STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

REPORT OF INVESTIGATIONS NO. 29

# COAL RESOURCES
# Of
# The Upper Part Of The
# ALLEGHENY FORMATION
# In Ohio

BY

RUSSELL A. BRANT

COLUMBUS
1956

STATE OF OHIO

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# ABSTRACT

Large quantities of coal are present in the upper part of the Allegheny formation. Original estimated reserves total 16,410,647,000 short tons. Production from the principal seam is as follows: Middle Kittanning 9,783,578,000 tons; Lower Freeport 2,446,278,000 tons; Upper Freeport 4,180,771,000 tons. A small amount of coal is present in the Strasburg coal bed, but its reserves are not estimated for this report. The coal deposits of the upper part of the Allegheny formation underlie about 9,000 square miles of Ohio. However, each of the coal beds underlies,or is known in, only a fraction of this area at thickness of 14 inches or more. The Middle Kittanning coal bed is the most widely distributed and is followed in importance by the Upper Freeport which is variable in its thickness. The Lower Freeport coal bed at minable thickness is defined principally in the northern coal producing counties of Ohio.

# CHAPTER 1

# INTRODUCTION

During the last several years considerable interest has developed in modern appraisal of our nation's coal reserves. The Ohio Geological Survey, during the past five years, has been accumulating and appraising the data for such estimates of coal for the State. Prior to this publication, three others have been released on the Meigs Creek, Lower Kittanning, Pittsburgh, and the Redstone coal in Ohio.

This report deals with the upper Allegheny formation coal beds and their characteristics. Reserves are reported on an estimated original basis, though in some areas the amount of mined-out coal can be determined within reasonable limits. Although it is not feasible to include or obtain detailed data for areas of mined-out coal for a study of this sort, it is believed that this report at least gives a starting basis for any who are interested in such an endeavor. The new appraisals for all coal beds completed thus far in the current series are as follows:

| Coal bed | Brant (1956) Present | Clark (1917) Previous | Ray (1929) Previous |
|---|---|---|---|
| Meigs Creek (No. 9) | 4,020,762,000 | 4,071,000,000 | 957,600,000 |
| Redstone (No. 8A) | 796,257,000 | 710,000,000 | 4,168,704,000 |
| Pittsburgh (No. 8) | 5,559,932,000 | 6,863,000,000 | |
| Upper Freeport (No. 7) | 4,180,771,000 | 16,732,000,000 | 803,712,000 |
| Lower Freeport (No. 6A) | 2,446,278,000 | 6,971,000,000 | -- |
| Middle Kittanning (No. 6) | 9,783,598,000 | 22,926,000,000 | 3,729,600,000 |
| Lower Kittanning (No. 5) | 9,913,989,000 | 14,674,000,000 | 439,296,000 |
| | 36,701,587,000 | 72,947,000,000 | 10,098,912,000 |

It may be seen then that present estimates are reduced about 50 percent from Clark's (1917) estimate and increased about 3.5 times that of Ray's (1929). The various estimates are based on different assumptions and are therefore not strictly comparable. Table 1, below, shows the reliability and thickness distribution of the estimated original reserves of the principal coal beds of the upper part of the Allegheny formation.

Table 1

Estimated Original Reserves of the Middle Kittanning and Lower and Upper Freeport Coal Beds in Ohio
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 14"- 28" | 28"-42" | 42"-54" | 54"-66" | 66"-78" | 78"-90" | 90"-102" | 102"-114" | Total |
| Middle Kittanning | | | | | | | | | |
| Proven | 193,014 | 710,170 | 885,662 | 460,653 | 99,842 | 90,166 | 123,674 | 209,786 | 2,772,967 |
| Probable | 877,049 | 2,177,906 | 829,685 | 208,204 | 199,619 | 53,512 | 49,797 | 20,139 | 4,415,911 |
| Stongly inferred | 722,215 | 880,557 | 203,184 | 1,363 | 6,474 | 2,385 | - | - | 1,816,178 |
| Weakly inferred | 328,338 | 406,996 | 43,208 | - | - | - | - | - | 778,542 |
| Total | 2,120,616 | 4,175,629 | 1,961,739 | 670,220 | 305,935 | 146,063 | 173,471 | 229,925 | 9,783,598 |
| Lower Freeport | | | | | | | | | |
| Proven | 69,355 | 87,067 | 156,113 | 160,783 | 38,233 | - | - | - | 511,551 |
| Probable | 167,746 | 255,994 | 459,528 | 65,029 | 34,076 | - | - | - | 982,373 |
| Strongly inferred | 77,841 | 143,982 | 463,117 | - | - | - | - | - | 684,940 |
| Weakly inferred | 36,039 | 60,131 | 171,244 | - | - | - | - | - | 267,414 |
| Total | 350,981 | 547,174 | 1,250,002 | 225,812 | 72,309 | - | - | - | 2,446,278 |
| Upper Freeport | | | | | | | | | |
| Proven | 154,510 | 413,125 | 418,685 | 188,612 | 57,519 | 3,181 | 545 | - | 1,236,177 |
| Probable | 439,757 | 982,127 | 512,228 | 475,364 | 26,852 | 1,113 | - | - | 2,437,441 |
| Strongly inferred | 139,205 | 255,100 | 26,625 | 22,035 | 545 | - | - | - | 443,510 |
| Weakly inferred | 24,947 | 38,696 | - | - | - | - | - | - | 63,643 |
| Total | 758,419 | 1,689,048 | 957,538 | 686,011 | 84,916 | 4,294 | 545 | - | 4,180,771 |

At the present it is estimated that about 1,914,037,206 (Ohio Department of Industrial Relations, 1956) tons of coal has been produced from Ohio. If this figure is doubled to make a very gross allowance of coal mined and lost in mining (4,000,000,000 tons) it can be seen in a general way that a substantial reserve remains in the state.

Although mined out areas are not shown, it is hoped that the maps, tables, and remarks in this report will be helpful to those whose interest is in the development of mines in the Ohio coal fields.

# PURPOSE

The purpose of this report is to present in concise form conclusions and results of the appraisal of the original coal reserves of the Middle Kittanning, Lower Freeport, and Upper Freeport coal beds.

Descriptions of the enclosing rocks and other associated minor coal beds are included for the purpose of showing the nature of correlation problems as well as the nature of floor and roof or overburden rocks. Because

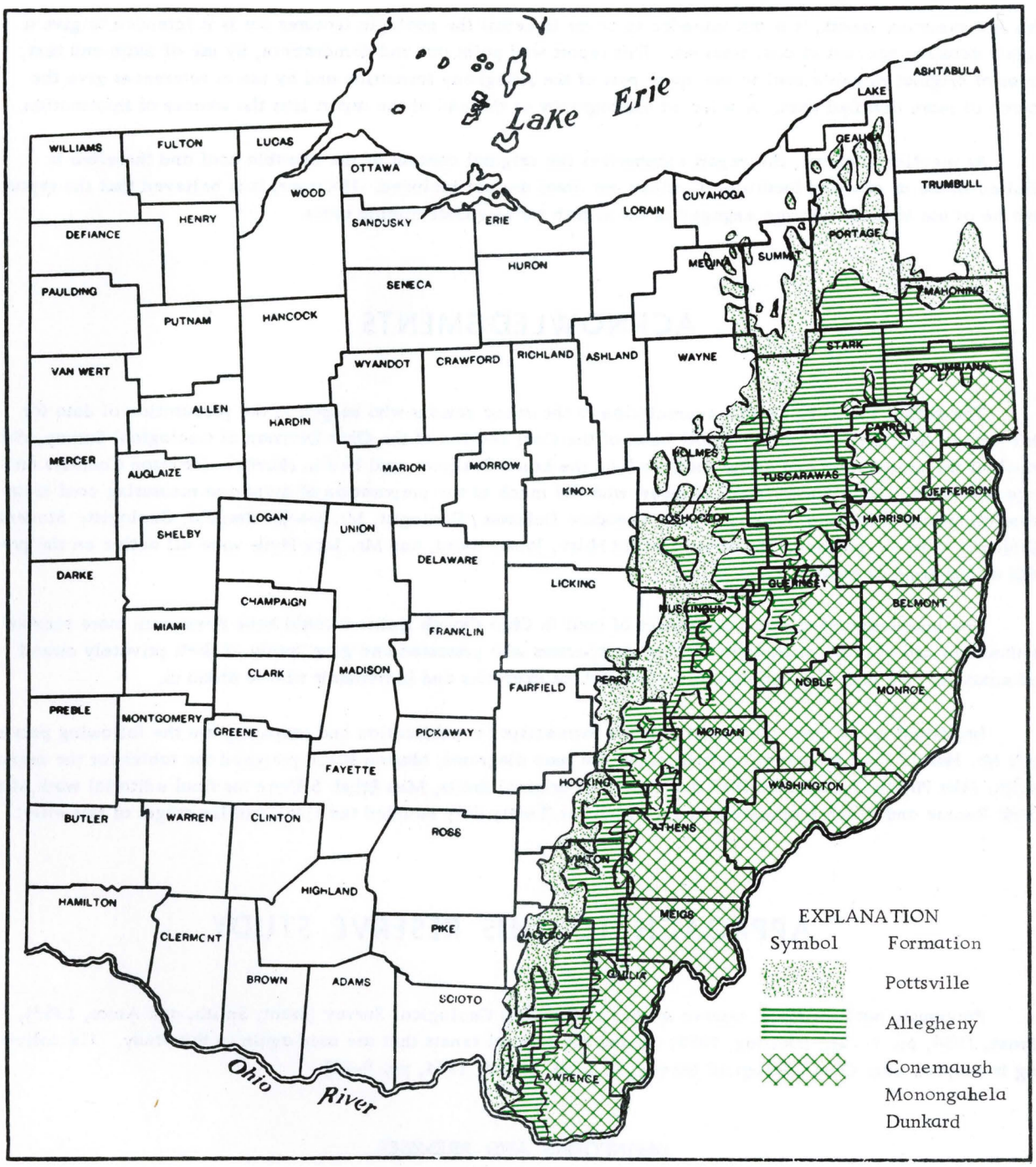



Figure 1. Generalized geologic map of Pennsylvanian formations in Ohio. The stippled area represents the Pottsville formation outcrop. The lined pattern represents the outcrop of the Allegheny formation in which is contained the Middle Kittanning, Lower and Upper Freeport coal beds of this report. The checkered pattern is the area of Conemaugh, Monongahela, Washington, and Greene formations which overlie the Allegheny rocks. The top of the Upper Freeport coal forms the contact between the Conemaugh and Allegheny formations.

this is a summary report, it is not intended to cover in detail the geologic features nor is it intended to give a highly detailed account of coal reserves. This report will point out and demonstrate, by use of maps and text, areas of original minable coal in the upper part of the Allegheny formation and by use of references give the source of more detailed data. A selected bibliography at the end of the report lists the sources of information.

As mentioned above, this report emphasizes the original content of the minable coal and therefore is limited in use as detailed locations of mined out areas are not included. However, it is believed that the report will be of use to those who are engaged in the search for new coal mining areas.

# ACKNOWLEDGMENTS

The author wishes to express appreciation to the many persons who helped in the preparation of data for this report. Mr. William Smith, former head of the Coal Section of the Ohio Division of Geological Survey, did much of the preparatory and correlation work on the Lower Freeport coal bed in Harrison-Jefferson Counties and adjacent areas. Other Survey staff members who did much of the preparation of maps and measuring coal areas were Mr. Richard DeLong, Geologist, Mr. Theodore DeBrosse, Geologist, Mr. Joseph Granchi, Geologist; Student-Geologic Aides - Lawrence Brondson, Donald Hilty, James Baird, and Mr. Jack Hyde were all active on the project at one time or another.

The knowledge of deeper occurrences of coal in Ohio though limited would have been even more tenuous without the aid of those mine operators and prospectors who possessed and gave freely of their privately owned information. We take this opportunity to thank those operators and individuals who so aided us.

Important to the final preparation of this manuscript for publication and preparing are the following personnel: Mr. Harold Flint prepared, for final copy, the map diagrams; Marian Klein prepared the tables for the manuscript; Miss Phyllis Tuck transcribed and typed the original drafts, Miss Ethel S.Dean for final editorial work,Misses Doris Runkle and Helen Markanton, and Mr.Fletcher Twitty ably handled the final printing stages of this effort.

# APPROACH TO THIS RESERVE STUDY

Previously published coal reserve studies of the Ohio Geological Survey (Brant, Smith, and Amos, 1953), (Brant, 1954, pp. 9-12), (DeLong, 1955) outline the general tenets that are used again in this study. The following is adapted from Ohio Geological Survey, R. I. 21 (Brant, 1954, pp. 9-12).

## DEFINITIONS AND PREMISES

Methods and definitions used in coal resources studies are rather well standardized among various states and with the U. S. Geological Survey and the U. S. Bureau of Mines. However, examination of the literature reveals that there are differences of opinion regarding the details of calculating and reporting reserves of coal. Divergence of definitions from those of U. S. Geological Survey is only in degree. Averitt (1949, pp. 224-228) considers all coal beyond two miles from established points as inferred. This report follows the Illinois procedure (Cady, 1952, pp. 14-20) and considers an additional category of reliability; beyond four miles from a point of measurement, the coal estimated is considered to be "weakly inferred" and that from two to four miles "strongly inferred." However, as will be seen, coal thicknesses of 14 - 28" are given consideration here as a future

reserve. It is probable that it will be many years until the circumstances dictate whether the very deep thicker coals will be mined before the shallower, thin ones.

## Thickness Categories

Thickness range categories used in estimating the original reserves in this publication are as follows: 14 to 28 inches, 28 to 42 inches, 42 to 54 inches, 54 to 66 inches, 66 to 78 inches, 78 to 90 inches, 90 to 102 inches, and 102 to 114 inches. In final reporting, all estimated original reserves greater than 66 inches thickness have been included in a 66-inch and greater category (See Tables 48 - 50). Individual county summaries, however, appropriately show estimates including the 102-to 114-inch thickness category.

## Reliability Categories

The reliability categories are used in connection with coal reserve estimates to show the relative certainty of the estimate within the area described. The various categories are based on the distance from a point of definitely known thickness of the coal bed. The farther away from the point of known thickness the less certain is the estimation of the quantity of coal.

Points of known thickness are the starting points of a series of concentric arcs spaced at one-half mile, 2 miles, and 4 miles. The terms that refer to the coal surrounded by the above arcs are proven, probable, strongly inferred. Weakly inferred coal lies in the area outside of 4 mile arc. All are based on the area of coal that is considered to have a thickness of 14" or greater (see Fig. 2). Specific definitions follow (see also Averitt 1949, pp. 225-226; Cady 1952, pp. 16-20).

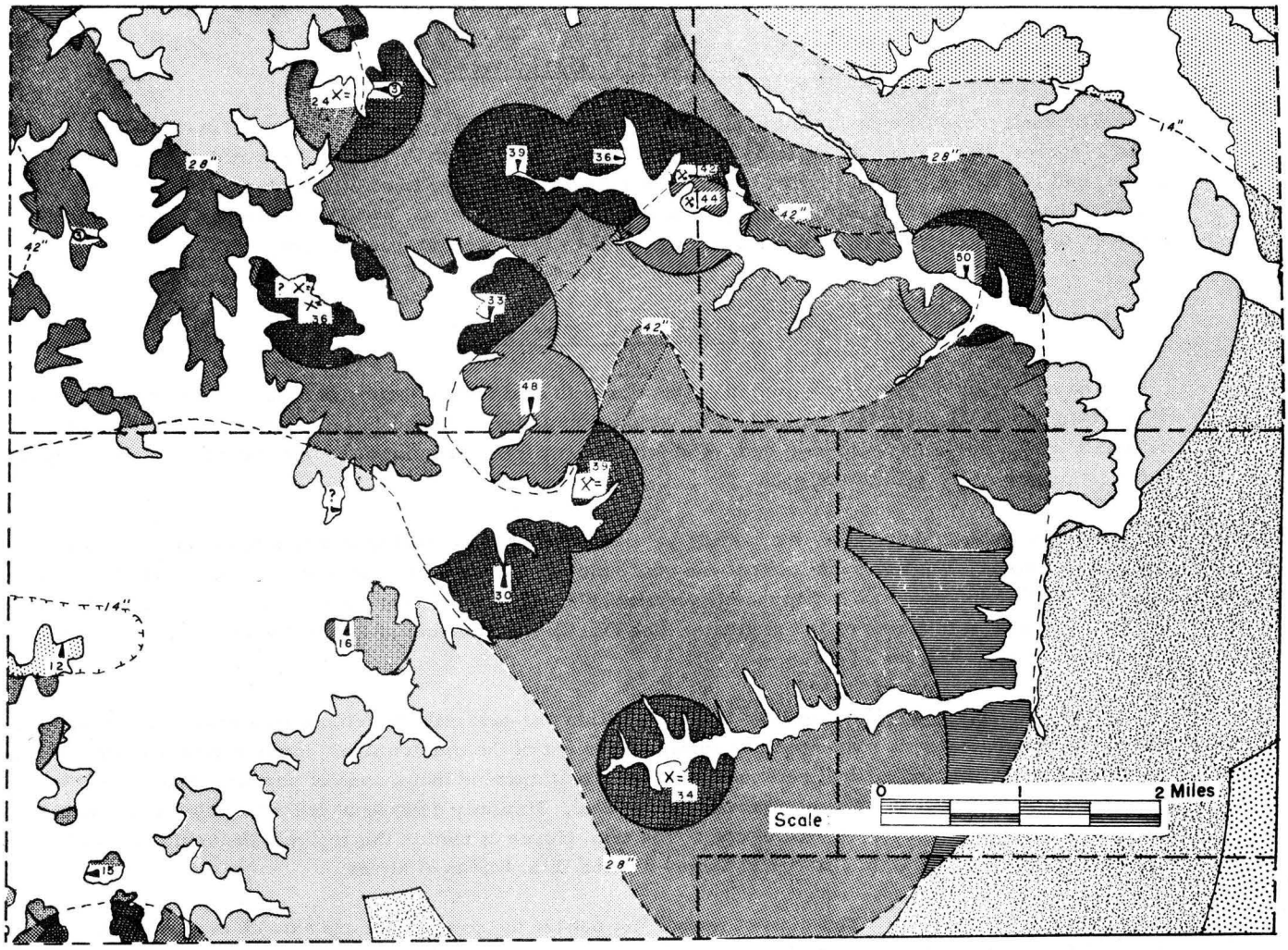
Proven Reserves. - Those reserves which lie within one-half mile of definite information are considered proved and the estimate is considered to be within 20 percent of the true tonnage. Points of definite information are from outcrops, mines, and drill core measurements. It is assumed that a zone of coal around any mine for a distance of one-half mile constitutes a proven area of coal. Similarly a circle of one-half mile radius around any core test constitutes a proven area of coal. The term proven as used in this report is the equivalent of the term "measured" of the U. S. Geological Survey and the U. S. Bureau of Mines.

Probable Reserves. - This class of reserve lies outside the proven area and extends to 2 miles from the point of definite information. Probable reserves occupy an area extending from one-half mile from the point of actual measurement to 2 miles from that point; hence it is one and one-half miles wide and extends beyond the boundary of proven coal. This term is equivalent to the term "indicated" as used by the U. S. Geological Survey and the U. S. Bureau of Mines.

Strongly Inferred Reserves. - Strongly inferred reserves are estimated in an area beyond the 2 mile limit of probable reserves and extend to 4 miles from the point of definitely established data. Coal within this definition lies in a band 2 miles wide extending beyond the probable coal area. The degree of certainty of actual tonnage in this area is naturally less than that of either the proven or probable categories. "Inferred reserves" used by U. S. Geological Survey and U. S. Bureau of Mines includes the strongly and weakly inferred categories of this report.

Weakly Inferred Reserves. - Coal estimated to lie beyond the 4 mile limit of strongly inferred reserves constitutes weakly inferred reserves. It rarely happens that sufficient data are available to insure adequate estimations, yet the general aspects of the geology may indicate that the coal is present at minable thickness. Therefore, because the reliability is diminished and the confidence placed in the results is lessened, a fourth category "weakly inferred reserves" is established.

## Figure 2. SAMPLE WORK MAP




This map is a copy of a portion of one of the work maps and includes a portion of Perry County (Resources Map, Area 16). The shading has been added to show how the various limits of reliability and thickness are made from the definitions that appear in this report and from the data that are available.

## OVERBURDEN

Overburden is material from the surface of the ground to the coal bed and is usually reported in steps of 1,000 feet, as 0 to 1,000 feet, 1,000 to 2,000 feet, and 2,000 to 3,000 feet, in regional resource studies. However, the estimated coal reserves of the upper Allegheny coal beds probably do not lie at a depth greater than 1,000 feet. Overburden figures are therefore not included in this report.

## METHODS USED IN MAKING THIS ESTIMATE

The preceding general ideas are embodied in the estimation of the Allegheny coal bed reserves. At the outset a series of work maps of $1^{\circ}$ longitude and a $1/2^{\circ}$ latitude were drawn from U. S. topographic maps at a scale of 1/62,500. On these maps were traced all of the political subdivision boundaries such as townships, counties, and the larger cities.

On the necessary base maps the outcrop was plotted and points of known coal occurrence were plotted with the appropriate symbol for mines, core holes, and outcrop. At that time the file number which is keyed to a stratigraphic file number, was written at the point of measurement. After all of the maps were completed with respect to outcrop and points of known data, thickness measurements of the coal were plotted at the proper points. Thickness lines were then drawn to form an isopachous map of the coal in accordance with the definitions above. Subsequent to drawing the thickness lines, reliability arcs were cast around each point of information and on completion of this step the map was ready for planimeter measurement of each individual area by thickness, reliability, township, and O'Neill area. Measurement data was listed on a form which indicated county, township, thickness, and reliability. This form was designed to be used as a key punch schedule for card programming of calculation by business machine methods. The results of the calculation were punched automatically onto the cards. These cards were then sorted in the desired arrangement (county, township, reliability, thickness) and placed in a tabulator which printed the calculations.

Advantages in the business machine technique are principally two fold; one is a considerable saving in time and another is elimination of human errors. The results of the calculations are incorporated in the various tables under the county headings and in the summary (Table 48 - 50) at the end of the text, opposite page 60. A state-wide summary of the estimated reserves of the upper Allegheny formations is given in Table 1.

# CHAPTER 2

# GENERAL GEOLOGY

The discussion which follows gives a brief outline of the geological aspects of the coal area described in this report. It is not intended to give a highly detailed account of the geology, but only a thumb-nail sketch in order to acquaint those new to the area with the general lay of the land as well as the nature of the general geologic features.

## PHYSIOGRAPHY

The Ohio coal field underlies a portion of the Appalachian Plateau (see Fig. 1), the dominant physiographic feature of eastern Ohio. An irregular line marking the western edge of the Appalachian Plateau may be traced northward from the Portsmouth area to northwest of Chillicothe thence to Newark and northward. In northeastern Ohio the plateau edge is the highland near the southern shore of Lake Erie (see map physical division of the United States by N. M. Fenneman).

The northern portion of the plateau is glaciated and the glacial deposits extend over a small part of the coal field considered in this report. On a map an east-west line slightly south of Canton approximately defines the glacial limits in northeastern Ohio. The northern bedrock surface has been modified by glaciation, and the present relief modified by deposition of till and outwash gravels so that the surface is much more subdued than in the unglaciated plateau to the south. In contrast to the more gently sloping hillsides in the northern part of the coal area, the southern hills stand in strong relief with steep valley walls. The local relief is somewhat greater to the south and east toward the Ohio River.

The physiographic history and present development of the land forms are of a certain amount of interest here. For in the northern glaciated reaches of the coal fields under discussion coal outcrops are rare because of burial by glacial debris and exploration is almost entirely done by use of drill hole information. In the southern area exposed outcrops are more common and a moderate amount of exploration can be done by a field examination of the rocks. Drilling to prove bodies of coal behind the outcrop and in the exploration of the deeper occurrence of coal is nevertheless necessary. More detailed description of the surface features of the coal field and adjacent areas may be found in Physiography of the United States (Fenneman, 1935, pp. 79-319).

## STRUCTURE

The rocks of the Ohio coal field lie in the northwest flank of the Appalachian coal basin. The regional dip is to the east and southeast at rates which normally range from 5 to 30 feet per mile but locally reach as much as 50 feet per mile. At places reversals of dip, minor faults, and other secondary structures are present. The most notable secondary regional structure that can be shown is the Cambridge anticline which appears to be related to the Burning Springs anticline of the Ohio-West Virginia border area and the complementary syncline

frequently known as the Lorain - Parkersburg syncline. These structures affect the attitude of the rocks and coal beds in the upper Allegheny formation.

## STRATIGRAPHY

The Pennsylvanian series is characterized by the occurrence of coal and was formerly referred to as coal measures. The area in Ohio underlain by strata of Pennsylvanian age is a part of the much larger Appalachian coal region which includes adjacent parts of Pennsylvania, West Virginia, and parts of other states to the south. The Pottsville and Allegheny formations include that which was formerly called "Lower Productive"; the Conemaugh, "Lower Barren"; the Monongahela, "Upper Productive"; and the Permian, "Upper Barrens." This terminology is not in vogue now but one will occasionally hear the term or find it in the older publications.

The Allegheny formation underlies approximately 9,000 square miles at an average thickness of 212 feet. In the Muskingum-Coshocton County area an aggregate thickness of about 170 feet is recorded for the formation (Stout, 1918, p. 124). The thickness of the formation in Vinton County (Stout 1927, p. 159) is about 235 feet. To the northeast in Columbiana County a thickness of about 270 feet is recorded by Stout and Lamborn (1924, p. 55). Graphic presentation of the average coal bed intervals and thickness of the Allegheny formation is shown in Figure 3.

The content of the Allegheny interval is characterized by an alternating series of sandstone, shale, limestone, and coal beds. These occur in repeated cyclical arrangement although the nature of the rock types observed in the coal-to-coal interval vary considerably. One coal-to-coal interval may represent a variety of rock types such as roof shales, marine limestone or shale, sandstone and non marine shale, and fresh water limestone, under clay and coal. In another cycle or at another place in the same cycle, the interval may consist of only one or two rock types such as shale or sandstone beds.

### Coal Beds of the Allegheny Formation

Important coal beds of the Allegheny formation include the Brookville, Clarion, Lower Kittanning, Middle Kittanning, Lower Freeport, Upper Freeport. Minor coal beds, some of which have been mined, have at least a small degree of economic importance, and include the Ogan, Winters, Scrub Grass, Lawrence, Strasburg, Upper Kittanning, and Bolivar coal beds.

In this report descriptions of those units overlying the Lower Kittanning coal bed and including the Upper Freeport coal bed are discussed. Of particular economic interest are: the Strasburg, the Middle Kittanning, Lower Freeport, and Upper Freeport coal beds.

### Lower Kittanning Coal to Middle Kittanning Coal Bed Interval

The rocks overlying the Lower Kittanning coal bed are usually composed of fine-grained materials: shale, siltstone, sometimes clay. The horizon or zone of the Strasburg coal is recognized rather widely although only in the Strasburg-Dover area does the bed exist at known minable thickness. Where the coal is not found, the top of the Oak Hill clay is commonly assigned the horizon of the coal. In the central to northern Ohio area between the Lower Kittanning coal bed and the Strasburg coal bed the principal rock is shale (the Hamden) containing siderite or limestone nodules and marine invertebrate fossils. However, this interval is variable in both thickness and in content. In places the entire interval is composed of massive shale containing siderite nodules. In other places the shale is rather highly carbonaceous, fissile, and contains a large percentage of siderite or hematite nodules. In the literature only that portion of the sequence which is very fossiliferous is considered a Hamden

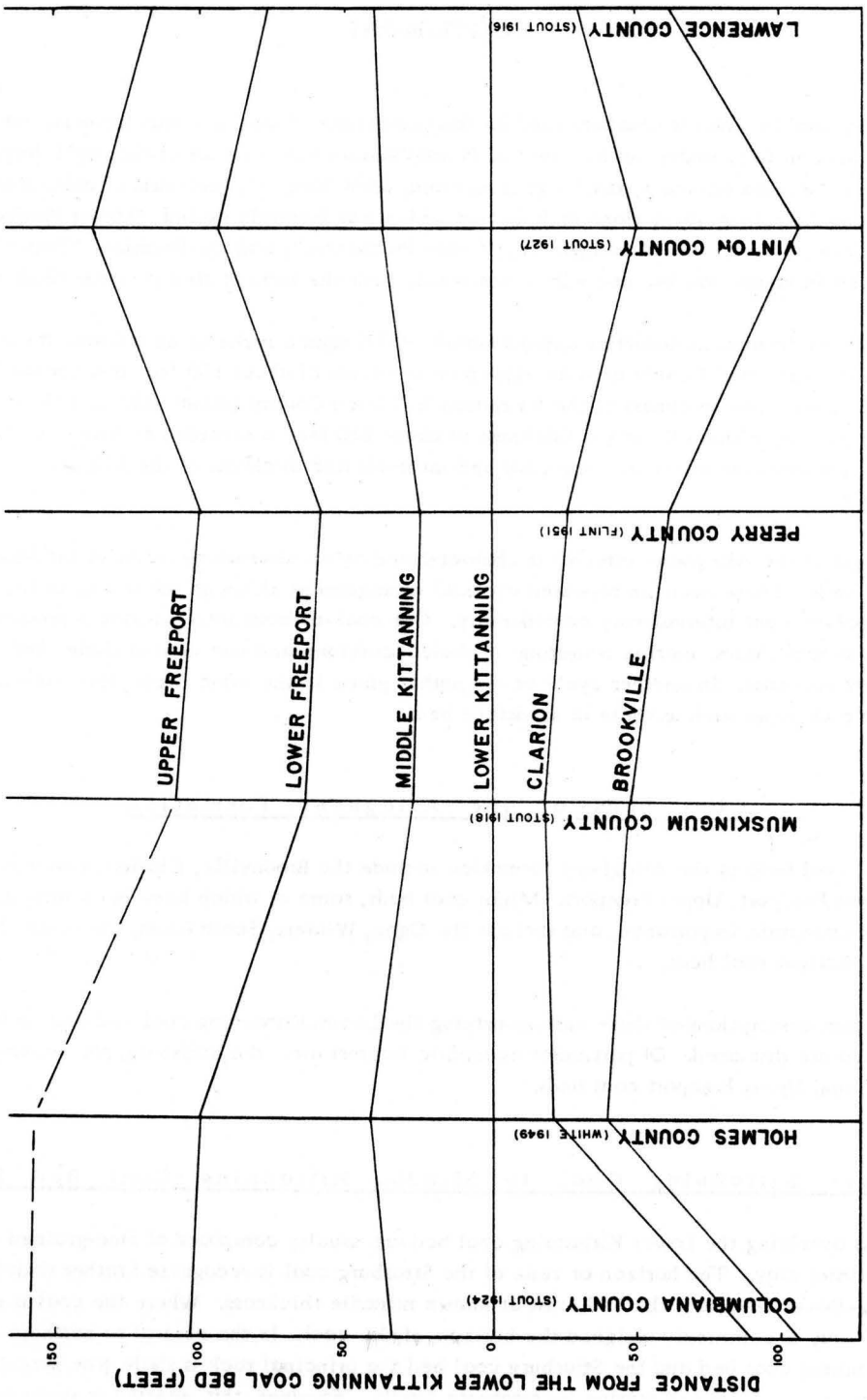



Figure 3. Allegheny formation showing intervals of principal coal beds.

member (see Stout and Lamborn, 1924, pp. 127-145). In some places such as Muskingum County the Hamden member is composed of limestone, "ironstone," and shale. (Stout, 1918, pp. 172-176.)

The interval in the central and northern area also occasionally contains sandstone but usually to a very minor extent. In the southern part of the state, Lawrence County in particular, the Hamden is not the recognizable unit that it is to the north. In Lawrence County a rider coal bed lying above the Lower Kittanning seam is known as the "Lost Seam." In southern Ohio the rocks overlying the Lower Kittanning coal bed commonly consist of massive sandstone and the interval between the Lower and Middle Kittanning coal beds is generally thinner than to the north.

The Oak Hill clay is named for its occurrence around the town of Oak Hill, Jackson County, Ohio. In northern Ohio this clay bed is associated with the Strasburg coal bed (White, 1949, p. 239), although the identity of the Oak Hill clay in this area is not certain (Stout, 1918, pp. 381-389, pp. 19, 27, 252).

The Strasburg coal bed occurs at known minable thickness only in parts of Tuscarawas County in the area around the town of Strasburg and adjacent Stark County and Mahoning County. This coal bed is commonly recognized as a horizon or smut streak on or in the Oak Hill clay bed, but it is very erratic and its identity is not certain in many of the measured sections in the southern part of the state.

The interval from the Lower Kittanning to the Middle Kittanning coal beds in northern Ohio seems to be generally tending to a predominance of fine-grained sediments or chemical sediments such as shales together with ore or limestone concretions. This is particularly exemplified in the Lower Kittanning to the Strasburg coal interval. Above the Strasburg coal, or its horizon, there appears to be a slight increase in coarse sediments, such as silt or sandstone. Sandstone, native to the Strasburg-Middle Kittanning interval, is particularly prominent in the Columbiana County area although it occurs sporadically throughout the outcrop region.

Above the Oak Hill clay in southern Ohio there is an occurrence of ironstone shale known as "red kidney ore" and the "black kidney ore" (Stout, 1916, p. 19, pp. 260-261). According to Stout and Lamborn in a later publication (1924, p. 146) these are probably correlative with the "shell ore" of Tuscarawas County. These ironstone concretionary beds are likely to be correlative with the Salem limestone which is developed in the vicinity of Salem in Columbiana County. The lithology and fossil content are indicative of the probably fresh water nature of the deposit. This horizon is usually not far below the Middle Kittanning coal. The Middle Kittanning clay is generally present and associated with the Middle Kittanning coal, but its thickness is variable as are its other qualities.

## Middle Kittanning Coal to Lower Freeport Coal Bed Interval

The Middle Kittanning coal bed is very persistent and widespread. The interval to the Lower Freeport coal contains sandstone, shale, limestone, and the Upper Kittanning coal bed. Overlying the Middle Kittanning coal is a black fissile fossiliferous marine shale known as the Washingtonville member. It is easily recognized in the northern half or more of the state and at least as far south as Muskingum County. To the south the rocks over the Middle Kittanning coal are more sandy and thick sandstone beds commonly overlie the coal; this sandstone is termed the Lower Freeport sandstone and is quarried in a number of places. Underlying the Lower Freeport clay the Lower Freeport limestone occurs sporadically. It is found in places in the northern part of the State (see Stout and Lamborn, 1924, pp. 190-196; Stout, 1918, pp. 210-211). This zone is marked in Perry County by a shale containing nodular limestone (Flint, 1951, p. 53). Stout (1927, pp. 335-337) also notes the occurrence of limestone and "ore" in Vinton County (pp. 334-337). In southernmost Ohio its manifestation is not apparent (Stout, 1916, p. 396) but this position is possibly marked by the "yellow kidney ore." The associated clay of the Lower Freeport coal is not widely developed or used.

## The Lower Freeport Coal to Upper Freeport Coal Bed Interval

The Lower Freeport coal of Ohio is of particular interest in the east. Although the horizon or zone of this coal is rather widely recognized, the principal development is found in Harrison and Jefferson Counties and areas adjacent thereto. In the subsurface there remains a degree of uncertainty in its correlation. In southern Ohio the Lower Freeport coal bed rarely occurs at minable thickness. In Muskingum County Stout (1918, p. 211) reports the bed to be thin and inconspicuous, and Flint (1951, p. 54) notes the upper part is composed of interbedded shale and coal substance and the lower part is usually too thin for mining in Perry County.

The interval between the Lower and Upper Freeport coal beds also contains the usually expected rock occurrences of shale or sandstone. The sandstone in northern Ohio appears to occur sporadically and frequently shares the interval with shale. Over this sandstone or shale unit the Bolivar clay occurs sporadically. In some areas limestone is present just beneath the clay. The interval from the Bolivar clay member to the Upper Freeport coal is usually short but may contain a variety of rock types. The principal occurrence is that of the Upper Freeport limestone and clay immediately below the Upper Freeport coal bed.

## The Upper Freeport Coal Bed

The Upper Freeport coal bed is widely distributed but its thickness is not regular. Overlying it is a succession of shale and sandstone beds of the Conemaugh formation. Figure 3 shows the thickness of the Allegheny formation and intervals of the coal beds from Lawrence County in the south to Mahoning County in the north.

# CHAPTER 3

# CHARACTERISTICS OF THE COAL

## RANK

Rank is a measure of the progressive change of coal material through the coalification agencies, namely compression and changes that go with compression. The principal changes are in heating values and carbon content. At various points of moist heating values or dry fixed-carbon content on the mineral-matter-free basis, limits may be set in the definition of the various ranks or stages of coalification. The definitions and qualities of coal to meet respective ranks are embodied in standards of the American Society for Testing Materials and designated as 388-38T Classification of Coal by Rank (A. S. T. M. 1938, see Table 2). This schedule is widely accepted and used in the rank classification of coal. It should be noted that "rank" has no specific connotation regarding commercial grading requirements or specifications of coal for industrial or commercial purposes (see Figure 4). Results of analyses of the samples of Ohio coal discussed in this report indicate that the Middle Kittanning and Lower and Upper Freeport coal beds range from high volatile "C" to high volatile bituminous "A" rank. This means the range in B. t. u. is from 11,000 to over 14,000 on the mineral-matter-free-moist basis and that on the fixed-carbon-content-dry-mineral-matter-free basis of those samples in the high volatile bituminous range is less than 69 percent.

### Middle Kittanning Coal

Samples from the Middle Kittanning coal bed are the most numerous and show a comparative wide range in rank. Of 113 samples, nine show less than 13,000 B. t. u. but exceed 11,000, hence are classified as high volatile bituminous C Rank; seventy-five (75) samples range from 13,000 to 14,000 B. t. u. and are classified as high volatile bituminous B rank; and the remaining twenty-eight (28) samples yield an excess of 14,000 B. t. u. with less than 69 percent fixed carbon and, therefore, are classified as high volatile bituminous A rank coal.

The principal location of samples of high volatile A rank (14,000 B. t. u. or more, 28 samples) is in the Jefferson, Columbiana, Carroll County area. Those possessing 13,000-14,000 B. t. u. are partly centered in the Athens County area (37 samples) and the rest are distributed throughout the field. The high volatile bituminous C rank analyses, 9 in number, are found grouped in the Hocking, Perry, and Vinton County area. The differences are probably significant, but until such time that more samples from the face of freshly exposed coal can be collected and assembled, it is not feasible to compile a map showing geographic changes in rank for coal.

### Lower Freeport Coal

The Lower Freeport coal analyses, 69 in number, show an interesting trend to high volatile bituminous A rank. Most of the analyses (15) are from Jefferson County. Three analyses which remain are all high volatile bituminous B rank coal (13,000 to 14,000 heating value per pound in all mineral-matter-free moist basis) and are from Columbiana, Athens, and Muskingum Counties.

Table 2

Classification of Coals by Rank[a]
(A.S.T.M., D388-38, 1939)

Legend: F.C. Fixed Carbon V.M. Volatile Matter B.t.u. British thermal units

| Class | Group | Limits of Fixed Carbon or B. t. u. Mineral-Matter-Free Basis | Requisite Physical Properties |
|---|---|---|---|
| I. Anthracitic | 1. Meta-anthracite..... | Dry F.C., 98 percent or more (Dry V.M., 2 percent or less) | |
| | 2. Anthracite..... | Dry F.C., 92 percent or more and less than 98 percent (Dry V.M., 8 percent or less and more than 2 percent) | |
| | 3. Semianthracite..... | Dry F.C., 86 percent or more and less than 92 percent (Dry V.M., 14 percent or less and more than 8 percent) | Nonagglomerating[b] |
| II. Bituminous[d] | 1. Low volatile bituminous coal ..... | Dry F.C., 78 percent or more and less than 86 percent (Dry V.M., 22 percent or less and more than 14 percent) | |
| | 2. Medium volatile bituminous coal ..... | Dry F.C., 69 percent or more and less than 78 percent (Dry V.M., 31 percent or less and more than 22 percent) | |
| | 3. High volatile A bituminous coal ..... | Dry F.C., less than 69 percent (Dry V.M., more than 31 percent); and moist[c] B.t.u., 14,000[e] or more | |
| | 4. High volatile B bituminous coal ..... | Moist[c] B.t.u., 13,000 or more and less than 14,000[e] | |
| | 5. High volatile C bituminous coal..... | Moist B.t.u., 11,000 or more and less than 13,000[e] | Either agglomerating or nonweathering[f] |
| III. Subbituminous | 1. Subbituminous A coal. | Moist B.t.u., 11,000 or more and less than 13,000[e] | Both weathering and nonagglomerating |
| | 2. Subbituminous B coal. | Moist B.t.u., 9,500 or more and less than 11,000[e] | |
| | 3. Subbituminous C coal. | Moist B.t.u., 8,300 or more and less than 9,500[e] | |
| IV. Lignitic | 1. Lignite ..... | Moist B.t.u., less than 8,300 | Consolidated |
| | 2. Brown coal..... | Moist B.t.u., less than 8,300 | Unconsolidated |

a - This classification does not include a few coals which have unusual physical and chemical properties and which come within the limits of fixed carbon or B.t.u. of the high-volatile bituminous and subbituminous ranks. All of these coals either contain less than 48 percent dry, mineral-matter-free fixed carbon or have more than 15,500 moist, mineral-matter-free B.t.u.

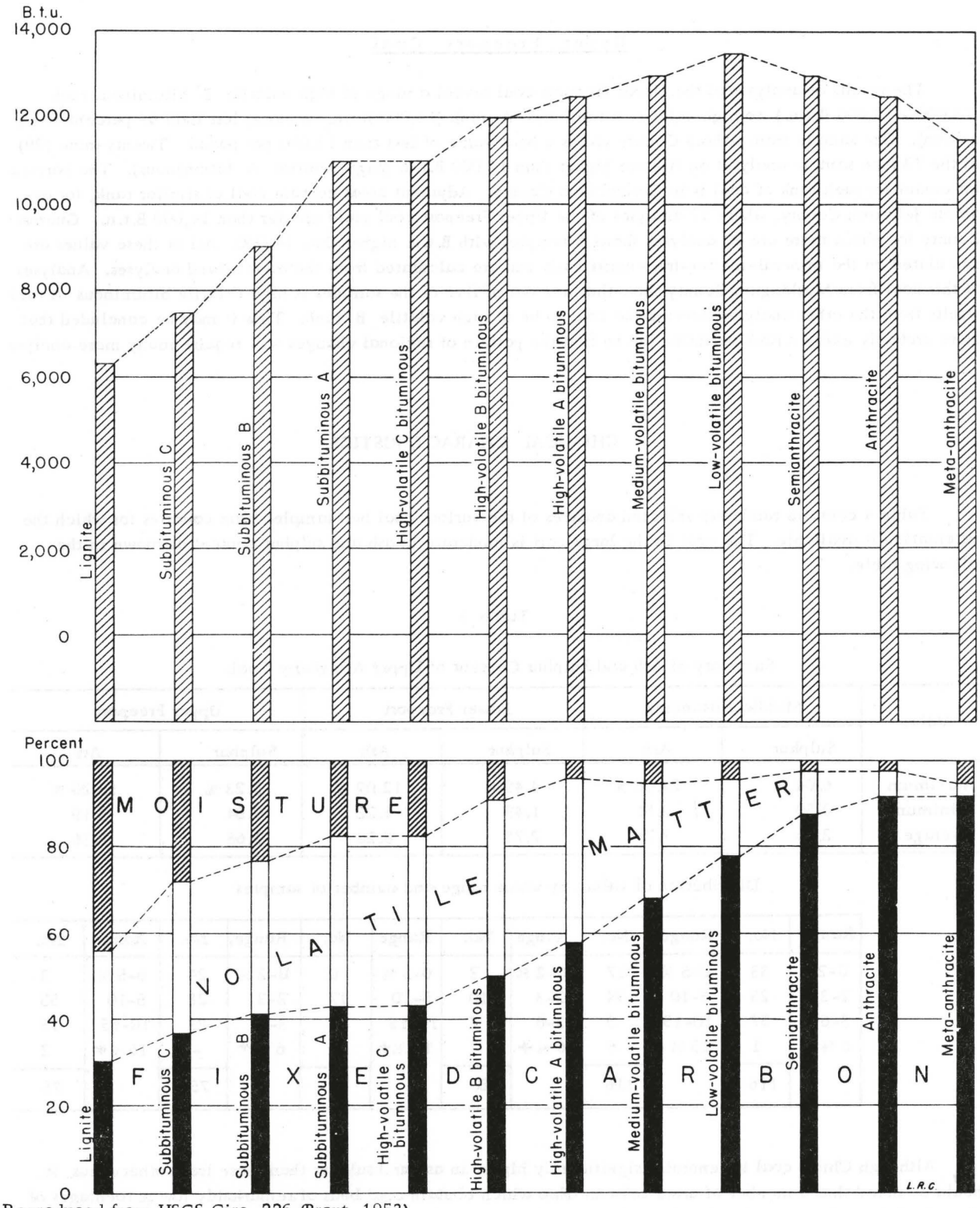
b - If agglomerating, classify in low-volatile group of the bituminous class.

c - Moist B.t.u. refers to coal containing its natural bed moisture but not including visible water on the surface of the coal.

d - It is recognized that there may be noncaking varieties in each group of the bituminous class.

e - Coals having 69 percent or more fixed carbon on the dry, mineral-matter-free basis shall be classified according to fixed carbon, regardless of B.t.u.

f - There are three varieties of coal in the high-volatile C bituminous coal group, namely, Variety 1, agglomerating and nonweathering; Variety 2, agglomerating and weathering; Variety 3, nonagglomerating and nonweathering.




Reproduced from USGS Circ. 226 (Brant, 1953)

Figure 4. Heat value of coal of different ranks compared to proximate analyses. Upper diagram: comparative heat value of typical samples of the several ranks of coal, computed on samples as received, on the ash-free basis. Lower diagram: variation in the fixed carbon, volatile matter, and moisture of samples used in upper diagram, computed on samples as received, on the ash-free basis.

## Upper Freeport Coal

The results of analyses of the Upper Freeport coal reveal a range of high volatile B bituminous rank (13,000 - 14,000 B.t.u.) to high volatile bituminous A rank (14,000 B.t.u. or more, less than 69 percent fixed carbon). One sample from Athens County yields a heat value of less than 13,000 per pound. Twenty-nine (29) of the 73 face sample analyses on file are higher than 14,000 B.t.u. (high volatile A bituminous). The particular center for such rank of coal is in Columbiana County. Adjacent areas contain coal of similar rank, for example Jefferson County, where 12 analyses of the Upper Freeport coal yield greater than 14,000 B.t.u.. Guernsey County for which there are 20 analyses shows 6 samples with B.t.u. higher than 14,000. All of these values are calculated on the mineral-matter-free-moist basis and are calculated from the as-received analyses. Analyses of this coal from Muskingum County show that one out of five of the samples is high volatile bituminous A rank, results from the other analyses showing the coal to be of high volatile B rank. Thus it may be concluded that there probably exists a rank variation but to find the pattern of regional changes will require many more analyses.

## CHEMICAL CHARACTERISTICS

Table 4 contains randomly selected analyses of the various coal bed samples from counties for which the information is available. The coal in the large part is moderate in ash and sulphur content as shown in the following table.

Table 3

Summary of Ash and Sulphur Content of Upper Allegheny Coals

| Value | Middle Kittanning | | Lower Freeport | | Upper Freeport | |
|---|---|---|---|---|---|---|
| | Sulphur | Ash | Sulphur | Ash | Sulphur | Ash |
| Maximum | 6.04 % | 24.06 % | 4.49 % | 12.09 % | 5.23 % | 19.20 % |
| Minimum | 0.50 | 3.51 | 1.49 | 6.22 | 0.84 | 3.19 |
| Average | 2.86 | 7.76 | 2.78 | 8.28 | 2.68 | 8.36 |

Distribution of values by value range and number of samples

| Range | No. | Range | No. | Range | No. | Range | No. | Range | No. | Range | No. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-2% | 33 | 0-5 % | 17 | 0-2 % | 3 | 0-5 % | 0 | 0-2 % | 24 | 0-5 % | 3 |
| 2-3 | 25 | 5-10 | 84 | 2-3 | 10 | 5-10 | 17 | 2-3 | 28 | 5-10 | 55 |
| 3-6 | 57 | 10-15 | 9 | 3-6 | 7 | 10-15 | 3 | 3-6 | 23 | 10-15 | 15 |
| 6 % + | 1 | 15 % + | 6 | 6 % + | - | 15 % + | - | 6 % + | - | 15 % + | 2 |
| | 116 | | 116 | | 20 | | 20 | | 75 | | 75 |

Although Ohio's coal is generally significantly higher in ash and sulphur than those from other areas, it should be noted that a number of areas exist in Ohio which contain coal beds of remarkably low percentages of ash and sulphur. For example of 115 samples from the Middle Kittanning coal bed 24 contain sulphur values of less than 2 percent. Most of these were from the Hocking Valley field where there may yet be sizable areas of unmined coal. Such coal which may meet requirements of coking certainly should be investigated in detail.

Coal from the Middle Kittanning bed has been coked in the past and according to Stout and Lamborn (1924, pp. 168, 171, 175) although the yield of coke from the Middle Kittanning coal bed is apparently small

TABLE 4

SELECTED ANALYSES OF THE UPPER ALLEGHENY COAL BEDS

| County and Township | O.G.S. File No.[1] | Source[2] | Year | Condition[3] | Proximate Analysis | | | | Ultimate Analysis | | | | | Heat Value | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Moisture | Volatile Matter | Fixed Carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Calories | B.t.u. |
| **Upper Freeport (No. 7) Coal** | | | | | | | | | | | | | | | |
| Athens<br>Dover | 492 | OGS | 1930 | 1 | 6.97 | 39.58 | 47.35 | 6.10 | - | - | - | - | 2.78 | 6,936 | 12,485 |
| | | | | 2 | - | 42.54 | 50.90 | 6.56 | - | - | - | - | 2.99 | 7,458 | 13,425 |
| | | | | 3 | - | 45.53 | 54.47 | - | - | - | - | - | 3,20 | 7,982 | 14,368 |
| | | | | 4 | - | 44.72 | 55.28 | - | - | - | - | - | - | 8,081 | 14,545 |
| | | | | 5 | 7.59 | 41.33 | 51.08 | - | - | - | - | - | - | 7,465 | 13,437 |
| Columbiana<br>Madison | 344 | OGS | 1921 | 1 | 2.45 | 36.97 | 49.95 | 10.63 | 5.07 | 69.39 | 1.21 | 9.90 | 3.80 | 7,152 | 12,874 |
| | | | | 2 | - | 37.89 | 51.22 | 10.89 | 4.92 | 71.12 | 1.24 | 7.94 | 3.89 | 7,331 | 13,196 |
| | | | | 3 | - | 42.52 | 57.48 | - | 5.52 | 79.81 | 1.39 | 8.91 | 4.37 | 8,227 | 14,809 |
| | | | | 4 | - | 41.19 | 58.81 | - | - | - | - | - | - | 8,389 | 15,101 |
| | | | | 5 | 2.83 | 40.04 | 57.13 | - | - | - | - | - | - | 8,153 | 14,676 |
| Columbiana<br>West | 341 | OGS | 1921 | 1 | 7.18 | 34.96 | 48.91 | 8.95 | 5.15 | 66.72 | 1.25 | 15.41 | 2.52 | 6,705 | 12,069 |
| | | | | 2 | - | 37.66 | 52.69 | 9.65 | 4.69 | 71.88 | 1.34 | 9.72 | 2.72 | 7,224 | 13,003 |
| | | | | 3 | - | 41.68 | 58.32 | - | 5.19 | 79.56 | 1.48 | 10.76 | 3.01 | 7,996 | 14,392 |
| | | | | 4 | - | 40.64 | 59.36 | - | - | - | - | - | - | 8,116 | 14,608 |
| | | | | 5 | 8.07 | 37.37 | 54.56 | - | - | - | - | - | - | 7,459 | 13,427 |
| Gallia<br>Walnut | 339 | OGS | 1902 | 1 | 7.62 | 32.85 | 47.14 | 12.39 | 5.19 | 63.48 | 1.28 | 15.85 | 1.81 | 6,371 | 11,468 |
| | | | | 2 | - | 35.56 | 51.03 | 13.41 | 4.70 | 68.71 | 1.39 | 9.83 | 1.96 | 6,896 | 12,413 |
| | | | | 3 | - | 41.07 | 58.93 | - | 5.43 | 79.35 | 1.61 | 11.35 | 2.26 | 7,964 | 14,335 |
| | | | | 4 | - | 39.91 | 60.09 | - | - | - | - | - | - | 8,102 | 14,584 |
| | | | | 5 | 8.90 | 36.36 | 54.74 | - | - | - | - | - | - | 7,382 | 13,288 |
| Guernsey<br>Center | 337 | OGS | 1925 | 1 | 6.47 | 35.90 | 51.85 | 5.78 | 5.41 | 72.59 | 1.41 | 13.68 | 1.13 | 7,076 | 12,736 |
| | | | | 2 | - | 38.38 | 55.44 | 6.18 | 5.01 | 77.61 | 1.51 | 8.48 | 1.21 | 7,565 | 13,617 |
| | | | | 3 | - | 40.91 | 59.09 | - | 5.34 | 82.72 | 1.61 | 9.04 | 1.29 | 8,063 | 14,514 |
| | | | | 4 | - | 40.36 | 59.64 | - | - | - | - | - | - | 8,128 | 14,630 |
| | | | | 5 | 6.95 | 37.56 | 55.49 | - | - | - | - | - | - | 7,563 | 13,614 |
| Guernsey<br>Richland | 338 | OGS | 1925 | 1 | 4.98 | 36.42 | 51.36 | 7.24 | 5.27 | 71.99 | 1.43 | 12.69 | 1.38 | 7,094 | 12,769 |
| | | | | 2 | - | 38.33 | 54.05 | 7.62 | 4.97 | 75.76 | 1.50 | 8.70 | 1.45 | 7,466 | 13,438 |
| | | | | 3 | - | 41.49 | 58.51 | - | 5.38 | 82.01 | 1.62 | 9.42 | 1.57 | 8,082 | 14,546 |
| | | | | 4 | - | 40.83 | 59.17 | - | - | - | - | - | - | 8,162 | 14,692 |
| | | | | 5 | 5.45 | 38.60 | 55.95 | - | - | - | - | - | - | 7,718 | 13,892 |
| Harrison<br>Freeport | 333-A | OGS | 1926 | 1 | 6.17 | 38.18 | 47.72 | 7.93 | 5.28 | 69.51 | 1.41 | 12.25 | 3.62 | 7,002 | 12,604 |
| | | | | 2 | - | 40.69 | 50.86 | 8.45 | 4.89 | 74.08 | 1.50 | 7.22 | 3.86 | 7,462 | 13,432 |
| | | | | 3 | - | 44.45 | 55.55 | - | 5.34 | 80.91 | 1.64 | 7.89 | 4.22 | 8,151 | 14,672 |
| | | | | 4 | - | 43.35 | 56.65 | - | - | - | - | - | - | 8,287 | 14,917 |
| | | | | 5 | 6.90 | 40.36 | 52.74 | - | - | - | - | - | - | 7,716 | 13,889 |
| Harrison<br>Freeport | 333-B | OGS | 1924 | 1 | 6.10 | 35.90 | 50.10 | 7.90 | 5.40 | 70.30 | 1.40 | 12.10 | 2.90 | 6,983 | 12,570 |
| | | | | 2 | - | 38.20 | 53.40 | 8.40 | 5.00 | 74.90 | 1.50 | 7.10 | 3.10 | 7,439 | 13,390 |
| | | | | 3 | - | 41.70 | 58.30 | - | 5.50 | 81.80 | 1.60 | 7.70 | 3.40 | 8,122 | 14,620 |
| | | | | 4 | - | 40.70 | 59.30 | - | - | - | - | - | - | 8,241 | 14,834 |
| | | | | 5 | 6.80 | 37.90 | 55.30 | - | - | - | - | - | - | 7,681 | 13,825 |
| Jefferson<br>Saline | 138-B | USBM[4] | 1916 | 1 | 3.43 | 36.26 | 49.57 | 10.74 | 5.15 | 69.66 | 1.37 | 8.03 | 5.05 | 7,068 | 12,722 |
| | | | | 2 | - | 37.55 | 51.33 | 11.12 | 4.94 | 72.13 | 1.42 | 5.16 | 5.23 | 7,319 | 13,174 |
| | | | | 3 | - | 42.25 | 57.75 | - | 5.56 | 81.15 | 1.60 | 5.81 | 5.88 | 8,235 | 14,822 |
| | | | | 4 | - | 40.61 | 59.39 | - | - | - | - | - | - | 8,428 | 15,171 |
| | | | | 5 | 4.01 | 38.98 | 57.01 | - | - | - | - | - | - | 8,091 | 14,563 |
| Lawrence<br>Aid | 329 | OGS | 1902 | 1 | 8.45 | 31.25 | 49.02 | 11.28 | 5.10 | 65.20 | 1.28 | 16.21 | 0.93 | 6,405 | 11,529 |
| | | | | 2 | - | 34.13 | 53.55 | 12.32 | 4.54 | 71.22 | 1.40 | 9.50 | 1.02 | 6,996 | 12,593 |
| | | | | 3 | - | 38.93 | 61.07 | - | 5.18 | 81.23 | 1.60 | 10.83 | 1.16 | 7,979 | 14,362 |
| | | | | 4 | - | 38.01 | 61.99 | - | - | - | - | - | - | 8,089 | 14,561 |
| | | | | 5 | 9.68 | 34.33 | 55.99 | - | - | - | - | - | - | 7,307 | 13,152 |
| Lawrence<br>Aid | 331 | OGS | 1901 | 1 | 7.85 | 32.90 | 47.07 | 12.18 | 5.09 | 63.03 | 1.25 | 15.79 | 2.66 | 6,305 | 11,349 |
| | | | | 2 | - | 35.70 | 51.08 | 13.22 | 4.58 | 68.40 | 1.35 | 9.56 | 2.89 | 6,842 | 12,316 |
| | | | | 3 | - | 41.14 | 58.86 | - | 5.28 | 78.81 | 1.56 | 11.02 | 3.33 | 7,884 | 14,192 |
| | | | | 4 | - | 39.80 | 60.20 | - | - | - | - | - | - | 8,037 | 14,467 |
| | | | | 5 | 9.19 | 36.15 | 54.66 | - | - | - | - | - | - | 7,298 | 13,136 |
| Muskingum<br>Perry | 321 | OGS | 1917 | 1 | 9.28 | 38.90 | 43.63 | 8.19 | 5.60 | 65.71 | 0.97 | 15.91 | 3.62 | 6,584 | 11,851 |
| | | | | 2 | - | 42.88 | 48.09 | 9.03 | 5.04 | 72.43 | 1.07 | 8.44 | 3.99 | 7,257 | 13,063 |
| | | | | 3 | - | 47.14 | 52.86 | - | 5.54 | 79.61 | 1.18 | 9.28 | 4.39 | 7,977 | 14,360 |
| | | | | 4 | - | 46.06 | 53.94 | - | - | - | - | - | - | 8,116 | 14,609 |
| | | | | 5 | 10.41 | 41.27 | 48.32 | - | - | - | - | - | - | 7,271 | 13,088 |
| Muskingum<br>Brush Creek | 324 | OGS | 1922 | 1 | 4.72 | 43.47 | 44.25 | 7.56 | 5.55 | 68.27 | 1.32 | 12.30 | 5.00 | 7,046 | 12,683 |
| | | | | 2 | - | 45.62 | 46.45 | 7.93 | 5.28 | 71.65 | 1.38 | 8.51 | 5.25 | 7,395 | 13,311 |
| | | | | 3 | - | 49.55 | 50.45 | - | 5.73 | 77.83 | 1.50 | 9.24 | 5.70 | 8,032 | 14,457 |
| | | | | 4 | - | 48.43 | 51.57 | - | - | - | - | - | - | 8,187 | 14,736 |
| | | | | 5 | 5.30 | 45.87 | 48.83 | - | - | - | - | - | - | 7,753 | 13,956 |
| Noble<br>Noble | 166-H | USBM[5] | 1913 | 1 | 5.15 | 37.34 | 49.00 | 8.51 | 5.42 | 70.51 | 1.50 | 11.12 | 2.94 | 7,074 | 12,733 |
| | | | | 2 | - | 39.37 | 51.66 | 8.97 | 5.12 | 74.34 | 1.58 | 6.89 | 3.10 | 7,459 | 13,426 |
| | | | | 3 | - | 43.25 | 56.75 | - | 5.62 | 81.66 | 1.74 | 7.57 | 3.41 | 8,194 | 14,749 |
| | | | | 4 | - | 42.22 | 57.78 | - | - | - | - | - | - | 8,321 | 14,977 |
| | | | | 5 | 5.77 | 39.79 | 54.44 | - | - | - | - | - | - | 7,839 | 14,111 |
| Perry<br>Monroe | 490 | OGS | 1930 | 1 | 5.42 | 41.74 | 46.79 | 6.05 | - | - | - | - | 2.70 | 6,971 | 12,547 |
| | | | | 2 | - | 44.13 | 49.48 | 6.39 | - | - | - | - | 2.85 | 7,368 | 13,263 |
| | | | | 3 | - | 47.14 | 52.86 | - | - | - | - | - | 3.04 | 7,871 | 14,168 |
| | | | | 4 | - | 46.41 | 53.59 | - | - | - | - | - | - | 7,963 | 14,334 |
| | | | | 5 | 5.89 | 43.68 | 50.43 | - | - | - | - | - | - | 7,497 | 13,494 |
| Tuscarawas<br>Mill | 318 | OGS | 1925 | 1 | 6.32 | 37.66 | 49.48 | 6.54 | 5.26 | 70.78 | 1.43 | 13.08 | 2.91 | 6,985 | 12,573 |
| | | | | 2 | - | 40.20 | 52.82 | 6.98 | 4.87 | 75.56 | 1.53 | 7.95 | 3.11 | 7,456 | 13,421 |
| | | | | 3 | - | 43.22 | 56.78 | - | 5.24 | 81.23 | 1.64 | 8.55 | 3.34 | 8,015 | 14,428 |
| | | | | 4 | - | 42.31 | 57.69 | - | - | - | - | - | - | 8,121 | 14,617 |
| | | | | 5 | 6.92 | 39.38 | 53.70 | - | - | - | - | - | - | 7,559 | 13,606 |
| **Lower Freeport (No. 6A) Coal** | | | | | | | | | | | | | | | |
| Columbiana<br>St. Clair | 129 | USBM[6] | 1916 | 1 | 3.58 | 38.47 | 47.48 | 10.47 | 5.39 | 70.04 | 1.56 | 8.05 | 4.49 | 7,138 | 12,848 |
| | | | | 2 | - | 39.90 | 49.24 | 10.86 | 5.18 | 72.64 | 1.62 | 5.04 | 4.66 | 7,403 | 13,325 |
| | | | | 3 | - | 44.76 | 55.24 | - | 5.81 | 81.49 | 1.82 | 5.65 | 5.23 | 8,305 | 14,948 |
| | | | | 4 | - | 43.36 | 56.64 | - | - | - | - | - | - | 8,486 | 15,275 |
| | | | | 5 | 4.15 | 41.56 | 54.29 | - | - | - | - | - | - | 8,134 | 14,641 |

TABLE 4 (Continued)

SELECTED ANALYSES OF THE UPPER ALLEGHENY COAL BEDS

| County and Township | O.G.S. File No. | Source | Year | Condition | Proximate Analysis | | | | Ultimate Analysis | | | | | Heat Value | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Moisture | Volatile Matter | Fixed Carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Calories | B.t.u. |
| **Lower Freeport (No. 6A) Coal (continued)** | | | | | | | | | | | | | | | |
| Columbiana Yellow Creek | 130 | USBM[7] | 1917 | 1 | 5.94 | 32.73 | 49.81 | 11.52 | 5.28 | 68.30 | 1.35 | 12.06 | 1.49 | 6,726 | 12,107 |
| | | | | 2 | - | 34.80 | 52.95 | 12.25 | 4.91 | 72.62 | 1.44 | 7.20 | 1.58 | 7,151 | 12,872 |
| | | | | 3 | - | 39.66 | 60.34 | - | 5.60 | 82.75 | 1.64 | 8.21 | 1.80 | 8,149 | 14,669 |
| | | | | 4 | - | 38.64 | 61.36 | - | - | - | - | - | - | 8,274 | 14,893 |
| | | | | 5 | 6.85 | 35.98 | 57.17 | - | - | - | - | - | - | 7,707 | 13,872 |
| Jefferson Island Creek | 349 | OGS | 1926 | 1 | 3.10 | 38.06 | 48.91 | 9.93 | 5.14 | 70.53 | 1.10 | 9.70 | 3.60 | 7,222 | 12,999 |
| | | | | 2 | - | 39.28 | 50.47 | 10.25 | 4.96 | 72.79 | 1.14 | 7.15 | 3.71 | 7,453 | 13,415 |
| | | | | 3 | - | 43.77 | 56.23 | - | 5.53 | 81.10 | 1.27 | 7.97 | 4.13 | 8,304 | 14,947 |
| | | | | 4 | - | 42.56 | 57.44 | - | - | - | - | - | - | 8,459 | 15,226 |
| | | | | 5 | 3.55 | 41.04 | 55.41 | - | - | - | - | - | - | 8,158 | 14,685 |
| Jefferson Saline | 131 | USBM[8] | 1912 | 1 | 4.26 | 35.55 | 48.10 | 12.09 | - | - | - | - | 2.36 | 6,941 | 12,494 |
| | | | | 2 | - | 37.13 | 50.24 | 12.63 | - | - | - | - | 2.46 | 7,250 | 13,050 |
| | | | | 3 | - | 42.50 | 57.50 | - | - | - | - | - | 2.82 | 8,298 | 14,936 |
| | | | | 4 | - | 41.33 | 58.67 | - | - | - | - | - | - | 8,448 | 15,207 |
| | | | | 5 | 4.97 | 39.28 | 55.75 | - | - | - | - | - | - | 8,028 | 14,450 |
| Jefferson Springfield | 196-A | USBM[9] | 1912 | 1 | 3.47 | 38.61 | 49.66 | 8.26 | - | - | - | - | 2.40 | 7,346 | 13,223 |
| | | | | 2 | - | 40.00 | 51.44 | 8.56 | - | - | - | - | 2.49 | 7,610 | 13,698 |
| | | | | 3 | - | 43.74 | 56.26 | - | - | - | - | - | 2.72 | 8,322 | 14,980 |
| | | | | 4 | - | 42.87 | 57.13 | - | - | - | - | - | - | 8,436 | 15,185 |
| | | | | 5 | 3.87 | 41.21 | 54.92 | - | - | - | - | - | - | 8,110 | 14,598 |
| **Middle Kittanning (No. 6) Coal** | | | | | | | | | | | | | | | |
| Athens Canaan | 297 | OGS | 1907 | 1 | 6.36 | 34.19 | 50.96 | 8.49 | 5.40 | 69.25 | 1.43 | 14.92 | 0.51 | 6,919 | 12,454 |
| | | | | 2 | - | 36.51 | 54.42 | 9.07 | 5.01 | 73.95 | 1.53 | 9.90 | 0.54 | 7,389 | 13,300 |
| | | | | 3 | - | 40.15 | 59.85 | - | 5.51 | 81.33 | 1.68 | 10.89 | 0.59 | 8,126 | 14,626 |
| | | | | 4 | - | 39.56 | 60.44 | - | - | - | - | - | - | 8,201 | 14,762 |
| | | | | 5 | 7.02 | 36.79 | 56.19 | - | - | - | - | - | - | 7,625 | 13,725 |
| Carroll Orange | 296 | OGS | 1902 | 1 | 3.76 | 39.11 | 50.34 | 6.79 | 5.36 | 71.99 | 1.40 | 11.40 | 3.06 | 7,238 | 13,028 |
| | | | | 2 | - | 40.64 | 52.31 | 7.05 | 5.13 | 74.80 | 1.46 | 8.38 | 3.18 | 7,521 | 13,537 |
| | | | | 3 | - | 43.72 | 56.28 | - | 5.52 | 80.47 | 1.57 | 9.02 | 3.42 | 8,091 | 14,564 |
| | | | | 4 | - | 42.81 | 57.19 | - | - | - | - | - | - | 8,200 | 14,760 |
| | | | | 5 | 4.13 | 41.05 | 54.82 | - | - | - | - | - | - | 7,862 | 14,151 |
| Columbiana Liverpool | 125 | USBM[10] | 1916 | 1 | 4.79 | 34.83 | 52.95 | 7.43 | 5.39 | 73.99 | 1.38 | 10.02 | 1.79 | 7,329 | 13,192 |
| | | | | 2 | - | 36.58 | 55.62 | 7.80 | 5.10 | 77.71 | 1.45 | 6.06 | 1.88 | 7,698 | 13,856 |
| | | | | 3 | - | 39.67 | 60.33 | - | 5.53 | 84.29 | 1.57 | 6.57 | 2.04 | 8,349 | 15,028 |
| | | | | 4 | - | 38.88 | 61.12 | - | - | - | - | - | - | 8,000 | 14,400 |
| | | | | 5 | 5.26 | 36.84 | 57.90 | - | - | - | - | - | - | 8,444 | 15,200 |
| Coshocton Jackson | 392 | OGS | 1902 | 1 | 5.32 | 40.93 | 47.45 | 6.30 | 5.50 | 69.29 | 1.24 | 13.45 | 4.22 | 7,086 | 12,755 |
| | | | | 2 | - | 43.23 | 50.12 | 6.65 | 5.19 | 73.18 | 1.31 | 9.21 | 4.46 | 7,484 | 13,471 |
| | | | | 3 | - | 46.31 | 53.69 | - | 5.56 | 78.39 | 1.40 | 9.87 | 4.78 | 8,017 | 14,431 |
| | | | | 4 | - | 45.28 | 54.72 | - | - | - | - | - | - | 8,145 | 14,661 |
| | | | | 5 | 5.85 | 42.63 | 51.52 | - | - | - | - | - | - | 7,669 | 13,804 |
| Gallia Greenfield | 483 | OGS | 1907 | 1 | 8.08 | 37.53 | 45.87 | 8.52 | 5.48 | 65.71 | 1.18 | 15.47 | 3.64 | 6,717 | 12,091 |
| | | | | 2 | - | 40.83 | 49.90 | 9.27 | 4.98 | 71.49 | 1.28 | 9.02 | 3.96 | 7,307 | 13,153 |
| | | | | 3 | - | 45.00 | 55.00 | - | 5.49 | 78.80 | 1.41 | 9.94 | 4.36 | 8,054 | 14,497 |
| | | | | 4 | - | 43.85 | 56.15 | - | - | - | - | - | - | 8,196 | 14,753 |
| | | | | 5 | 9.10 | 39.86 | 51.04 | - | - | - | - | - | - | 7,451 | 13,412 |
| Hocking Starr | 481 | OGS | 1902 | 1 | 6.52 | 38.30 | 47.15 | 8.03 | 5.49 | 67.33 | 1.20 | 14.43 | 3.52 | 6,850 | 12,330 |
| | | | | 2 | - | 40.97 | 50.44 | 8.59 | 5.10 | 72.03 | 1.28 | 9.23 | 3.77 | 7,328 | 13,190 |
| | | | | 3 | - | 44.82 | 55.18 | - | 5.58 | 78.80 | 1.40 | 10.10 | 4.12 | 8,017 | 14,429 |
| | | | | 4 | - | 43.74 | 56.26 | - | - | - | - | - | - | 8,148 | 14,666 |
| | | | | 5 | 7.29 | 40.56 | 52.15 | - | - | - | - | - | - | 7,553 | 13,596 |
| Hocking Ward | 478 | OGS | 1902 | 1 | 7.40 | 34.17 | 53.43 | 5.00 | 5.55 | 70.58 | 1.32 | 16.49 | 1.06 | 7,027 | 12,649 |
| | | | | 2 | - | 36.90 | 57.70 | 5.40 | 5.11 | 76.22 | 1.43 | 10.70 | 1.14 | 7,589 | 13,660 |
| | | | | 3 | - | 39.01 | 60.99 | - | 5.40 | 80.57 | 1.51 | 11.31 | 1.21 | 8,022 | 14,440 |
| | | | | 4 | - | 38.50 | 61.50 | - | - | - | - | - | - | 8,079 | 14,542 |
| | | | | 5 | 7.87 | 35.47 | 56.66 | - | - | - | - | - | - | 7,443 | 13,398 |
| Holmes Walnut Creek | 476 | OGS | 1902 | 1 | 7.31 | 34.92 | 53.56 | 4.21 | 5.42 | 70.62 | 1.44 | 17.31 | 1.00 | 6,952 | 12,514 |
| | | | | 2 | - | 37.68 | 57.78 | 4.54 | 4.97 | 76.19 | 1.56 | 11.66 | 1.08 | 7,500 | 13,500 |
| | | | | 3 | - | 39.47 | 60.53 | - | 5.21 | 79.82 | 1.63 | 12.21 | 1.13 | 7,857 | 14,142 |
| | | | | 4 | - | 39.03 | 60.97 | - | - | - | - | - | - | 7,904 | 14,228 |
| | | | | 5 | 7.70 | 36.02 | 56.28 | - | - | - | - | - | - | 7,296 | 13,133 |
| Jefferson Saline | 122 | USBM[11] | 1916 | 1 | 2.64 | 36.75 | 49.46 | 11.15 | 5.26 | 71.04 | 1.49 | 8.99 | 2.07 | 7.158 | 12,884 |
| | | | | 2 | - | 37.75 | 50.80 | 11.45 | 5.10 | 72.97 | 1.53 | 6.82 | 2.13 | 7,352 | 13,234 |
| | | | | 3 | - | 42.63 | 57.37 | - | 5.76 | 82.40 | 1.73 | 7.70 | 2.41 | 8,303 | 14,945 |
| | | | | 4 | - | 41.62 | 58.38 | - | - | - | - | - | - | 8,435 | 15,183 |
| | | | | 5 | 3.04 | 40.35 | 56.61 | - | - | - | - | - | - | 8,178 | 14,721 |
| Lawrence Perry | 475 | OGS | 1907 | 1 | 6.64 | 34.28 | 48.16 | 10.92 | 5.16 | 64.95 | 1.23 | 14.42 | 3.32 | 6,626 | 11,927 |
| | | | | 2 | - | 36.72 | 51.58 | 11.70 | 4.73 | 69.57 | 1.32 | 9.13 | 3.55 | 7,097 | 12,775 |
| | | | | 3 | - | 41.59 | 58.41 | - | 5.36 | 78.79 | 1.49 | 10.34 | 4.02 | 8,037 | 14,468 |
| | | | | 4 | - | 40.23 | 59.77 | - | - | - | - | - | - | 8,194 | 14,749 |
| | | | | 5 | 7.69 | 37.13 | 55.18 | - | - | - | - | - | - | 7,564 | 13,615 |
| Mahoning Green | 473 | OGS | 1907 | 1 | 5.23 | 36.86 | 53.19 | 4.72 | 5.50 | 73.84 | 1.41 | 12.36 | 2.17 | 7,502 | 13,504 |
| | | | | 2 | - | 38.89 | 56.13 | 4.98 | 5.19 | 77.91 | 1.49 | 8.14 | 2.29 | 7,916 | 14,249 |
| | | | | 3 | - | 40.93 | 59.07 | - | 5.46 | 81.99 | 1.57 | 8.57 | 2.41 | 8,331 | 14,996 |
| | | | | 4 | - | 40.25 | 59.75 | - | - | - | - | - | - | 8,411 | 15,139 |
| | | | | 5 | 5.58 | 38.01 | 56.41 | - | - | - | - | - | - | 7,942 | 14,295 |
| Muskingum Adams | 474 | OGS | 1917 | 1 | 5.63 | 44.70 | 44.84 | 4.83 | 5.69 | 71.41 | 1.25 | 13.50 | 3.32 | 7,206 | 12,971 |
| | | | | 2 | - | 47.37 | 47.51 | 5.12 | 5.37 | 75.67 | 1.33 | 9.00 | 3.51 | 7,635 | 13,743 |
| | | | | 3 | - | 49.93 | 50.07 | - | 5.66 | 79.75 | 1.40 | 9.49 | 3.70 | 8,047 | 14,485 |
| | | | | 4 | - | 49.23 | 50.77 | - | - | - | - | - | - | 8,145 | 14,661 |
| | | | | 5 | 6.06 | 46.24 | 47.70 | - | - | - | - | - | - | 7,653 | 13,775 |
| Perry Bearfield | 458 | OGS | 1902 | 1 | 5.90 | 36.58 | 47.42 | 10.10 | 5.26 | 65.43 | 1.22 | 13.03 | 4.96 | 6,686 | 12,035 |
| | | | | 2 | - | 38.87 | 50.40 | 10.73 | 4.90 | 69.53 | 1.29 | 8.28 | 5.27 | 7,105 | 12,789 |
| | | | | 3 | - | 43.54 | 56.46 | - | 5.49 | 77.88 | 1.45 | 9.28 | 5.90 | 7,959 | 14,326 |
| | | | | 4 | - | 41.99 | 58.01 | - | - | - | - | - | - | 8,137 | 14,647 |
| | | | | 5 | 6.83 | 39.12 | 54.05 | - | - | - | - | - | - | 7,582 | 13,648 |

TABLE 4 (Continued)

SELECTED ANALYSES OF THE UPPER ALLEGHENY COAL BEDS

| County and Township | O.G.S. File No. | Source | Year | Condition | Proximate Analysis | | | | Ultimate Analysis | | | | | Heat Value | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Moisture | Volatile Matter | Fixed Carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Calories | B.t.u. |
| Middle Kittanning (No. 6) Coal (continued) | | | | | | | | | | | | | | | |
| Perry Monroe | 450 | OGS | 1902 | 1 | 6.79 | 35.45 | 51.85 | 5.91 | 5.49 | 70.30 | 1.30 | 16.00 | 1.00 | 6,983 | 12,569 |
| | | | | 2 | - | 38.04 | 55.62 | 6.34 | 5.08 | 75.42 | 1.39 | 10.70 | 1.07 | 7,492 | 13,485 |
| | | | | 3 | - | 40.61 | 59.39 | - | 5.42 | 80.54 | 1.48 | 11.42 | 1.14 | 7,999 | 14,398 |
| | | | | 4 | - | 40.09 | 59.91 | - | - | - | - | - | - | 8,061 | 14,510 |
| | | | | 5 | 7.30 | 37.15 | 55.55 | - | - | - | - | - | - | 7,473 | 13,452 |
| Stark Sandy | 301-B | OGS | 1926 | 1 | 6.49 | 40.26 | 46.64 | 6.61 | - | - | - | - | 1.93 | 6,942 | 12,495 |
| | | | | 2 | - | 43.05 | 49.88 | 7.07 | - | - | - | - | 2.07 | 7,423 | 13,362 |
| | | | | 3 | - | 46.33 | 53.67 | - | - | - | - | - | 2.23 | 7,988 | 14,379 |
| | | | | 4 | - | 45.66 | 54.34 | - | - | - | - | - | - | 8,074 | 14,534 |
| | | | | 5 | 7.07 | 42.44 | 50.49 | - | - | - | - | - | - | 7,503 | 13,506 |
| Tuscarawas Warwick | 431 | OGS | 1902 | 1 | 4.10 | 41.64 | 49.05 | 5.21 | 5.57 | 72.45 | 1.42 | 12.10 | 3.25 | 7,331 | 13,196 |
| | | | | 2 | - | 43.42 | 51.15 | 5.43 | 5.34 | 75.55 | 1.48 | 8.82 | 3.38 | 7,644 | 13,759 |
| | | | | 3 | - | 45.91 | 54.09 | - | 5.65 | 79.89 | 1.56 | 9.33 | 3.57 | 8,083 | 14,549 |
| | | | | 4 | - | 45.12 | 54.88 | - | - | - | - | - | - | 8,182 | 14,727 |
| | | | | 5 | 4.43 | 43.12 | 52.45 | - | - | - | - | - | - | 7,821 | 14,077 |
| Vinton Brown | 426 | OGS | 1925 | 1 | 8.58 | 40.53 | 40.36 | 10.53 | 5.55 | 62.97 | 1.33 | 15.55 | 4.07 | 6,322 | 11,379 |
| | | | | 2 | - | 44.33 | 44.15 | 11.52 | 5.03 | 68.88 | 1.45 | 8.67 | 4.45 | 6,915 | 12,447 |
| | | | | 3 | - | 50.10 | 49.90 | - | 5.68 | 77.85 | 1.64 | 9.80 | 5.03 | 7,815 | 14,068 |
| | | | | 4 | - | 48.91 | 51.09 | - | - | - | - | - | - | 7,979 | 14,363 |
| | | | | 5 | 9.93 | 44.06 | 46.01 | - | - | - | - | - | - | 7,187 | 12,936 |

1. Number carried in Ohio Geological Survey file of coal analyses.

2. OGS - Ohio Geological Survey.
   USBM - United States Bureau of Mines.

3. 1, As received; 2, moisture-free; 3, moisture- and ash-free;
   4, dry mineral-matter-free (unit coal); 5, Moist, mineral-matter-free.

4. USBM Bull. 193, pp. 51, 210;

5. OGS Bull. 34, p. 163; USBM Bull. 85, pp. 63, 251.

6. USBM Bull. 193, pp. 49, 201.

7. USBM Bull. 193, pp. 50, 225.

8. USBM Bull. 193, pp. 51, 208.

9. USGS Bull. 531, pp. 344-345; Bull. 58, pp. 61, 247.

10. USBM Bull. 193, pp. 49, 201.

11. USBM Bull. 193, pp. 51, 207.

(60 percent), blending with low volatile coal would probably be feasible, and washing may materially reduce sulphur and ash content. The possibility of having a coking coal or a blending coal near at hand should be of intense interest to those in the coking business in Ohio where cost of shipping and mining would show materially in the finished cost of the coking product.

# CHAPTER 4

# DESCRIPTIONS OF COAL RESERVES BY COUNTY

The upper Allegheny coal bed appraisals in this report include the Middle Kittanning, Lower Freeport, and Upper Freeport. Other coal beds are described but because of their rather restricted areal occurrence and importance are not included in the reserves estimates. Numerical names of the coal beds used by miners in some areas are not always consistent with the geologically accepted numerical or geographic names. The geographic name which is preferred by the geologist will usually be used. The following county descriptions of minable upper Allegheny coal beds will follow a geographical arrangement. The text will start with Mahoning County and as closely as possible will trend southwestward and end with the description of the upper Allegheny coal beds in Lawrence County.

## MAHONING COUNTY

The Lower Kittanning and lower coal beds in the section are the chief contributors to the coal resources of Mahoning County. However, the Middle Kittanning coal bed is found in the southern tiers of townships (see Fig. 5). This bed contributes at least a small amount of current production as well as a moderate reserve of coal for the county. Table 5 below illustrates the estimated original reserves of the Middle Kittanning coal bed in Mahoning County

Table 5

Estimated original reserves of the Middle Kittanning coal bed in Mahoning County
(In thousands of short tons)

| Reliability Category | Thickness | | |
|---|---|---|---|
| | 14" - 28" | 28" - 42" | Total |
| Proven | 10,813 | 11,595 | 22,408 |
| Probable | 49,258 | 14,974 | 64,232 |
| Strongly inferred | 17,314 | 8,978 | 26,292 |
| Weakly inferred | 457 | - | 457 |
| Total | 77,842 | 35,547 | 113,389 |

The Lower Freeport coal is known to be present but underlies only small areas in the southern part of the county, and the estimated reserves are summarized in Table 6. Appendix Table 48 gives complete summary of the estimated reserves by township, and Figure 6 shows the area of the Lower Freeport coal bed for Mahoning County. Lamborn (1942) has written a brief resume of the coal deposits in the southeastern part of the county. Newberry (1878, pp. 781-814) describes general geology as well as the coal beds known in Mahoning County.

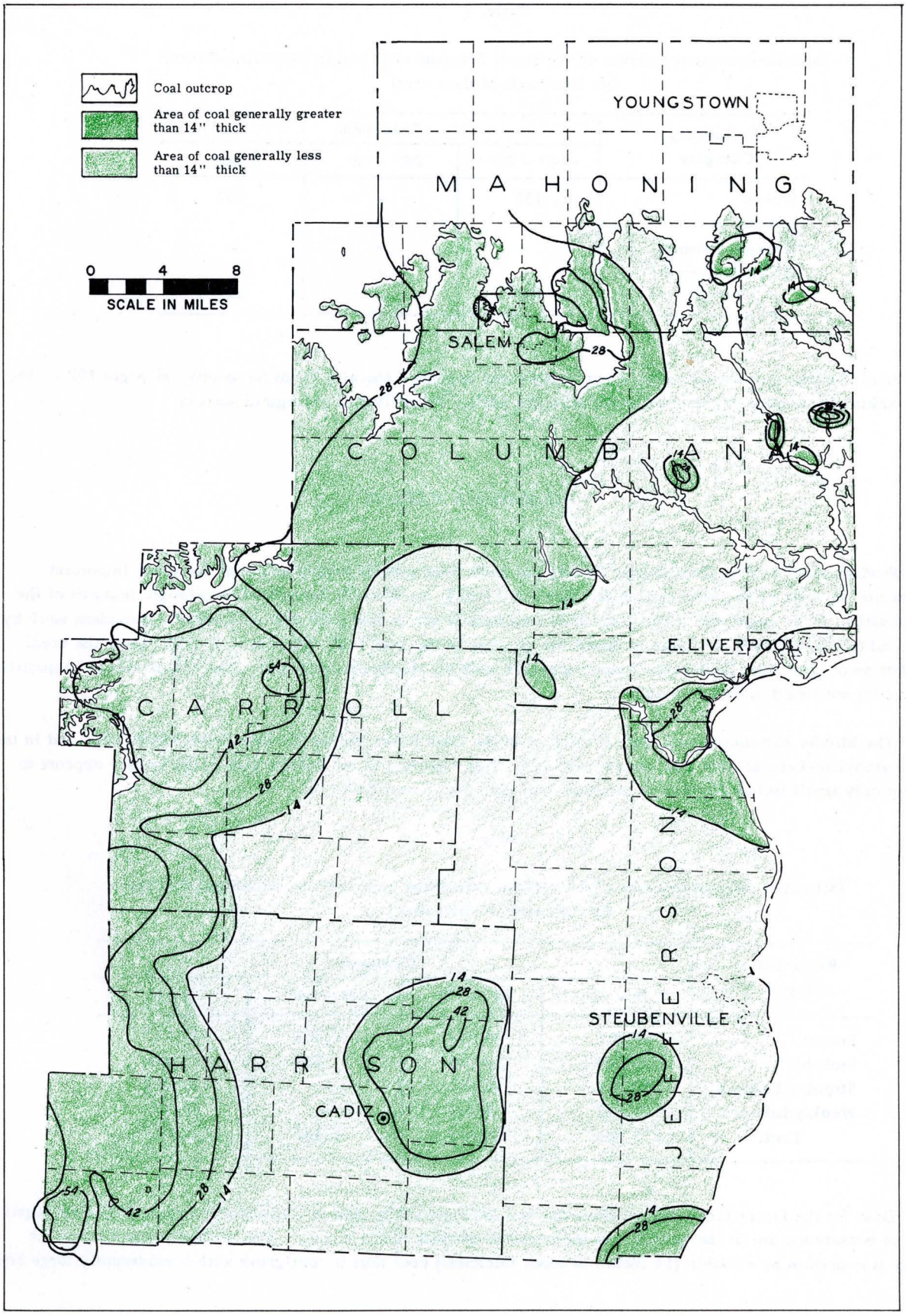



Figure 5. The Middle Kittanning coal bed in Mahoning, Columbiana, Carroll, Jefferson, and Harrison Counties.

Table 6

Estimated original reserves of the Lower Freeport coal bed in Mahoning County
(In thousands of short tons)

| Reliability Category | Thickness | | |
|---|---|---|---|
| | 14" - 28" | 28" - 42" | Total |
| Proven | 437 | - | 437 |
| Probable | - | - | - |
| Strongly inferred | - | - | — |
| Weakly inferred | - | - | - |
| Total | 437 | - | 437 |

Care should be given, however, when using correlations described therein, for as he asserts, on pages 797 - 798, doubt exists with respect to the correlation from the earlier Pennsylvania geological surveys.

## COLUMBIANA COUNTY

Production of coal in Columbiana County has been from several beds and among the more important sources are the upper Allegheny coal beds. Newberry (1878, pp. 90-132) describes the geologic features of the county although his numerical identification of coal beds is not in line with that used today. A modern work by Stout and Lamborn (1924) describes in detail the geology of the coal beds. Figures 5, 6, and 7 show the areal distribution of these coal beds in the county together with the thickness variations. Analyses showing the quality of the coal are listed in Tables 3 and 4.

The Middle Kittanning coal bed is thickest in the Ohio River Valley-Yellow Creek Valley area and in the Washingtonville-Letonia area and thence westward. This coal bed in the eastern part of the county appears to contain only small isolated bodies of minable coal (See Fig. 5 and Table 7).

Table 7

Estimated original reserves of the Middle Kittanning coal bed in Columbiana County
(In thousands of short tons)

| Reliability Category | Thickness | | | |
|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | Total |
| Proven | 47,011 | 24,053 | 1,363 | 72,427 |
| Probable | 165,798 | 39,160 | 136 | 205,094 |
| Strongly Inferred | 150,018 | 32,401 | - | 182,419 |
| Weakly Inferred | 52,537 | 9,840 | - | 62,377 |
| Total | 415,364 | 105,454 | 1,499 | 522,317 |

Data for the Lower Freeport coal show the bed to be generally thin in Columbiana County. The principal areas of occurrence are in the central and southeastern portions of the county. The southern extremity of the county is underlain by minable (14 inches or more thickness) coal that is contiguous with a moderately large body

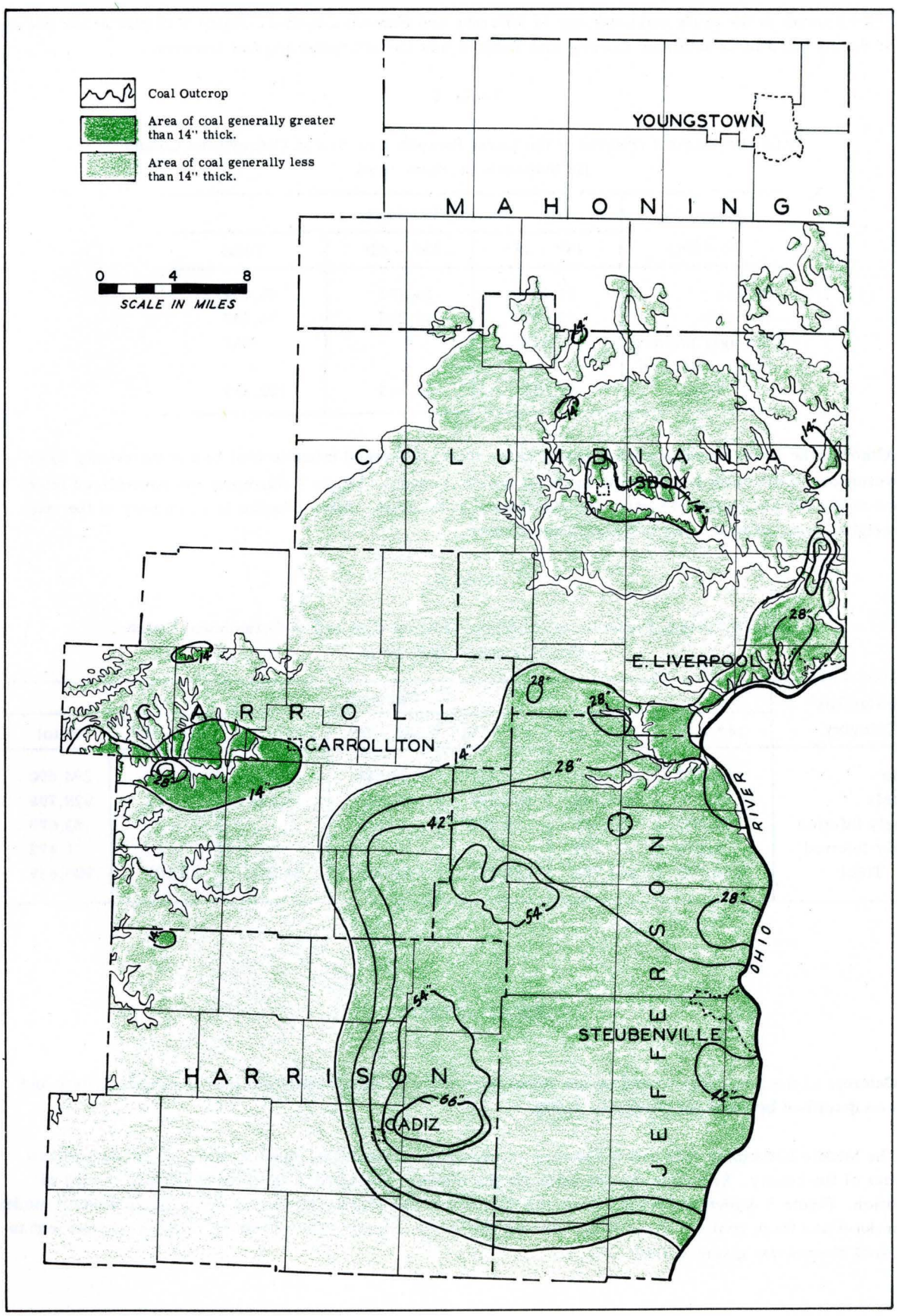



Figure 6. The Lower Freeport coal bed in Mahoning, Columbiana, Carroll, Jefferson and Harrison Counties.

of coal that extends to the south and southwest in Jefferson and Harrison Counties. Figure 6 illustrates the occurrence of the coal bed in Columbiana County, and Table 8 lists the estimated original reserves.

Table 8

Estimated original reserves of the Lower Freeport coal bed in Columbiana County
(In thousands of short tons)

| Reliability Category | Thickness | | |
|---|---|---|---|
| | 14" - 28" | 28" - 42" | Total |
| Proven | 31,706 | 14,378 | 46,084 |
| Probable | 63,072 | 11,265 | 74,337 |
| Strongly Inferred | 437 | - | 437 |
| Weakly Inferred | - | - | - |
| Total | 95,215 | 25,643 | 120,858 |

Although the Upper Freeport coal is probably the most widespread minable coal bed in the county its extreme variations in thickness is a deterent to its economic recovery. Figure 7 illustrates the generalized interpretation of the thickness characteristics and distribution of the coal. Table 9 below is a summary of the estimated original reserves of the bed in Columbiana County.

Table 9

Estimated original reserves of the Upper Freeport coal bed in Columbiana County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | |
|---|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - 78" | 78" - 90" | Total |
| Proven | 44,722 | 141,300 | 74,331 | 23,626 | 8,723 | 1,988 | 294,690 |
| Probable | 91,198 | 269,742 | 106,544 | 45,663 | 15,538 | 1,113 | 529,798 |
| Strongly Inferred | 22,600 | 57,547 | 3,362 | 170 | - | - | 83,679 |
| Weakly Inferred | 1,273 | 199 | - | - | - | - | 1,472 |
| Total | 159,793 | 468,788 | 184,237 | 69,459 | 24,261 | 3,101 | 909,639 |

## CARROLL COUNTY

Outcrops of the Allegheny formation are found principally in the northwestern part of Carroll County and have been described by Lamborn (1942, pp. 7-22).

The Middle Kittanning coal bed is known or its presence is inferred at minable thickness in the northern two-thirds of the county. Estimates are not made for the southern one-third of the county because of lack of information. Figure 5 depicts the areal extent and thickness of the Middle Kittanning coal. Large areas of moderately uniform and thick coal are found in the western half of the county. The estimated reserves with respect to the original content are given in Table 10.

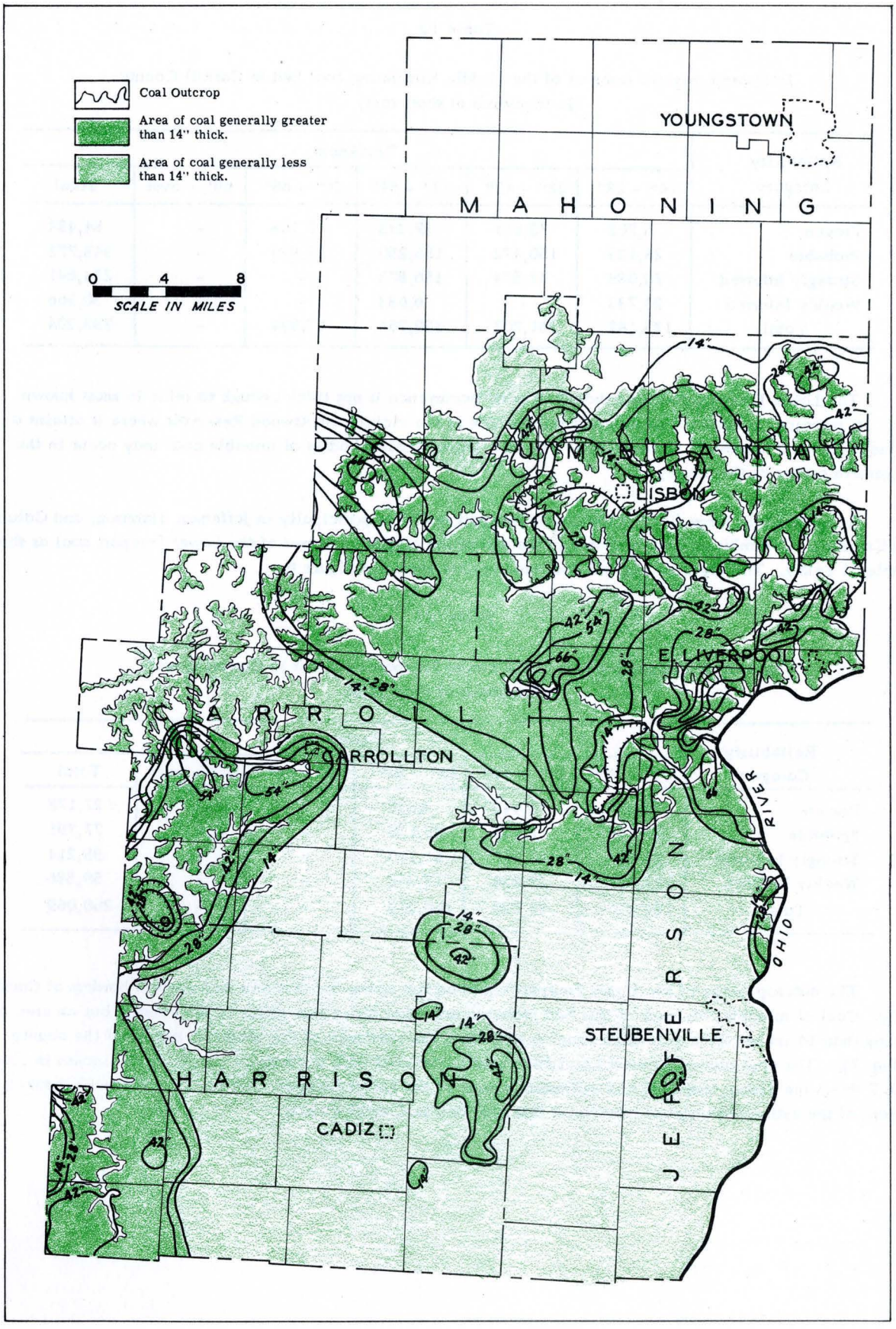



Figure 7. The Upper Freeport coal bed in Mahoning, Columbiana, Carroll, Jefferson, and Harrison Counties.

Table 10

Estimated original reserves of the Middle Kittanning coal bed in Carroll County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 6,202 | 33,661 | 39,393 | 5,168 | - | 84,424 |
| Probable | 25,125 | 150,472 | 156,250 | 11,926 | - | 343,773 |
| Strongly Inferred | 70,089 | 47,574 | 156,978 | - | - | 274,641 |
| Weakly Inferred | 23,733 | - | 6,633 | - | - | 30,366 |
| Total | 125,149 | 231,707 | 359,254 | 17,094 | - | 733,204 |

The Lower Freeport coal bed though of wide occurrence is not thick enough to mine in most known areas. Its principal occurrence at minable thickness is in the vicinity of Atwood Reservoir where it attains a maximum known thickness of 52 inches (see Fig. 6). Other smaller bodies of minable coal may occur in the southwestern corner of the county.

A moderately large field of the Lower Freeport coal lies principally in Jefferson, Harrison, and Columbiana Counties. Columbiana County shares in the estimated original reserves of the Lower Freeport coal as shown in Table 11 below. The areas of original coal reserves are shown in Figure 6.

Table 11

Estimated original reserves of the Lower Freeport coal bed in Carroll County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 20,097 | 3,446 | 3,635 | - | - | 27,178 |
| Probable | 47,468 | 2,153 | 28,170 | - | - | 77,791 |
| Strongly Inferred | 23,237 | 10,867 | 61,110 | - | - | 95,214 |
| Weakly Inferred | 17,274 | 29,254 | 13,358 | - | - | 59,886 |
| Total | 108,076 | 45,720 | 106,273 | - | - | 260,069 |

The outcrop fringe of the Upper Freeport coal bed lies along the northern and western borders of Carroll County. Coal of minable thickness of this bed probably underlies about two-thirds of the county, but an area of coal less than 14 inches thick is found through a strip from the northwest to the southeast corner of the county (see Fig. 7). The area around Atwood Reservoir contains the coal with thicknesses exceeding 54 inches in places. Figure 7 shows the known variation and estimated extent of the Lower Freeport coal bed and Table 12 shows a summary of the estimated original reserves of this coal bed in Carroll County.

Table 12

Estimated original reserves of the Upper Freeport coal bed in Carroll County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 5,506 | 9,805 | 15,631 | 6,758 | 204 | 37,904 |
| Probable | 34,468 | 124,468 | 100,728 | 29,079 | 750 | 289,493 |
| Strongly Inferred | 23,973 | 132,155 | 13,358 | - | - | 169,486 |
| Weakly Inferred | 14,908 | 38,497 | - | - | - | 53,405 |
| Total | 78,855 | 304,925 | 129,717 | 35,837 | 954 | 550,288 |

## JEFFERSON COUNTY

Although nearly 90 percent of the current coal production of Jefferson County is from the Pittsburgh bed, a large reserve is estimated in the county for the upper Allegheny coal beds. Analyses of the Middle Kittanning, Lower Freeport, and Upper Freeport are shown in Table 4.

Coal of the Middle Kittanning bed is irregular in thickness and is known in five separate small to moderate sized areas. The most northerly body of minable coal in the county is adjacent to Columbiana County and the Ohio River. To the south, four to five miles west of Steubenville, drill holes reveal an area of possibly 15 or 20 square miles that is underlain by the Middle Kittanning coal. Another large and possibly the most important known body of minable No. 6 coal is along the Belmont County line west of the Ohio River where coal of minable thickness has been observed in test cores. Figure 5 shows the known occurrence in thickness of the coal in Jefferson County and Table 13 below shows the category distribution of the estimated 106,086,000 tons.

Table 13

Estimated original reserves of the Middle Kittanning coal bed in Jefferson County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 6,063 | 12,291 | 1,272 | - | - | 19,626 |
| Probable | 43,811 | 21,898 | - | - | - | 65,709 |
| Strongly Inferred | 20,751 | - | - | - | - | 20,751 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 70,625 | 34,189 | 1,272 | - | - | 106,086 |

The Lower Freeport coal bed in Jefferson County appears to underlie nearly the entire county at minable thickness. This bed was shaft-mined years ago at Steubenville and hence is also known as the Steubenville shaft coal. Lamborn (1930, pp. 61-79) describes the Lower Freeport coal in Jefferson County but judges the bed to be discontinuous. In light of present analysis Figure 6 indicates the estimated occurrence of the Lower Freeport coal and Table 14 is a listing of the estimated original reserves of the bed in the county. Table 49 in the Appendix shows the estimated original reserves of the bed by township.

Table 14

Estimated original reserves of the Lower Freeport coal bed in Jefferson County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 13,060 | 61,755 | 108,452 | 66,960 | - | 250,227 |
| Probable | 40,311 | 207,425 | 280,332 | 12,949 | - | 541,017 |
| Strongly Inferred | 25,384 | 105,187 | 357,163 | - | - | 487,734 |
| Weakly Inferred | 14,968 | 28,723 | 157,886 | - | - | 201,577 |
| Total | 93,723 | 403,090 | 903,833 | 79,909 | - | 1,480,555 |

Upper Freeport coal is known at minable thickness in the northern part of the county where the coal attains at least 96 inches at one place, in Saline Township. Another area of the coal of minable thickness is known north of Steubenville and still another small area occurs to the west of Steubenville where the coal has been mined. Figure 7 shows the known occurrence of the Upper Freeport coal and demonstrates its spotty nature. Table 15 below shows the present estimate of the original reserves of the county for this bed and Table 50 shows the estimate by township for Jefferson County.

Table 15

Estimated original reserves of the Upper Freeport coal bed in Jefferson County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - 78" | 78" - 90" | 90" - 102" | Total |
| Proven | 9,978 | 29,617 | 19,128 | 4,714 | 6,406 | 1,193 | 545 | 71,581 |
| Probable | 38,764 | 86,139 | 35,530 | 852 | - | - | - | 161,285 |
| Strongly Inferred | 11,648 | 16,101 | 5,134 | - | - | - | - | 32,883 |
| Weakly Inferred | - | - | - | - | - | - | - | - |
| Total | 60,390 | 131,857 | 59,792 | 5,566 | 6,406 | 1,193 | 545 | 265,749 |

## BELMONT COUNTY

The Allegheny formation coal beds are all under deep cover in Belmont County, but a small number of drill holes reveal the occurrence of the Middle Kittanning and Lower and Upper Freeport coal beds.

The Middle Kittanning coal was found by drilling just west of Bellaire and to the north of this point in the county line area near the Ohio River. Figure 11 shows estimated distribution of this coal bed, the original reserves of which are estimated at 74,480,000 tons. (See Table 48 for the estimate reserves by township.)

Lower Freeport coal is not known at minable thickness in Belmont County. The margin of the main field of this coal is believed to thin just north of the Belmont-Jefferson-Harrison County line (See Fig. 6). The Upper Freeport coal bed, probably at minable thickness or greater in the northwest corner of Belmont County, is

estimated to contain 34,203,000 tons of coal (Table 50). This estimate is based on data from adjacent Guernsey and Harrison Counties (See Figs. 7 and 12).

## HARRISON COUNTY

Outcrops of the uppermost Allegheny rocks are found in the northwestern part of Harrison County. The Middle Kittanning coal bed is below drainage throughout the county. Known minable portions of this bed are in the western one-third of the county and in the east central part of the county centered about Green Township. Known and estimated areal occurrence of minable portions of this coal bed are indicated in Figure 5, and Table 16 below summarizes the estimated original reserves. In Table 48 in the Appendix is found a classification of reserves by township.

Table 16

Estimated original reserves of the Middle Kittanning coal bed in Harrison County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 7,313 | 48,800 | 97,504 | 22,717 | - | 176,334 |
| Probable | 60,648 | 205,802 | 152,660 | 5,339 | - | 424,449 |
| Strongly Inferred | 35,282 | 70,698 | 9,677 | - | - | 115,657 |
| Weakly Inferred | 7,355 | - | - | - | - | 7,355 |
| Total | 110,598 | 325,300 | 259,841 | 28,056 | - | 723,795 |

Coal of the Lower Freeport bed is known at thicknesses up to 74 inches in northeastern Harrison County. This occurrence is part of a larger field that extends into Jefferson and Columbiana Counties as is shown in Figure 6. The thicker portion of the minable coal area is centered in Green Township. This area is the principal known occurrence of minable coal in the Lower Freeport coal bed in the county. Other areas in the State contain this coal, but only occasionally does the thickness attain as much as 14 inches and in the areas of deeper occurrence too little information is available to make an intelligent estimate about the occurrence.

The summary of the estimated original reserves of this bed is represented in Table 17, and the summary by township is found in Table 49.

Table 17

Estimated original reserves of the Lower Freeport coal bed in Harrison County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 954 | 2,453 | 42,618 | 93,823 | 38,233 | 178,081 |
| Probable | 10,912 | 32,897 | 150,526 | 52,080 | 34,076 | 280,491 |
| Strongly Inferred | 28,783 | 27,928 | 44,844 | - | - | 101,555 |
| Weakly Inferred | 3,797 | 2,154 | - | - | - | 5,951 |
| Total | 44,446 | 65,432 | 237,988 | 145,903 | 72,309 | 566,078 |

Coal of the Upper Freeport bed in Harrison County is known at minable thickness in the western portion of the county where a band averaging six miles in width extends north into Carroll and eastern Tuscarawas Counties. To the south the field terminates in northern Guernsey County and northwestern Belmont County. Other smaller and more isolated areas of this coal at minable thickness are found in the county. The two principal ones are in Green Township and northern adjacent German Township. Figure 7 shows the known estimated area of occurrence of the bed in this county. Estimated original reserves of the Upper Freeport coal in Harrison County are shown in Table 18 below.

Table 18

Estimated original reserves of the Upper Freeport coal bed in Harrison County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 15,982 | 61,720 | 61,655 | 568 | - | 139,925 |
| Probable | 34,310 | 155,810 | 9,677 | 1,363 | - | 201,160 |
| Strongly Inferred | 11,768 | 31,904 | - | - | - | 43,672 |
| Weakly Inferred | 1,292 | - | - | - | - | 1,292 |
| Total | 63,352 | 249,434 | 71,332 | 1,931 | - | 386,049 |

## STARK COUNTY

Production from Stark County has been from several coal beds. The earlier contributors to production were the Sharon and the Brookville coal. Later production of the coal has been dominantly from the Lower and Middle Kittanning as well as small production from the Strasburg and Upper Freeport coal beds. Upper Allegheny formation deposits in Stark County are restricted to the southeastern part.

Most important of the upper Allegheny coal beds in the county is the Middle Kittanning which has been mined extensively. Its estimated original reserve is 348,654,000 tons as indicated in Table 19 below. Figure 8 shows that this coal bed is relatively uniform in thickness throughout its extent except for a small area west of Waynesburg where it appears to be less than 14 inches in thickness.

Table 19

Estimated original reserves of the Middle Kittanning coal bed in Stark County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 4,175 | 41,081 | 1,318 | - | - | 46,574 |
| Probable | 11,112 | 198,082 | 2,363 | - | - | 211,557 |
| Strongly Inferred | 1,570 | 87,496 | - | - | - | 89,066 |
| Weakly Inferred | - | 1,457 | - | - | - | 1,457 |
| Total | 16,857 | 328,116 | 3,681 | - | - | 348,654 |

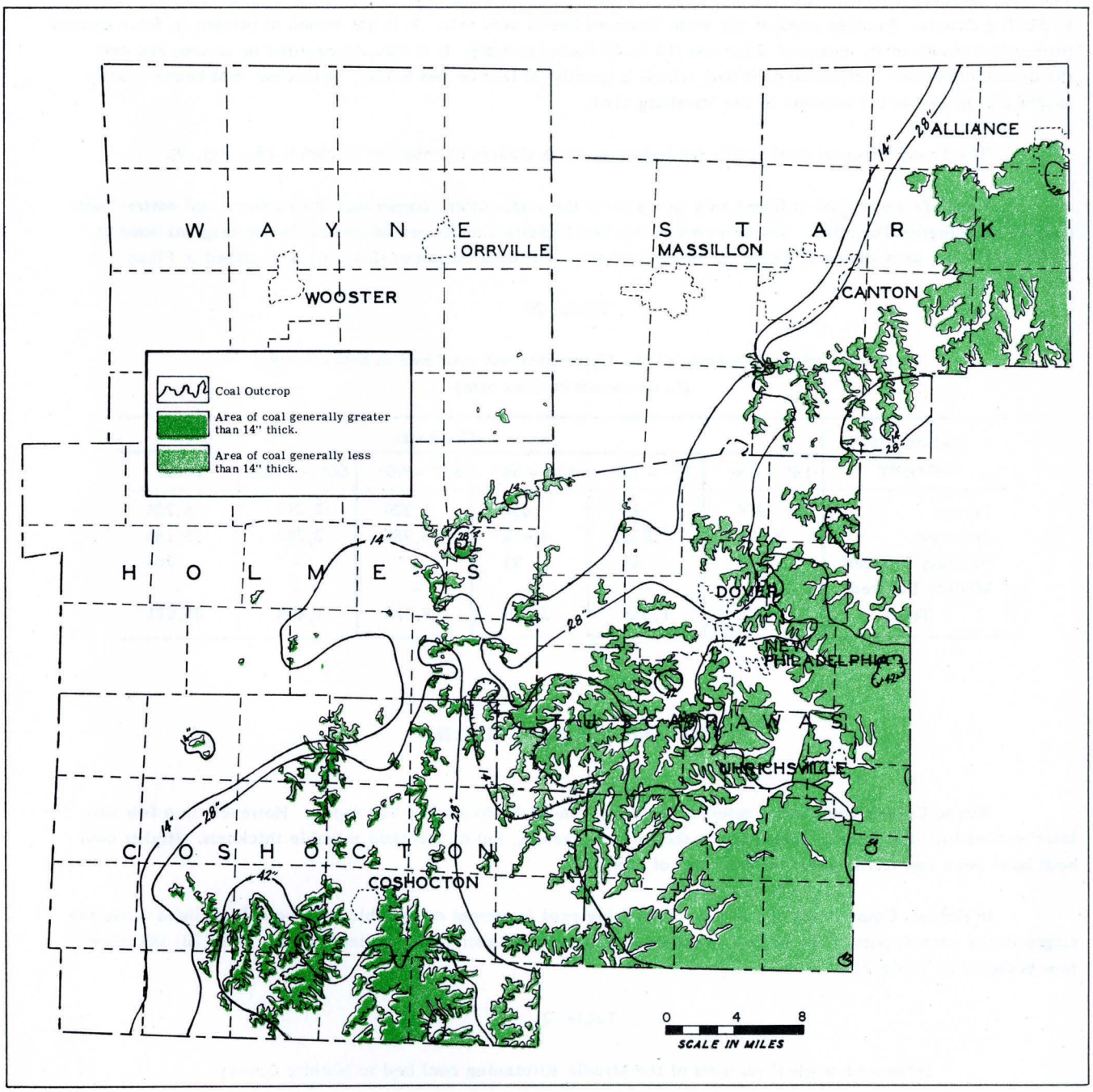



Figure 8. The Middle Kittanning coal bed in Stark, Wayne, Tuscarawas, Holmes, and Coshocton Counties.

The Strasburg coal has been named for its occurrence in Tuscarawas County near the town of Strasburg. The bed, however, extends eastward and underlies an area at minable thickness in parts of Stark County and Mahoning County. In other parts of the State this coal bed is very thin. It is not mined at present in Stark County primarily because of its marginal thickness (14 to 28 inches or less). It is also disregarded in mining because the associated Lower Kittanning coal bed, which is usually 20 feet or less below, is thicker and hence usually sought and mined at the expense of the Strasburg coal.

The Lower Freeport coal bed is not known in Stark County at minable thickness (See Fig. 9).

Upper Freeport coal is found only in ridges in the southeastern corner and the northern and eastern portions of Washington Township. The reserves of this bed in Stark County are estimated on the original basis at 25,671,000 tons, as is shown in Table 20 below, and the areal distribution of this coal is depicted in Figure 10.

Table 20

Estimated original reserves of the Upper Freeport coal bed in Stark County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 974 | 33 | 636 | 2,329 | 2,249 | 6,221 |
| Probable | 3,677 | 1,822 | 4,452 | 6,986 | 2,249 | 19,186 |
| Strongly Inferred | 140 | 33 | 91 | - | - | 264 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 4,791 | 1,888 | 5,179 | 9,315 | 4,498 | 25,671 |

## WAYNE AND HOLMES COUNTIES

Wayne County contains no reserves of coal in the beds covered by this report. However, in a few isolated outlier hills the Middle Kittanning is shown to be present, but at less than minable thickness. Higher coal beds have been lost to the geologic processes of erosion.

In Holmes County only the Middle Kittanning coal is present at minable thickness. It is found along the ridges in the eastern part of the county as shown in Figure 8. An estimated original reserve of 22,201,000 short tons is shown in Table 21.

Table 21

Estimated original reserves of the Middle Kittanning coal bed in Holmes County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 8,945 | 4,108 | 817 | - | - | 13,870 |
| Probable | 4,017 | 4,175 | - | - | - | 8,192 |
| Strongly Inferred | 139 | - | - | - | - | 139 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 13,101 | 8,283 | 817 | - | - | 22,201 |

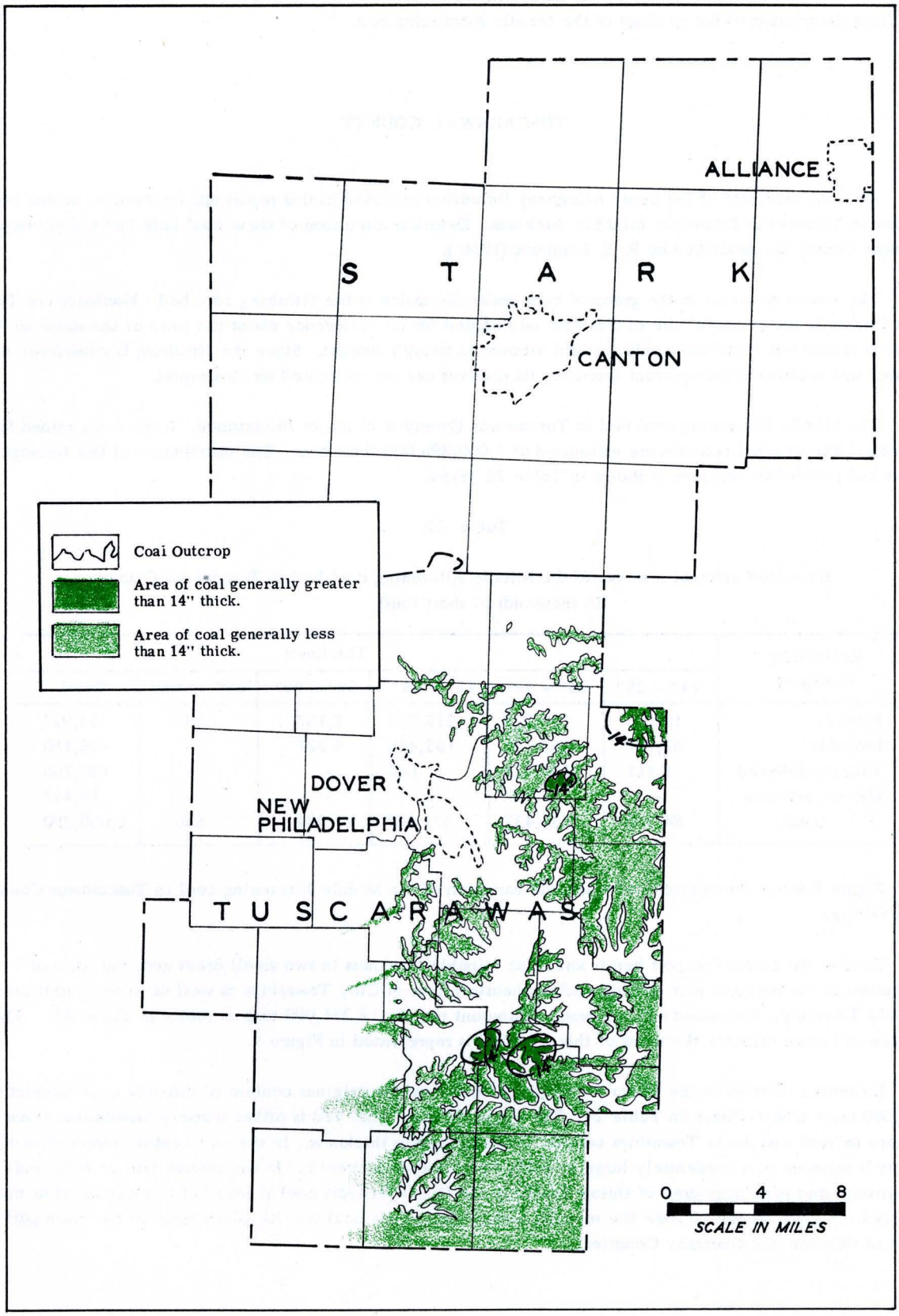



Figure 9. The Lower Freeport coal bed in Stark and Tuscarawas Counties.

White (1949, p. 241) states the Middle Kittanning coal is the second most important one in Holmes County and is exceeded in value only by the Lower Kittanning coal bed. On pages 241 to 257 (White, 1949) is an excellent description of the geology of the Middle Kittanning bed.

## TUSCARAWAS COUNTY

All coal members of the upper Allegheny formation included in this report are represented at one place or another in Tuscarawas County at minable thickness. Detailed discussion of these coal beds and the geology of Tuscarawas County are described by R. E. Lamborn (1956 ).

The lowest or oldest in the group of beds under discussion is the Strasburg coal bed. Northwestern Tuscarawas County is the principal site of this coal bed named for its occurrence about the town of the same name. The coal is mined but contributes only a small amount to today's market. Since the Strasburg is considered to be a minor and relatively unimportant resource, its reserves are not estimated for this report.

The Middle Kittanning coal bed in Tuscarawas County is of major importance. It has been mined for many years. The original reserves are estimated at 1,000,390,000 short tons. The distribution of this tonnage by thickness and reliability category is shown in Table 22 below.

Table 22

Estimated original reserves of the Middle Kittanning coal bed in Tuscarawas County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 16,200 | 115,028 | 215,726 | 7,157 | 886 | 354,997 |
| Probable | 67,087 | 267,787 | 155,479 | 4,827 | - | 495,180 |
| Strongly Inferred | 1,411 | 129,173 | 182 | - | - | 130,766 |
| Weakly Inferred | - | 19,447 | - | - | - | 19,447 |
| Total | 84,698 | 531,435 | 371,387 | 11,984 | 886 | 1,000,390 |

Figure 8 shows the outcrop and thickness variation of the Middle Kittanning coal in Tuscarawas County and its environs.

Coal of the Lower Freeport bed is known at minable thickness in two small areas near the town of Gnadenhutten in the northern part of Rush and northeastern part of Clay Townships as well as in two small areas in Fairfield Township.. Estimated original reserves amount to only 18,281,000 tons as shown in Table 23. The distribution of known minable thickness of this coal bed is represented in Figure 9.

Estimated reserves of the Upper Freeport coal based on the original content of minable coal amount to 121,604,000 short tons as shown in Table 24. The Upper Freeport coal bed is rather sparsely distributed; some of the hilltops in York and Bucks Townships contain coal at minable thickness. In the east central border area of the county a segment of a moderately large minable body of coal is present. In the eastern part of Rush and Mill Townships and in a large area of Union Township the Upper Freeport coal is found at thicknesses of as much as 69 inches. Figures 10 and 12 show the minable occurrence of the coal and its relationship to the main part of this field in Harrison and Guernsey Counties.

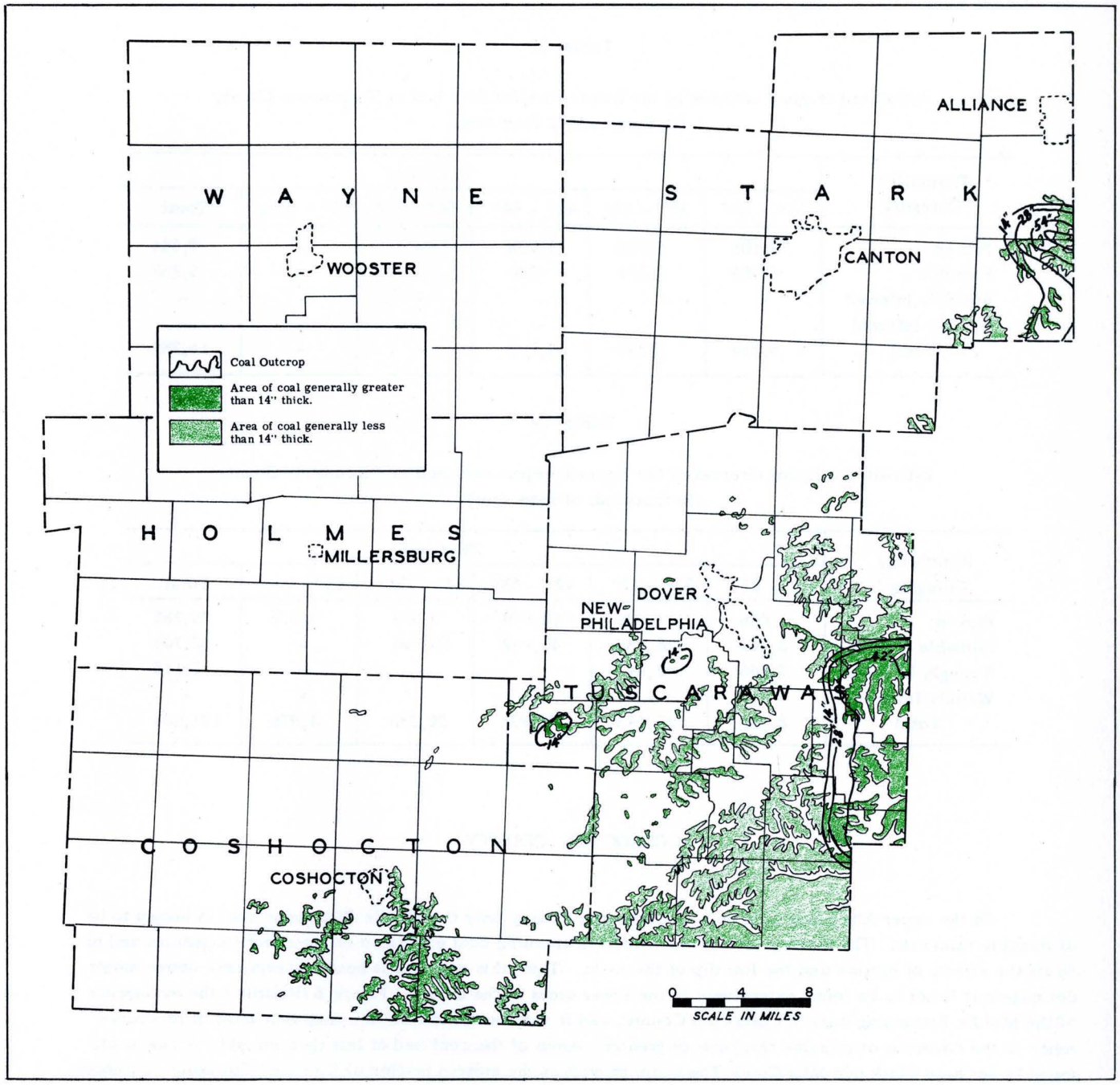



Figure 10. The Upper Freeport coal bed in Stark, Wayne, Tuscarawas, Holmes, and Coshocton Counties.

Table 50 of the Appendix includes the estimated original reserves of the Upper Freeport coal bed in Tuscarawas County by township.

Table 23

Estimated original reserves of the Lower Freeport coal bed in Tuscarawas County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 3,101 | 5,035 | 1,408 | - | - | 9,544 |
| Probable | 5,983 | 2,254 | 500 | - | - | 8,737 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 9,084 | 7,289 | 1,908 | - | - | 18,281 |

Table 24

Estimated original reserves of the Upper Freeport coal bed in Tuscarawas County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 656 | 4,606 | 12,949 | 9,598 | 1,976 | 29,785 |
| Probable | 5,944 | 28,988 | 40,982 | 10,790 | - | 86,704 |
| Strongly Inferred | 2,266 | 2,849 | - | - | - | 5,115 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 8,866 | 36,443 | 53,931 | 20,388 | 1,976 | 121,604 |

## COSHOCTON COUNTY

Of the upper Allegheny coal beds in Coshocton County only the Middle Kittanning coal is known to be of minable thickness. The outcrop area of the Middle Kittanning coal exhibits a rather dendritic pattern and reflects the effects of erosion and the low dip of the rocks. Thus, this coal bed is nearly everywhere above major drainage and is not to be found extensively in the lower areas of the county. Figure 8 illustrates the occurrence of the Middle Kittanning coal in Coshocton County, and it may be noted from the map that most of its occurrence in the county is at minable thickness or greater. Areas of the coal bed at less than minable thickness are found in northern Clark and Mill Creek Townships as well as the eastern portion of Crawford Township. Lamborn (1954, pp. 161-190) describes the upper Allegheny coal beds and intervening rocks.

An estimated 334,969,000 tons of original reserves of the Middle Kittanning coal bed is shown in Table 25. Distribution by township may be found in Table. 48.

The Lower Freeport and Upper Freeport coal beds do not constitute a reserve and thus are not estimated for Coshocton County.

Table 25

Estimated original reserves of the Middle Kittanning coal bed in Coshocton County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 7,176 | 48,136 | 69,744 | 454 | - | 125,510 |
| Probable | 20,633 | 78,086 | 108,407 | - | - | 207,126 |
| Strongly Inferred | 1,372 | 564 | - | - | - | 1,936 |
| Weakly Inferred | 397 | - | - | - | - | 397 |
| Total | 29,578 | 126,786 | 178,151 | 454 | - | 334,969 |

## MUSKINGUM COUNTY

The upper Allegheny coal beds, Middle Kittanning, Lower Freeport, and Upper Freeport, are all present in Muskingum County. Although present, variation in thickness among them is large.

The Middle Kittanning coal bed underlies nearly three quarters of the county at minable thickness. An original reserve of 1,047,286,000 short tons is estimated for this bed in the county. Table 26 below shows the thickness and reliability distribution of these reserves. It is interesting to note that a large percentage of the estimate falls into the 28 - 42 inch thickness range. Figure 13 shows the outcrop and thickness distribution of this coal bed. Stout (1918, pp. 182-207) discusses in detail the Middle Kittanning coal.

Table 26

Estimated original reserves of the Middle Kittanning coal bed in Muskingum County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 2,584 | 142,757 | 40,618 | 1,022 | - | 186,981 |
| Probable | 20,852 | 364,028 | 74,650 | 1,022 | - | 460,552 |
| Strongly Inferred | 38,741 | 178,139 | 2,317 | - | - | 219,197 |
| Weakly Inferred | 37,570 | 142,986 | - | - | - | 180,556 |
| Total | 99,747 | 827,910 | 117,585 | 2,044 | - | 1,047,286 |

Coal reserves in the Lower Freeport coal bed are negligible and are not estimated. Stout (1918, p. 211) ites only one thickness measurement in Section 25 of Brush Creek Township. This coal bed is of importance to ıe east in Jefferson and Harrison Counties.

Coal of the Upper Freeport bed is characterized by its erratic nature, and Stout (1918, p. 211) states that it "....is unsteady in both thickness and extent in Muskingum County." Although the horizon may be traced through a large part of the county only four small deposits of minable coal at this horizon are known from existing data. Most northerly is one underlying about two square miles in Monroe Township. To the southeast and covering about 30 square miles another minable body of the coal lies in southeastern Washington, western

Perry, northwestern Salt Creek, and northeastern Wayne Townships. Still farther south in parts of Newton, Brush Creek, and Harrison Townships an area of perhaps 20 square miles, and still another area of about 2 square miles are found in southern Harrison Township. In all of these localities the coal ranges from less than 14 inches to more than 42 inches thickness. Original reserves of this bed in Muskingum County are estimated at 156,274,000 tons. This is shown in Table 27 and the areal extent and thickness of the bed is depicted in Figure 14.

Table 27

Estimated original reserves of the Upper Freeport coal bed in Muskingum County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 7,394 | 17,592 | 38,167 | - | - | 63,153 |
| Probable | 24,153 | 39,027 | 28,761 | - | - | 91,941 |
| Strongly Inferred | 716 | 464 | - | - | - | 1,180 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 32,263 | 57,083 | 66,928 | - | - | 156,274 |

## NOBLE COUNTY

Allegheny rocks do not outcrop in Noble County and all available information is from drill holes and mine data. Middle Kittanning coal is known only in one area where it was pierced by the drill. On the basis of this information a five square mile area is estimated for the No. 6 coal bed with a maximum thickness of 49 inches. An estimated original reserve tonnage of more than 7 million tons is shown in Table 28.

Table 28

Estimated original reserves of the Middle Kittanning coal bed in Noble County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | - | - | 1,363 | - | - | 1,363 |
| Probable | 2,584 | 2,319 | 1,590 | - | - | 6,493 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 2,584 | 2,319 | 2,953 | - | - | 7,856 |

The Upper Freeport coal is known at minable thickness in the northern part of Noble County in parts of Wayne, Seneca, Buffalo, and Brookfield Townships. This is the southern extension of the Cambridge field and was extensively mined in the past. Figure 12 shows estimated extent and thickness and Table 29 shows the estimated original reserves.

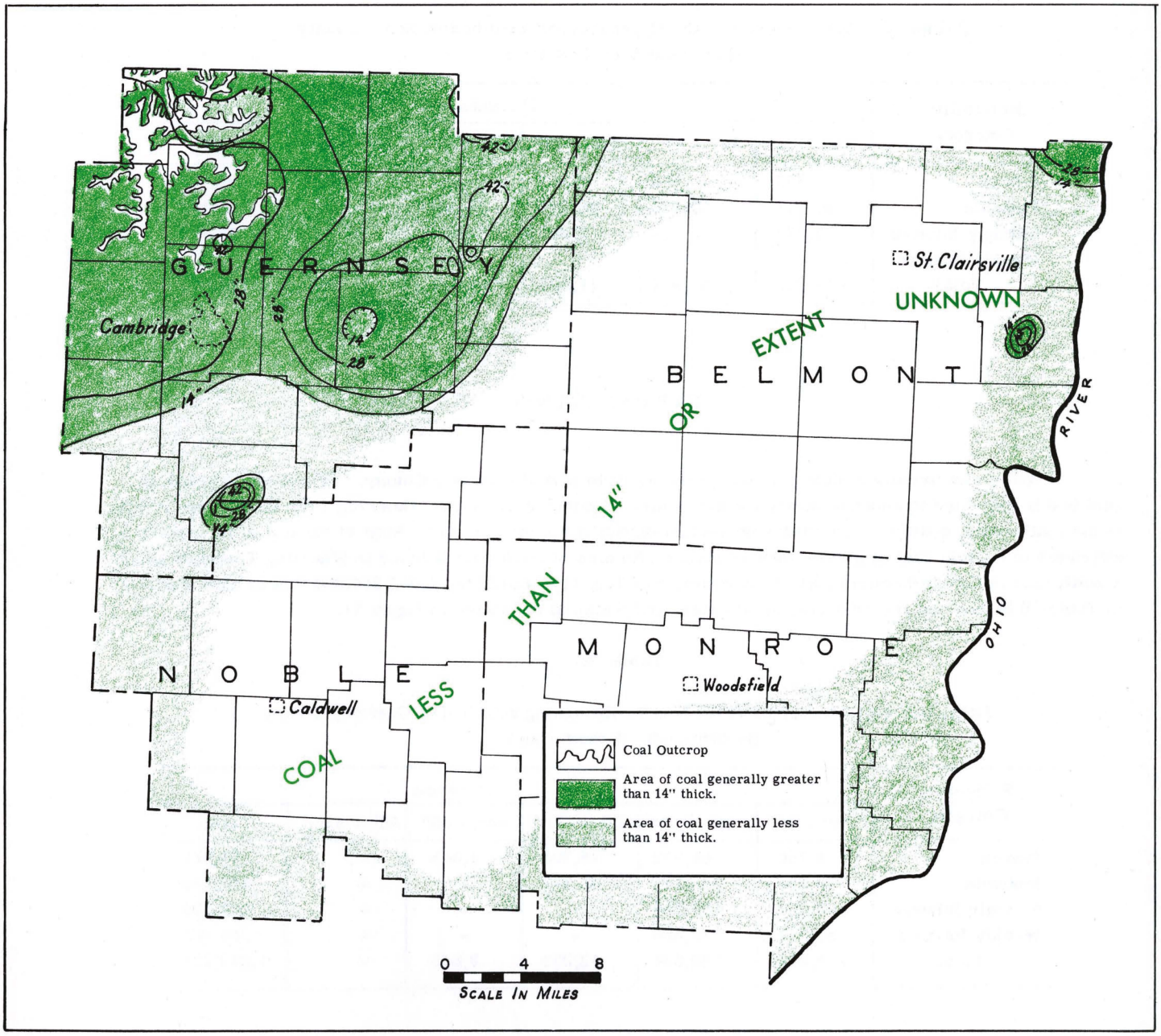



Figure 11. The Middle Kittanning coal bed in Guernsey, Belmont, Noble, and Monroe Counties.

Table 29

Estimated original reserves of the Upper Freeport coal bed in Noble County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 398 | 696 | 9,223 | 14,937 | 4,089 | 29,343 |
| Probable | 20,215 | 52,876 | 28,897 | 64,404 | 136 | 166,528 |
| Strongly Inferred | 3,638 | 4,373 | 2,908 | 16,073 | - | 26,992 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 24,251 | 57,945 | 41,028 | 95,414 | 4,225 | 222,863 |

## GUERNSEY COUNTY

Allegheny formation rocks crop out in the northern part of Guernsey County. The Middle Kittanning coal bed is estimated to underlie nearly the entire area at minable thickness. However, because data are lacking in the southeastern quarter of the county no evaluation was made for that area. Most of the rest of the county is estimated to contain coal at greater than 14 inches. An area of thick coal is found in Wheeling Township and in a small area in the northeastern part of the county (see Fig. 11). Estimated 1,042,214,000 tons of coal is shown in Table 30 below, and the estimated areal extent and thickness are shown in Figure 11.

Table 30

Estimated original reserves of the Middle Kittanning coal bed in Guernsey County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 8,766 | 61,952 | 18,308 | 2,045 | - | 91,071 |
| Probable | 75,256 | 339,545 | 23,945 | - | - | 438,746 |
| Strongly Inferred | 90,226 | 157,299 | - | - | - | 247,525 |
| Weakly Inferred | 83,984 | 180,888 | - | - | - | 264,872 |
| Total | 258,232 | 739,684 | 42,253 | 2,045 | - | 1,042,214 |

Upper Freeport coal though less widespread is generally thick and has been mined extensively in the past. The field is well developed about Cambridge and is hence referred to as the Cambridge field. The thickness ranges from 14 inches to more than 66 inches. Figure 12 shows extent and thickness of Upper Freeport coal in the county and the estimated 704,943,000 tons of original reserves is shown in Table 31.

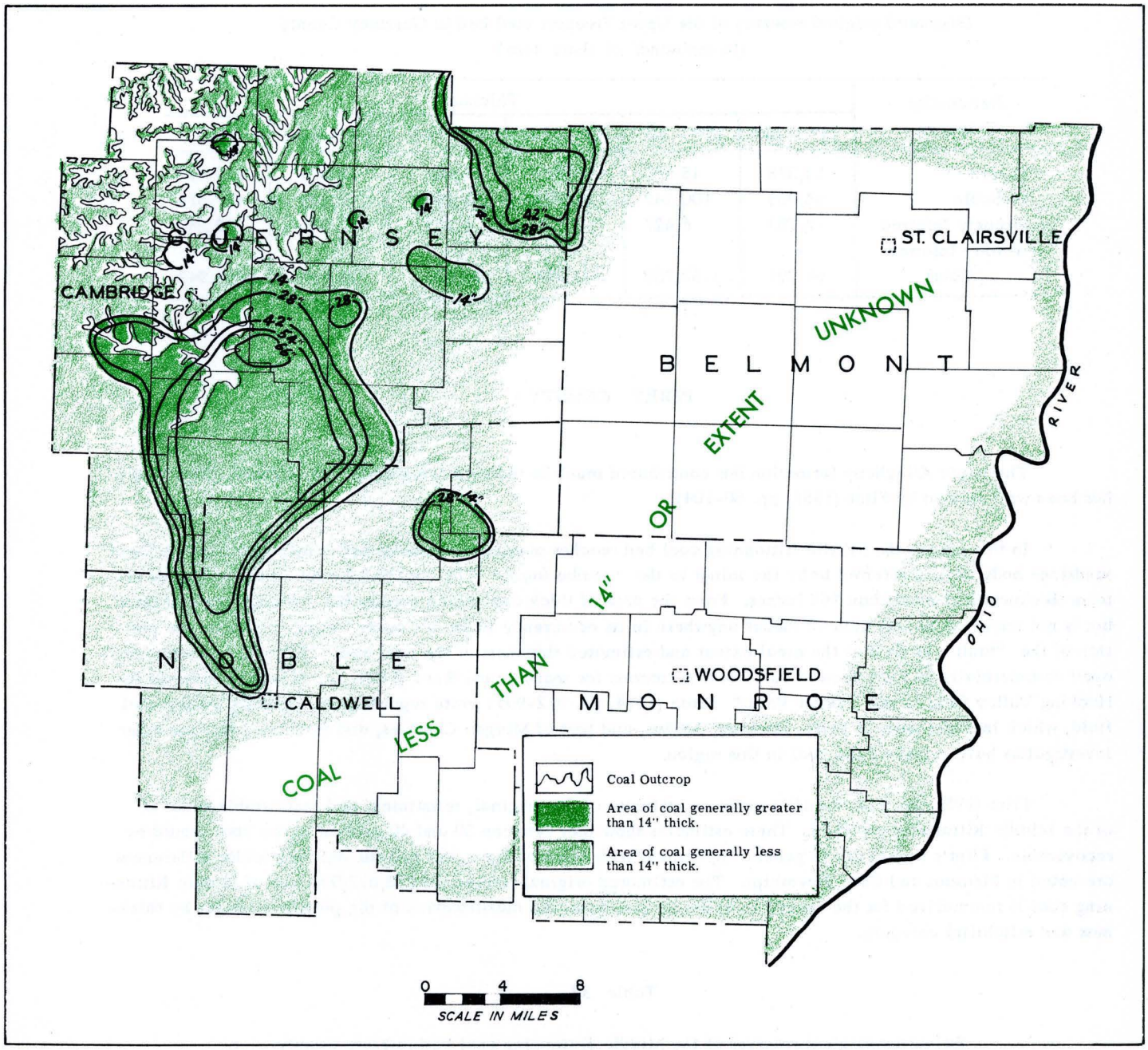



Figure 12. The Upper Freeport coal bed in Guernsey, Belmont, Noble, and Monroe Counties.

Table 31

Estimated original reserves of the Upper Freeport coal bed in Guernsey County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 13,578 | 45,983 | 55,793 | 64,007 | 15,675 | 195,036 |
| Probable | 44,963 | 100,349 | 76,693 | 258,184 | 7,429 | 487,618 |
| Strongly Inferred | 7,753 | 6,427 | 1,772 | 5,792 | 545 | 22,289 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 66,294 | 152,759 | 134,258 | 327,983 | 23,649 | 704,943 |

## PERRY COUNTY

The upper Allegheny formation has contributed much to the coal reserves of Perry County. This area has been well studied by Flint (1951, pp. 80-104).

In this county the Middle Kittanning coal bed reaches unusual dimensions and is associated with a large sandstone body usually referred to by the miner as the "jumbo fault." The coal bed bordering the sandstone attains thicknesses of more than 168 inches. From the area of thick coal which borders the "fault," the bed thins but is not known to be less than 42 inches anywhere in its occurrence in Perry County. Figure 13 shows the position of the "fault" as well as the areal extent and estimated thickness of the coal bed. This coal bed was developed commercially and has been of considerable interest for many years; Reed (1878, pp. 815-882) discusses the Hocking Valley field of the "Great Vein," Orton (1884, pp. 912-991) wrote regarding the Hocking Valley coal field, which includes parts of Perry, Hocking, Athens, and part of Morgan Counties, and from time to time other investigators have reviewed the coal in this region.

Flint (1951, pp. 101 and 103) made an estimate of the original, remaining, and recoverable reserves of the Middle Kittanning coal bed. These estimates show that between 30 and 40 percent of the coal should be recoverable. Flint's figures are in general agreement with those of the writer and the only particular differences are noted in Pleasant and Coal Townships. The estimated original reserve of 772,617,000 tons of Middle Kittanning coal is summarized for the county in Table 32 and shows the classification of the present estimate by thickness and reliability category.

Table 32

Estimated original reserves of the Middle Kittanning coal bed in Perry County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 28" - 42" | 42" - 54" | 54" - 66" | 66" - 78" | 78" - 90" | 90"-102" | 102" & over | Total |
| Proven[1] | 3,280 | 285,239 | 214,736 | 39,528 | 27,431 | 32,077 | 170,326 | 772,617 |
| Probable | - | - | - | - | - | - | - | - |
| Strongly Inferred | - | - | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - | - | - |
| Total | 3,280 | 285,239 | 214,736 | 39,528 | 27,431 | 32,077 | 170,326 | 772,617 |

[1] Although this estimate is shown to be in the proven category, a relatively small but undetermined portion should be considered as probable.

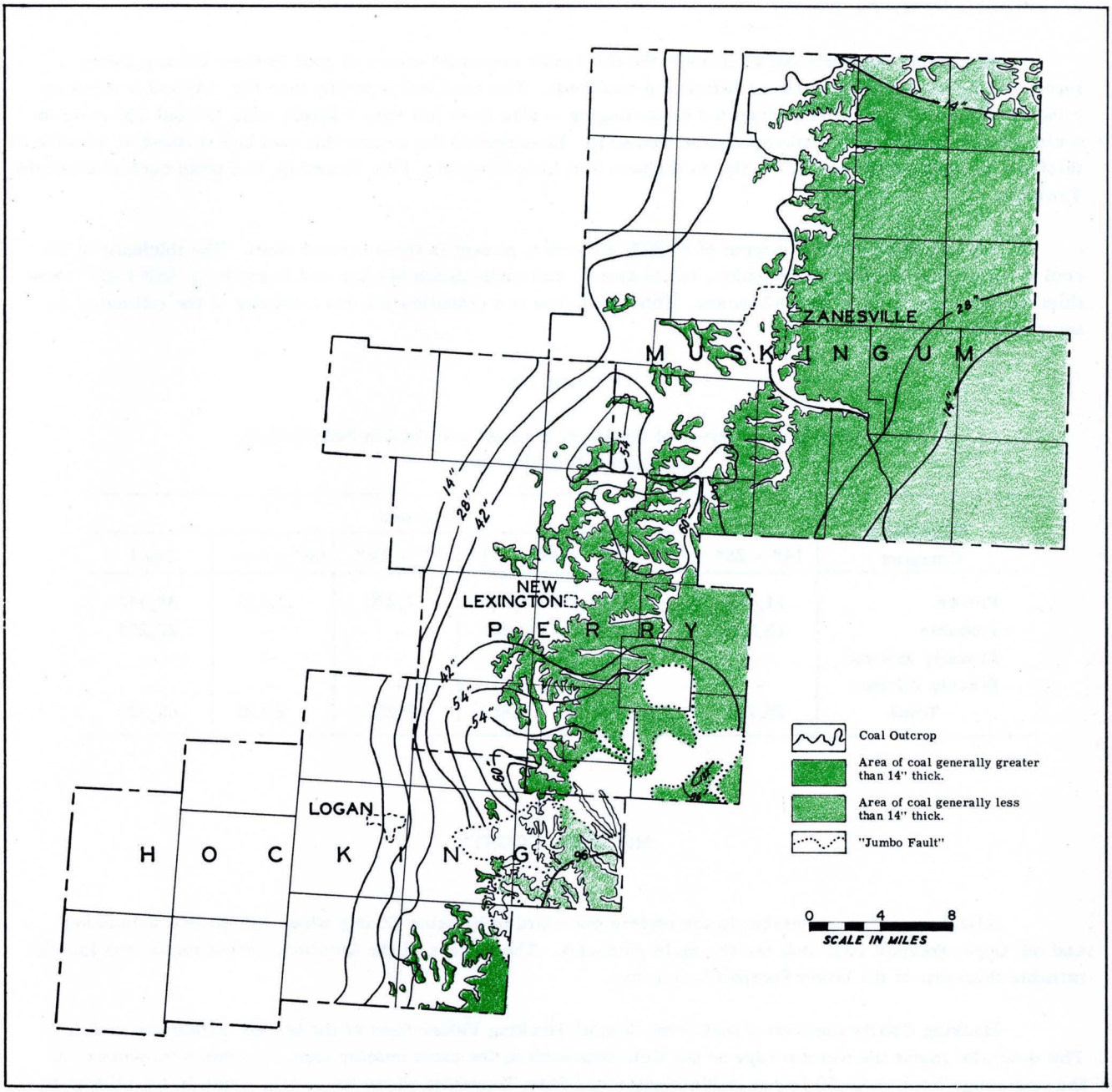



**Figure 13.** The Middle Kittanning coal bed in Muskingum, Perry, and Hocking Counties.

Although the Lower Freeport coal has been mined in the county, it is generally thin and is therefore not estimated for reserve purposes.

The Upper Freeport coal constitutes the third most important source of coal in Perry County, being superseded by the Middle and Lower Kittanning coal beds. This coal bed is patchy (See Fig. 14) and is noted at minable thickness in six widely separated areas ranging in size from less than a square mile in Coal Township to a nine square mile area in northern Monroe Township. Elsewhere in the county this coal bed is found at minable thickness in southern Monroe Township, in southern Salt Lick Township, Pike Township, and north central Bearfield Township.

An estimated original reserve of 65,922,000 tons is present in these several areas. The thickness of the coal in most areas is less than 28 inches, but in central and northeastern Monroe and in southern Salt Lick Townships the thickness is more than 42 inches. Table 33 below is a classification and summary of the estimated reserve of this coal bed.

Table 33

Estimated original reserves of the Upper Freeport coal bed in Perry County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 11,132 | 8,978 | 8,132 | 7,270 | 3,135 | 38,647 |
| Probable | 15,583 | 9,011 | 2,681 | - | - | 27,275 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 26,715 | 17,989 | 10,813 | 7,270 | 3,135 | 65,922 |

## HOCKING COUNTY

Allegheny rocks are present in the eastern one-third of Hocking County where the Middle Kittanning and the Upper Freeport coal beds are the main producers. The horizon of the Strasburg coal is found; and locally minable thickness of the Lower Freeport bed occurs.

Hocking County contains a part of the famous Hocking Valley field of the Middle Kittanning coal bed. This area also marks the western edge of the field inasmuch as the rocks outcrop here. Recorded thicknesses of the coal range from about 30 inches in Washington and Starr Townships where the coal is found in the hilltops to more than 120 inches in Ward Township just north of Nelsonville. The associated sandstone body is found adjacent to the coal in many places although the extent of the "Jumbo Fault" is much less than it is in Perry County. See Figure 13 for the extent and thickness of the coal and the association with the "Jumbo Fault." The estimated 193,901,000 tons of original reserves is distributed by thickness and reliability in Table 34; the estimate by township is shown in Table 48.

Outcrops of the Upper Freeport coal occur along the eastern border of the county. However, only in Ward Township is there a minable body of the Upper Freeport coal (see Fig. 14). In this area the thickness ranges from less than 14 inches to as much as 46 inches. An estimated original reserve of 25,218,000 tons is present. Table 35 shows a summary of the estimate.

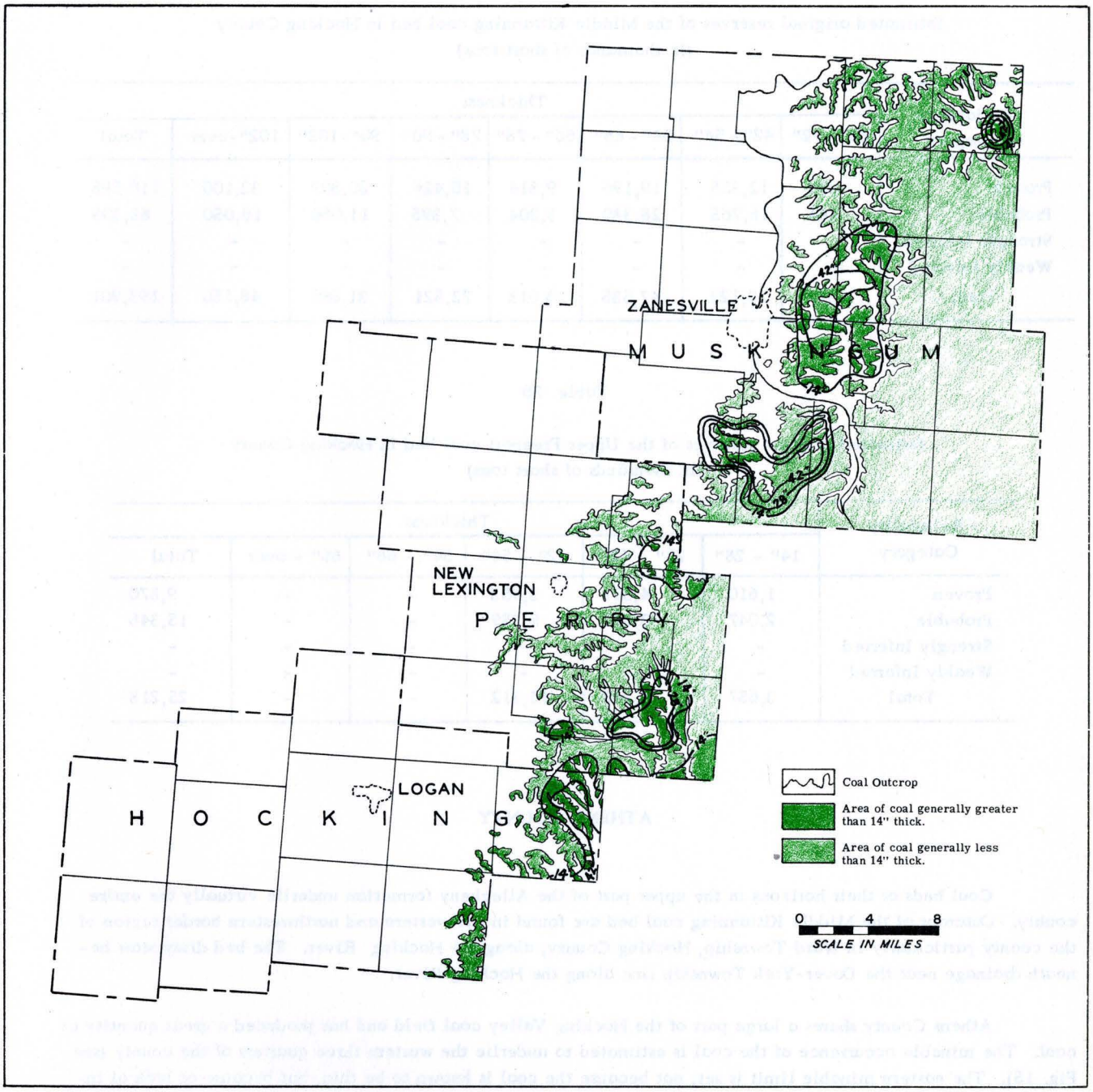



**Figure 14.** The Upper Freeport coal bed in Muskingum, Perry, and Hocking Counties.

Table 34

Estimated original reserves of the Middle Kittanning coal bed in Hocking County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 28" - 42" | 42" - 54" | 54" - 66" | 66" - 78" | 78" - 90" | 90"-102" | 102"-over | Total |
| Proven | 895 | 12,358 | 19,196 | 9,814 | 15,426 | 20,809 | 32,100 | 110,598 |
| Probable | 464 | 16,765 | 28,339 | 3,204 | 7,395 | 11,086 | 16,050 | 83,303 |
| Strongly Inferred | - | - | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - | - | - |
| Total | 1,359 | 29,123 | 47,535 | 13,018 | 22,821 | 31,895 | 48,150 | 193,901 |

Table 35

Estimated original reserves of the Upper Freeport coal bed in Hocking County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 1,610 | 4,307 | 3,953 | - | - | 9,870 |
| Probable | 2,047 | 3,942 | 9,359 | - | - | 15,348 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 3,657 | 8,249 | 13,312 | - | - | 25,218 |

## ATHENS COUNTY

Coal beds or their horizons in the upper part of the Allegheny formation underlie virtually the entire county. Outcrops of the Middle Kittanning coal bed are found in the western and northwestern border region of the county particularly in Ward Township, Hocking County, along the Hocking River. The bed disappears beneath drainage near the Dover-York Township line along the Hocking River.

Athens County shares a large part of the Hocking Valley coal field and has produced a great quantity of coal. The minable occurrence of the coal is estimated to underlie the western three quarters of the county (see Fig. 15). The eastern minable limit is set, not because the coal is known to be thin, but because of lack of information. To the south and west, however, in Vinton and western Meigs County, the Middle Kittanning coal is known to be generally less than 14 inches thick over large areas. Such areas are inferred to extend to the east and represent an inferred area of thin coal in southern Athens County.

From the areas of thick coal in the northwestern part of the county where measurements show 100 inches in Trimble and 120 inches in York Township, the thickness gradually decreases to the south and east. In the southwestern part of Ames Township an area of about two square miles, this bed is less than 14 inches thick. Thickening takes place in Canaan Township where nearly the entire township is underlain by coal over 42 inches.

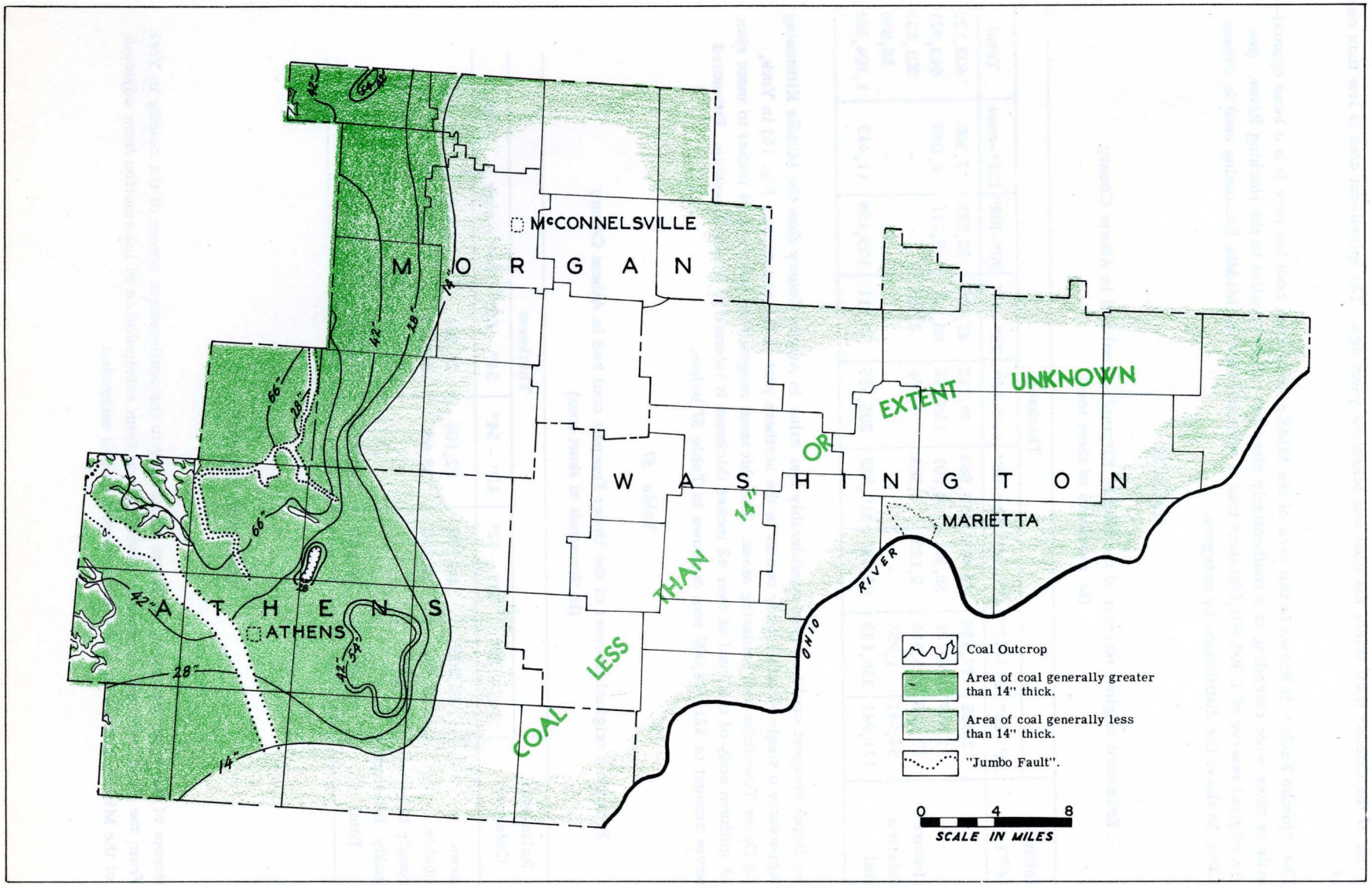



Figure 15. The Middle Kittanning coal bed in Athens, Morgan, and Washington Counties.

Drill data show that the eastern half of the township contains this coal at thicknesses of over 54 inches. This area is the site of the Canaan shaft where the coal was taken out years ago. The mined-out area is less than one square mile.

The "Jumbo Fault" is known in this area of the Middle Kittanning coal but here it is a band approximately a mile or more wide extending in a southeasterly direction nearly parallel to the Hocking River. (see Fig. 15). An original reserve of 1,304,501,000 short tons is estimated for the Middle Kittanning coal in Athens County. Table 36 shows the distribution by category.

Table 36

Estimated original reserves of the Middle Kittanning coal bed in Athens County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66"-78" | 78"-90" | 90"-102" | 102"-over | Total |
| Proven | 2,088 | 37,536 | 22,445 | 174,868 | 39,732 | 47,309 | 70,788 | 7,360 | 402,126 |
| Probable | 31,627 | 190,726 | 38,301 | 134,601 | 159,749 | 46,117 | 38,711 | 4,089 | 643,921 |
| Strongly Inferred | 83,285 | 105,916 | 2,135 | 1,363 | 6,474 | 2,385 | - | - | 201,558 |
| Weakly Inferred | 54,941 | 1,955 | - | - | - | - | - | - | 56,896 |
| Total | 171,941 | 336,133 | 62,881 | 310,832 | 205,955 | 95,811 | 109,499 | 11,449 | 1,304,501 |

The Upper Freeport coal bed is of considerably less value in Athens County than the Middle Kittanning coal bed. Apparently a single minable body occurs in the northern part of the county (see Fig. 16) in York, Trimble, and Dover Townships and bordering areas. The thickness ranges from less than 14 inches to more than 66 inches. A uniform body of this coal at over 42 inches thickness is inferred in Dover Township. Estimated original reserves amount to 321,743,000 tons as shown in Table 37 below.

Table 37

Estimated original reserves of the Upper Freeport coal bed in Athens County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 16,260 | 44,792 | 72,106 | 20,501 | 3,816 | 157,475 |
| Probable | 32,202 | 39,390 | 38,665 | 52,024 | - | 162,281 |
| Strongly Inferred | 1,987 | - | - | - | - | 1,987 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 50,449 | 84,182 | 110,771 | 72,525 | 3,816 | 321,743 |

## MORGAN COUNTY

Outcrops of the upper Allegheny rocks are found only in the northwestern corner of the county in York Township. From the little information directly available and from extrapolation of information from adjacent areas, coal of the Middle Kittanning and Upper Freeport beds is estimated.

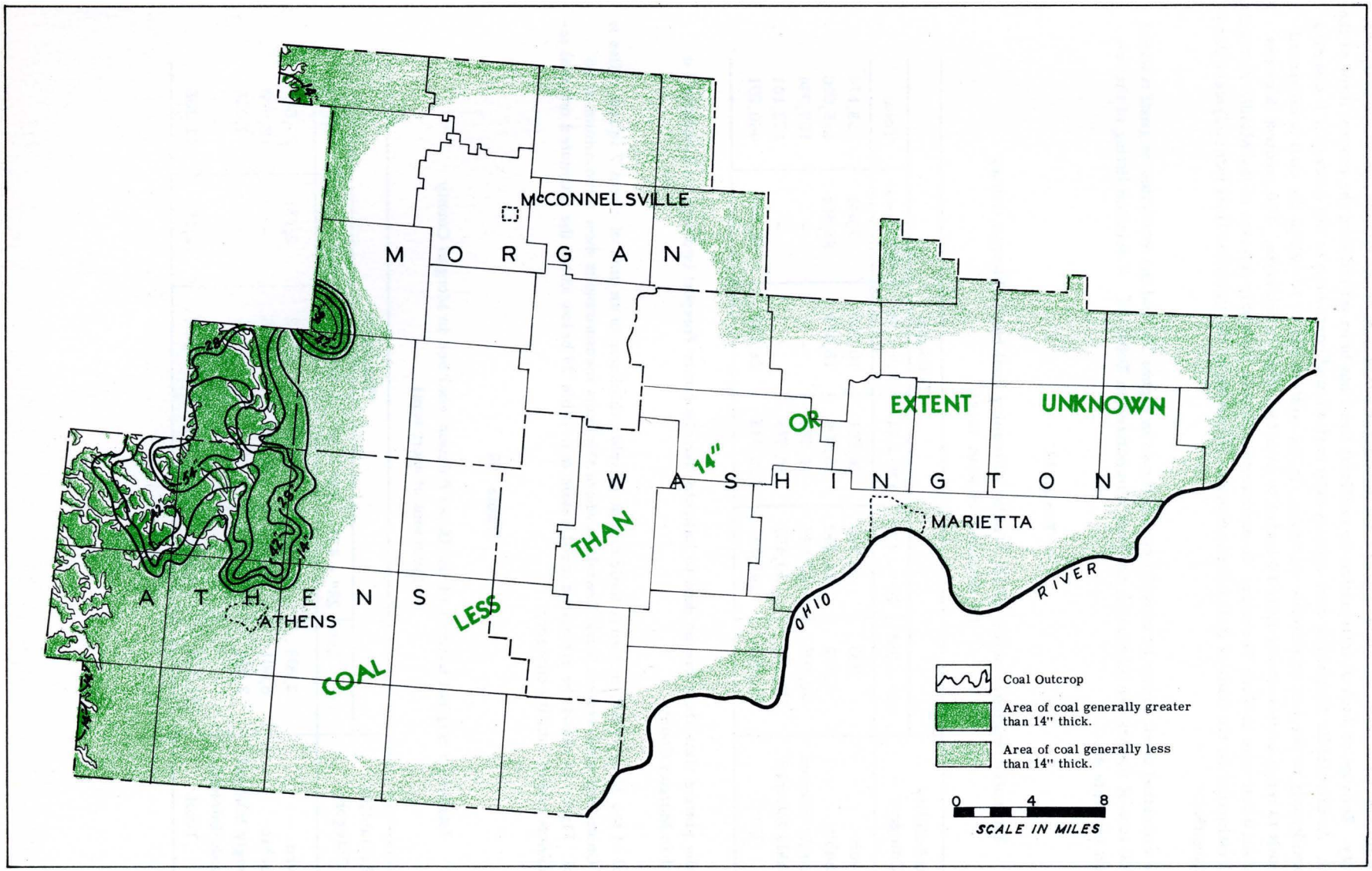



Figure 16. The Upper Freeport coal bed in Athens, Morgan, and Washington Counties.

The Middle Kittanning coal bed is estimated to underlie all or part of the eastern tier of townships of Morgan County. Because of lack of information an artificial limit has been set marking the eastern limit of the minable coal. As the Middle Kittanning coal appears very uniform and continuous at the outcrop it is assumed to extend considerably to the east at minable thickness. In the western tier of townships the coal is estimated on original basis to range economically from 14 inches to over 66 inches in thickness. The greatest thickness observed is from a test core in York Township. In northwestern Homer Township reserves of the Middle Kittanning coal are also estimated on the basis of drill information and extension of the thickness lines from adjacent Perry and Athens Counties.

The estimated areal extent of minable coal is shown in Figure 15, and the estimated original reserves of 446,291,000 tons of the Middle Kittanning coal are summarized in Table 38. A detailed listing of the reserves is found in Table 48.

Table 38

Estimated original reserves of the Middle Kittanning coal bed in Morgan County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 835 | 5,930 | 26,761 | 10,109 | 9,541 | 53,176 |
| Probable | 7,772 | 46,250 | 55,704 | 18,628 | 36,666 | 165,020 |
| Strongly Inferred | 26,895 | 47,144 | 31,895 | - | - | 105,934 |
| Weakly Inferred | 35,163 | 50,423 | 36,575 | - | - | 122,161 |
| Total | 70,665 | 149,747 | 150,935 | 28,737 | 46,207 | 446,291 |

At the present time there are no data to indicate that the Lower Freeport bed may be considered a source of coal in Morgan County.

Coal of the Upper Freeport bed is indicated at minable thickness in an area of about 7 square miles in southwestern Union and northwestern York Townships where thickness measurements show a maximum of 66 inches of coal. Figure 16 shows the estimated areal extent and Table 39 below shows the estimated original reserves by thickness and reliability category.

Table 39

Estimated original reserves of the Upper Freeport coal bed in Morgan County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 2,903 | 3,511 | 7,087 | 9,882 | 2,181 | 25,564 |
| Probable | 6,401 | 3,279 | 3,135 | 795 | - | 13,610 |
| Strongly Inferred | 2,028 | - | - | - | - | 2,028 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 11,332 | 6,790 | 10,222 | 10,677 | 2,181 | 41,202 |

## MEIGS COUNTY

A small area in Columbia Township in the northwest part of the county is estimated to contain the Middle Kittanning coal at thicknesses of 14 to 28 inches. This area, and that adjoining to the west and south, show the first major decline of thickness from the northern extent of the coal bed. The outcrop area of thin coal to the south and west is adjacent to an area in which data are lacking and therefore a large part of the county is assumed to be void of minable Middle Kittanning coal although there is a possibility of such occurrence (see Fig. 17).

Table 40

Estimated original reserves of the Middle Kittanning coal bed in Meigs County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 616 | - | - | - | - | 616 |
| Probable | 17,135 | - | - | - | - | 17,135 |
| Strongly Inferred | 19,321 | - | - | - | - | 19,321 |
| Weakly Inferred | 10,793 | - | - | - | - | 10,793 |
| Total | 47,865 | - | - | - | - | 47,865 |

No data are available for an estimate of the reserves of the Upper Freeport coal bed in Meigs County. A possibility exists that this bed is present at minable thickness but the spotty and erratic nature known from other areas leads to a conclusion of poor outlook for that possibility (see Fig. 18).

## VINTON COUNTY

The upper part of the Allegheny formation is restricted to the eastern tier of townships and small hilltop areas adjacent thereto. Minable coal of the Middle Kittanning and Upper Freeport bed is present though the area is small. Of the two the Middle Kittanning coal bed is the more important.

The Middle Kittanning coal bed in Vinton County shows a major break in an otherwise continuous stratum across the State. The principal area of minable occurrence of the coal is in Brown Township in the northeast corner of the county. The thickness of the bed in this area ranges from 28 inches to 39 inches; the coal thins to the south. In the southwest corner of Knox Township and southern Madison Township the thickness diminishes to less than 14 inches. In the hilltop areas in central southern Vinton Township the thickness ranges from less than 14 inches to more than 42 inches. To the east and south of this area, however, the coal bed is generally less than 14 inches thick. See Figure 17 which shows the outcrop and thickness variations of the Middle Kittanning coal bed. The 173,353,000 tons of estimated original reserves is distributed by category according to Table 41.

The Upper Freeport coal bed is poorly represented at minable thickness in the county, although three small areas occur in Knox Township and one in Vinton Township. Table 42 shows the thickness and reliability of the 21,336,000 tons estimated original reserves. Figure 18 indicates the areal distribution of the coal.

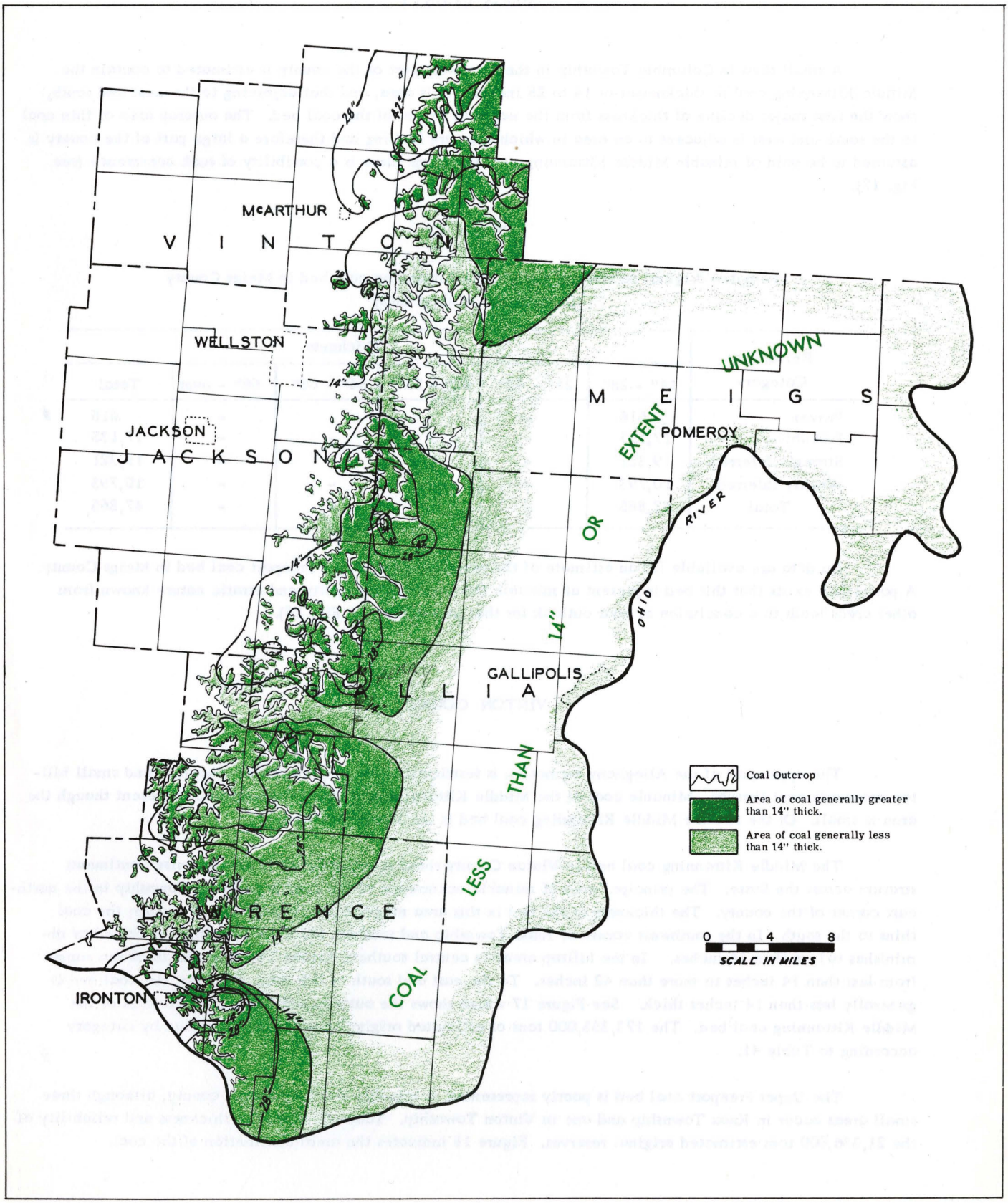



Figure 17. The Middle Kittanning coal bed in Vinton, Jackson, Meigs, Gallia, and Lawrence Counties.

Table 41

Estimated original reserves of the Middle Kittanning coal bed in Vinton County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 19,321 | 28,888 | 21,491 | 1,477 | - | 71,177 |
| Probable | 37,808 | 33,361 | 26,080 | 2,840 | - | 100,089 |
| Strongly Inferred | 2,087 | - | - | - | - | 2,087 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 59,216 | 62,249 | 47,571 | 4,317 | - | 173,353 |

Table 42

Estimated original reserves of the Upper Freeport coal bed in Vinton County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 4,572 | 8,050 | - | 1,988 | - | 14,610 |
| Probable | 5,467 | 1,259 | - | - | - | 6,726 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 10,039 | 9,309 | - | 1,988 | - | 21,336 |

## JACKSON COUNTY

As in Vinton County the Allegheny rocks are found in the eastern portions of the county. The upper part of the formation is restricted to the eastern tier of townships.

The Middle Kittanning coal bed is present but the field is broken by larger areas of thin coal. In northern Jackson County a small body of the Middle Kittanning coal is present in the hilltops in Milton Township. The area of diminished coal is extensive to the south, but minable thickness is again observed in eastern Bloomfield and over most of Madison Township where it is joined by an area of the coal in adjacent portions of Gallia County. Its thickness in this area is not remarkable and is generally 14 to 28 inches. Figure 17 shows the outcrop and known thickness characteristics while Table 43 shows the distribution of the estimated 64,792,000 tons of original reserves.

A small area in Milton Township fringing on Vinton County contains minable thickness of the Upper Freeport coal (see Fig. 18). This is also true for a small strip of land in the southwestern corner of Madison Township. The estimated original reserves of 5,157,000 tons are shown in Table 50.

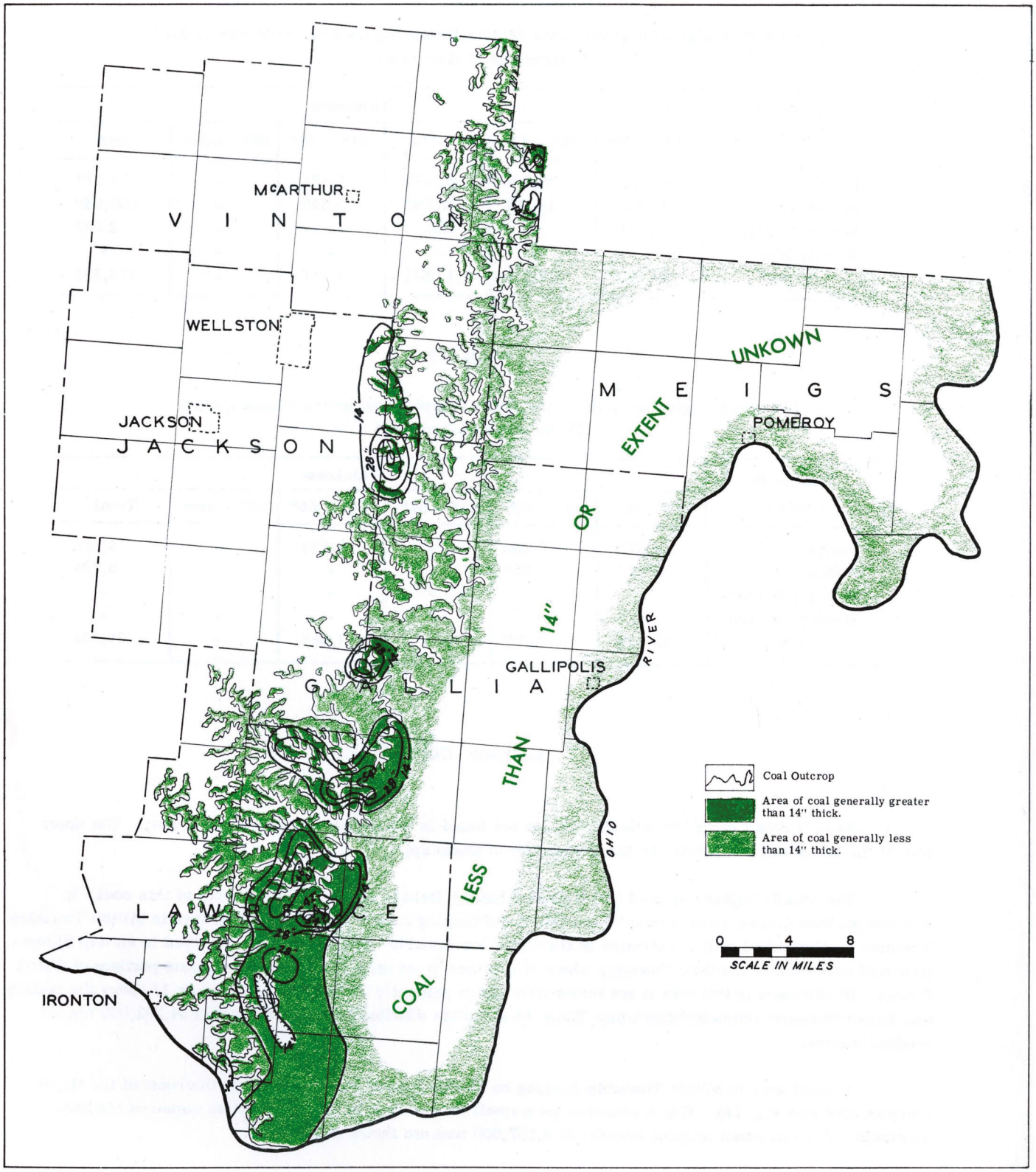



Figure 18. The Upper Freeport coal bed in Vinton, Jackson, Meigs, Gallia, and Lawrence Counties.

Table 43

Estimated original reserves of the Middle Kittanning coal bed in Jackson County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 16,996 | 10,138 | 1,454 | - | - | 28,588 |
| Probable | 26,994 | 9,210 | - | - | - | 36,204 |
| Strongly Inferred | - | - | - | - | - | - |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 43,990 | 19,348 | 1,454 | - | - | 64,792 |

## GALLIA COUNTY

Outcrops of the upper part of the Allegheny formation are found only in the western part of the county.

Minable coal of the Middle Kittanning bed is shared at two areas by Jackson and Lawrence Counties. In the northwestern part of the county minable portions of the coal bed are known in Huntington, Raccoon, northwest Perry, and the northeastern one-third of Greenfield Townships. In this area the thickness ranges from less than 14 inches to a maximum of 66 inches in Huntington Township. A narrow band of thin coal separates the northern body from a southern one which fringes the southern border of Greenfield Township and is estimated to underlie at minable thickness the western one-half of Walnut Township, where the thickness ranges from 14 to 28 inches. A drill hole in Addison Township pierced a coal bed in Section 15 which is believed to be the Middle Kittanning coal. Figure 17 shows the outcrop and the thickness distribution of the Middle Kittanning coal and Table 44 shows the distribution of the estimated 270,187,000 tons of original reserves.

Table 44

Estimated original reserves of the Middle Kittanning coal bed in Gallia County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 13,259 | 30,314 | 9,678 | 1,704 | 341 | 55,296 |
| Probable | 70,944 | 46,516 | 5,225 | 682 | - | 123,367 |
| Strongly Inferred | 77,166 | 563 | - | - | - | 77,729 |
| Weakly Inferred | 13,795 | - | - | - | - | 13,795 |
| Total | 175,164 | 77,393 | 14,903 | 2,386 | 341 | 270,187 |

Upper Freeport coal is estimated for small discontinuous areas located in Huntington, Perry, and Greenfield townships. A drill hole revealed a coal bed in Section 17 of Gallipolis Township which is believed to be Upper Freeport coal. Figure 18 shows the occurrence of this coal and Table 45 shows the distribution of the estimated 71,033,000 tons of estimated original reserves.

Table 45

Estimated original reserves of the Upper Freeport coal bed in Gallia County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" -66" | 66" - 78" | Total |
| Proven | 617 | 6,891 | 11,314 | 9,087 | 3,067 | 30,976 |
| Probable | 11,628 | 6,991 | 12,131 | 2,328 | 68 | 33,146 |
| Strongly Inferred | 3,995 | 2,916 | - | - | - | 6,911 |
| Weakly Inferred | - | - | - | - | - | - |
| Total | 16,240 | 16,798 | 23,445 | 11,415 | 3,135 | 71,033 |

## LAWRENCE COUNTY

This county contains or shares three areas of the minable Middle Kittanning coal bed. In northern Washington Township a small area of minable coal is adjacent to the field in Jackson and Gallia Counties. To the south the comparatively large area of the coal occurs with thickness ranging from less than 14 inches to 44 inches. The coal tapers southward and is diminished below minable thickness in northern Upper and central Lawrence Townships. Minable thickness is also found just to the south in central and central upper Lawrence Township and farther south in Perry and Fayette Townships. The thickness is not great here, but moderate areas of the coal exceed 28 inches. Figure 17 reveals the outcrop and known thickness variations of the coal. Table 46 summarizes the 431,500,000 tons of estimated original reserves.

Table 46

Estimated original reserves of the Middle Kittanning coal bed in Lawrence County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - over | Total |
| Proven | 14,651 | 41,776 | 16,084 | - | - | 72,511 |
| Probable | 118,431 | 127,714 | 11,585 | - | - | 257,730 |
| Strongly Inferred | 81,916 | 11,730 | - | - | - | 93,646 |
| Weakly Inferred | 7,613 | - | - | - | - | 7,613 |
| Total | 222,611 | 181,220 | 27,669 | - | - | 431,500 |

Upper Freeport coal is found in two moderate-sized areas in the county. One is in the extreme north in Symmes Township where coal is present from less than 14 to 78 inches in thickness. The second area is in Aid, Mason, Lawrence, and Perry Townships where the coal ranges from less than 14 to more than 66 inches. Figure 18 shows the areal relationships and Table 47 shows the distribution of the estimated original reserves of this coal bed.

Table 47

Estimated original reserves of the Upper Freeport coal bed in Lawrence County
(In thousands of short tons)

| Reliability Category | Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 14" - 28" | 28" - 42" | 42" - 54" | 54" - 66" | 66" - 78" | Total |
| Proven | 17,413 | 21,004 | 19,765 | 13,347 | 5,998 | 77,527 |
| Probable | 58,957 | 47,175 | 8,996 | 2,896 | 682 | 118,706 |
| Strongly Inferred | 45,739 | 331 | - | - | - | 46,070 |
| Weakly Inferred | 7,474 | - | - | - | - | 7,474 |
| Total | 129,583 | 68,510 | 28,761 | 16,243 | 6,680 | 249,777 |

## SCIOTO COUNTY

This county is on the very fringe of the upper part of the Allegheny rocks and therefore only a few hilltops contain minable Middle Kittanning coal. Figure 17 may be examined, and Table 48 shows the distribution of 1,750,000 tons of estimated original reserves.

# CHAPTER 5

# MINING HISTORY

For many years the upper Allegheny formation coal beds have been a source of commercial fuel in Ohio.

The following counties have produced significant quantities of coal from these coal beds:

| County | Principal Beds Mined | Production (1800 - 1955) |
|---|---|---|
| Athens | 5, 6, 7, 8 | 195,482,536 |
| Carroll | 5, 6, 7 | 18,391,752 |
| Columbiana | 5, 6, 6a, 7 | 53,421,941 |
| Coshocton | 6, 7 | 26,475,143 |
| Gallia | 6, 7 | 7,451,447 |
| Guernsey | Formerly much 7 | 121,838,688 |
| Harrison | 8 and some 7 | 153,677,538 |
| Hocking | 6 | 75,411,258 |
| Jackson | Coals below 5 | 61,209,953 |
| Jefferson | 8 but also 5, 6, 6a, 7 | 257,672,665 |
| Lawrence | 4, 5, and 8 | 13,751,236 |
| Mahoning | 5, some 6, and others lower | 18,492,696 |
| Muskingum | 6 and 7 | 47,300,379 |
| Morgan | None | |
| Noble | 7 in part | 30,821,241 |
| Perry | 6, some 7 | 141,741,553 |
| Stark | 6, formerly 1, some 5 & 4 | 52,284,724 |
| Tuscarawas | 6 and 7 | 93,011,691 |
| Vinton | 6, 7, and others | 11,341,888 |

Some of the production as shown in the table above is from beds other than the upper Allegheny formation. However, the greater amount listed is from the Middle Kittanning (No. 6) and Upper Freeport (No. 7) coal beds. These beds have long contributed substantially to the Ohio coal production. In 1954 reported production from the Middle Kittanning, Lower and Upper Freeport coal beds amounted to 8,362,532 tons out of a total of 31,472,066 tons total reported production. The Middle Kittanning coal bed is second only to the Pittsburgh bed in amount of coal produced; the amounts for these were (1954) 7,562,271 and 14,291,091 tons respectively. Thus it may be appreciated that the upper Allegheny coal beds, especially the Middle Kittanning coal bed, are important in Ohio's coal mining economy.

Most of the Ohio coal is recovered by strip mining, although substantial amounts are mined by underground methods. In 1955 the Ohio coal production amounted to 37,034,321 tons. Of this amount 24,448,302 tons

or 66 percent was strip or auger mined. During this same period about 9,700,000 tons was mined from upper Allegheny coal beds, about 4,500,000 tons of which was produced from underground mines. Production from the Pittsburgh coal bed only, exceeds the rate of production from the Allegheny formation coal beds.

In recent years an increasing amount of coal has been produced by auger mining methods, and in the figures quoted above auger and strip mined coal production are combined.

Augering has been used principally to recover a band of coal behind the last strip cut of the highwall in open pit mining. It utilizes a tool somewhat the shape of a carpenter's auger. The sizes vary from 24 inches to considerably greater. Recent legislation has been passed to control the safety aspects of this method, particularly for the covering of the resulting holes.

The future recovery for most of the reserves is necessarily deep mine operations as many of the thicker occurrences of the coal are well beyond present "strippable" depth.

# TABLE 48

## ESTIMATED ORIGINAL RESERVES OF THE MIDDLE KITTANNING COAL BED IN OHIO

(In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| ATHENS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alexander | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,089 | 133 | -- | -- | -- | 5,222 | 41,087 | -- | -- | -- | -- | 41,087 | 46,176 | 133 | -- | -- | -- | 46,309 |
| Ames | 616 | 629 | 318 | 2,896 | 10,870 | 15,329 | 1,650 | 25,973 | 3,862 | 8,917 | 10,757 | 51,159 | 11,648 | 30,910 | -- | -- | -- | 42,558 | 2,127 | -- | -- | -- | -- | 2,127 | 16,041 | 57,512 | 4,180 | 11,813 | 21,627 | 111,173 |
| Athens | 40 | 1,756 | 1,772 | 7,554 | -- | 11,122 | 40 | 21,634 | 7,451 | 27,772 | -- | 56,897 | 5,148 | 38,497 | -- | -- | -- | 43,645 | 1,391 | 1,955 | -- | -- | -- | 3,346 | 6,619 | 63,842 | 9,223 | 35,326 | -- | 115,010 |
| Bern | -- | -- | -- | -- | -- | -- | 318 | -- | -- | -- | -- | 318 | 4,492 | -- | -- | -- | -- | 4,492 | -- | -- | -- | -- | -- | -- | 4,810 | -- | -- | -- | -- | 4,810 |
| Canaan | -- | 10,535 | 11,223 | 50,774 | -- | 72,532 | -- | 54,730 | 5,543 | 12,381 | -- | 72,654 | -- | 11,231 | -- | -- | -- | 11,231 | -- | -- | -- | -- | -- | -- | -- | 76,496 | 16,766 | 63,155 | -- | 156,417 |
| Carthage | -- | -- | -- | -- | -- | -- | 1,670 | 596 | -- | -- | -- | 2,266 | 3,498 | -- | -- | -- | -- | 3,498 | -- | -- | -- | -- | -- | -- | 5,168 | 596 | -- | -- | -- | 5,764 |
| Dover | 398 | 1,259 | 1,681 | 52,761 | 93,937 | 150,036 | -- | -- | -- | 15,164 | 76,671 | 91,835 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 398 | 1,259 | 1,681 | 67,925 | 170,608 | 241,871 |
| Lee | 318 | -- | -- | -- | -- | 318 | 13,954 | 563 | -- | -- | -- | 14,517 | 27,451 | -- | -- | -- | -- | 27,451 | 10,018 | -- | -- | -- | -- | 10,018 | 51,741 | 563 | -- | -- | -- | 52,304 |
| Lodi | -- | 2,485 | 1,136 | 3,976 | -- | 7,597 | 2,386 | 22,992 | 1,499 | 1,022 | -- | 27,899 | 14,709 | 2,319 | -- | -- | -- | 17,028 | 318 | -- | -- | -- | -- | -318 | 17,413 | 27,796 | 2,635 | 4,998 | -- | 52,842 |
| Rome | -- | 398 | -- | -- | -- | 398 | 8,229 | 10,336 | 1,090 | 170 | -- | 19,825 | 8,408 | -- | -- | -- | -- | 8,408 | -- | -- | -- | -- | -- | -- | 16,637 | 10,734 | 1,090 | 170 | -- | 28,631 |
| Trimble | 716 | 1,093 | 1,227 | 795 | 22,785 | 26,616 | 3,360 | 7,454 | 8,042 | 17,606 | 133,932 | 170,394 | 99 | 232 | -- | 170 | 8,859 | 9,360 | -- | -- | -- | -- | -- | -- | 4,175 | 8,779 | 9,269 | 18,571 | 165,576 | 206,370 |
| Wategloo | -- | 19,381 | 4,316 | 738 | -- | 24,435 | 20 | 46,448 | 10,723 | 20,730 | -- | 77,921 | 2,743 | 22,594 | 2,135 | 1,193 | -- | 28,665 | -- | -- | -- | -- | -- | -- | 2,763 | [redacted] | 17,174 | 22,661 | -- | 131,021 |
| York | -- | -- | 772 | 55,374 | 37,597 | 93,743 | -- | -- | 91 | 30,839 | 27,306 | 58,236 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 863 | 86,213 | 64,903 | 151,979 |
| Total | 2,088 | 37,536 | 22,445 | 174,868 | 165,189 | 402,126 | 31,627 | 190,726 | 38,301 | 134,601 | 248,666 | 643,921 | 83,285 | 105,916 | 2,135 | 1,363 | 8,859 | 201,558 | 54,941 | 1,955 | -- | -- | -- | 56,896 | 171,941 | 336,133 | 62,881 | 310,832 | 422,714 | 1,304,501 |
| BELMONT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Colerain | -- | -- | -- | -- | -- | --- | 139 | -- | -- | -- | -- | 139 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 139 | -- | -- | -- | -- | 139 |
| Flushing | -- | -- | -- | -- | -- | --- | 5,347 | 133 | -- | -- | -- | 5,480 | 755 | -- | -- | -- | -- | 755 | -- | -- | -- | -- | -- | -- | 6,102 | 133 | -- | -- | -- | 6,235 |
| Kirkwood | -- | -- | -- | -- | -- | --- | 239 | -- | -- | -- | -- | 239 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 239 | -- | -- | -- | -- | 239 |
| Pease | -- | 3,313 | -- | -- | -- | 3,313 | 4,771 | 13,318 | -- | -- | -- | 18,089 | 1,292 | 2,319 | -- | -- | -- | 3,611 | -- | -- | -- | -- | -- | -- | 6,063 | 18,950 | -- | -- | -- | 25,013 |
| Pultney | -- | 1,325 | 2,726 | -- | -- | 4,051 | 3,240 | 2,153 | 545 | -- | -- | 5,938 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,240 | 3,478 | 3,271 | -- | -- | 9,989 |
| Warren | -- | 3,313 | -- | -- | -- | 3,313 | 5,765 | 21,534 | -- | -- | -- | 27,299 | 1,690 | 563 | -- | -- | -- | 2,253 | -- | -- | -- | -- | -- | -- | 7,455 | 25,410 | -- | -- | -- | 32,865 |
| Total | -- | 7,951 | 2,726 | -- | -- | 10,677 | 19,501 | 37,138 | 545 | -- | -- | 57,184 | 3,737 | 2,882 | -- | -- | -- | 6,619 | -- | -- | -- | -- | -- | -- | 23,238 | 47,971 | 3,271 | -- | -- | 74,480 |
| CARROLL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Augusta | -- | -- | -- | -- | -- | -- | 3,836 | 364 | -- | -- | -- | 4,200 | 25,523 | 2,253 | -- | -- | -- | 27,776 | 16,896 | -- | -- | -- | -- | 16,896 | 46,255 | 2,617 | -- | -- | -- | 48,872 |
| Brown | 2,286 | 7,289 | -- | -- | -- | 9,575 | 8,945 | 43,300 | 9,723 | -- | -- | 61,968 | 1,948 | 12,954 | 21,536 | -- | -- | 36,438 | -- | -- | -- | -- | -- | -- | 13,179 | 63,543 | 31,259 | -- | -- | 107,981 |
| Center | -- | -- | -- | -- | -- | -- | -- | 4,406 | 7,678 | -- | -- | 12,084 | 4,294 | 16,565 | 7,224 | -- | -- | 28,083 | 1,590 | -- | -- | -- | -- | 1,590 | 5,884 | 20,971 | 14,902 | -- | -- | 41,757 |
| East | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,180 | -- | -- | -- | -- | 3,180 | 3,180 | -- | -- | -- | -- | 3,180 |
| Harrison | -- | -- | 273 | 1,988 | -- | 2,261 | -- | 2,650 | 36,439 | 8,689 | -- | 47,778 | -- | -- | 85,327 | -- | -- | 85,327 | -- | -- | 6,633 | -- | -- | 6,633 | -- | 2,650 | 128,672 | 10,677 | -- | 141,999 |
| Lee | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 338 | -- | -- | -- | -- | 338 | 338 | -- | -- | -- | -- | 338 |
| Monroe | 437 | 1,226 | 7,497 | -- | -- | 9,160 | 1,133 | 32,400 | 32,259 | -- | -- | 65,792 | 8,786 | 12,821 | -- | -- | -- | 21,607 | -- | -- | -- | -- | -- | -- | 10,356 | 46,447 | 39,756 | -- | -- | 96,559 |
| Orange | 1,173 | 12,755 | 27,034 | -- | -- | 40,962 | 5,884 | 24,582 | 14,630 | -- | -- | 45,096 | 2,723 | -- | -- | -- | -- | 2,723 | -- | -- | -- | -- | -- | -- | 9,780 | 37,337 | 41,664 | -- | -- | 88,781 |
| Perry | 875 | -- | -- | -- | -- | 875 | 1,729 | -- | -- | -- | -- | 1,729 | 119 | -- | -- | -- | -- | 119 | -- | -- | -- | -- | -- | -- | 2,723 | -- | -- | -- | -- | 2,723 |
| Rose | 1,431 | 9,078 | 4,589 | -- | -- | 15,098 | 795 | 13,152 | 51,296 | -- | -- | 65,243 | -- | -- | 42,891 | -- | -- | 42,891 | -- | -- | -- | -- | -- | -- | 2,226 | 22,230 | 98,776 | -- | -- | 123,232 |
| Union | -- | 3,313 | -- | -- | -- | 3,313 | 1,948 | 17,559 | -- | -- | -- | 19,507 | 16,737 | 2,385 | -- | -- | -- | 19,122 | 1,729 | -- | -- | -- | -- | 1,729 | 20,414 | 23,257 | -- | -- | -- | 43,671 |
| Washington | -- | -- | -- | 3,180 | -- | 3,180 | 855 | 12,059 | 4,225 | 3,237 | -- | 20,376 | 9,959 | 596 | -- | -- | -- | 10,555 | -- | -- | -- | -- | -- | -- | 10,814 | 12,655 | 4,225 | 6,417 | -- | 34,111 |
| Total | 6,202 | 33,661 | 39,393 | 5,168 | -- | 84,424 | 25,125 | 150,472 | 156,250 | 11,926 | -- | 343,773 | 70,089 | 47,574 | 156,978 | -- | -- | 274,641 | 23,733 | -- | 6,633 | -- | -- | 30,366 | 125,149 | 231,707 | 359,254 | 17,094 | -- | 733,204 |
| COLUMBIANA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butler | 1,769 | -- | -- | -- | -- | 1,769 | 24,489 | 2,982 | -- | -- | -- | 27,471 | 34,746 | 331 | -- | -- | -- | 35,077 | 537 | -- | -- | -- | -- | 537 | 61,541 | 3,313 | -- | -- | -- | 64,854 |
| Center | 4,890 | -- | -- | -- | -- | 4,890 | 22,879 | -- | -- | -- | -- | 22,879 | 10,098 | -- | -- | -- | -- | 10,098 | -- | -- | -- | -- | -- | -- | 37,867 | -- | -- | -- | -- | 37,867 |
| Elk Run | 1,014 | 1,789 | -- | -- | -- | 2,803 | 3,180 | 431 | -- | -- | -- | 3,611 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,194 | 2,220 | -- | -- | -- | 6,414 |
| Fairfield | 60 | 663 | -- | -- | -- | 723 | 8,746 | 497 | -- | -- | -- | 9,243 | 5,566 | -- | -- | -- | -- | 5,566 | -- | -- | -- | -- | -- | -- | 14,372 | 1,160 | -- | -- | -- | 15,532 |
| Franklin | -- | -- | -- | -- | -- | -- | 6,599 | -- | -- | -- | -- | 6,599 | 6,063 | -- | -- | -- | -- | 6,063 | 298 | -- | -- | -- | -- | 298 | 12,960 | -- | -- | -- | -- | 12,960 |
| Hanover | -- | -- | -- | -- | -- | -- | 596 | -- | -- | -- | -- | 596 | 31,347 | -- | -- | -- | -- | 31,347 | 41,167 | -- | -- | -- | -- | 41,167 | 73,110 | -- | -- | -- | -- | 73,110 |
| Knox | 875 | 3,081 | -- | -- | -- | 3,956 | 6,977 | 16,797 | -- | -- | -- | 23,774 | 4,751 | 26,305 | -- | -- | -- | 31,056 | -- | 4,738 | -- | -- | -- | 4,738 | 12,603 | 50,921 | -- | -- | -- | 63,524 |
| Liverpool | 8,746 | -- | -- | -- | -- | 8,746 | 6,063 | -- | -- | -- | -- | 6,063 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14,809 | -- | -- | -- | -- | 14,809 |
| Middleton | 1,570 | -- | -- | -- | -- | 1,570 | 2,823 | -- | -- | -- | -- | 2,823 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,393 | -- | -- | -- | -- | 4,393 |
| Perry | 3,041 | 3,976 | -- | -- | -- | 7,017 | 16,836 | 6,129 | -- | -- | -- | 22,965 | 1,849 | -- | -- | -- | -- | 1,849 | -- | -- | -- | -- | -- | -- | 21,726 | 10,105 | -- | -- | -- | 31,831 |
| St. Clair | 1,391 | -- | -- | -- | -- | 1,391 | 2,087 | -- | -- | -- | -- | 2,087 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,478 | -- | -- | -- | -- | 3,478 |
| Salem | 10,933 | 7,719 | -- | -- | -- | 18,652 | 35,084 | 5,102 | -- | -- | -- | 40,186 | 3,180 | -- | -- | -- | -- | 3,180 | -- | -- | -- | -- | -- | -- | 49,197 | 12,821 | -- | -- | -- | 62,018 |
| Unity | 1,193 | 3,313 | 1,363 | -- | -- | 5,869 | 2,743 | 1,325 | 136 | -- | -- | 4,204 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,936 | 4,638 | 1,499 | -- | -- | 10,073 |
| Washington | 1,988 | -- | -- | -- | -- | 1,988 | 5,009 | -- | -- | -- | -- | 5,009 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,997 | -- | -- | -- | -- | 6,997 |
| Wayne | 5,168 | -- | -- | -- | -- | 5,168 | 13,219 | -- | -- | -- | -- | 13,219 | 716 | -- | -- | -- | -- | 716 | -- | -- | -- | -- | -- | -- | 19,103 | -- | -- | -- | -- | 19,103 |
| West | -- | -- | -- | -- | -- | -- | 815 | -- | -- | -- | -- | 815 | 51,702 | 5,765 | -- | -- | -- | 57,467 | 10,535 | 5,102 | -- | -- | -- | 15,637 | 63,052 | 10,867 | -- | -- | -- | 73,919 |
| Yellow Creek | 4,373 | 3,512 | -- | -- | -- | 7,885 | 7,653 | 5,897 | -- | -- | -- | 13,550 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 12,026 | 9,409 | -- | -- | -- | 21,435 |
| Total | 47,011 | 24,053 | 1,363 | -- | -- | 72,427 | 165,798 | 39,160 | 136 | -- | -- | 205,094 | 150,018 | 32,401 | -- | -- | -- | 182,419 | 52,537 | 9,840 | -- | -- | -- | 62,377 | 415,364 | 105,454 | 1,499 | -- | -- | 522,317 |
| COSHOCTON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Adams | 1,928 | 232 | -- | -- | -- | 2,160 | 6,977 | 3,379 | -- | -- | -- | 10,356 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,905 | 3,611 | -- | -- | -- | 12,516 |
| Bedford | -- | 1,922 | 409 | -- | -- | 2,331 | 99 | 5,466 | 4,089 | -- | -- | 9,654 | -- | 166 | -- | -- | -- | 166 | -- | -- | -- | -- | -- | -- | 99 | 7,554 | 4,498 | -- | -- | 12,151 |
| Bethlehem | -- | 2,683 | -- | -- | -- | 2,683 | -- | 2,319 | -- | -- | -- | 2,319 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,002 | -- | -- | -- | 5,002 |
| Clark | 139 | 3,677 | -- | -- | -- | 3,816 | 378 | 1,325 | -- | -- | -- | 1,703 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 517 | 5,002 | -- | -- | -- | 5,519 |
| Crawford | 159 | 3,711 | -- | -- | -- | 3,870 | 735 | 5,731 | -- | -- | -- | 6,466 | 835 | -- | -- | -- | -- | 835 | -- | -- | -- | -- | -- | -- | 1,729 | 9,442 | -- | -- | -- | 11,171 |
| Franklin | -- | 1,656 | 13,449 | -- | -- | 15,105 | -- | 2,054 | 36,893 | -- | -- | 38,947 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,710 | 50,342 | -- | -- | 54,052 |
| Jackson | -- | 9,044 | 14,494 | -- | -- | 23,538 | -- | 10,403 | 12,994 | -- | -- | 23,397 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19,447 | 27,488 | -- | -- | 46,935 |
| Keene | -- | 1,822 | -- | -- | -- | 1,822 | -- | 5,102 | -- | -- | -- | 5,102 | -- | 232 | -- | -- | -- | 232 | -- | -- | -- | -- | -- | -- | -- | 7,156 | -- | -- | -- | 7,156 |
| Lafayette | 239 | 3,545 | 2,363 | -- | -- | 6,147 | -- | 8,547 | 4,816 | -- | -- | 13,363 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 239 | 12,092 | 7,179 | -- | -- | 19,510 |
| Linton | -- | 7,653 | 18,901 | -- | -- | 26,554 | 60 | 11,728 | 27,261 | -- | -- | 39,049 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 | 19,381 | 46,162 | -- | -- | 65,603 |
| Mill Creek | 60 | 1,888 | -- | -- | -- | 1,948 | 934 | 1,656 | -- | -- | -- | 2,590 | 139 | -- | -- | -- | -- | 139 | -- | -- | -- | -- | -- | -- | 1,133 | 3,544 | -- | -- | -- | 4,677 |
| Monroe | 457 | -- | -- | -- | -- | 457 | 199 | -- | -- | -- | -- | 199 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 656 | -- | -- | -- | -- | 656 |
| Oxford | 3,677 | -- | -- | -- | -- | 3,677 | 10,416 | -- | -- | -- | -- | 10,416 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14,093 | -- | -- | -- | -- | 14,093 |
| Pike | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 99 | -- | -- | -- | -- | 99 | 99 | -- | -- | -- | -- | 99 |
| Tuscarawas | -- | 6,427 | 2,045 | -- | -- | 8,472 | -- | 11,397 | 545 | -- | -- | 11,942 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17,824 | 2,590 | -- | -- | 20,414 |
| Virginia | -- | 1,888 | 15,312 | -- | -- | 17,200 | -- | 3,280 | 20,673 | -- | -- | 23,953 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,168 | 35,985 | -- | -- | 41,153 |
| Washington | -- | -- | 1,090 | -- | -- | 1,090 | 60 | 1,988 | 1,136 | -- | -- | 3,184 | 398 | 166 | -- | -- | -- | 564 | 298 | -- | -- | -- | -- | 298 | 756 | 2,154 | 2,226 | -- | -- | 5,136 |
| White Eyes | 517 | 1,988 | 1,681 | 454 | -- | 4,640 | 775 | 3,711 | -- | -- | -- | 4,486 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,292 | 5,699 | 1,681 | 454 | -- | 9,126 |
| Total | 7,176 | 48,136 | 69,744 | 454 | -- | 125,510 | 20,633 | 78,086 | 108,407 | -- | -- | 207,126 | 1,372 | 564 | -- | -- | -- | 1,936 | 397 | -- | -- | -- | -- | 397 | 29,578 | 126,786 | 178,151 | 454 | -- | 334,969 |

*88,423

# TABLE 48 (Continued)

## ESTIMATED ORIGINAL RESERVES OF THE MIDDLE KITTANNING COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total † | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| GALLIA | | | | | | | | | | | | | | | | | | | | | | | | | 3,220 | -- | -- | -- | -- | 3,220 |
| Addison | 1,829 | -- | -- | -- | -- | 1,829 | 1,391 | -- | -- | -- | -- | 1,391 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17,195 | 16,996 | 2,726 | -- | -- | 36,917 |
| Greenfield | 5,109 | 10,933 | 2,726 | -- | -- | 18,768 | 11,370 | 6,063 | -- | -- | -- | 17,433 | 716 | -- | -- | -- | -- | 716 | -- | -- | -- | -- | -- | -- | 37,450 | 36,311 | 8,996 | 2,386 | 341 | 85,484 |
| Huntington | 974 | 15,571 | 4,453 | 1,704 | 341 | 23,043 | 19,321 | 20,740 | 4,543 | 682 | -- | 45,286 | 15,386 | -- | -- | -- | -- | 15,386 | 1,769 | -- | -- | -- | -- | 1,769 | 99 | -- | -- | -- | -- | 99 |
| Morgan | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 99 | -- | -- | -- | -- | 99 | 99 | -- | -- | -- | -- | |
| Perry | -- | 1,259 | 2,045 | -- | -- | 3,304 | 11,132 | 7,289 | 682 | -- | -- | 19,103 | 14,014 | -- | -- | -- | -- | 14,014 | -- | -- | -- | -- | -- | -- | 25,146 | 8,548 | 2,727 | -- | -- | 36,421 |
| Raccoon | 5,347 | 2,551 | 454 | -- | -- | 8,352 | 24,092 | 12,424 | -- | -- | -- | 36,516 | 21,567 | 563 | -- | -- | -- | 22,130 | -- | -- | -- | -- | -- | -- | 51,006 | 15,538 | 454 | -- | -- | 66,998 |
| Walnut | -- | -- | -- | -- | -- | -- | 3,638 | -- | -- | -- | -- | 3,638 | 25,483 | -- | -- | -- | -- | 25,483 | 11,927 | -- | -- | -- | -- | 11,927 | 41,048 | -- | -- | -- | -- | 41,048 |
| Total | 13,259 | 30,314 | 9,678 | 1,704 | 341 | 55,296 | 70,944 | 46,516 | 5,225 | 682 | -- | 123,367 | 77,166 | 563 | -- | -- | -- | 77,729 | 13,795 | -- | -- | -- | -- | 13,795 | 175,164 | 77,393 | 14,903 | 2,386 | 341 | 270,187 |
| GUERNSEY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Adams | -- | -- | -- | -- | -- | -- | -- | 8,349 | -- | -- | -- | 8,349 | -- | 35,449 | -- | -- | -- | 35,449 | -- | 40,021 | -- | -- | -- | 40,021 | -- | 83,819 | -- | -- | -- | 83,819 |
| Cambridge | -- | 331 | 1,090 | -- | -- | 1,421 | 2,544 | 16,002 | 91 | [redacted] | -- | 18,637 | 5,963 | 29,386 | -- | -- | -- | 35,349 | 16,200 | 31,937 | -- | -- | -- | 48,137 | 24,707 | 77,656 | 1,181 | -- | -- | 103,544 |
| Center | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,216 | 4,207 | -- | -- | -- | 11,423 | 22,522 | 26,537 | -- | -- | -- | 49,059 | 29,738 | 30,744 | -- | -- | -- | 60,482 |
| Jackson | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,852 | -- | -- | -- | -- | 7,852 | 7,852 | -- | -- | -- | -- | 7,852 |
| Jefferson | -- | 629 | -- | -- | -- | 629 | 3,598 | 19,447 | -- | -- | -- | 23,045 | 27,809 | 13,716 | -- | -- | -- | 41,525 | -- | -- | -- | -- | -- | -- | 31,407 | 33,792 | -- | -- | -- | 65,199 |
| Knox | -- | 11,894 | -- | -- | -- | 11,894 | -- | 57,215 | 545 | -- | -- | 57,760 | -- | 1,557 | -- | -- | -- | 1,557 | -- | -- | -- | -- | -- | -- | -- | 70,666 | 545 | -- | -- | 71,211 |
| Liberty | 80 | 12,921 | 1,817 | -- | -- | 14,818 | 974 | 48,336 | 91 | -- | -- | 49,401 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,054 | 61,257 | 1,908 | -- | -- | 64,219 |
| Londonderry | 2,862 | 13,086 | 7,451 | 909 | -- | 24,308 | 10,833 | 59,335 | 20,037 | -- | -- | 90,205 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13,695 | 72,421 | 27,488 | 909 | -- | 114,513 |
| Madison | 716 | 6,659 | -- | -- | -- | 7,375 | 11,251 | 48,634 | -- | -- | -- | 59,885 | 596 | 4,605 | -- | -- | -- | 5,201 | -- | -- | -- | -- | -- | -- | 12,563 | 59,898 | -- | -- | -- | 72,461 |
| Millwood | -- | -- | -- | -- | -- | -- | 2,147 | 530 | -- | -- | -- | 2,677 | 3,280 | -- | -- | -- | -- | 3,280 | -- | -- | -- | -- | -- | -- | 5,427 | 530 | -- | -- | -- | 5,957 |
| Monroe | -- | -- | -- | -- | -- | -- | 1,391 | 961 | -- | -- | -- | 2,352 | 17,274 | 10,668 | -- | -- | -- | 27,942 | 4,433 | 33,560 | -- | -- | -- | 37,993 | 23,098 | 45,189 | -- | -- | -- | 68,287 |
| Oxford | 159 | 4,340 | 1,817 | 1,136 | -- | 7,452 | 12,205 | 16,697 | 545 | -- | -- | 29,447 | 1,849 | -- | -- | -- | -- | 1,849 | -- | -- | -- | -- | -- | -- | 14,213 | 21,037 | 2,362 | 1,136 | -- | 38,748 |
| Richland | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,087 | 596 | -- | -- | -- | 2,683 | 10,674 | 2,418 | -- | -- | -- | 13,092 | 12,761 | 3,014 | -- | -- | -- | 15,775 |
| Valley | -- | -- | 2,953 | -- | -- | 2,953 | 4,313 | 4,108 | 1,727 | -- | -- | 10,148 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,313 | 4,108 | 4,680 | -- | -- | 13,101 |
| Washington | -- | 3,677 | 3,180 | -- | -- | 6,857 | -- | 29,916 | 909 | -- | -- | 30,825 | -- | 39,623 | -- | -- | -- | 39,623 | -- | 3,976 | -- | -- | -- | 3,976 | -- | 77,192 | 4,089 | -- | -- | 81,281 |
| Westland | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 18,685 | 32,732 | -- | -- | -- | 51,417 | 18,685 | 32,732 | -- | -- | -- | 51,417 |
| Wheeling | 258 | 4,804 | -- | -- | -- | 5,062 | 12,483 | 9,541 | -- | -- | -- | 22,024 | 5,924 | -- | -- | -- | -- | 5,924 | -- | -- | -- | -- | -- | -- | 18,665 | 14,345 | -- | -- | -- | 33,010 |
| Wills | 4,691 | 3,611 | -- | -- | -- | 8,302 | 13,517 | 20,474 | -- | -- | -- | 33,991 | 18,228 | 17,492 | -- | -- | -- | 35,720 | 3,618 | 9,707 | -- | -- | -- | 13,325 | 40,054 | 51,284 | -- | -- | -- | 91,338 |
| Total | 8,766 | 61,952 | 18,308 | 2,045 | -- | 91,071 | 75,256 | 339,545 | 23,945 | -- | -- | 438,746 | 90,226 | 157,299 | -- | -- | -- | 247,525 | 83,984 | 180,888 | -- | -- | -- | 264,872 | 258,232 | 739,684 | 42,253 | 2,045 | -- | 1,042,214 |
| HARRISON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Archer | 2,126 | 2,617 | -- | -- | -- | 4,743 | 11,589 | 11,993 | -- | -- | -- | 23,582 | 616 | 7,421 | -- | -- | -- | 8,037 | -- | -- | -- | -- | -- | -- | 14,331 | 22,031 | -- | -- | -- | 36,362 |
| Cadiz | 656 | 1,524 | -- | -- | -- | 2,180 | 6,043 | 6,891 | -- | -- | -- | 12,934 | 3,001 | 530 | -- | -- | -- | 3,531 | 378 | -- | -- | -- | -- | 378 | 10,078 | 8,945 | -- | -- | -- | 19,023 |
| Franklin | -- | 6,725 | 27,488 | -- | -- | 34,213 | 497 | 27,895 | 10,859 | -- | -- | 39,251 | 3,518 | 4,274 | -- | -- | -- | 7,792 | -- | -- | -- | -- | -- | -- | 4,015 | 38,894 | 38,347 | -- | -- | 81,256 |
| Freeport | -- | 11,098 | 23,263 | 22,717 | -- | 57,078 | -- | 19,613 | -- | -- | -- | 19,613 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30,711 | 23,263 | 22,717 | -- | 76,691 |
| German | 99 | 2,982 | -- | -- | -- | 3,081 | 11,251 | 8,614 | 1,363 | -- | -- | 21,228 | 1,491 | -- | -- | -- | -- | 1,491 | -- | -- | -- | -- | -- | -- | 12,841 | 11,596 | 1,363 | -- | -- | 25,800 |
| Green | 1,590 | 6,228 | 3,635 | -- | -- | 11,453 | 9,442 | 60,693 | 3,180 | -- | -- | 73,315 | 2,584 | 22,329 | -- | -- | -- | 24,913 | -- | -- | -- | -- | -- | -- | 13,616 | 89,250 | 6,815 | -- | -- | 109,681 |
| Monroe | 1,590 | 17,095 | 5,543 | -- | -- | 24,228 | 9,462 | 32,467 | 34,167 | 5,339 | -- | 81,435 | 60 | -- | -- | -- | -- | 60 | -- | -- | -- | -- | -- | -- | 11,112 | 49,562 | 39,710 | 5,339 | -- | 105,723 |
| Moorefield | -- | 133 | 2,226 | -- | -- | 2,359 | 517 | 14,345 | 2,453 | -- | -- | 17,315 | 10,018 | 4,804 | -- | -- | -- | 14,822 | -- | -- | -- | -- | -- | -- | 10,535 | 19,282 | 4,679 | -- | -- | 34,496 |
| North | 99 | -- | -- | -- | -- | 99 | 2,544 | -- | -- | -- | -- | 2,544 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,643 | -- | -- | -- | -- | 2,643 |
| Nottingham | -- | -- | 909 | -- | -- | 909 | -- | 9,939 | 15,902 | -- | -- | 25,841 | 6,460 | 24,913 | 136 | -- | -- | 31,509 | 6,281 | -- | -- | -- | -- | 6,281 | 12,741 | 34,852 | 16,947 | -- | -- | 64,540 |
| Rumley | -- | -- | -- | -- | -- | -- | 2,147 | -- | -- | -- | -- | 2,147 | 338 | -- | -- | -- | -- | 338 | -- | -- | -- | -- | -- | -- | 2,485 | -- | -- | -- | -- | 2,485 |
| Short Creek | 1,153 | 232 | -- | -- | -- | 1,385 | 7,156 | 7,289 | -- | -- | -- | 14,445 | 1,193 | -- | -- | -- | -- | 1,193 | -- | -- | -- | -- | -- | -- | 9,502 | 7,521 | -- | -- | -- | 17,023 |
| Stock | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,003 | 2,485 | -- | -- | -- | 8,488 | 696 | -- | -- | -- | -- | 696 | 6,699 | 2,485 | -- | -- | -- | 9,184 |
| Washington | -- | 166 | 34,440 | -- | -- | 34,606 | -- | 6,063 | 84,736 | -- | -- | 90,799 | -- | 3,942 | 9,541 | -- | -- | 13,483 | -- | -- | -- | -- | -- | -- | -- | 10,171 | 128,717 | -- | -- | 138,888 |
| Total | 7,313 | 48,800 | 97,504 | 22,717 | -- | 176,334 | 60,648 | 205,802 | 152,660 | 5,339 | -- | 424,449 | 35,282 | 70,698 | 9,677 | -- | -- | 115,657 | 7,355 | -- | -- | -- | -- | 7,355 | 110,598 | 325,300 | 259,841 | 28,056 | -- | 723,795 |
| HOCKING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Falls Gore | -- | -- | -- | 284 | 2,045 | 2,329 | -- | -- | -- | -- | 5,033 | 5,033 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 284 | 7,078 | 7,362 |
| Green | -- | -- | 818 | 1,647 | 6,532 | 8,997 | -- | -- | 1,136 | 2,385 | 682 | 4,203 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,954 | 4,032 | 7,214 | 13,200 |
| Starr | -- | 696 | 10,450 | 14,880 | -- | 26,026 | -- | 199 | 15,175 | 20,843 | -- | 36,217 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 895 | 25,625 | 35,723 | -- | 62,243 |
| Ward | -- | -- | 1,090 | 2,385 | 69,572 | 73,047 | -- | -- | 454 | 5,111 | 32,020 | 37,585 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,544 | 7,496 | 101,592 | 110,632 |
| Washington | -- | 199 | -- | -- | -- | 199 | -- | 265 | -- | -- | -- | 265 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 464 | -- | -- | -- | 464 |
| Total | -- | 895 | 12,358 | 19,196 | 78,149 | 110,598 | -- | 464 | 16,765 | 28,339 | 37,735 | 83,303 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,359 | 29,123 | 47,535 | 115,884 | 193,901 |
| HOLMES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Berlin | 1,630 | 663 | -- | -- | -- | 2,293 | 318 | -- | -- | -- | -- | 318 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,948 | 663 | -- | -- | -- | 2,611 |
| Clark | 3,399 | 2,617 | -- | -- | -- | 6,016 | 1,670 | 3,512 | -- | -- | -- | 5,182 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,069 | 6,129 | -- | -- | -- | 11,198 |
| Hardy | -- | -- | -- | -- | -- | -- | 60 | -- | -- | -- | -- | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 | -- | -- | -- | -- | 60 |
| Killbuck | 60 | -- | -- | -- | -- | 60 | 80 | -- | -- | -- | -- | 80 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 140 | -- | -- | -- | -- | 140 |
| Knox | 60 | 398 | 363 | -- | -- | 821 | 40 | -- | -- | -- | -- | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 100 | 398 | 363 | -- | -- | 861 |
| Mechanic | 377 | 66 | -- | -- | -- | 443 | 119 | -- | -- | -- | -- | 119 | 139 | -- | -- | -- | -- | 139 | -- | -- | -- | -- | -- | -- | 635 | 66 | -- | -- | -- | 701 |
| Monroe | -- | 66 | 454 | -- | -- | 520 | 80 | 663 | -- | -- | -- | 743 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 80 | 729 | 454 | -- | -- | 1,263 |
| Paint | 477 | -- | -- | -- | -- | 477 | 497 | -- | -- | -- | -- | 497 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 974 | -- | -- | -- | -- | 974 |
| Walnut Creek | 2,942 | 298 | -- | -- | -- | 3,240 | 1,153 | -- | -- | -- | -- | 1,153 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,095 | 298 | -- | -- | -- | 4,393 |
| Total | 8,945 | 4,108 | 817 | -- | -- | 13,870 | 4,017 | 4,175 | -- | -- | -- | 8,192 | 139 | -- | -- | -- | -- | 139 | -- | -- | -- | -- | -- | -- | 13,101 | 8,283 | 817 | -- | -- | 22,201 |
| JACKSON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bloomfield | 2,982 | 762 | -- | -- | -- | 3,744 | 7,772 | 2,982 | -- | -- | -- | 10,754 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,754 | 3,744 | -- | -- | -- | 14,498 |
| Jefferson | 398 | -- | -- | -- | -- | 398 | 537 | -- | -- | -- | -- | 537 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 935 | -- | -- | -- | -- | 935 |
| Madison | 11,469 | 9,376 | 1,454 | -- | -- | 22,299 | 15,326 | 6,228 | -- | -- | -- | 21,554 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 26,795 | 15,604 | 1,454 | -- | -- | 43,853 |
| Milton | 2,147 | -- | -- | -- | -- | 2,147 | 3,359 | -- | -- | -- | -- | 3,359 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,506 | -- | -- | -- | -- | 5,506 |
| Total | 16,996 | 10,138 | 1,454 | -- | -- | 28,588 | 26,994 | 9,210 | -- | -- | -- | 36,204 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 43,990 | 19,348 | 1,454 | -- | -- | 64,792 |
| JEFFERSON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brush Creek | -- | -- | -- | -- | -- | -- | 2,127 | -- | -- | -- | -- | 2,127 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,127 | -- | -- | -- | -- | 2,127 |
| Cross Creek | 1,451 | 2,683 | 1,272 | -- | -- | 5,406 | 8,826 | 10,270 | -- | -- | -- | 19,096 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,277 | 12,953 | 1,272 | -- | -- | 24,502 |
| Knox | 477 | -- | -- | -- | -- | 477 | 5,069 | -- | -- | -- | -- | 5,069 | 6,639 | -- | -- | -- | -- | 6,639 | -- | -- | -- | -- | -- | -- | 12,185 | -- | -- | -- | -- | 12,185 |
| Mt. Pleasant | -- | -- | -- | -- | -- | -- | 2,286 | 1,391 | -- | -- | -- | 3,677 | 298 | -- | -- | -- | -- | 298 | -- | -- | -- | -- | -- | -- | 2,584 | 1,391 | -- | -- | -- | 3,975 |

# TABLE 48 (Continued)

## ESTIMATED ORIGINAL RESERVES OF THE MIDDLE KITTANNING COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| Saline | 4,135 | 9,608 | -- | -- | -- | 13,743 | 17,592 | 5,963 | -- | -- | -- | 23,555 | 8,448 | -- | -- | -- | -- | 8,448 | -- | -- | -- | -- | -- | -- | 30,175 | 15,571 | -- | -- | -- | 45,746 |
| Smithfield | -- | -- | -- | -- | -- | -- | 437 | 497 | -- | -- | -- | 934 | 1,590 | -- | -- | -- | -- | 1,590 | -- | -- | -- | -- | -- | -- | 2,027 | 497 | -- | -- | -- | 2,524 |
| Wayne | -- | -- | -- | -- | -- | -- | 4,492 | 2,253 | -- | -- | -- | 6,745 | 894 | -- | -- | -- | -- | 894 | -- | -- | -- | -- | -- | -- | 5,386 | 2,253 | -- | -- | -- | 7,639 |
| Wells | -- | -- | -- | -- | -- | -- | 2,982 | 1,524 | -- | -- | -- | 4,506 | 2,882 | -- | -- | -- | -- | 2,882 | -- | -- | -- | -- | -- | -- | 5,864 | 1,524 | -- | -- | -- | 7,388 |
| Total | 6,063 | 12,291 | 1,272 | -- | -- | 19,626 | 43,811 | 21,898 | -- | -- | -- | 65,709 | 20,751 | -- | -- | -- | -- | 20,751 | -- | -- | -- | -- | -- | -- | 70,625 | 34,189 | 1,272 | -- | -- | 106,086 |
| LAWRENCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aid | 3,141 | 7,123 | -- | -- | -- | 10,264 | 34,329 | 18,420 | -- | -- | -- | 52,749 | 20,911 | 1,226 | -- | -- | -- | 22,137 | -- | -- | -- | -- | -- | -- | 58,381 | 26,769 | -- | -- | -- | 85,150 |
| Decatur | -- | 8,448 | -- | -- | -- | 8,448 | 21,070 | 24,383 | -- | -- | -- | 45,453 | 2,982 | -- | -- | -- | -- | 2,982 | -- | -- | -- | -- | -- | -- | 24,052 | 32,831 | -- | -- | -- | 56,883 |
| Elizabeth | 139 | 1,391 | -- | -- | -- | 1,530 | 9,700 | 1,391 | -- | -- | -- | 11,091 | 12,324 | -- | -- | -- | -- | 12,324 | 318 | -- | -- | -- | -- | 318 | 22,481 | 2,782 | -- | -- | -- | 25,263 |
| Fayette | 358 | 1,623 | -- | -- | -- | 1,981 | 7,375 | 11,927 | -- | -- | -- | 19,302 | 24,132 | 1,326 | -- | -- | -- | 25,458 | 1,431 | -- | -- | -- | -- | 1,431 | 33,296 | 14,876 | -- | -- | -- | 48,172 |
| Hamilton | -- | -- | -- | -- | -- | -- | -- | 166 | -- | -- | -- | 166 | 199 | 464 | -- | -- | -- | 663 | -- | -- | -- | -- | -- | -- | 199 | 630 | -- | -- | -- | 829 |
| Lawrence | 1,988 | 994 | -- | -- | -- | 2,982 | 6,361 | 1,060 | -- | -- | -- | 7,421 | 5,765 | -- | -- | -- | -- | 5,765 | -- | -- | -- | -- | -- | -- | 14,114 | 2,054 | -- | -- | -- | 16,168 |
| Mason | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,050 | -- | -- | -- | -- | 8,050 | 5,864 | -- | -- | -- | -- | 5,864 | 13,914 | -- | -- | -- | -- | 13,914 |
| Perry | 199 | 6,261 | 8,496 | -- | -- | 14,956 | 5,705 | 34,157 | 7,042 | -- | -- | 46,904 | 298 | 6,262 | -- | -- | -- | 6,560 | -- | -- | -- | -- | -- | -- | 6,202 | 46,680 | 15,538 | -- | -- | 68,420 |
| Symmes | 4,671 | 11,165 | 6,679 | -- | -- | 22,515 | 24,529 | 30,612 | 4,543 | -- | -- | 59,684 | 7,255 | 2,452 | -- | -- | -- | 9,707 | -- | -- | -- | -- | -- | -- | 36,455 | 44,229 | 11,222 | -- | -- | 91,906 |
| Upper | 855 | 3,943 | 909 | -- | -- | 5,707 | 4,373 | 5,101 | -- | -- | -- | 9,474 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,228 | 9,044 | 909 | -- | -- | 15,181 |
| Washington | 3,300 | 828 | -- | -- | -- | 4,128 | 4,989 | 497 | -- | -- | -- | 5,486 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,289 | 1,325 | -- | -- | -- | 9,614 |
| Total | 14,651 | 41,776 | 16,084 | -- | -- | 72,511 | 118,431 | 127,714 | 11,585 | -- | -- | 257,730 | 81,916 | 11,730 | -- | -- | -- | 93,646 | 7,613 | -- | -- | -- | -- | 7,613 | 222,611 | 181,220 | 27,669 | -- | -- | 431,500 |
| MAHONING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Beaver | 1,690 | -- | -- | -- | -- | 1,690 | 6,361 | -- | -- | -- | -- | 6,361 | 2,783 | -- | -- | -- | -- | 2,783 | -- | -- | -- | -- | -- | -- | 10,834 | -- | -- | -- | -- | 10,834 |
| Goshen | 1,292 | -- | -- | -- | -- | 1,292 | 22,502 | 2,319 | -- | -- | -- | 24,821 | 13,159 | 497 | -- | -- | -- | 13,656 | 457 | -- | -- | -- | -- | 457 | 37,410 | 2,816 | -- | -- | -- | 40,226 |
| Green | 6,440 | 8,448 | -- | -- | -- | 14,888 | 16,141 | 5,466 | -- | -- | -- | 21,607 | 1,372 | -- | -- | -- | -- | 1,372 | -- | -- | -- | -- | -- | -- | 23,953 | 13,914 | -- | -- | -- | 37,867 |
| Smith | -- | 3,147 | -- | -- | -- | 3,147 | 338 | 7,189 | -- | -- | -- | 7,527 | -- | 8,481 | -- | -- | -- | 8,481 | -- | -- | -- | -- | -- | -- | 338 | 18,817 | -- | -- | -- | 19,155 |
| Springfield | 1,391 | -- | -- | -- | -- | 1,391 | 3,916 | -- | -- | -- | -- | 3,916 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,307 | -- | -- | -- | -- | 5,307 |
| Total | 10,813 | 11,595 | -- | -- | -- | 22,408 | 49,258 | 14,974 | -- | -- | -- | 64,232 | 17,314 | 8,978 | -- | -- | -- | 26,292 | 457 | -- | -- | -- | -- | 457 | 77,842 | 35,547 | -- | -- | -- | 113,389 |
| MEIGS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Columbia | 616 | -- | -- | -- | -- | 616 | 17,135 | -- | -- | -- | -- | 17,135 | 19,321 | -- | -- | -- | -- | 19,321 | 10,515 | -- | -- | -- | -- | 10,515 | 47,587 | -- | -- | -- | -- | 47,587 |
| Scipio | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 278 | -- | -- | -- | -- | 278 | 278 | -- | -- | -- | -- | 278 |
| Total | 616 | -- | -- | -- | -- | 616 | 17,135 | -- | -- | -- | -- | 17,135 | 19,321 | -- | -- | -- | -- | 19,321 | 10,793 | -- | -- | -- | -- | 10,793 | 47,865 | -- | -- | -- | -- | 47,865 |
| MORGAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bloom | -- | -- | -- | -- | -- | -- | 1,670 | -- | -- | -- | -- | 1,670 | 994 | -- | -- | -- | -- | 994 | -- | -- | -- | -- | -- | -- | 2,664 | -- | -- | -- | -- | 2,664 |
| Deerfield | -- | -- | -- | -- | -- | -- | -- | 2,319 | 318 | -- | -- | 2,637 | 875 | 15,803 | 3,589 | -- | -- | 20,267 | 14,352 | 38,596 | 27,943 | -- | -- | 80,891 | 15,227 | 56,718 | 31,850 | -- | -- | 103,795 |
| Homer | 835 | 1,027 | 4,407 | 2,556 | 7,292 | 16,117 | 4,552 | 8,250 | 21,173 | 14,482 | 36,666 | 85,123 | 7,216 | 2,485 | -- | -- | -- | 9,701 | 99 | -- | -- | -- | -- | 99 | 12,702 | 11,762 | 25,580 | 17,038 | 43,958 | 111,040 |
| Malta | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,376 | -- | -- | -- | -- | 10,376 | 10,376 | -- | -- | -- | -- | 10,376 |
| Penn | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 457 | -- | -- | -- | -- | 457 | 457 | -- | -- | -- | -- | 457 |
| Union | -- | -- | 7,724 | 5,111 | 2,249 | 15,084 | -- | 6,858 | 22,218 | 3,862 | -- | 32,938 | 6,460 | 18,420 | 28,306 | -- | -- | 53,186 | 9,581 | 11,827 | 8,632 | -- | -- | 30,040 | 16,041 | 37,105 | 66,880 | 8,973 | 2,249 | 131,248 |
| York | -- | 4,903 | 14,630 | 2,442 | -- | 21,975 | 1,550 | 28,823 | 11,995 | 284 | -- | 42,652 | 11,350 | 10,436 | -- | -- | -- | 21,786 | 298 | -- | -- | -- | -- | 298 | 13,198 | 44,162 | 26,625 | 2,726 | -- | 86,711 |
| Total | 835 | 5,930 | 26,761 | 10,109 | 9,541 | 53,176 | 7,772 | 46,250 | 55,704 | 18,628 | 36,666 | 165,020 | 26,895 | 47,144 | 31,895 | -- | -- | 105,934 | 35,163 | 50,423 | 36,575 | -- | -- | 122,161 | 70,665 | 149,747 | 150,935 | 28,737 | 46,207 | 446,291 |
| MUSKINGUM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Adams | -- | 2,187 | 4,180 | -- | -- | 6,367 | -- | 27,233 | 29,805 | -- | -- | 57,038 | -- | 22,628 | 2,135 | -- | -- | 24,763 | -- | -- | -- | -- | -- | -- | -- | 52,048 | 36,120 | -- | -- | 88,168 |
| Blue Rock | -- | -- | -- | -- | -- | -- | 5,765 | 1,491 | -- | -- | -- | 7,256 | 14,272 | -- | -- | -- | -- | 14,272 | -- | -- | -- | -- | -- | -- | 20,037 | 1,491 | -- | -- | -- | 21,528 |
| Brush Creek | -- | 24,317 | 2,726 | -- | -- | 27,043 | 835 | 49,396 | 818 | -- | -- | 51,049 | 258 | 14,147 | -- | -- | -- | 14,405 | -- | -- | -- | -- | -- | -- | 1,093 | 87,860 | 3,544 | -- | -- | 92,497 |
| Cass | -- | 994 | -- | -- | -- | 994 | 99 | 828 | -- | -- | -- | 927 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 99 | 1,822 | -- | -- | -- | 1,921 |
| Clay | -- | 6,361 | 9,859 | -- | -- | 16,220 | -- | 13,848 | 1,318 | -- | -- | 15,166 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 20,209 | 11,177 | -- | -- | 31,386 |
| Falls | -- | 364 | -- | -- | -- | 364 | -- | 2,617 | -- | -- | -- | 2,617 | -- | 1,160 | -- | -- | -- | 1,160 | -- | -- | -- | -- | -- | -- | -- | 4,141 | -- | -- | -- | 4,141 |
| Harrison | 1,908 | 4,638 | -- | -- | -- | 6,546 | 11,032 | 11,695 | -- | -- | -- | 22,727 | 4,651 | 10,867 | -- | -- | -- | 15,518 | -- | -- | -- | -- | -- | -- | 17,591 | 27,200 | -- | -- | -- | 44,791 |
| Highland | -- | -- | -- | -- | -- | -- | -- | 1,922 | -- | -- | -- | 1,922 | -- | 35,117 | -- | -- | -- | 35,117 | -- | 46,116 | -- | -- | -- | 46,116 | -- | 83,155 | -- | -- | -- | 83,155 |
| Hopewell | -- | 3,048 | -- | -- | -- | 3,048 | -- | 1,160 | -- | -- | -- | 1,160 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,208 | -- | -- | -- | 4,208 |
| Jackson | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 60 | -- | -- | -- | -- | 60 | 60 | -- | -- | -- | -- | 60 |
| Madison | -- | 24,781 | -- | -- | -- | 24,781 | -- | 21,766 | 454 | -- | -- | 22,220 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 46,547 | 454 | -- | -- | 47,001 |
| Monroe | -- | 4,870 | 13,903 | -- | -- | 18,773 | -- | 26,603 | 36,121 | -- | -- | 62,724 | -- | 5,698 | 182 | -- | -- | 5,880 | -- | -- | -- | -- | -- | -- | -- | 37,171 | 50,206 | -- | -- | 87,377 |
| Muskingum | -- | 3,711 | -- | -- | -- | 3,711 | -- | 2,651 | -- | -- | -- | 2,651 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,362 | -- | -- | -- | 6,362 |
| Newton | -- | 19,977 | 9,950 | 1,022 | -- | 30,949 | -- | 12,026 | 6,134 | 1,022 | -- | 19,182 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 32,003 | 16,084 | 2,044 | -- | 50,131 |
| Perry | -- | 2,717 | -- | -- | -- | 2,717 | -- | 27,862 | -- | -- | -- | 27,862 | -- | 39,259 | -- | -- | -- | 39,259 | 398 | 15,968 | -- | -- | -- | 16,366 | 398 | 85,806 | -- | -- | -- | 86,204 |
| Rich Hill | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,786 | -- | -- | -- | -- | 8,786 | 8,786 | -- | -- | -- | -- | 8,786 |
| Salem | -- | 894 | -- | -- | -- | 894 | -- | 21,567 | -- | -- | -- | 21,567 | -- | 37,138 | -- | -- | -- | 37,138 | -- | 22,959 | -- | -- | -- | 22,959 | -- | 82,558 | -- | -- | -- | 82,558 |
| Salt Creek | -- | 398 | -- | -- | -- | 398 | 3,121 | 21,302 | -- | -- | -- | 24,423 | 19,560 | 12,125 | -- | -- | -- | 31,685 | 11,986 | -- | -- | -- | -- | 11,986 | 34,667 | 33,825 | -- | -- | -- | 68,492 |
| Springfield | -- | 6,361 | -- | -- | -- | 6,361 | -- | 9,541 | -- | -- | -- | 9,541 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15,902 | -- | -- | -- | 15,902 |
| Union | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 16,340 | 57,943 | -- | -- | -- | 74,283 | 16,340 | 57,943 | -- | -- | -- | 74,283 |
| Washington | 676 | 21,833 | -- | -- | -- | 22,509 | -- | 55,856 | -- | -- | -- | 55,856 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 676 | 77,689 | -- | -- | -- | 78,365 |
| Wayne | -- | 15,306 | -- | -- | -- | 15,306 | -- | 54,664 | -- | -- | -- | 54,664 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 69,970 | -- | -- | -- | 69,970 |
| Total | 2,584 | 142,757 | 40,618 | 1,022 | -- | 186,981 | 20,852 | 364,028 | 74,650 | 1,022 | -- | 460,552 | 38,741 | 178,139 | 2,317 | -- | -- | 219,197 | 37,570 | 142,986 | -- | -- | -- | 180,556 | 99,747 | 827,910 | 117,585 | 2,044 | -- | 1,047,286 |
| NOBLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Buffalo | -- | -- | 1,363 | -- | -- | 1,363 | 2,584 | 2,319 | 1,590 | -- | -- | 6,493 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,584 | 2,319 | 2,953 | -- | -- | 7,856 |
| Total | -- | -- | 1,363 | -- | -- | 1,363 | 2,584 | 2,319 | 1,590 | -- | -- | 6,493 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,584 | 2,319 | 2,953 | -- | -- | 7,856 |
| PERRY[1] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bearfield | -- | 861 | 109,089 | 13,460 | -- | 123,410 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 861 | 109,089 | 13,460 | -- | 123,410 |
| Clayton | -- | -- | 20,991 | 46,287 | -- | 67,278 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 20,991 | 46,287 | -- | 67,278 |
| Coal | -- | -- | -- | 511 | 51,581 | 52,092 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 511 | 51,581 | 52,092 |
| Harrison | -- | 1,922 | 2,226 | 73,888 | -- | 78,036 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,922 | 2,226 | 73,888 | -- | 78,036 |

# TABLE 48 (Continued)

## ESTIMATED ORIGINAL RESERVES OF THE MIDDLE KITTANNING COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| Jackson | -- | -- | 15,766 | 2,101 | -- | 17,867 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15,766 | 2,101 | -- | 17,867 |
| Madison | -- | 497 | 1,681 | 5,452 | -- | 7,630 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 497 | 1,681 | 5,452 | -- | 7,630 |
| Monday Creek | -- | -- | 45 | 9,314 | 8,780 | 18,139 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 45 | 9,314 | 8,780 | 18,139 |
| Monroe | -- | -- | 13,994 | 21,184 | 125,571 | 160,749 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13,994 | 21,184 | 125,571 | 160,749 |
| Pike | -- | -- | 89,598 | 4,487 | -- | 94,085 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 89,598 | 4,487 | -- | 94,085 |
| Pleasant | -- | -- | 14,130 | 7,838 | 13,131 | 35,099 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14,130 | 7,838 | 13,131 | 35,099 |
| Reading | -- | -- | 9,632 | -- | -- | 9,632 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9,632 | -- | -- | 9,632 |
| Salt Lick | -- | -- | 8,087 | 30,214 | 70,299 | 108,600 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,087 | 30,214 | 70,299 | 108,600 |
| Total | -- | 3,280 | 285,239 | 214,736 | 269,362 | 772,617 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,280 | 285,239 | 214,736 | 269,362 | 772,617 |
| SCIOTO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bloom | -- | -- | -- | -- | -- | -- | 258 | 199 | -- | -- | -- | 457 | 199 | -- | -- | -- | -- | 199 | -- | -- | -- | -- | -- | -- | 457 | 199 | -- | -- | -- | 656 |
| Vernon | -- | -- | -- | -- | -- | -- | 398 | -- | -- | -- | -- | 398 | 696 | -- | -- | -- | -- | 696 | -- | -- | -- | -- | -- | -- | 1,094 | -- | -- | -- | -- | 1,094 |
| Total | -- | -- | -- | -- | -- | -- | 656 | 199 | -- | -- | -- | 855 | 895 | -- | -- | -- | -- | 895 | -- | -- | -- | -- | -- | -- | 1,551 | 199 | -- | -- | -- | 1,750 |
| STARK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bethlehem | -- | -- | -- | -- | -- | -- | 179 | -- | -- | -- | -- | 179 | 318 | -- | -- | -- | -- | 318 | -- | -- | -- | -- | -- | -- | 497 | -- | -- | -- | -- | 497 |
| Canton | 179 | 1,093 | -- | -- | -- | 1,272 | 60 | 8,249 | -- | -- | -- | 8,309 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 239 | 9,342 | -- | -- | -- | 9,581 |
| Lexington | 338 | 8,879 | -- | -- | -- | 9,217 | -- | 3,346 | -- | -- | -- | 3,346 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 338 | 12,225 | -- | -- | -- | 12,563 |
| Marlboro | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,524 | -- | -- | -- | 1,524 | -- | -- | -- | -- | -- | -- | -- | 1,524 | -- | -- | -- | 1,524 |
| Nimishillen | -- | 1,756 | -- | -- | -- | 1,756 | -- | 18,851 | -- | -- | -- | 18,851 | -- | 19,480 | -- | -- | -- | 19,480 | -- | 1,358 | -- | -- | -- | 1,358 | -- | 41,445 | -- | -- | -- | 41,445 |
| Osnaburg | -- | 6,758 | -- | -- | -- | 6,758 | -- | 38,662 | -- | -- | -- | 38,662 | -- | 9,376 | -- | -- | -- | 9,376 | -- | -- | -- | -- | -- | -- | -- | 54,796 | -- | -- | -- | 54,796 |
| Paris | -- | 10,303 | -- | -- | -- | 10,303 | 676 | 61,025 | -- | -- | -- | 61,701 | -- | 18,089 | -- | -- | -- | 18,089 | -- | -- | -- | -- | -- | -- | 676 | 89,417 | -- | -- | -- | 90,093 |
| Pike | 954 | 5,334 | -- | -- | -- | 6,288 | 2,902 | 6,493 | -- | -- | -- | 9,395 | 417 | 530 | -- | -- | -- | 947 | -- | -- | -- | -- | -- | -- | 4,273 | 12,357 | -- | -- | -- | 16,630 |
| Sandy | 378 | 2,187 | 1,318 | -- | -- | 3,883 | 5,566 | 1,922 | 2,363 | -- | -- | 9,851 | 835 | 1,027 | -- | -- | -- | 1,862 | -- | -- | -- | -- | -- | -- | 6,779 | 5,136 | 3,681 | -- | -- | 15,596 |
| Washington | 2,326 | 4,771 | -- | -- | -- | 7,097 | 1,729 | 59,534 | -- | -- | -- | 61,263 | -- | 37,470 | -- | -- | -- | 37,470 | -- | 99 | -- | -- | -- | 99 | 4,055 | 101,874 | -- | -- | -- | 105,929 |
| Total | 4,175 | 41,081 | 1,318 | -- | -- | 46,574 | 11,112 | 198,082 | 2,363 | -- | -- | 211,557 | 1,570 | 87,496 | -- | -- | -- | 89,066 | -- | 1,457 | -- | -- | -- | 1,457 | 16,857 | 328,116 | 3,681 | -- | -- | 348,654 |
| TUSCARAWAS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auburn | 1,173 | 7,023 | 3,135 | -- | -- | 11,331 | 12,682 | 4,406 | 91 | -- | -- | 17,179 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13,855 | 11,429 | 3,226 | -- | -- | 28,510 |
| Bucks | 2,862 | 563 | -- | -- | -- | 3,425 | 11,509 | 66 | -- | -- | -- | 11,575 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14,371 | 629 | -- | -- | -- | 15,000 |
| Clay | -- | 13,683 | -- | -- | -- | 13,683 | -- | 31,142 | -- | -- | -- | 31,142 | -- | 2,253 | -- | -- | -- | 2,253 | -- | -- | -- | -- | -- | -- | -- | 47,078 | -- | -- | -- | 47,078 |
| Dover | 5,645 | 4,837 | 5,498 | -- | -- | 15,980 | 2,087 | 6,261 | 3,908 | -- | -- | 12,256 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,732 | 11,098 | 9,406 | -- | -- | 28,236 |
| Fairfield | 99 | 9,111 | 10,041 | -- | -- | 19,251 | 99 | 11,132 | 34,258 | -- | -- | 45,489 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 198 | 20,243 | 44,299 | -- | -- | 64,740 |
| Franklin | 696 | -- | -- | -- | -- | 696 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 696 | -- | -- | -- | -- | 696 |
| Goshen | -- | 3,048 | 17,220 | 4,260 | -- | 24,528 | -- | 4,207 | 32,440 | 4,657 | -- | 41,304 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,255 | 49,660 | 8,917 | -- | 65,832 |
| Jefferson | 2,187 | 15,405 | -- | -- | -- | 17,592 | 10,992 | 16,300 | -- | -- | -- | 27,292 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13,179 | 31,705 | -- | -- | -- | 44,884 |
| Lawrence | 1,928 | -- | -- | -- | -- | 1,928 | 3,658 | 961 | -- | -- | -- | 4,619 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,586 | 961 | -- | -- | -- | 6,547 |
| Mill | -- | 464 | 50,660 | -- | -- | 51,124 | -- | 1,425 | 23,308 | -- | -- | 24,733 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,889 | 73,968 | -- | -- | 75,857 |
| Oxford | 1,073 | 5,466 | -- | -- | -- | 6,539 | 8,726 | 26,040 | -- | -- | -- | 34,766 | 278 | 3,346 | -- | -- | -- | 3,624 | -- | -- | -- | -- | -- | -- | 10,077 | 34,852 | -- | -- | -- | 44,929 |
| Perry | -- | 2,982 | -- | -- | -- | 2,982 | -- | 15,869 | -- | -- | -- | 15,869 | -- | 59,435 | -- | -- | -- | 59,435 | -- | 8,514 | -- | -- | -- | 8,514 | -- | 86,800 | -- | -- | -- | 86,800 |
| Rush | -- | 1,539 | 15,811 | 2,272 | -- | 22,622 | -- | 45,354 | 16,493 | -- | -- | 61,847 | -- | 21,137 | 182 | -- | -- | 21,319 | -- | -- | -- | -- | -- | -- | -- | 71,030 | 32,486 | 2,272 | -- | 105,788 |
| Salem | 99 | 9,343 | -- | -- | -- | 9,442 | 14,531 | 27,067 | -- | -- | -- | 41,598 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14,630 | 36,410 | -- | -- | -- | 51,040 |
| Sandy | 60 | 5,500 | 1,136 | -- | -- | 6,696 | 2,763 | 9,243 | 136 | -- | -- | 12,142 | -- | 861 | -- | -- | -- | 861 | -- | -- | -- | -- | -- | -- | 2,823 | 15,604 | 1,272 | -- | -- | 19,699 |
| Sugar Creek | 40 | 2,750 | 182 | -- | -- | 2,972 | 40 | 1,193 | 182 | -- | -- | 1,415 | 1,093 | -- | -- | -- | -- | 1,093 | -- | -- | -- | -- | -- | -- | 1,173 | 3,943 | 364 | -- | -- | 5,480 |
| Union | -- | 5,831 | 62,064 | -- | -- | 67,895 | -- | -- | 26,943 | -- | -- | 26,943 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,831 | 89,007 | -- | -- | 94,838 |
| Warren | 239 | 11,397 | 11,177 | -- | -- | 22,813 | -- | 31,573 | 591 | -- | -- | 32,164 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 239 | 42,970 | 11,768 | -- | -- | 54,977 |
| Warwick | -- | 3,313 | 27,761 | -- | -- | 31,074 | -- | 4,174 | 13,312 | -- | -- | 17,486 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,487 | 41,073 | -- | -- | 48,560 |
| Washington | -- | 3,909 | -- | -- | -- | 3,909 | -- | 20,375 | -- | -- | -- | 20,375 | -- | 42,141 | -- | -- | -- | 42,141 | -- | 10,933 | -- | -- | -- | 10,933 | -- | 77,358 | -- | -- | -- | 77,358 |
| Wayne | 99 | -- | -- | -- | -- | 99 | -- | -- | -- | -- | -- | -- | 40 | -- | -- | -- | -- | 40 | -- | -- | -- | -- | -- | -- | 139 | -- | -- | -- | -- | 139 |
| York | -- | 5,864 | 11,041 | 625 | 886 | 18,416 | -- | 10,999 | 3,817 | 170 | -- | 14,986 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 16,863 | 14,858 | 795 | 886 | 33,402 |
| Total | 16,200 | 115,028 | 215,726 | 7,157 | 886 | 354,997 | 67,087 | 267,787 | 155,479 | 4,827 | -- | 495,180 | 1,411 | 129,173 | 182 | -- | -- | 130,766 | -- | 19,447 | -- | -- | -- | 19,447 | 84,698 | 531,435 | 371,387 | 11,984 | 886 | 1,000,390 |
| VINTON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brown | -- | 16,631 | 20,219 | 1,477 | -- | 38,327 | -- | 18,486 | 26,080 | 27,840 | -- | 47,406 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 35,117 | 46,299 | 4,317 | -- | 85,733 |
| Clinton | 1,451 | 861 | 45 | -- | -- | 2,357 | 1,471 | -- | -- | -- | -- | 1,471 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,922 | 861 | 45 | -- | -- | 3,828 |
| Elic | 656 | 298 | 91 | -- | -- | 1,045 | 239 | 762 | -- | -- | -- | 1,001 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 895 | 1,060 | 91 | -- | -- | 2,046 |
| Knox | 11,489 | 6,427 | -- | -- | -- | 17,916 | 21,428 | 8,647 | -- | -- | -- | 30,075 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 32,917 | 15,074 | -- | -- | -- | 47,991 |
| Madison | 3,876 | 4,638 | -- | -- | -- | 8,514 | 6,778 | 5,135 | -- | -- | -- | 11,913 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,654 | 9,773 | -- | -- | -- | 20,427 |
| Swan | -- | 33 | 1,136 | -- | -- | 1,169 | -- | 331 | -- | -- | -- | 331 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 364 | 1,136 | -- | -- | 1,500 |
| Vinton | 1,849 | -- | -- | -- | -- | 1,849 | 3,300 | -- | -- | -- | -- | 3,300 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,149 | -- | -- | -- | -- | 5,149 |
| Wilkesville | -- | -- | -- | -- | -- | -- | 4,592 | -- | -- | -- | -- | 4,592 | 2,087 | -- | -- | -- | -- | 2,087 | -- | -- | -- | -- | -- | -- | 6,679 | -- | -- | -- | -- | 6,679 |
| Total | 19,321 | 28,888 | 21,491 | 1,477 | -- | 71,177 | 37,808 | 33,361 | 26,080 | 2,840 | -- | 100,089 | 2,087 | -- | -- | -- | -- | 2,087 | -- | -- | -- | -- | -- | -- | 59,216 | 62,249 | 47,571 | 4,317 | -- | 173,353 |
| State Total[1] | 193,014 | 710,170 | 885,662 | 460,653 | 523,468 | 2,772,967 | 877,049 | 2,177,906 | 829,685 | 208,204 | 323,067 | 4,415,911 | 722,215 | 880,557 | 203,184 | 1,363 | 8,859 | 1,816,178 | 328,338 | 406,996 | 43,208 | -- | -- | 778,542 | 2,120,616 | 4,175,629 | 1,961,739 | 670,220 | 855,394 | 9,783,598 |

1 Perry County reserves based on estimate of Flint (1951, p. 101).

# TABLE 49

## ESTIMATED ORIGINAL RESERVES OF THE LOWER FREEPORT COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| **CARROLL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brown | -- | -- | -- | -- | -- | -- | 398 | -- | -- | -- | -- | 398 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 398 | -- | -- | -- | -- | 398 |
| Center | 1,789 | -- | -- | -- | -- | 1,789 | 5,049 | -- | -- | -- | -- | 5,049 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,838 | -- | -- | -- | -- | 6,838 |
| Fox | -- | -- | -- | -- | -- | -- | 2,286 | -- | -- | -- | -- | 2,286 | 10,635 | -- | -- | -- | -- | 10,635 | -- | -- | -- | -- | -- | -- | 12,921 | -- | -- | -- | -- | 12,921 |
| Harrison | 2,385 | -- | -- | -- | -- | 2,385 | 12,225 | -- | -- | -- | -- | 12,225 | 139 | -- | -- | -- | -- | 139 | -- | -- | -- | -- | -- | -- | 14,749 | -- | -- | -- | -- | 14,749 |
| Lee | -- | -- | -- | -- | -- | -- | -- | 1,656 | 10,450 | -- | -- | 12,106 | 5,009 | 10,867 | 17,720 | -- | -- | 33,596 | 16,121 | 11,198 | 8,906 | -- | -- | 36,225 | 21,130 | 23,721 | 37,076 | -- | -- | 81,927 |
| Loudon | 9,999 | -- | 2,499 | -- | -- | 12,498 | -- | -- | 17,720 | -- | -- | 17,720 | -- | -- | 43,390 | -- | -- | 43,390 | -- | 18,056 | 4,452 | -- | -- | 22,508 | 9,999 | 18,056 | 68,061 | -- | -- | 96,116 |
| Monroe | 994 | 2,485 | 1,136 | -- | -- | 4,615 | 13,656 | 497 | -- | -- | -- | 14,153 | 5,168 | -- | -- | -- | -- | 5,168 | -- | -- | -- | -- | -- | -- | 19,818 | 2,982 | 1,136 | -- | -- | 23,936 |
| Orange | 497 | 795 | -- | -- | -- | 1,292 | 99 | -- | -- | -- | -- | 99 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 596 | 795 | -- | -- | -- | 1,391 |
| Perry | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,153 | -- | -- | -- | -- | 1,153 | 1,153 | -- | -- | -- | -- | 1,153 |
| Rose | 2,942 | 166 | -- | -- | -- | 3,108 | 3,677 | -- | -- | -- | -- | 3,677 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,619 | 166 | -- | -- | -- | 6,785 |
| Union | 1,491 | -- | -- | -- | -- | 1,491 | 10,078 | -- | -- | -- | -- | 10,078 | 2,286 | -- | -- | -- | -- | 2,286 | -- | -- | -- | -- | -- | -- | 13,855 | -- | -- | -- | -- | 13,855 |
| Total | 20,097 | 3,446 | 3,635 | -- | -- | 27,178 | 47,468 | 2,153 | 28,170 | -- | -- | 77,791 | 23,237 | 10,867 | 61,110 | -- | -- | 95,214 | 17,274 | 29,254 | 13,358 | -- | -- | 59,886 | 108,076 | 45,720 | 106,273 | -- | -- | 260,069 |
| **COLUMBIANA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Center | 1,908 | -- | -- | -- | -- | 1,908 | 4,294 | -- | -- | -- | -- | 4,294 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,202 | -- | -- | -- | -- | 6,202 |
| Elk Run | 3,976 | -- | -- | -- | -- | 3,976 | 5,327 | -- | -- | -- | -- | 5,327 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9,303 | -- | -- | -- | -- | 9,303 |
| Liverpool | 5,526 | 4,472 | -- | -- | -- | 9,998 | 6,798 | 663 | -- | -- | -- | 7,461 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 12,324 | 5,135 | -- | -- | -- | 17,459 |
| Middleton | 2,922 | -- | -- | -- | -- | 2,922 | 2,942 | -- | -- | -- | -- | 2,942 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,864 | -- | -- | -- | -- | 5,864 |
| St. Clair | 4,691 | 4,141 | -- | -- | -- | 8,832 | 13,795 | 9,177 | -- | -- | -- | 22,972 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 18,486 | 13,318 | -- | -- | -- | 31,804 |
| Salem | 1,153 | -- | -- | -- | -- | 1,153 | 358 | -- | -- | -- | -- | 358 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,511 | -- | -- | -- | -- | 1,511 |
| Unity | 1,531 | -- | -- | -- | -- | 1,531 | 954 | -- | -- | -- | -- | 954 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,485 | -- | -- | -- | -- | 2,485 |
| Washington | 2,445 | 5,003 | -- | -- | -- | 7,448 | 20,375 | 1,425 | -- | -- | -- | 21,800 | 437 | -- | -- | -- | -- | 437 | -- | -- | -- | -- | -- | -- | 23,257 | 6,428 | -- | -- | -- | 29,685 |
| Yellow Creek | 7,554 | 762 | -- | -- | -- | 8,316 | 8,229 | -- | -- | -- | -- | 8,229 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15,783 | 762 | -- | -- | -- | 16,545 |
| Total | 31,706 | 14,378 | -- | -- | -- | 46,084 | 63,072 | 11,265 | -- | -- | -- | 74,337 | 437 | -- | -- | -- | -- | 437 | -- | -- | -- | -- | -- | -- | 95,215 | 25,643 | -- | -- | -- | 120,858 |
| **HARRISON** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Archer | -- | 166 | 6,043 | 3,635 | -- | 9,844 | 4,174 | 10,668 | 16,220 | 9,371 | -- | 40,433 | 5,586 | 2,120 | 3,453 | -- | -- | 11,159 | -- | -- | -- | -- | -- | -- | 9,760 | 12,954 | 25,716 | 13,006 | -- | 61,436 |
| Athens | -- | -- | -- | -- | -- | -- | 1,490 | -- | -- | -- | -- | 1,490 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,490 | -- | -- | -- | -- | 1,490 |
| Cadiz | -- | 663 | 727 | 4,543 | 4,975 | 10,908 | 3,041 | 13,119 | 10,041 | 5,566 | 1,363 | 33,130 | 7,573 | 1,060 | -- | -- | -- | 8,633 | -- | -- | -- | -- | -- | -- | 10,614 | 14,842 | 10,768 | 10,109 | 6,338 | 52,671 |
| German | -- | -- | 10,132 | 24,421 | -- | 34,553 | -- | -- | 53,613 | 2,385 | -- | 55,998 | -- | -- | 30,441 | -- | -- | 30,441 | -- | -- | -- | -- | -- | -- | -- | -- | 94,186 | 26,806 | -- | 120,992 |
| Green | -- | -- | 18,083 | 61,224 | 33,258 | 112,565 | -- | -- | 24,762 | 34,758 | 32,713 | 92,233 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 42,845 | 95,982 | 65,971 | 204,798 |
| Monroe | 954 | 1,193 | -- | -- | -- | 2,147 | 358 | -- | -- | -- | -- | 358 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,312 | 1,193 | -- | -- | -- | 2,505 |
| Rumley | -- | -- | 1,454 | -- | -- | 1,454 | -- | 5,366 | 11,359 | -- | -- | 16,725 | 7,037 | 14,113 | 9,314 | -- | -- | 30,464 | 3,240 | 2,154 | -- | -- | -- | 5,394 | 10,277 | 21,633 | 22,127 | -- | -- | 54,037 |
| Short Creek | -- | 431 | 6,179 | -- | -- | 6,610 | 1,849 | 3,744 | 34,531 | -- | -- | 40,124 | 8,587 | 10,635 | 1,636 | -- | -- | 20,858 | 557 | -- | -- | -- | -- | 557 | 10,993 | 14,810 | 42,346 | -- | -- | 68,149 |
| Total | 954 | 2,453 | 42,618 | 93,823 | 38,233 | 178,081 | 10,912 | 32,897 | 150,526 | 52,080 | 34,076 | 280,491 | 28,783 | 27,928 | 44,844 | -- | -- | 101,555 | 3,797 | 2,154 | -- | -- | -- | 5,951 | 44,446 | 65,432 | 237,988 | 145,903 | 72,309 | 566,078 |
| **JEFFERSON** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brush Creek | 795 | 9,011 | -- | -- | -- | 9,806 | 18,983 | 14,842 | -- | -- | -- | 33,825 | 13,914 | -- | -- | -- | -- | 13,914 | -- | -- | -- | -- | -- | -- | 33,692 | 23,853 | -- | -- | -- | 57,545 |
| Cross Creek | -- | 7,620 | 46,434 | -- | -- | 54,054 | -- | 6,063 | 59,383 | -- | -- | 65,446 | -- | -- | 32,122 | -- | -- | 32,122 | -- | -- | 3,408 | -- | -- | 3,408 | -- | 13,683 | 141,347 | -- | -- | 155,030 |
| Island Creek | 4,115 | 729 | 6,861 | -- | -- | 11,705 | 9,382 | 15,472 | 46,525 | -- | -- | 71,379 | -- | 30,678 | 23,444 | -- | -- | 54,122 | -- | 10,270 | 2,408 | -- | -- | 12,678 | 13,497 | 57,149 | 79,238 | -- | -- | 149,884 |
| Knox | 596 | 6,626 | -- | -- | -- | 7,222 | 1,292 | 36,774 | -- | -- | -- | 38,066 | -- | 45,222 | -- | -- | -- | 45,222 | -- | 663 | -- | -- | -- | 663 | 1,888 | 89,285 | -- | -- | -- | 91,173 |
| Mt. Pleasant | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 557 | 1,922 | -- | -- | -- | 2,479 | 12,821 | 6,228 | -- | -- | -- | 19,049 | 13,378 | 8,150 | -- | -- | -- | 21,528 |
| Ross | 994 | 15,505 | 2,635 | 8,235 | -- | 27,369 | 596 | 67,683 | 727 | -- | -- | 69,006 | -- | 10,436 | -- | -- | -- | 10,436 | -- | -- | -- | -- | -- | -- | 1,590 | 93,624 | 3,362 | 8,235 | -- | 106,811 |
| Salem | -- | 133 | 7,042 | 26,523 | -- | 33,698 | -- | 2,220 | 38,801 | 1,306 | -- | 42,327 | -- | 7,090 | 80,056 | -- | -- | 87,146 | -- | -- | 1,454 | -- | -- | 1,454 | -- | 9,443 | 127,353 | 27,829 | -- | 164,625 |
| Saline | 6,560 | 11,165 | -- | -- | -- | 17,725 | 7,156 | 26,702 | -- | -- | -- | 33,858 | -- | 994 | -- | -- | -- | 994 | -- | -- | -- | -- | -- | -- | 13,716 | 38,861 | -- | -- | -- | 52,577 |
| Smithfield | -- | -- | -- | -- | -- | -- | -- | -- | 15,539 | -- | -- | 15,539 | 497 | 2,418 | 52,114 | -- | -- | 55,029 | -- | 8,680 | 82,328 | -- | -- | 91,008 | 497 | 11,098 | 149,981 | -- | -- | 161,576 |
| Springfield | -- | 4,307 | 24,398 | 32,202 | -- | 60,907 | 1,391 | 18,354 | 35,076 | 11,643 | -- | 66,464 | 3,717 | 464 | 1,363 | -- | -- | 5,544 | -- | -- | -- | -- | -- | -- | 5,108 | 23,125 | 60,837 | 43,845 | -- | 132,915 |
| Steubenville | -- | 6,460 | 14,085 | -- | -- | 20,545 | -- | 12,921 | 16,765 | -- | -- | 29,686 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19,381 | 30,850 | -- | -- | 50,231 |
| Warren | -- | 199 | 3,453 | -- | -- | 3,652 | 1,511 | 6,394 | 7,042 | -- | -- | 14,947 | 6,699 | 5,963 | 7,588 | -- | -- | 20,250 | 2,147 | 2,882 | 4,089 | -- | -- | 9,118 | 10,357 | 15,438 | 22,172 | -- | -- | 47,967 |
| Wayne | -- | -- | -- | -- | -- | -- | -- | -- | 35,121 | -- | -- | 35,121 | -- | -- | 111,543 | -- | -- | 111,543 | -- | -- | 28,124 | -- | -- | 28,124 | -- | -- | 174,788 | -- | -- | 174,788 |
| Wells | -- | -- | 3,544 | -- | -- | 3,544 | -- | -- | 25,353 | -- | -- | 25,353 | -- | -- | 48,933 | -- | -- | 48,933 | -- | -- | 36,075 | -- | -- | 36,075 | -- | -- | 113,905 | -- | -- | 113,905 |
| Total | 13,060 | 61,755 | 108,452 | 66,960 | -- | 250,227 | 40,311 | 207,425 | 280,332 | 12,949 | -- | 541,017 | 25,384 | 105,187 | 357,163 | -- | -- | 487,734 | 14,968 | 28,723 | 157,886 | -- | -- | 201,577 | 93,723 | 403,090 | 903,833 | 79,909 | -- | 1,480,555 |
| **MAHONING** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Springfield | 437 | -- | -- | -- | -- | 437 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 437 | -- | -- | -- | -- | 437 |
| Total | 437 | -- | -- | -- | -- | 437 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 437 | -- | -- | -- | -- | 437 |
| **TUSCARAWAS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Clay | 99 | 729 | 1,272 | -- | -- | 2,100 | 159 | 133 | 91 | -- | -- | 383 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 258 | 862 | 1,363 | -- | -- | 2,483 |
| Fairfield | 1,451 | 99 | -- | -- | -- | 1,550 | 477 | -- | -- | -- | -- | 477 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,928 | 99 | -- | -- | -- | 2,027 |
| Rush | 676 | 3,147 | 136 | -- | -- | 3,959 | 2,922 | 1,955 | 409 | -- | -- | 5,286 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,598 | 5,102 | 545 | -- | -- | 9,245 |
| Warren | 875 | 1,060 | -- | -- | -- | 1,935 | 2,425 | 166 | -- | -- | -- | 2,591 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,300 | 1,226 | -- | -- | -- | 4,526 |
| Total | 3,101 | 5,035 | 1,408 | -- | -- | 9,544 | 5,983 | 2,254 | 500 | -- | -- | 8,737 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9,084 | 7,289 | 1,908 | -- | -- | 18,281 |
| State Total | 69,355 | 87,067 | 156,113 | 160,783 | 38,233 | 511,551 | 167,746 | 255,994 | 459,528 | 65,029 | 34,076 | 982,373 | 77,841 | 143,982 | 463,117 | -- | -- | 684,940 | 36,039 | 60,131 | 171,244 | -- | -- | 267,414 | 350,981 | 547,174 | 1,250,002 | 225,812 | 72,309 | 2,446,278 |

# TABLE 50

## ESTIMATED ORIGINAL RESERVES OF THE UPPER FREEPORT COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| **ATHENS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ames | 4,214 | 5,102 | 1,954 | -- | -- | 11,270 | 3,995 | 398 | -- | -- | -- | 4,393 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,209 | 5,500 | 1,954 | -- | -- | 15,663 |
| Athens | 1,352 | 3,545 | 7,406 | 511 | -- | 12,814 | 3,240 | 497 | -- | -- | -- | 3,737 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,592 | 4,042 | 7,406 | 511 | -- | 16,551 |
| Canaan | -- | 232 | 182 | -- | -- | 414 | 1,471 | 364 | -- | -- | -- | 1,835 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,471 | 596 | 182 | -- | -- | 2,249 |
| Dover | 3,916 | 21,435 | 42,800 | 8,121 | 1,022 | 77,294 | 6,818 | 13,417 | 6,770 | 14,710 | -- | 41,715 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,734 | 34,852 | 49,570 | 22,831 | 1,022 | 119,009 |
| Lee | 636 | -- | -- | -- | -- | 636 | 1,690 | -- | -- | -- | -- | 1,690 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,326 | -- | -- | -- | -- | 2,326 |
| Trimble | 4,711 | 8,614 | 17,447 | 9,711 | -- | 40,483 | 9,382 | 15,968 | 25,489 | 33,111 | -- | 83,950 | 1,073 | -- | -- | -- | -- | 1,073 | -- | -- | -- | -- | -- | -- | 15,166 | 24,582 | 42,936 | 42,822 | -- | 125,506 |
| Waterloo | 855 | 2,021 | -- | -- | -- | 2,876 | 1,352 | -- | -- | -- | -- | 1,352 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,207 | 2,021 | -- | -- | -- | 4,228 |
| York | 576 | 3,843 | 2,317 | 2,158 | 2,794 | 11,688 | 4,254 | 8,746 | 6,406 | 4,203 | -- | 23,609 | 914 | -- | -- | -- | -- | 914 | -- | -- | -- | -- | -- | -- | 5,744 | 12,589 | 8,723 | 6,361 | 2,794 | 36,211 |
| Total | 16,260 | 44,792 | 72,106 | 20,501 | 3,816 | 157,475 | 32,202 | 39,390 | 38,665 | 52,024 | -- | 162,281 | 1,987 | -- | -- | -- | -- | 1,987 | -- | -- | -- | -- | -- | -- | 50,449 | 84,182 | 110,771 | 72,525 | 3,816 | 321,743 |
| **BELMONT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flushing | -- | 3,313 | 8,315 | -- | -- | 11,628 | 3,578 | 5,400 | 3,498 | -- | -- | 12,476 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,578 | 8,713 | 11,813 | -- | -- | 24,104 |
| Kirkwood | -- | 828 | 318 | -- | -- | 1,146 | 2,982 | 4,472 | 1,499 | -- | -- | 8,953 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,982 | 5,300 | 1,817 | -- | -- | 10,099 |
| Total | -- | 4,141 | 8,633 | -- | -- | 12,774 | 6,560 | 9,872 | 4,997 | -- | -- | 21,429 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,560 | 14,013 | 13,630 | -- | -- | 34,203 |
| **CARROLL** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Augusta | -- | 298 | 682 | -- | -- | 980 | 497 | 23,754 | 6,633 | -- | -- | 30,884 | -- | 32,566 | -- | -- | -- | 32,566 | -- | 1,193 | -- | -- | -- | 1,193 | 497 | 57,811 | 7,315 | -- | -- | 65,623 |
| Brown | 696 | 2,021 | 1,636 | -- | -- | 4,353 | 4,512 | 5,798 | 227 | -- | -- | 10,537 | 338 | 66 | -- | -- | -- | 404 | -- | -- | -- | -- | -- | -- | 5,546 | 7,885 | 1,863 | -- | -- | 15,294 |
| Center | 358 | 199 | 1,227 | 170 | -- | 1,954 | 1,809 | 3,876 | 6,997 | 57 | -- | 12,739 | 2,266 | 1,193 | -- | -- | -- | 3,459 | -- | -- | -- | -- | -- | -- | 4,433 | 5,268 | 8,224 | 227 | -- | 18,152 |
| East | -- | 298 | 4,453 | -- | -- | 4,751 | -- | 25,940 | 13,176 | -- | -- | 39,116 | -- | 34,521 | -- | -- | -- | 34,521 | -- | -- | -- | -- | -- | -- | -- | 60,759 | 17,629 | -- | -- | 78,388 |
| Fox | -- | 33 | 136 | 114 | 204 | 487 | -- | 9,674 | 3,817 | 1,704 | 750 | 15,945 | 5,268 | 35,846 | -- | -- | -- | 41,114 | 10,774 | 24,516 | -- | -- | -- | 35,290 | 16,042 | 70,069 | 3,953 | 1,818 | 954 | 92,836 |
| Harrison | 179 | 331 | 454 | -- | -- | 964 | 2,962 | 1,557 | 2,544 | 909 | -- | 7,972 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,141 | 1,888 | 2,998 | 909 | -- | 8,936 |
| Lee | -- | -- | -- | -- | -- | -- | 1,868 | -- | -- | -- | -- | 1,868 | 5,049 | 33 | -- | -- | -- | 5,082 | -- | -- | -- | -- | -- | -- | 6,917 | 33 | -- | -- | -- | 6,950 |
| Loudon | -- | -- | -- | -- | -- | -- | 3,161 | 1,855 | -- | -- | -- | 5,016 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,161 | 1,855 | -- | -- | -- | 5,016 |
| Monroe | 596 | 2,352 | 4,044 | 1,079 | -- | 8,071 | 219 | 5,102 | 39,892 | 7,724 | -- | 52,937 | -- | 961 | 13,358 | -- | -- | 14,319 | -- | -- | -- | -- | -- | -- | 815 | 8,415 | 57,294 | 8,803 | -- | 75,327 |
| Orange | 2,187 | 2,153 | -- | -- | -- | 4,340 | 4,632 | 34,587 | -- | -- | -- | 39,219 | 855 | 15,505 | -- | -- | -- | 16,360 | -- | -- | -- | -- | -- | -- | 7,674 | 52,245 | -- | -- | -- | 59,919 |
| Perry | -- | -- | -- | -- | -- | -- | 3,220 | 1,988 | -- | -- | -- | 5,208 | 4,135 | 663 | -- | -- | -- | 4,798 | -- | -- | -- | -- | -- | -- | 7,355 | 2,651 | -- | -- | -- | 10,006 |
| Rose | 159 | 66 | 636 | 1,363 | -- | 2,224 | 318 | 762 | 454 | 284 | -- | 1,818 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 477 | 828 | 1,090 | 1,647 | -- | 4,042 |
| Union | 596 | 2,054 | 2,363 | 4,032 | -- | 9,045 | 8,805 | 9,575 | 26,988 | 18,401 | -- | 63,769 | 2,683 | 1,458 | -- | -- | -- | 4,141 | -- | -- | -- | -- | -- | -- | 12,084 | 13,087 | 29,351 | 22,433 | -- | 76,955 |
| Washington | 735 | -- | -- | -- | -- | 735 | 2,465 | -- | -- | -- | -- | 2,465 | 3,379 | 9,343 | -- | -- | -- | 12,722 | 4,134 | 12,788 | -- | -- | -- | 16,922 | 10,713 | 22,131 | -- | -- | -- | 32,844 |
| Total | 5,506 | 9,805 | 15,631 | 6,758 | 204 | 37,904 | 34,468 | 124,468 | 100,728 | 29,079 | 750 | 289,493 | 23,973 | 132,155 | 13,358 | -- | -- | 169,486 | 14,908 | 38,497 | -- | -- | -- | 53,405 | 78,855 | 304,925 | 129,717 | 35,837 | 954 | 550,288 |
| **COLUMBIANA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butler | -- | -- | -- | -- | -- | -- | 835 | 2,750 | 2,272 | -- | -- | 5,857 | 3,081 | 1,226 | -- | -- | -- | 4,307 | -- | -- | -- | -- | -- | -- | 3,916 | 3,976 | 2,272 | -- | -- | 10,164 |
| Center | 7,891 | 5,963 | -- | -- | -- | 13,854 | 15,385 | 12,788 | -- | -- | -- | 28,173 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 23,276 | 18,751 | -- | -- | -- | 42,027 |
| Elk Run | 1,550 | 31,705 | 2,635 | -- | -- | 35,890 | 795 | 27,531 | 3,408 | -- | -- | 31,734 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,345 | 59,236 | 6,043 | -- | -- | 67,624 |
| Fairfield | -- | 1,922 | -- | -- | -- | 1,922 | 4,433 | 17,956 | -- | -- | -- | 22,389 | 7,076 | 19,878 | -- | -- | -- | 26,954 | 875 | -- | -- | -- | -- | 875 | 12,384 | 39,756 | -- | -- | -- | 52,140 |
| Franklin | 1,888 | 6,460 | 1,045 | -- | -- | 9,393 | 4,612 | 41,147 | 2,272 | 2,045 | -- | 50,076 | 596 | 9,111 | -- | -- | -- | 9,707 | -- | -- | -- | -- | -- | -- | 7,096 | 56,718 | 3,317 | 2,045 | -- | 69,176 |
| Hanover | 1,630 | 2,882 | 5,816 | -- | -- | 10,328 | 8,289 | 25,775 | 7,179 | -- | -- | 41,243 | 6,699 | 18,818 | -- | -- | -- | 25,517 | -- | -- | -- | -- | -- | -- | 16,618 | 47,475 | 12,995 | -- | -- | 77,088 |
| Knox | 437 | 199 | -- | -- | -- | 636 | 378 | 1,060 | 1,590 | 284 | -- | 3,312 | 179 | -- | -- | -- | -- | 179 | -- | -- | -- | -- | -- | -- | 994 | 1,259 | 1,590 | 284 | -- | 4,127 |
| Liverpool | 2,107 | 1,491 | -- | -- | -- | 3,598 | 2,385 | 1,524 | -- | -- | -- | 3,909 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,492 | 3,015 | -- | -- | -- | 7,507 |
| Madison | 7,434 | 18,321 | 19,810 | -- | -- | 45,565 | 17,174 | 19,679 | 16,947 | 398 | -- | 54,198 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 24,608 | 38,000 | 36,757 | 398 | -- | 99,763 |
| Middleton | 5,228 | 19,381 | 1,045 | -- | -- | 25,654 | 4,154 | 26,868 | -- | -- | -- | 31,022 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9,382 | 46,249 | 1,045 | -- | -- | 56,676 |
| St. Clair | 7,275 | 7,951 | 3,135 | -- | -- | 18,361 | 10,177 | 6,758 | 4,316 | -- | -- | 21,251 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 17,452 | 14,709 | 7,451 | -- | -- | 39,612 |
| Salem | 1,849 | 2,220 | 6,497 | -- | -- | 10,566 | 6,997 | 9,376 | 5,816 | -- | -- | 22,189 | 3,081 | 1,656 | -- | -- | -- | 4,737 | -- | -- | -- | -- | -- | -- | 11,927 | 13,252 | 12,313 | -- | -- | 37,492 |
| Unity | 457 | 11,695 | 7,724 | -- | -- | 19,876 | 3,041 | 15,836 | 3,998 | -- | -- | 22,875 | -- | 398 | -- | -- | -- | 398 | -- | -- | -- | -- | -- | -- | 3,498 | 27,929 | 11,722 | -- | -- | 43,149 |
| Washington | 1,073 | 10,933 | 5,997 | 9,030 | 8,326 | 35,359 | 3,737 | 23,953 | 8,814 | 6,872 | 11,540 | 54,916 | 1,093 | 1,756 | -- | -- | -- | 2,849 | -- | -- | -- | -- | -- | -- | 5,903 | 36,642 | 14,811 | 15,902 | 19,866 | 93,124 |
| Wayne | 2,047 | 10,105 | 4,362 | -- | -- | 16,514 | 2,604 | 27,001 | 21,082 | 12,665 | -- | 63,352 | -- | 563 | -- | -- | -- | 563 | -- | -- | -- | -- | -- | -- | 4,651 | 37,669 | 25,444 | 12,665 | -- | 80,429 |
| West | -- | 1,458 | 3,589 | 8,746 | 2,385 | 16,178 | -- | 6,129 | 23,262 | 22,036 | 5,111 | 56,538 | 795 | 4,141 | 3,362 | 170 | -- | 8,468 | 398 | 199 | -- | -- | -- | 597 | 1,193 | 11,927 | 30,213 | 30,952 | 7,496 | 81,781 |
| Yellow Creek | 3,856 | 8,614 | 12,676 | 5,850 | -- | 30,996 | 6,202 | 3,611 | 5,588 | 1,363 | -- | 16,764 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,058 | 12,225 | 18,264 | 7,213 | -- | 47,760 |
| Total | 44,722 | 141,300 | 74,331 | 23,626 | 10,711 | 294,690 | 91,198 | 269,742 | 106,544 | 45,663 | 16,651 | 529,798 | 22,600 | 57,547 | 3,362 | 170 | -- | 83,679 | 1,273 | 199 | -- | -- | -- | 1,472 | 159,793 | 468,788 | 184,237 | 69,459 | 27,362 | 909,639 |
| **GALLIA** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gallipolis | -- | 2,253 | -- | -- | -- | 2,253 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,253 | -- | -- | -- | 2,253 |
| Greenfield | 199 | 232 | 1,454 | -- | -- | 1,885 | 576 | 166 | -- | -- | -- | 742 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 775 | 398 | 1,454 | -- | -- | 2,627 |
| Huntington | 40 | 629 | 2,272 | 1,931 | 1,295 | 6,167 | 2,166 | 762 | 182 | 170 | 68 | 3,348 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,206 | 1,391 | 2,454 | 2,101 | 1,363 | 9,515 |
| Perry | 159 | 3,512 | 818 | -- | -- | 4,489 | 3,479 | 1,458 | -- | -- | -- | 4,937 | 3,061 | 1,425 | -- | -- | -- | 4,486 | -- | -- | -- | -- | -- | -- | 6,699 | 6,395 | 818 | -- | -- | 13,912 |
| Walnut | 219 | 265 | 6,770 | 7,156 | 1,772 | 16,182 | 5,407 | 4,605 | 11,949 | 2,158 | -- | 24,119 | 934 | 1,491 | -- | -- | -- | 2,425 | -- | -- | -- | -- | -- | -- | 6,560 | 6,361 | 18,719 | 9,314 | 1,772 | 42,726 |
| Total | 617 | 6,891 | 11,314 | 9,087 | 3,067 | 30,976 | 11,628 | 6,991 | 12,131 | 2,328 | 68 | 33,146 | 3,995 | 2,916 | -- | -- | -- | 6,911 | -- | -- | -- | -- | -- | -- | 16,240 | 16,798 | 23,445 | 11,415 | 3,135 | 71,033 |
| **GUERNSEY** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Adams | -- | 4,472 | -- | -- | -- | 4,472 | 2,385 | 8,812 | -- | -- | -- | 11,197 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,385 | 13,284 | -- | -- | -- | 15,669 |
| Gambridge | 1,014 | 1,358 | 2,044 | 10,564 | 3,748 | 18,728 | 5,983 | 16,035 | 1,726 | 3,692 | 2,658 | 30,094 | 716 | 795 | -- | -- | -- | 1,511 | -- | -- | -- | -- | -- | -- | 7,713 | 18,188 | 3,770 | 14,256 | 6,406 | 50,333 |
| Center | -- | 3,313 | -- | 1,193 | 11,927 | 16,433 | 7,852 | 17,128 | 12,086 | 20,275 | 4,771 | 62,112 | -- | 398 | 91 | 795 | 545 | 1,829 | -- | -- | -- | -- | -- | -- | 7,852 | 20,839 | 12,177 | 22,263 | 17,243 | 80,374 |
| Jackson | -- | -- | 3,862 | 23,910 | -- | 27,772 | -- | 7,057 | 12,131 | 78,034 | -- | 97,222 | -- | 232 | -- | -- | -- | 232 | -- | -- | -- | -- | -- | -- | -- | 7,289 | 15,993 | 101,944 | -- | 125,226 |
| Knox | 795 | -- | -- | -- | -- | 795 | 199 | -- | -- | -- | -- | 199 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 994 | -- | -- | -- | -- | 994 |
| Liberty | 1,670 | 629 | -- | -- | -- | 2,299 | 1,153 | -- | -- | -- | -- | 1,153 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,823 | 629 | -- | -- | -- | 3,452 |
| Londonderry | 2,008 | 17,526 | 44,117 | -- | -- | 63,651 | 4,870 | 17,559 | 18,356 | -- | -- | 40,785 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,878 | 35,085 | 62,473 | -- | -- | 104,436 |
| Madison | 1,888 | 1,822 | -- | -- | -- | 3,710 | 954 | 1,888 | -- | -- | -- | 2,842 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,842 | 3,710 | -- | -- | -- | 6,552 |

# TABLE 50 (Continued)

## ESTIMATED ORIGINAL RESERVES OF THE UPPER FREEPORT COAL BED IN OHIO

### (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| Oxford | 60 | 5,102 | 227 | -- | -- | 5,389 | 1,829 | 4,771 | -- | -- | -- | 6,600 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,889 | 9,873 | 227 | -- | -- | 11,989 |
| Richland | 5,268 | 563 | 3,090 | 13,176 | -- | 22,097 | 5,804 | 9,574 | 13,403 | 50,660 | -- | 79,441 | 1,431 | 1,491 | -- | 2,499 | -- | 5,421 | -- | -- | -- | -- | -- | -- | 12,503 | 11,628 | 16,493 | 66,335 | -- | 106,959 |
| Spencer | -- | -- | -- | 114 | -- | 114 | 1,431 | 4,870 | 7,360 | 5,509 | -- | 19,170 | 1,531 | 2,319 | 1,408 | 1,249 | -- | 6,507 | -- | -- | -- | -- | -- | -- | 2,962 | 7,189 | 8,768 | 6,872 | -- | 25,791 |
| Valley | -- | -- | 1,272 | 15,050 | -- | 16,322 | 119 | 928 | 11,631 | 100,014 | -- | 112,692 | -- | -- | 273 | 1,249 | -- | 1,522 | -- | -- | -- | -- | -- | -- | 119 | 928 | 13,176 | 116,313 | -- | 130,536 |
| Washington | 40 | 1,358 | -- | -- | -- | 1,398 | 1,749 | 861 | -- | -- | -- | 2,610 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,789 | 2,219 | -- | -- | -- | 4,008 |
| Westland | 398 | 2,154 | -- | -- | -- | 2,552 | 3,976 | 5,267 | -- | -- | -- | 9,243 | 199 | 331 | -- | -- | -- | 530 | -- | -- | -- | -- | -- | -- | 4,573 | 7,752 | -- | -- | -- | 12,325 |
| Wheeling | 338 | -- | -- | -- | -- | 338 | 60 | -- | -- | -- | -- | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 398 | -- | -- | -- | -- | 398 |
| Wills | 99 | 7,686 | 1,181 | -- | -- | 8,966 | 6,599 | 5,599 | -- | -- | -- | 12,198 | 3,876 | 861 | -- | -- | -- | 4,737 | -- | -- | -- | -- | -- | -- | 10,574 | 14,146 | 1,181 | -- | -- | 25,901 |
| Total | 13,578 | 45,983 | 55,793 | 64,007 | 15,675 | 195,036 | 44,963 | 100,349 | 76,693 | 258,184 | 7,429 | 487,618 | 7,753 | 6,427 | 1,772 | 5,792 | 545 | 22,289 | -- | -- | -- | -- | -- | -- | 66,294 | 152,759 | 134,258 | 327,983 | 23,649 | 704,943 |
| HARRISON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Franklin | -- | -- | -- | -- | -- | -- | 1,531 | 6,295 | -- | -- | -- | 7,826 | 4,075 | 14,743 | -- | -- | -- | 18,818 | 1,292 | -- | -- | -- | -- | 1,292 | 6,898 | 21,038 | -- | -- | -- | 27,936 |
| Freeport | 99 | 18,718 | 45,889 | -- | -- | 64,706 | 557 | 25,742 | 1,136 | -- | -- | 27,435 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 656 | 44,460 | 47,025 | -- | -- | 92,141 |
| German | 3,220 | 10,204 | 909 | -- | -- | 14,333 | 7,951 | 15,670 | 636 | -- | -- | 24,257 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 11,171 | 25,874 | 1,545 | -- | -- | 38,590 |
| Green | 9,720 | 16,631 | 9,269 | -- | -- | 35,620 | 9,402 | 15,571 | 3,271 | -- | -- | 28,244 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19,122 | 32,202 | 12,540 | -- | -- | 63,864 |
| Monroe | 1,988 | 9,608 | -- | -- | -- | 11,596 | 4,771 | 19,016 | -- | -- | -- | 23,787 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,759 | 28,624 | -- | -- | -- | 35,383 |
| Moorefield | -- | -- | -- | -- | -- | -- | 4,075 | 7,057 | -- | -- | -- | 11,132 | 596 | -- | -- | -- | -- | 596 | -- | -- | -- | -- | -- | -- | 4,671 | 7,057 | -- | -- | -- | 11,728 |
| Nottingham | -- | -- | -- | -- | -- | -- | 954 | 11,463 | -- | -- | -- | 12,417 | 6,242 | 1,656 | -- | -- | -- | 7,898 | -- | -- | -- | -- | -- | -- | 7,196 | 13,119 | -- | -- | -- | 20,315 |
| Rumley | 338 | 66 | -- | -- | -- | 404 | 1,690 | 133 | -- | -- | -- | 1,823 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,028 | 199 | -- | -- | -- | 2,227 |
| Short Creek | 557 | 1,325 | 1,045 | -- | -- | 2,927 | 755 | 199 | -- | -- | -- | 954 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,312 | 1,524 | 1,045 | -- | -- | 3,881 |
| Washington | 60 | 5,168 | 4,543 | 568 | -- | 10,339 | 2,624 | 54,664 | 4,634 | 1,363 | -- | 63,285 | 855 | 15,505 | -- | -- | -- | 16,360 | -- | -- | -- | -- | -- | -- | 3,539 | 75,337 | 9,177 | 1,931 | -- | 89,984 |
| Total | 15,982 | 61,720 | 61,655 | 568 | -- | 139,925 | 34,310 | 155,810 | 9,677 | 1,363 | -- | 201,160 | 11,768 | 31,904 | -- | -- | -- | 43,672 | 1,292 | -- | -- | -- | -- | 1,292 | 63,352 | 249,434 | 71,332 | 1,931 | -- | 386,049 |
| HOCKING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ward | 1,610 | 4,307 | 3,953 | -- | -- | 9,870 | 2,047 | 3,942 | 9,359 | -- | -- | 15,348 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,657 | 8,249 | 13,312 | -- | -- | 25,218 |
| Total | 1,610 | 4,307 | 3,953 | -- | -- | 9,870 | 2,047 | 3,942 | 9,359 | -- | -- | 15,348 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,657 | 8,249 | 13,312 | -- | -- | 25,218 |
| JACKSON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bloomfield | -- | 99 | 182 | -- | -- | 281 | 696 | 364 | -- | -- | -- | 1,060 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 696 | 463 | 182 | -- | -- | 1,341 |
| Madison | -- | -- | -- | -- | -- | -- | 239 | -- | -- | -- | -- | 239 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 239 | -- | -- | -- | -- | 239 |
| Milton | 815 | -- | -- | -- | -- | 815 | 1,709 | 99 | -- | -- | -- | 1,808 | 954 | -- | -- | -- | -- | 954 | -- | -- | -- | -- | -- | -- | 3,478 | 99 | -- | -- | -- | 3,577 |
| Total | 815 | 99 | 182 | -- | -- | 1,096 | 2,644 | 463 | -- | -- | -- | 3,107 | 954 | -- | -- | -- | -- | 954 | -- | -- | -- | -- | -- | -- | 4,413 | 562 | 182 | -- | -- | 5,157 |
| JEFFERSON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brush Creek | 3,916 | 4,075 | 1,363 | -- | -- | 9,354 | 5,685 | 17,261 | 20,673 | -- | -- | 43,619 | 1,193 | 6,030 | 5,134 | -- | -- | 12,357 | -- | -- | -- | -- | -- | -- | 10,794 | 27,366 | 27,170 | -- | -- | 65,330 |
| Cross Creek | 1,232 | 1,259 | -- | -- | -- | 2,491 | 3,459 | -- | -- | -- | -- | 3,459 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,691 | 1,259 | -- | -- | -- | 5,950 |
| Island Creek | 437 | 1,756 | -- | -- | -- | 2,193 | 2,644 | 4,738 | -- | -- | -- | 7,382 | 636 | 265 | -- | -- | -- | 901 | -- | -- | -- | -- | -- | -- | 3,717 | 6,759 | -- | -- | -- | 10.476 |
| Knox | 99 | 2,385 | -- | -- | -- | 2,484 | 7,932 | 3,744 | -- | -- | -- | 11,676 | 1,550 | 298 | -- | -- | -- | 1,848 | -- | -- | -- | -- | -- | -- | 9,581 | 6,427 | -- | -- | -- | 16,008 |
| Ross | 1,809 | 11,794 | 8,178 | -- | -- | 21,781 | 2,366 | 31,904 | 11,268 | -- | -- | 45,538 | 6,778 | 9,508 | -- | -- | -- | 16,286 | -- | -- | -- | -- | -- | -- | 10,953 | 53,206 | 19,446 | -- | -- | 83,605 |
| Saline | 2,107 | 4,605 | 8,633 | 4,714 | 8,144 | 28,203 | 4,472 | 13,948 | 2,726 | 852 | -- | 21,998 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,579 | 18,553 | 11,359 | 5,566 | 8,144 | 50,201 |
| Springfield | 378 | 3,743 | -- | -- | -- | 4,121 | 10,536 | 10,171 | -- | -- | -- | 20,707 | 1,491 | -- | -- | -- | -- | 1,491 | -- | -- | -- | -- | -- | -- | 12,405 | 13,914 | -- | -- | -- | 26,319 |
| Wayne | -- | -- | 954 | -- | -- | 954 | 1,670 | 4,373 | 863 | -- | -- | 6,906 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,670 | 4,373 | 1,817 | -- | -- | 7,860 |
| Total | 9,978 | 29,617 | 19,128 | 4,714 | 8,144 | 71,581 | 38,764 | 86,139 | 35,530 | 852 | -- | 161,285 | 11,648 | 16,101 | 5,134 | -- | -- | 32,883 | -- | -- | -- | -- | -- | -- | 60,390 | 131,857 | 59,792 | 5,566 | 8,144 | 265,749 |
| LAWRENCE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aid | 1,690 | 8,481 | 14,994 | 8,633 | 2,045 | 35,843 | 7,613 | 27,199 | 8,269 | 2,896 | 682 | 46,659 | 219 | -- | -- | -- | -- | 219 | -- | -- | -- | -- | -- | -- | 9,522 | 35,680 | 23,263 | 11,529 | 2,727 | 82,721 |
| Fayette | 1,093 | -- | -- | -- | -- | 1,093 | 16,101 | -- | -- | -- | -- | 16,101 | 31,307 | -- | -- | -- | -- | 31,307 | 1,312 | -- | -- | -- | -- | 1,312 | 49,813 | -- | -- | -- | -- | 49,813 |
| Lawrence | 7,653 | 5,234 | 636 | -- | -- | 13,523 | 21,031 | 6,394 | -- | -- | -- | 27,425 | 12,364 | -- | -- | -- | -- | 12,364 | -- | -- | -- | -- | -- | -- | 41,048 | 11,628 | 636 | -- | -- | 53,312 |
| Mason | 775 | 530 | -- | -- | -- | 1,305 | 2,524 | 8,514 | 454 | -- | -- | 11,492 | 477 | 331 | -- | -- | -- | 808 | -- | -- | -- | -- | -- | -- | 3,776 | 9,375 | 454 | -- | -- | 13,605 |
| Perry | 4,055 | 961 | -- | -- | -- | 5,016 | 5,923 | 99 | -- | -- | -- | 6,022 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9,978 | 1,060 | -- | -- | -- | 11,038 |
| Symmes | 2,147 | 5,798 | 4,135 | 4,430 | 3,953 | 20,463 | 5,765 | 4,969 | 273 | -- | -- | 11,007 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7,912 | 10,767 | 4,408 | 4,430 | 3,953 | 31,470 |
| Union | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 199 | -- | -- | -- | -- | 199 | 5,983 | -- | -- | -- | -- | 5,983 | 6,182 | -- | -- | -- | -- | 6,182 |
| Upper | -- | -- | -- | 284 | -- | 284 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 284 | -- | 284 |
| Windsor | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,173 | -- | -- | -- | -- | 1,173 | 179 | -- | -- | -- | -- | 179 | 1,352 | -- | -- | -- | -- | 1,352 |
| Total | 17,413 | 21,004 | 19,765 | 13,347 | 5,998 | 77,527 | 58,957 | 47,175 | 8,996 | 2,896 | 682 | 118,706 | 45,739 | 331 | -- | -- | -- | 46,070 | 7,474 | -- | -- | -- | -- | 7,474 | 129,583 | 68,510 | 28,761 | 16,243 | 6,680 | 249,777 |
| MONROE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Seneca | -- | -- | -- | -- | -- | -- | 576 | 1,524 | -- | -- | -- | 2,100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 576 | 1,524 | -- | -- | -- | 2,100 |
| Total | -- | -- | -- | -- | -- | -- | 576 | 1,524 | -- | -- | -- | 2,100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 576 | 1,524 | -- | -- | -- | 2,100 |
| MORGAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Homer | 1,113 | 2,650 | 3,589 | 852 | -- | 8,204 | 3,459 | 861 | 1,499 | 568 | -- | 6,387 | 2,028 | -- | -- | -- | -- | 2,028 | -- | -- | -- | -- | -- | -- | 6,600 | 3,511 | 5,088 | 1,420 | -- | 16,619 |
| Union | 418 | 861 | 3,498 | 9,030 | 2,181 | 15,988 | 1,670 | 2,418 | 1,636 | 227 | -- | 5,951 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,088 | 3,279 | 5,134 | 9,257 | 2,181 | 21,939 |
| York | 1,372 | -- | -- | -- | -- | 1,372 | 1,272 | -- | -- | -- | -- | 1,272 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,644 | -- | -- | -- | -- | 2,644 |
| Total | 2,903 | 3,511 | 7,087 | 9,882 | 2,181 | 25,564 | 6,401 | 3,279 | 3,135 | 795 | -- | 13,610 | 2,028 | -- | -- | -- | -- | 2,028 | -- | -- | -- | -- | -- | -- | 11,332 | 6,790 | 10,222 | 10,677 | 2,181 | 41,202 |

# TABLE 50 (Continued)

# ESTIMATED ORIGINAL RESERVES OF THE UPPER FREEPORT COAL BED IN OHIO

## (In thousands of short tons)

| County and Township | Proven coal | | | | | | Probable coal | | | | | | Strongly inferred coal | | | | | | Weakly inferred coal | | | | | | Total | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total | 14"-28" | 28"-42" | 42"-54" | 54"-66" | 66" and over | Total |
| MUSKINGUM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue Rock | 99 | 199 | -- | -- | -- | 298 | 735 | 398 | -- | -- | -- | 1,133 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 834 | 597 | -- | -- | -- | 1,431 |
| Brush Creek | 1,551 | 2,716 | 7,861 | -- | -- | 12,128 | 6,361 | 10,237 | 14,903 | -- | -- | 31,501 | 159 | -- | -- | -- | -- | 159 | -- | -- | -- | -- | -- | -- | 8,071 | 12,953 | 22,764 | -- | -- | 43,788 |
| Clay | 417 | -- | -- | -- | -- | 417 | 219 | -- | -- | -- | -- | 219 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 636 | -- | -- | -- | -- | 636 |
| Harrison | 1,292 | 2,982 | 7,224 | -- | -- | 11,498 | 2,127 | 2,054 | 2,317 | -- | -- | 6,498 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,419 | 5,036 | 9,541 | -- | -- | 17,996 |
| Monroe | 457 | 1,491 | 3,726 | -- | -- | 5,674 | 1,531 | 994 | 227 | -- | -- | 2,752 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,988 | 2,485 | 3,953 | -- | -- | 8,426 |
| Newton | 239 | 2,849 | 4,771 | -- | -- | 7,859 | 199 | 1,160 | 545 | -- | -- | 1,904 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 438 | 4,009 | 5,316 | -- | -- | 9,763 |
| Perry | 159 | 3,976 | 1,727 | -- | -- | 5,862 | 2,087 | 15,703 | 1,727 | -- | -- | 19,517 | 199 | 133 | -- | -- | -- | 332 | -- | -- | -- | -- | -- | -- | 2,445 | 19,812 | 3,454 | -- | -- | 25,711 |
| Salem | 199 | 265 | -- | -- | -- | 464 | 795 | 1,557 | -- | -- | -- | 2,352 | 358 | 331 | -- | -- | -- | 689 | -- | -- | -- | -- | -- | -- | 1,352 | 2,153 | -- | -- | -- | 3,505 |
| Salt Creek | 1,391 | -- | -- | -- | -- | 1,391 | 5,089 | 530 | -- | -- | -- | 5,619 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6,480 | 530 | -- | -- | -- | 7,010 |
| Washington | 417 | 861 | 6,815 | -- | -- | 8,093 | 557 | 696 | 7,815 | -- | -- | 9,068 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 974 | 1,557 | 14,630 | -- | -- | 17,161 |
| Wayne | 1,173 | 2,253 | 6,043 | -- | -- | 9,469 | 4,453 | 5,698 | 1,227 | -- | -- | 11,378 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,626 | 7,951 | 7,270 | -- | -- | 20,847 |
| Total | 7,394 | 17,592 | 38,167 | -- | -- | 63,153 | 24,153 | 39,027 | 28,761 | -- | -- | 91,941 | 716 | 464 | -- | -- | -- | 1,180 | -- | -- | -- | -- | -- | -- | 32,263 | 57,083 | 66,928 | -- | -- | 156,274 |
| NOBLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Beaver | -- | -- | -- | -- | -- | -- | 1,590 | 8,746 | -- | -- | -- | 10,336 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,590 | 8,746 | -- | -- | -- | 10,336 |
| Brookfield | -- | -- | -- | -- | -- | -- | 1,451 | 894 | -- | -- | -- | 2,345 | 219 | -- | -- | -- | -- | 219 | -- | -- | -- | -- | -- | -- | 1,670 | 894 | -- | -- | -- | 2,564 |
| Buffalo | -- | -- | -- | 3,124 | -- | 3,124 | 1,988 | 4,274 | 2,772 | 51,682 | -- | 60,716 | 2,743 | 4,373 | 2,908 | 16,073 | -- | 26,097 | -- | -- | -- | -- | -- | -- | 4,731 | 8,647 | 5,680 | 70,879 | -- | 89,937 |
| Marion | -- | -- | -- | -- | -- | -- | 795 | 7,057 | -- | -- | -- | 7,852 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 795 | 7,057 | -- | -- | -- | 7,852 |
| Noble | -- | 696 | 8,996 | 10,507 | 4,089 | 24,288 | 6,460 | 17,261 | 24,580 | 11,586 | 136 | 60,023 | 159 | -- | -- | -- | -- | 159 | -- | -- | -- | -- | -- | -- | 6,619 | 17,957 | 33,576 | 22,093 | 4,225 | 84,470 |
| Olive | -- | -- | -- | -- | -- | -- | 457 | -- | -- | -- | -- | 457 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 457 | -- | -- | -- | -- | 457 |
| Seneca | -- | -- | -- | -- | -- | -- | 1,650 | 8,084 | -- | -- | -- | 9,734 | 298 | -- | -- | -- | -- | 298 | -- | -- | -- | -- | -- | -- | 1,948 | 8,084 | -- | -- | -- | 10,032 |
| Wayne | 398 | -- | 227 | 1,306 | -- | 1,931 | 5,824 | 6,560 | 1,545 | 1,136 | -- | 15,065 | 219 | -- | -- | -- | -- | 219 | -- | -- | -- | -- | -- | -- | 6,441 | 6,560 | 1,772 | 2,442 | -- | 17,215 |
| Total | 398 | 696 | 9,223 | 14,937 | 4,089 | 29,343 | 20,215 | 52,876 | 28,897 | 64,404 | 136 | 166,528 | 3,638 | 4,373 | 2,908 | 16,073 | -- | 26,992 | -- | -- | -- | -- | -- | -- | 24,251 | 57,945 | 41,028 | 95,414 | 4,225 | 222,863 |
| PERRY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bearfield | 1,590 | -- | -- | -- | -- | 1,590 | 3,677 | -- | -- | -- | -- | 3,677 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5,267 | -- | -- | -- | -- | 5,267 |
| Clayton | 318 | 729 | 545 | -- | -- | 1,592 | 99 | 133 | -- | -- | -- | 232 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 417 | 862 | 545 | -- | -- | 1,824 |
| Coal | 1,034 | 828 | -- | -- | -- | 1,862 | 1,550 | 1,060 | -- | -- | -- | 2,610 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,584 | 1,888 | -- | -- | -- | 4,472 |
| Harrison | 914 | -- | -- | -- | -- | 914 | 2,127 | 199 | -- | -- | -- | 2,326 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,041 | 199 | -- | -- | -- | 3,240 |
| Monroe | 4,194 | 5,930 | 7,360 | 7,270 | 3,135 | 27,889 | 5,824 | 7,156 | 2,681 | -- | -- | 15,661 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,018 | 13,086 | 10,041 | 7,270 | 3,135 | 43,550 |
| Pike | 2,028 | -- | -- | -- | -- | 2,028 | 676 | -- | -- | -- | -- | 676 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2,704 | -- | -- | -- | -- | 2,704 |
| Pleasant | 517 | 530 | -- | -- | -- | 1,047 | 855 | 364 | -- | -- | -- | 1,219 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,372 | 894 | -- | -- | -- | 2,266 |
| Salt Lick | 537 | 961 | 227 | -- | -- | 1,725 | 775 | 99 | -- | -- | -- | 874 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,312 | 1,060 | 227 | -- | -- | 2,599 |
| Total | 11,132 | 8,978 | 8,132 | 7,270 | 3,135 | 38,647 | 15,583 | 9,011 | 2,681 | -- | -- | 27,275 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 26,715 | 17,989 | 10,813 | 7,270 | 3,135 | 65,922 |
| STARK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paris | 636 | 33 | 636 | 2,215 | 1,090 | 4,610 | 3,240 | 1,226 | 2,635 | 3,578 | 1,636 | 12,315 | 80 | 33 | 91 | -- | -- | 204 | -- | -- | -- | -- | -- | -- | 3,956 | 1,292 | 3,362 | 5,793 | 2,726 | 17,129 |
| Sandy | 338 | -- | -- | -- | -- | 338 | 179 | -- | -- | -- | -- | 179 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 517 | -- | -- | -- | -- | 517 |
| Washington | -- | -- | -- | 114 | 1,159 | 1,273 | 258 | 596 | 1,817 | 3,408 | 613 | 6,692 | 60 | -- | -- | -- | -- | 60 | -- | -- | -- | -- | -- | -- | 318 | 596 | 1,817 | 3,522 | 1,772 | 8,025 |
| Total | 974 | 33 | 636 | 2,329 | 2,249 | 6,221 | 3,677 | 1,822 | 4,452 | 6,986 | 2,249 | 19,186 | 140 | 33 | 91 | -- | -- | 264 | -- | -- | -- | -- | -- | -- | 4,791 | 1,888 | 5,179 | 9,315 | 4,498 | 25,671 |
| TUSCARAWAS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bucks | 497 | -- | -- | -- | -- | 497 | 1,153 | -- | -- | -- | -- | 1,153 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,650 | -- | -- | -- | -- | 1,650 |
| Fairfield | -- | 133 | -- | -- | -- | 133 | 119 | 696 | -- | -- | -- | 815 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 119 | 829 | -- | -- | -- | 948 |
| Goshen | -- | -- | -- | -- | -- | -- | 20 | 2,120 | -- | -- | -- | 2,140 | 676 | 861 | -- | -- | -- | 1,537 | -- | -- | -- | -- | -- | -- | 696 | 2,981 | -- | -- | -- | 3,677 |
| Mill | -- | 762 | 682 | 7,042 | 1,976 | 10,462 | 735 | 6,725 | 10,904 | 9,257 | -- | 27,621 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 735 | 7,487 | 11,586 | 16,299 | 1,976 | 38,083 |
| Perry | -- | -- | -- | -- | -- | -- | 557 | -- | -- | -- | -- | 557 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 557 | -- | -- | -- | -- | 557 |
| Rush | -- | -- | 1,272 | 2,556 | -- | 3,828 | 1,690 | 12,589 | 2,408 | 1,533 | -- | 18,220 | 994 | 166 | -- | -- | -- | 1,160 | -- | -- | -- | -- | -- | -- | 2,684 | 12,755 | 3,680 | 4,089 | -- | 23,208 |
| Sandy | 60 | -- | -- | -- | -- | 60 | 40 | -- | -- | -- | -- | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 100 | -- | -- | -- | -- | 100 |
| Union | -- | 3,711 | 10,995 | -- | -- | 14,706 | 1,590 | 6,858 | 27,670 | -- | -- | 36,118 | 596 | 1,822 | -- | -- | -- | 2,418 | -- | -- | -- | -- | -- | -- | 2,186 | 12,391 | 38,665 | -- | -- | 53,242 |
| York | 99 | -- | -- | -- | -- | 99 | 40 | -- | -- | -- | -- | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 139 | -- | -- | -- | -- | 139 |
| Total | 656 | 4,606 | 12,949 | 9,598 | 1,976 | 29,785 | 5,944 | 28,988 | 40,982 | 10,790 | -- | 86,704 | 2,266 | 2,849 | -- | -- | -- | 5,115 | -- | -- | -- | -- | -- | -- | 8,866 | 36,443 | 53,931 | 20,388 | 1,976 | 121,604 |
| VINTON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knox | 1,531 | 6,228 | -- | -- | -- | 7,759 | 3,300 | 99 | -- | -- | -- | 3,399 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4,831 | 6,327 | -- | -- | -- | 11,158 |
| Vinton | 1,928 | -- | -- | -- | -- | 1,928 | 20 | -- | -- | -- | -- | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1,948 | -- | -- | -- | -- | 1,948 |
| Wilkesville | 1,113 | 1,822 | -- | 1,988 | -- | 4,923 | 2,147 | 1,160 | -- | -- | -- | 3,307 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3,260 | 2,982 | -- | 1,988 | -- | 8,230 |
| Total | 4,572 | 8,050 | -- | 1,988 | -- | 14,610 | 5,467 | 1,259 | -- | -- | -- | 6,726 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10,039 | 9,309 | -- | 1,988 | -- | 21,336 |
| State Total | 154,510 | 413,125 | 418,685 | 188,612 | 61,245 | 1,236,177 | 439,757 | 982,127 | 512,228 | 475,364 | 27,965 | 2,437,441 | 139,205 | 255,100 | 26,625 | 22,035 | 545 | 443,510 | 24,947 | 38,696 | -- | -- | -- | 63,643 | 758,419 | 1,689,048 | 957,538 | 686,011 | 89,755 | 4,180,771 |

Table 51

## LIST OF OUTCROP MAPS ON TOPOGRAPHIC QUADRANGLE BASE [1]

The Middle Kittanning Coal Bed Plotted

ATHENS COUNTY
- Athens
- New Lexington
- Zaleski
- Chesterhill

CARROLL COUNTY
- Carrollton
- Dover

COLUMBIANA COUNTY
- Alliance
- Carrollton
- Columbiana
- Lisbon
- Wellsville

COSHOCTON COUNTY
- Brinkhaven
- Cambridge
- Conesville
- Coshocton
- Frazeysburg
- Newcomerstown

GALLIA COUNTY
- Athalia
- Bidwell
- Oak Hill
- Wilkesville

GUERNSEY COUNTY
- Antrim
- Cambridge

HOCKING COUNTY
- Athens
- Logan
- New Lexington
- Zaleski

HOLMES COUNTY
- Coshocton
- Loudonville
- Millersburg
- Navarre
- Newcomerstown

JACKSON COUNTY
- Bidwell
- Oak Hill
- Wilkesville

JEFFERSON COUNTY
- Steubenville
- Wellsville

LAWRENCE COUNTY
- Athalia
- Bidwell
- Ceredo
- Ironton
- Oak Hill

MAHONING COUNTY
- Alliance
- Columbiana
- Lisbon

MORGAN COUNTY
- New Lexington

MUSKINGUM COUNTY
- Cambridge
- Conesville
- Frazeysburg
- Philo
- Zanesville

PERRY COUNTY
- Logan
- New Lexington
- Zanesville

STARK COUNTY
- Alliance
- Canton
- Carrollton
- Dover

TUSCARAWAS COUNTY
- Antrim
- Cambridge
- Dover
- Navarre
- Newcomerstown
- Uhrichsville

VINTON COUNTY
- Wilkesville
- Zaleski

[1] These maps are on open file and available for examination in the office of the State Geologist. They are also available at cost in photostat form. See Publication List (I. C. No. 9) for prices and procedure for ordering.

Table 51 (Continued)

Upper Freeport Coal Bed

ATHENS COUNTY
- Athens
- New Lexington
- Wilkesville
- Zaleski

CARROLL COUNTY
- Carrollton
- Dover
- Salineville
- Scio
- Uhrichsville

COLUMBIANA COUNTY
- Alliance
- Carrollton
- Columbiana
- Lisbon
- Salineville
- Wellsville

COSHOCTON COUNTY
- Cambridge
- Conesville
- Coshocton
- Newcomerstown

GALLIA COUNTY
- Athalia
- Bidwell
- Oak Hill
- Wilkesville

GUERNSEY COUNTY
- Antrim
- Cambridge
- Cumberland

HARRISON COUNTY
- Antrim
- Scio
- Uhrichsville

HOCKING COUNTY
- Athens
- Logan
- New Lexington
- Zaleski

JACKSON COUNTY
- Bidwell
- Oak Hill
- Wilkesville

JEFFERSON COUNTY
- Salineville
- Steubenville
- Wellsville

LAWRENCE COUNTY
- Athalia
- Bidwell
- Ceredo
- Ironton
- Oak Hill

MEIGS COUNTY
- Wilkesville

MORGAN COUNTY
- New Lexington
- Philo
- Zanesville

MUSKINGUM COUNTY
- Cambridge
- Conesville
- Philo
- Zanesville

PERRY COUNTY
- New Lexington
- Zanesville

STARK COUNTY
- Alliance
- Carrollton
- Dover

TUSCARAWAS COUNTY
- Antrim
- Cambridge
- Dover
- Navarre
- Newcomerstown
- Uhrichsville

VINTON COUNTY
- Wilkesville
- Zaleski

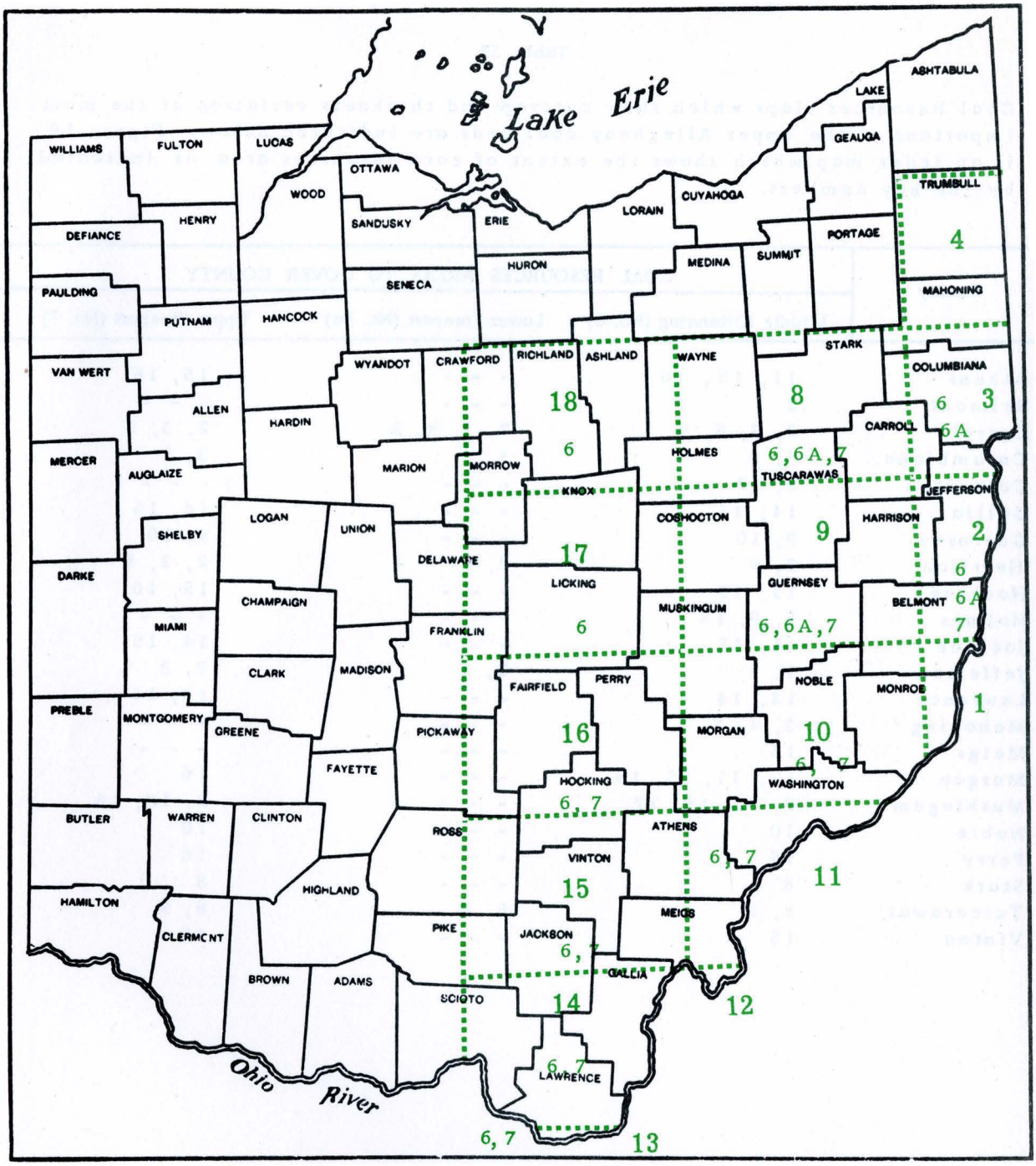



Figure 19. Coal resources maps (index). The dark boundaries outline the areas covered by the various resources maps (O'Neill areas). The O'Neill area measures $1^{\circ}$ longitude by $1/2^{\circ}$ latitude at a scale of 1: 62,500. The small numbers identify the coal beds for Resources Maps that are available (No. 6 is the Middle Kittanning, No. 6a is the Lower Freeport, and No. 7 is the Upper Freeport). The bold numbers identify the Resources Maps by area. These maps are available at cost through the Ohio Division of Geological Survey.

Table 52

Coal Resources Maps which show outcrop and thickness variation of the most important of the upper Allegheny coal beds are indicated below. Figure 19 is an index map which shows the extent of each resources area as indicated by the key numbers.

| County | COAL RESOURCES AREAS TO COVER COUNTY | | |
|---|---|---|---|
| | Middle Kittanning (No. 6) | Lower Freeport (No. 6a) | Upper Freeport (No. 7) |
| Athens | 11, 15, 16 | - - - | 15, 16 |
| Belmont | 2 | - - - | - - - |
| Carroll | 2, 3, 8, 9 | 2, 3, 8, 9 | 2, 3, 8 |
| Columbiana | 3, 8 | 3 | 3, 8 |
| Coshocton | 9, 17 | - - - | - - - |
| Gallia | 14, 15 | - - - | 14, 15 |
| Guernsey | 9, 10 | - - - | 9, 10 |
| Harrison | 2, 9 | 2, 9 | 2, 3, 8 |
| Hocking | 15, 16 | - - - | 15, 16 |
| Holmes | 8, 9, 18 | - - - | - - - |
| Jackson | 14, 15 | - - - | 14, 15 |
| Jefferson | 2, 3 | 2, 3 | 2, 3 |
| Lawrence | 13, 14 | - - - | 13, 14 |
| Mahoning | 3, 4, 8 | - - - | - - - |
| Meigs | 15 | - - - | - - - |
| Morgan | 10, 11, 15, 16 | - - - | 16 |
| Muskingum | 9, 10, 16, 17 | - - - | 9, 10, 16 |
| Noble | 10 | - - - | 10 |
| Perry | 16 | - - - | 16 |
| Stark | 8 | - - - | 8 |
| Tuscarawas | 8, 9 | 8, 9 | 8, 9 |
| Vinton | 15 | - - - | 15 |

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