } <i>Middle Kittanning</i>.....	..	3
Clay	1	0
Clay	2	6
Covered interval.....	20	8
Altitude of shaft opening, 1,090 feet		
Covered, depth of shaft.....	13	0
Coal, varies in thickness from 2 feet 4 inches to 3 feet, <i>Lower Kittanning</i>	2	8
Clay, reported thickness.....	15	0

A layer of cannel coal 2 inches in thickness occurs at the top of the Lower Kittanning bed in this shaft. It thickens to the north in the workings, measuring as much as 3 feet in places.

At the Myers mine located in the central part of Section 22, Lower Kittanning coal has a thickness of 1 foot 10 inches. At the Padore mine one-half mile to the southeast, the coal varies in thickness from 2 feet 6 inches to 3 feet 9 inches. In parts of this mine the bituminous coal gives way entirely to the cannel variety.

BEAVER TOWNSHIP

The Lower Kittanning coal has been worked to some extent from slope mines along Mill Creek south of East Lewistown and from several shaft openings to the north and northeast of North Lima. Along Mill Creek the coal lies at altitudes ranging from 1,024 feet in Section 33, to 1,075 feet near East Lewistown. The thickness of the coal ranges from 2 feet 4 inches to 2 feet 6 inches. A thin cannel occurs in places at the top of the bed but it does not become an important part of the seam. Sandstone lies close above the coal. The following measurements made at the J. C. Robertson mine in Section 28 are typical:

	<i>Feet</i>	<i>Inches</i>
Sandstone, not measured.....	..	..
Cannel coal, somewhat bony } Coal, good. A discontinuous sulphur } <i>Lower Kittanning</i> band occurs 3 inches above base } Altitude 1,050 feet.....	..	3
Clay	2	4
Clay	1	0

Lower Kittanning coal has been mined for years in the area to the north and northeast of North Lima, and some of the older mines have been abandoned. In the northwest quarter of Section 13, the Hahn Coal

Company mines Lower Kittanning coal from a shaft 40 feet in depth. The bituminous part of the bed has a thickness of about 2 feet 8 inches and is of excellent quality. It is overlain by 10 inches of cannel coal. Similar conditions occur in the central part of Section 12, where the bed is mined from a shaft 86 feet in depth.

In the northeastern quarter of Section 2 is the slope mine of the Dunn Coal Company, where Lower Kittanning coal lies about 70 feet below the surface or at an altitude of 1,074 feet. The coal is of average thickness for this region and is of excellent quality. A section of the bed reported by the mine foreman is as follows:

	<i>Feet</i>	<i>Inches</i>
Sandstone .....	..	..
Draw slate.....	2	0
Cannel coal, varies from 4 inches to 6 inches	} <i>Lower Kittanning</i>	5
Coal, good, varies in thickness from 2 feet 2 inches to 2 feet 4 inches		2	3

GREEN TOWNSHIP

Lower Kittanning coal has been mined at a number of places in the eastern half of Green Township. It was worked in the southwestern corner of Section 11 and at several other places along Cherry Valley. In the northern part of Section 23, near Greenford, the Lower Kittanning clay is mined by the Greenford Clay and Tile Company and the material is used for ceramic purposes. A measurement in the mine is as follows:

	<i>Feet</i>	<i>Inches</i>
Roof, "soapstone," not measured.....	..	..
Coal, good, <i>Lower Kittanning</i>	2	8
Clay, varies from 6 feet to 8 feet.....	7	0

Coal and clay from the Lower Kittanning horizon are also worked at the plant of the American Fire Clay Products Company in the northern part of Section 1. In the central part of Section 26, Lower Kittanning coal, having a thickness of 2 feet and occurring at an altitude of 1,170 feet, is mined by Klink & Mellinger to supply local trade. At the mine of the Coy Coal Company in the southeastern corner of Section 16, the bed, which has an altitude of 1,110 feet, is reached by a shaft 67 feet in depth. The coal in this mine has an average thickness of about 3 feet but variations occur ranging from 2 feet 10 inches to 4 feet 4 inches. In places in this mine an inch or so of cannel coal occurs at the top of the bed. Lower Kittanning coal is also worked in the northeastern quarter of Section 21. No analyses of the Lower Kittanning coal in this area have been made by the Geological Survey.

MIDDLE KITTANNING COAL

The Middle Kittanning coal is either thin or wanting in Springfield and Beaver townships and is of small importance in the eastern half of Green Township. The bed occurs at intervals, ranging from 31 to 45 feet, above the Lower Kittanning coal. In the southwestern part of Section 22, Springfield Township, 1 foot 3 inches of Middle Kittanning coal is found 33 feet above the Lower Kittanning coal. In the northwestern quarter of Section 13, Beaver Township, Middle Kittanning coal, 1 foot 10 inches in thickness, is reported to occur some 40 feet above the shaft vein. Middle Kittanning coal was penetrated in a shaft mine owned and operated by Porter Brothers and located in Boardman Township near Woodworth. The coal at this locality has a thickness of 2 feet 4 inches and lies 37 feet above the Lower Kittanning.

At a few localities in the southern half of Green Township, the Middle Kittanning coal has been mined but it is generally thin and of little importance. In the northwest quarter of Section 21, this coal bed, 1 foot 6 inches in thickness, outcrops at an altitude of 1,170 feet. The Silver Creek Coal Company, Poland, Ohio, owns and operates a mine in Middle Kittanning coal in the east central part of Section 21. The bed in this mine is reported to have a thickness of 4 feet and to lie 31 feet above the Lower Kittanning coal.

Formerly, the Middle Kittanning coal was worked at a number of small banks along the southern edge of Green Township. The coal where mined in Section 33 has a thickness of 2 feet 6 inches. At the J. C. Katzenbaugh mine in Section 35, the bed occurs as one block 2 feet 4 inches in thickness. The beds above and below the Middle Kittanning coal are well exposed at the Abe Stauffer mine in the southwest quarter of Section 36, where the following measurements were secured:

	<i>Feet</i>	<i>Inches</i>
Shale, gray.....	3	0
Shale, gray, with iron ore nodules.....	4	0
Nodular layer of ore in shale.....	..	8
Shale, gray.....	..	8
Shale, bony.....	3	0
Shale, dark, fissile, arenaceous.....	3	8
Coal, <i>Middle Kittanning</i>	2	6
Clay, with ore concretions.....	10	0

A sample of the Middle Kittanning coal from this mine was cut in 1921 by C. F. Moses. Analysis by D. J. Demorest is as follows:¹

¹ Geol. Survey Ohio, 4th Ser., Bull. 34, p. 74, 1930.

PROXIMATE ANALYSIS

	<i>As received</i>	<i>Moisture free</i>
Moisture	5.04	0.00
Volatile matter.....	40.14	42.27
Fixed carbon.....	51.31	54.03
Ash	3.51	3.70
	<hr/>	<hr/>
	100.00	100.00

ULTIMATE ANALYSIS

Carbon	74.14	78.07
Hydrogen	5.42	5.13
Oxygen	14.46	10.49
Nitrogen	1.41	1.49
Sulphur	1.06	1.12
Ash	3.51	3.70
	<hr/>	<hr/>
	100.00	100.00

	<i>As received</i>	<i>Moisture free</i>	
Heating value	{Calories	7,426	7,819
	{B. t. u.	13,366	14,075
Fusion of ash	{Incipient	2,478°F.	
	{Complete	2,580°F.	

LOWER AND UPPER FREEPORT COALS

Owing to deposits of glacial drift which mantle the surface, there are few bedrock exposures of the succession above the Middle Kittanning coal, and as there are no mine openings, little information can be secured. The place of the Lower Freeport coal in this portion of the State is about 100 feet above the Lower Kittanning coal and the horizon of the Upper Freeport coal belongs some 60 feet higher in the series. Very little data can be secured on the Freeport coals in this area, and it is assumed that they are generally wanting or are too thin for profitable mining. A coal bed, evidently the Lower Freeport, having a thickness of 1 foot 6 inches, outcrops 90 feet above the Lower Kittanning coal, or at an altitude of 1,180 feet, along the road at the south edge of Section 22, Springfield Township. It is overlain by friable sandstone which is quarried in the vicinity for road material. A clay bed outcropping at an altitude of 1,215 feet at the northern edge of Section 22, belongs to one of the Freeport coal horizons.

ECONOMIC ASPECTS

The Lower Kittanning is the only coal bed occurring above drainage in Springfield and Beaver townships and the northern half of Green Township, Mahoning County, which is worthy of much consideration as a source of fuel. Although the bed generally averages little more than 30 inches in thickness, the coal is of good quality. The cannel variety, which on the whole constitutes a small percentage of the bed, is well adapted for use in gas producers and for domestic use in open fires. Average mining conditions prevail in the area and no unusual roof troubles are experienced. In Beaver Township, where sandstone is found immediately above the coal, prospective areas should be drilled in advance of underground workings to minimize losses from horsebacks.

The Middle Kittanning coal is generally too thin in Springfield, Beaver, and northern Green townships for economic utilization. In southern Green Township, where this bed has been mined for a number of years, the coal generally consists of a single block without persistent partings, having a maximum thickness of about 30 inches. The coal, however, is of excellent quality in this area.