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VERA M. BINKS, *Director*

DIVISION OF THE  
STATE GEOLOGICAL SURVEY  
M. M. LEIGHTON, *Chief*  
URBANA

---

BULLETIN NO. 78

---

# MINABLE COAL RESERVES OF ILLINOIS

BY

GILBERT H. CADY  
IN COLLABORATION WITH OTHER MEMBERS  
OF THE COAL DIVISION



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URBANA, ILLINOIS

1952

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October 20, 1952

## FOREWORD

This report presents the results obtained by the Illinois State Geological Survey in a careful compilation of the minable coal resources of Illinois, in accordance with "A Plan for a Rapid Reappraisal of Movable Bituminous Coal Resources of Pennsylvanian Age East of Mississippi River on the Basis of Information now Available," which was recommended by the National Bituminous Coal Advisory Council, December, 1948, to the Secretary of the Interior.

This plan was prepared for the consideration of the Coal Resources Committee of the Council by Dr. M. M. Leighton, Chief, Illinois State Geological Survey, at the request of the late Charles O'Neill, Chairman of the Committee, with the active collaboration of the Committee, members of Dr. Leighton's staff, Committee on Coal Resources of the American Institute of Mining and Metallurgical Engineers, and members of the U. S. Geological Survey and U. S. Bureau of Mines.

The information contained in this bulletin was assembled during a period of about nine months of intensive effort in 1950-1951 by almost the complete staff of the Coal Division of the Illinois State Geological Survey, which resulted in the compilation of a series of 33 maps showing available information concerning the coal resources of the state in beds 28 inches or more in thickness, and the extent of the mined-out area for each of these beds. On the basis of this graphical compilation and planimeter survey of the areas, the statistics of the coal resources were compiled with the aid of International Business Machine punched cards, and maps of each commercial coal bed prepared. Reserves were determined by coal bed, area, and county, in terms of four classes of probability of occurrence—*proved*, *probable*, *strongly indicated* or *inferred*, and *weakly indicated* or *inferred*—and thicknesses at one-foot steps.

The first part of the report explains the tabulated data and describes the distribution, geographical and geological, of the various coal beds represented in the inventory. The second part of the report discusses the basis of the inventory determinations, area by area, for the 33 areas set up under the project, and also lists pertinent geological reports concerning the different areas. The third part of the report presents the statistical inventory tabulations. The statistical data are so presented that they can be used with little need for reference to the main text. However, for those who are interested in the figures that give the reserve of the coal supply but who are unfamiliar with the coal beds, such explanation as is needed is provided by the text, with lists of descriptive literature so far as it is available.

There is no other general report on the occurrence, distribution, and character of the coal beds of Illinois. Therefore, this condensed report will be useful to the industry, to economists, and the State Geological Survey in future studies of the coal resources of the state. It is a part of the concerted effort of government and state scientific agencies to assemble an up-to-date national coal resources inventory.<sup>1</sup>

This inventory was assembled during the latter half of 1950 and the first half of 1951, under the general direction of G. H. Cady, Head of the Coal Division, until he retired August 1, 1951, and under the immediate supervision of Jack A. Simon of Dr. Cady's staff. The original manuscript was prepared by Dr. Cady before his retirement, after which revision of the manuscript for publication was directed by Arthur Bevan as Acting Head of the Coal Division. H. B. Willman, Head of the

<sup>1</sup>Averitt, Paul, and Berryhill, Louise R., Coal resources of the United States; A progress report: U. S. Geol. Survey Circ. 94, Dec. 1950. Contains bibliography of United States Geological Survey coal resources investigations recently completed and in progress and of publications by other surveys and bureaus.

Division of Areal Geology and Stratigraphy, and other members of the Survey staff have made helpful suggestions.

In the delineation of mined-out areas able assistance was given by George M. Wilson, Frederick Williams, and James E. Brooks, of the Coal Division staff. The following members of the staff posted on the maps the drill holes, mine shafts, areas closely drilled for coal and oil and gas pools, and measured the areas by planimeter: Kenneth Clegg, W. E. Cooper, E. P. Du Bois, John A. Harrison, Adabell Karstrom, Margaret A. Parker, Mary B. Rolley, Raymond Siever, Jack A. Simon, and Frederick Williams of the regular staff; and Louis Unfer and Louis N. Pierard of the part-time summer staff. For compiling the accompanying

summary maps, the services of Kenneth Clegg and Frederick Williams are especially acknowledged. Miss Margaret Parker planned and ably carried through the arrangements for the tabulation of the statistical data with the use of IBM punched cards.

The Survey is indebted for map data pertaining to mined-out areas to the Paul Weir Company, to Fred S. Wilkey, Secretary of the Illinois Coal Operators Association, to Harry Gill, President of the Illinois Coal Producers Association, and to members of these organizations. To many independent operators of both shipping and local mines the Survey is also indebted for the use of mine maps, many of which were given to the Survey's permanent files.

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# MINABLE COAL RESERVES OF ILLINOIS

BY

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*In collaboration with other members of  
the Coal Division*

## PART I

### INTRODUCTION

THE COAL RESOURCES of Illinois are of great importance to the present and future economy of the state. Coal probably represents quantitatively the most important of the mineral resources, and for the long run, at least, the most important of the fuels. The prosperity of many communities is dependent in a substantial degree upon the coal reserves locally accessible. In the modern industrial economy, coal is of critical importance, and the quantity of coal demanded by this economy annually is great.

For these and other reasons information about coal resources is valuable to the public, to industries, and to individuals. Maps such as have been prepared for this study are of greater value than individual drilling logs, especially when used with structure maps, which are available for most of the coal field. Such information also aids geologists in the search for oil and gas and in other studies.

It is wise for the state from time to time to prepare an inventory of its mineral resources. Progress in geological investigations and in mining and exploration is steadily improving our knowledge of the occurrence, character, and quantity of workable bodies of coal. Although many factors determine the immediate value of a coal deposit, the area in which a coal occurs and its thickness are two of the most fundamental factors in estimating reserves, and these are given particular consideration in this inventory.

The last comprehensive inventory of the coal resources of the United States was made by M. R. Campbell in preparation of a report to the Twelfth International Geological Conference at Toronto<sup>1</sup> in 1912. Illinois was included in this survey. Bement<sup>2</sup> published an estimate of Illinois coal resources in 1929.

Campbell and Bement estimated the coal reserves in Illinois to be of the order of 200 billion tons. DeWolf<sup>3</sup> in 1908 published an estimate of approximately 137 billion tons.

The early estimates depended upon scattered information considerably less in amount than has now become available. Furthermore, the estimates included supplies of coal in beds as thin as 14 inches, about which there was little reliable information. Nevertheless, for many years Campbell's figures were generally accepted as valid, particularly as they had been supported by Bement.

In recent years the Campbell estimates of coal supplies in the United States, in the light of present requirements for successful mining operations, have been scrutinized

<sup>1</sup>Campbell, M. R., The coal reserves of the United States: Int. Geol. Congress XII, Canada. The coal resources of the world, vol. 1: xiii-xiv, vol. 2: 525-539, map, 1913.

<sup>2</sup>Bement, A., Illinois coal, a non-technical account of its occurrence, production and preparation: Illinois Geol. Survey Bull. 56, pp. 36-41, 1929.

<sup>3</sup>DeWolf, F. W., Coal resources of Illinois: Am. Inst. Min. Met. Eng. Bull. 24, pp. 1103-1112, 1908.

and criticized.<sup>4</sup> The United States Coal Commission<sup>5</sup> in 1923 made a survey of recoverable reserves in the United States and estimated a total amount of recoverable coal in Illinois at only 53,920 million tons, about one-fourth of the amount estimated by Campbell and Bement. Since that date about 1,580 million tons have been mined,<sup>6</sup> which represents a probable loss of approximately 3160 million tons, thereby reducing the figure to approximately 51,000 million tons.

The Illinois State Geological Survey for more than 40 years has been a repository of a larger amount of information about the coal resources of Illinois than is found assembled elsewhere. Although information is still incomplete at many points, it is believed that this inventory of Illinois coal has been undertaken with greater care and with a larger quantity of information than any previous one. A nation-wide coal survey recently conducted for one of the military agencies by an engineering firm made liberal use of the Survey data, but since much confidential data in the Survey files were not available to this group, their estimates could not include the same amount of coal in the various categories recognized.

One of the objectives of the Geological Survey in studying the coal geology of Illinois has been to delineate the areas underlain by workable coal beds. Between 1912 and 1915 a cooperative investigation was carried on by the State Geological Survey, the Engineering Experiment Station of the University of Illinois, and the U. S. Bureau of Mines,<sup>7</sup> with the purpose of mapping the state's coal resources. For some years after 1912 a series of reports was published describing the coal resources of eight min-

ing districts set up by the cooperative group.<sup>8</sup> For each district a map was drawn showing the structure of the principal bed being mined, except that the maps in Bulletin 29 indicate in a generalized way the areas underlain by one or by more than one workable coal bed.

Since that time, and particularly between 1938 and 1950, new maps using much more information than was available between 1912 and 1919 were published for the mining districts in which No. 5 and No. 6 coals are mined in southwestern and southern Illinois.<sup>9</sup> A short report accompanies each structure map which shows the location of datum points used in the construction of the map and the lay of the No. 6 coal bed shown by structure contour lines with 25-foot intervals. These maps provide a comprehensive picture of the lay of the No. 6 coal bed in the mining districts of the state south of Sangamon and Macon counties, and west and south of the deepest part of the Illinois basin.

In addition to these structure maps, similar maps showing the structure of No. 6

<sup>8</sup>Following are the Coop. Min. Inv. Series Bulletins referred to:

10. Coal resources of District I (Longwall), G. H. Cady, 1915.
11. Coal resources of District VII (southwestern Illinois), F. H. Kay, 1915.
14. Coal resources of District VIII (Danville), F. H. Kay and K. D. White, 1915.
15. Coal resources of District VI (Franklin, Williamson and Jefferson counties), G. H. Cady, 1916.
16. Coal resources of District II (Jackson County), G. H. Cady, 1917.
19. Coal resources of District V (Saline, Gallatin, and White counties), G. H. Cady, 1919.
26. Coal resources of District IV (Springfield-Peoria districts), G. H. Cady, 1921.
29. Coal resources of District III (western Illinois), H. E. Culver, 1925.

<sup>9</sup>Circ. 24. Structure of Herrin (No. 6) coal bed in central and southern Jefferson, southeastern Washington, Franklin, Williamson, Jackson, and eastern Perry counties, Illinois, by G. H. Cady and others, 1938.

Circ. 42. Structure of Herrin (No. 6) coal bed in Hamilton, White, Saline, and Gallatin counties, Illinois, north of the Shawneetown fault, G. H. Cady assisted by E. F. Taylor, C. C. Boley and others, 1939.

Circ. 58. Structure of Herrin (No. 6) coal bed in Randolph, western Perry, southwestern Washington, and southeastern St. Clair counties, G. H. Cady, 1940.

Circ. 71. Structure of Herrin (No. 6) coal bed in Madison County and western Bond, western Clinton, southern Macoupin, southwestern Montgomery, northern St. Clair, and northwestern Washington County, J. N. Payne, 1941.

Circ. 88. Structure of Herrin (No. 6) coal bed in Macoupin county, eastern Jersey and Greene, southwestern Scott, and southern Morgan and Sangamon counties, J. N. Payne, 1942.

Circ. 105. Structure of Herrin (No. 6) coal bed in Christian and Montgomery counties and adjacent parts of Fayette, Macon, Sangamon, and Shelby counties, J. N. Payne and G. H. Cady, 1944.

Circ. 164. Structure of Herrin (No. 6) coal bed in Marion and Fayette counties and in adjacent parts of Bond, Clinton, Montgomery, Clay, Effingham, Washington, Jefferson, and Wayne counties, Raymond Siever, 1950.

<sup>4</sup>Crichton, A. B. How much coal do we really have? The need for an up-to-date survey: Am. Inst. Min. Met. Eng. Trans., vol. 77, Coal Division, 1948, pp. 26-38, 1949.

<sup>5</sup>Report of the U. S. Coal Commission; Part II. Anthracite—detailed studies (documents relating to combinations and profits in anthracite industry); III. Report of engineers advisory valuation committee, pp. 1028-1035, Washington, 1925.

<sup>6</sup>Voskuil, W. H., Illinois mineral industry in 1947: Illinois Geol. Survey Rept. Inv. 140, p. 37, 1949.

<sup>7</sup>Coal Report 1948, Illinois Dept. Mines and Minerals, p. 20, 1949.

<sup>8</sup>Coal Report 1949, Illinois Dept. Mines and Minerals, p. 20, 1950.

<sup>9</sup>Preliminary report on organization and method of investigation: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 1, 1913.

coal bed, based mainly upon electric logs of oil test holes and about 240 control rotary drill holes, have been published for Wayne,<sup>10</sup> Clay, Edwards, Gallatin, Hamilton, Richland,<sup>11</sup> White,<sup>12</sup> Shelby, Moultrie, and parts of adjacent counties.<sup>13</sup> Maps for

Jasper<sup>14</sup> and Wabash<sup>15</sup> counties have been prepared.

Because these maps indicate the altitude of the No. 6 coal bed with reference to sea level, it is possible, with the help of topographic maps which now cover about 90 percent of the state, to determine the depth to the No. 6 coal bed. Most of these publications are accompanied by a tabulated list of drill holes, mine shafts, etc., which also gives the thickness, depth, and altitude of No. 6 and No. 5 coal beds (so far as such data are not confidential). Thus much information is available to the public in regard to the extent and position of some of the coal beds.

<sup>10</sup>Sims, P. K., Payne, J. N., and Cady, G. H., Pennsylvanian key beds of Wayne county and the structure of the "Shoal Creek" limestone and the Herrin (No. 6) coal bed, in Progress reports on subsurface studies of the Pennsylvanian system in the Illinois Basin: Illinois Geol. Survey Rept. Inv. 93, pp. 27-32, 1944.

<sup>11</sup>Subsurface geology and coal resources of the Pennsylvanian system in certain counties of the Illinois Basin: Illinois Geol. Survey Rept. Inv. 148, 1951.

Clay County, H. A. Lowenstam, pp. 27-50.  
Edwards County, H. L. Smith and G. H. Cady, pp. 51-68.

Gallatin County, M. W. Pullen, Jr., pp. 69-95.  
Hamilton County, Mary B. Rolley, pp. 96-109.  
Richland County, Raymond Siever and G. H. Cady, pp. 111-123.

<sup>12</sup>Harrison, J. A., Subsurface geology and coal resources of the Pennsylvanian system in White County, Illinois: Illinois Geol. Survey Rept. Inv. 153, 1951.

<sup>13</sup>Du Bois, E. P., Geology and coal resources of a part of the Pennsylvanian system in Shelby, Moultrie, and portions of Effingham and Fayette counties: Illinois Geol. Survey Rept. Inv. 156, 1951.

<sup>14</sup>Rolley, Mary B., and Williams, F. E., Subsurface geology of Jasper County: Illinois Geol. Survey, in progress.

<sup>15</sup>Rolley, Mary B., Karstrom, Adabell, Cady, G. H., and Parker, Margaret A., Subsurface geology of the Pennsylvanian System in Wabash County, and a description of the Friendsville coal bed: Illinois Geol. Survey, in progress.

## PROCEDURE OF THE COAL RESERVES INVENTORY

## MAP SCALE AND UNIT AREAS

The topographic map standard scale of 1:62,500 was used as the basis of mapping. By combining eight 15-minute topographic quadrangles in two horizontal rows of four each, the unit areas consisted of one-half square degree on a scale of approximately one mile to the inch. On the basis of the one-half square degree grid, the coal field was divided into 33 areas (fig. 1).

## DEFINITION OF MINABLE COAL

In the present study, evaluation of minability of a coal bed is based entirely upon the criterion of thickness, but it is generally conceded that coal is unrecoverable beneath the larger towns and cities and in closely drilled oil and gas pools. The lower limit of thickness is more or less arbitrarily regarded as 28 inches for underground mining and 24 inches for strip mining. Coal beds thinner than this have been mined but only on a small scale. Indeed, to regard coal beds 28 inches thick as minable under present competitive conditions in the industry is scarcely realistic. However, in determining the quantity of coal actually workable some concession must be made to the fact that coal beds 28 inches thick have been worked and undoubtedly will be worked in Illinois if quality and conditions of recovery justify it. There is also the possibility that the energy represented by such coal beds may eventually be recoverable by underground methods of gasification.

To assume that thickness is the only criterion determining minability of a bed of coal tends to result in too large an estimate of recoverable coal. It is impossible to know how much too large such an estimate may be because, even in areas where there has been a considerable amount of drilling, the data supplied by the well logs commonly do not provide adequate information upon which to judge the quality of the roof rock. The extent to which the coal bed may be crossed by "horsebacks" or

interbedded with "white top" is also difficult to ascertain from scattered drilling, and in some places water may be so abundant in the strata above the coal bed as to make shaft mining impracticable.

The figure 1800 tons per acre foot of coal was used in calculating the reserves.

## COAL BEDS IN OIL-POOL AREAS

Oil and gas pools and other areas in which holes drilled for oil are closely spaced were usually considered in this study as areas in which the coal is not minable. Inspection of the maps (plates 1-8) will show that the total extent of such areas is considerable, being larger than the mined-out areas. The areas indicated are conservatively outlined; the Survey oil and gas maps show somewhat more and larger oil pool areas than are indicated on the coal resources maps. Drillers are legally required to protect coal beds penetrated in drilling for oil and gas, and particularly to plug oil and gas wells when abandoned.<sup>16</sup> Except in areas where coal is being mined or where future mining is already planned, the protective measures actually taken are probably inadequate.

Elaborate precautions to protect coal beds against invasion by water, oil, or gas have been taken in the Franklin County fields, particularly in the Benton pool and other oil pools that penetrate No. 5 and No. 6 coal beds on properties of two major coal mining companies. Howell<sup>17</sup> has briefly described the methods used to protect the coal and mining operations in the area of the Benton pool. Elsewhere, for the most part, the same precautions have not been taken. This is particularly true in the Illinois Basin in such pools as the Loudon and Salem which were opened before there were any regulations to protect the coal beds. There, hundreds of unplugged drill holes penetrate the coal beds.

<sup>16</sup>An act in relation to oil, gas, coal and other surface and underground resources. Illinois Department of Mines and Minerals, Division of Oil and Gas, 1950.

<sup>17</sup>Howell, J. V., Geology of Benton field, Franklin County, Illinois: Bull. Amer. Assoc. Petr. Geol., vol. 32, no. 5, pp. 745-766, May 1948.



It is probable that there are areas within the Illinois Basin in which coals other than No. 6 and No. 5 are 30 inches or more thick especially below No. 5 coal bed. Because most of them lie below 1000 feet the regulations do not apply to them. In any case, there is no reliable information on the thickness of most of these coals. Even the No. 6 coal in most of the Illinois Basin north of Hamilton County lies at a depth below 1000 feet and probably has not been protected. Mining must be done cautiously near isolated holes drilled for oil and gas; where such holes are closely spaced the coal is regarded as unminable.

### MINED-OUT AREAS

Maps of mined-out areas were compiled from several sources. The state of Illinois has no depository of mine maps where maps of all mining operations have been stored since statehood was granted in 1818. As a result, the extent of the mining by many of the mines operating 50 or more years ago is not known. Many maps have been filed in county court houses, and in recent years at mine rescue stations, particularly at the Mine Rescue Station in Springfield. Between 1937 and 1940 a W.P.A. project directed by the Department of Mines and Minerals collected much old information from many sources and assembled it on township maps compiled from the maps of the State Highway Department. Copies of many of these maps are in the Survey files. Since that time the State Department of Mines and Minerals has built up a considerable collection of maps of abandoned as well as active mines.

The Geological Survey has added mine maps to its collection from time to time as opportunity permitted until it also has a collection of several hundred maps.

During the summer of 1949, in anticipation of the need for data on the mined-out areas in the state in preparing estimates of coal reserves, the Paul Weir Company of Chicago assembled available data from maps in the files of the Department of Mines and Minerals and the State Geological Survey, and assembled these data on maps on the

topographic scale (1:62,500). Maps of active mines were given or loaned to the Survey by members of the two coal operators associations through the good offices of the secretaries of those associations, Fred S. Wilkey, Secretary of the Illinois Coal Operators Association, and Harry Gill, President of the Illinois Coal Producers Association.

Some additional data, especially on long abandoned mines, were obtained from the Annual Coal Reports issued by the Department of Mines and Minerals since 1916, the State Mining Board from 1911 to 1916, and the State Bureau of Labor Statistics from 1882 to 1910. These were often helpful in providing data on the thickness of coal, although the thicknesses reported were probably averages, and their reliability can be checked only in a general way.

Probably most of the operations of active shipping mines to January 1950 are shown, and at least 90 percent of all the mined-out areas are correctly shown. To obtain the possible 10 percent deficiency in information would have required more time than the need for a rapid survey allowed. It is hoped that additional data on such mined-out areas will eventually reach the Survey files so that they can be entered on the maps.

### CATEGORIES OF RESERVES

The primary categories of coal reserves consist of I-A, *Proved* reserves; I-B, *Probable* reserves; II-A, *Strongly indicated* reserves; and II-B, *Weakly indicated* reserves (see table 1).

#### CLASS I-A—PROVED RESERVES

The areas of proved reserves were defined as extending no more than one-half mile from a mined-out area, diamond drill hole, or an outcrop.

Some arbitrary rule in regard to the distance from the working face of a mine, the location of a diamond drill hole or of an outcrop had to be adopted in mapping the extent of proved coal. The point might be made that in view of the better knowledge in regard to the occurrence and extension of coal beds in Illinois, it would be justifiable for the Illinois Geological Survey to extend

TABLE 1.—SUMMARY OF CLASSIFICATIONS FOR COAL RESERVES INVENTORY

Class	Maximum distance from datum points*	Accepted datum points	Remarks
I-A Proved	½ mile	Mined-out areas Diamond drill holes Outcrops	Approximately equivalent to "measured" category of the U.S. Geol. Survey
I-B Probable	2 miles	All points of Class I-A plus coal test churn drill holes	Approximately equivalent to "indicated" category of the U.S. Geol. Survey
II-A Strongly Indicated	4 miles	All points of Classes I-A and I-B plus churn drill holes drilled for oil or water with unusually good records and control rotary drill holes	Approximately equivalent to "inferred" category of the U.S. Geol. Survey
II-B Weakly Indicated	Indefinite	All points used in higher categories plus knowledge of geologic probability based on all available information	
Thin or absent		All available data plus knowledge of geologic probability	Data, though sometimes sparse, shows coal thin or absent
No information			

\*Distances modified in practice by geological considerations.

the limit of proved coal somewhat farther than might be suitable for the country as a whole. Although there is undoubtedly basis for this opinion, and therefore geologists might regard as essentially proved a much wider belt of coal than is indicated by the one-half mile radius, the fact remains that engineers in the Illinois field appear to be committed to a pattern of exploration whereby drill holes are usually spaced about one mile apart.

The result of drilling indicates that such spacing, except in areas of structural or sedimentary irregularity, adds little information to what would have been learned by about half as many holes. Yet, in view of the irregularities in some areas, it is doubtful whether mining companies in prospecting new fields are generally willing to chance drilling at points more widely spaced than one mile. It seemed desirable, therefore, in order to make a convincing case of the estimated quantity of actually proved coal, to abide by customary engineering practice and extend such areas only one-half mile beyond the last point of observation.

In indicating the extent of proved coal, the practice has been followed which is essentially that adopted by the U. S. Geological Survey<sup>18</sup> whereby "measured" coal, the equivalent of what is here called proved coal, "extends one-half mile from the last point of measurement." In carrying out this project, covering in detail unit areas of one-half square degree that embrace between 2400 and 2500 square miles, it was necessary to employ people who were not well acquainted with the Illinois coal field. It was therefore necessary to set up rather strict standards of measurement that could be applied with a minimum loss of time in deliberation. The completed maps were reviewed by two experienced members of the staff, and in some places nearly contiguous proved areas were joined. In other places, information about local conditions made it necessary to reduce the indicated size of proved areas.

As previously indicated, thickness of the bed is not the only criterion of workability.

<sup>18</sup>Averitt, Paul, Work of the U. S. Geological Survey on coal and the coal reserves: Min. Eng., vol. 1, no. 6, p. 224 (Mining Trans., vol. 184), June 1949.

It is often impossible to know from the data whether or not the drilling proves that the coal bed extends in workable thickness and also that workable conditions continue. Additional information is necessary before it can be proved that some tracts of coal of workable thickness are actually minable. Variability of roof conditions and irregularity in structure, particularly in areas where the Coal Measures are much faulted or where they are cut by dikes, are unpredictable factors. As these factors are of only local importance, they were not given much consideration in this survey.

*Importance of bedrock topography.*—The recently published map of the bedrock topography of Illinois<sup>19</sup> is very useful in determining the extent of the areas of the various classes of coal resources. The bedrock surface hidden beneath the prairie surface of Illinois is very irregular. Its topography in many places determines the position of the margin of coal beds. With this regional picture of the bedrock topography, it is now possible to indicate more accurately the probable areal extent of certain coal beds, particularly in western Illinois where all the commercially important beds crop out.

Many of the deposits in the preglacial valleys contain large quantities of groundwater. The minability of coal beds lying under or adjacent to such preglacial valleys is determined by the proximity of gravels and sands containing water. In the present study, this possibility was given no consideration in assessing the value of the reserves because the information available was not adequate for such evaluation. Consequently it is probable that some areas especially along the margins of coal beds, mapped as underlain by minable coal, are shown somewhat too large.

#### CLASS I-B—PROBABLE RESERVES

The areas of probable reserves were defined generally as not extending more than two miles from a mined-out area, outcrop, diamond drill hole, or churn drill hole known to have been drilled as a coal test.

<sup>19</sup>Horberg, Leland, *Bedrock topography of Illinois: Illinois Geol. Survey Bull. 73, 1950.*

The formula adopted is essentially the same as that used by the U. S. Geological Survey with regard to the coal resources of the second order which they refer to as "indicated" reserves, or that coal lying up to two miles beyond the last point of measurement. Such an area represents approximately 12.5 square miles around a single drill hole except for approximately .81 square mile of proved area in the case of a diamond drill hole. It also is designated by a belt one and one-half miles wide bordering more or less continuous areas of proved reserves.

In general, this was the procedure followed in handling the available data. In certain areas and for certain coals, probably no such an amount of coal exists as would have been indicated by a strict application of the formula. This is particularly true of coal beds known to be characteristically lenticular. On the other hand, there are other coal beds which in certain parts of the state are known to be uniform in thickness and widespread, so that extension of the area of probable coal somewhat beyond the two-mile limit seems justifiable, if thereby nearly contiguous areas can be combined. This is particularly true for No. 2 coal in northern Illinois, No. 6 coal in large parts of the southern Illinois coal field, and No. 5 coal in Saline, Gallatin, and Hamilton counties, and locally elsewhere for these beds and for the No. 7 coal bed.

The main purpose in recognizing the category of "probable" reserves is to suggest where dependable information plus geologic interpretation strongly indicates the presence of a coal bed at least 28 inches thick and justifies exploratory drilling to "prove" the area. Many considerations other than the probable presence of a coal bed of workable thickness determine the location of exploratory drilling, such as character of the roof, floor, and the coal itself, which can be ascertained only by diamond drilling. At any rate, if it is believed that information about a coal bed warrants systematic exploration, it is justifiable to consider such deposits of coal as a tangible asset.

The extent of probable Class I-B coal is also limited in many places in the state by

the position of outcrops with respect to bedrock topography. Thus the shape of the areas probably underlain by Class I-B coal is irregular in many places because of information in regard to the bedrock topography.

#### CLASS II-A—STRONGLY INDICATED RESERVES

Some arbitrary standard is necessary to distinguish between coal reserves estimated on fairly certain knowledge and reserves estimated largely on scattered evidence of uncertain value. Geological information is more important in the two lower (Class II) than in the two higher (Class I) categories because there is less direct exploratory evidence. Hence the information about the coal beds, such as whether or not they are characteristically lenticular or otherwise irregular, and whether or not they are likely to be cut out in places by preglacial or glacial erosion, enters more into the determination of the strongly indicated reserves than the probable reserves.

In general, depending upon geological information, it was assumed that a fringe of Class II-A reserves two miles wide bordered the areas of Class I-B reserves. In the case of a single drill hole, this outer border would circle an area four miles in radius, some 50 square miles in area, in many places including about 12.5 square miles of Class I coal, within which Class I-A coal, if present, would have an area of .81 square mile. The results obtained were reviewed by experienced members of the staff, and modifications were made in accordance with specific knowledge. Lack of information necessitated eliminating some areas of Class II-A coal and even to regard reserves bordering areas of Class I-A coal as too weakly established to justify classing them as more than weakly indicated or as areas of no information.

Coal reserves in Classes II-A and II-B can scarcely be regarded as reserves in the sense that they await development without much additional exploration, yet they cannot be ignored in evaluating the coal resources of the state. Scattered drilling will probably substantiate or disprove the opin-

ion that there is a fairly strong indication of minable coal in these areas.

The data used as a basis for mapping the extent of coal resources of Class II-A areas consist of diamond drill holes, mines, outcrops, churn drill coal-test holes, churn drill holes drilled for oil, gas, or water (if sufficiently detailed records were kept), and "control" rotary drill holes (logged by members of the Geological Survey).

In the southern part of the state, members of the staff of the Coal Division have personally observed one-foot drilling time and collected drill cuttings at intervals of five feet in most cases in rotary oil-test drill holes, at least to the No. 6 coal bed, and in a number of drill holes, to depths below No. 6, and have compiled detailed logs from study of the samples obtained. Two hundred and forty-one such control drill holes have been logged and, since the information about the coals in such drill holes is fairly reliable, the logs have been used as a basis for outlining areas of Class II-A for No. 6 and No. 5 coals, particularly in the deep part of the Illinois Basin where there has been practically no exploration for coal with diamond drill. Although electric logs may strongly suggest that a coal bed is present, they give unsatisfactory evidence of the thickness of coal beds, so have not been used to delimit areas of this or higher classes of reserves.

In Class II-A, the thicknesses as recorded were used as a basis for estimating thickness by township, since points were too widely spaced to justify drawing isopach lines. Thicknesses so determined are of dubious value, and for this reason, estimates of the quantity of Class II-A reserves will change as new information becomes available. It is impossible to determine whether the estimates for this class are too large or too small.

Areas of Class II-A have been modified in accordance with the available data in regard to the bedrock topography.

#### CLASS II-B—WEAKLY INDICATED RESERVES

Areas classified as II-B are much more subject to arbitrary evaluation than any of the three higher categories of reserves. If

geological probability suggested that a coal was present, 28 inches or more in thickness, within a given area where none of the more reliable data used in higher categories was available, the area was classified as II-B. The minimum thickness of 28 inches was used in calculation of reserves of this classification even though adjacent classified areas might indicate a greater thickness. The status of such areas would be changed with the drilling of a hole if its log gave fairly definite evidence of the presence or absence of coal beds 28 inches or more thick. It is possible that core drilling in some of the areas designated as underlain by reserves of Class II-B will penetrate one or more beds five feet in thickness, particularly if drilling continues 200 to 300 feet below the position of No. 6 coal bed in the southeastern part of the state. Class II-B areas are between those designated as strongly indicated and those regarded as barren, or concerning which there is no information.

#### AREAS WHERE COAL IS THIN OR ABSENT

Within the area covered by the coal resources inventory, there are tracts where the available information indicates that the coal beds are less than 28 inches thick or are absent, even though the horizon of a particular coal may be present. Altogether there are probably 40 to 50 coal bed horizons in the Pennsylvanian system in Illinois. Only a small number of these are sufficiently thick over a large area to be regarded as important sources of coal. A few, like the Cutler coal bed in southern Illinois, are fairly continuous and commonly as much as 26 inches thick. It may be that these coal beds will eventually be mined by stripping or used in underground gasification, but since they do not generally reach the minimum thickness of 28 inches they were not considered workable reserves.

In western Illinois there are several thin beds below No. 2 coal bed that locally attain a thickness of between two and three feet, but like No. 1 coal bed they appear to be lenticular, thus their appearance in a few outcrops or drill holes provides no assurance of their continuity. If the lower limit of 14 inches used by M. R. Campbell

were employed in calculating the amount of the coal reserves, it would be necessary to take these coal beds into consideration, and in so doing, it is probable that at least one foot would be added to the total thickness of coal beds in the Illinois field. This would amount to an increase of at least 37 billion tons to the estimate presented in the tabulated data (Part III).

#### AREAS OF "NO INFORMATION"

There are large areas in the Illinois coal field where the information is so meager that classification of coal beds seems unjustifiable. For example, there is no information as to the depth of the glacial drift and the location of the margins of many of the coal beds in some places along the Pennsylvanian boundary in western Illinois and along the northeastern margin of the coal field. Field investigations might clear up some of these uncertainties, but there was no opportunity to make investigations while the study was in progress. Here and there, particularly in the north-central and central parts of the state, are large tracts concerning which there is so little trustworthy information that coal resources in these areas have to be designated as unknown.

#### DISTRIBUTION OF DIAMOND DRILL HOLES

Diamond drilling for coal has been very unevenly distributed in the state. The accompanying map indicates the townships in which drilling of this kind has been done and the logs of such holes have been filed with the State Geological Survey (fig. 2).

In general, coal mining in Illinois is on a one-bed basis. That is, even where there may be two beds of workable thickness, two beds are not mined from one shaft. In some districts two beds may be stripped, as in Vermilion, Fulton, Williamson, and Saline counties. Diamond drilling accordingly is usually directed to determine the character of a particular bed. If it happens to be necessary to penetrate an upper workable bed to reach one of particular interest, it is customary to confine description of the upper coal to a measurement of its total thickness. It is unfortunate that commercial

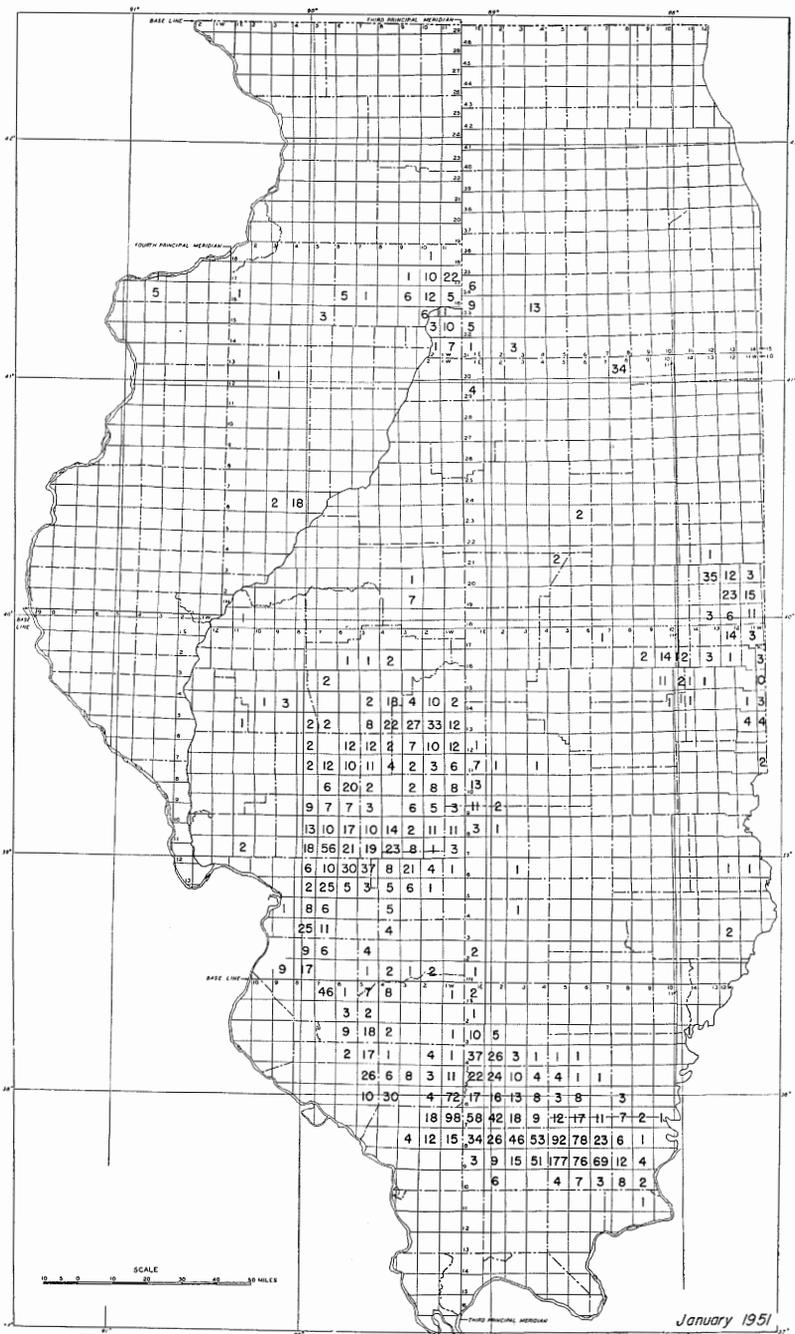


FIG. 2.—Townships containing one or more diamond drill holes whose records are in the Survey files.

drilling is not more often continued beyond the depth of special interest to lower coal beds to obtain information about them at relatively low additional cost. In a few instances the Survey has taken the opportunity to obtain information about lower coals by continuing drilling in a hole which would otherwise be drilled no deeper than No. 6 coal.

Since most mining is in the No. 6 coal bed, which is the uppermost of the beds of workable thickness in the southern half of the coal field, drilling rarely continues below this coal bed. East of the Du Quoin anticline No. 5 coal becomes more important and drilling very commonly continues below No. 6 coal bed to the No. 5 coal bed. This is especially the case in Saline and Gallatin counties where the No. 5 bed is commercially more important than No. 6 coal.

Below No. 5 coal in this part of the state, there are other beds of workable thickness, particularly the Davis and Dekoven beds, but in Saline and Gallatin counties scarcely a diamond drill hole has been continued to a sufficient depth below the No. 5 bed to reach the Dekoven. South of the outcrop of No. 5 coal a few holes explored the Dekoven and Davis beds 25 to 30 years ago. Within the last 10 years several diamond drill holes in Franklin County which were continued several hundred feet below the No. 5 bed and even below the Davis bed provided information about some of these lower beds, found to be of workable thickness as defined in this report.

In northern Illinois conditions are somewhat different. Particularly from Bloomington north, the most profitable bed was thought to be the LaSalle (No. 2). To reach this bed it was necessary to drill through coals No. 7 and No. 6, or No. 7 and No. 5, depending upon the location. Most of the drilling was in the northern part of the region, in LaSalle, Bureau, and Putnam counties. Even today, except for the information that can be obtained from shaft records, the greater part of central Illinois is unexplored. There is practically no information about coal beds below No. 7 or No. 6 bed from Streator and Bloomington southward to Springfield and Decatur.

Diamond drill holes, except for a few tracts recently drilled in Edgar County, are unevenly and most widely spaced in eastern Illinois south of Vermilion County, although there is evidence of minable coal beds in Edgar, Clark, Crawford, Lawrence, and Wabash counties. Coal beds have been traced in Indiana by diamond drilling up to the state line and beyond into Illinois, but systematic exploration in this part of Illinois has been undertaken in only a few places.

There are relatively few diamond drill holes in western Illinois, most of which are in Fulton County and in the vicinity of Galesburg and Monmouth, where there has been considerable exploration of the No. 1 coal bed. Drilling has mainly been of shallow depth in exploration of the strippable coal deposits, and it has not been done by diamond drill.

Within the past 10 years there has been a large amount of exploratory drilling in the No. 6 coal mining districts and in Saline County. Drilling has been carried on in Macoupin, Madison, Christian, Fayette, St. Clair, Randolph, Franklin, Jefferson, Williamson, and Saline counties. Most of the cores were examined and logged by members of the Survey staff, and a large body of useful information has been obtained concerning the Coal Measures and coal beds.

#### DISTRIBUTION OF CHURN AND ROTARY DRILL HOLES

Several thousand churn and rotary drill holes have been drilled in the coal field of Illinois. Where churn drill holes are tests for coal they are fairly reliable in reporting the thickness of the coal, but where drilled for other purposes incidental reports on the thickness of coal beds penetrated are much less trustworthy. Logs of churn drill holes other than coal tests are generally not regarded as adequate basis for defining the areas of proved or probable coal reserves. Oil tests prior to about 1935 were made by cable tools. Such tests are scattered widely throughout the state, but thousands are concentrated in the old oil fields of Clark,

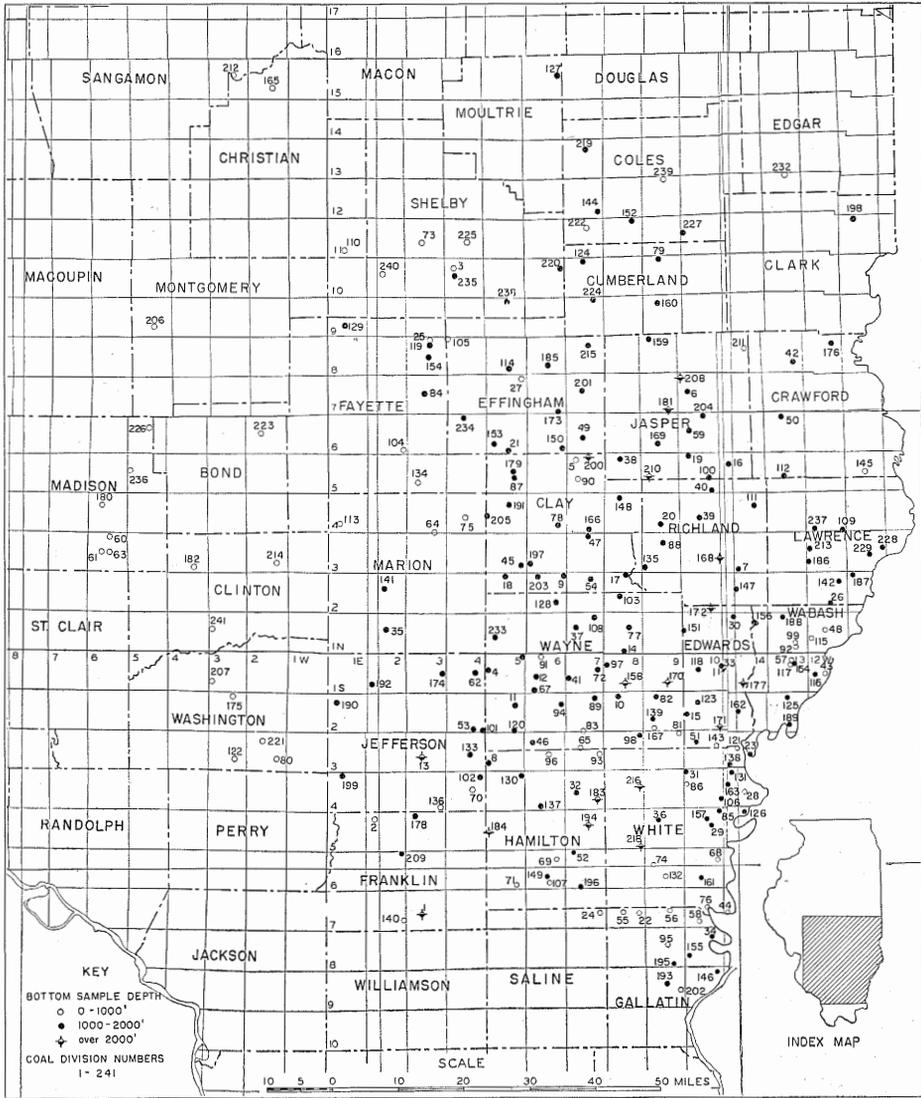


FIG. 3.—Distribution of control rotary drill holes in Illinois.

Crawford, and Lawrence counties. Records of the coal-bearing strata were not carefully kept, and only an occasional driller's log reports coal. Samples of the drill cuttings of many of these holes were filed with the Survey and many have been examined and logs compiled. Coal fragments were found in many of them but thickness of the beds is uncertain. Because of discrepancies in the data provided by these records, it has been impossible to work out a consistent interpretation concerning the identity of the coal beds encountered and the extent of the individual beds. Two recently drilled diamond drill holes in central Lawrence County near Bridgeport have yielded considerable information, but there is still much uncertainty as to the extent of the area underlain by the various coal beds penetrated by those holes.

Thousands of rotary drill holes have been put down in the southeastern part of the Illinois coal field since about 1938, in the area known as the Illinois Basin. The drillers' records of these holes are rarely useful in locating the position of coal beds or in providing trustworthy information concerning their thickness. Between 1941 and 1945 the staff of the Coal Division of the Survey observed the drilling, collected samples at intervals from 1 foot to 5 feet, and kept 1-foot drilling time logs of various thicknesses of the Pennsylvanian beds for 241 of these wells (fig. 3). Such observation usually extended from the bottom of the surface pipe to the base of the No. 6 coal bed, but for many wells observation extended to the base of the Pennsylvanian strata. These "control" well logs and examination of the cuttings provided the basis for detailed lithologic logs which together with the drilling time logs have a greater degree of reliability than any other type of record of rotary oil-well drilling. They are therefore used in determining the reserves in Class II for No. 6 and No. 5 coal beds.

#### THICKNESS OF COAL BEDS

For the purpose of estimating the quantity of coal present in the various tracts classified in terms of probability of occurrence, the thickness of the coal has been indi-

cated by isopachs (lines of equal thickness) or by assigning an average value to certain areas. It was possible to draw isopach lines more or less satisfactorily in areas where datum points were fairly closely spaced. Elsewhere an average value has been estimated, based on information from at least one drill hole.

Isopachs were generally drawn at the following steps: 28, 42, 54, 66, 78, 90, 102, 114, and 126 inches. The measurements were then calculated on the basis of the average thickness between two successive lines, at 35, 48, 60, 72, 84, 96, 108, 120, and 132 inches, that is, on the basis of even feet, except that in the first case 35 inches was used to represent the average between 28 and 42 inches. Where an average thickness had to be assumed, there was a tendency to place this at the even foot. However, in many places this was unsatisfactory and whatever figure seemed most appropriate was used.

#### DEPTH TO COAL BEDS

No Illinois coal of workable thickness is at a depth that makes mining impossible, but mining of a bed 28 inches thick at a depth of 1200 to 1500 feet seems much beyond probability for years to come. Nevertheless, as the shallower coal beds become worked out or if any of the deep-lying beds eventually prove to be of exceptional quality in ash or sulfur content or coking quality, depth in itself will probably not be a deterrent against the recovery of such coal.

However, all coal below 1200 feet in depth was put in Class II-B (weakly indicated), except such coal beds as were penetrated by diamond drill holes. As diamond drill holes more than 1200 feet deep are uncommon and fairly widely scattered, there is not much occasion to make provision for coal supplies at this depth in the classes of higher probability. In the case of deep-lying coal beds penetrated by diamond drill holes, no extension has been made beyond the half mile assigned to proved reserves. The depth of 1200 feet was selected because the No. 6 coal bed probably never reaches this depth in the state; hence the limitation applies only to beds below No. 6.

### ADDITIONAL DATA REQUIRED FOR COMPLETE APPRAISAL OF COAL RESERVES

The present appraisal goes no further than a classification of the coal reserves in terms of thickness and, to a limited extent, depth of the coal beds based on quality and quantity of information about them. Other considerations which are necessary for a comprehensive and complete evaluation of coal reserves are: 1) B.t.u. values, 2) rank of coal, 3) ash content, 4) sulfur content, 5) coking quality, 6) depth, 7) characteristics of roof material, and 8) availability for stripping.

*Heat value.*—One of the significant bases for evaluation of coal is its heat value. The commercially more important coal beds in Illinois, namely, Rock Island (No. 1), Murphysboro, LaSalle or Colchester (No. 2), Harrisburg and Springfield (No. 5), Herrin (No. 6), and Danville (No. 7), have been frequently sampled and analyzed, and representative values for the various counties have been obtained by coal bed.<sup>20</sup> Such analyses present calorific (B.t.u.) values on various bases—"as received," "dry," "ash and moisture free," "moist, mineral matter free," and "dry, mineral matter free." What is most preferred fundamentally is the heat value of the pure coal substance without moisture and ash determined as mineral matter. This has been called the "unit coal" heat value<sup>21</sup> and has been determined for a group of representative Illinois coals by mine, county, and bed.<sup>22</sup> A modification of this value, called the "moist mineral matter-free B.t.u.," has been selected as the basis for rank determination<sup>23</sup> for the high-volatile bituminous coals with less than 69 percent fixed carbon (dry mineral matter free), more than 11,000 B.t.u. (moist mineral matter free), and either agglutinating or nonweathering.

<sup>20</sup>Cady, G. H., Classification and selection of Illinois coals, Illinois Geol. Survey Bull. 62, 1935. Analyses of Illinois coals, Illinois Geol. Survey Supplement to Bull. 62, 1948.

<sup>21</sup>Parr, S. W., and Wheeler, E. F., Unit coal and the composition of coal ash: Univ. of Ill. Eng. Expt. Sta. Bull. 37, 1909.

<sup>22</sup>Cady, G. H., *ibid.*

<sup>23</sup>A.S.T.M. Standard specifications for classification of coal by rank: A.S.T.M. Standard, 1949, part 6, pp. 652-657, 1949.

*Classification of coal by rank.*—The basis for rank classification of high-volatile bituminous coals is stated in the preceding paragraph. Rank has some advantage over the unit B.t.u. value of coal as an index of the coal material, if a satisfactory representative value for moisture of the coal in the bed can be obtained. It is believed that this is possible if the face samples are collected according to proper specifications. The moist mineral matter-free B.t.u. has been shortened to read to the nearest hundred B.t.u. and this figure is then called the rank index,<sup>24</sup> thus a symbol such as (138) designates the rank index of a coal having 13,800 B.t.u. per pound.

In Illinois the rank index of each bed of coal is fairly constant for each county and in general increases systematically toward the southeastern part of the state (fig. 4).<sup>25</sup> Therefore, it is possible to indicate the amount of coal by rank for one or two beds in certain counties of Illinois.

However, since little is known about a number of the coal beds, and information about any bed is available for only part of the state, it is not possible at present to know just how much coal of each probability class and thickness belongs to each of the three ranks. Although the rank of more than two coals in a county is rarely known, it is generally true that the ranks of No. 5, No. 6, and No. 7 coal beds in the same county are about the same. It is probable that lower coal beds in the same region will have a somewhat higher rank, although there is no known amount of systematic variation with depth in the Illinois field. Rank appears to change more with respect to geographic position than with respect to depth. Classification by rank based upon samples obtained from drill cores, rather than standard face samples from mines, must be regarded as merely indicative.

*Ash content.*—It would be desirable to have a map showing the systematic variations in ash content for the coal beds of Illinois similar to that for variations in rank. Because there is no known constant

<sup>24</sup>Cady, G. H., Classification and selection of Illinois coals: Illinois Geol. Survey Bull. 62, p. 30, 1935.

<sup>25</sup>*Ibid.*, fig. 1, p. 34.



relationship between the character of the coal material and the ash content (the amount of ash is probably mainly fortuitous), it is impossible to construct a statewide map showing any systematic variations in ash content. This can be done for moisture content of different beds, but the effect of the water on the potential heat of the coal bed is included in the determination of the rank index.

*Sulfur content.*—The sulfur content of Illinois coals on the as-received basis varies from about 7 percent to less than 1 percent. It is particularly important to know where coals with less than about 1½ percent of sulfur may be found, because if such coals have good coking properties they can be used separately or in combination with other coals in the manufacture of metallurgical coke. Such coal is known only in a few relatively small areas which have been described elsewhere.<sup>26</sup> Except for the more generally mined beds, little information is available about the sulfur content of the coal beds represented in this inventory. The data available concerning areas where the coal is known to have low sulfur content can be easily assembled to show the amount of such coal probably still present in those areas; but probably other areas will be found, as the distribution of sulfur in coal beds is very erratic and low-sulfur coal may be found almost anywhere.

*Variations in coking quality.*—The information available does not permit delineation of areas of coking as distinguished from non-coking coals in Illinois, or the differentiation of coking coals into those suitable for the manufacture of metallurgical coke and those not suitable, except for sulfur content. In general it is assumed that all Illinois coals will coke if used soon after they are mined. Oxidation of Illinois coals rapidly reduces their coking capacity, with greater effect the lower the rank of the coal.<sup>27</sup> In general, only the coals in southern Illinois, from Jefferson County southward and east of the Du Quoin anticline,

when properly prepared, are suitable in blends with eastern low-volatile coals for the production of metallurgical coke.<sup>28</sup>

*Variations in depth.*—At the cost of considerable effort, including the preparation of structure maps of each of the coal beds 28 inches or more in thickness and the use of surface contour maps, it would be possible to classify the coal resources with respect to depth, for example, in steps of 100 feet. Where the structure of No. 6 coal bed has already been mapped it would have been possible to indicate these categories, but the lack of similar maps for other coal beds and the desirability of rapid completion of the inventory with information available, made it necessary to postpone setting up a classification on the basis of depth in small steps. For areas where structure maps are available, depth to at least one coal bed is readily ascertained by reference to structure contours and tabulated data concerning depth at the reference points, or by using surface elevation figures from contour maps.

Undoubtedly some service would be accomplished had it been possible in the limited time available to indicate where coal beds are probably less than 100 feet in depth, as it is in this range that strip mining will be carried on in the not very distant future, judging from recent development of stripping equipment. It would also probably be useful if the amount of coal at depths between 100 and 500 feet were specified, and from there on down at 250-foot steps to 1500 feet; this will eventually be possible. Very little coal probably lies below this depth, and that only in the trough of the Illinois Basin, where the amount of minable coal is much reduced by close drilling for oil. The accompanying map (fig. 5) indicates the outline of the area where the altitude of No. 6 coal is 500 or more feet below sea level or where the bed is 1000 feet or more in depth.

*Roof characteristics.*—There is probably no factor other than thickness and quality of the coal more important in determining the workability of a coal bed than the

<sup>26</sup>Cady, G. H., Contributions to the study of coal; 2. Distribution of sulphur in Illinois coals and its geological implications: Illinois Geol. Survey Rept. Inv. 35, pp. 25-41, 1935.

<sup>27</sup>Thiessen, Gilbert, Coke from Illinois coals: Illinois Geol. Survey Bull. 64, pp. 109, 110, 113, 1937.

<sup>28</sup>Reed, F. H., et al., Use of Illinois coal for production of metallurgical coke: Illinois Geol. Survey Bull. 71, p. 10 and fig. 9, p. 63, 1947.

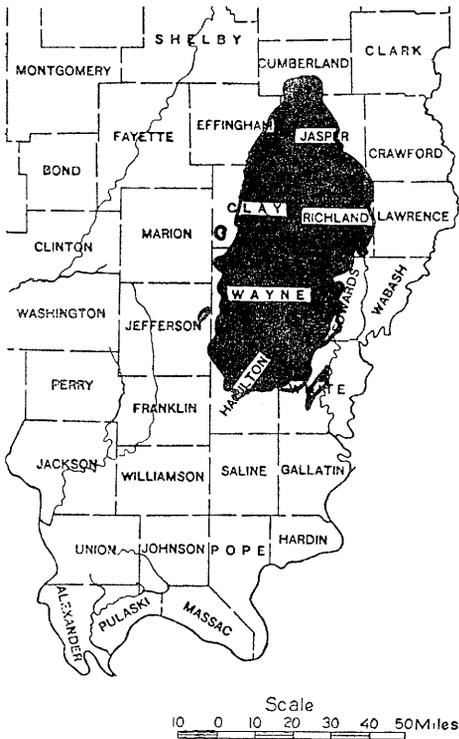


FIG. 5.—Area in the Illinois Basin where No. 6 coal bed lies 500 feet or more below sea level.

character of the roof material and whether or not it would constitute either an unsurmountable personnel or economic hazard. Roof conditions are exceedingly difficult to foretell from exploration drilling, and undoubtedly this very difficulty has resulted in some mining failures. It is difficult to interpret cores correctly in terms of the safety factor in mining, and it is practically impossible to do so when the only information available is that provided by drillers' logs or logs of this generalized type. This condition cannot be remedied until a satisfactory technique is developed for testing drill cores to obtain a factor of strength.

Some service to the mining industry might be given by maps showing the variation in the interval between the top of the coal bed and the caprock limestone, when a coal, such as No. 6, is characterized by a cap-

rock. Information of this kind would give some indication as to where roof bolting might be most effective. However, it would hardly seem to lie within the purpose of the present study to set up special classifications of areas favorable and unfavorable to roof bolting, since the distinction could not be applied to all coal beds.

*Availability for stripping.*—Were there enough information available as to the extent of strippable coal resources on the basis of 100 feet as the limit of strippable depth, it would be worth the extra effort to indicate it. However, where coals lie at relatively shallow depths and the bedrock surface is concealed by a mantle of glacial drift or alluvium of unknown depth, the accurate delineation of such areas is most unlikely without evidence from many drill holes. Evidence has shown that the margin of coal beds is exceedingly irregular where a considerable part of the cover is composed of glacial drift. The best that can be done is to indicate, on the basis of information at hand concerning the bedrock topography, the likely position of the outcrop of the coal on the bedrock surface. Subsequent drilling may verify the position as mapped, but the usual result is that the outcrop is found to be much more ramifying than was indicated. Many mining companies have at great expense drilled out the outcrops of coal beds whose general position only could be ascertained from surface shows or from shallow mines. It is therefore thought better to avoid making definite assumptions in regard to thickness of cover and extent of strippable coal in marginal areas which are in Class I-B or Classes II-A or II-B. It is possible that later, by benefit of additional field work on the basis of the present study, prospective areas of strippable coal can be designated. At the present it is believed unwise if not impossible to arrive at any figure upon which confidence can be placed of the quantity of coal present in areas as yet undrilled, or for which no drilling data are available, at depths less than 100 feet.

## GEOLOGICAL OCCURRENCE OF COAL BEDS

## PENNSYLVANIAN SYSTEM

The Coal Measures or Pennsylvanian system of Illinois has been subdivided into four groups<sup>29</sup> which from the youngest downward are named the McLeansboro, Carbondale, Tradewater, and Caseyville. The total thickness of the Pennsylvanian system is about 2600 feet,<sup>30</sup> distributed by groups as follows: McLeansboro, 1200 feet; Carbondale, 400 feet; Tradewater, 545 feet; and Caseyville, 470 feet.

There are 40 to 50 coal beds or horizons distributed throughout the Pennsylvanian system in Illinois. Beds locally as much as 28 inches thick may be found at many stratigraphic positions, but the more important beds are within a range of about 700 feet in the middle portion of the system: the lower 100 feet of the McLeansboro group, the 400 feet of the Carbondale group, and the upper 200 feet of the Tradewater group. Coal beds above or below this middle portion are of relatively small economic interest.

## MCLEANSBORO GROUP

The coal beds of the McLeansboro group may be conveniently discussed as: 1) coal beds in the upper part, and 2) coal beds in the lower part, the division being made at the Shoal Creek limestone. This limestone is 5 to 10 feet or more thick, and is encountered in most drill holes 300 to 500 feet above No. 6 coal bed.

## UPPER MCLEANSBORO COAL BEDS

Although there are probably 10 to 15 coal bed horizons in the McLeansboro group above the Shoal Creek limestone only two are known to be 28 inches or more thick in an area sufficiently large to be thought worth mapping for the purpose of the coal inventory. These are the Trowbridge coal bed in southwestern Cumberland and east-

ern Shelby counties and the Friendsville coal bed of Wabash and southern Lawrence counties. The Friendsville coal bed is thought to lie 200 to 300 feet above the Shoal Creek limestone, the identity of this limestone not being very definite in Wabash County.<sup>31</sup> The Trowbridge coal bed<sup>32</sup> lies about 600 feet above the Shoal Creek limestone.<sup>33</sup>

Within the area of the Illinois Basin<sup>34, 35</sup> and adjacent to it there are a number of localities where coal beds in the upper part of the McLeansboro group have been worked by stripping or underground mining. Such coals are the Shelbyville<sup>36</sup> bed in Shelby County, the Calhoun<sup>37</sup> coal bed mined by stripping in eastern Richland and western Lawrence counties, the Opdyke coal bed in the vicinity of Opdyke<sup>38</sup> in eastern Jefferson County, a coal near Fancher<sup>39</sup> in southern Shelby County, and several others. None of these beds is known to be as much as 28 inches thick in a sufficiently large area to justify including statistics relative to the quantity of coal. It is probable, however, that within the area of the Illinois Basin as shown by Bell<sup>40, 41</sup> there is every-

<sup>29</sup>Rolley, Mary B., Karstrom, Adabell, Cady, G. H., and Parker, Margaret A., Subsurface geology of the Pennsylvanian system in Wabash County and a description of the Friendsville coal: Illinois Geol. Survey, in progress.

<sup>30</sup>Cady, G. H., Summary list of areas in western, northern, and central Illinois recommended for special investigations as possibly suitable for strip-mining: Illinois Geol. Survey Circ. 19, pl. XIV, 1937.

<sup>31</sup>Log of control drill hole NE  $\frac{1}{4}$  NW  $\frac{1}{4}$  sec. 12, T. 10 N., R. 6 E., Shelby County. Interval Shoal Creek limestone to Trowbridge coal bed, 638 ft.

<sup>32</sup>Moulton, Gail F. and Bell, A. H., Three typical oil fields of the Illinois region, *In* Structure of typical American oil fields: Am. Assoc. Petr. Geol. Bull., fig. 1, p. 116, 1929.

<sup>33</sup>Bell, A. H., The relation of the geology to the development of the petroleum industry in Illinois: Trans. Ill. Acad. Sci., vol. 23, no. 3, pp. 367-370, 1931.

<sup>34</sup>Broadhead, G. C., Shelby County: Geol. Survey of Illinois, vol. VI, pp. 169, 171, 1875.

<sup>35</sup>Worthen, A. H., Richmond and Lawrence counties: Geol. Survey of Illinois, vol. VI, pp. 46, 49, 1875.

<sup>36</sup>Engleman, Henry, Jefferson County: Geol. Survey of Illinois, vol. III, pp. 232-234, 1868.

<sup>37</sup>Broadhead, G. C., Shelby County: Geol. Survey of Illinois, vol. VI, p. 168, 1875.

<sup>38</sup>Bell, A. H., Role of fundamental geologic principles in the opening of the Illinois Basin: Econ. Geol., vol. 36, no. 8, pp. 774-785, Dec. 1941. Reprinted as Illinois Geol. Survey Circ. 75, 1941.

<sup>39</sup>Southern Illinois: Resources and potentials of the sixteen southernmost counties: Univ. of Ill., Press, fig. 44 (p. 103), 1949. (The inner area surrounded by a dotted line is regarded as the "Illinois Basin.")

<sup>29</sup>Weller, J. M., Geology and oil possibilities of extreme southern Illinois: Illinois Geol. Survey Rept. Inv. 71, footnote 13 (p. 36), 1940.

<sup>30</sup>Weller, J. M., Geologic map of Illinois; stratigraphic sections: Illinois Geol. Survey, 1945.

where present at least one coal bed between 12 and 28 inches thick. Assuming that the average is at least 12 inches the amount of coal represented by these thin beds is about 9½ billion tons. This quantity is not included in estimates herewith presented, and will not be mentioned further.

#### LOWER MCLEANSBORO COAL BEDS

*Danville (No. 7).*—In the lower part of the McLeansboro group, below the Shoal Creek limestone, this inventory is concerned with only two coal beds: the Danville (No. 7) and the Jamestown coal beds. The No. 7 bed is extensively mined in the Danville district, and at one mine in Douglas County. It is also widely distributed in the Longwall district of northern Illinois and in an area west of Sparland, Marshall County, in western Illinois, where it is called the Sparland No. 7. No. 7 coal bed is also present along the east side of the state in Edgar, Clark, Crawford, and Lawrence counties.<sup>42</sup>

*Jamestown.*—Data are not available on the character of the Jamestown coal in the known limited area where it is of minable thickness.

The coal bed here called Jamestown appears in Perry County near the village of that name as a streak or thin layer of coal lying between the Herrin limestone (caprock of No. 6 coal) and a second and higher limestone of very similar characteristics called the Jamestown.<sup>43</sup> The coal bed commonly appears in the high wall of strip pits working No. 6 coal bed in southern Illinois.

This bed is never, so far as known, more than a few inches thick in southern Illinois and does not extend into northern and western Illinois. In parts of western Kentucky (Hopkins County) it is 6½ feet thick. It is believed that in Lawrence County, Illinois, and in adjacent Knox and Sullivan counties, Indiana, the Jamestown coal bed is also of workable thickness. It

has been mined in some places where it has been called Indiana VI.<sup>44</sup> Near Bridgeport, Lawrence County, recent drilling produced a core which contained what is probably the Jamestown and No. 6 coal beds with an intervening foot or so of limestone thought to represent the Herrin limestone. Another core drill hole nearby showed about the same succession except that a foot or two of dark shale was reported between the limestone and the lower coal bed.

Between the No. 6 coal bed and the Shoal Creek limestone, recent drilling has penetrated at least 12 coal beds or horizons in southern Illinois. None of these is sufficiently thick to be included in this inventory. Just which bed here represents No. 7 coal in northern and eastern Illinois is not definitely known. The Cutler<sup>45</sup> coal bed, which may be the equivalent of Danville (No. 7) coal bed, is commonly 24 inches thick but only rarely reaches 28 inches.

#### CARBONDALE GROUP

Coal beds of the Carbondale group are the most important in Illinois. This group contains the Herrin (No. 6) coal bed at or near the top, the Briar Hill (No. 5A) coal bed, the Harrisburg (No. 5) coal bed, the Sumnum (No. 4) coal bed, the LaSalle or Colchester (No. 2) bed, and two or three thin beds that rarely attain 28 inches. The Palzo sandstone commonly lies a few feet above, or rests on, the Dekoven coal bed of the Tradewater group. The base of the Palzo sandstone (Isabel sandstone of western Illinois), which, however, is probably not everywhere present, is regarded as the base of the Carbondale group.

#### HERRIN (NO. 6) AND HARRISBURG (NO. 5)

The No. 6 coal is the most widespread bed in the southern half of the coal basin, and the No. 2 coal bed in the northern half. The Harrisburg (No. 5) coal bed has workable thickness in most of southern

<sup>42</sup>Weller, J. M., and Wanless, H. R., Correlation of minable coals of Illinois, Indiana, and western Kentucky: Am. Assoc. Petr. Geol. Bull., vol. 23, no. 9, pp. 1374-1392, Sept. 1939.

<sup>43</sup>Bell, A. H., Ball, C. G., McCabe, L. C., Geology of the Pinckneyville and Jamestown area, Perry County, Illinois: Illinois Geol. Survey Ill. Pet. 19, p. 3, fig. 3, April 1931.

<sup>44</sup>Ashley, G. H., Coal deposits of Indiana: Indiana Dept. of Geol. and Nat. Res., 23rd Ann. Rept., pp. 1077-1078, nos. 730, 731, 1898.

<sup>45</sup>Bell, A. H., Ball, C. G., and McCabe, L. C., Geology of the Pinckneyville and Jamestown areas, Perry County, Illinois: Illinois Geol. Survey Ill. Pet. 19, 1931.

Illinois east of the Du Quoin anticline, but occurs sporadically west of the anticline. It is absent in much of southwestern Illinois, but is the most important coal bed in the Springfield and Peoria districts, north of which it again becomes thin and unworkable. In central Illinois where No. 5 coal is workable, the No. 6 coal bed is generally thin and unworkable. Nos. 5 and 6 coal beds are both of workable thickness in southern Illinois east of the Du Quoin anticline, in parts of Perry, Randolph, and St. Clair counties, in a narrow strip in northern Christian and southern Sangamon counties, and in northern Peoria and northeastern Fulton counties.

#### BRIAR HILL (NO. 5A)

The Briar Hill (No. 5A) coal bed has only locally a thickness of as much as 28 inches. One of these occurrences is in the Eagle Valley area<sup>46</sup> in southeastern Gallatin County. This coal bed is so rarely 28 inches thick that it is not included in the inventory.

#### LASALLE (NO. 2)

The LaSalle, or Colchester (No. 2), coal bed is apparently very widespread with a thickness of about 28 inches or more in Illinois north of Springfield and Decatur. It does not appear to reach this minimum workable thickness in the Danville district. South of Springfield a coal bed thought to be No. 2 has been penetrated in drill holes about 100 feet below No. 5 coal, or its horizon, and 125 to 140 feet below No. 6 coal bed. It is apparently continuous but seems to be less than 28 inches thick in the southern part of the state. Identification of this bed as No. 2 awaits more thorough study of the fossil spores, as they become available from drill cores.

The LaSalle (No. 2) coal has been identified by Kosanke<sup>47</sup> from cores of a drill hole in sec. 27, T. 6 S., R. 2 E., Franklin County, at a depth of 789 feet, 150 feet below No. 6 coal bed, and in sec.

16, T. 6 S., R. 1 E., Franklin County, 120 feet below No. 6 coal bed. In a single diamond drill hole in Franklin County the No. 2 coal bed measured about 5 feet in thickness, but is commonly less than 2 feet thick, and hence generally unworkable. Even if only a foot thick, the coal in this bed in southern Illinois amounts to hundreds of millions of tons.

#### MISCELLANEOUS COALS

Along the eastern boundary of Illinois there are areas where drilling has established the presence of coal beds which correspond to the beds known as IV and IV-A in Indiana. These two beds lie between No. 2 and No. 5 coals of Illinois or beds known in Indiana as III-A and V. Bed IV is commonly regarded as a main lower bed, and IV-A as a "rider" bed. They probably underlie fairly large areas in eastern Illinois, but both are discontinuous. There has not been enough core drilling to determine their continuity or the minability of Indiana IV coal bed over large areas in Illinois. For this reason it is necessary to restrict estimates rather closely. A coal bed between No. 5 and No. 2 beds designated as "No. 4" has been used freely as a basis of stratigraphic reference and structure mapping in electric logs of rotary drill holes in the Illinois Basin.<sup>48</sup> It is equivalent to the bed called IV-A in Indiana. In western Illinois the Sumnum (No. 4) coal is a lenticular bed occurring rather infrequently between No. 5 and No. 2 coals. Very locally another lenticular bed, the Kerton Creek, appears a short distance below the Sumnum bed. Small lenses of Sumnum (No. 4) coal bed have been mined near Sumnum and Ipava in Fulton County, near Roodhouse and Greenfield in Greene County, and at Soperville in Knox County.

The portion of the Carbondale group below the LaSalle (No. 2) coal bed contains a few thin coal beds of small or no economic importance. Other than in eastern Illinois none is known to have a thickness of 28 inches except possibly locally.

<sup>46</sup>Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area: Illinois Geol. Survey Bull. 47, pl. III (p. 64), 1925.

<sup>47</sup>Kosanke, R. M., Pennsylvanian spores of Illinois and their use in correlation: Illinois Geol. Survey Bull. 74, p. 70, 1950.

<sup>48</sup>Cady, G. H., et al., Subsurface geology and coal resources of the Pennsylvanian system in certain counties of the Illinois Basin: Illinois Geol. Survey Rept. Inv. 148, pp. 38, 60, 77, 103, 118, 1951.

In eastern Illinois adjacent to the Indiana coal field, coal bed III lies only a short distance below III-A, the supposed equivalent of No. 2 coal in Illinois. This coal bed has been found as far west as the vicinity of Bridgeport, Lawrence County, where it has been penetrated by diamond drill holes. Except in eastern Edgar County estimates of the quantity of this coal are restricted because of uncertainty as to the extent of this coal bed in Illinois. The Indiana III coal in workable thickness in areas along the east side of Illinois from Edgar to Lawrence counties may be the equivalent of the Lower Liverpool coal bed of western Illinois,<sup>40</sup> but such a correlation cannot be regarded as thoroughly established.

#### TRADEWATER AND CASEYVILLE GROUPS

The Tradewater group lies below the Palzo<sup>50</sup> sandstone, the basal member of the Carbondale group. This sandstone is correlated with the Isabel<sup>51</sup> sandstone of western Illinois which underlies the Lower Liverpool coal bed. The Tradewater group contains two coal beds that have been important sources of coal in the Illinois coal field, namely Murphysboro and Rock Island (No. 1) beds. In the past the Murphysboro bed has been called "No. 2" on the assumption that it was the southern Illinois equivalent of LaSalle (No. 2) bed, an assumption that is now believed to be wrong. The resources of these two beds have been essentially exhausted in Jackson, Rock Island, and Mercer counties. There are some reserves of the Murphysboro coal bed in northern Jackson County and possibly also in the vicinity of Carbondale in southeastern Jackson County.

Isolated lenses of Rock Island (No. 1) coal bed have been worked in the vicinity of Galesburg and Monmouth, along Spoon River, at Ellisville and Seville, and are being worked at present on Put Creek near Cuba in Fulton County and near Alpha in

southwest Henry County. The Rock Island (No. 1) coal bed is not definitely known to have an equivalent in southern Illinois or east of the Illinois River. The equivalent of the Murphysboro coal bed in western or northern Illinois or even east of the Du Quoin anticline is uncertain.

In addition to the Murphysboro and Rock Island coal beds are several beds that in places reach a thickness of 28 inches. These beds are, from the top down, the Dekoven, the Davis, the Stonefort, the Bald Hill, the Delwood, and the Upper and Lower Willis, all in the Tradewater group; and the Reynoldsburg, near the top of the Caseyville group, the Minshall and Block coal beds of Indiana, and coals mined near Makanda in southern Jackson County.

Of these beds the Dekoven and Davis are the only ones that have been mined to any extent, and that only in southern Williamson, Saline and Gallatin counties, very little having been mined in Gallatin County. Little information is available about these two coal beds north of the outcrop of the No. 5 coal bed in southern Illinois. What may be the same beds have been mined in a small area near Campbell Hill, Jackson County, where the Davis coal bed, or a bed slightly older, has been mined mainly in connection with the mining of its underclay. There is some basis for thinking that the Dekoven and Davis may be equivalent to the two beds formerly mined at about 1000 feet in depth at Assumption, and to two closely associated beds encountered in drilling in southeastern Macoupin County. The only area where the quantity of coal present in the Dekoven and Davis beds can be estimated with a reasonable degree of accuracy is in southern Saline and southeastern Williamson counties. In general the upper of these two beds, the Dekoven, is commonly about 30-36 inches thick and the Davis is about 40 inches thick in Saline and Williamson counties, but this thickness does not seem to persist far northward.

A coal 4 to 5 feet thick has been mined in the vicinity of New Burnside, Johnson County, underlying a relatively small area. The relationships suggest that this may be the equivalent of the coal bed a short dis-

<sup>40</sup>Wanless, H. R., Pennsylvanian correlations in the Eastern Interior and Appalachian coal fields: Geol. Soc. Am. Spec. Paper 17, p. 92, 1939.

<sup>50</sup>Dunbar, C. O., and Henbest, L. G., Pennsylvanian fusulinidae of Illinois, with section on stratigraphy by J. M. Weller and the authors: Illinois Geol. Survey Bull. 67, footnote 12 (p. 10), 1942.

<sup>51</sup>Wanless, H. R., *op. cit.*, p. 87.

tance below the Curlew limestone farther east, perhaps equivalent to the Murphysboro.

The interval separating the No. 2 and Dekoven coal beds is about 100 to 140 feet. The Bald Hill coal bed lies about 75 to 100 feet below the Davis bed, and the coal bed below the Curlew limestone (Murphysboro?) about 50 to 75 feet lower. The Delwood, Upper and Lower Willis, and Reynoldsburg coal beds are found as lenses in shaly strata separating fairly massive sandstones. There is probably 50 to 75 feet between the Upper Willis and the Reynoldsburg coal beds and 150 feet between the Delwood and Willis and 100 feet from the Murphysboro (?) to the Delwood. None of these coal beds is believed to be generally as much as 28 inches thick.

The stratigraphic relationship of the Minshall and Block coals of Indiana to coals of the Tradewater group in southern Illinois is not certain, although the Minshall limestone a short distance above the Minshall coal bed has been correlated with the Curlew<sup>52</sup> limestone of Illinois.

Diamond drill holes and mine shafts in the vicinity of Litchfield, Montgomery County, penetrated coal beds of workable

<sup>52</sup>Wanless, H. R., Pennsylvanian correlations in the Eastern Interior and Appalachian coal fields: Geol. Soc. Am. Spec. Paper 17, p. 80 (glossary), 1939.

thickness, and others too thin to work, below the horizon of the No. 6 coal bed.<sup>53,54</sup> A bed 2 to 4 feet thick at a depth of 540 feet, 90 to 100 feet below the horizon of No. 6, is believed to be the LaSalle (No. 2). This was worked for some time, and later a bed at a depth of about 700 feet, 286 feet below the horizon of No. 6 bed, was mined. The equivalent of this bed elsewhere in the state is uncertain although it has been correlated with both the Rock Island and the Murphysboro.

Locally in western Illinois two or three thin coal beds—the Pope Creek, Tarter, and Babylon<sup>55</sup>—below the No. 1 bed thicken to nearly 28 inches. In some places in western Illinois there are coal beds between Rock Island (No. 1) and Colchester (No. 2) but these rarely are as much as 28 inches thick.

In the descriptions of the 33 areas upon which estimates are based (Part II) the approximate stratigraphic position of the various coal beds is shown graphically (figs. 9-37).

<sup>53</sup>Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 153-154, 1922.

<sup>54</sup>Payne, J. N., and Cady, G. H., Structure of Herrin (No. 6) coal bed in Christian and Montgomery counties and adjacent parts of Fayette, Macon, Sangamon, and Shelby counties: Illinois Geol. Survey Circ. 105, pp. 7-8, 1944.

<sup>55</sup>Wanless, H. R., Geology and mineral resources of the Beardstown, Glasford, Havana, and Vermont quadrangles; Chapter on Pennsylvanian stratigraphy, p. 30 (Babylon coal bed), p. 36 (Tarter coal bed): Ms., files Illinois Geol. Survey, 1943.

## CHARACTERISTICS OF THE COALS

In general, the coals of the Illinois field are predominantly normal, bright banded, bituminous coals. Only occasionally are there beds or benches of canneloid or splint coal. The coals prevailingly contain vitrain and clarain and small amounts of fusain and durain. Local differences, however, exist in the proportions of these ingredients and in the composition of the clarain, which depends upon the proportion of bituminous constituents, such as waxes and resin. Consequently the coals do not exhibit entirely uniform combustion characteristics. Laminæ and layers of cannel or splint coal are found locally in the beds and modify the character and apparent rank of the coal.

Illinois coals show a general increase in rank from north to southeast through the coal field, with the lowest-rank coals in the northwest part of the coal field and the highest-rank coals in the Eagle Valley region of southern Gallatin County. There is an increase in B.t.u. value on a moist mineral matter-free basis of about 3000 units from north to south, considerably greater than the difference between the heat value of the highest-rank Illinois coal and that of high-rank low-volatile coal of the Pocahontas type.

It seems probable that there is some increase in the rank of Illinois coals with increase in depth, in agreement with Hilt's law.<sup>56</sup> However, this law does not seem to hold true for the coal beds in the middle 400 feet of the Pennsylvanian system. It does seem to be true, however, for the beds in the upper part of the McLeansboro and those in the Carbondale and lower groups.

UPPER McLEANSBORO COAL  
BEDS

## TROWBRIDGE AND FRIENDSVILLE

In general the coals of the upper part of the McLeansboro group are somewhat dif-

<sup>56</sup>Hilt, Carl, Ann. Assoc. d'ingenieur de Liege, p. 287, 1873. In most large coal basins the volatile content of the coal decreases and the fixed carbon content increases with depth.

ferent from the coals more commonly mined in the middle part of the Pennsylvanian section. The higher McLeansboro coals seem to be duller in appearance, partly because of the smaller quantity of vitrain. As they have been observed in only a few places, generalizations may not have wide applicability. The rank of these coals is about like that of the coal in the northern part of the state; the deeper coals apparently show several hundred more B.t.u.<sup>57</sup> Both the Trowbridge and Friendsville coals seem to be somewhat benched and, like most benched coals in this field, contain beds of bony or shaly coal and other impurities. Neither bed produces high-quality coal.

LOWER McLEANSBORO COAL  
BEDS

## DANVILLE (NO. 7)

The Danville (No. 7) coal is fairly well benched, with thin partings of fusain and mineral matter. The bed is apparently continuous over fairly large areas in the northern half and the eastern side of the coal field, but there seem to be large areas in which it is thin.

The No. 7 coal bed is somewhat unique with respect to the character of the overlying strata, which are commonly uniform thick gray shale or "soapstone" beds with no black shale or limestone.

## CARBONDALE COAL BEDS

## HERRIN (NO. 6)

The Herrin (No. 6) coal, like No. 7, is a benched bed. The benches are marked off by clay, bone, pyrite, and fusain partings.

<sup>57</sup>Cady, G. H., Analyses of Illinois coals: Illinois Geol. Survey Supplement to Bull. 62.

Also note, pp. 68 and 69, Shelby County, Trowbridge coal, rank index 114; Wabash County, Friendsville coal, rank index 122; and White County, No. 6 coal, rank index 133. The difference between the first two is 800 B.t.u. and between the second two 1100 B.t.u. The Trowbridge coal bed lies 875 feet above No. 6 and the Friendsville coal bed about 700 feet above No. 6. Some allowance must be made for the fact that there is a regional increase in rank southward.

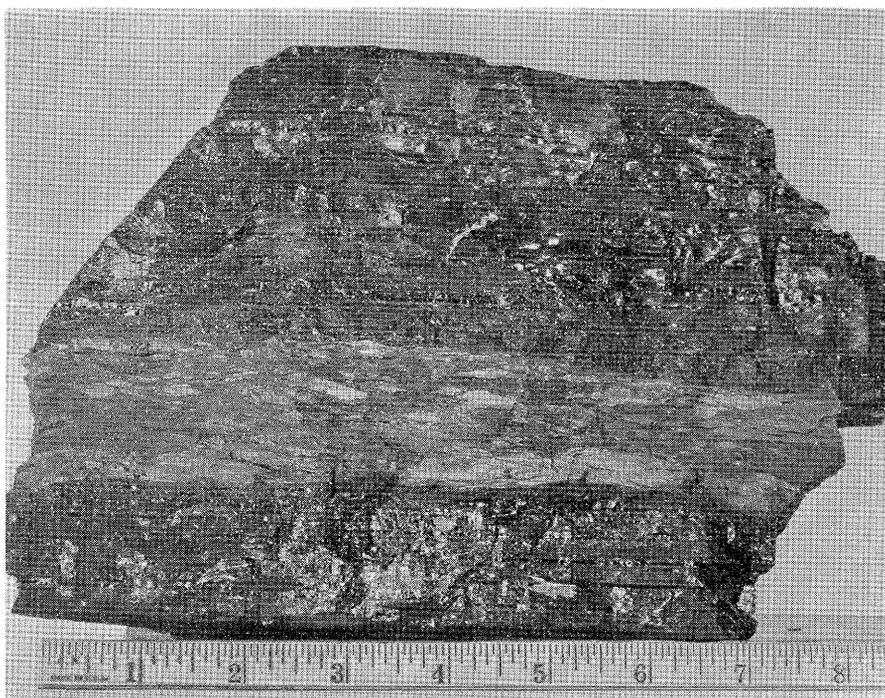


FIG. 6.—“Blue band,” a characteristic feature in the lower part of No. 6 coal.

A bench only a few inches thick may be persistent over several townships. The most persistent parting is the “blue band,” a layer of clay or clay shale commonly  $\frac{1}{2}$  to 3 inches thick<sup>58</sup> (fig. 6). This band provides a reliable means of identifying the bed. It usually lies between one and two feet above the bottom of the bed—somewhat higher where the bed is exceptionally thick. This clay-shale band is usually coextensive with the bed in southern, eastern, and western Illinois, but is less widespread in northern Illinois.

In addition to the blue band, the No. 6 coal bed in some regions, particularly in southwestern Illinois, contains other almost equally continuous partings of stony pyrite, clay, and fusain at fairly regular positions above and below the blue band.

“*White top.*”—In some parts of northern Illinois, an irregularly interbedded coal and light-colored shale, locally called “white top,”<sup>59</sup> lies on the No. 6 coal bed. Because

the “white top” greatly reduces the quantity of recoverable coal in certain parts of western Illinois, the only practicable means of recovery is by strip mining. A similar roof is found locally in other places in the state, particularly where gray shale intervenes between the coal bed and the more common black shale.

*Low-sulfur coal.*—The content of sulfur in the No. 6 coal bed in certain fairly large areas is unusually low—less than about 1.25 percent. Such a coal bed is generally overlain by gray shale. Low-sulfur coal in Franklin County<sup>60</sup> coincides with the area where gray shale, rather than black shale or “slate,” lies directly on the coal. This relationship is found in the vicinity of Troy in southern Madison County and in certain areas of the No. 5 coal bed in Saline County.

*Horsebacks.*—Clay veins, or horsebacks, are particularly characteristic in the No. 5 coal bed, are locally found in the No. 6 coal bed, particularly in western Illinois, and

<sup>58</sup>Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 20-21, 1922.

<sup>59</sup>Cady, G. H., Coal resources of District IV: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, p. 176, 1921.

<sup>60</sup>Cady, G. H., Distribution of sulphur in Illinois coals and its geological implications: Illinois Geol. Survey Rept. Inv. 55, pp. 23-39, 1935.

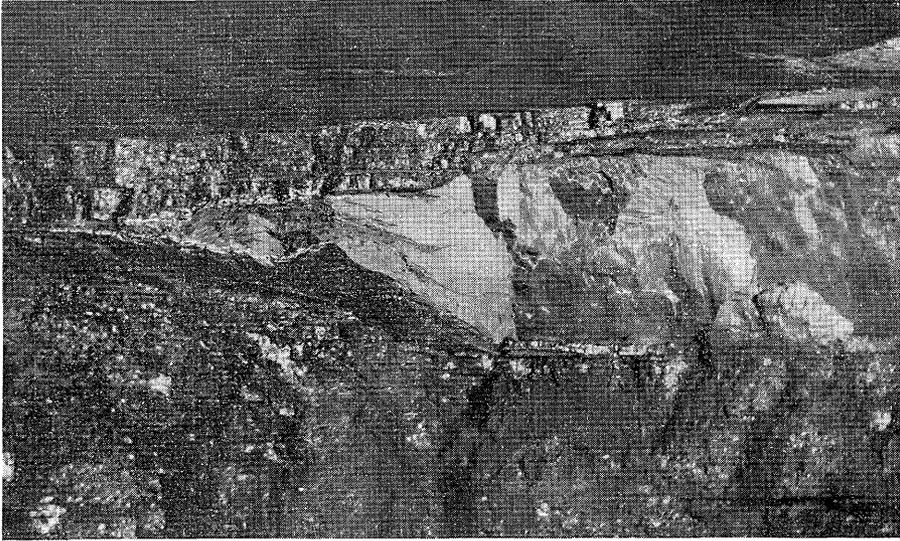


FIG. 7.—A typical "roll" in the Grape Creek (No. 6) coal of the Danville mining district (entry cuts through the "roll," only one side of which is shown.) (From Illinois Geol. Survey Coop. Min. Inv. Series Bull. 14, p. 43.)

locally also in the No. 7 bed.<sup>61</sup> They are clay- or silt-filled irregular openings commonly extending entirely across the bed with an inclination usually between vertical and 45 degrees. Such irregularities in the No. 6 coal bed do not interfere with mining as much as "white top." (See also discussion of No. 5 coal bed.)

"Rolls."—In the Danville district the Grape Creek coal bed, thought to be the equivalent of No. 6, is characterized by irregularities in the roof known as "rolls" (fig. 7). These are "lenticular masses of shale usually covered by a thin layer of coal [which] extend downward into the coal bed, and in many places they practically replace the bed."<sup>62</sup> "Rolls" are not an uncommon phenomenon in other coal beds and in other parts of the coal field, but seem to occur more frequently in the No. 6 bed. Ordinarily where such irregularities occur, roof conditions range from fair to bad.

#### HARRISBURG (No. 5)

The Harrisburg coal bed is characteristically unbenched and hence is without per-

sistent partings of any kind, with the known exception of an area in Logan County. There are no horizontal streaks and partings that can be traced far, but there are bedded impurities at various levels, mainly lenses and occasional pyrite nodules and facings.

In western and central Illinois (Peoria, Fulton, Tazewell, Logan, Macon, and Sangamon counties and as far north as Bloomington) this coal bed is further characterized by rather common clay veins or horsebacks.<sup>63</sup> These resemble the horsebacks in No. 6 bed, but are rarely as much as a foot wide. Some contain fragments of coal. Many do not extend more than a few inches into the roof shale and also appear to have a different lithology from that of the underclay.

In some parts of southern Illinois dikes of basic igneous rock have crossed the No. 5 coal bed, coking the coal for a distance of 8 to 10 feet or more, rendering it unmarketable<sup>64</sup> It seems probable that these dikes may reach the No. 6 bed. One dike in Saline County is reported to have a width of 300

<sup>61</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, fig. 22, p. 85, 1915.

<sup>62</sup>Kay, F. H., and White, K. D., Coal resources of District VIII (Danville): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 14, p. 42, 1915.

<sup>63</sup>Savage, T. E., The geology and mineral resources of the Springfield quadrangle: Illinois Geol. Survey Bull. 20, pp. 115-119, 1915.

<sup>64</sup>Cady, G. H., Coal resources of District V (Saline and Gallatin counties): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 19, pp. 56-61, 1919.

feet, but the common width is not more than about 30 feet. These dikes are sufficiently numerous (at least 6) to cause considerable loss in mine development, and probably all have not yet been found. Recently two dikes were discovered in a strip mine in No. 5 coal bed near Absher in eastern Williamson County.

#### SUMMUM (No. 4)

The limited extent of the Summum coal bed affects its value. This bed, like Rock Island (No. 1), is lenticular but much more limited in distribution than No. 1. The localities where it has been worked are given on page 31. The probable equivalent of No. 4 coal, the Indiana IV-A coal bed, is not known to be of minable thickness in eastern Illinois.

#### INDIANA IV

The Indiana IV coal bed is known to continue at least a short distance west of Indiana into parts of Edgar, Clark, Crawford, and Lawrence counties. In Indiana it is regarded as a coal of good quality commonly characterized by a relatively low sulfur content. It has not been mined in Illinois.

#### LaSALLE (No. 2)

The LaSalle or Colchester (No. 2) coal bed is remarkably uniform in large areas. It is unbenched, like No. 5, and more continuous. It contains no persistent bedded impurities, and is not crossed by clay veins or associated with "white top." "Rolls" in the roof and floor are uncommon. The roof varies in general from gray shale, known as "soapstone," to black sheety shale, known as "slate." The common method of mining has been by the "longwall" system, which allows for the recovery of a high percentage of the coal and for more or less uniform subsidence of the surface. This bed has been extensively mined in the Longwall district of northern Illinois, formerly by underground mining operations, but more recently by strip mining in LaSalle, Grundy, and Kankakee counties.

#### INDIANA III

Indiana III coal bed continues a short distance west of Indiana into Illinois but is known from drilling data only. No information concerning its quality in Illinois is available.

#### TRADEWATER AND CASEYVILLE GROUPS

##### DEKOVEN AND DAVIS

The Dekoven and Davis coal beds are closely associated. They are regarded as of noteworthy importance only in southeastern Illinois, in southeast Williamson, southern Saline, and to a lesser extent in Gallatin and White counties. The interval between the Dekoven and Davis beds varies<sup>65</sup> between 15 and 40 feet. In Jackson County two apparently corresponding beds are separated by one to three feet of strata.

The characteristic of the two beds that affects their minability is the irregularity in thickness of the upper coal bed, which is due to the fact that the overlying Palzo sandstone has cut down into or even through it. The Davis coal bed in places, particularly toward the west in Williamson County, appears to split into an upper bench about 1 foot thick, and the lower, minable portion is only 2½ to 3 feet thick. In general the Dekoven is about 3 feet thick and the Davis about 4 feet thick. Neither bed is conspicuously benched. About the same thicknesses characterize the coals in the vicinity of Campbell Hill, Jackson County. Here it is possible that one of the coal beds is older than the Davis, and may correspond to the Bald Hill bed.

##### MURPHYSBORO

The Murphysboro coal bed is restricted in its characteristic thick development to Jackson County. The original main field of development in the vicinity of Murphysboro has been mined out. The coal bed varies in thickness from about 1 to 7½

<sup>65</sup>Cady, G. H., Coal resources of District V (Saline and Gallatin counties): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 19, p. 40, pl. VI, 1919.

feet.<sup>66</sup> In the Murphysboro region the bed was generally unbenched, but toward the margins of this area on the east and north it tended to be divided into an upper and lower bench by shale partings which vary from a trace to as much as 35 feet in thickness. Mining ceased when it became impossible to work both benches. Drilling data indicate that to the west and northwest the bed divides into several thin beds and identification is difficult.

Pockets of thicker coal somewhat like that in the Murphysboro field have been mined near Oraville, Bryden, and Sato in the northern part of Jackson County, but the coal bed apparently is not of minable thickness eastward in the area underlain by No. 6 coal bed in northeastern Jackson County. There appear to be pockets of this coal 4 to 6 feet thick in the vicinity of Carbondale.<sup>67</sup> In general, in the Murphysboro area, this coal was reputed to be of excellent character, with an average sulfur content of about 1.25 percent, which made it suitable for coking. In the outlying areas, however, the coal is considerably higher in sulfur, particularly in the Carbondale region.<sup>68</sup> The exact equivalent of this coal bed is not definitely known outside of Jackson County and the western part of Williamson County.

#### ROCK ISLAND (No. 1)

The Rock Island coal bed known definitely only in western Illinois is typically developed in the now largely abandoned Rock Island and Mercer counties mining district. The outstanding characteristic of the bed is its lenticular occurrence in narrow channel-shaped areas. The coal bed, according to Culver,<sup>69</sup> "ranges from three inches to six feet in thickness and is rarely

uniform within a single mine. There is also considerable variation in character. In some places it shows no partings; in others two or more bands of pyrite or shale separate the bed into several benches. As a general rule the top coal is harder and commonly brighter than the lower. Where three benches are developed, the middle is usually the dullest and the bottom bench commonly contains the most pyrite in balls and lenses. The roof is dark shale, locally sheeted and slaty; commonly there is a cap-rock of dark argillaceous limestone." The coal bed thins very abruptly at the borders of the lenticular areas, and the limestone caprock usually terminates slightly beyond the margin of the coal basins.

#### MISCELLANEOUS COAL BEDS

So little is known about the characteristics of the miscellaneous coal beds of the Tradewater and Caseyville groups that only general statements are justifiable. The so-called Bald Hill coal bed and the bed beneath the Curlew limestone (Murphysboro?) both have a thin layer of clay about an inch thick near the middle of the bed. This is the chief basis of identification in the Campbell Hill area. The clay parting has not been observed at enough widely spaced localities to know whether it is characteristic over a considerable area. The coal beds in the lower part of the Tradewater group—Willis, Delwood, Reynoldsburg, and that near Neilson in southern Williamson County, as well as the coal at New Burnside—are commonly overlain by massive sandstone, the lower part of which is irregular and in many places cuts down into and even through the coal bed. The upper part of the Reynoldsburg coal bed near Ozark in Johnson County becomes somewhat canneloid and is accompanied by a black organic shale with some properties of an oil shale.<sup>70</sup>

<sup>66</sup>Cady, G. H., Coal resources of District II (Jackson County): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 16, p. 20, 1917.

<sup>67</sup>*Ibid.*, fig. 6, p. 38.

<sup>68</sup>Cady, G. H., Analyses of Illinois coal: Illinois Geol. Survey Supplement to Bull. 62, p. 63, 1948.

<sup>69</sup>Coal resources of District III (western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 103-104, 1925.

<sup>70</sup>Barrett, N. O., Notes on Illinois bituminous shales including results of their experimental distillation: *In* Illinois Geol. Survey Bull. 38, pp. 453-459, 1922.

## STRUCTURE OF THE ILLINOIS COAL FIELD

## ILLINOIS BASIN AND BOUNDING STRUCTURES

The Illinois coal field has long been known as a spoon-shaped basin. The deeper part, toward the southern and narrow end of the spoon (fig. 8), known as the Illinois Basin, lies between strongly developed structural features: the LaSalle anticline on the east and the Du Quoin anticline on the west. The LaSalle anticline crosses the east side of the field from north-northwest to south-southeast, from LaSalle to Lawrence County. The much shorter and weaker monoclinical fold of the Du Quoin anticline lies near the central axis of the field and extends from Perry County to northern Marion County. A third important structural feature bounding the Illinois Basin on the southeast is the so-called Shawneetown-Rough Creek fault zone. It is partly anticlinal, and extends westward from Kentucky across the Ohio River about 20 miles into Illinois, a few miles south of Shawneetown. The faults have been responsible in part for a line of conspicuous hills, known as Gold Hill, Wildcat Hill, and Cave Hill, marking the north edge of the physiographic region called the Shawnee Hill<sup>71</sup> section.<sup>72</sup>

## EAGLE VALLEY SYNCLINE

South of the Shawneetown fault zone and bounded by it and by its extension as a strong fold on the west, and lying north of Hardin County, is the area known as "Eagle Valley." This is a well-defined synclinal structure with fairly continuous outward-facing "rim rock" escarpments arranged concentrically from the center of the basin, and an interior valley-like area. Workable coal beds of the Carbondale group crop out more or less continuously around the syn-

clinal basin. The eastern part is continuous with a similar structural feature in western Kentucky, known as the Moorman syncline.<sup>73</sup>

## CAMPBELL HILL-COTTAGE GROVE ANTICLINAL FAULT ZONE

A fourth fairly strong structural feature of the Illinois coal field is an irregular uplift which crosses the southern end of the field about 15 degrees north of west. On the west in northern Jackson County it is known as the Campbell Hill anticline.<sup>74</sup> On the east side of the state, in Saline and Gallatin counties, it has been called the Harrisburg fault<sup>75</sup> and is marked by faulting near Cottage Grove.<sup>76</sup> Where it crosses eastern Williamson and western Saline counties in Ts. 8 and 9 S., Rs. 3, 4, and 5 E., the structure is anticlinal, but there are a number of faults that produce a somewhat mosaic pattern.

## STRUCTURES IN THE ILLINOIS BASIN

Neither within the Illinois Basin nor on surrounding shelf-like areas are there uniform dips of the strata toward the center of the Basin. Within the Basin there are two prominent anticlinal belts that trend NNE-SSW, slightly transverse to the axis of the Basin. The western one is the Salem-Louden anticlinal belt, and the eastern one is the Clay City anticlinal belt. These have proved to be very important in determining the position of oil and gas fields. Numerous minor anticlines and domes in the Basin have produced oil and gas.

<sup>73</sup>Hutchinson, F. M., Geology and coal of the Central City, Madisonville, Calhoun, and Newberg quadrangles: Kentucky Geol. Survey Bull. 19, p. 4, 1912.

<sup>74</sup>Root, T. B., The oil and gas resources of the Ava-Campbell Hill area: Illinois Geol. Survey Rept. Inv. 16, 1928.

<sup>75</sup>Cady, G. H., Coal resources of District V (Saline and Gallatin counties): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 19, p. 31, 1919.

<sup>76</sup>DeWolf, F. W., Coal investigations in the Saline-Gallatin field, Illinois, and the adjoining areas: *In* Illinois Geol. Survey Bull. 8, p. 217, 1907.

<sup>71</sup>Not to be confused with Shawneetown Hills, a conspicuous line of hills shown on the map of Shawneetown quadrangle three to four miles north of Old Shawneetown.

<sup>72</sup>Leighton, M. M., Ekblaw, G. E., and Horberg, Leland, Physiographic divisions of Illinois: Illinois Geol. Survey Rept. Inv. 129, fig. 1, p. 18, 1948.

## STRUCTURAL FEATURES OF EASTERN ILLINOIS

East of the LaSalle anticlinal belt and roughly paralleling it in east-central Illinois is the less pronounced Oakland anticlinal belt. A fairly prominent synclinal trough extending roughly north and south 6 to 10 miles west of the Indiana state line is known as the Marshall-Sidell syncline.<sup>77</sup> The coal beds along the state line dip toward this axis for several miles and then rise toward the axis of the Oakland anticlinal belt. Between the Oakland anticlinal belt and the LaSalle anticlinal belt there is a second shallow syncline.

## SHELF AREA IN SOUTHWESTERN ILLINOIS

West of the Du Quoin anticline and the Illinois Basin the beds continue to rise, but more gently, toward the margin of the coal field in St. Clair and Madison counties. In some mines the westward rise is indistinguishable and local reversals in dip make structural features in which oil and gas have been found.<sup>78</sup>

## STRUCTURE OF WESTERN ILLINOIS

In Morgan, Scott, Greene, and Jersey counties and northward to Bureau County west of the Illinois River is the platform-like area of western Illinois. Local structural irregularities, though small, in many places obscure the eastward regional dip. Rarely has oil or gas been found in such irregularities in this area.<sup>79, 80</sup>

<sup>77</sup>Mylius, L. A., Oil and gas development and possibilities in east-central Illinois: Illinois Geol. Survey Bull. 54, pl. 1, p. 28, 1927.

<sup>78</sup>Shaw, E. W., The Carlyle oil field and surrounding territory: In Illinois Geol. Survey Bull. 20, 1915.

Kay, F. H., The Carlinville oil and gas field: In Illinois Geol. Survey Bull. 20, pp. 81-95, 1915.

Blatchley, R. S., Oil and gas in Bond, Macoupin, and Montgomery counties: Illinois Geol. Survey Bull. 28, 1914.

Lee, W., Oil and gas in Gillespie and Mt. Olive quadrangles: In Illinois Geol. Survey Bull. 31, pp. 70-107, 1915.

Lowenstam, H. A., and Du Bois, E. P., Marine pool, Madison County: A new type of oil reservoir in Illinois: Illinois Geol. Survey Rept. Inv. 114, 1946.

<sup>79</sup>Payne, J. N., Structure of Herrin (No. 6) coal bed in Macoupin County, eastern Greene and Jersey, southeastern Scott, and southern Morgan and Sangamon counties, Illinois, with discussion of oil and gas possibilities by W. H. Easton: Illinois Geol. Survey Circ. 88, pp. 27-46, Dec. 1942.

<sup>80</sup>Kay, F. H., Coal resources of District VII (Southwestern Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 33-40, 1915.

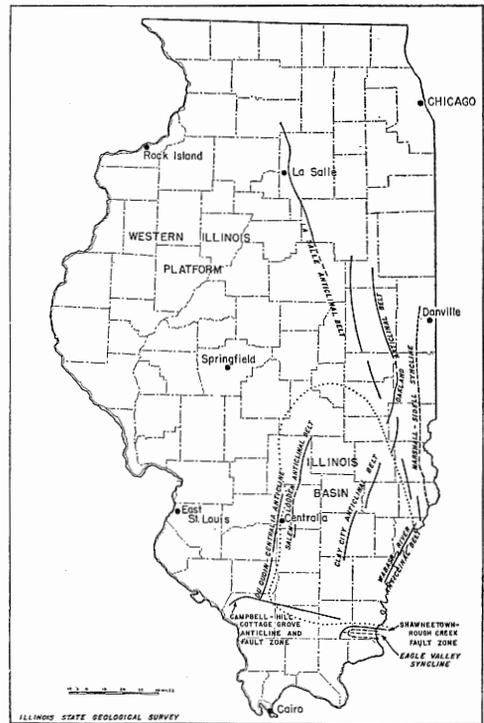


FIG. 8.—Outline of principal structural features discussed in this report.

## STRUCTURE OF NORTHERN ILLINOIS

North of the Illinois Basin the coal field narrows, sharply divided by the LaSalle anticline into east and west portions. From the western edge of the field, the strata dip gently eastward to the Illinois River valley below the great bend at Bureau and from there more rapidly to the west limb of the LaSalle anticline which lies about a mile east of LaSalle. An abrupt monoclinial rise of the strata brought the LaSalle (No. 2) coal bed, which is about 100 feet deep west of the anticline, to a level such that it has been eroded for several miles across the crest of the fold between LaSalle and Utica.<sup>81, 82</sup> From the axis of the anticline the strata dip regularly at a low angle eastward to the axis of a broad syncline in the

<sup>81</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, pp. 47-52, pl. I, 1915.

<sup>82</sup>Cady, G. H., Structure of the LaSalle anticline: In Illinois Geol. Survey Bull. 36, pp. 142-157, 1920.

vicinity of Seneca and then rise gently.<sup>83</sup> Both the anticline and the trough to the west become less pronounced through Livingston, McLean, and DeWitt counties. To the south there is a somewhat steeper slope down to the west into the Illinois Basin and a renewed accentuation of the anticline on the east.

### INFLUENCES OF STRUCTURAL FEATURES

Because of the basin-like shape of the Illinois coal field the outcrops of the important coal beds are roughly concentric. In the southwestern part of the state where the dip is fairly high, the line of outcrop indicates a fairly definite strike at right angles to the local dip. In the western part of the state, where there is very little dip, the outcrops of the coal beds are related more to the location of valleys than structure, and the outcrop lines are ramifying. Except along the LaSalle anticline in northern Illinois south to the Danville district the margins of the coal beds have been determined by preglacial and glacial erosion and are generally concealed beneath a thick covering of drift.

In the northern part of the coal field, the outcrops of the coal beds swing south around the southward-pitching axis of the LaSalle anticline. Beds eroded away on the north side of the Illinois River valley are still present on the south side. For example, No. 2 coal bed can be traced continuously along the south side of the valley, even above the axis of the anticline, but has been eroded on the north side. The outcrop lines of the No. 2, No. 5, No. 6, and No. 7 coal beds swing south around the axis of the anticline and cross it between LaSalle and Streator.

In central Illinois—in Piatt, Champaign, and Douglas counties—where the folding again becomes fairly strong, preglacial erosion denuded the Pennsylvanian strata along the crest of the LaSalle anticline. The margins of the coal beds are deeply concealed beneath glacial drift and the pattern of out-

crop is unknown. It appears probable that the margins of the coal beds swing southward successively around the southward-pitching axis of the anticline in Douglas, Coles, Cumberland, and Clark counties, and in Crawford and Lawrence counties, and to the south the more important coal-bearing section of the Pennsylvanian extends across the LaSalle anticline. Where the drift is not thick, it is possible that the rise of the strata along or near the axis of the anticline may bring workable beds fairly close to the surface, as for instance near Oakland in northeast Coles County.

The Du Quoin anticline<sup>84</sup> separates the Franklin-Williamson County district of southern Illinois from the southwestern Illinois mining district and shifts to the north the outcrop line of the No. 6 coal bed as it passes around the south end of the anticline. Between the north line of Jackson County and Carbondale, the Du Quoin anticline becomes almost indistinguishable from the regional northward dip. From a study of drill cores and logs it is apparent that some of the Carbondale and lower groups of the Pennsylvanian were not deposited across the anticline. Only 489 feet of Pennsylvanian strata was penetrated<sup>85</sup> in a drill hole near St. John, Perry County, as compared with probably three times that amount in Williamson County to the east. There has been no diamond drilling between St. John and Centralia along the anticline sufficiently deep to provide information about the coal beds below No. 6.

Coal beds No. 6 and No. 5 and the DeKoven and Davis beds extend beneath the Eagle Valley syncline and are exposed in more or less concentric belts around the rim on three sides and in isolated blocks in the central part of the syncline. At least one bed—the Willis—has been traced for several miles on the south side of Eagle Valley south of the outcrop line of the Davis bed.<sup>86</sup>

<sup>84</sup>Fisher, D. J., Structure of the Herrin (No. 6) coal seam near Du Quoin: Illinois Geol. Survey Rept. Inv. 5, 1925.

<sup>85</sup>Shaw, E. W., and Savage, T. E., Description of the Murphysboro and Herrin quadrangles: U. S. Geol. Survey Geol. Atlas Folio 185, p. 4, 1912.

<sup>86</sup>Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area: Illinois Geol. Survey Bull. 47, geologic map, 1925.

<sup>83</sup>Willman, H. B., and Payne, J. N., Geology and mineral resources of the Ottawa, Marseilles, and Streator quadrangles: Illinois Geol. Survey Bull. 66, pp. 181-188, 1942.

The Campbell Hill-Cottage Grove belt of folding and faulting swings the outcrop line of the coals of the Carbondale and lower groups to the east around the eastward-pitching Campbell Hill anticline. The eastward indentation in the line of outcrop of the No. 6 coal bed west of Dowell, northeast Jackson County,<sup>87</sup> is the result of the uplift of the bed along the eastward extension of the Campbell Hill anticline.

The zone eastward from Dowell across Jackson, Franklin, and Williamson counties is marked in places by faults and in other places by both faults and anticlinal structures. Some faults are parallel to the structure and others cross it from northwest to southeast. Discontinuous and irregular faulting continues eastward to near Cottage Grove, and makes for unusually hazardous mining conditions unfavorable to high recovery. Several mines in Williamson and Saline counties are working in or adjacent to this disturbed belt.

Aside from the irregularities caused by the four structures described, the pattern of outcrops and the structure of the coal beds are set by the general basin form of the strata of the Illinois coal field. Thus the youngest coal beds in the coal field tend to

occur concentrically near the margin of the Illinois Basin. As they cannot be continuously traced, it is uncertain how many such beds are present.

In the Illinois Basin the Herrin (No. 6) coal bed lies about 500 feet below sea level, that is in general at a depth exceeding 1000 feet. The base of the Carbondale is at least 250 feet deeper, and the coal beds such as the Rock Island, Murphysboro, and Bald Hill, if present, are probably another 100 to 150 feet lower. Exploration with the diamond drill to these depths, even in the mining districts, is rarely undertaken and it has never been carried on in the deeper parts of the Basin. The main reason is undoubtedly the availability of workable coal at shallower depths. A purpose for exploring to these greater depths would be to find coal of higher rank, lower sulfur and ash content, and/or better coking quality, but there is little evidence that the search would be well rewarded.

The coal in Eagle Valley has been sufficiently well mapped<sup>88</sup> on the basis of outcrops and a few diamond drill holes so that further exploration would be mainly to determine the character of the coal, the character of the roof and floor of the coal beds, and in exploration of possible faulting.

<sup>87</sup>Cady, G. H., et al., Structure of the Herrin (No. 6) coal bed in central and southern Jefferson, southeastern Washington, Franklin, Williamson, Jackson, and eastern Perry counties, Illinois: Illinois Geol. Survey Circ. 24, structure map, March 14, 1938.

<sup>88</sup>Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area: Illinois Geol. Survey Bull. 47, geologic map, 1925.

## STRIPPABLE COAL RESERVES

## CRITERIA FOR STRIPPABLE COAL

There are a number of conditions that determine whether or not a body of coal can be economically mined by stripping. Stripping in Illinois is generally restricted to coal beds that approach the surface in belts around the boundary of the coal field. The following are particularly important geologic considerations: 1) thickness of the coal bed, 2) quantity of recoverable coal, 3) thickness of overburden, 4) character of overburden, and 5) quality of the coal, particularly the ash content.

*Minimum thickness of coal bed.*—The minimum thickness of coal stripped extensively in Illinois is about 22 inches.<sup>89</sup> In LaSalle County No. 2 coal of this thickness was mined under very favorable conditions with respect to both truck and railroad haulage. The overburden was about 1 foot for each inch of coal, with a maximum of about 25 feet. Small mines depending on trucking, particularly local trucking, have stripped coal with an average thickness of about 18 inches, as in Richland County, with about the same ratio of thickness of coal to overburden as in LaSalle County.

*Quantity of recoverable coal.*—The extent of coal deposit required to support a stripping operation depends on a variety of factors, determined by the capital investment in the equipment necessary to obtain and prepare the coal, and the cost of the coal. A recently opened strip mine in Illinois is reported to have at least \$4,000,000 invested in equipment, with an option on 22,000,000 tons of coal on a royalty basis. Capital investment in some instances includes the purchase of land, which in this case would have amounted to about 3½ square miles or 2200 acres, and cost about \$700,000.

The following are typical examples of acreage of operation of strip mines in dif-

ferent parts of the coal field.<sup>90</sup> A mine operated in Knox County with an area underlain by coal amounting to 1553 acres. A strip mine in Saline County holds 2314 acres of land underlain by strippable coal, and one in Perry County 5740 acres. In all these mines the capital investment, excluding the value of the coal, is probably about \$4,000,000; they are all large operations. A fairly representative small mine in Saline and Williamson counties, now abandoned, held 795 acres, and a similar mine in Schuyler County, 630 acres. One of the small mines in Perry County that dealt entirely with truck trade held only 38 acres of strip-pable coal. This mine, of course, used small stripping equipment and a rather primitive preparation plant.

In general, about 10,000,000 tons of coal (for example, five square miles underlain by coal two feet thick) is necessary for an operation that requires an investment of \$2,000,000 for stripping and preparation equipment. A company in LaSalle County strip-mining 22 to 24 inches of No. 2 coal reports owning only 426 acres of land, but relatively little equipment was needed and capital investment was comparatively low. The quantity of coal regarded as essential for strip mine operations varies considerably; and much depends upon the prospective daily production and the equipment necessary to obtain that production, and particularly the extent to which the cost of equipment has been amortized in previous use.

*Thickness of overburden.*—There does not appear to be a fixed ratio of thickness of overburden to thickness of coal bed if the coal bed is about 30 inches or more thick. Some of the thickest overburden moved in the state was above a 30-inch coal in Will County. Probably the thickest overburden to be moved at present is in Vermilion County (Fairview Collieries

<sup>89</sup>Willman, H. B., and Payne, J. N., Geology and mineral resources of the Marseilles, Ottawa, and Streator quadrangles: Illinois Geol. Survey Bull. 66, p. 255, 1942.

<sup>90</sup>Bristow, J. W., Testimony before Illinois Strip Mine Investigation Commission, July 16, 1942 (copy in Coal Division file).

Corporation) where there is up to 90 feet or more over coal that averages about 5 feet thick. For about 20 years, 60 feet has been regarded as the maximum thickness of overburden that could be handled by a single shovel. With the use of draglines and combinations of shovel and draglines, there is a tendency for the average overburden limit to go as high as 75 feet. Such a limit would probably be excessive at present for coal beds less than 24 inches thick.

*Character of overburden.*—The character of the overburden is an important factor in determining the thickness that can be economically removed. Massive sandstone or a heavy layer of limestone, like the caprock of the No. 6 coal bed, may decrease the speed and hence increase the cost of stripping thus making the operation unprofitable.

*Quality of the coal.*—Undoubtedly the progress of strip mining in Illinois has been determined to considerable extent by the variations in the quality of the coal, at least in the early days. More effective coal-cleaning processes have made it possible to obtain about the same grade of coal from two beds of quite different ash content, for example No. 5 and No. 6 coal beds in southern and western Illinois. It seems probable that upper McLeansboro coal beds with a high ash content, such as the Friendsville and Trowbridge, could probably be cleaned to an acceptably low ash content.

### STRIPPING CONDITIONS

The general geologic features of the Illinois coal field have been described, and the general locations of large tracts of strippable coal are fairly well known, particularly for the relatively continuous No. 2, No. 5, and No. 6 coals. The discontinuous surface exposures due to glacial and preglacial erosion and glacial drift cover make delineation of strip areas of lenticular beds impossible.

### MCLEANSBORO COAL BEDS

There are a number of localities, mainly in the Illinois Basin, where coal beds above the Shoal Creek limestone in the McLeansboro formation lie close to the surface. The thickest and best known of these are the

Trowbridge<sup>91</sup> (26''-30'') in southwestern Cumberland and eastern Shelby counties, and the Friendsville<sup>92</sup> (36''-40'') near Mt. Carmel in Wabash County. They are the only ones that have been included in the estimate of coal reserves.

In addition to the two coal beds named above, there are the Opdyke<sup>93</sup> in eastern Jefferson County, which has been explored by drilling by one of the large strip mine companies, the Calhoun<sup>94</sup> in eastern Richland and western Lawrence counties where for several years there were several local stripping operations, the Fancher<sup>95</sup> in southern Shelby County near Fancher where a thin bed has been mined on a small scale both underground and by stripping, the Shelbyville,<sup>96</sup> which has been mined underground at a number of places near Shelbyville, and others.

Except for the Friendsville and Trowbridge coal beds, none of the upper McLeansboro beds has been mapped; the extent of the beds and strippable areas is not known. In general the quality of these coal beds is inferior to that of the coal beds of the Carbondale. Because the beds are thin, there has been little interest in carrying on extensive exploration. Although the Friendsville coal bed is one of the thickest coal beds of the upper McLeansboro, its value is lessened by the large amount of drilling for oil that breaks up possible strippable areas. Also, land values have risen because of the oil possibilities. However, it seems quite possible that large-scale stripping operations will be carried on in one or more of these coal beds at some future time.

This list of thin coal beds near the surface in or near the Illinois Basin (fig. 8) does not cover all the thin coal beds near the surface in the Illinois coal field, as a study of the county reports of the Geo-

<sup>91</sup>Cady, G. H., Summary list of areas in western, southern, and central Illinois recommended for special investigations as possibly suitable for strip mining: Illinois Geol. Survey Circ. 19, plate XIV, 1937.

<sup>92</sup>Rolley, Mary B., and Cady, G. H., Description of the geology of Pennsylvanian strata and coal resources of Wabash County: Manuscript, 1951.

<sup>93</sup>Engleman, Henry, Jefferson County: Geol. Survey of Illinois, vol. III, pp. 232-234, 1868.

<sup>94</sup>Worthen, A. H., Richland and Lawrence counties: Geol. Survey of Illinois, vol. IV, pp. 46, 49, 1875.

<sup>95</sup>Broadhead, G. C., Shelby County: Geol. Survey of Illinois, vol. VI, p. 168, 1875.

<sup>96</sup>*Ibid.*, pp. 169, 171.

logical Survey of Illinois would reveal. In general, the beds are 12 to 18 inches thick; those 20 inches or more in thickness are uncommon. Definite information about the extent and distribution of these thin beds is meager.

*No. 7 coal bed.*—The No. 7 coal bed, below the Shoal Creek limestone, does not have the wide continuity of No. 6 coal, though it is not characteristically lenticular. It probably is present in workable thickness in a smaller total area than workable No. 5 coal. The Danville district is the most important area in which No. 7 coal is strip-pable. Large quantities of thick coal have been removed along the valleys of the Vermilion River system and also along the upland east of the valley.<sup>97</sup> The only margin that is significant in Vermilion County so far as No. 7 coal is concerned is that on the east, and this boundary is followed with difficulty south of Vermilion County.

No. 7 coal of workable thickness but of poor quality lies west of Sparland, Marshall County. It crops out along the base of the west bluff of the Illinois River valley, and is about 4 to 4½ feet thick. As the strata rise gently westward, the coal is found in irregular patches in the higher portions of the hills in northern Peoria County and adjacent parts of Stark and Marshall counties, and as far west as Kewanee. The bed becomes thinner to the west with thicknesses ranging from about 24 to 36 inches. Drilling information about this coal bed is usually incidental to information in regard to No. 6 coal bed. Because of its ramifying margin and its scattered distribution, exploration of this bed is generally unsatisfactory in this area.

#### CARBONDALE COAL BEDS

*Herrin (No. 6) coal bed.*—This important coal bed is marked by a regular margin along which the coal is continuously of workable thickness except for a fairly wide belt extending from a point a short distance south of Springfield to about the

north line of Woodford County, east of the Illinois River valley, but nearly to the north boundary of the coal field, west of the Illinois River valley.

The boundary of No. 6 coal bed has been almost entirely explored in western Saline, Williamson, Jackson, Perry, Randolph, and St. Clair counties. There has been some drilling along the margin of the bed near Cottage Grove in Gallatin County, but very little to the east. From French Village to Caseyville the margin of the No. 6 coal bed is in the Mississippi River bluff. In the vicinity of Bethalto the coal has been explored and for a short time was mined by stripping. From Bethalto northward across Madison and Macoupin counties and into southern Sangamon County the margin of the No. 6 coal is difficult to delineate because of the deep cover of glacial drift, the relatively few outcrops, and the small amount of drilling. Further exploration in this general region might show some strip-pable coal but it would probably be found only in narrow valleys.

In western Illinois No. 6 coal bed is found in Peoria and northeastern Fulton counties and in considerable areas of Knox, Stark, Henry, and Bureau counties. The coal is a high-ash coal, but washes to acceptable purity. The bed is nearly horizontal and the margin is ramifying. Some large tracts seem to be isolated by erosion from the main body of the coal, which extends toward, but apparently not across, the Illinois River valley. Probably the margin of this bed is not completely explored although exploration has been carried on for more than 20 years. The remaining tracts suitable for stripping are probably few and small. "White top" and horsebacks added to the bedded impurities may make certain sections unprofitable to mine. Small areas of strip-pable Grape Creek (No. 6) coal bed remain in Vermilion County.

*Harrisburg (No. 5) coal bed.*—The Harrisburg (No. 5) coal which is the same bed as the Springfield (No. 5) coal bed, is not continuous. It underlies a fairly large area east of the Du Quoin anticline in Jefferson, Franklin, Williamson, Saline, Hamilton, White, and Gallatin counties and is pres-

<sup>97</sup>Campbell, M. R., and Leverett, Frank, Description of the Danville quadrangle: U. S. Geol. Survey Geol. Atlas Folio 67, 1900.

Kay, F. H., and White, K. D., Coal resources of District VIII (Danville): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 14, 1915.

ent in the Eagle Valley region. West of the Du Quoin anticline it is found south of the extension of the Campbell Hill anticline into northeastern Jackson County. It seems to be absent in the marginal belt south of Pinckneyville and to appear again in western Perry County in the vicinity of Percy and Willisville, continuing into Randolph County to a point a few miles west of Sparta. It appears again in a small area along the Mississippi bluff line west of Belleville. Northward from French Village the No. 5 coal bed seems to be absent in the marginal belt, but it appears a few miles north of the Sangamon County line, deeply hidden by glacial drift. It continues north to Douglas in Knox County on the west side of the Illinois River.

The No. 5 coal occurs in an isolated tract near Rushville, Schuyler County, where a fairly large strip mine was recently abandoned. The complete outcrop of this bed is not known to have been thoroughly explored, particularly west of Rushville. The No. 5 bed underlies a considerable part of eastern Fulton and Peoria counties, and the margin has been closely drilled except in an area between Fiatt and Fairview where the glacial drift seems to be thick.

The No. 5 coal bed extends northward into southern Knox County in the vicinity of Rapatee and Yates City; farther north it tends to become thin and unimportant. It is not of workable thickness in the northern part of the Illinois coal field. There seems to be little possibility of the discovery of any large additional quantity of the No. 5 coal bed in western Illinois.

*LaSalle (No. 2) coal bed.*—The No. 2 bed is of workable thickness along its outcrop throughout western and northern Illinois. The margin of the coal bed can be traced from Alton northward through Jersey, Greene, Scott, Morgan, and Cass counties, and from Calhoun to Henry County in western Illinois. The margin of the bed is lost beneath thick glacial drift in much of Bureau County although the large number of drill holes makes it possible to indicate its approximate position. East of the LaSalle anticline, the margin of the No. 2 bed has been traced along the north bluff

of the Illinois River valley east of Utica, but it is lost to the north beneath the thick drift across the east half of LaSalle County and western Grundy County. From Morris to Coal City and thence to Essex the margin of the coal bed has been fairly accurately located, and much of the marginal coal has been removed by stripping. Between Essex and northern Vermilion County the margin of the No. 2 coal bed is under a deep cover of drift, and its exact position is unknown. In general the coal bed here is under too thick a cover to be strippable.

No. 2 coal is not of workable thickness along its outcrops in southern Illinois.

#### TRADEWATER AND CASEYVILLE COAL BEDS

*Davis and Dekoven beds.*—The outcrop of the Davis and Dekoven coal beds has been mapped continuously around the north, west, and south sides of the Eagle Valley syncline. There has been no special exploration in this area for strippable coal because in general the dip of these beds is too steep for favorable strip-mining conditions, except possibly at the west end of the Valley. The overlying fairly massive Palzo sandstone will probably be a deterrent to extensive stripping in this region.

North of Eagle Valley the Davis and Dekoven coal beds, or their horizons, have been traced across southern Illinois from approximately the west line of Gallatin County, near which they are cut off by the Shawneetown fault,<sup>98</sup> to a short distance west of the east line of Williamson County, near Palzo, about 5 miles northwest of Stonefort. The outcrops of these coal beds have been well explored in the vicinity of Stonefort and Palzo up to a point about 5 miles east of Stonefort. As the Palzo sandstone is thicker to the east, some fairly large hills of Palzo sandstone rise abruptly above the Dekoven coal bed.

From the vicinity of Campbell Hill northward it has not been possible to trace

<sup>98</sup>Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area: Illinois Geol. Survey Bull. 47, pl. I, 1925.

any of the coal beds of workable thickness below the No. 5 coal bed. There are occasional outcrops of beds reported to be 28 inches thick or more in Randolph County, but outcrops have not been traced and the exact stratigraphic position of the beds is unknown. It seems probable that in Randolph County and to the northwest in St. Clair County the lower Pennsylvanian beds were deposited in a smaller area than those of the upper Carbondale and McLeansboro group; hence the McLeansboro beds, or at least the upper Carbondale beds, overlap beyond the edges of the lower part of the Carbondale group. The beds representing the Davis and Dekoven in southern Illinois therefore do not extend beyond the outcrop of the younger coals of McLeansboro age between Campbell Hill and the Illinois River north of Greene County. In western Illinois the equivalents of these beds are not of workable thickness.

*Bald Hill coal bed.*—The Bald Hill coal bed crops out around the base of Stonefort hill just north of the village of Stonefort and has been traced for only a short distance. It appears to be very variable in thickness, ranging from 24 to 30 inches. At the Illinois Central Railroad cut about one mile northeast of Stonefort it does not seem to be present. At other places to the east no coal has been observed in the strata at its general horizon. The Bald Hill coal bed has not been identified east of the Harrisburg quadrangle.

Across most of Williamson and Jackson counties the Bald Hill coal bed has not been traced. It may be the coal bed that appears in outcrop, however, near Campbell Hill, where there seems to be a tract of uncertain size underlain by this coal bed. The coal crops out at approximately the same elevation in sections 4, 7, 8, and 9, T. 4 W., R. 7 S. It is mined at a brick plant in section 9. This area has not been explored beyond the immediate vicinity of Campbell Hill. The bed appears to be about 30 inches thick. If this coal is the equivalent to the Bald Hill coal bed at Stonefort, the strata between the Davis and the Bald Hill are much less thick here than in Williamson and Saline counties.

*Murphysboro coal bed.*—The Murphysboro coal bed seems to be of workable thickness only in Jackson County. The outcrop line is followed with considerable uncertainty, and numerous gaps occur along the flank of the Ozark upland area west of Murphysboro to the Campbell Hill anticline north of Sato. The Murphysboro coal appears to be a series of thin beds separated by shale which locally combine to form one bed 4 to 6 feet thick. It is difficult to identify except where it is relatively thick and essentially a single bed. Furthermore, the bed is in places overlain by sandstone with an uneven lower surface that may dip into or through the coal, entirely eliminating it over some area. This adds to the difficulty in tracing the bed. There has been very little exploration along its outcrop as mapped in the Murphysboro<sup>99</sup> and Carbondale<sup>100</sup> quadrangles, and it is not likely that exploration would prove fruitful.

A coal bed which is probably the equivalent of the Murphysboro has been stripped in a small area about two miles south of Mitchellville along the newly built road to Eddyville. The outcrop has not been traced either to the east or west. The Curlew limestone lies 10 feet above the coal; neither is continuous. In all probability there is some strippable coal 24 to 30 inches thick along the outcrop. It is possible that this bed is represented to the west in southeastern Williamson County by the New Burnside coal bed. The bed crops out near Pond Creek between New Burnside and Stonefort and may underlie the Pond Creek flood plain between the creek and the New York Central Railroad.

*Rock Island coal bed.*—The lenticular occurrence of the Rock Island coal bed makes mapping of its outcrop in western Illinois exceedingly difficult, if not impossible, for much of the area where this horizon undoubtedly is present. Even occasional evidence of a coal bed 4 to 5 feet thick does not indicate continuity of the bed for any

<sup>99</sup>Shaw, E. W., and Savage, T. E., Description of the Murphysboro-Herrin quadrangles: U. S. Geol. Survey, Geol. Atlas Folio 185, 1903.

<sup>100</sup>Lamar, J. E., Geology and mineral resources of the Carbondale quadrangle: Illinois Geol. Survey Bull. 48, pl. I, 1925.

great distance. In general, exploratory drilling for strippable occurrences of this bed has not proved satisfactory. Discovery of areas of this coal bed suitable for stripping is highly fortuitous.

*Reynoldsburg coal bed.*—The uppermost coal bed in the Caseyville<sup>101</sup> group lies between the upper Caseyville quartz-pebble sandstone (Pounds sandstone) and the Grindstaff sandstone. It is known as the Reynoldsburg coal bed in Johnson County, a short distance south of Ozark. The coal bed crops out on the north side of a valley extending west of Reynoldsburg, beneath the Grindstaff sandstone, which makes a

<sup>101</sup>Weller, J. M., Geology and oil possibilities of extreme southern Illinois: Illinois Geol. Survey Rept. Inv. 71, p. 39, 1940.

line of hills to the north. The coal bed dips north and may crop out around the hills to the south at a higher altitude, where it might be strippable.

The same coal bed is present east of Reynoldsburg, but is apparently thinner. It has not been traced more than two miles,<sup>102</sup> although undoubtedly the same stratigraphic horizon is continuous across the southern part of the state. In most places the topography is not favorable for stripping. The stratigraphic position may be the same as that of the Lower Willis coal in the Equality-Shawneetown area.<sup>103</sup>

<sup>102</sup>Barrett, N. O., Notes on Illinois bituminous shales including results of their experimental distillation: in Illinois Geol. Survey Bull. 38, pp. 453-459, 1922.

<sup>103</sup>Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area: Illinois Geol. Survey Bull. 47, 1925.

## MAPS OF THE COAL RESERVES

Accompanying this report are maps (plates 1, 2, 3, 4) showing the resources represented by the No. 7, No. 6, No. 5, and No. 2 coal beds in Illinois. A fifth map (plate 5) shows the resources of miscellaneous nonoverlapping coal beds: Friendsville, Trowbridge, Indiana III, Dekoven, Campbell Hill, Assumption, Litchfield, Murphysboro, Rock Island (No. 1), and Makanda beds. The Jamestown, Wiley, Davis, Delwood, Willis, Reynoldsburg, and other coal beds are shown on maps representing parts of one or more of the unit areas (plates 6, 7, 8). The maps also indicate the mined-out areas, bed by bed, and the areas closely drilled for oil and gas.

This set of maps shows reserves in categories of probability, that is Class I-A, proved reserves; Class I-B, probable reserves; Class II-A, reserves strongly indicated; and Class II-B, reserves weakly indicated. The large maps also show the

Pennsylvanian boundary. Areas unclassified on the maps are areas in which the coal bed is thin or absent, or for which information concerning the bed is insufficient for classification. Thus it is possible that the actual reserve of coal is greater than indicated on the accompanying maps, but, on the other hand, the reserve of coal estimated in Classes II-A and II-B may prove to be exaggerated.

It is not possible on the scale of these maps to indicate detailed information about variations in thickness of the different beds. General information about the thickness of the coal beds is presented in brief form in the description of the thirty-three coal resources inventory areas (Part II). It is hoped that eventually the more detailed large-scale maps from which the summary maps were compiled will be made available, at least for selected areas.

PART II

COAL RESERVES BY AREA

GENERALIZED STRATIGRAPHIC SECTIONS

The stratigraphic sections that accompany discussion of each of the coal resources inventory areas (fig. 3) are generalized to show the relationships of coals and the more prominent limestone horizons. It should be understood that there may be considerable variation from this generalized section within any one area. These stratigraphic sections have been compiled from published sections, manuscripts, and records of drill holes in the files of the Illinois Geological Survey.

AREA 1<sup>1</sup>

*Quadrangles: Morris (59), Wilmington (58).*

A considerable part of Area 1 is underlain by the LaSalle (No. 2) coal bed (fig. 9), and a small part by both No. 2 and what is thought to be the Sumnum (No. 4) coal bed. No. 2 coal has been mined underground and by strip mining, but at present is mined only by stripping. Underground mining was by the longwall method, and recovery was probably 90 percent or more. Strip mining recovers about the same per-

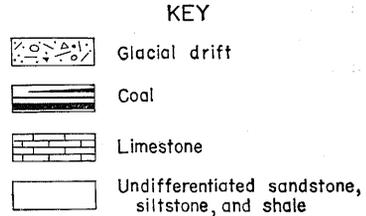
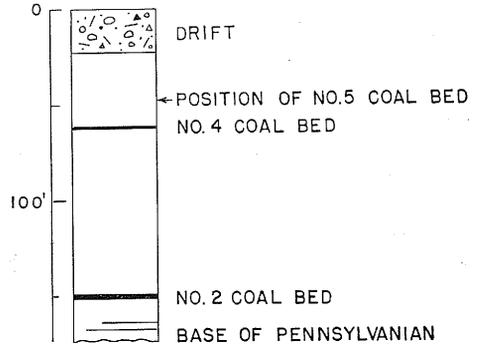


FIG. 9.—Generalized geologic column for Area 1.

centage if the loss in marginal areas is ignored.

A coal bed thought to be the Sumnum (No. 4) bed has been explored by drilling in a small area along Mazon River in sec. 12, T. 32 N., R. 7 E., west of Coal City. Except for data from these drill holes little is known about this coal bed. Culver states that the coal is reported here and there between Waupecan Creek and Coal City but

<sup>1</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, pp. 62-76, 1915.  
 Culver, H. E., Geology and mineral resources of the Morris quadrangle: in Illinois Geol. Survey Bull. 43, pp. 96-103, 1922.  
 Grim, R. E., and Bradley, W. F., A unique clay from Goose Lake, Illinois, area: Illinois Geol. Survey Rept. Inv. 53, p. 6, 1929.  
 Geological Survey of Illinois, vol. IV, pp. 190-225, 1870.

COAL RESOURCES: AREA 1  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sumnum No. 4 . . . . .	—	588	—	—	588
LaSalle No. 2 . . . . .	33,989	84,129	90,027	—	208,144
Total . . . . .	33,989	84,717	90,027	—	208,733

he does not give details. He cites a maximum thickness of 18 inches for this coal bed, which he states lies 75 feet above LaSalle (No. 2) coal bed.

### AREA 2<sup>2</sup>

*Quadrangles: Northern tier—unmapped (48, 49, 50, 51). Southern tier—Hennepin (63), LaSalle (62), Ottawa (61), Marseilles (60).*

Area 2 lies across the LaSalle anticline which crosses the east side of the LaSalle quadrangle. The west part of the LaSalle quadrangle and all of the Hennepin quadrangle lie west of the anticline and the northeast part of the LaSalle quadrangle and all of the Ottawa and Marseilles quadrangles lie east of the anticline.

The workable coal beds in Area 2 are LaSalle (No. 2), Herrin (No. 6), and Sparland (No. 7), locally known as the Third, Second, and First veins, respectively. West of the anticline all the coal beds, but prin-

cipally No. 2, have been worked by shaft mines. The No. 2 coal lies about 100 feet above sea level at the foot of the west limb of the anticline in the LaSalle quadrangle, and rises to an altitude just above 325 feet in the western part of the Hennepin quadrangle. No. 6 and No. 7 coals (fig. 10) are less widespread than No. 2 and somewhat thicker (4½ feet as compared with 3½ feet). The interval from No. 2 to No. 6 coal bed varies from 152 to 191 feet in the Hennepin quadrangle and from 150 to 205 feet in the LaSalle quadrangle.

The interval between the No. 6 and No. 7 coal beds in Area 2 ranges from 33 to 50 feet in Bureau County, from 24 to 60 feet in Putnam County, from 32 to 57 feet in Marshall County, and from 34 to 64 feet in LaSalle County. The No. 6 coal bed has an average thickness of 42 to 48 inches. It may occur locally near Marseilles but otherwise is not found east of the anticline in this Area.

Both the No. 6 and No. 7 coals have been worked in mines west of the anticline, but nowhere very successfully. Especially noteworthy are the mines formerly located at Cherry and the abandoned M and H Zinc Company mine at LaSalle. Experimental openings have been made into one or both of the upper beds but mining did not prove profitable. Most of the coal produced in Area 2 has come from the LaSalle (No. 2) bed.

<sup>2</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, 1915.

\_\_\_\_\_, Geology and mineral resources of the Hennepin and LaSalle quadrangles: Illinois Geol. Survey Bull. 37, 1919.

\_\_\_\_\_, Structure of the LaSalle anticline: in Illinois Geol. Survey Bull. 36, pp. 85-179, 1920.

Willman, H. B., and Payne, J. N., Geology and mineral resources of the Marseilles, Ottawa, and Streator quadrangles: Illinois Geol. Survey Bull. 66, 1942.

Geological Survey of Illinois: Bureau County, vol. V, pp. 167-184, 1873; DeKalb, Kane, and DuPage counties, vol. IV, pp. 11-125, 1870; Grundy County, vol. IV, pp. 190-206, 1870; Kendall County, vol. IV, pp. 136-148, 1870; LaSalle County, vol. III, pp. 257-287, 1868; Lee County, vol. V, pp. 124-139, 1873; Marshall and Putnam counties, vol. V, pp. 202-216, 1873.

COAL RESOURCES: AREA 2  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sparland No. 7 . . . . .	113,133	363,935	17,184	41,953	536,205
Herrin No. 6 . . . . .	137,591	317,279	9,194	68,684	532,748
LaSalle No. 2 . . . . .	717,118	313,550	117,732	77,760	1,226,160
Total . . . . .	967,842	994,765	144,109	188,397	2,295,113

AREA 3<sup>3</sup>

*Quadrangles: Northern tier—LeClair (44), Cordova (45), Prophetstown (46), Walnut (47). Southern tier—Orion (67), Geneseo (66), Annawan (65), Buda (64).*

Pennsylvanian strata underlie part or all of Area 3, but workable coal is probably not present in the Prophetstown and Walnut quadrangles. Colchester (No. 2) coal, Herrin (No. 6) coal, and small areas of Sparland (No. 7) coal beds are present within the Orion, Geneseo, Annawan, and Buda quadrangles (fig. 11). The Rock Island (No. 1) coal bed is present but is not continuously of workable thickness in the Orion, Geneseo, Cordova, and LeClair quadrangles (LeClair is the southwest quarter of the small-scale Cordova sheet).

Lenticular bodies of the Rock Island (No. 1) coal bed are present here and there in the western part of Area 3 in Henry and eastern Rock Island and north-eastern Mercer counties. There is still a little sporadic mining in the region, but at one time there were many small and a few fairly large operations, particularly in the vicinity of Coal Valley and along the foot of the bluff that faces the Rock River Valley.

As is true wherever the Rock Island coal bed is mined, its lenticular character and distribution make it impossible to estimate accurately the quantity of coal beyond the immediate vicinity of drill holes or mining operations. Lenticular bodies of the No. 1 coal bed are found as far east as Geneseo, but it is unknown whether similar lenticular bodies exist farther east in the area in which the No. 2 and younger coal beds are found.

<sup>3</sup>Cady, G. H., Summary list of areas in western, northern, and central Illinois recommended for special investigation as possibly suitable for strip mining: Illinois Geol. Survey Circ. 19, pls. I, X, and IX, 1937.

Culver, H. E., Coal resources of District III (western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 61-68, 1925.

Geological Survey of Illinois: Bureau County, vol. V, pp. 167-184, 1870; Henry County, vol. V, pp. 185-201, 1870.

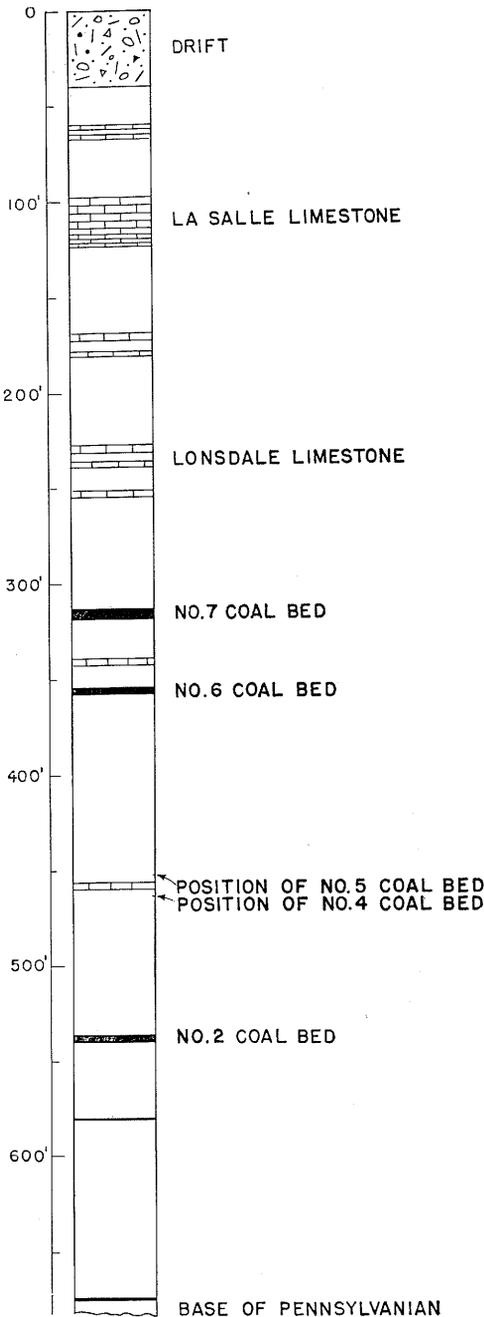


FIG. 10.—Generalized geologic column for Area 2.

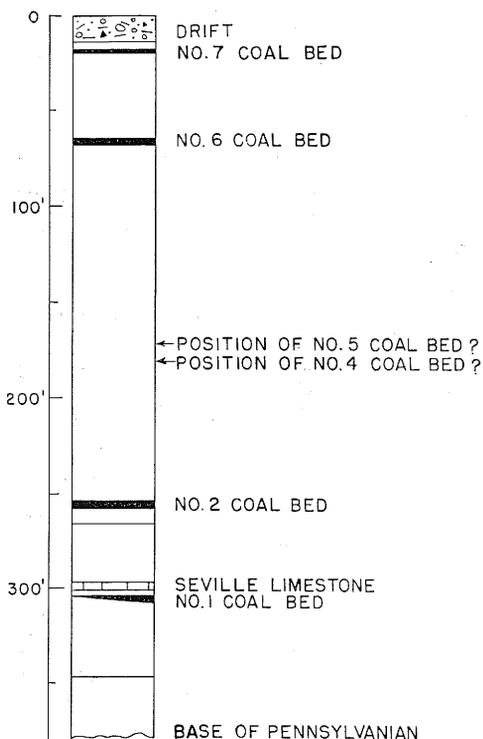


FIG. 11.—Generalized geologic column for Areas 3 and 4.

Even if drilling discovered the presence of a workable thickness of this coal, it would not prove the presence of the coal for more than a short distance from the drill hole. The exploration of this bed is expensive and generally disappointing, although some valuable bodies of coal have been found. The Colchester (LaSalle No. 2) coal bed has been worked out by stripping in

the vicinity of Atkinson, where it was 32 inches thick. Although No. 2 coal bed is probably present in much of Buda, Annawan, and Geneseo quadrangles east of Orion and south of the Chicago Rock Island and Pacific Railroad connecting Tiskilwa and Geneseo, the bed has been mined only near Atkinson and Cambridge, and has been explored by diamond drilling only near Sheffield. In most of the Area its presence is rated only II-B, or weakly inferred.

In Area 3, No. 5 coal bed is thin or absent. The horizon is exposed near Cambridge but no coal is present.

The Herrin (No. 6) coal bed underlies an area with a somewhat ramifying northern boundary that extends from a point near Kewanee to the vicinity of Sheffield. The outcrop is concealed beneath fairly thick glacial drift, for it is crossed by the southwest boundary of the Wisconsin drift sheet. The northern border of the bed follows a devious course from Kewanee to Sheffield, along which there has been considerable drilling and some strip mining, particularly near Sheffield. This coal bed dips gently to the southeast; little is known about it except for the border areas which have been explored. The coal bed is about 4 to 4½ feet thick and has a fairly high ash content. Areas away from the border must be classified as weakly indicated (II-B).

Locally around Kewanee where coal No. 6 has been mined, drill holes on the higher hills have occasionally penetrated the Sparland (No. 7) coal bed, with considerable variation in thickness (28 to 40 inches).

COAL RESOURCES: AREA 3  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sparland No. 7 . . . . .	—	3,636	—	25,685	29,320
Herrin No. 6 . . . . .	116,320	—	1,715	107,185	225,220
Colchester No. 2 . . . . .	36,846	—	—	948,106	984,952
Rock Island No. 1 . . . . .	51,658	3,721	61,649	—	117,027
Total . . . . .	204,824	7,356	63,364	1,080,975	1,356,519

COAL RESOURCES: AREA 4  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Rock Island No. 1 . . . . .	12,880	28,405	7,075	—	48,359

AREA 4<sup>4</sup>

Quadrangles: *Muscatine* (70), *Edgington* (69), *Milan* (68).

The only workable coal bed within Area 4 is the Rock Island (No. 1) coal (fig. 11), which has been largely worked out. This bed occurs characteristically in detached more or less elongated lenses in the vicinity of Coal Valley (Orion quadrangle) and near Sherard, Cable, and Matherville. There are a few areas where the No. 1 coal bed is known from outcrop or from small mines, around some of which proved and probable (I-A, I-B) coal areas are shown, with a fringe of "strongly indicated" coal (II-A). In most cases, however, the amount of proved coal cannot be extended beyond the margins of the mined-out areas.

<sup>4</sup>Savage, T. E., and Udden, J. A., *Geology and mineral resources of the Milan and Edgington quadrangles: In Illinois Geol. Survey Bull.* 38, pp. 115-208, 1921.  
Geological Survey of Illinois: Rock Island County, vol. V, pp. 217-234, 1873; Mercer County, vol. IV, pp. 301-312, 1870.

AREA 5<sup>5</sup>

Quadrangles: *Northern tier—Wapello* (71), *Keithsburg* (72), *Alexis* (73). *Southern tier — Burlington* (100), *Oquawka* (99), *Monmouth* (98).

Of the six quadrangles or parts of quadrangles included in Area 5, important coal reserves are found only in Alexis and Monmouth quadrangles. The area is discontinuously underlain by the Rock Island (No. 1) coal bed (fig. 12). The Colchester (No. 2) coal bed is supposedly present in a belt of irregular width along the east border of the Area.

The Rock Island (No. 1) coal bed has its usual lenticular form and distribution. The deposits are largest in an area in the vicinity of Gilchrist, Mercer County, but are found in places as far south as Ponemah in Warren County.

<sup>5</sup>Cady, G. H., Summary list of areas in western, southern, and central Illinois recommended for special investigation as possibly suitable for strip-mining: *Illinois Geol. Survey Circ.* 19, pl. I, 1937.

Culver, H. E., Coal resources of District III (Western Illinois): *Illinois Geol. Survey Coop. Min. Inv. Series Bull.* 29, pp. 115-120, 84-91, 1923.

Wanless, H. R., *Geology and mineral resources of the Alexis quadrangle: Illinois Geol. Survey Bull.* 57, 1929.  
Geological Survey of Illinois: Mercer County, vol. IV, pp. 301-312, 1870; Warren County, vol. IV, pp. 288-300, 1870.

COAL RESOURCES: AREA 5  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Colchester No. 2. . . . .	—	—	2,877	—	2,877
Rock Island No. 1 . . . . .	17,250	—	12,640	—	29,891
Total . . . . .	17,250	—	15,518	—	32,768

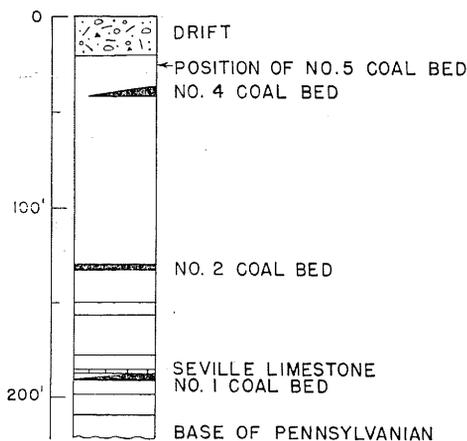


FIG. 12.—Generalized geologic column for Area 5.

The Colchester (No. 2) coal is known in a few places near the east side of Area 5, but the margin is very irregular and difficult to trace because of the cover of glacial drift. In general the available information does not warrant designating any coal resources along this margin except for one small tract in which coal is strongly indicated.

#### AREA 6<sup>6</sup>

*Quadrangles: Northern tier—Woodhull (74), Galva (75), Kewanee (76), Bradford (77). Southern tier—Galesburg (97), Maquon (96), Elmwood (95), Dunlap (94)..*

Area 6 is underlain, but not continuously, by Rock Island (No. 1), Colchester (No.

<sup>6</sup>Cady, G. H., Coal resources of District IV: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, pp. 106-202, 1921.

2), Sumnum (No. 4), Springfield (No. 5), and Herrin (No. 6) coal beds (fig. 13), all of which are of workable thickness. As a rule only the bed nearest the surface is mined; but there are some exceptions with respect to No. 1 coal bed.

The lenticular No. 1 coal bed is being mined near Alpha in southwestern Henry County and at a locality between Knoxville and Galesburg, along Court Creek, Knox County. Both are elongated lenticular bodies that pinch out very suddenly east and west. No similar bodies have been discovered east of Galesburg, but there has been very little core drilling. Proved or probable areas cannot be extended more than a very short distance beyond mine boundaries or drill holes because of the known lenticular form of the bed.

The Colchester or LaSalle (No. 2) coal bed may be widespread in Area 6. Not much is known about this coal bed north of the Chicago Burlington and Quincy Railroad main line from Galesburg to Kewanee, because very few diamond drill holes have been drilled; the coal is known to be present near Alexis and also east of Monmouth in Area 5. The No. 2 coal bed crops out along Spoon River and its tributaries south-

Cady, G. H., Summary list of areas in western, northern, and central Illinois recommended for special investigations as possibly suitable for strip-mining: Illinois Geol. Survey Circ. 19, pl. II (northwest Illinois); pl. VII (Galesburg field); pl. VIII (Abingdon field); pl. XII (Galva field); pl. XIII (Kickapoo field), 1937.

Culver, H. E., Coal resources of District III (Western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 70, 76, 1925.

Horberg, Leland, Bedrock topography of Illinois: Illinois Geol. Survey Bull. 73, pl. I, fig. 11 (p. 49), fig. 12 (p. 58), 1950.

Geological Survey of Illinois: Knox County, vol. IV, pp. 313-324, 1870; Stark County, vol. IV, pp. 325-333, 1870; Peoria County, vol. V, 235-252, 1873; Marshall and Putnam counties, vol. V, pp. 202-260, 1873; and Bureau County, vol. IV, pp. 313-325, 1951.

#### COAL RESOURCES: AREA 6 (In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6	147,163	145,783	267,154	730,179	1,290,280
Springfield No. 5	77,141	79,821	210,629	68,370	435,961
Colchester No. 2	—	8,710	142,310	315,120	466,140
Rock Island No. 1	29,499	33,105	4,540	6,539	73,682
Total	253,803	267,419	624,634	1,120,208	2,266,063

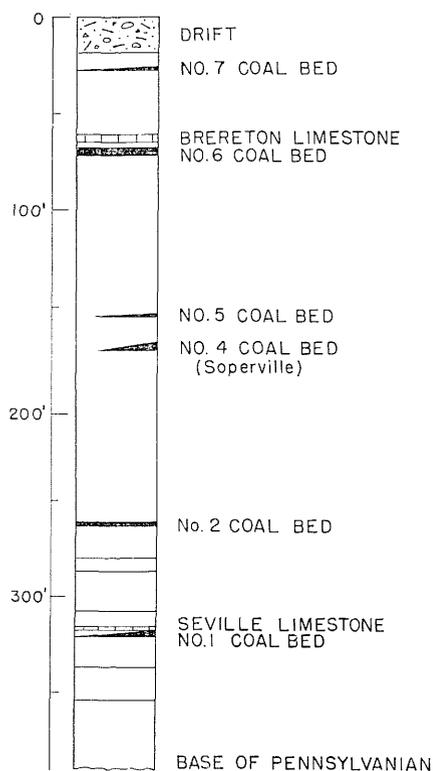


FIG. 13.—Generalized geologic column for Area 6.

east of Galesburg. A small strip mine once produced coal from this bed in the vicinity of Delong. East of Dahinda the No. 2 coal bed is below drainage and there is little information about it. This bed is about 24 to 32 inches thick; there are some reports that it reaches as much as 36 inches.

The Sumnum (No. 4) coal is believed to be the coal formerly worked for many years in the vicinity of Soperville, T. 12 N., R. 1 E., about six miles northwest of Galesburg. Very little information is available as to the extent of this deposit, but it is thought to have been relatively small, lenticular, and elongated in a general north-south direction. So far as known there is no other occurrence of the No. 4 coal bed of workable thickness in Area 6. Since this deposit is supposed to have been worked out, it represents no reserve.

The Springfield (No. 5) coal bed in Area 6 lies about 100 to 110 feet above No. 2 coal and within 20 feet above the Sumnum (No. 4) coal. Thinning northward across

the Area, the No. 5 coal bed is generally less than 28 inches thick north of the Santa Fe Railroad (T. 11 N.). Along the southern boundary of the Area its thickness averages 48 inches but its continuity is broken by deep preglacial valleys north of which the coal thins to 28-35 inches. A small area of No. 5 coal of unexplored extent is known south of Abingdon.

The Herrin (No. 6) coal bed represents the greater part of the coal reserves in Area 6. This bed lies about 75 to 80 feet above the No. 5 bed and has a thickness of 44 to 56 inches, commonly about 4 feet.

Like the Pennsylvanian strata as a whole, the No. 6 coal dips very gently to the east, lying fairly close to the preglacial rock surface. Hence the area which it underlies is limited in part by preglacial erosion and in part by erosion since glacial times. The margin of the bed is therefore very irregular. One rather large outlier is worked by strip mining south of Victoria. Preglacial erosion isolated this area from the main body of coal to the east and northeast. From Laura to Wyoming and westward toward Galva, erosion has produced great irregularity in the west border of the coal, which probably includes some irregular blocks of strippable coal. In eastern Stark and northern Peoria counties the glacial moraine of the Wisconsin stage limits the extent of possible strip mining toward the east because the drift increases the thickness of the overburden. Also, the No. 6 coal bed thins toward the east so that it is unworkable along and west of the Illinois River bluff in Marshall County.

In the east half of Area 6, particularly in localities where the bedrock surface is relatively high and within the area underlain by the Herrin (No. 6) coal bed, the Sparland (No. 7) coal bed has been encountered at some places in drilling for strippable coal. This bed lies 20 to 30 feet above No. 6 coal and is of irregular thickness, commonly less than 28 inches.

The maps of adjacent areas, particularly Area 7, indicate that this bed may extend into Area 6, but information for Area 6 is insufficient to justify classification of No. 7 coal reserves in this Area.

AREA 7<sup>r</sup>

*Quadrangles: Northern tier — Lacon (78), Wenona (79), Streator (80), unmapped (81). Southern tier—Metamora (93), unmapped (92, 91), Pontiac (90).*

Area 7 lies near the north end of the Illinois coal field. The Illinois Valley is along the west border and the LaSalle anticline diagonally crosses the eastern third; thus a triangular area of about one quarter the size of Area 7 is on the higher side of the LaSalle anticline.

In this Area LaSalle (No. 2), Herrin (No. 6), and Sparland (No. 7) coal beds are certainly present (fig. 14), and a coal which is possibly Springfield (No. 5) coal bed occurs along the southern border of the area where No. 6 coal bed is probably absent. The entire Area is underlain by coal except for a small elongated tract in LaSalle County north and northwest of Streator where a deep glacial valley cut through the Pennsylvanian strata. There has been little diamond drilling below No. 2 coal bed and the Rock Island (No. 1) coal bed has not been identified anywhere in this Area. So far as is known the Sumnum (No. 4) coal bed is thin or absent.

The No. 2 coal bed, the "Third Vein" of the Longwall district, is thought to be essentially continuous in Area 7. It has been mined along the anticline at Lowell along

the Vermilion River. On the west side of the anticline this bed has been mined at Standard in Putnam County, at Wenona and Toluca in Marshall County, at Minonk and Roanoke in Woodford County, and at Rutland in LaSalle County. East of the anticline the No. 2 coal bed has been mined in the vicinity of Streator in LaSalle County. There has been little exploration of the bed by the drill east of the anticline. Therefore mine operations provide essentially all that is known about No. 2 coal in the eastern one-third of Area 7.

It is believed that the No. 6 coal bed does not extend across the preglacial Illinois Valley, and that it does not cross the LaSalle anticline north of the latitude of Streator. However, a small outlier of this coal bed is possibly present near Kangley. There is also an outlier near Verona, Grundy County, which has been mined out. It is probable that the No. 6 coal is generally thin and unworkable west of the Illinois River near Sparland in Marshall County, except for scattered lenses reported to be 3 to 5 feet thick. Elsewhere, in the central and southern portions of the Area, the No. 6 coal bed seems to be present. In general the thickness of No. 6 coal bed is about 4 to 4½ feet. The bed is somewhat interrupted by white top and horsebacks. There has been little exploratory diamond drilling in the Area.

The No. 6 coal for many years was referred to as the No. 5 or "Second Vein" coal. It was worked at Streator where for a long time it was thought to be the same as the No. 7 coal bed.

The No. 7 coal bed is fairly widespread

COAL RESOURCES: AREA 7  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sparland No. 7 . . . . .	116,747	355,334	367,614	67,925	907,621
Herrin No. 6 . . . . .	95,174	168,421	191,385	—	454,980
Springfield No. 5 . . . . .	—	556	27,463	—	28,019
LaSalle No. 2 . . . . .	190,862	1,016,914	931,758	2,610,226	4,749,760
Total . . . . .	402,783	1,541,225	1,518,220	2,678,152	6,140,380

<sup>r</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, 1913.  
Willman, H. B., and Payne, J. N., Geology and mineral resources of the Marseilles, Ottawa, and Streator quadrangles: Illinois Geol. Survey Bull. 66, 1942.  
Geological Survey of Illinois: Marshall and Putnam counties, vol. V, pp. 202-216, 1873; LaSalle County, vol. III, pp. 257-287, 1868; Livingston County, vol. VI, pp. 235-244, 1875; Woodford County, vol. IV, pp. 334-342, 1870; Grundy County, vol. IV, pp. 190-206, 1870.

on the west side of the LaSalle anticline. Like No. 6, it terminates against the east side of the preglacial Illinois Valley, but is found again in the west bluff of the river valley. In some areas, as at Streator, the No. 7 coal bed is absent or too thin to work. At LaSalle this bed is about 4 feet thick but

in the Streator area it is only about 18 inches to 2 feet thick. This bed has been worked more or less experimentally in several mines west of the LaSalle anticline. It has a relatively high ash content as compared with the No. 2 coal bed and is not of uniform thickness.

In the vicinity of Sparland the No. 7 bed has been worked off and on for many years by drift mines in the west bluff of the Illinois River valley. Its thickness here ranges from about 40 to 48 inches. This coal bed is not known to have been explored by drilling west of the bluff line.

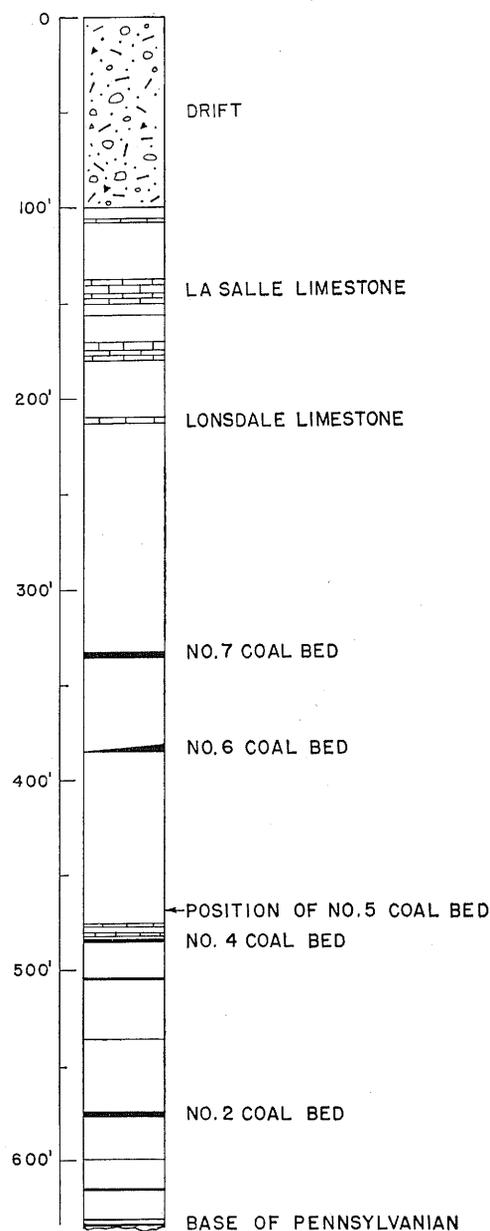


FIG. 14.—Generalized geologic column for Area 7.

AREA 8<sup>8</sup>

*Quadrangles: Northern tier — Dwight (82), Herscher (83), Kankakee (84), Mokence (85). Southern tier—Cullom (89), Piper City (88), Gilman (87), Watseka (86).*

Area 8 is crossed by the irregular margin of the Illinois coal field which is traceable only by evidence from scattered churn drill holes, dug wells, etc. So far as known, workable beds of coal do not extend farther east than into western Herscher and Piper City quadrangles.

The coal beds of workable thickness are LaSalle (No. 2), and Herrin (No. 6) or Sparland (No. 7) (fig. 15), and a lenticular bed a few feet above No. 2 near Cardiff. Mining is restricted to Dwight and Herscher quadrangles.

The LaSalle (No. 2) coal bed which ranges from about 30 to 42 inches in thickness, lies beneath the west border of the Area, its east margin extending north and south at about the longitude of Essex. Exploration of this margin has extended as far south as Cardiff at about the south line of T. 30 N. South of this line the No. 2 coal has been classified as weakly indicated (II-B) except in the southwest corner of

<sup>8</sup>Cady, G. H., Coal resources of District I (Longwall): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 10, pp. 62-76, 95-103, 1915.

Summary list of areas in western, northern, and central Illinois recommended for special investigation as possibly suitable for strip-mining: Illinois Geol. Survey Circ. 19, pl. VI, 1937.

Athy, L. F., Geology and mineral resources of the Herscher quadrangle: Illinois Geol. Survey Bull. 55, 1928.

Leighton, M. M., Ekblaw, G. E., and Horberg, Leland. Physiographic divisions of Illinois: Jour. Geol., vol. 56, no. 1, pp. 16-33, Jan. 1948. Also Illinois Geol. Survey Rept. Inv. 129, 1948.

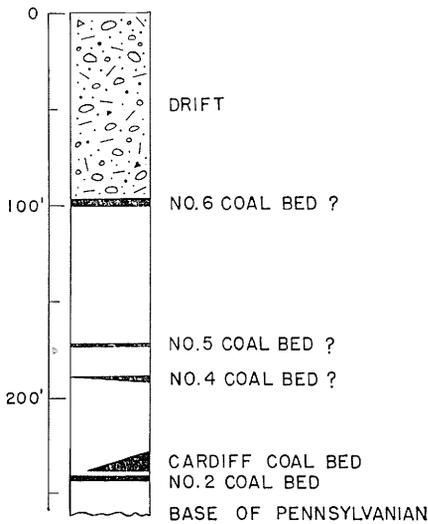


FIG. 15.—Generalized geologic column for Area 8.

the Area where there are some probable reserves (I-B) and some strongly indicated reserves (II-A). In general the No. 2 bed in this area is a blanket stratum which appears to be continuous up to the margin determined by preglacial and glacial erosion. Toward the eastern limit, in Kankakee County, this margin is sufficiently close to the surface so that strip mining is possible; the coal has already been removed in some tracts along this border.

A 36- to 60-inch coal bed thought to be Herrin (No. 6), but possibly the equivalent of the Sparland (No. 7) coal, underlies an elongated narrow area extending from a

point near Mazonia to Reddick, and a small outlier near Cardiff. In the Cardiff field the No. 6 coal bed ranges in drill holes from 6 to 42 inches in thickness but most commonly from 36 to 42 inches. The interval between the upper coal bed and No. 2 coal bed in the South Wilmington field is in general between 75 and 85 feet, although much lesser intervals seem to occur. In the Cardiff field the interval seems to be between 118 and 143 feet, assuming that the upper coal bed is the same as that in the South Wilmington field. The upper coal is being stripped in the tract east of South Wilmington but has not been mined at Cardiff. There may be an area underlain by No. 5, No. 6, or No. 7 coal bed in the west part of the Cullom quadrangle in the southwest part of Area 8 but information about the coal beds present in this part of the area is meager. These reserves of uncertain correlation were tabulated with reserves of No. 7 coal bed.

The Cardiff coal bed is a lenticular bed a short distance above the No. 2 coal bed in the Cardiff field. This bed attained a maximum known thickness of 150 inches in the central part of the lens. As it is regarded to be worked out it is not included in the estimate of reserves. No other occurrence of workable coal is known at this position. In the Cardiff field two thin coal beds, possibly No. 4 and No. 5, lie about midway between No. 2 and No. 6 beds. These are in general not of workable thickness.

COAL RESOURCES: AREA 8  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sparland No. 7 . . . . .	269	11,254	10,148	—	21,672
Herrin No. 6 . . . . .	9,432	75,092	—	1,334	85,858
LaSalle No. 2 . . . . .	96,801	238,236	271,139	597,519	1,203,696
Total . . . . .	106,502	324,582	281,288	598,853	1,311,225

AREA 9<sup>a</sup>

Quadrangles: Northern tier — Sibley (113), Buckley (114), Cissna Park (115), Milford (116). Southern tier—Gibson City (120), Paxton (119), Potomac (118), Hoopston (117).

Area 9 is the northeastern part of the Illinois coal field. The LaSalle anticline crosses the western part of the Area, through the Sibley and Gibson City quadrangles. The margin of the coal field crosses the northeast portion of the Milford quadrangle. The Pennsylvanian strata have been eroded from an elliptical area near Gibson City in Ford County along the axis of the LaSalle anticline. The north and south extensions of this area are not definitely known because there is no subsurface information. The bedrock is deeply buried by glacial deposits, to a depth that ranges from about 100 to more than 400 feet, so that available information about the coal resources comes from churn-drilled water wells or from a few oil and gas test holes. The area is therefore largely classified as "unknown" or barren.

In that part of the Area east of Gibson City some water wells encountered coal, in general immediately below the drift or under a slight cover of rock. It is possible that LaSalle (No. 2) coal bed is fairly widespread but reserves have been classified only in the northwestern corner of the Area

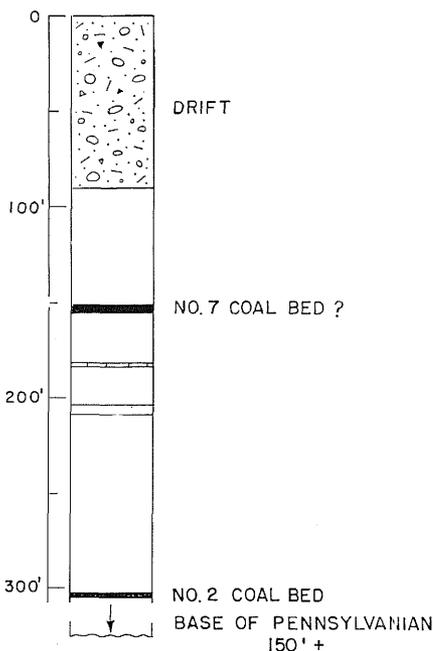


FIG. 16.—Generalized geologic column for Area 9.

(fig. 16). Both Grape Creek (No. 6) and Danville (No. 7) coals may be present in the southern part of the Potomac quadrangle as both of these coal beds occur just to the south in Area 16.

One or more coal beds of workable thickness (No. 5, No. 6, and/or No. 7) probably occur near the northwest corner of Area 9 as a continuation from the east part of Area 10. The reserves of this latter portion of Area 9 have been included with reserves of No. 7 coal. East of Saybrook is an extension from Area 10 of coals considered to be No. 7 and No. 5. No. 6 coal is too thin to constitute a reserve here.

<sup>a</sup>Horberg, Leland, *Bedrock topography in Illinois*: Illinois Geol. Survey Bull. 73, pl. I, sheet 2, 1950.

Kay, F. H., and White, K. D., *Coal resources of District VIII (Danville)*: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 14, pl. I, pp. 29-32, 1915.

Geological Survey of Illinois: Champaign, Edgar, and Ford counties, vol. IV, pp. 266-275, 1870; Livingston County, vol. VI, pp. 235-244, 1875; Iroquois and Kankakee counties, vol. IV, pp. 226-240, 1870; Tazewell, McLean, Mason, and Logan counties, vol. IV, pp. 176-189, 1870; Vermilion County, vol. IV, pp. 241-265, 1870.

COAL RESOURCES: AREA 9  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	2,735	28,558	76,476	—	107,769
Springfield No. 5 . . . . .	—	1,439	29,817	—	31,256
LaSalle No. 2 . . . . .	628	34,590	51,474	—	86,692
Total . . . . .	3,363	64,587	157,767	—	225,717

AREA 10<sup>10</sup>

Quadrangles: Northern tier—Mackinaw (109), Danvers (110), Normal (111), unmapped (112). Southern tier—Unmapped (124, 123, 122, 121).

Area 10 lies west of the LaSalle anticline in the north part of the Illinois coal field. It includes most of McLean County and small portions of bordering counties on the north, west, and south. The bedrock of the area is buried by about 100 to 450 feet of glacial drift. Consequently, as for much of central Illinois, the geological delineation of the bedrock is based entirely on information from drilling or mine shafts. There are only a few drill holes in this area sufficiently deep to reach the workable coal beds. Nine mine shafts, now closed, were located at Bloomington, Colfax, Chenoa, Fairbury, and Eureka.

The Pennsylvanian strata underlying the glacial drift in Area 10 are of McLeansboro and Carbondale age (fig. 17). The boundary between these two groups runs from a point near Eureka on the north to a point near McLean on the south, and thence westward along the south border of the Area to the southwest corner (see the Geological Map of Illinois).

Except for areas adjacent to the mines at Bloomington, Colfax, Fairbury, Chenoa, and Eureka, and around a few scattered drill holes, there are no proved reserves of

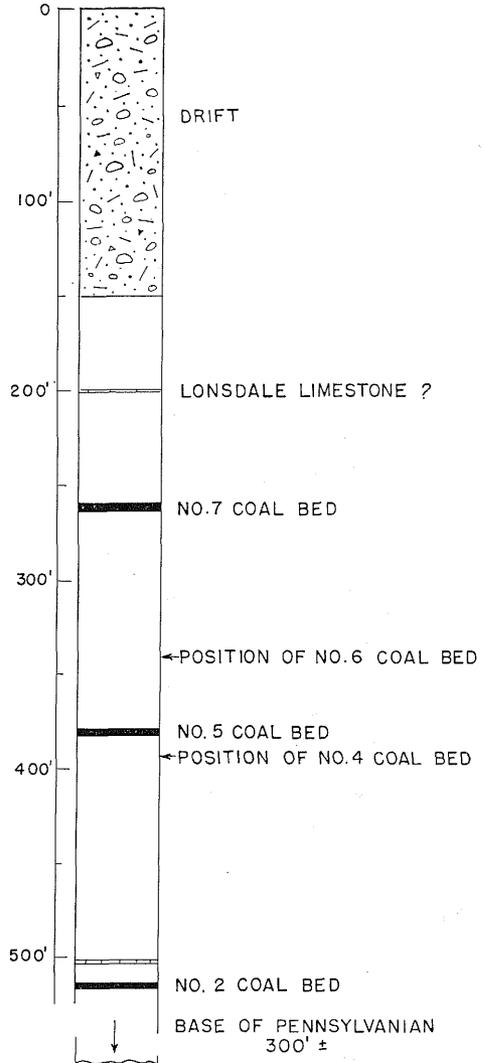


FIG. 17.—Generalized geologic column for Area 10.

<sup>10</sup>Cady, G. H., Coal resources of District IV: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, pp. 127-138, 1921.

Geological Survey of Illinois: Tazewell, McLean, Mason, and Logan counties, vol. IV, pp. 176-189, 1870; Woodford County, vol. IV, pp. 334-342, 1870; Moultrie, Macon, and Piatt counties, vol. VI, pp. 185-196, 1875; Livingston, vol. VI, pp. 235-244, 1875.

COAL RESOURCES: AREA 10  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Sparland No. 7 . . . . .	33,270	247,430	358,224	—	638,923
Springfield No. 5 . . . . .	6,280	179,859	236,935	78,309	501,383
LaSalle No. 2 . . . . .	14,189	162,117	337,051	—	513,358
Total . . . . .	53,739	589,406	932,209	78,309	1,653,664

coal in Area 10. The workable coal beds in this Area are LaSalle (No. 2), Springfield (No. 5), and Sparland (No. 7). The coal beds formerly mined at Colfax and Chenoa and the upper coal bed at Fairbury are unidentified.

In this survey the reserves of doubtful correlation were tabulated with those of the No. 7 coal. Drilling at Saybrook penetrated beds thought to be No. 7, No. 6, and No. 5. The No. 6 coal bed is too thin to be workable. In the mine at Bloomington the No. 2 and No. 5 beds were worked. Here the No. 6 bed is thin and unworkable but No. 7 is present and has been classified as a reserve.

AREA 11<sup>11</sup>

*Quadrangles: Northern tier — Avon (105), Canton (106), Glasford (107), Peoria (108). Southern tier—Vermont (128), Havana (127), Manito (126), Delavan (125).*

This is an area of numerous outcrops and exposures of workable coal beds in the Tradewater and Carbondale groups (fig. 18). The Sparland (No. 7) coal bed does not attain workable thickness in this Area.

<sup>11</sup>Cady, G. H., Coal resources of District IV; Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, pp. 76-105, 155-202, 226-237, 1921.  
 Culver, H. E., Coal resources of District III (Western Illinois); Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 44-50, 1925.  
 Horberg, Leland, Bedrock topography of Illinois: Illinois Geol. Survey Bull. 73, pl. I, sheet 2, 1950.  
 Savage, T. E., Geology and mineral resources of the Avon and Canton quadrangles: In Illinois Geol. Survey Bull. 38, 1921. (Also Bull. 38C, extract from Bull. 38.)  
 Udden, J. A., Geology and mineral resources of the Peoria quadrangle, Illinois: U. S. Geol. Survey Bull. 506, 1912.  
 Geological Survey of Illinois: Peoria County, vol. V, pp. 235-252, 1873; Fulton County, vol. IV, pp. 90-110, 1870; Tazewell, McLean, Logan, and Mason counties, vol. IV, pp. 176-189, 1870.

As the dip of the bedrock is very gently to the east, the margins of the beds from youngest to oldest lie successively westward. The margins of the Herrin (No. 6), Springfield (No. 5), and Colchester (No. 2) coal beds are essentially continuous as beds of workable thickness, but Sumnum (No. 4) and Rock Island (No. 1) coal beds are lenticular.

The No. 6 coal bed in this Area is restricted to a roughly rectangular area in the northern two townships between the Illinois and Spoon River valleys, with very irregular margins developed by recent as well as preglacial erosion. There is a much smaller elliptical area extending for about 12 miles south from East Peoria, Ts. 24 and 25 N., R. 4 W. No. 6 coal bed is relatively close to the surface and has been extensively strip-mined in Fulton County. There are also areas of strippable coal on the south side of Kickapoo Creek in Peoria County. Along the southern margin of the Area, underlain by the No. 6 coal bed, the coal has a high content of bedded impurities. In most of the area in Peoria County the coal lies too deep for strip mining and conditions are not in general favorable for underground mining. It is probable that the largest reserves of strippable coal in Area 11 are No. 6.

The margin of Springfield (No. 5) bed in general lies east of the valley of Spoon River, except for outliers of the bed near Ipava and Sumnum. The eastward dip of the strata is sufficient to bring the coal well below the upland, but in general the coal still remains above drainage level along the Kickapoo and Illinois valleys. In the tri-

COAL RESOURCES: AREA 11  
 (In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	18,892	65,436	390,041	178,275	652,643
Springfield No. 5 . . . . .	449,969	698,073	428,952	—	1,576,994
Colchester No. 2 . . . . .	67,906	711,589	684,832	7,454	1,471,781
Total . . . . .	536,767	1,475,098	1,503,824	185,729	3,701,419

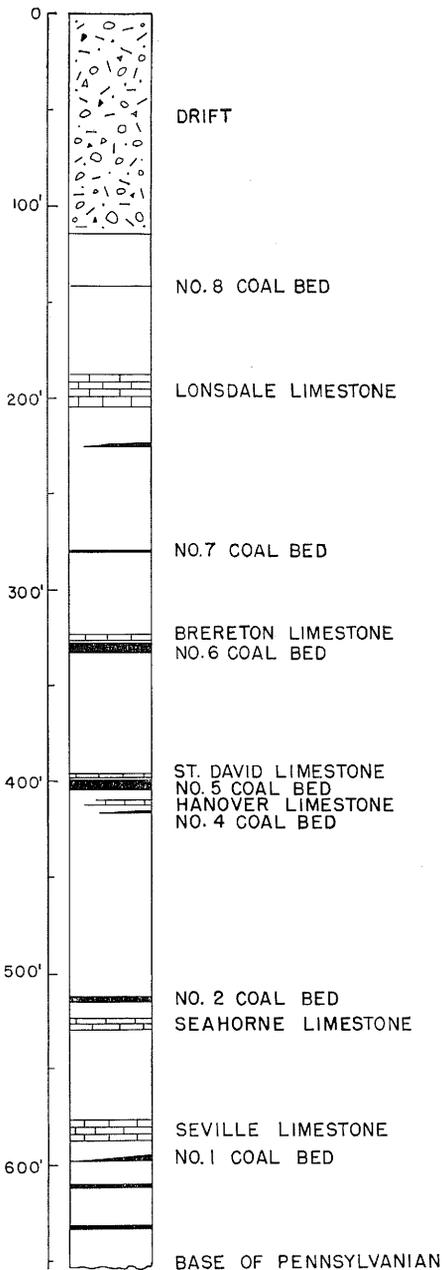


FIG. 18.—Generalized geologic column for Area 11.

angular area defined by Peoria, Canton, and Farmington, this bed has been worked in many places by drifts and shafts. The bed approaches the surface in Fulton County and has been worked extensively by strip mining near St. David, Cuba, Fairview,

and Rapatee. The remaining supply of this coal available under the prevailing limitations of thickness of cover is relatively small. Several large tracts have been worked out and others are approaching exhaustion.

The Sumnum (No. 4) coal bed lies just a few feet below No. 5 but attains a workable thickness of 28 inches or more in only a few places. This coal bed has been worked locally at Ipava and Sumnum and is present in other places. Wherever the Sumnum (No. 4) coal thickens, the overlying No. 5 bed generally shows adjustment to uneven compaction of the No. 4 coal bed within and on either side of the lenticular bodies. The actual amount of No. 4 coal is probably small and there are insufficient data for indicating reserves.

Colchester (No. 2) coal bed approaches the general upland level along Spoon River. The bed is commonly exposed along the valley walls or in tributary valleys and is several feet higher on the west side than on the east. It lies within strippable depth near Avon, Marietta, Table Grove, and Vermont, but the bed is exceedingly irregular because of preglacial and recent erosion, and prospecting would probably discover only small tonnages. It is also present at strippable depth in the flood plain north of the Illinois River between Banner and Kingston mines.

The Rock Island (No. 1) coal bed, like the Sumnum (No. 4) bed, is very lenticular in this Area as it is in Area 6 to the north. It has been mined near Ellisville and near Marietta, and is now being mined along Put Creek north of Cuba. There are no cores from this horizon, but evidence suggests that other areas of coal may be present though the amount of such coal is uncertain. The farthest east this coal has been worked is a mine near Pottstown. Reserves of No. 1 coal could not be estimated because of insufficient data. In general worked-out sections coincide with the size of the original body of minable coal; hence areas bordering them are not classified as proved except where drill hole logs give evidence of the extension of the bed, as in the Put Creek area.

AREA 12<sup>12</sup>

*Quadrangles: Northern tier—Fort Madison (101), Lomax (102), La Harpe (103), Good Hope (104). Southern tier—Keokuk (132), Carthage (131), Colchester (130), Macomb (129).*

Only about half of Area 12 is underlain by Pennsylvanian strata, but isolated outliers reach almost to the Mississippi River Valley. The only coal bed known to be of workable thickness is the Colchester (No. 2) bed, and this is barely 28 inches thick in most of the Area (fig. 19). In general the coal bed lies almost horizontal, local variations being more influential in determining the position of the bed than the slight regional eastward dip.

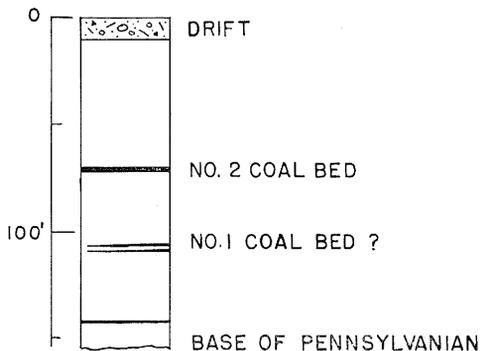


FIG. 19.—Generalized geologic column for Area 12.

Colchester (No. 2) coal bed underlies parts of the four eastern quadrangles of Area 12: La Harpe, Good Hope, Col-

<sup>12</sup>Hinds, Henry, Description of the Colchester-Macomb quadrangles, Illinois: U. S. Geol. Survey Geol. Atlas Folio 208, 1919.

Savage, T. E., and Nebel, M. L., Geology and mineral resources of the La Harpe and Good Hope quadrangles: *In* Illinois Geol. Survey Bull. 43, pp. 13-93, 1923. (Also Bull. 43A, extract from Bull. 43.)

Geological Survey of Illinois: Henderson County, vol. IV, pp. 276-287, 1870; Warren County, vol. IV, pp. 288-300, 1870; McDonough County, vol. V, pp. 253-265, 1873; Hancock County, vol. I, pp. 327-349, 1866; Schuyler County, vol. IV, pp. 75-89, 1870.

chester, and Macomb. Detailed geological maps of each of these quadrangles show the approximate extent of the margins of the Colchester (No. 2) coal bed. Here and there along these margins the coal is probably strippable, but there are few large tracts known. Much of the margin of the coal bed is obscured by glacial drift, and it is difficult to trace by drilling. The drift is too thick along most of the margin of the bed for profitable strip mining. In a few places the coal has been worked in small underground mines, particularly near Colchester and Industry.

AREA 13<sup>13</sup>

*Quadrangles: Northern tier—Mendon (134), Camp Point (135), Augusta (136), Rushville (137). Southern tier—Quincy (165), Hannibal (166), Barry (167), Pittsfield (168).*

Area 13 consists of two fairly large areas of Pennsylvanian strata almost entirely surrounded by Mississippian strata; that is, it consists of outliers or portions of outliers from adjacent areas of the main Illinois coal field. Within these areas Colchester (No. 2) coal bed appears to be essentially continuous, but in much of Area 13 it does not reach 28 inches in thickness (fig. 20). No. 2 coal bed has been mined by stripping north of Clayton and near Augusta, where the bed is 24 to 36 inches thick. It has also been mined by shafts, drifts, and slopes, mainly for local trade.

Near Rushville, an area of Springfield (No. 5) coal about 4 feet thick lies near

<sup>13</sup>Culver, H. E., Coal resources of District III (Western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 26-34, 56-60, 104-112, 1925.

Geological Survey of Illinois: Hancock County, vol. I, pp. 327-349, 1866; Schuyler County, vol. IV, pp. 75-89, 1870; Henderson County, vol. IV, pp. 276-287, 1870; Brown County, vol. IV, pp. 62-74, 1870; Adams County, vol. IV, pp. 43-61, 1870.

COAL RESOURCES: AREA 12  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Colchester No. 2.	43,963	30,921	18,268	20,166	113,318

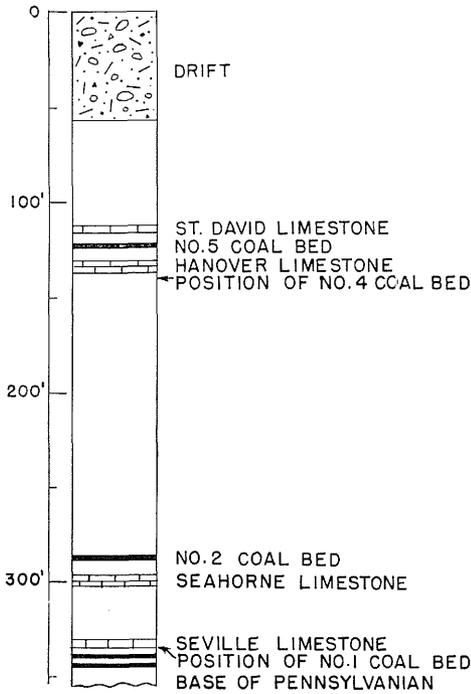


FIG. 20.—Generalized geologic column for Area 13.

the surface and has been mined by stripping. The coal bed extends east into Area 14. At places outlying strata of McLeansboro age are thought to be present, as near Mt. Sterling, Brown County, and near Liberty in Adams County. No. 5 or No. 6 coal beds are not known to be present in workable thickness in these outlying areas.

AREA 14<sup>14</sup>

Quadrangles: Northern tier — Beardstown (138), Chandlerville (139), Petersburg (140), Mason City (141). Southern tier—Arenzville (161), Virginia (160), Tallula (159), Springfield (158).

Area 14 includes a small portion of the western Illinois outlier of Pennsylvanian strata, and a much larger portion of the main coal field. The southern boundary of the Springfield district corresponds fairly closely with the southern boundary of Area 14. In the middle of the Area is the belt, 10-12 miles wide, of the Illinois valley, which is underlain by Mississippian strata. In the northwest triangular area west of Illinois River, the Colchester (No. 2) coal bed is generally well below the top of the bluff facing the Illinois valley (fig. 21). Near Pleasant View in eastern Schuyler County, the relief is sufficient and the drift thin enough so that Springfield (No. 5) coal bed lies close to the surface; there has been some drift mining in this bed. Another

<sup>14</sup>Cady, G. H., Coal resources of District IV: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, pp. 62-66, 117-126, 148-153, 203-223, 1921.

Savage, T. E., Geology and mineral resources of the Springfield quadrangle: *In* Illinois Geol. Survey Bull. 20, pp. 97-130, 1915.

Shaw, E. W., and Savage, T. E., Description of the Tallula-Springfield quadrangles, Illinois: U. S. Geol. Survey Geol. Atlas Folio 188, 1913.

Geological Survey of Illinois: Cass and Menard counties, vol. IV, pp. 163-175, 1870; Tazewell, Logan, McLean, and Mason counties, vol. IV, pp. 176-189, 1870; Morgan County, vol. IV, pp. 149-162, 1870; Sangamon County, vol. V, pp. 306-319, 1873.

COAL RESOURCES: AREA 13  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Springfield No. 5	24,302	—	—	—	24,302
Colchester No. 2.	10,083	49,269	81,265	375,172	515,789
Total	34,385	49,269	81,265	375,172	540,091

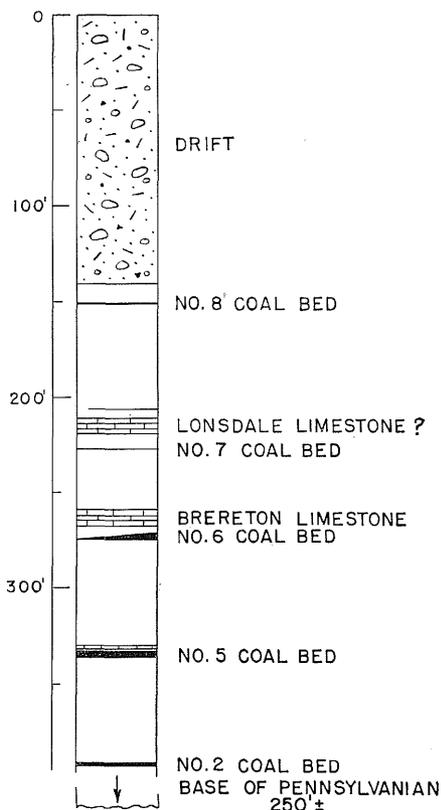


FIG. 21.—Generalized geologic column for Area 14.

outlier of Springfield (No. 5) coal has been mined by stripping near Astoria.

It seems probable that the Colchester (No. 2) coal bed extends as a thin blanket on the east side of the Illinois River valley

beyond the east boundary of Area 12. This coal has been mined at Virginia, Bluff Spring, and south of Chandlerville in Cass County. Only one diamond drill hole extends to this coal bed; it is near Springfield, and in it the coal is less than 28 inches thick.

The Springfield (No. 5) coal bed appears to be present under about one-quarter to one-third of Area 14 in its eastern half. The margin of this coal bed is deeply buried beneath the drift and it is nowhere known to be near enough to the surface to be stripplable.

The margin of the No. 5 coal in Menard, Mason, and the part of Logan County in Area 14 is rather indefinitely delineated along the south side of the preglacial Sangamon Valley. South of this indefinite margin No. 5 coal bed has been mined by many shaft mines along railroads in Sangamon and Menard counties. There also are active and abandoned scattered truck mines in the Springfield district. The No. 5 coal bed in this district is 4½ to 5 feet thick and contains horsebacks. At one time there were 27 shipping mines operating in this district; in 1950 there were only three.

The Springfield (No. 5) coal bed is the most important workable bed in this Area, but there are a few workable lenticular bodies of Sumnum (No. 4) coal near Chapin and Neeleys in the north part of Morgan County. The Colchester (No. 2) is believed to be more than 28 inches thick near Jacksonville.

COAL RESOURCES: AREA 14  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Springfield No. 5 . . . . .	668,660	2,076,195	1,086,452	121,309	3,952,616
Sumnum No. 4 . . . . .	14,875	13,104	—	—	27,979
Colchester No. 2. . . . .	30,255	192,941	253,794	1,154,733	1,631,723
Total . . . . .	713,790	2,282,241	1,340,246	1,276,041	5,612,318

AREA 15<sup>15</sup>

*Quadrangles: Northern tier—Lincoln (142), Unmapped (143, 144), Monticello (145). Southern tier—Unmapped (157, 156), Decatur (155), Unmapped (154).*

Area 15 lies within the central part of the Illinois coal field and is believed to be underlain by horizons of all the economically important coal beds in the state (fig. 22). The northeast corner of the Area is crossed by the west flank of the LaSalle anticline. Elsewhere the beds dip gently southeastward, rarely more than 50 feet per mile.

In general, information about this Area adequate for estimating resources is limited to the west half. Even in this better-known area, there are large unexplored tracts. Exploration is confined mainly around Lincoln, Decatur, Mount Pulaski, Niantic, and Dawson.

In the east half of the Area the Pennsylvanian is obscured by about 300 feet of glacial drift, which contains much water-bearing gravel. Even should workable coal beds be found here, it would probably be years before development would be attempted beneath such a cover of unconsolidated water-bearing material.

In the west half of Area 15, the principal workable coal bed appears to be the Springfield (No. 5) coal, although near Decatur the Herrin (No. 6) coal approaches workable thickness. The boundary of the region in which No. 6 coal is workable in southern Illinois probably lies close to the southern boundary of Area 15. The workable areas of No. 5 and No. 6 coal beds overlap somewhat along this line. It seems probable that a large, mainly unexplored, area of No. 5 coal bed lies in the triangle defined by Springfield, Lincoln, and Decatur.

The widespread occurrence of Colchester (No. 2) bed and drill-hole evidence justify classification of some areas of this coal bed

as resources although it is generally of minimum thickness.

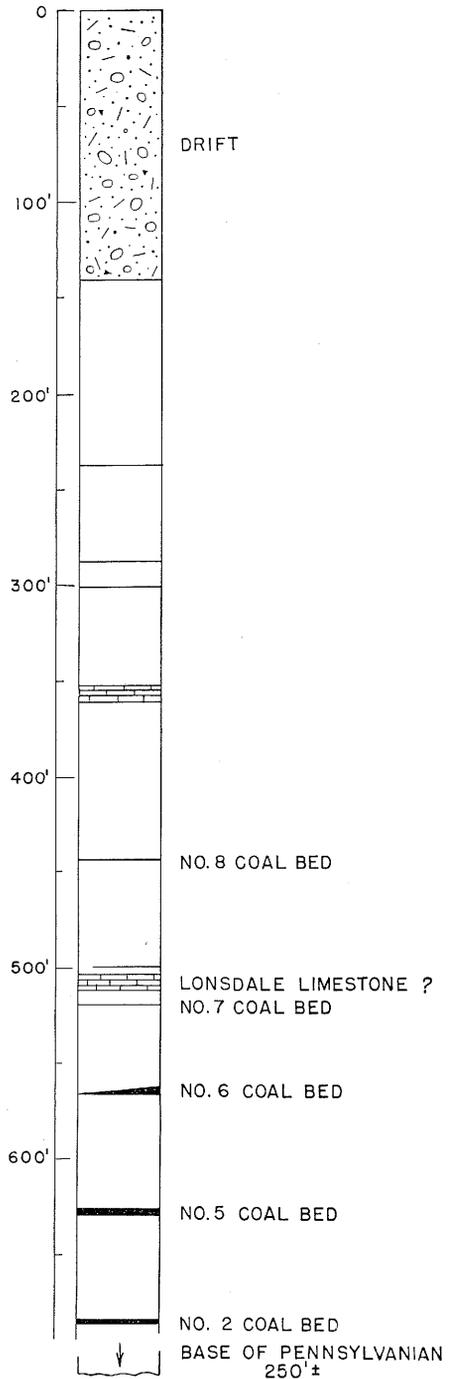


FIG. 22.—Generalized geologic column for Area 15.

<sup>15</sup>Cady, G. H., Coal resources of District IV: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 26, pp. 68-75, 117-126, 139-147, 203-223, 1921.

Hörberg, Leland, Bedrock topography in Illinois: Illinois Geol. Survey Bull. 73, pl. I, sheet 2, 1950.

Shaw, E. W., and Savage, T. E., Description of the Tallula-Springfield quadrangles, Illinois: U. S. Geol. Survey Geol. Atlas Folio 188, 1913.

COAL RESOURCES: AREA 15  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	—	—	63,501	—	63,501
Springfield No. 5 . . . . .	169,761	790,400	1,158,294	1,294,899	3,413,354
Colchester No. 2. . . . .	—	—	—	22,389	22,389
Total . . . . .	169,761	790,400	1,221,795	1,317,288	3,499,245

AREA 16<sup>16</sup>

*Quadrangles: Northern tier—Mahomet (146), Urbana (147), Fithian (148), Danville (149). Southern tier—Unmapped (153, 152, 151), Ridge Farm (150).*

The LaSalle anticline crosses the west quarter (quadrangles 146 and 153) of Area 16, dividing it with respect to the coal reserves. On the west side of the anticlinal zone, which extends roughly from a point near Mahomet to the vicinity of Tuscola, the coal beds lie within the north border of the deep Illinois Basin. There is very little information concerning the coal reserves in this region, although it is believed that the important coal bed horizons

could be recognized if drill cores to sufficient depth were available.

East of the LaSalle anticline is a prominent anticlinal structure, the Oakland anticline, which has caused a large barren area in eastern Champaign County. Between the Oakland anticline and the state line is a broad synclinal trough in which strata as high as the Livingston limestone are at or near the surface. A minor syncline occurs in the vicinity of Murdock, Douglas County, between the Oakland anticlinal belt and the LaSalle anticlinal belt.

In Area 16, which contains the well-known Danville mining district, at least two coal beds are present in workable thickness, the Danville (No. 7) and Grape Creek (No. 6) coals (fig. 23). In places in northern Edgar County the Harrisburg (No. 5) coal bed reaches a thickness of 3 feet and extends into Area 16. Indiana III coal bed also extends into the southern part of Area 16 from Edgar County, although information does not justify extending classification more than 2 miles from diamond drill holes.

COAL RESOURCES: AREA 16  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	472,119	1,293,659	710,606	364,135	2,840,518
Grape Creek . . . . .	341,040	496,746	113,540	—	951,327
Harrisburg No. 5 . . . . .	26,797	25,685	—	—	52,482
Indiana III . . . . .	37,445	50,182	—	—	87,627
Coals of unknown correlation lower than No. 6 . . . . .	10,063	—	—	—	10,063
Total . . . . .	887,465	1,866,271	824,146	364,135	3,942,017

<sup>16</sup>Campbell, M. R., and Leverett, Frank, Description of the Danville quadrangle, Illinois-Indiana: U. S. Geol. Survey Geol. Atlas Folio 67, 1900.

Kay, F. H., and White, K. D., Coal resources of District VIII (Danville): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 14, 1915.

Simon, Jack A., Geology and coal resources of Vermilion County, Illinois: Manuscript, 1951.

Geological Survey of Illinois: Champaign, Edgar, and Ford counties, vol. IV, pp. 266-275, 1870; Vermilion County, vol. IV, pp. 241-265, 1870; Cumberland, Coles, and Douglas counties, vol. VI, pp. 98-111, 1875.

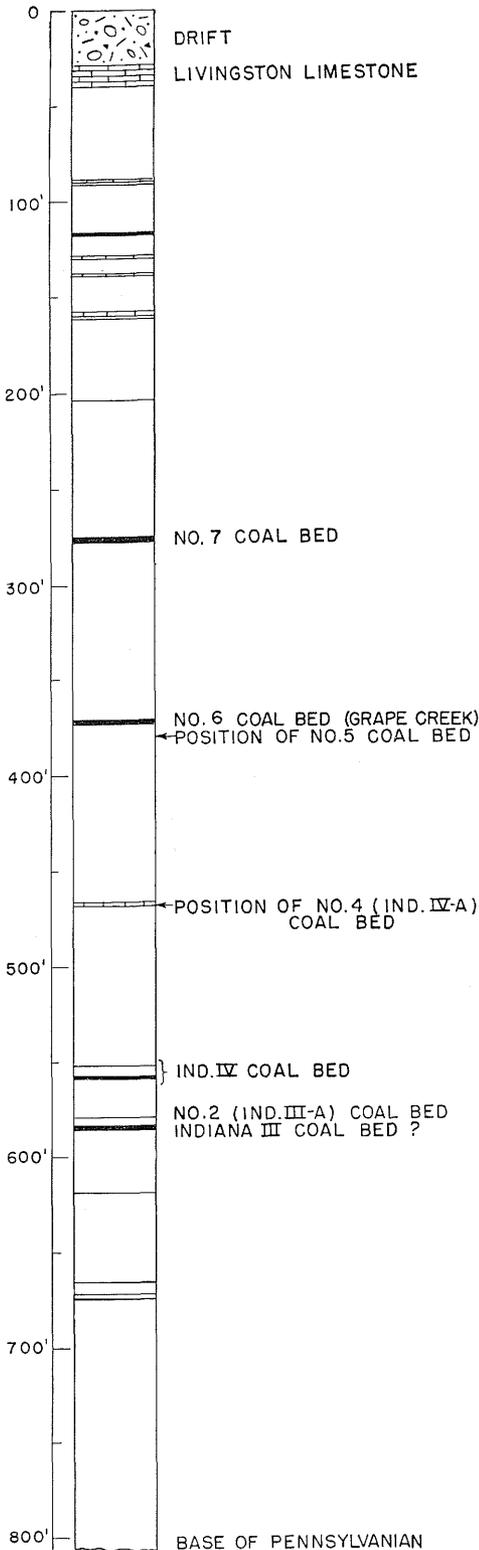


FIG. 23.—Generalized geologic column for Area 16.

Estimates of reserves are for Danville (No. 7) and Grape Creek (No. 6) coal beds, with smaller amount of reserves of No. 5 and Indiana III coal beds also included.

Reserves of local reported occurrence of coal of minable thickness of unknown correlation below the Grape Creek coal have been totaled together in the tabulated list of reserves.

The east margin of the Danville (No. 7) coal bed lies along the west side of the Vermilion River valley south of Danville and extends westward up the Salt Fork of this river for several miles. It dips west and presumably underlies the Pennsylvanian beds at or near the surface along Salt Fork and the Little Vermilion River in western Vermilion County. West of this, deep drift buries the country rock and obscures the west margin of the No. 7 coal as the beds rise toward the Oakland anticline. The margin of the No. 7 coal in most places is covered by glacial drift. Near Murdock in the "Murdock syncline" a coal bed, believed to be the No. 7 bed, is being mined. Numerous churn drill holes drilled for water have penetrated coal here and there in southwestern Vermilion and southern Champaign counties, but it is usually impossible to identify them.

The Grape Creek (No. 6) coal bed lies 20-110 feet below No. 7 coal; in general the interval increases from the minimum in northern Vermilion County and averages 100 feet in southern Vermilion County. The No. 6 bed is more irregular in thickness than No. 7. No. 6 bed tends to thicken from Danville at least as far as southern Vermilion County, whereas the No. 7 coal bed becomes thinner in that direction. However, both coals are present in an area around Collison about 10 miles northwest of Danville. In general, west and northwest of Danville the No. 7 coal bed is worked, and the No. 6 coal bed from Danville south. The extent of both beds in western Vermilion County has been little explored.

The No. 5 coal is known to be of minable thickness only in the southeastern corner of Area 16.

AREA 17<sup>17</sup>

*Quadrangles: Northern tier — Arcola (178), Oakland (179), Kansas (180), Paris (181). Southern tier—Mattoon (185), Toledo (184), Casey (183), Marshall (182).*

The LaSalle anticline divides Area 17 roughly in half along a fairly straight line through Tuscola (Area 16), about 6 to 8 miles east of Arcola, about 6 miles east of Charleston, and 2 to 3 miles west of Casey. The west half lies near the northern border of the Illinois basin. The portion east of the anticline lies in the broad syncline which is structurally continuous with the Indiana coal field. This syncline is divided by the north-south Oakland anticlinal belt between Casey and Oakland.

The coal beds found in Vermillion and Vigo counties, Indiana—No. VI (Danville No. 7)<sup>18</sup>, No. V (Harrisburg No. 5), No. IV, and No. III, Minshall, and Brazil Block—in some places extend into Edgar and Clark counties, Illinois (fig. 24). Drilling (fig. 25) has given evidence of these Indiana coal beds in Illinois at least as far down as No. III. The eastern outcrops of these beds are in Indiana, except for an outcrop of No. 7 coal bed (Indiana VI) in northeastern Edgar County. There has been little diamond drilling in Edgar and Clark counties west of Paris and Marshall, but it is probable that these coal horizons are present in the Marshall-Sidell syncline and crop out or approach the surface on the flanks or over the top of the Oakland anticline between Oakland and Martinsville. Coal beds lie at a relatively shallow depth near Oakland in northeastern Coles County, between the axes of the LaSalle and Oakland anticlines.

There is little reliable information concerning the coal beds of the lower McLeans-

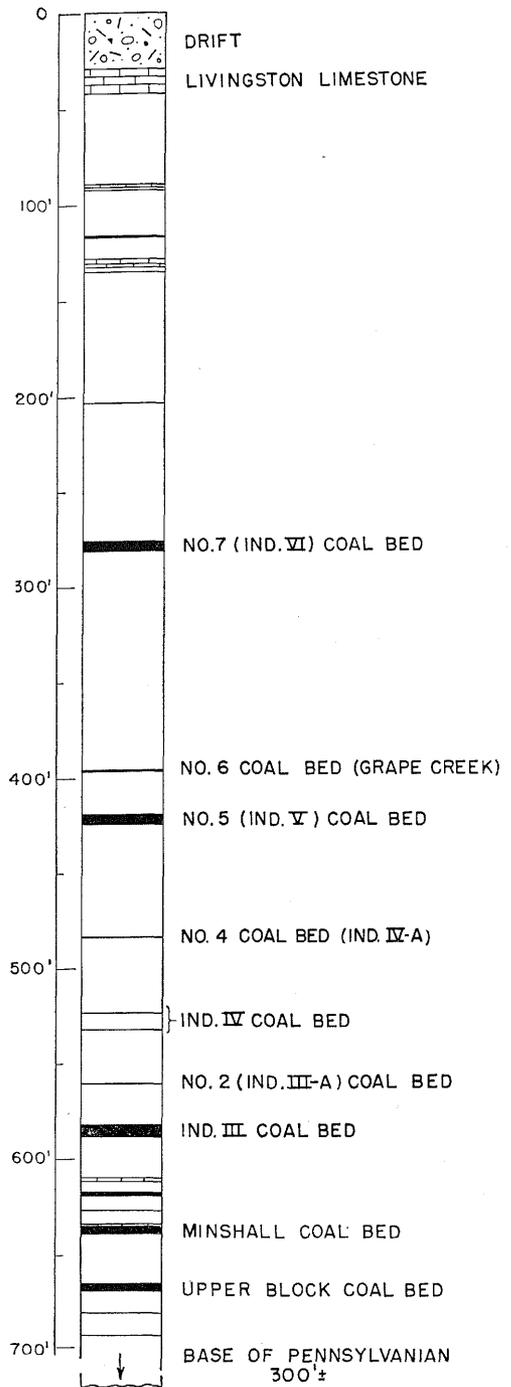


FIG. 24.—Generalized geologic column for Area 17.

<sup>17</sup>Cady, G. H., Summary list of areas in western, northern, and central Illinois recommended for special investigation as possibly suitable for strip-mining: Illinois Geol. Survey Circ. 19, pl. XIV, 1937.

Mylius, L. A., Oil and gas development and possibilities in east-central Illinois: Illinois Geol. Survey Bull. 54, pp. 82-83, 106-107, 1927.

Geological Survey of Illinois: Cumberland, Coles, and Douglas counties, vol. VI, pp. 98-111, 1875; Champaign, Edgar, and Ford counties, vol. IV, pp. 266-275, 1870; Clark County, vol. VI, pp. 9-21, 1875.

<sup>18</sup>In the Clinton, Indiana, field, Indiana VI coal bed is the same as Illinois No. 7 coal bed; in Sullivan County and southward, Indiana VI is apparently a lower coal.

## MINABLE COAL RESERVES

COAL RESOURCES: AREA 17  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Trowbridge . . . . .	8,396	7,611	—	—	16,007
Danville No. 7 . . . . .	109,404	517,323	1,163,339	—	1,790,066
Harrisburg No. 5 . . . . .	79,462	324,382	536,400	—	940,244
Indiana III . . . . .	108,687	455,131	651,865	—	1,215,683
Total . . . . .	305,948	1,304,448	2,351,604	—	3,962,000

boro and Carbondale groups west of the LaSalle anticline. No diamond drilling has gone deep enough to reach them. According to the Illinois Bureau of Labor Statistics report for 1884 the deepest coal mine then in Illinois worked a bed 3½ feet thick at a depth of 904 feet at Mattoon. A log of the shaft records a depth of only 840 feet to 3½ feet of coal.

A carefully logged rotary drill hole near the northwest corner of Cumberland County penetrated three coal beds reported to be 3 to 4 feet thick at 950, 1005, and 1025 feet, thought to represent No. 7, No. 6, and No. 5 coal beds, respectively. The coal bed mined for a short time in 1884 at Mattoon may have been one of these beds. Indications from electric logs of neighboring drill holes suggest that it was No. 7 coal. Drilling years ago by undescribed equipment in the vicinity of Charleston, according to four unreliable records, found a coal bed reported to be 4 to 5 feet thick at various depths between 450 and 550 feet. This coal may be the same as that at 840 (or 904) feet in the old mine at Mattoon, considering the rise at Charleston over the LaSalle anticline. About all that can be said about coal resources west of the anticline is that indications of at least one bed of coal at least 28 inches thick near Mattoon are good, and near Charleston weaker.

The Trowbridge coal occurs in a bed about 2 feet thick that underlies and is exposed locally in an area of several square miles adjacent to the valley of the Little Wabash River near Neoga. The coal has been mined both underground and by striping to supply local demand. None of the

mines produced more than a few tons a day. This coal bed lies approximately 400 feet above the Millersville limestone and 1000 feet above No. 6 coal bed.

AREA 18<sup>19</sup>

*Quadrangles: Northern tier — Taylorville (174), Unmapped (175), Dalton City (176), Sullivan (177). Southern tier — Nokomis (189), Pana (188), Shelbyville (187), Stewardson (186).*

Herrin (No. 6) coal bed underlies large portions of Area 18. Most of the northwest portion of Area 18 is underlain by the Springfield (No. 5) coal bed, and, at least at Assumption, two beds several hundred feet below the horizon of No. 6 coal bed have been worked. These have been called the Rock Island (No. 1) and the Murphysboro coal beds, but may represent the Davis and Dekoven beds of southern Illinois (fig. 25). The area underlain by the Assumption coal is undefined although it apparently extends as far north as Blue Mound.

<sup>19</sup>Cady, G. H., Summary list of areas in western, northern, and central Illinois recommended for special investigation as possibly suitable for strip mining: Illinois Geol. Survey Circ. 19, pl. XIV, 1937.

Du Bois, E. P., Subsurface studies of the Pennsylvanian system in Shelby, Moultrie, and parts of Effingham and Fayette counties, Illinois: Illinois Geol. Survey Rept. Inv. 156, 1951.

Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 65-83, 139-155, 204-216, 1915.

Payne, J. N., and Cady, G. H., Structure of Herrin (No. 6) coal bed in Christian and Montgomery counties and adjacent parts of Fayette, Macon, Sangamon, and Shelby counties: Illinois Geol. Survey Circ. 105, 1944.

Taylor, E. F., and Cady, G. H., Structure of the Millersville limestone in the north part of the Illinois basin: *Illinois Geol. Survey Rept. Inv. 93*, pp. 22-26, pl. 2, 1944.

Geological Survey of Illinois: Christian County, vol. VI, pp. 156-162, 1875; Moultrie, Macon, and Piatt counties, vol. VI, pp. 185-196, 1875; Shelby County, vol. VI, pp. 163-174, 1875; Montgomery County, vol. VI, pp. 149-155, 1875.

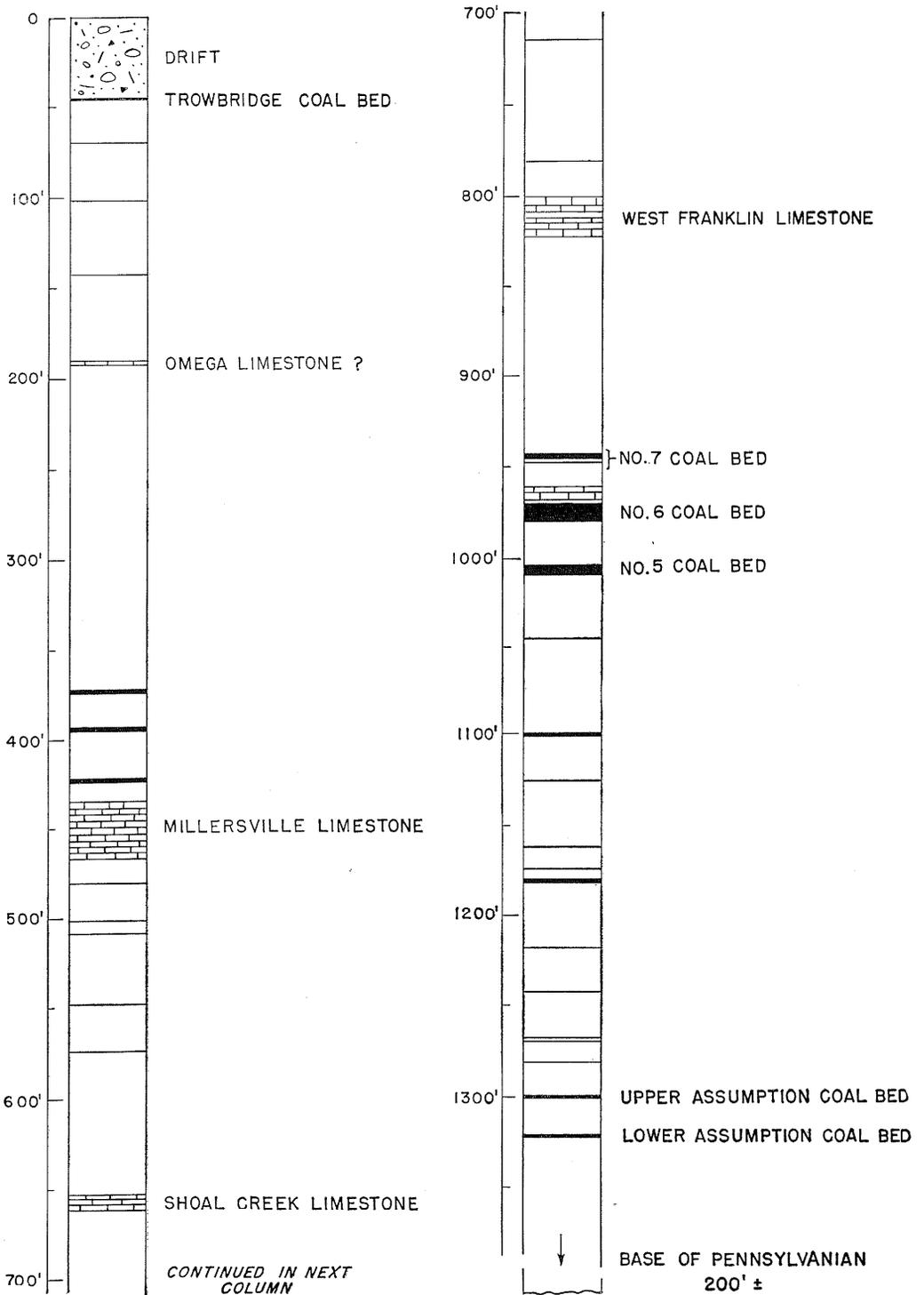


FIG. 25.—Generalized geologic column for Area 18.

## MINABLE COAL RESERVES

Dividing the area underlain by No. 6 coal bed into two main parts, that to the north and northwest and that to the southeast, is a large barren area lying between Pana and Taylorville, Pana and Moweaqua, and between Nokomis and the west boundary of the Area. It is commonly referred to as a sandstone "cut-out" area, and extends southward into Areas 22 and 23 (Madison and Bond counties) and eastward beyond Assumption an unexplored distance.

In addition to the No. 6, No. 5, and Assumption coal beds, a bed that may be the Danville (No. 7) coal is reported up to 42 inches thick in an area extending south from Pana into Area 23. Other isolated occurrences of this coal above minimum thickness have been reported near Nokomis and between Edinburg and Stonington.

At Lovington, Moultrie County, is an area underlain by a bed thought to be the Herrin (No. 6) coal. There are no diamond drill holes or shafts between Lovington and Moweaqua on the west and Lovington and Shelbyville on the south. It seems probable that the area of the cut-out extends east between Shelbyville and Sullivan.

The coal beds of the Carbondale and lower groups in this Area are at considerable depth; the mine at Assumption, for many years the deepest in the state, was

1004 feet deep. The mine at Lovington was 912 feet deep, those at Pana between 700 and 800 feet, and the one at Tower Hill 812 feet. In general the depth to the No. 6 coal decreases both northward and to the west, at Tovey being only 372 feet and at Nokomis 638 and 650 feet at two shafts. Reported occurrences of minable coals below No. 6 of uncertain correlation are totalled together in the tabulated lists of reserves.

There are also shallow-lying coal beds of generally workable thickness in the southeast quarter of the Area (Shelbyville and Stewardson quadrangles). The Shelbyville coal bed has been worked periodically for many years, mainly by small shafts along the Kaskaskia River northeast of Shelbyville. The same or another bed underlies several square miles in the vicinity of Fancher. The Trowbridge coal bed, thought to be somewhat higher than the Shelbyville bed, crops out along both sides of the Little Wabash River between Trowbridge and Neoga (Area 17). It is about 2 feet thick. The Shelbyville, Fancher, and Trowbridge coals have all been mined by shafts, slopes, and drifts. Portions of each bed apparently lie at strippable depth. There is information sufficient for classification only for the Trowbridge coal bed. It is generally thinner than 28 inches but some areas are probably strippable.

COAL RESOURCES: AREA 18  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Trowbridge . . . . .	—	262	—	—	262
Danville No. 7 . . . . .	56,334	108,937	—	—	165,271
Herrin No. 6 . . . . .	1,054,729	2,469,450	1,279,288	87,987	4,891,455
Springfield No. 5 . . . . .	84,839	547,506	592,779	393,533	1,618,658
Assumption . . . . .	—	9,534	69,181	—	78,715
Coals of unknown correlation lower than No. 6 . . . . .	7,945	—	6,375	—	14,320
Total . . . . .	1,203,847	3,135,689	1,947,624	481,520	6,768,680

AREA 19<sup>20</sup>

Quadrangles: Northern tier—Winchester (170), Jacksonville (171), Waverly (172), Divernon (173). Southern tier—Roodhouse (193), Greenfield (192), Carlinville (191), Raymond (190).

Area 19 extends eastward from the west margin of the Illinois coal field and includes the west side of the Macoupin-Montgomery counties mining district, extending from Carlinville to Chatham on the west and Pawnee, Divernon, and Thomasville on the east.

In a small area near Schopfer in Macoupin County the Danville (No. 7) coal bed attains a thickness of 28 to 35 inches. Because of the apparently limited extent of coal as much as 28 inches thick only classes I-A and I-B were mapped.

Mining in this Area is mainly restricted to the Herrin (No. 6) coal bed (fig. 26). This coal bed has been mined in an outlier near Murrayville and near Franklin, in Morgan County, possibly near Greenfield in Greene County, and along the stream valleys in the vicinity of Hagaman and Hettick in Macoupin County. The actual position of the west margin of the No. 6 coal bed is very indefinitely known, being concealed in many places by a fairly thick deposit of glacial drift. The coal along the margin is rarely close enough to the surface to be mined by stripping; there are no large strip mines in the Area.

Drilling in northwest Montgomery County and southern Sangamon County in the east quarter of Area 19 discovered areas of Springfield (No. 5) coal about 3 feet thick.

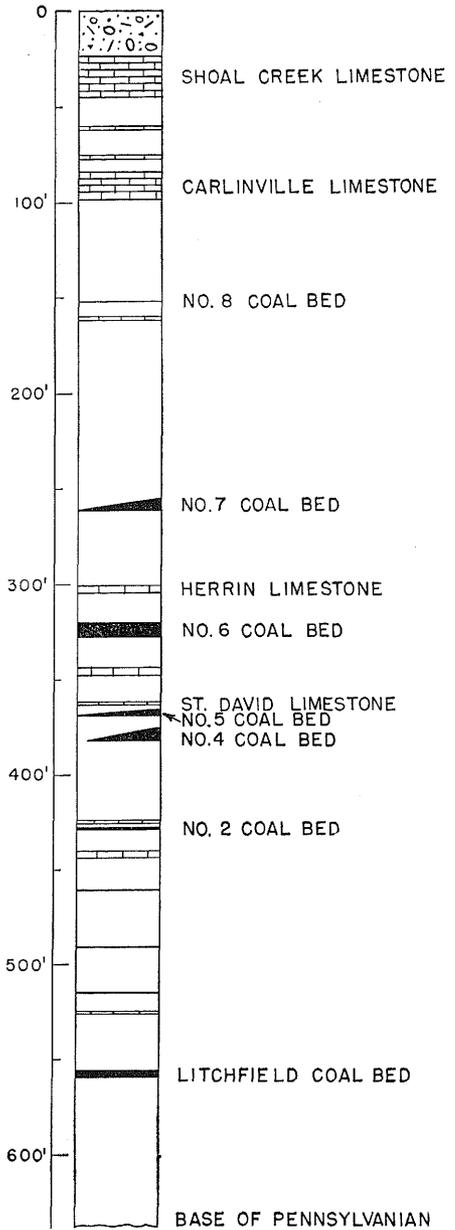


FIG. 26.—Generalized geologic column for Area 19.

Near Roodhouse and Greenfield there are lenticular deposits of what is believed to be Sumnum (No. 4) coal, although the identity of the coal bed at Greenfield is somewhat uncertain.

In Morgan, Scott, and Greene counties, the Colchester (No. 2) coal bed comes to

<sup>20</sup>Culver, H. E., Coal resources of District III (Western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 51-55, 91-94, 112-115, 1925.

Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, 1915.

Lines, E. H., Pennsylvanian fire clays of Illinois: In Illinois Geol. Survey Bull. 30, pp. 66-68, 1917.

Parnalee, C. W., and Schrover, C. R., Further investigation of Illinois fire clays: In Illinois Geol. Survey Bull. 38, pp. 350-352, 362-364, 1922. (Also Bull. 38D, extract from Bull. 38.)

Payne, J. N., Structure of Herrin (No. 6) coal bed in Macoupin County, eastern Jersey and Greene, southeastern Scott, and southern Morgan and Sangamon counties: Illinois Geol. Survey Circ. 88, 1942.

Geological Survey of Illinois: Greene County, vol. III, pp. 122-123, 1868; Macoupin County, vol. V, pp. 286-305, 1873; Montgomery County, vol. VI, pp. 149-155, 1875; Sangamon County, vol. V, pp. 306-319, 1873; Scott County, vol. III, pp. 134-144, 1868.

## MINABLE COAL RESERVES

COAL RESOURCES: AREA 19  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	6,487	9,024	—	—	15,510
Herrin No. 6 . . . . .	1,184,616	2,870,609	587,163	730,336	5,372,725
Springfield No. 5 . . . . .	60,906	321,804	601,459	—	984,170
Sumnum No. 4 . . . . .	18,294	6,905	—	—	25,199
Colchester No. 2 . . . . .	53,804	356,254	1,578,892	159,103	2,148,053
Litchfield . . . . .	8,172	59,724	—	—	67,896
Total . . . . .	1,332,279	3,624,320	2,767,515	889,439	8,613,552

its marginal outcrop near Carrollton, White Hall, Roodhouse, and Winchester. It is probable that this coal bed extends eastward under most of the Area, but drilling to a sufficient depth to reach it has been done in very few places. The reserves of this coal are essentially unknown except along its margin and at somewhat isolated points. In this Area the No. 2 coal bed is about 28 to 36 inches thick except near Schopfer where thicknesses of over 48 inches have been recorded in two drill holes; one is a diamond drill hole, but there is some uncertainty in regard to correlation. Along the west margin of the No. 2 coal bed there are important deposits of refractory clays underlying and extending beyond the margin of the coal bed, particularly at White Hall and Roodhouse. There has been some mining of the coal in connection with the mining or stripping of the underclay, but there has been little or no stripping of the coal alone.

A single diamond drill hole near Divernon penetrated over 4 feet of coal about 225 feet below No. 6 coal, which may be the same as the deepest bed mined at Litchfield (see Area 22). No other occurrence of this coal is known in Area 19, except in a small area extending north from Area 22 along the south border.

AREA 20<sup>21</sup>

*Quadrangles: Northern tier—Hannibal (166), Barry (167), Pittsfield (168),*

<sup>21</sup>Culver, H. E., Coal resources of District III (Western Illinois); Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 38-40, 95-98, 1925.

*Griggsville (169). Southern tier—Bowling Green (196), Nebo (195), Pearl (194).*

Area 20 contains a few scattered outliers of Pennsylvanian strata, mainly of Carbon-dale age, with some pockets of coal. On the east side of the Illinois River valley there is a 2 to 3 square-mile area of Colchester (No. 2) coal near Exeter (fig. 27). A fairly large area from Hadley to Griggsville in the northern tier of townships is underlain by the No. 2 coal bed. The Colchester (No. 2) coal bed is rarely more than 2 feet thick in the Area and averages about 18 inches. No other coal is known except for small pockets of coal 5 to 6 feet thick in solution pits in the Mississippian limestone along Hadley Creek north of Barry and Hadley. This coal appears to be older than the No. 2 coal bed although the relationships are not very clear. Refractory clays are commonly present below the No. 2 coal bed.

No coal reserves are mapped in Area 20.

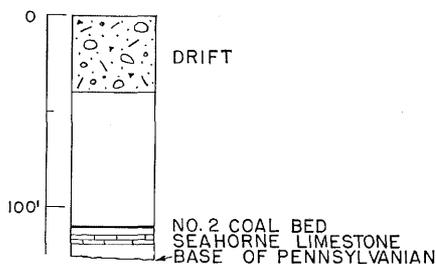


FIG. 27.—Generalized geologic column for Area 20.

Lamar, J. E., Refractory clays of Pike and Calhoun counties, Illinois; Illinois Geol. Survey Rept. Inv. 22, 1931.  
Parmelee, C. W., and Schroyer, C. R., Further investigations of Illinois fire clays; *Illinois Geol. Survey Bull.* 38, p. 366, 1922. (Also Bull. 38D, Extract from Bull. 38.)  
Geological Survey of Illinois: Calhoun County, vol. IV, pp. 1-23, 1870; Pike County, vol. IV, pp. 24-42, 1870.

AREAS 21 AND 22<sup>22</sup>

*Quadrangles: Northern tier — Hardin (197) (Area 21), Jerseyville (198), Brighton (199), Gillespie (200), Mt. Olive (201). Southern tier—Brussels (223) (Area 21), St. Charles (222), Alton (221), Edwardsville (220), New Douglas (219).*

Area 21 contains a thin discontinuous tongue of Pennsylvanian strata along the backbone ridge of Calhoun County. Small areas of Colchester (No. 2) coal commonly less than 2 feet thick are present. This coal was not included in the estimates of reserves.

Area 22 (fig. 28) lies east of the longitude of the mouth of the Illinois River. The margin of the Pennsylvanian strata forms an irregular crescent from the Mississippi valley west of Edwardsville, passing north of Alton and extending to a point about three miles west of Jerseyville, from which farthest point west it curves eastward toward the crossing of Macoupin

Creek where it again curves west toward Carrollton (Area 19).

Beginning about 150 feet below Herrin (No. 6) coal bed, four other coals are reported in some logs of diamond drill holes and have been observed in some drill cores. The coals are spaced in a stratigraphic interval of about 100 feet. The lowermost of these is the bed worked in a mine at Litchfield at a depth of 690 feet which was 56 inches thick, 240 feet below No. 6 coal bed and about 140 feet below No. 2. This coal is also recognized in a record of a diamond drill hole south of Mt. Olive in Macoupin County and was reported to be 61 inches thick. Churn drill hole records also report the Litchfield coal east of the town of Macoupin. One of the intermediate coal beds, the Wiley, is also classified in a small area south of Mt. Olive in Macoupin County. Probably the same coal bed has been penetrated in a few other places in the general vicinity of Litchfield. The correlation of these lower beds is uncertain. The three thinner beds each generally attain a thickness of 31 to 38 inches.

The Colchester (No. 2) coal bed which lies about 90 feet below Herrin (No. 6) has been worked underground at a number of places in the northwest part of the Alton quadrangle, particularly along the West Fork Wood River down to East Alton, and along the branches west of Wood River near North Alton. The bed here is 24 to 30 inches thick. Scattered diamond drill records in the central and northeastern portion of the Area reveal two beds at the

<sup>22</sup>Culver, H. E., Coal resources of District III (Western Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 29, pp. 38-40, 68-70, 1925.

Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 42-50, 89-114, 139-155, 1922.

Lee, Wallace, Description of the Gillespie and Mt. Olive quadrangles, Illinois: U. S. Geol. Survey Geol. Atlas Folio 220, 1926.

Payne, J. N., Structure of Herrin (No. 6) coal bed in Madison County and western Clinton, southern Macoupin, southwestern Montgomery, northern St. Clair, and northwestern Washington counties: Illinois Geol. Survey Circ. 71, 1941.

\_\_\_\_\_, Structure of Herrin (No. 6) coal bed in Macoupin County, eastern Jersey and Greene, southeastern Scott, and southern Morgan and Sangamon counties: Illinois Geol. Survey Circ. 88, 1942.

Geological Survey of Illinois: Bond County, vol. VI, pp. 128-134, 1875; Calhoun County, vol. IV, pp. 1-23, 1870; Jersey County, vol. III, pp. 104-121, 1868; Madison County, vol. I, pp. 313-326, 1866; Macoupin County, vol. V, pp. 286-305, 1873; Montgomery County, vol. VI, pp. 149-155, 1875.

COAL RESOURCES: AREA 22  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	10,482	—	—	—	10,482
Herrin No. 6 . . . . .	1,653,574	2,453,462	219,142	273,140	4,599,318
Harrisburg No. 5 . . . . .	17,607	109,264	325,600	—	452,471
Summum No. 4 . . . . .	13,657	36,995	67,585	—	118,237
Colchester No. 2 . . . . .	62,920	415,687	1,654,980	—	2,133,588
Wiley . . . . .	11,443	87,065	165,884	—	264,391
Litchfield . . . . .	19,622	196,216	941,587	—	1,157,425
Total . . . . .	1,789,305	3,298,688	3,374,778	273,140	8,735,911

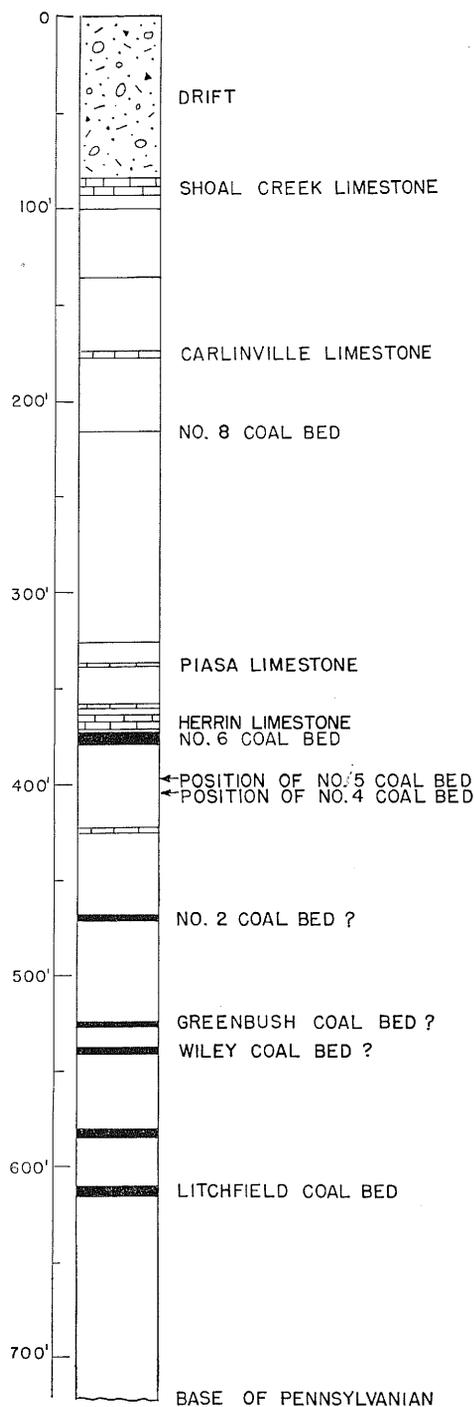


FIG. 28.—Generalized geologic column for Area 22.

position of the No. 2 coal. In some places the thickness exceeds 30 inches in both beds. The southeastern portion of Area 22 is unclassified because of lack of information.

Sumnum (No. 4) and Harrisburg (No. 5) coal beds are lenticular as revealed by several diamond and two churn drill hole records in the northeastern corner of Area 22. The thickness ranges to 67 inches in the No. 5 coal bed and to 96 inches in the No. 4 coal bed in a very short distance. Classification of areas of reserves for these coals could not be extended the normal distance from datum points because of the known erratic and lenticular character of these bodies of coal.

The west margin of the Herrin (No. 6) coal bed lies buried beneath the Mississippi valley alluvium west of Edwardsville. It extends in a general northerly direction, with a somewhat lobate outline, from the vicinity of Bethalto, three to four miles west of Medora and Kemper. The margin of the bed has never been accurately delineated, and it is probable that such mapping would require drilling information. This bed has been worked by shaft mines and at least one strip mine along the west margin, from near Bethalto to the vicinity of Fosterburg, and at other scattered localities. From Bethalto and Fosterburg and from the Mississippi valley below Bethalto eastward the No. 6 coal bed is believed to be continuous to the cut-out zone, which extends approximately north-south completely through Area 22 in western Montgomery, extreme western Bond, and eastern Madison counties. This irregular cut-out lies between Hornsby, Macoupin County, and Hillsboro, Montgomery County, in the northern portion of the Area and between Marine, Madison County, and Pocahontas, Bond County, in the south. The cut-out zone is 1 to 6 miles wide; east of it the No. 6 coal bed is again apparently continuous.

As far as records indicate, Danville (No. 7) coal bed is thin or absent in Area 22 except possibly in the vicinity of Delhi and Brighton in Jersey County. Here the coal has warranted classification only near the outcrops.

AREA 23<sup>23</sup>

Quadrangles: Northern tier—Hillsboro (202), Ramsey (203), St. Elmo (204), Unmapped (205). Southern tier—Greenville (218), Vandalia (217), Kimmundy (216), Unmapped (215).

There has been considerable mining in the northwest part of Area 23 near Hillsboro and Coffeen in Montgomery County but none elsewhere except for a mine once operated near Kimmundy.

The Herrin (No. 6) coal bed has been explored by diamond drill at scattered localities in the western half of the Area, but there has been no diamond drill exploration of strata below No. 6 coal bed (fig. 29). In the eastern part of the Area, except for the log of the shaft at Kimmundy, information in regard to Pennsylvanian strata is restricted to drillers' logs of churn drill and rotary drill holes, electric logs, and logs

compiled by members of the Coal Division of the Survey of some control rotary drill holes. Only the logs of control drill holes are used in estimating the coal of Class II-A.

The Herrin (No. 6) is the most important coal bed in Area 23, but becomes somewhat difficult to trace in the east half. Near Kimmundy a bed 50 inches thick at a depth of 856 feet was worked for some years. It was formerly regarded as No. 6, but is now thought by Siever to be Harrisburg (No. 5). A thin bed 7 feet higher, formerly thought to be a split from No. 6, is now regarded as the possible equivalent of No. 5A coal bed. The bed thought to be No. 6, 41 feet higher, is only 2 feet thick at Kimmundy.

No. 6 coal bed is thought to be thin or absent in a considerable part of the Area, particularly east of R. 2 E. and north of T. 3 N.

A coal bed thought to be the Danville (No. 7) coal has been reported to average about 3 feet in thickness in a number of drill holes in the northwest part of Fayette County in an area extending at least as far north as Pana in Area 18.

Information about the coal beds below No. 6 in Area 23 is very inadequate. Irregular areas underlain by No. 5 coal but not by No. 6 are believed to occur in the east quarter of Area 23. It is improbable that there are coal beds 28 inches or more in thickness below No. 5 coal bed, but better information than is yet available from drilling will be necessary to establish the facts.

<sup>23</sup>Du Bois, E. P., Geology and coal resources of a part of the Pennsylvanian system in Shelby, Moultrie, and portions of Effingham and Fayette counties, Illinois: Illinois Geol. Survey Rept. Inv. 156, 1951.

Kay, F. H., Coal resources of District VII: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 42-50, 83-88, 115-155, 204-216, 1922.

Lowenstam, H. A., Subsurface geology of Clay County: *In* Illinois Geol. Survey Rept. Inv. 148, pp. 27-50, 1951.

Siever, Raymond, Structure of Herrin (No. 6) coal bed in Marion and Fayette counties and adjacent parts of Bond, Clinton, Montgomery, Clay, Effingham, Washington, Jefferson, and Wayne counties: Illinois Geol. Survey Circ. 164, 1950.

Sims, P. K., Payne, J. N., and Cady, G. H., Pennsylvanian key beds of Wayne County and the structure of the "Shoal Creek" limestone and Herrin (No. 6) coal bed: *In* Illinois Geol. Survey Rept. Inv. 93, pp. 27-32, 1944.

Geological Survey of Illinois: Wayne and Clay counties, vol. VI, pp. 82-97, 1875; Fayette County, vol. VI, pp. 135-148, 1875; Marion County, vol. III, pp. 172-218, 1868; Montgomery County, vol. VI, pp. 149-155, 1875; Shelby County, vol. VI, pp. 163-174, 1875.

COAL RESOURCES: AREA 23  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	38,127	304,318	—	—	342,445
Herrin No. 6 . . . . .	711,115	2,578,429	2,669,684	559,829	6,519,057
Harrisburg No. 5 . . . . .	3,139	59,640	1,230,028	—	1,292,806
Total . . . . .	752,381	2,942,386	3,899,712	559,829	8,154,308

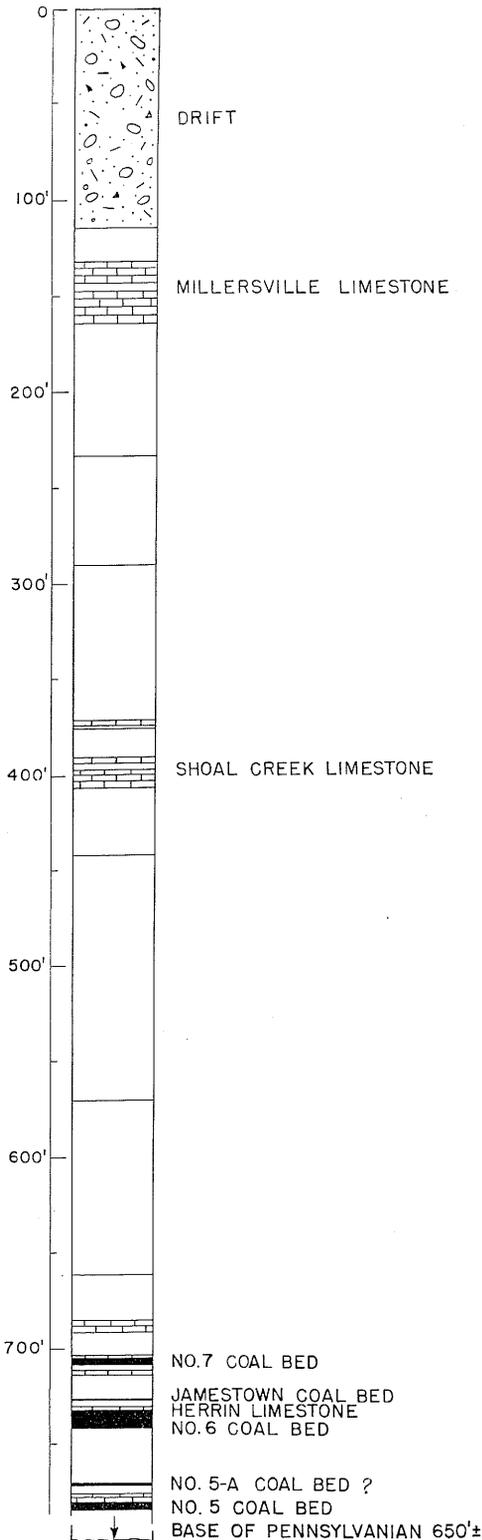


FIG. 29.—Generalized geologic column for Area 23.

AREA 24<sup>24</sup>

*Quadrangles: Northern tier—Unmapped (206), Greenup (207), Unmapped (208, 209). Southern tier—Unmapped (214), Newton (213), Hardinville (212), Birds (211).*

Area 24 lies across the deeper part of the Illinois Basin and northern part of the eastern Illinois oil fields. It is a region in which there is no coal mining except for an occasional shallow operation in a bed near the surface. The LaSalle anticline crosses the area, passing near the northeast corner of Jasper County, near Oblong in Crawford County, and near the northwest corner of Lawrence County.

On the east the Wabash River separates Indiana from Illinois, but not the Indiana coal field from that in Illinois, for the coals in Indiana from No. VII down to No. III continue into Illinois as shown by records of diamond drill holes in southern Clark County and in Crawford and Lawrence counties (fig. 30).

In northern Crawford and southern Clark counties the beds dip west from the state line for 10 or 12 miles and then rise toward the Oakland anticlinal belt which runs northward toward the northwest corner of Crawford County through Westfield and Kansas, and thence to the southwest corner of Vermilion County. Also there is apparently an overlapping of beds against this arch so that the coal beds of the lower Pennsylvanian pinch out, and only those in the upper Carbondale and in the McLeansboro group are present. Erosion has removed most of the upper part of the McLeansboro group if it was ever present. A thinning of the McLeansboro may also have taken place, for intervals between key

<sup>24</sup>Lowenstam, H. A., Subsurface geology of Clay County: In Illinois Geol. Survey Rept. of Inv. 148, pp. 27-50, 1951.

Mylius, L. A., Oil and gas development and possibilities in east-central Illinois: Illinois Geol. Survey Bull. 54, 1927.

Rolley, Mary B., and Williams, F. E., Pennsylvanian subsurface geology of Jasper County, Illinois: Illinois Geol. Survey, in progress.

Geological Survey of Illinois: Cumberland, Coles, and Douglas counties, vol. VI, pp. 98-111, 1875; Effingham County, vol. VI, pp. 75-184, 1875; Clark County, vol. VI, pp. 9-12, 1875; Crawford County, vol. VI, pp. 22-30, 1875; Clay and Wayne counties, vol. VI, pp. 82-97, 1875; Jasper County, vol. VI, pp. 31-36, 1875; Lawrence and Richland counties, vol. VI, pp. 37-50, 1875.

McLeansboro beds appear to decrease toward the Oakland and LaSalle anticlinal belts.

It is believed that, in eastern Crawford, southeastern Clark, and northeastern Lawrence counties, the Danville (No. 7), Jamestown, Herrin (No. 6), Harrisburg (No. 5), Indiana IV, and Indiana III coal beds can be traced 10 to 12 miles into Illinois from the Indiana coal fields. The Oakland anticlinal belt merges with the LaSalle anticline near Oblong, and the crest of the anticline plunges to the south and thus a thicker section of Pennsylvanian coal beds continues around the southern end of the anticline and probably into the Illinois Basin. Except along the east border there has been no core drilling in Area 24 and,

although some information is obtained by study of drillers' logs, and especially electric logs, and from observation at a number of control drill holes, the actual extent of the coal supplies in beds below No. 5 is largely a matter of conjecture. Some items of information are supplied by drillers and others who may have observed drilling operations. It seems probable that, although some of the coal beds found in Indiana may cross the position of the LaSalle anticline, the workable beds in the west half of Area 24 are probably fewer than to the east.

The coal resources in this Area are classified as no lower than Class II-A. There is not enough evidence to extend the presence of workable coal more than 4 miles from points of observation.

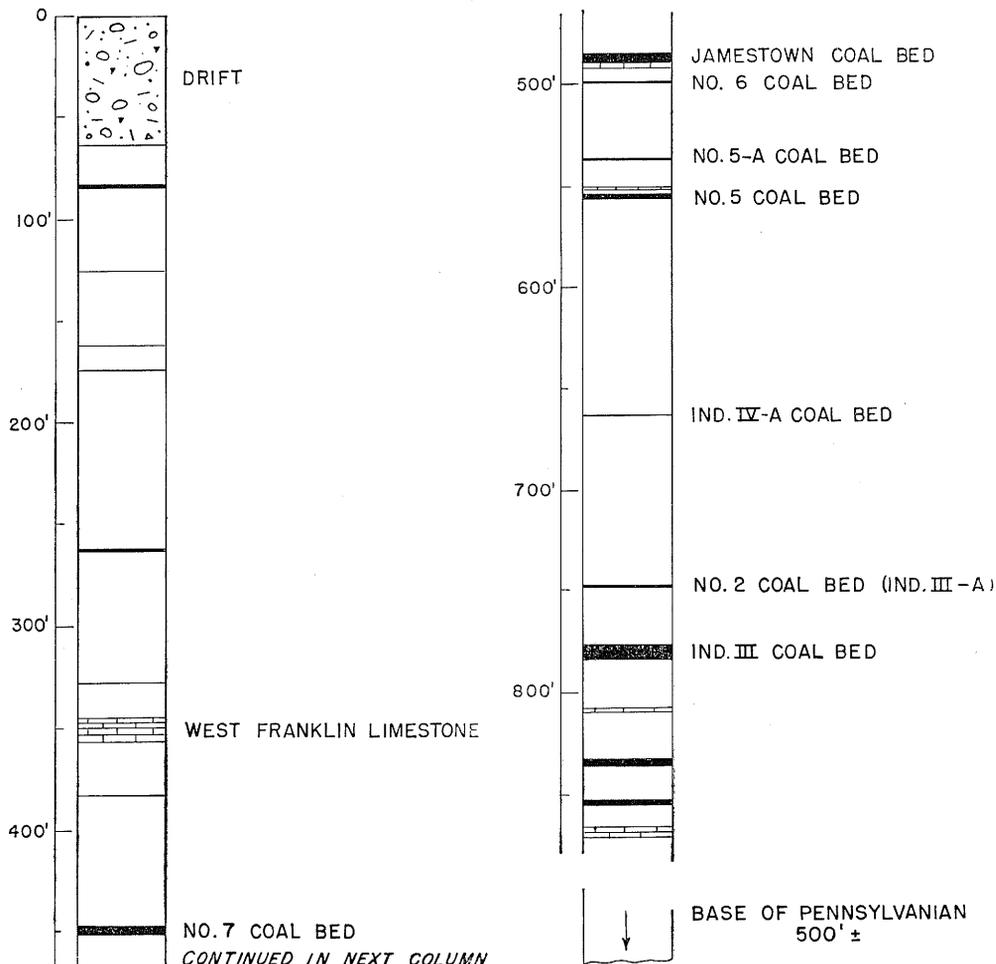


FIG. 30.—Generalized geologic column for Area 24.

## MINABLE COAL RESERVES

COAL RESOURCES: AREA 24  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Danville No. 7 . . . . .	34,853	125,356	189,811	—	350,020
Jamestown . . . . .	32,849	136,441	214,235	—	383,525
Herrin No. 6 . . . . .	17,244	137,438	3,959,894	386,681	4,501,256
Harrisburg No. 5 . . . . .	39,650	231,471	3,239,004	653,021	4,163,145
Indiana IV . . . . .	—	11,030	37,664	—	48,694
Indiana III . . . . .	17,235	134,009	301,226	—	452,469
Total . . . . .	141,830	775,745	7,941,833	1,039,701	9,899,110

AREA 25<sup>25</sup>

*Quadrangles: Northern tier — Flora (232), Olney (233), Sumner (234), Vincennes (235). Southern tier—Fairfield (240), Albion (239), Mt. Carmel (238), Princeton (237).*

Area 25 lies mainly in the southern part of the Illinois Basin with the structurally weak southern end of the LaSalle anticline crossing the northeast quarter near Bridgeport and St. Francisville. Around Bridgeport the McLeansboro group is about 550 to 600 feet thick whereas in Richland County it is about 950 to 1000 feet thick. There is a gradual rise of strata from the trough of the Basin in central Richland County to the east margin of Area 25 in Lawrence County, but the rise is not even, and here and there reverse slopes, providing traps for oil and gas in lower strata, are fairly frequent. In Edwards, Wabash, and northern White counties faulting is an important element of the structure. The faults and fault zones are more or less parallel to the Wabash River in a belt up to 15 miles wide, including parts of Indiana.

<sup>25</sup>Cady, G. H., *et al.*, Subsurface geology and coal resources of the Pennsylvanian system in certain counties of the Illinois Basin (Clay, Edwards, Gallatin, Hamilton, and Richland counties): Illinois Geol. Survey Rept. Inv. 148, 1951.

Harrison, J. A., Subsurface geology and coal resources of the Pennsylvanian system in White County, Illinois: Illinois Geol. Survey Rept. Inv. 153, 1951.

Leighton, M. M., *et al.*, Progress reports on subsurface studies of the Pennsylvanian system in the Illinois Basin: Illinois Geol. Survey Rept. Inv. 93, 1944.

Rolley, Mary B., Karstrom, Adabell, Parker, Margaret A., and Cady, G. H., Pennsylvanian subsurface geology of Wabash County, Illinois: Illinois Geol. Survey, in progress.

Geological Survey of Illinois: Edwards and Wabash counties, vol. VI, pp. 51-65, 1875; Lawrence and Richmond counties, vol. VI, pp. 37-50, 1875; Wayne and Clay counties, vol. VI, pp. 82-97, 1875; White and Hamilton counties, vol. VI, pp. 66-81, 1875.

The most complete record in the Area of the Pennsylvanian strata through the McLeansboro and most of the Carbondale groups was provided by the cores of two diamond drill holes near Bridgeport (secs. 7 and 18, T. 3 N., R. 12 W.) which penetrated Danville (No. 7), Jamestown, Herrin (No. 6), Harrisburg (No. 5), Indiana IV, No. 2 (Indiana III-A), and the Indiana III coal beds, several of which were 28 or more inches thick (fig. 31). Control rotary drill holes extended to the base of the Pennsylvanian system at several places, and in some of them, beds that may have been 3 to 4 feet thick or more were found at depths of about 1400 feet, 400 to 500 feet below No. 6 coal bed.

The upper portion of the McLeansboro group is found only in the west two-thirds of Area 25, the horizon of the Shoal Creek limestone occurring in most places beneath the glacial drift at about the longitude of Mt. Carmel and Sumner. A little west of this line the Friendsville coal bed, about 650 to 700 feet above the Herrin (No. 6) coal, lies near the surface. In places along a fairly narrow belt which extends nearly lengthwise across Wabash County and probably continues northward into southern Lawrence County, the Friendsville coal is at strippable depth.

The coals for which estimates of resources are made are the Friendsville, No. 7, Jamestown, No. 6, No. 5, Indiana IV, and Indiana III.

A few coal cuttings from some of the rotary drill holes in this area have been analyzed. (See discussion of coals in Clay and Wayne counties in Area 26.)

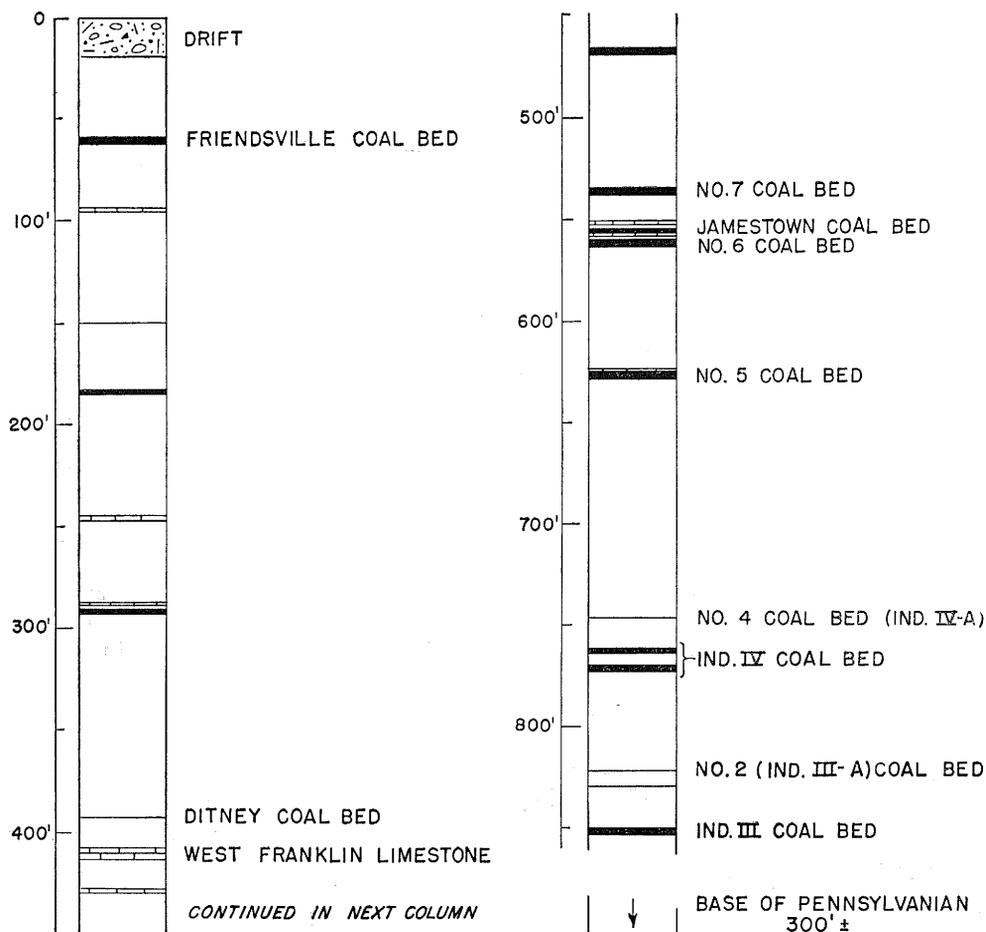


FIG. 31.—Generalized geologic column for Area 25.

COAL RESOURCES: AREA 25  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Friendsville . . . . .	—	24,449	70,018	5,388	99,855
Danville No. 7 . . . . .	9,068	44,739	30,752	—	84,559
Jamestown . . . . .	9,297	54,922	153,190	—	217,409
Herrin No. 6 . . . . .	7,678	74,646	4,024,584	328,720	4,435,628
Harrisburg No. 5 . . . . .	13,440	93,257	2,673,271	320,508	3,100,476
Indiana IV . . . . .	11,946	47,042	23,360	—	82,348
Indiana III . . . . .	4,086	48,576	12,459	—	65,121
<b>Total . . . . .</b>	<b>55,516</b>	<b>387,630</b>	<b>6,987,634</b>	<b>654,616</b>	<b>8,085,396</b>

AREA 26<sup>26</sup>

*Quadrangles: Northern tier—Carlyle (228), Centralia (229), Salem (230), Unmapped (231). Southern tier—Nashville (244), Ashley (243), Mt. Vernon (242), Wayne City (241).*

Area 26 lies across the west boundary of the Illinois Basin and the Du Quoin anticlinal belt, the east two-thirds of the area lying within the Illinois Basin. The active coal mining district is in the half of the Area west of the longitude of Mt. Vernon and Salem. Mining at Mt. Vernon and Salem was of short duration and ceased more than 25 years ago. There has been no other mining in Area 26 east of Odin. All mining has been in the Herrin (No. 6) coal bed (fig. 32) except for that at Salem, where Harrisburg (No. 5) was mined.

Diamond drilling, as well as mining, has been restricted to the west half of the Area

and has not extended below the No. 6 coal bed. Evidence of workable coal beds below No. 6 is therefore only in data obtained from churn and rotary drill holes and particularly from the control rotary drill holes for which the Pennsylvanian strata were logged by Coal Division staff members.

East of the Du Quoin anticline, the No. 6 coal bed is only 4½ feet thick at Mt. Vernon, and it is doubtful whether it is any thicker in eastern Marion and Jefferson counties. Rotary drill tests have been interpreted by Sims as indicating a prevailing thickness of 3 to 5 feet in Wayne County, and Lowenstam assigns a thickness of between 3 and 4½ feet to No. 6 coal over much of Clay County.

Siever has mapped a continuous channel sandstone cut-out of the No. 6 coal bed one to three miles wide, traced by electric logs of rotary drill holes, from Irvington, Washington County, to Keenville, Wayne County. This channel tends to narrow somewhat toward the west, where it bends south and possibly connects with a similar sandstone channel in western Jefferson and Franklin counties.

In general Area 26 appears to be underlain by little No. 5 coal 28 inches or more thick west of the Du Quoin anticline, although a coal bed 4½ feet thick once mined at Salem has been called No. 5 by Siever. It is thought by Sims that in Wayne County the No. 5 coal bed is between 3 and 5 feet thick, on the basis of evidence supplied by rotary drill holes, including some control drill holes. This coal bed lies 60 to 100 feet below No. 6 coal bed in Wayne County. Lowenstam places the No. 5 coal bed 34-74 feet below No. 6 bed in Clay County, with

<sup>26</sup>Kay, F. H., coal resources of District VI (Southwestern Illinois), Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 50-65, 115-138, 169-204, 1922.  
 Lowenstam, H. A., Geology of Clay County: In Illinois Geol. Survey Rept. Inv. 148, pp. 27-50, 1951.  
 Prescott, G. W., Subsurface stratigraphy of Pennsylvanian formations associated with coal No. 6, in the region of Centralia, Illinois: Trans. Illinois Acad. Sci., vol. 31, no. 2, pp. 184-186, 1938. Also Illinois Geol. Survey Circ. 53.  
 Shaw, E. W., Description of the Carlyle-Centralia quadrangles: U. S. Geol. Survey Geol. Atlas Folio 216, 1923.  
 Siever, Raymond, Structure of Herrin (No. 6) coal bed in Marion and Fayette counties and adjacent parts of Bond, Clinton, Montgomery, Clay, Effingham, Washington, Jefferson, and Wayne counties: Illinois Geol. Survey Circ. 164, 1950.  
 \_\_\_\_\_, The Mississippian-Pennsylvanian unconformity in southern Illinois: Bull. Am. Assoc. Petr. Geol., vol. 35, no. 3, pp. 542-581, 1951. Also Illinois Geol. Survey Rept. Inv. 152, 1951.  
 Sims, P. K., Payne, J. N., and Cady, G. H., Pennsylvanian key beds of Wayne County and the structure of the "Shoal Creek" limestone and the Herrin (No. 6) coal bed: In Illinois Geol. Survey Rept. Inv. 93, pp. 27-32, 1944.  
 Weller, J. M., and Bell, A. H., The geology and oil and gas possibilities of parts of Marion and Clay counties, with a discussion of the central portion of the Illinois Basin: Illinois Geol. Survey Rept. Inv. 40, 1936.  
 Geological Survey of Illinois: Clinton County, vol. III, pp. 172-191, 1868; Jefferson County, vol. III, pp. 219-238, 1868; Marion County, vol. III, pp. 172-218, 1868; Wayne and Clay counties, vol. VI, pp. 82-97, 1875; Washington County, vol. III, pp. 145-171, 1868.

COAL RESOURCES: AREA 26  
 (In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	251,170	1,558,908	4,936,768	553,604	7,300,449
Harrisburg No. 5 . . . . .	7,617	104,326	2,389,743	845,577	3,347,263
Total . . . . .	258,787	1,663,234	7,326,511	1,399,181	10,647,712

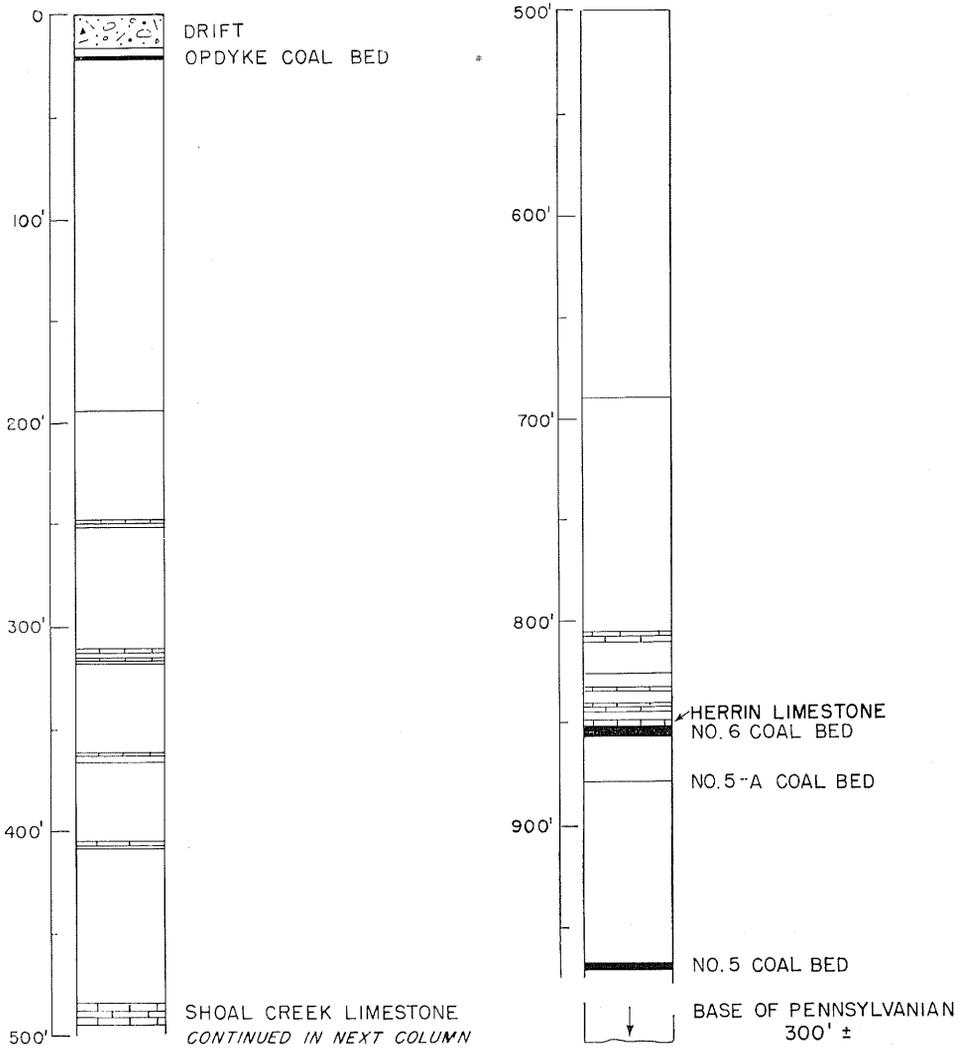


FIG. 32.—Generalized geologic column for Area 26.

thicknesses that may vary from 2 to 7 feet. However, as data from rotary drill electric logs are known to be unsatisfactory in determining thickness, there have been no estimates of the quantity of coal in this bed in Clay County in any category higher than Class II-A.

Although drilling has penetrated coal beds below No. 5, evidence is inconclusive as to their thickness and no attempt was made to estimate the amount of coal represented by them. Some of the deep-lying coal beds mentioned in the discussion of Area 25 are apparently present in at least the eastern part of Area 26.

AREA 27<sup>27</sup>

Quadrangles: Northern tier—St. Louis Special (224 & 225), Belleville (226), Breese (227). Southern tier—Kimmswick (248), Waterloo (247), New Athens (246), Okawville (245).

Area 27 lies along the west margin of the Illinois coal field. In the border zone near the boundary of the Pennsylvanian, the Herrin (No. 6), Harrisburg (No. 5), and Colchester (No. 2) coal beds are known to be present (fig. 33). The No. 2 coal bed, about 18 to 21 inches thick, has at times been exposed in ravines in the S. 1/2 sec. 9, T. 1 N., R. 9 W., and is found in some drill holes to the east. The No. 5 coal bed is proved only at scattered localities in the west-central part of Area 27. Because of its known variability resources were classified only Class II-B beyond the scattered datum points. However, the amount of diamond drilling below No. 6 bed in this area has been very small, and the No. 5 coal bed has not been adequately explored to determine its distribution.

The No. 6 coal bed is believed to be widespread east of its margin, except for an indefinitely outlined barren area in south-

<sup>27</sup>Cady, G. H., Coal stripping possibilities in southern and southwestern Illinois: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 31, 1927.

Kay, F. H., Coal resources of District VI (Southwestern Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 50-65, 101-112, 155-204, 1922.

Payne, J. N., Structure of Herrin (No. 6) coal bed in Madison County and western Bond, western Clinton, southern Macoupin, southwestern Montgomery, northern St. Clair, and northwestern Washington counties: Illinois Geol. Survey Circ. 71, 1941.

Shaw, E. W., Description of the New Athens and Okawville quadrangles: U. S. Geol. Survey Geol. Atlas Folio 213, 1922.

Udden, J. A., and Shaw, E. W., Description of Belleville and Breese quadrangles: U. S. Geol. Survey Geol. Atlas Folio 195, 1915.

Geological Survey of Illinois: Clinton County, vol. III, pp. 172-191, 1868; Madison County, vol. I, pp. 313-326, 1866; Monroe County, vol. V, pp. 266-285, 1873; St. Clair County, vol. I, pp. 297-312, 1866; Washington County, vol. III, pp. 145-171, 1868.

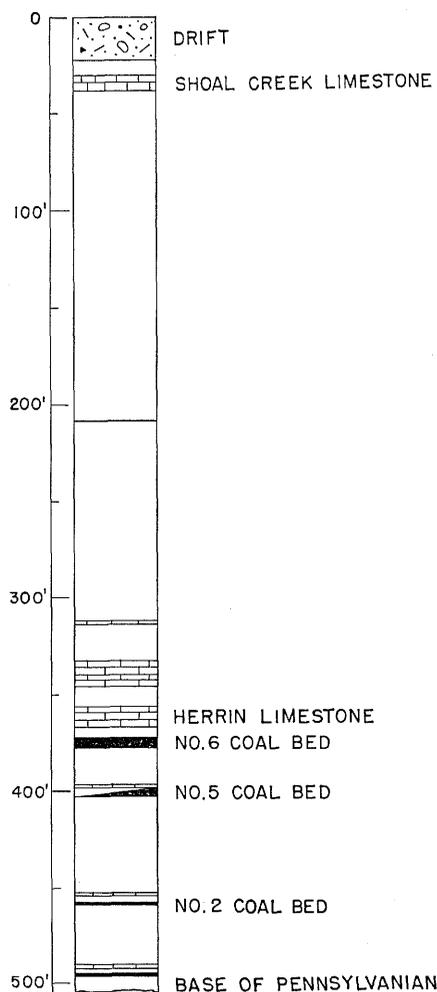


FIG. 33.—Generalized geologic column for Area 27.

eastern Madison County, which is the continuation of a similar barren area in Area 22.

Because of the indefinite information about coal beds other than No. 6 and No. 5

## COAL RESOURCES: AREA 27

(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6	1,284,473	2,367,843	1,584,376	87,437	5,324,130
Harrisburg No. 5	18,920	2,485	5,902	1,171,211	1,198,517
Total	1,303,393	2,370,328	1,590,277	1,258,648	6,522,647

in this area, no attempt was made to estimate the reserves in such beds.

A small outlier of Pennsylvanian beds probably containing small areas of both No. 6 and No. 5 coals lies northwest of Waterloo. The east side of this outlier is defined by a fault.

AREA 28 AND 29<sup>28</sup>

*Quadrangles: Northern tier — Crystal City (249) (Area 28), Renault (250) (Area 28), Baldwin (251), Coulterville (252), Pinckneyville (253), Du Quoin (254). Southern tier—Weingarten (268) (Area 28), Chester (267), Campbell Hill (266), Murphysboro (265), Herrin (264).*

Except for a small area underlain by the Pennsylvanian beds west of the Kaskaskia River mostly in St. Clair County in

Area 28, the coal-bearing strata are restricted to Area 29. Within Area 29 Harrisburg (No. 5) and Herrin (No. 6) coal beds have been mined, and also the Murphysboro coal bed (fig. 34). The Murphysboro coal bed has been largely worked out in the vicinity of Murphysboro, but there is known to be some of this coal of workable thickness in the northern part of Jackson County. It is not definitely known outside Jackson County in this Area.

The No. 6 coal bed is believed to be widespread in the part of Area 29 underlain by the McLeansboro group, as indicated by the Geological Map of Illinois, except for a large split-coal and cut-out area between Du Quoin in Perry County and Christopher in Franklin County, between Big Muddy River and Sesser, Valier, Christopher, and Zeigler, and extending almost entirely across Franklin County from north to south. A channel sandstone that forms part of this barren area appears to be continuous with similar channel sandstone which extends across the southern half of Area 26.

No. 5 coal in Area 29 is discontinuous. One fairly large area extends from a point near Sparta, Randolph County, to Willisville and Cutler, Perry County. A second area, where No. 5 is being mined, is near Elkhville. This bed seems to be essentially continuous eastward from the Du Quoin anticline. No. 5 coal bed has not been extensively mined underground, although small mines have been operating for many years near Sparta. It is stripped near Percy,

<sup>28</sup>Cady, G. H., Coal resources of District VI: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 15, 1916.

—, Coal resources of District II (Jackson County): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 16, 1917.

—, Coal stripping possibilities in southern and southwestern Illinois: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 31, 1927.

—, Benson, E. T., Taylor, E. F., and others, Structure of Herrin (No. 6) coal bed in central and southern Jefferson, southeastern Washington, Franklin, Williamson, Jackson, and eastern Perry counties, Illinois: Illinois Geol. Survey Circ. 24, 1938.

—, Structure of Herrin (No. 6) coal bed in Randolph, western Perry, southwestern Washington, and southeastern St. Clair counties: Illinois Geol. Survey Circ. 58, 1940.

Kay, F. H., Coal resources of District VI (Southwestern Illinois): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, pp. 169-204, 1922.

Shaw, E. W., and Savage, T. E., Description of the Murphysboro and Herrin quadrangles: U. S. Geol. Survey Geol. Atlas Folio 185, 1913.

Geological Survey of Illinois: Franklin and Williamson counties, vol. VI, pp. 112-127, 1875; Monroe County, vol. V, pp. 266-285, 1874; Jackson County, vol. III, pp. 58-83, 1868; Perry County, vol. III, pp. 84-103, 1868; Randolph County, vol. I, pp. 278-298, 1866; St. Clair County, vol. I, pp. 297-312, 1866; Washington County, vol. III, pp. 145-171, 1868.

COAL RESOURCES: AREA 29  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6	2,158,396	1,684,314	807,707	—	4,650,417
Harrisburg No. 5	539,205	1,141,075	278,725	17,890	1,976,895
Dekoven	235	16,007	61,164	—	77,407
Davis	2,648	30,634	95,781	—	129,064
Campbell Hill	8,833	—	—	—	8,833
Bald Hill	14,768	12,590	—	—	27,359
Murphysboro	9,057	—	27,833	124,343	161,233
Total	2,733,142	2,884,621	1,271,211	142,233	7,031,207

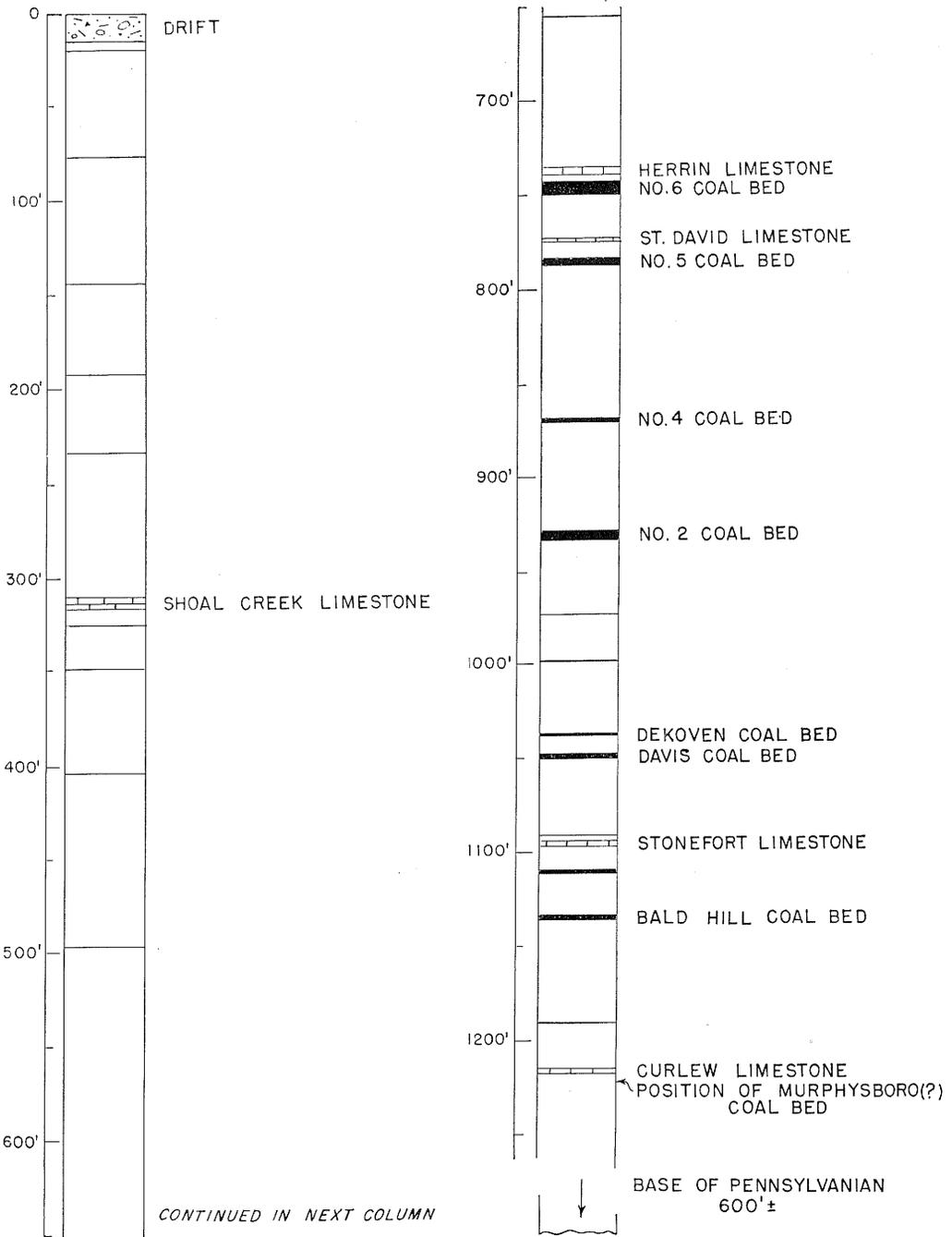


FIG. 34.—Generalized geologic column for Area 29.

Perry County, near Elkville, Jackson County, and west of Carterville in Williamson County. The interval between No. 5 and No. 6 coal beds in Area 29 is commonly between 25 and 40 feet but in places is less than 25 feet.

In Perry and Randolph counties there has been very little diamond drilling below No. 6 coal bed except in the marginal tracts where both No. 6 and No. 5 are strippable. There are a few fairly deep diamond drill holes near St. John, Perry County, near Herrin, Williamson County, and in adjacent parts of Area 30 to the east, from which there is some information about coal beds below No. 5. A bed probably representing No. 2 was penetrated in several places in Randolph County where it is probably fairly widely distributed but generally thin. The Pennsylvanian section thins considerably across the Du Quoin anticline. In Williamson and Franklin counties cores of No. 4, No. 2, Davis, Dekoven, Stonefort, and Bald Hill coal beds more than 28 inches thick have been recovered from drill holes. Some of these beds thicken and reach a thickness of 28 inches in Area 30 to the east.

Of this group of coals, Bald Hill, Davis, and Dekoven have been classified as reserves. In the vicinity of Campbell Hill in northeastern Jackson County a coal which may be the equivalent of the Davis Coal or an older coal has been reported in small mines to attain a thickness in excess of four feet.

Area 29 lies on the west border of the Franklin-Williamson counties mining district, and much of the No. 6 coal bed has been worked out in this area.

#### AREAS 30 AND 31<sup>29</sup>

*Quadrangles: Northern tier—Ina (255), McLeansboro (256), Enfield (257), Carmi (258), New Harmony (259) (Area 31). Southern tier — West Frankfort (263) Galatia (262), Eldorado (261), New Haven (260).*

Areas 30 and 31 lie across the southern end of the Illinois Basin. Area 30 is one

<sup>29</sup>Cady, G. H., The geology and coal resources of the West Frankfort quadrangle. Illinois: *In* Illinois Geol. Survey Bull. 16, pp. 244-265, 1910.

\_\_\_\_\_, Coal resources of District VI: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 11, 1916.

of the largest coal-producing areas in the state. Within Franklin, Williamson, and Jefferson counties the coal that is mined is almost entirely from Herrin (No. 6) coal bed (fig. 35). In Saline County and in a small portion of eastern Williamson County, underground mines produce entirely from Harrisburg (No. 5) coal bed. In Jefferson County a mine near Waltonville and a recently abandoned mine at Nason have operated in the Herrin (No. 6) coal bed. In Hamilton County there are no mines but drilling has shown that both No. 6 and No. 5 beds occur here at least 5 feet thick especially in the southern part of the County. The mine at Norris City which worked No. 6 coal bed has been the only mine in White County. There are no mines in Gallatin County in this Area but both No. 5 and No. 6 coal beds are present.

No. 5 coal is mined just south of Area 30 in Gallatin County, but mining, if extensively undertaken in Gallatin County, will be somewhat hampered by faults of the Wabash valley fault belt which continues northeastward into White and Wabash counties (Area 25).

Diamond drill exploration of the Coal Measures below the Harrisburg (No. 5) coal bed has been carried on in Franklin, Williamson, and Gallatin counties and near

\_\_\_\_\_, Coal resources of District V (Saline and Gallatin counties): Illinois Geol. Survey Coop. Min. Inv. Series Bull. 19, 1919.

\_\_\_\_\_, Structure of parts of northeastern Williamson and western Saline counties: Illinois Geol. Survey Rept. Inv. 2, 1925.

\_\_\_\_\_, Taylor, E. F., Boley, C. C., and others, Structure of Herrin (No. 6) coal bed in Hamilton, White, Saline, and Gallatin counties, Illinois, north of Shawneetown fault: Illinois Geol. Survey Circ. 42, 1939.

\_\_\_\_\_, Benson, E. T., Taylor E. F., and others, Structure of Herrin (No. 6) coal bed in central and southern Jefferson, southeastern Washington, Franklin, Williamson, Jackson, and eastern Perry counties, Illinois: Illinois Geol. Survey Circ. 24, 1941.

\_\_\_\_\_, Coal resources of Franklin County, Illinois: Trans. Illinois Acad. Sci., vol. 41, pp. 65-76, 1948. Also Illinois Geol. Survey Circ. 151, 1949.

DeWolf, F. W., Coal investigations in the Saline-Gallatin field, Illinois, and adjoining areas: *In* Illinois Geol. Survey Bull. 8, pp. 211-229, 1907.

\_\_\_\_\_, Coal investigations in Saline and Williamson counties: *In* Illinois Geol. Survey Bull. 8, pp. 230-245, 1907.

English, R. M., and Grogan, R. M., Omaha pool and mica-peridotite intrusives, Gallatin County, Illinois: Am. Assoc. Petr. Geol., Structure of typical American oil fields, vol. 3, 1948. Also Illinois Geol. Survey Rept. Inv. 130, 1948.

Pullen, M. W., Jr., Subsurface geology of Gallatin County: *In* Illinois Geol. Survey Rept. Inv. 148, pp. 69-95, 1951.

Rolley, Mary B., Subsurface geology of Hamilton County: *In* Illinois Geol. Survey Rept. Inv. 148, pp. 96-110, 1951.

Udden, J. A., The Delafield drill core: *In* Illinois Geol. Survey Bull. 4, pp. 203-211, 1907.

\_\_\_\_\_, Diamond drill core from Franklin County: *In* Illinois Geol. Survey Bull. 16, pp. 300-316, 1910.

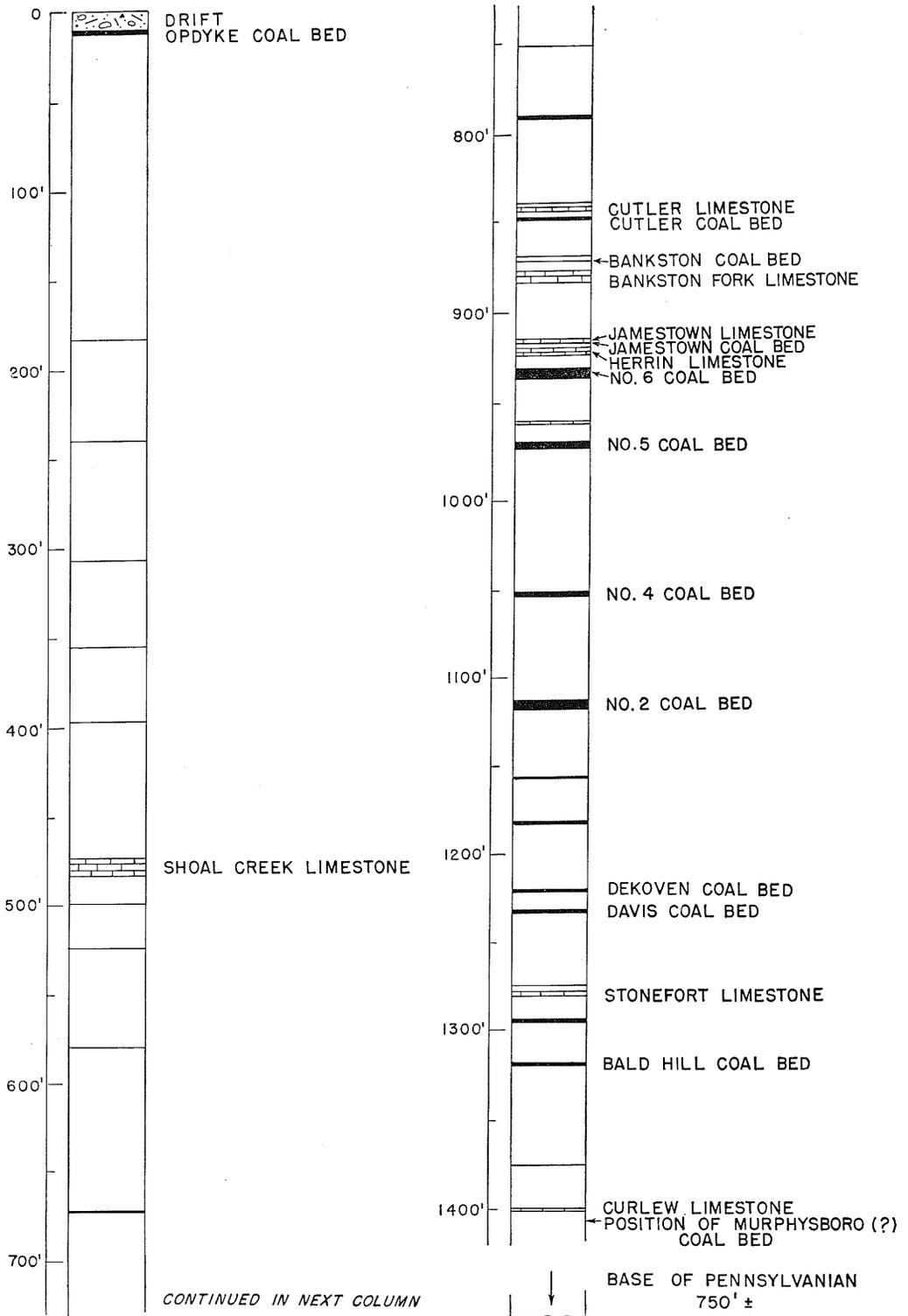


FIG. 35.—Generalized geologic column for Areas 30 and 31.

New Haven in southeastern White County. In the few diamond drill holes that have penetrated to a sufficient depth, No. 4, No. 2, Dekoven, Davis, Stonefort, Bald Hill and Murphysboro (?) and a few miscellaneous coal beds have been found; only the Dekoven and the Davis coal beds seem to be 28 inches or more thick in a considerable proportion of the holes. Reserve classification has been made locally for several of these coal beds. No. 2 coal was between 4 and 5 feet thick in one hole, but it is generally less than 2 feet thick. The distribution of diamond drill holes reaching these lower coals is very uneven, there being none between Franklin County and New Haven. In the tabulated list, local occurrence of coals of uncertain correlation below No. 6 have been considered in one total of reserves.

Around Belle Rive in eastern Jefferson County (Ina and McLeansboro quadrangles) there is a considerable area underlain at shallow depth by a coal bed about 20 to 24 inches thick, known as the Opdyke coal. This coal is between 800 and 900 feet above the base of the McLeansboro group. No reserves were computed for this coal. Other thin coal beds crop out here and there in the northern part of the Area southeast of Macedonia in McLeansboro quadrangle (secs. 3, 4, and 5, T. 6 S., R. 5 E., Hamilton County) but none is sufficiently thick to be included in this inventory. Detailed mapping of the beds has never been undertaken.

The continuity of the No. 5 and No. 6 coal beds in this Area is remarkable. The thickness of each, of at least 4 feet, seems to prevail except possibly in the east half of Jefferson and the north half of Hamilton and White counties. These areas have not been core-drilled except for a hole near Delafield and one about 4 miles north of McLeansboro, drilled many years ago. At Delafield a bed 5 feet 3 inches thick of No. 6 coal was found at 915 feet, and 7 feet 6 inches of No. 6 and 5 feet 1 inch of No. 5 are reported in the log of the other hole, No. 6 at a depth of 1020 feet and No. 5 80 feet lower. Only the core of the Delafield drill hole was seen by a member of the Survey staff. At Norris City, the farthest point north in White County where reliable data are available on the thickness of No. 6 coal bed, its average thickness is reported as 5 feet.

Crossing the southwest quarter of Area 30 in Williamson and Saline counties, the Cottage Grove anticlinal and fault belt considerably disturbs the strata and creates difficulties in mining. Differences in the altitude of the coal beds of about 200 feet within a mile or less are found along this zone.

In parts of Saline County and as far northeast as Omaha in Gallatin County igneous dikes and sills have entered the Pennsylvanian beds in a number of places, and wherever they cross the coal beds, associated coal has been altered to coke.

COAL RESOURCES: AREA 30  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	2,814,750	3,513,201	3,864,774	—	10,192,725
Harrisburg No. 5 . . . . .	1,487,647	2,629,151	4,515,450	7,193	8,639,441
Summum No. 4 . . . . .	4,767	4,767	—	—	9,534
Colchester No. 2 . . . . .	—	7,768	—	—	7,768
Dekoven . . . . .	24,133	280,914	1,043,802	—	1,348,849
Davis . . . . .	33,115	426,207	1,177,181	209,426	1,845,929
Stonefort . . . . .	4,540	—	—	—	4,540
Bald Hill . . . . .	12,476	26,443	—	—	38,919
Coals of unknown correlation lower than No. 6 . . . . .	3,178	—	—	—	3,178
Total . . . . .	4,384,606	6,888,452	10,601,206	216,619	22,090,882

## MINABLE COAL RESERVES

COAL RESOURCES: AREA 31  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	—	—	65,373	—	65,373
Harrisburg No. 5 . . . . .	—	—	65,373	—	65,373
Total . . . . .	—	—	130,747	—	130,747

AREA 32<sup>30</sup>

*Quadrangles: Northern tier — Marion (272), Harrisburg (273), Equality (274), Shawneetown (275). Southern tier—Vienna (279), Brownfield (278), Golconda (277), Cave in Rock (276).*

Coal reserves that were tabulated in the inventory are all found in the northern tier of quadrangles of Area 32. The Area includes the largely undeveloped reserves of the highest-rank Illinois coal, in the Eagle Valley syncline south of the Shawneetown fault. Except for Eagle Valley, the south margin of the main southern Illinois coal field in which Harrisburg (No. 5) and Herrin (No. 6) coal beds are worked lies in the northern tier of townships (T. 9 S.). The south margin of the Dekoven and Davis coal beds does not extend south of T. 10 S., except possibly locally in northeastern Hardin County (fig. 36).

In T. 11 S., in Pope and Johnson counties (Marion and Harrisburg quadrangles) there are some apparently lenticular bodies of coal representing the Bald Hill (near Stonefort), the Murphysboro (?) (near

New Burnside), the Delwood, Upper and Lower Willis (Reynoldsburg?), and Battery Rock coals, and possibly other coal beds. Here and there they attain a thickness of 28 inches or more. They have been worked as a source of coal for local use of truck trade. Of these lower coals, the Dekoven, Davis, Bald Hill, and Willis coal beds are locally included in classified reserves.

This Area contains bodies of workable coal representing all the coal horizons of the state in the Carbondale, Tradewater, and Caseyville groups, except No. 2, which is not known to reach a thickness of 28 inches. An area of unknown size is underlain by No. 4 bed near Marion where it was once worked by shaft mining. The No. 6 and No. 5 beds crop out in the northern tier of townships or abut against the Shawneetown fault. The eastward extension of the Cottage Grove fault zone is near Cottage Grove in R. 7 E. The northeast part of Area 32 is considerably broken by faults. The south margin of Pleistocene glaciation in Illinois crosses the Area in an irregular line with a sharp northward indentation at the latitude of Carrier Mills, but the surface beyond the margin of the glacial till is covered with several feet of loess that blankets the bedrock.

The stratigraphic and structural geology of this region has never been systematically and thoroughly described; neither this brief comment nor the columnar section (fig. 36) can provide more than a very generalized and over-simplified conception of the geology of the Pennsylvanian sediments in this Area. The best and most complete

<sup>30</sup>Brokaw, A. D., Parts of Saline, Johnson, Pope, and Williamson counties: *In* Illinois Geol. Survey Bull. 35, pp. 11-18, 1917.

Butts, Charles, Geology and mineral resources of the Equality-Shawneetown area; Illinois Geol. Survey Bull. 47, 1925.

Cady, G. H., Coal resources of District VI: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 15, 1916.

Coal resources of District V: Illinois Geol. Survey Coop. Min. Inv. Series Bull. 19, 1919.

The areal geology of Saline County: *Trans. Illinois Acad. Sci.*, vol. 19, pp. 250-272, 1926.

St. Clair, Stuart, Parts of Williamson, Union, and Jackson counties: *In* Illinois Geol. Survey Bull. 35, pp. 19-55, 1917.

Weller, J. M., Geology and oil possibilities of extreme southern Illinois—Union, Johnson, Pope, Hardin, Alexander, Pulaski, and Massac counties: Illinois Geol. Survey Rept. Inv. 71, 1940.

Geological Survey of Illinois: Gallatin County, vol. VI, pp. 197-219, 1875; Hardin County, vol. I, pp. 350-375, 1866; Johnson County, vol. I, pp. 376-409, 1866; Pope County, vol. I, pp. 428-493, 1866; Williamson and Franklin counties, vol. VI, pp. 112-127, 1875.

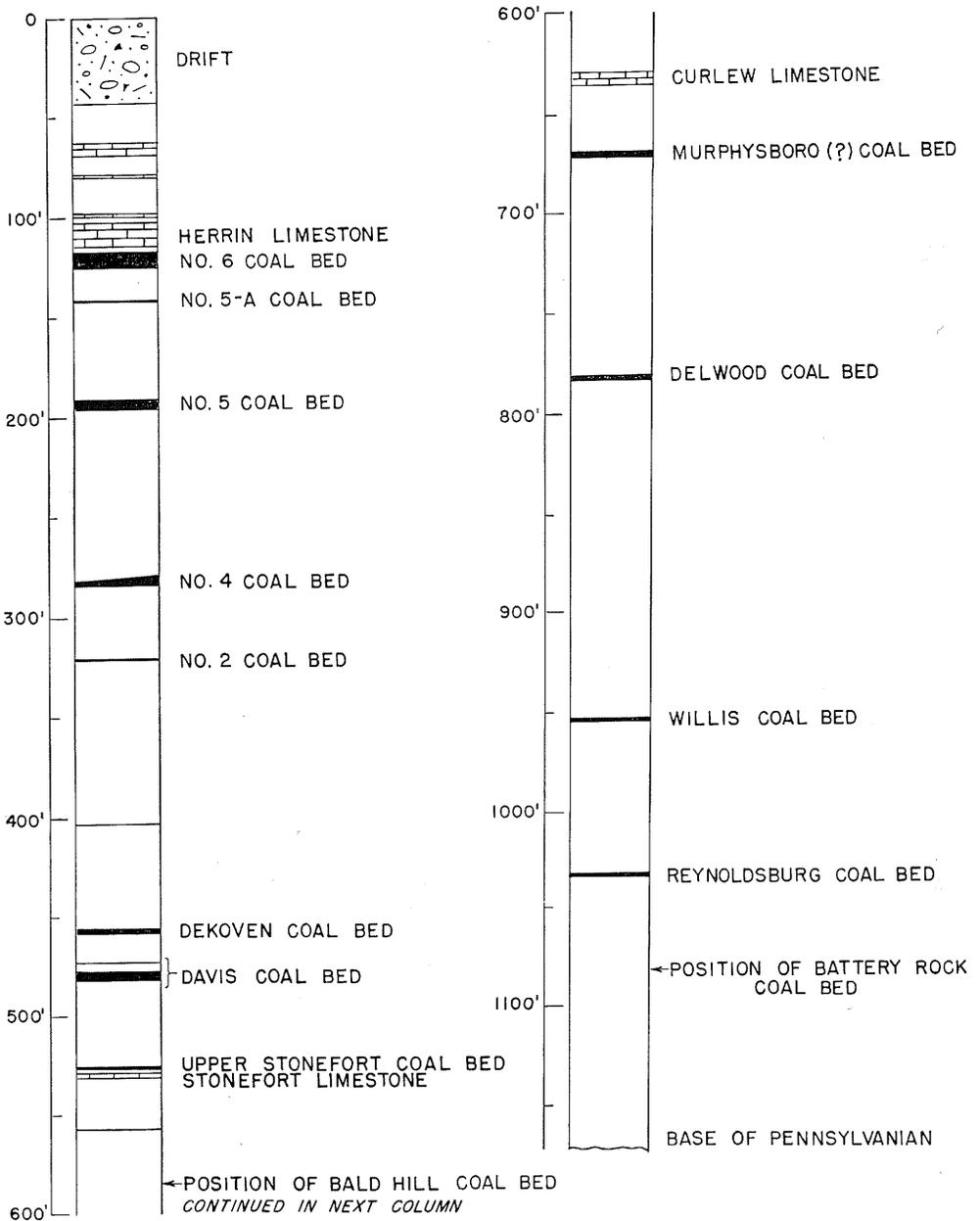


FIG. 36.—Generalized geologic column for Area 32.

description of the rocks and coals in any part of the Area can be found in Butts (1925). There are many stratigraphic and

structural problems to be solved before the distribution and relationships of the various coal beds in the Area will be understood.

## MINABLE COAL RESERVES

COAL RESOURCES: AREA 32  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Herrin No. 6 . . . . .	296,378	123,489	108,597	—	528,464
Harrisburg No. 5 . . . . .	390,043	176,935	144,428	—	711,407
Dekoven . . . . .	67,782	548,154	443,183	—	1,059,118
Davis . . . . .	76,242	517,738	444,090	154,630	1,192,700
Bald Hill . . . . .	—	—	5,028	1,229	6,258
Willis . . . . .	6,892	—	—	—	6,892
Total . . . . .	837,337	1,366,316	1,145,326	155,860	3,504,839

AREA 33<sup>31</sup>

*Quadrangles: Northern tier—Altenburg (269), Alto Pass (270), Carbondale (271). Southern tier—Jonesboro (281), Dongola (280).*

The coal resources of Area 33 are included within Alto Pass and Carbondale quadrangles. The workable coal beds, upon which estimates of reserves are made, are the Murphysboro, Harrisburg (No. 5), and certain lenticular or otherwise discontinuous beds in the Tradewater group which outcrop in the vicinity of Makanda. However, this estimate may not represent the total reserves. Drilling near the southeast corner of Area 29 and the southwest corner of Area 30 (fig. 37) indicates that No. 4 and Colchester (No. 2) coal beds, about 75 and 125 feet, respectively, below No. 5 coal bed, may have thicknesses between 28 and 36 inches. The Ingram mine, now abandoned, near the southwest corner of Marion (SE cor. NE  $\frac{1}{4}$  SE  $\frac{1}{4}$  sec. 23, T. 9 S., R. 2 E.) worked between 1910 and 1915 a bed about 40 inches thick at a depth of 125 feet. Correlation of this bed is uncertain because of lack of information about the character of the overlying beds.

<sup>31</sup>Dunbar, C. O., and Henbest, L. G., Pennsylvanian fusulinidae of Illinois: Illinois Geol. Survey Bull. 67, p. 24, 1942.

Lamar, J. E., Geology and mineral resources of the Carbondale quadrangle: Illinois Geol. Survey Bull. 48, 1925.

St. Clair, Stuart, Parts of Williamson, Union, and Jackson counties: In Illinois Geol. Survey Bull. 35, pp. 19-55, 1917.

Geological Survey of Illinois: Jackson County, vol. III, pp. 58-83, 1868; Johnson County, vol. I, pp. 376-409, 1866; Union County, vol. III, pp. 33-57, 1868; Williamson and Franklin counties, vol. VI, pp. 112-127, 1875.

Over the greatest part of the Carbondale quadrangle the interval between the Murphysboro coal bed and the base of the Pennsylvanian is about 600 feet (fig. 37). Lamar correlates the Murphysboro coal bed with the Davis and Dekoven coal beds, a correlation used by Butts in his studies on the Equality-Shawneetown area (see footnote, Area 32), but now regarded as unacceptable. Preference is now given either to the Bald Hill or the coal occurring below the Curlew limestone bed as correlative with the Murphysboro. For the present the equivalent of the Murphysboro in the eastern part of Area 33 must be regarded as unproved, but it is probably represented by coal occurring below the Curlew limestone. It is not known to be of workable thickness in the east part of the Carbondale quadrangle.

The coal worked at the Ingram mine, near the southwest corner of Marion, is not known definitely to extend into this Area. Drilling near Chamness penetrated beds which appear to correlate with the Dekoven and Davis beds but which Lamar correlates with the Murphysboro bed at Carbondale. The upper one of these beds has a reported thickness of 29 inches. Possibly the coal worked in the Ingram mine was either the Dekoven or Davis. Acceptable correlations cannot be made until core drilling has penetrated this bed.

In the western part of the Carbondale quadrangle the succession below the Murphysboro coal, as revealed by the log of an old churn drill hole on the campus of Southern Illinois University, consisted

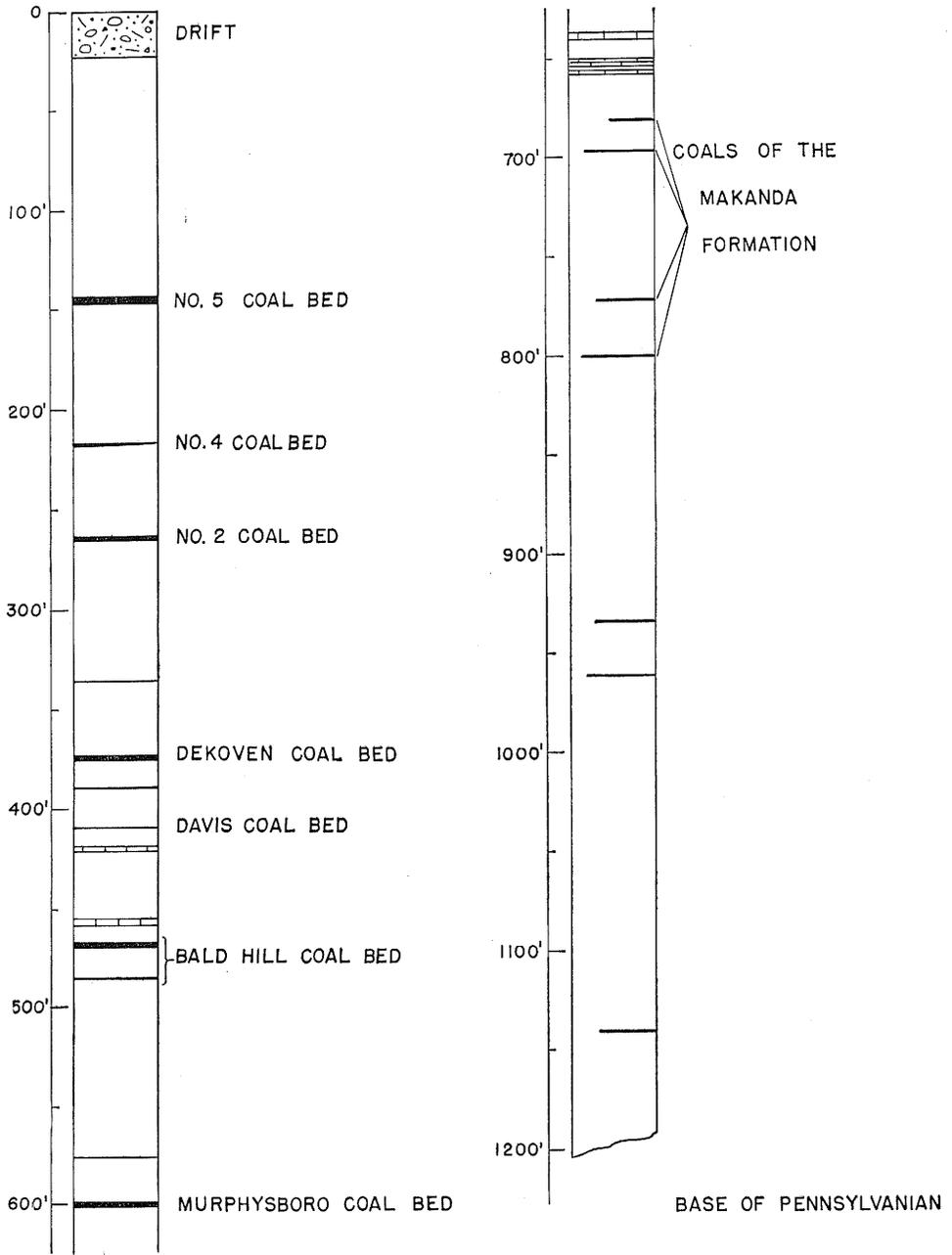


FIG. 37.—Generalized geologic column for Area 33.

## MINABLE COAL RESERVES

mainly of sandstone and shale, with a few thin limestone beds in the upper 75 feet. The succession appears to be quite different and considerably thicker than that below the Davis or Bald Hill coal beds, but similar and much thicker than that beneath the Curlew coal bed in the eastern part of Area 33. With present information it is impossible to make definite correla-

tions of the Murphysboro coal bed in the Carbondale region with the coals encountered in drilling near the northeast corner of Area 33.

The coal beds north of Makanda are in the Makanda formation (lower part of the Tradewater group). The Drury formation (Caseyville group) also contains lenticular discontinuous bodies of coal.

COAL RESOURCES: AREA 33  
(In thousands of tons)

Coal bed	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
Harrisburg No. 5 . . . . .	2,746	—	—	—	2,746
Murphysboro . . . . .	25,007	86,016	119,537	—	230,561
Makanda . . . . .	1,962	—	—	—	1,962
Total . . . . .	29,715	86,016	119,537	—	235,269

**PART III**  
**TABULATED DATA**

**RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES**  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total*
<b>ADAMS CO.</b>					
Colchester No. 2					
28. . . . .	—	575	15,641	201,370	217,586
35. . . . .	—	327	—	—	327
Total, coal bed and county . . . . .	—	902	15,641	201,370	217,913
<b>BOND CO.</b>					
Herrin No. 6					
35. . . . .	2,583	2,419	—	—	5,002
48. . . . .	—	13,272	8,295	—	21,567
60. . . . .	38,673	267,681	675,145	—	981,498
66. . . . .	15,475	130,024	—	—	145,499
72. . . . .	126,039	278,577	16,411	—	421,026
78. . . . .	19,381	—	—	—	19,381
84. . . . .	180,393	499,986	—	—	680,379
90. . . . .	1,345	—	—	—	1,345
96. . . . .	26,903	138,011	—	—	164,913
102. . . . .	9,623	1,715	—	—	11,338
Total, coal bed . . . . .	420,415	1,331,685	699,850	—	2,451,950
Harrisburg No. 5					
28. . . . .	—	—	3,322	—	3,322
66. . . . .	4,994	74,352	217,200	—	296,546
Total, coal bed . . . . .	4,994	74,352	220,521	—	299,867
Colchester No. 2					
35. . . . .	—	—	2,092	—	2,092
Litchfield					
42. . . . .	—	—	2,472	—	2,472
Total, county . . . . .	425,408	1,406,037	924,936	—	2,756,381
<b>BROWN CO.</b>					
Colchester No. 2					
20. . . . .	—	1,065	—	—	1,065
28. . . . .	—	13,993	6,617	41,352	61,962
Total, coal bed and county . . . . .	—	15,058	6,617	41,352	63,027

\*Detail may not add to total because of rounding.

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>BUREAU CO.</b>					
Sparland No. 7					
28 . . . . .	—	3,636	17,184	39,861	60,680
35 . . . . .	28,967	101,777	—	—	130,744
42 . . . . .	8,945	9,181	—	—	18,126
48 . . . . .	7,040	35,153	—	—	42,192
Total, coal bed . . . . .	44,952	149,746	17,184	39,861	251,742
Herrin No. 6					
28 . . . . .	—	—	—	182,957	182,957
35 . . . . .	10,462	21,905	—	—	32,367
42 . . . . .	2,354	7,886	4,747	—	14,987
48 . . . . .	32,507	56,047	—	—	88,555
54 . . . . .	39,345	3,884	1,715	—	44,944
60 . . . . .	33,684	117,755	—	—	151,440
66 . . . . .	18,187	1,541	—	—	19,729
Total, coal bed . . . . .	136,540	209,019	6,462	182,957	534,978
LaSalle (Colchester) No. 2*					
28 . . . . .	7,742	60,523	—	628,827	697,093
35 . . . . .	258,807	74,477	—	—	333,285
42 . . . . .	117,268	30,249	—	—	147,516
48 . . . . .	43,896	—	—	—	43,896
Total, coal bed . . . . .	427,713	165,249	—	628,827	1,221,789
Total, county . . . . .	609,205	524,014	23,646	851,645	2,008,510
<b>CASS CO.</b>					
Springfield No. 5					
28 . . . . .	—	—	—	1,700	1,700
66 . . . . .	—	3,391	43,958	—	47,349
Total, coal bed . . . . .	—	3,391	43,958	1,700	49,049
Colchester No. 2					
28 . . . . .	1,282	6,356	14,725	363,141	385,504
35 . . . . .	1,733	7,127	56,071	—	64,931
Total, coal bed . . . . .	3,014	13,483	70,796	363,141	450,434
Total, county . . . . .	3,014	16,874	114,754	364,841	499,483
<b>CHAMPAIGN CO.</b>					
Danville No. 7					
28 . . . . .	—	—	—	181,884	181,884

\*Called LaSalle No. 2 in areas 2 and 7, Colchester No. 2 in areas 3 and 6.

CHRISTIAN COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>CHRISTIAN CO.</b>					
Danville No. 7					
28 . . . . .	2,119	—	—	—	2,119
35 . . . . .	8,827	31,256	—	—	40,083
42 . . . . .	10,828	—	—	—	10,828
54 . . . . .	8,424	—	—	—	8,424
Total, coal bed . . . . .	30,198	31,256	—	—	61,454
Herrin No. 6					
42 . . . . .	2,393	3,963	—	—	6,356
48 . . . . .	15,335	6,815	1,524	—	23,674
60 . . . . .	24,941	64,062	105,088	—	194,091
66 . . . . .	1,233	40,074	—	—	41,307
72 . . . . .	69,812	113,395	—	—	183,207
78 . . . . .	8,598	—	33,808	—	42,405
84 . . . . .	249,365	355,608	456,123	—	1,061,097
90 . . . . .	242,292	703,168	—	—	945,460
96 . . . . .	195,403	404,168	—	—	599,570
102 . . . . .	19,247	17,817	—	—	37,064
108 . . . . .	5,145	—	—	—	5,145
Total, coal bed . . . . .	833,763	1,709,069	596,544	—	3,139,377
Springfield No. 5					
28 . . . . .	9,808	51,945	24,795	281,510	368,058
35 . . . . .	2,158	42,176	39,037	—	83,370
42 . . . . .	667	—	—	—	667
48 . . . . .	3,632	90,752	234,188	—	328,571
54 . . . . .	8,172	225,781	—	—	233,952
60 . . . . .	36,206	25,894	617	—	62,717
66 . . . . .	10,789	12,639	26,264	—	49,691
Total, coal bed . . . . .	71,432	449,185	324,900	281,510	1,127,027
Assumption					
35 . . . . .	—	—	69,181	—	69,181
42 . . . . .	—	9,534	—	—	9,534
Total, coal bed . . . . .	—	9,534	69,181	—	78,715
Coals of unknown correlation lower than No. 6 coal					
28 . . . . .	2,119	—	—	—	2,119
35 . . . . .	2,648	—	—	—	2,648
42 . . . . .	3,178	—	—	—	3,178
Total, coal bed . . . . .	7,945	—	—	—	7,945
Total, county . . . . .	943,338	2,199,043	990,625	281,510	4,414,516

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>CLARK CO.</b>					
Danville No. 7					
35 . . . . .	—	53,651	73,856	—	127,507
42 . . . . .	7,533	—	86,783	—	94,316
54 . . . . .	4,086	—	33,595	—	37,681
66 . . . . .	—	—	57,151	—	57,151
Total, coal bed . . . . .	11,619	53,651	251,386	—	316,655
Herrin No. 6					
28 . . . . .	—	—	11,848	—	11,848
Harrisburg No. 5					
28 . . . . .	—	—	7,507	—	7,507
35 . . . . .	—	—	14,810	—	14,810
42 . . . . .	—	—	95,689	—	95,689
48 . . . . .	2,870	18,114	75,776	—	96,760
54 . . . . .	—	48,273	110,519	—	158,793
60 . . . . .	—	—	46,407	—	46,407
66 . . . . .	—	—	91,183	—	91,183
Total, coal bed . . . . .	2,870	66,388	441,892	—	511,149
Indiana III					
35 . . . . .	—	—	22,265	—	22,265
54 . . . . .	—	9,887	323,689	—	333,576
66 . . . . .	—	24,044	—	—	24,044
Total, coal bed . . . . .	—	33,931	345,954	—	379,885
Total, county . . . . .	14,488	153,970	1,051,080	—	1,219,538
<b>CLAY CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	418	418
35 . . . . .	—	—	166,315	—	166,315
42 . . . . .	—	—	559,228	—	559,228
48 . . . . .	—	—	144,602	—	144,602
54 . . . . .	—	—	46,256	—	46,256
Total, coal bed . . . . .	—	—	916,401	418	916,819
Harrisburg No. 5					
28 . . . . .	—	—	115,737	—	115,737
35 . . . . .	—	—	578,295	—	578,295
42 . . . . .	—	—	8,278	—	8,278
Total, coal bed . . . . .	—	—	702,311	—	702,311
Total, county . . . . .	—	—	1,618,711	418	1,619,130

COLES COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>CLINTON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	27,515	27,515
35 . . . . .	—	3,433	—	—	3,433
48 . . . . .	3,677	21,119	36,946	—	61,742
54 . . . . .	4,086	—	31,073	—	35,158
60 . . . . .	25,333	221,442	335,723	—	582,498
72 . . . . .	48,223	356,258	1,344,998	—	1,749,480
84 . . . . .	91,021	381,581	134,177	—	606,778
90 . . . . .	16,646	45,735	2,438	—	64,819
96 . . . . .	24,750	80,260	—	—	105,010
Total, coal bed . . . . .	213,736	1,109,827	1,885,355	27,515	3,236,433
Harrisburg No. 5					
28 . . . . .	2,119	—	—	530,954	533,072
35 . . . . .	—	—	13,274	—	13,274
78 . . . . .	—	—	5,902	—	5,902
Total, coal bed . . . . .	2,119	—	19,176	530,954	552,248
Total, county . . . . .	215,854	1,109,827	1,904,530	558,469	3,788,681
<b>COLES CO.</b>					
Danville No. 7					
28 . . . . .	—	—	275,468	—	275,468
42 . . . . .	2,903	33,740	—	—	36,644
Total, coal bed . . . . .	2,903	33,740	275,468	—	312,112
Harrisburg No. 5					
28 . . . . .	4,237	39,808	—	—	44,046
Total, county . . . . .	7,140	73,549	275,468	—	356,157

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>CRAWFORD CO.</b>					
Danville No. 7 42 . . . . .	8,043	62,537	140,572	—	211,152
Jamestown 48 . . . . .	9,192	71,471	160,654	—	241,317
Herrin No. 6 28 . . . . .	—	—	55,763	85,554	141,317
35 . . . . .	—	—	102,366	—	102,366
42 . . . . .	—	11,495	19,617	—	31,112
48 . . . . .	—	—	93,756	—	93,756
54 . . . . .	—	23,355	62,549	—	85,904
72 . . . . .	—	—	117,363	—	117,363
Total, coal bed . . . . .	—	34,850	451,412	85,554	571,817
Harrisburg No. 5 28 . . . . .	—	—	—	353,045	353,045
35 . . . . .	6,408	52,965	215,226	—	274,599
42 . . . . .	—	—	82,036	—	82,036
48 . . . . .	—	—	40,309	—	40,309
54 . . . . .	—	14,780	26,583	—	41,363
66 . . . . .	—	—	25,092	—	25,092
72 . . . . .	—	31,140	81,582	—	112,722
Total, coal bed . . . . .	6,408	98,884	470,829	353,045	929,166
Indiana III 90 . . . . .	17,235	134,009	301,226	—	452,469
Total, county . . . . .	40,877	401,752	1,524,693	438,599	2,405,921
<b>CUMBERLAND CO.</b>					
Trowbridge 28 . . . . .	497	3,348	—	—	3,845
Herrin No. 6 28 . . . . .	—	—	36,042	—	36,042
48 . . . . .	—	—	60,800	—	60,800
60 . . . . .	—	—	65,407	—	65,407
Total, coal bed . . . . .	—	—	162,249	—	162,249
Harrisburg No. 5 35 . . . . .	—	—	45,053	—	45,053
48 . . . . .	—	—	60,800	—	60,800
60 . . . . .	—	—	65,407	—	65,407
Total, coal bed . . . . .	—	—	171,260	—	171,260
Total, county . . . . .	497	3,348	333,509	—	337,354

## DOUGLAS COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>DE WITT CO.</b>					
Springfield No. 5 28 . . . . .	—	—	—	173,619	173,619
<b>DOUGLAS CO.</b>					
Danville No. 7 28 . . . . .	—	—	—	19,329	19,329
48 . . . . .	—	22,060	—	—	22,060
60 . . . . .	—	—	295,929	—	295,929
72 . . . . .	—	43,044	—	—	43,044
78 . . . . .	44,373	111,186	—	—	155,559
84 . . . . .	19,067	171,841	—	—	190,908
Total, coal bed . . . . .	63,440	348,132	295,929	19,329	726,829
Harrisburg No. 5 28 . . . . .	—	11,011	—	—	11,011
Coals of unknown correlation lower than No. 6 coal					
28 . . . . .	2,119	—	—	—	2,119
35 . . . . .	7,945	—	—	—	7,945
Total, coal bed . . . . .	10,063	—	—	—	10,063
Total, county . . . . .	73,503	359,143	295,929	19,329	747,904

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>EDGAR CO.</b>					
Danville No. 7					
28 . . . . .	2,119	51,683	78,126	53,305	185,232
35 . . . . .	—	7,095	125,121	—	132,215
42 . . . . .	13,065	80,310	143,907	—	237,281
48 . . . . .	2,690	30,535	173,612	—	206,837
54 . . . . .	30,417	303,916	—	—	334,333
60 . . . . .	43,493	—	167,805	—	211,298
66 . . . . .	23,428	—	—	—	23,428
72 . . . . .	5,448	87,097	—	—	92,545
Total, coal bed . . . . .	120,658	560,635	688,571	53,305	1,423,169
Grape Creek					
28 . . . . .	—	—	85,083	—	85,083
35 . . . . .	2,648	58,163	—	—	60,811
42 . . . . .	3,178	—	—	—	3,178
48 . . . . .	—	52,012	—	—	52,012
60 . . . . .	4,540	34,749	—	—	39,289
66 . . . . .	4,994	3,391	—	—	8,385
Total, coal bed . . . . .	15,360	148,315	85,083	—	248,758
Harrisburg No. 5					
28 . . . . .	3,060	59,111	—	—	62,171
35 . . . . .	1,602	83,501	38,710	—	123,813
42 . . . . .	24,952	1,334	64,735	—	91,021
48 . . . . .	30,041	88,913	5,874	—	124,828
54 . . . . .	39,496	—	—	—	39,496
Total, coal bed . . . . .	99,152	232,859	109,318	—	441,330
Indiana III					
28 . . . . .	2,119	—	—	—	2,119
42 . . . . .	—	—	12,437	—	12,437
48 . . . . .	14,886	38,605	—	—	53,491
54 . . . . .	4,237	78,135	293,474	—	375,847
60 . . . . .	32,676	240,723	—	—	273,398
66 . . . . .	60,357	95,807	—	—	156,164
72 . . . . .	5,448	—	—	—	5,448
Total, coal bed . . . . .	119,722	453,270	305,911	—	878,904
Total, county . . . . .	354,893	1,395,080	1,188,883	53,305	2,992,160
<b>EDWARDS CO.</b>					
Herrin No. 6					
35 . . . . .	—	—	549,393	—	549,393
42 . . . . .	—	—	134,922	—	134,922
Total, coal bed . . . . .	—	—	684,316	—	684,316
Harrisburg No. 5					
28 . . . . .	—	—	96,513	—	96,513
35 . . . . .	—	—	353,032	—	353,032
Total, coal bed . . . . .	—	—	449,545	—	449,545
Total, county . . . . .	—	—	1,133,861	—	1,133,861

FAYETTE COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>EFFINGHAM CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	1,151	1,151
35 . . . . .	—	—	110,964	—	110,964
48 . . . . .	—	—	166,572	—	166,572
54 . . . . .	—	—	158,036	—	158,036
60 . . . . .	—	—	185,348	—	185,348
Total, coal bed . . . . .	—	—	620,921	1,151	622,072
Harrisburg No. 5					
35 . . . . .	—	—	12,816	—	12,816
42 . . . . .	—	—	142,024	—	142,024
48 . . . . .	—	—	643,242	—	643,242
60 . . . . .	—	—	366,268	—	366,268
Total, coal bed . . . . .	—	—	1,164,351	—	1,164,351
Total, county . . . . .	—	—	1,785,271	1,151	1,786,422
<b>FAYETTE CO.</b>					
Danville No. 7					
28 . . . . .	6,356	53,226	—	—	59,582
35 . . . . .	14,680	211,695	—	—	226,375
42 . . . . .	6,434	—	—	—	6,434
48 . . . . .	3,632	—	—	—	3,632
Total, coal bed . . . . .	31,102	264,921	—	—	296,023
Herrin No. 6					
28 . . . . .	—	—	—	502,837	502,837
60 . . . . .	4,540	38,224	900,174	—	942,938
72 . . . . .	29,795	249,791	175,136	—	454,722
78 . . . . .	20,037	176,762	318,113	—	514,911
84 . . . . .	16,949	235,869	—	—	252,818
96 . . . . .	26,006	79,722	—	—	105,727
Total, coal bed . . . . .	97,326	780,367	1,393,423	502,837	2,773,953
Harrisburg No. 5					
35 . . . . .	—	—	159,646	—	159,646
Total, county . . . . .	128,427	1,045,289	1,553,069	502,837	3,229,622

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>FRANKLIN CO.</b>					
Herrin No. 6					
35 . . . . .	—	—	14,876	—	14,876
42 . . . . .	—	182,316	—	—	182,316
60 . . . . .	7,566	13,451	—	—	21,018
66 . . . . .	12,639	16,276	77,373	—	106,288
72 . . . . .	84,878	316,308	—	—	401,186
78 . . . . .	32,715	120,731	—	—	153,446
84 . . . . .	311,667	210,446	—	—	522,113
90 . . . . .	13,788	11,518	—	—	25,305
96 . . . . .	326,150	87,703	—	—	413,852
102 . . . . .	9,242	—	—	—	9,242
108 . . . . .	224,973	34,805	—	—	259,779
114 . . . . .	5,857	—	—	—	5,857
120 . . . . .	61,988	2,018	—	—	64,006
126 . . . . .	6,944	—	—	—	6,944
132 . . . . .	27,004	—	—	—	27,004
Total, coal bed . . . . .	1,125,411	995,572	92,249	—	2,213,231
Harrisburg No. 5					
35 . . . . .	3,956	10,724	—	—	14,680
42 . . . . .	16,242	74,660	69,442	—	160,345
48 . . . . .	240,644	665,034	99,091	—	1,004,769
54 . . . . .	26,230	274,760	452,116	—	753,106
60 . . . . .	43,661	55,206	—	—	98,867
Total, coal bed . . . . .	330,733	1,080,384	620,650	—	2,031,768
Dekoven					
28 . . . . .	3,897	39,076	120,105	—	163,079
42 . . . . .	—	—	141,004	—	141,004
48 . . . . .	3,632	54,433	—	—	58,065
Total, coal bed . . . . .	7,529	93,509	261,109	—	362,147
Davis					
28 . . . . .	4,133	—	110,271	19,904	134,308
35 . . . . .	9,906	153,597	209,831	—	373,335
42 . . . . .	235	—	—	—	235
Total, coal bed . . . . .	14,274	153,597	320,102	19,904	507,878
Bald Hill					
28 . . . . .	10,358	25,711	—	—	36,068
42 . . . . .	3,178	3,178	—	—	6,356
48 . . . . .	6,143	8,026	—	—	14,169
72 . . . . .	5,448	—	—	—	5,448
Total, coal bed . . . . .	25,126	36,915	—	—	62,040
Total, county . . . . .	1,503,073	2,359,977	1,294,110	19,904	5,177,065

FULTON COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>FULTON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	7,847	7,847
35 . . . . .	262	1,798	1,439	—	3,498
42 . . . . .	3,296	7,768	—	—	11,064
48 . . . . .	—	43,493	153,300	—	196,793
54 . . . . .	5,902	5,095	8,121	—	19,118
Total, coal bed . . . . .	9,459	58,154	162,860	7,847	238,319
Springfield No. 5					
42 . . . . .	353	—	—	—	353
48 . . . . .	99,988	158,905	48,873	—	307,766
54 . . . . .	135,186	145,880	2,018	—	283,083
60 . . . . .	100,829	15,357	6,558	—	122,743
66 . . . . .	1,418	20,099	—	—	21,517
72 . . . . .	15,065	—	—	—	15,065
Total, coal bed . . . . .	352,839	340,240	57,448	—	750,528
Summum No. 4					
72 . . . . .	5,448	—	—	—	5,448
Colchester No. 2					
28 . . . . .	53,932	631,260	337,639	37,481	1,060,312
35 . . . . .	6,866	47,439	—	—	54,305
42 . . . . .	628	—	—	—	628
Total, coal bed . . . . .	61,426	678,699	337,639	37,481	1,115,245
Total, county . . . . .	429,172	1,077,092	557,948	45,327	2,109,539

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>GALLATIN CO.</b>					
Herrin No. 6					
28 . . . . .	2,040	—	—	—	2,040
42 . . . . .	—	56,142	—	—	56,142
48 . . . . .	47,169	208,944	482,096	—	738,209
54 . . . . .	27,945	96,950	42,725	—	167,620
60 . . . . .	6,614	107,162	—	—	113,776
66 . . . . .	—	47,349	—	—	47,349
72 . . . . .	—	11,165	—	—	11,165
78 . . . . .	—	15,519	—	—	15,519
Total, coal bed . . . . .	83,768	543,232	524,820	—	1,151,820
Harrisburg No. 5					
48 . . . . .	7,443	107,476	230,645	—	345,565
54 . . . . .	59,320	174,481	370,349	—	604,149
60 . . . . .	54,534	261,909	—	—	316,442
66 . . . . .	4,994	30,333	—	—	35,327
Total, coal bed . . . . .	126,291	574,198	600,994	—	1,301,483
Dekoven					
28 . . . . .	5,963	24,063	24,063	—	54,089
35 . . . . .	9,514	176,810	328,054	—	514,378
42 . . . . .	4,865	42,019	32,132	—	79,015
48 . . . . .	4,215	—	—	—	4,215
Total, coal bed . . . . .	24,557	242,892	384,248	—	651,697
Davis					
42 . . . . .	1,530	15,772	179,020	—	196,322
48 . . . . .	26,723	305,300	329,692	—	661,716
Total, coal bed . . . . .	28,253	321,072	508,712	—	858,038
Willis					
35 . . . . .	2,419	—	—	—	2,419
42 . . . . .	4,473	—	—	—	4,473
Total, coal bed . . . . .	6,892	—	—	—	6,892
Total, county . . . . .	269,761	1,681,393	2,018,775	—	3,969,930

GRUNDY COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>GREENE CO.</b>					
Summum No. 4					
48 . . . . .	8,609	6,905	—	—	15,514
72 . . . . .	9,685	—	—	—	9,685
Total, coal bed . . . . .	18,294	6,905	—	—	25,199
Colchester No. 2					
28 . . . . .	27,594	92,852	249,914	—	370,360
Total, county . . . . .	45,888	99,757	249,914	—	395,559
<b>GRUNDY CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	1,334	1,334
35 . . . . .	2,877	29,621	—	—	32,498
Total, coal bed . . . . .	2,877	29,621	—	1,334	33,832
Summum No. 4					
35 . . . . .	—	588	—	—	588
LaSalle No. 2					
28 . . . . .	10,776	58,457	307,796	135,694	512,723
35 . . . . .	71,796	209,962	—	—	281,759
Total, coal bed . . . . .	82,572	268,419	307,796	135,694	794,482
Total, county . . . . .	85,450	298,629	307,796	137,028	828,902

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>HAMILTON CO.</b>					
Herrin No. 6					
48 . . . . .	—	—	10,178	—	10,178
54 . . . . .	8,172	—	268,707	—	276,879
60 . . . . .	13,732	302,150	843,286	—	1,159,168
66 . . . . .	21,578	120,961	—	—	142,539
72 . . . . .	27,777	405,423	—	—	433,200
78 . . . . .	26,886	269,437	—	—	27,323
84 . . . . .	55,319	269,531	—	—	324,850
90 . . . . .	10,509	420	—	—	10,929
96 . . . . .	10,761	151,462	—	—	162,223
102 . . . . .	—	4,955	—	—	4,955
108 . . . . .	21,085	38,639	—	—	59,724
Total, coal bed . . . . .	195,818	1,293,978	1,122,171	—	2,611,967
Harrisburg No. 5					
35 . . . . .	—	—	7,422	—	7,422
42 . . . . .	8,043	—	196,950	—	204,993
48 . . . . .	5,694	168,455	117,654	—	291,804
54 . . . . .	18,865	94,681	501,600	—	615,146
60 . . . . .	68,714	496,354	386,726	—	951,793
66 . . . . .	38,717	26,942	—	—	65,659
72 . . . . .	—	2,354	—	—	2,354
78 . . . . .	4,153	—	—	—	4,153
Total, coal bed . . . . .	144,187	788,786	1,210,351	—	2,143,324
Dekoven					
28 . . . . .	—	—	3,557	—	3,557
Davis					
42 . . . . .	—	—	5,336	—	5,336
Total, county . . . . .	340,004	2,082,764	2,341,415	—	4,764,184
<b>HANCOCK CO.</b>					
Colchester No. 2					
28 . . . . .	—	—	—	48,414	48,414
35 . . . . .	1,504	4,381	—	—	5,885
Total, coal bed and county . . . . .	1,504	4,381	—	48,414	54,299
<b>HARDIN CO.</b>					
Dekoven					
35 . . . . .	—	—	1,177	—	1,177
Davis					
48 . . . . .	—	—	2,421	—	2,421
Total, county . . . . .	—	—	3,598	—	3,598

## HENRY COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>HENRY CO.</b>					
Sparland No. 7					
28 . . . . .	—	—	—	18,466	18,466
Herrin No. 6					
28 . . . . .	—	—	—	84,796	84,796
42 . . . . .	8,945	—	—	—	8,945
48 . . . . .	71,651	15,604	10,133	—	97,388
54 . . . . .	14,679	—	—	—	14,679
Total, coal bed . . . . .	95,275	15,604	10,133	84,796	205,807
Colchester No. 2					
28 . . . . .	4,159	—	—	568,277	572,436
35 . . . . .	24,946	—	—	—	24,946
Total, coal bed . . . . .	29,104	—	—	568,277	597,382
Rock Island No. 1					
28 . . . . .	—	—	—	4,734	4,734
35 . . . . .	2,583	—	327	—	2,910
42 . . . . .	11,181	—	29,425	—	40,606
48 . . . . .	20,760	—	538	—	21,298
54 . . . . .	1,261	—	5,851	—	7,112
Total, coal bed . . . . .	35,785	—	36,141	4,734	76,660
Total, county . . . . .	160,164	15,604	46,274	676,273	898,315

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>JACKSON CO.</b>					
Herrin No. 6					
42 . . . . .	—	76,504	—	—	76,504
72 . . . . .	10,761	—	—	—	10,761
84 . . . . .	43,392	—	—	—	43,392
90 . . . . .	6,305	—	—	—	6,305
96 . . . . .	73,803	—	—	—	73,803
Total, coal bed . . . . .	134,261	76,504	—	—	210,765
Harrisburg No. 5					
48 . . . . .	49,456	47,528	6,501	—	103,486
54 . . . . .	46,861	59,068	—	—	105,929
60 . . . . .	9,080	—	—	—	9,080
Total, coal bed . . . . .	105,397	106,596	6,501	—	218,494
Campbell Hill					
48 . . . . .	8,833	—	—	—	8,833
Murphysboro					
28 . . . . .	—	—	—	124,343	124,343
35 . . . . .	817	13,307	20,107	—	34,231
48 . . . . .	10,806	20,850	—	—	31,655
60 . . . . .	897	2,018	3,083	—	5,997
72 . . . . .	3,027	4,641	24,750	—	32,418
84 . . . . .	2,668	1,726	—	—	4,394
90 . . . . .	504	3,531	—	—	4,035
96 . . . . .	717	—	—	—	717
102 . . . . .	—	3,144	—	—	3,144
Total, coal bed . . . . .	19,436	49,216	47,940	124,343	240,935
Makanda					
28 . . . . .	785	—	—	—	785
35 . . . . .	1,177	—	—	—	1,177
Total, coal bed . . . . .	1,962	—	—	—	1,962
Total, county . . . . .	269,889	232,316	54,441	124,343	680,989
<b>JASPER CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	117,908	184,421	302,330
35 . . . . .	—	—	250,209	—	250,209
42 . . . . .	—	—	202,717	—	202,717
48 . . . . .	—	—	1,073,730	—	1,073,730
60 . . . . .	—	—	32,676	—	32,676
Total, coal bed . . . . .	—	—	1,677,239	184,421	1,861,661
Harrisburg No. 5					
28 . . . . .	—	—	182,826	184,421	367,247
35 . . . . .	—	—	583,232	—	583,232
42 . . . . .	—	—	220,176	—	220,176
48 . . . . .	—	—	244,545	—	244,545
Total, coal bed . . . . .	—	—	1,230,779	184,421	1,415,200
Total, county . . . . .	—	—	2,908,018	368,843	3,276,861

JERSEY COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>JEFFERSON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	198,048	198,048
35 . . . . .	327	4,283	—	—	4,610
42 . . . . .	—	4,865	—	—	4,865
48 . . . . .	3,856	11,075	6,098	—	21,029
54 . . . . .	17,403	146,485	375,191	—	539,079
60 . . . . .	16,478	113,552	760,336	—	890,366
66 . . . . .	18,557	74,229	—	—	92,786
72 . . . . .	69,611	242,595	24,280	—	336,485
78 . . . . .	4,445	52,387	56,468	—	113,299
84 . . . . .	120,288	64,970	12,005	—	197,264
90 . . . . .	1,093	—	—	—	1,093
96 . . . . .	304,269	79,901	—	—	384,170
102 . . . . .	2,858	—	—	—	2,858
108 . . . . .	37,630	—	—	—	37,630
120 . . . . .	22,307	—	—	—	22,307
126 . . . . .	2,825	—	—	—	2,825
Total, coal bed . . . . .	621,946	794,341	1,234,378	198,048	2,848,713
Harrisburg No. 5					
28 . . . . .	—	—	—	364,370	364,370
35 . . . . .	785	30,242	669,871	—	700,898
42 . . . . .	8,043	42,293	337,953	—	388,289
48 . . . . .	83,309	238,896	216,118	—	538,322
54 . . . . .	—	11,904	—	—	11,904
Total, coal bed . . . . .	92,136	323,335	1,223,943	364,370	2,003,784
Total, county . . . . .	714,082	1,117,676	2,458,321	562,419	4,852,498
<b>JERSEY CO.</b>					
Danville No. 7					
28 . . . . .	4,237	—	—	—	4,237
35 . . . . .	6,245	—	—	—	6,245
Total, coal bed . . . . .	10,482	—	—	—	10,482
Herrin No. 6					
28 . . . . .	—	—	—	28,640	28,640
35 . . . . .	6,016	30,177	—	—	36,192
42 . . . . .	1,883	—	—	—	1,883
54 . . . . .	4,540	—	—	—	4,540
Total, coal bed . . . . .	12,439	30,177	—	28,640	71,256
Colchester No. 2					
28 . . . . .	5,283	35,990	156,514	—	197,787
Total, county . . . . .	28,204	66,167	156,514	28,640	279,524

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>KANKAKEE CO.</b>					
Herrin No. 6					
42 . . . . .	549	35,506	—	—	36,055
LaSalle No. 2					
28 . . . . .	—	—	18,623	—	18,623
35 . . . . .	20,597	47,832	—	—	68,429
Total, coal bed . . . . .	20,597	47,832	18,623	—	87,052
Total, county . . . . .	21,147	83,337	18,623	—	123,107
<b>KNOX CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	48,858	48,858
42 . . . . .	314	—	—	—	314
48 . . . . .	44,434	60,890	56,182	—	161,506
54 . . . . .	9,433	—	44,288	—	53,721
Total, coal bed . . . . .	54,181	60,890	100,470	48,858	264,399
Springfield No. 5					
24 . . . . .	9,707	—	—	—	9,707
28 . . . . .	2,014	2,119	6,094	18,100	28,326
35 . . . . .	4,544	—	—	—	4,544
42 . . . . .	12,123	24,560	9,887	—	46,570
48 . . . . .	36,408	42,282	—	—	78,690
Total, coal bed . . . . .	64,797	68,960	15,981	18,100	167,838
Colchester No. 2					
20 . . . . .	—	—	9,827	—	9,827
24 . . . . .	—	—	10,627	—	10,627
28 . . . . .	—	—	4,054	127,429	131,483
35 . . . . .	—	—	4,021	—	4,021
42 . . . . .	—	—	46,727	—	46,727
Total, coal bed . . . . .	—	—	75,255	127,429	202,684
Rock Island No. 1					
28 . . . . .	—	418	—	1,805	2,223
35 . . . . .	3,694	3,923	—	—	7,618
42 . . . . .	8,121	13,378	—	—	21,500
48 . . . . .	4,349	7,622	—	—	11,972
54 . . . . .	504	4,288	—	—	4,792
60 . . . . .	1,794	2,018	4,540	—	8,351
66 . . . . .	678	—	—	—	678
72 . . . . .	—	673	—	—	673
Total, coal bed . . . . .	19,141	32,321	4,540	1,805	57,806
Total, county . . . . .	138,119	162,171	196,246	196,191	692,727

LASALLE COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>LASALLE CO.</b>					
Sparland No. 7					
28 . . . . .	—	46,504	118,510	—	165,014
35 . . . . .	14,549	73,823	—	—	88,372
42 . . . . .	6,317	23,775	—	—	30,092
48 . . . . .	45,735	155,004	—	—	200,739
54 . . . . .	1,362	1,009	—	—	2,371
60 . . . . .	3,195	—	—	—	3,195
Total, coal bed . . . . .	71,157	300,116	118,510	—	489,782
Herrin No. 6					
28 . . . . .	4,237	—	9,102	—	13,339
35 . . . . .	15,170	70,652	4,446	—	90,269
42 . . . . .	3,178	4,826	—	—	8,004
48 . . . . .	37,709	8,654	—	—	46,362
54 . . . . .	555	—	—	—	555
60 . . . . .	9,248	2,410	—	—	11,658
Total, coal bed . . . . .	70,096	86,541	13,548	—	170,186
LaSalle No. 2					
22 . . . . .	9,330	—	—	—	9,330
24 . . . . .	9,080	4,551	942	—	14,572
28 . . . . .	23,252	241,335	316,087	276,907	857,582
35 . . . . .	122,211	218,757	15,987	—	356,955
42 . . . . .	114,757	12,437	—	—	127,193
Total, coal bed . . . . .	278,629	477,080	333,016	276,907	1,365,633
Total, county . . . . .	419,882	863,738	465,075	276,907	2,025,601

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>LAWRENCE CO.</b>					
Danville No. 7					
28 . . . . .	2,119	25,188	6,460	—	33,767
35 . . . . .	7,945	26,580	37,566	—	72,091
48 . . . . .	6,950	51,653	—	—	58,603
54 . . . . .	18,865	4,136	35,965	—	58,967
Total, coal bed . . . . .	35,879	107,557	79,991	—	223,427
Jamestown					
28 . . . . .	1,203	—	—	—	1,203
35 . . . . .	1,144	40,573	138,035	—	179,753
48 . . . . .	23,899	79,318	68,736	—	171,953
54 . . . . .	6,709	—	—	—	6,709
Total, coal bed . . . . .	32,955	119,891	206,771	—	359,617
Herrin No. 6					
28 . . . . .	4,813	9,704	4,106	214,082	232,704
35 . . . . .	—	34,754	248,182	—	282,936
42 . . . . .	3,178	—	12,633	—	15,811
48 . . . . .	7,891	52,774	196,120	—	256,786
54 . . . . .	—	8,979	94,832	—	103,811
60 . . . . .	4,540	65,351	101,333	—	171,224
66 . . . . .	308	5,672	113,255	—	119,235
102 . . . . .	4,192	—	—	—	4,192
Total, coal bed . . . . .	24,922	177,233	770,461	214,082	1,186,698
Harrisburg No. 5					
28 . . . . .	—	2,406	71,875	214,082	288,363
35 . . . . .	—	—	137,316	—	137,316
42 . . . . .	11,221	53,632	138,806	—	203,659
48 . . . . .	11,882	55,913	114,202	—	181,996
54 . . . . .	9,231	98,665	16,242	—	124,139
60 . . . . .	4,372	—	—	—	4,372
66 . . . . .	4,932	15,228	19,975	—	40,135
72 . . . . .	5,044	—	—	—	5,044
Total, coal bed . . . . .	46,682	225,844	498,416	214,082	985,024
Indiana IV					
28 . . . . .	3,269	30,497	—	—	33,767
48 . . . . .	—	27,575	61,024	—	88,599
54 . . . . .	8,676	—	—	—	8,676
Total, coal bed . . . . .	11,946	58,072	61,024	—	131,042
Indiana III					
54 . . . . .	4,086	48,576	12,459	—	65,121
Total, county . . . . .	156,469	737,175	1,629,124	428,163	2,950,930

**McDONOUGH COUNTY**

**RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)**  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>LIVINGSTON CO.</b>					
Danville (Sparland) No. 7*					
28 . . . . .	—	—	118,196	—	118,196
42 . . . . .	—	10,593	—	—	10,593
48 . . . . .	9,640	32,507	—	—	42,147
54 . . . . .	—	78,842	—	—	78,842
60 . . . . .	7,791	—	—	—	7,791
Total, coal bed . . . . .	17,431	121,942	118,196	—	257,569
Herrin No. 6					
28 . . . . .	—	—	91,491	—	91,491
35 . . . . .	4,806	83,141	90,792	—	178,739
42 . . . . .	3,178	65,715	—	—	68,893
48 . . . . .	20,715	—	—	—	20,715
54 . . . . .	9,887	—	—	—	9,887
60 . . . . .	841	—	—	—	841
Total, coal bed . . . . .	39,426	148,857	182,283	—	370,566
LaSalle No. 2					
28 . . . . .	4,080	77,080	335,913	1,704,100	2,121,173
35 . . . . .	18,897	140,879	46,099	—	205,875
42 . . . . .	3,021	21,539	—	—	24,560
Total, coal bed . . . . .	25,998	239,498	382,012	1,704,100	2,351,608
Total, county . . . . .	82,855	510,297	682,491	1,704,100	2,979,743
<b>LOGAN CO.</b>					
Springfield No. 5					
28 . . . . .	—	—	—	631,495	631,495
48 . . . . .	6,188	106,265	170,922	—	283,375
60 . . . . .	55,038	162,481	235,398	—	452,917
66 . . . . .	9,063	—	—	—	9,063
72 . . . . .	38,942	248,715	327,540	—	615,196
Total, coal bed and county . . . . .	109,230	517,461	733,860	631,495	1,992,046
<b>MCDONOUGH CO.</b>					
Colchester No. 2					
22 . . . . .	—	6,309	1,110	—	7,419
28 . . . . .	21,212	31,282	28,012	—	80,506
Total, coal bed and county . . . . .	21,212	37,591	29,122	—	87,925

\*Called Danville No. 7 in area 9, Sparland No. 7 in areas 7, 8, and 10.

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MCLEAN CO.</b>					
Danville (Sparland) No. 7*					
28 . . . . .	2,119	31,386	371,694	—	405,199
42 . . . . .	6,356	83,449	—	—	89,804
54 . . . . .	—	2,573	—	—	2,573
66 . . . . .	12,824	92,971	—	—	105,795
Total, coal bed . . . . .	21,298	210,379	371,694	—	603,370
Springfield No. 5					
28 . . . . .	—	—	190,411	18,806	209,217
35 . . . . .	2,648	39,233	—	—	41,881
48 . . . . .	3,632	61,607	—	—	65,239
Total, coal bed . . . . .	6,280	100,840	190,411	18,806	316,337
LaSalle No. 2					
28 . . . . .	—	—	14,202	16,635	30,837
42 . . . . .	11,260	70,894	183,414	—	265,568
Total, coal bed . . . . .	11,260	70,894	197,617	16,635	296,406
Total, county . . . . .	38,838	382,113	759,722	35,440	1,216,113
<b>MACON CO.</b>					
Herrin No. 6					
60 . . . . .	—	—	20,289	—	20,289
84 . . . . .	—	—	75,720	—	75,720
90 . . . . .	—	12,611	—	—	12,611
Total, coal bed . . . . .	—	12,611	96,009	—	108,619
Springfield No. 5					
28 . . . . .	—	—	—	415,844	415,844
48 . . . . .	21,343	119,134	232,753	—	373,229
66 . . . . .	13,872	120,468	197,779	—	332,119
72 . . . . .	5,448	—	—	—	5,448
Total, coal bed . . . . .	40,662	239,602	430,532	415,844	1,126,640
Total, county . . . . .	40,662	252,212	526,541	415,844	1,235,260

\*Called Danville No. 7 in area 9, Sparland No. 7 in areas 7 and 10.

MACOUPIN COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MACOUPIN CO.</b>					
Danville No. 7					
28 . . . . .	6,487	9,024	—	—	15,510
Herrin No. 6					
28 . . . . .	—	—	—	530,091	530,091
35 . . . . .	11,018	128,848	40,312	—	180,178
42 . . . . .	1,138	—	—	—	1,138
48 . . . . .	31,880	162,044	28,786	—	222,709
54 . . . . .	21,388	252	117,077	—	138,717
60 . . . . .	87,153	360,047	9,304	—	456,504
66 . . . . .	10,542	—	—	—	10,542
72 . . . . .	386,591	612,304	—	—	998,895
78 . . . . .	25,137	5,465	—	—	30,602
84 . . . . .	418,616	695,209	—	—	1,113,826
90 . . . . .	22,867	28,416	—	—	51,283
96 . . . . .	133,886	52,729	—	—	186,615
102 . . . . .	6,479	1,620	—	—	8,099
108 . . . . .	6,255	—	—	—	6,255
Total, coal bed . . . . .	1,162,950	2,046,934	195,479	530,091	3,935,453
Harrisburg (Springfield) No. 5*					
35 . . . . .	2,648	9,122	31,256	—	43,026
Summum No. 4					
28 . . . . .	3,165	8,657	20,506	—	32,328
Colchester No. 2					
28 . . . . .	5,676	65,362	578,557	—	649,594
35 . . . . .	5,296	80,951	457,490	—	543,737
42 . . . . .	3,178	43,941	—	—	47,119
48 . . . . .	—	—	333,100	—	333,100
54 . . . . .	4,086	54,781	—	—	58,866
Total, coal bed . . . . .	18,236	245,035	1,369,146	—	1,632,416
Davis					
35 . . . . .	3,727	41,064	81,572	—	126,363
Litchfield					
48 . . . . .	—	2,959	31,162	—	34,122
54 . . . . .	—	—	307,043	—	307,043
60 . . . . .	4,540	63,950	146,844	—	215,333
72 . . . . .	—	—	140,835	—	140,835
Total, coal bed . . . . .	4,540	66,909	625,885	—	697,334
Total, county . . . . .	1,201,752	2,426,744	2,323,843	530,091	6,482,430

\*Called Harrisburg No. 5 in area 22, Springfield No. 5 in area 19.

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MADISON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	151,806	151,806
35 . . . . .	7,847	11,083	—	—	18,930
48 . . . . .	51,653	93,038	2,825	—	147,516
54 . . . . .	706	—	—	—	706
60 . . . . .	182,770	225,478	—	—	408,248
66 . . . . .	1,295	617	—	—	1,911
72 . . . . .	283,218	399,706	118,372	—	801,295
78 . . . . .	2,477	—	—	—	2,477
84 . . . . .	217,273	67,167	59,399	—	343,838
96 . . . . .	64,477	—	—	—	64,477
108 . . . . .	2,724	—	—	—	2,724
Total, coal bed . . . . .	814,438	797,089	180,595	151,806	1,943,928
Colchester No. 2					
28 . . . . .	2,119	25,946	81,552	—	109,617
35 . . . . .	31,190	92,492	369,444	—	493,127
42 . . . . .	3,296	46,923	—	—	50,218
Total, coal bed . . . . .	36,604	165,361	450,997	—	652,962
Davis					
35 . . . . .	—	—	4,675	—	4,675
Litchfield					
60 . . . . .	—	—	8,015	—	8,015
Total, county . . . . .	851,043	962,450	644,282	151,806	2,609,580
<b>MARION CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	154,918	154,918
42 . . . . .	—	—	11,378	—	11,378
48 . . . . .	—	—	40,623	—	40,623
60 . . . . .	—	—	399,280	—	399,280
72 . . . . .	18,832	5,515	287,253	—	311,600
84 . . . . .	70,227	230,219	—	—	300,447
Total, coal bed . . . . .	89,059	235,734	738,534	154,918	1,218,246
Harrisburg No. 5					
28 . . . . .	—	—	—	26,835	26,835
35 . . . . .	—	—	620,013	—	620,013
42 . . . . .	3,139	44,883	—	—	48,021
48 . . . . .	4,439	49,187	—	—	53,626
Total, coal bed . . . . .	7,578	94,070	620,013	26,835	748,495
Total, county . . . . .	96,637	329,804	1,358,547	181,754	1,966,741

MERCER COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MARSHALL CO.</b>					
Sparland No. 7					
28 . . . . .	—	15,510	152,512	66,565	234,587
35 . . . . .	10,985	58,032	—	—	69,017
42 . . . . .	33,780	—	—	—	33,780
Total, coal bed . . . . .	44,765	73,542	152,512	66,565	337,384
Herrin No. 6					
35 . . . . .	—	2,648	—	—	2,648
42 . . . . .	—	7,101	—	—	7,101
Total, coal bed . . . . .	—	9,749	—	—	9,749
LaSalle (Colchester) No. 2*					
28 . . . . .	9,861	230,115	173,645	413,778	827,399
35 . . . . .	28,869	—	—	—	28,869
42 . . . . .	1,765	—	—	—	1,765
Total, coal bed . . . . .	40,495	230,115	173,645	413,778	858,033
Total, county . . . . .	85,260	313,407	326,157	480,343	1,205,167
<b>MASON CO.</b>					
Springfield No. 5					
72 . . . . .	—	—	23,271	—	23,271
<b>MENARD CO.</b>					
Springfield No. 5					
28 . . . . .	—	—	—	38,841	38,841
60 . . . . .	11,097	—	—	—	11,097
66 . . . . .	22,133	513,560	171,207	—	706,901
72 . . . . .	211,320	549,150	329,894	—	1,090,365
78 . . . . .	14,427	5,975	—	—	20,401
Total, coal bed . . . . .	258,977	1,068,686	501,101	38,841	1,867,605
Colchester No. 2					
28 . . . . .	—	—	—	23,775	23,775
Total, county . . . . .	258,977	1,068,686	501,101	62,616	1,891,380
<b>MERCER CO.</b>					
Colchester No. 2					
28 . . . . .	—	—	2,877	—	2,877
Rock Island No. 1					
28 . . . . .	—	3,688	—	—	3,688
35 . . . . .	229	12,456	9,808	—	22,494
42 . . . . .	11,966	9,220	—	—	21,186
48 . . . . .	11,568	—	10,313	—	21,881
Total, coal bed . . . . .	23,763	25,364	20,121	—	69,248
Total, county . . . . .	23,763	25,364	22,998	—	72,125

\*Called LaSalle No. 2 in area 7, Colchester No. 2 in area 6.

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MONROE CO.</b>					
Harrisburg No. 5 28 . . . . .	—	—	—	4,970	4,970
<b>MONTGOMERY CO.</b>					
Danville No. 7 28 . . . . .	2,119	5,231	—	—	7,350
35 . . . . .	10,070	7,552	—	—	17,622
Total, coal bed . . . . .	12,188	12,783	—	—	24,972
Herrin No. 6 28 . . . . .	—	—	—	11,822	11,822
35 . . . . .	1,635	12,293	27,398	—	41,325
48 . . . . .	1,614	24,347	16,994	—	42,955
54 . . . . .	—	—	120,356	—	120,356
60 . . . . .	6,950	63,277	1,569	—	71,796
72 . . . . .	60,867	177,894	61,943	—	300,704
78 . . . . .	2,477	—	27,906	—	30,383
84 . . . . .	294,954	1,131,873	80,585	—	1,507,412
90 . . . . .	156,119	629,102	28,920	—	814,142
96 . . . . .	381,211	388,205	12,734	—	782,150
102 . . . . .	20,485	191	—	—	20,676
Total, coal bed . . . . .	926,312	2,427,181	378,404	11,822	3,743,720
Harrisburg (Springfield) No. 5* 28 . . . . .	2,119	8,422	25,658	—	36,199
35 . . . . .	13,732	77,812	204,175	—	295,719
42 . . . . .	3,492	50,611	—	—	54,102
66 . . . . .	—	—	137,792	—	137,792
Total, coal bed . . . . .	19,342	136,845	367,626	—	523,812
Summum No. 4 48 . . . . .	3,228	6,905	10,492	—	20,625
96 . . . . .	7,264	21,432	36,588	—	65,284
Total, coal bed . . . . .	10,492	28,337	47,080	—	85,909
Colchester No. 2 35 . . . . .	10,789	130,188	325,405	—	466,383
42 . . . . .	3,060	2,629	—	—	5,689
48 . . . . .	448	—	80,977	—	81,425
54 . . . . .	—	5,347	—	—	5,347
Total, coal bed . . . . .	14,298	138,164	406,382	—	558,844
Davis 35 . . . . .	7,716	46,001	68,887	—	122,603
42 . . . . .	—	—	10,750	—	10,750
Total, coal bed . . . . .	7,716	46,001	79,637	—	133,353
Litchfield 42 . . . . .	3,178	45,314	124,251	—	172,743
48 . . . . .	8,429	43,358	72,906	—	124,694
54 . . . . .	4,086	59,724	—	—	63,810
60 . . . . .	3,475	40,634	108,059	—	152,168
Total, coal bed . . . . .	19,168	189,030	305,216	—	513,415
Total, county . . . . .	1,009,516	2,978,342	1,584,345	11,822	5,584,025

\*Called Harrisburg No. 5 in areas 22, 23, Springfield No. 5 in area 19.

MOULTRIE COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>MORGAN CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	112,599	112,599
35 . . . . .	1,504	18,701	—	—	20,205
48 . . . . .	11,478	21,298	—	—	32,776
Total, coal bed . . . . .	12,982	39,999	—	112,599	165,580
Springfield No. 5					
28 . . . . .	—	—	—	18,021	18,021
Sumnum No. 4					
28 . . . . .	1,177	13,104	—	—	14,281
48 . . . . .	8,250	—	—	—	8,250
Total, coal bed . . . . .	9,427	13,104	—	—	22,531
Colchester No. 2					
28 . . . . .	—	—	13,392	540,527	553,918
35 . . . . .	2,648	37,958	113,416	—	154,022
42 . . . . .	—	—	105,812	—	105,812
48 . . . . .	12,061	56,092	467,344	—	535,497
60 . . . . .	—	—	4,540	—	4,540
Total, coal bed . . . . .	14,710	94,050	704,503	540,527	1,353,789
Total, county . . . . .	37,119	147,153	704,503	671,146	1,559,921
<b>MOULTRIE CO.</b>					
Herrin No. 6					
66 . . . . .	—	—	232,428	—	232,428
72 . . . . .	—	102,768	—	—	102,768
78 . . . . .	20,328	—	—	—	20,328
Total, coal bed . . . . .	20,328	102,768	232,428	—	355,524

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>PEORIA CO.</b>					
Sparland No. 7					
28 . . . . .	—	—	—	1,360	1,360
35 . . . . .	4,021	—	—	—	4,021
Total, coal bed . . . . .	4,021	—	—	1,360	5,381
Herrin No. 6					
28 . . . . .	—	7,611	169,408	422,095	599,115
35 . . . . .	9,089	19,257	165,465	—	193,811
42 . . . . .	47,237	22,363	22,088	—	91,688
48 . . . . .	—	2,287	15,873	—	18,159
54 . . . . .	—	—	1,110	—	1,110
Total, coal bed . . . . .	56,326	51,518	373,944	422,095	903,882
Springfield No. 5					
28 . . . . .	10,698	33,767	28,902	50,271	123,636
35 . . . . .	4,348	—	63,819	—	68,167
42 . . . . .	17,341	33,152	147,909	—	198,401
48 . . . . .	81,380	196,703	246,070	—	524,153
54 . . . . .	18,664	60,027	—	—	78,690
Total, coal bed . . . . .	132,431	323,648	486,699	50,271	993,049
LaSalle (Colchester) No. 2*					
28 . . . . .	3,583	61,831	251,039	40,776	357,230
35 . . . . .	6,506	27,627	43,451	—	77,583
Total, coal bed . . . . .	10,089	89,458	294,490	40,776	434,813
Total, county . . . . .	202,867	464,624	1,155,133	514,502	2,337,126
<b>PERRY CO.</b>					
Herrin No. 6					
35 . . . . .	—	—	13,960	—	13,960
42 . . . . .	—	30,837	—	—	30,837
48 . . . . .	—	3,811	—	—	3,811
54 . . . . .	1,160	—	—	—	1,160
60 . . . . .	108,619	93,487	—	—	202,106
72 . . . . .	392,846	492,184	208,361	—	1,093,391
78 . . . . .	23,243	133,919	35,994	—	193,155
84 . . . . .	122,015	230,769	309,941	—	662,724
90 . . . . .	757	—	—	—	757
96 . . . . .	46,004	24,392	—	—	70,395
108 . . . . .	15,335	—	—	—	15,335
120 . . . . .	6,726	—	—	—	6,726
Total, coal bed . . . . .	716,703	1,009,399	568,256	—	2,294,358
Harrisburg No. 5					
28 . . . . .	—	—	—	14,229	14,229
35 . . . . .	5,296	3,694	—	—	8,991
42 . . . . .	667	7,925	6,905	—	15,497
48 . . . . .	2,063	39,547	71,740	—	113,350
54 . . . . .	108,199	142,248	4,792	—	255,239
Total, coal bed . . . . .	116,225	193,414	83,437	14,229	407,305
Total, county . . . . .	832,928	1,202,813	651,693	14,229	2,701,663

\*Called LaSalle No. 2 in area 7, Colchester No. 2 in areas 6, 11.

RANDOLPH COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>PIATT CO.</b>					
Springfield No. 5 28 . . . . .	—	—	—	10,698	10,698
<b>PUTNAM CO.</b>					
Sparland No. 7 28 . . . . .	—	35,754	6,722	9,311	51,787
35 . . . . .	37,402	34,362	—	—	71,764
42 . . . . .	22,480	51,003	—	—	73,484
Total, coal bed . . . . .	59,882	121,119	6,722	9,311	197,035
Herrin No. 6 35 . . . . .	11,410	18,766	—	—	30,177
48 . . . . .	5,291	15,783	—	—	21,074
60 . . . . .	4,540	6,950	—	—	11,490
66 . . . . .	10,234	—	—	—	10,234
78 . . . . .	5,902	—	—	—	5,902
Total, coal bed . . . . .	37,377	41,499	—	—	78,876
LaSalle No. 2 28 . . . . .	3,662	134,020	1,491	137,394	276,567
35 . . . . .	126,396	55,711	—	—	182,107
42 . . . . .	9,220	—	—	—	9,220
Total, coal bed . . . . .	139,277	189,731	1,491	137,394	467,893
Total, county . . . . .	236,536	352,349	8,213	146,705	743,804
<b>RANDOLPH CO.</b>					
Herrin No. 6 35 . . . . .	196	—	—	—	196
42 . . . . .	667	—	—	—	667
60 . . . . .	42,708	10,032	—	—	52,740
66 . . . . .	3,083	—	—	—	3,083
72 . . . . .	267,412	25,759	—	—	293,172
78 . . . . .	19,891	40,875	—	—	60,766
84 . . . . .	100,515	5,257	—	—	105,772
Total, coal bed . . . . .	434,472	81,924	—	—	516,396
Harrisburg No. 5 28 . . . . .	5,545	—	—	—	5,545
35 . . . . .	11,345	30,471	17,949	—	59,765
42 . . . . .	19,499	—	—	—	19,499
48 . . . . .	11,747	11,568	—	—	23,316
54 . . . . .	57,757	6,154	—	—	63,911
Total, coal bed . . . . .	105,893	48,193	17,949	—	172,035
Total, county . . . . .	540,365	130,117	17,949	—	688,431

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>RICHLAND CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	32,537	130,254	162,791
35 . . . . .	—	—	523,630	—	523,630
42 . . . . .	—	—	103,144	—	103,144
48 . . . . .	—	—	92,500	—	92,500
54 . . . . .	—	—	309,767	—	309,767
Total, coal bed . . . . .	—	—	1,061,579	130,254	1,191,832
Harrisburg No. 5					
28 . . . . .	—	—	132,398	121,099	253,498
35 . . . . .	—	—	242,068	—	242,068
48 . . . . .	—	—	436,944	—	436,944
Total, coal bed . . . . .	—	—	811,410	121,099	932,509
Total, county . . . . .	—	—	1,872,989	251,353	2,124,342
<b>ROCK ISLAND CO.</b>					
Rock Island No. 1					
28 . . . . .	—	3,348	4,760	—	8,108
35 . . . . .	—	—	3,106	—	3,106
42 . . . . .	—	3,413	14,909	—	18,322
48 . . . . .	32,597	—	—	—	32,597
Total, coal bed and county . . . . .	32,597	6,761	22,775	—	62,133
<b>ST. CLAIR CO.</b>					
Herrin No. 6					
28 . . . . .	—	131	—	34,734	34,865
35 . . . . .	—	1,537	—	—	1,537
48 . . . . .	—	5,022	—	—	5,022
54 . . . . .	6,860	—	—	—	6,860
60 . . . . .	22,587	111,870	33,180	—	167,637
72 . . . . .	160,474	152,605	51,182	—	364,262
78 . . . . .	219,240	14,062	14,354	—	247,656
84 . . . . .	427,169	486,882	273,533	—	1,187,584
90 . . . . .	18,832	20,765	39,093	—	78,690
96 . . . . .	37,933	150,206	—	—	188,139
102 . . . . .	—	—	120,530	—	120,530
108 . . . . .	—	31,476	—	—	31,476
Total, coal bed . . . . .	893,095	974,557	531,871	34,734	2,434,257
Harrisburg No. 5					
28 . . . . .	7,873	—	—	602,279	610,152
35 . . . . .	5,296	2,485	—	—	7,781
48 . . . . .	3,632	—	—	—	3,632
Total, coal bed . . . . .	16,801	2,485	—	602,279	621,565
Total, county . . . . .	909,896	977,042	531,871	637,014	3,055,823

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>SALINE CO.</b>					
<b>Herrin No. 6</b>					
28 . . . . .	3,139	—	—	—	3,139
35 . . . . .	8,893	163	—	—	9,056
42 . . . . .	1,412	235	—	—	1,648
48 . . . . .	76,717	16,769	—	—	93,487
54 . . . . .	85,752	22,346	—	—	108,098
60 . . . . .	417,552	120,782	—	—	538,333
66 . . . . .	136,621	83,045	—	—	219,666
72 . . . . .	262,772	98,531	—	—	361,303
78 . . . . .	4,372	1,822	—	—	6,193
84 . . . . .	11,378	9,259	—	—	20,637
90 . . . . .	420	—	—	—	420
Total, coal bed . . . . .	1,009,027	352,952	—	—	1,361,979
<b>Harrisburg No. 5</b>					
35 . . . . .	621	—	—	—	621
48 . . . . .	87,120	9,326	—	—	96,446
54 . . . . .	101,591	64,768	—	—	166,359
60 . . . . .	341,888	110,077	—	—	451,965
66 . . . . .	9,988	8,385	—	—	18,372
72 . . . . .	167,671	84,138	—	—	251,809
78 . . . . .	18,580	2,623	—	—	21,203
84 . . . . .	105,458	10,122	—	—	115,580
90 . . . . .	11,770	—	—	—	11,770
96 . . . . .	4,304	—	—	—	4,304
102 . . . . .	1,143	—	—	—	1,143
Total, coal bed . . . . .	850,134	289,439	—	—	1,139,573
<b>Sumnum No. 4</b>					
28 . . . . .	2,119	2,119	—	—	4,237
35 . . . . .	—	2,648	—	—	2,648
Total, coal bed . . . . .	2,119	4,767	—	—	6,885
<b>Colchester No. 2</b>					
28 . . . . .	—	2,119	—	—	2,119
84 . . . . .	—	5,650	—	—	5,650
Total, coal bed . . . . .	—	7,768	—	—	7,768
<b>Dekoven</b>					
28 . . . . .	—	4,028	18,832	—	22,860
35 . . . . .	2,583	29,294	242,460	—	274,337
42 . . . . .	26,914	161,562	206,248	—	394,724
48 . . . . .	4,484	—	—	—	4,484
54 . . . . .	—	1,866	—	—	1,866
Total, coal bed . . . . .	33,980	196,750	467,540	—	698,270
<b>Davis</b>					
28 . . . . .	—	—	—	89,111	89,111
35 . . . . .	3,858	50,905	23,801	—	78,564
42 . . . . .	25,423	177,765	324,575	—	527,763
48 . . . . .	19,998	174,688	252,392	—	447,077
Total, coal bed . . . . .	49,279	403,358	600,768	89,111	1,142,516
<b>Coals of unknown correlation lower than No. 6 bed</b>					
42 . . . . .	3,178	—	—	—	3,178
Total, county . . . . .	1,947,716	1,255,034	1,068,308	89,111	4,360,170

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>SANGAMON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	237,203	237,203
35 . . . . .	—	43,941	45,118	—	89,059
42 . . . . .	3,139	31,661	—	—	34,800
48 . . . . .	3,408	54,029	—	—	57,437
54 . . . . .	10,189	—	—	—	10,189
60 . . . . .	—	—	170,496	—	170,496
66 . . . . .	617	16,893	4,994	—	22,503
72 . . . . .	37,193	218,382	—	—	255,575
78 . . . . .	—	—	31,258	—	31,258
84 . . . . .	176,078	242,303	—	—	418,381
96 . . . . .	127,429	234,053	—	—	361,482
Total, coal bed . . . . .	358,052	841,263	251,865	237,203	1,688,382
Springfield No. 5					
28 . . . . .	—	—	—	253,838	253,838
35 . . . . .	20,009	106,550	192,176	—	318,736
42 . . . . .	—	—	34,094	—	34,094
48 . . . . .	9,326	15,290	109,539	—	134,155
54 . . . . .	—	50,997	138,919	—	189,916
60 . . . . .	26,006	289,596	271,773	—	587,375
66 . . . . .	239,209	764,052	208,630	—	1,211,892
72 . . . . .	134,311	128,864	73,713	—	336,888
Total, coal bed . . . . .	428,862	1,355,349	1,028,843	253,838	3,066,892
Colchester No. 2					
28 . . . . .	1,779	19,721	—	259,304	280,804
Litchfield					
54 . . . . .	4,086	—	—	—	4,086
Total, county . . . . .	792,778	2,216,333	1,280,708	750,345	5,040,164
<b>SCHUYLER CO.</b>					
Springfield No. 5					
42 . . . . .	314	—	—	—	314
48 . . . . .	15,424	—	—	—	15,424
60 . . . . .	23,035	—	—	—	23,035
66 . . . . .	6,535	—	—	—	6,535
72 . . . . .	10,425	—	—	—	10,425
Total, coal bed . . . . .	55,733	—	—	—	55,733
Colchester No. 2					
28 . . . . .	37,219	120,001	59,006	102,137	318,363
35 . . . . .	4,381	12,424	—	—	16,805
Total, coal bed . . . . .	41,600	132,425	59,006	102,137	335,168
Total, county . . . . .	97,333	132,425	59,006	102,137	390,901

STARK COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>SCOTT CO.</b>					
Colchester No. 2					
28 . . . . .	—	—	5,126	101,352	106,478
35 . . . . .	—	490	36,519	—	37,010
Total, coal bed and county . . . . .	—	490	41,646	101,352	143,488
<b>SHELBY CO.</b>					
Trowbridge					
28 . . . . .	7,899	4,525	—	—	12,424
Danville No. 7					
28 . . . . .	4,237	6,277	—	—	10,514
35 . . . . .	—	98,017	—	—	98,017
42 . . . . .	13,104	—	—	—	13,104
48 . . . . .	3,632	—	—	—	3,632
Total, coal bed . . . . .	20,973	104,294	—	—	125,267
Herrin No. 6					
28 . . . . .	—	—	—	106,400	106,400
66 . . . . .	3,761	39,827	90,875	—	134,463
72 . . . . .	7,331	15,940	182,400	—	205,671
78 . . . . .	—	—	59,528	—	59,528
84 . . . . .	72,267	351,606	210,289	—	634,163
90 . . . . .	3,447	28,248	—	—	31,695
96 . . . . .	5,560	6,098	—	—	11,658
Total, coal bed . . . . .	92,366	441,719	543,092	106,400	1,183,577
Harrisburg (Springfield) No. 5*					
28 . . . . .	—	—	—	43,679	43,679
35 . . . . .	—	—	148,039	—	148,039
48 . . . . .	—	—	60,038	—	60,038
54 . . . . .	—	45,146	—	—	45,146
60 . . . . .	7,959	—	—	—	7,959
Total, coal bed . . . . .	7,959	45,146	208,077	43,679	304,861
Coals of unknown correlation lower than No. 6 coal					
35 . . . . .	—	—	6,375	—	6,375
Total, county . . . . .	129,196	595,685	757,544	150,079	1,632,504
<b>STARK CO.</b>					
Herrin No. 6					
28 . . . . .	4,760	—	654	337,770	343,184
35 . . . . .	—	3,662	65	—	3,727
48 . . . . .	—	8,026	—	—	8,026
54 . . . . .	17,705	13,367	5,851	—	36,924
Total, coal bed and county . . . . .	22,466	25,055	6,571	337,770	391,861

\*Called Harrisburg No. 5 in area 23, Springfield No. 5 in area 18.

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>TAZEWELL CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	3,217	—	3,217
Springfield No. 5					
35 . . . . .	—	—	1,308	—	1,308
48 . . . . .	—	—	79,453	—	79,453
54 . . . . .	3,279	45,045	—	—	48,324
Total, coal bed . . . . .	3,279	45,045	80,760	—	129,084
LaSalle (Colchester) No. 2*					
28 . . . . .	—	—	122,512	—	122,512
35 . . . . .	—	9,743	—	—	9,743
42 . . . . .	—	31,896	29,739	—	61,635
Total, coal bed . . . . .	—	41,639	152,250	—	193,890
Total, county . . . . .	3,279	86,684	236,228	—	326,191

\*Called LaSalle No. 2 in area 10, Colchester No. 2 in area 11.

VERMILION COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>VERMILION CO.</b>					
Danville No. 7					
28	340	—	—	109,617	109,957
35	45,837	84,220	29,850	—	159,907
42	10,789	30,798	—	—	41,587
48	21,881	203,115	69,633	—	294,629
54	17,251	84,188	128,275	—	229,715
60	54,142	78,186	—	—	132,327
66	118,927	330,269	170,899	—	620,095
72	101,827	9,887	—	—	111,713
78	1,093	—	—	—	1,093
84	8,317	314	—	—	8,631
96	1,794	—	—	—	1,794
108	706	—	—	—	706
Total, coal bed	382,903	820,977	398,657	109,617	1,712,155
Grape Creek					
28	—	15,981	28,457	—	44,438
35	8,174	41,554	—	—	49,728
42	2,079	2,393	—	—	4,473
48	22,867	66,584	—	—	89,451
54	—	4,691	—	—	4,691
60	50,667	82,894	—	—	133,560
66	13,933	41,553	—	—	55,487
72	158,053	75,731	—	—	233,784
78	19,235	8,306	—	—	27,542
84	28,483	3,845	—	—	32,328
90	9,332	—	—	—	9,332
96	5,829	2,421	—	—	8,250
102	4,478	2,477	—	—	6,955
108	2,018	—	—	—	2,018
114	532	—	—	—	532
Total, coal bed	325,681	348,431	28,457	—	702,569
Indiana III					
28	8,553	—	—	—	8,553
35	10,593	2,648	—	—	13,241
42	3,178	3,178	—	—	6,356
54	4,086	—	—	—	4,086
60	—	2,242	—	—	2,242
84	—	10,044	—	—	10,044
Total, coal bed	26,409	18,112	—	—	44,521
Total, county	734,993	1,187,520	427,114	109,617	2,459,245

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>WABASH CO.</b>					
Friendsville					
28 . . . . .	—	17,681	70,018	5,388	93,087
35 . . . . .	—	6,768	—	—	6,768
Total, coal bed . . . . .	—	24,449	70,018	5,388	99,855
Herrin No. 6					
28 . . . . .	—	—	24,900	11,325	36,225
35 . . . . .	—	—	539,683	—	539,683
Total, coal bed . . . . .	—	—	564,583	11,325	575,908
Harrisburg No. 5					
28 . . . . .	—	—	214,134	12,267	226,401
35 . . . . .	—	—	286,663	—	286,663
Total, coal bed . . . . .	—	—	500,797	12,267	513,063
Total, county . . . . .	—	24,449	1,135,397	28,980	1,188,826
<b>WARREN CO.</b>					
Colchester No. 2					
20 . . . . .	—	—	4,727	—	4,727
25 . . . . .	11,583	—	—	—	11,583
28 . . . . .	—	—	22,494	20,166	42,659
Total, coal bed . . . . .	11,583	—	27,220	20,166	58,969
Rock Island No. 1					
28 . . . . .	—	785	2,328	—	3,112
Total, county . . . . .	11,583	785	29,548	20,166	62,082

WAYNE COUNTY

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>WASHINGTON CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	—	97,743	97,743
35 . . . . .	1,929	3,106	—	—	5,035
48 . . . . .	3,453	5,829	—	—	9,281
60 . . . . .	9,752	58,513	968,664	—	1,036,929
66 . . . . .	—	4,932	—	—	4,932
72 . . . . .	71,494	250,733	223,830	—	546,057
78 . . . . .	19,454	—	127,872	—	147,326
84 . . . . .	59,242	423,246	84,508	—	566,996
90 . . . . .	41,111	—	193,363	—	234,473
96 . . . . .	38,650	246,249	219,167	—	504,066
102 . . . . .	9,242	—	—	—	9,242
108 . . . . .	16,848	260,687	—	—	277,534
120 . . . . .	9,080	4,596	—	—	13,676
126 . . . . .	9,534	—	—	—	9,534
Total, coal bed . . . . .	289,787	1,257,890	1,817,403	97,743	3,462,823
Harrisburg No. 5					
28 . . . . .	—	—	—	498,233	498,233
35 . . . . .	—	—	140,258	—	140,258
48 . . . . .	—	12,106	—	—	12,106
Total, coal bed . . . . .	—	12,106	140,258	498,233	650,598
Total, county . . . . .	289,787	1,269,997	1,957,661	595,976	4,113,421
<b>WAYNE CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	30,837	186,174	217,011
35 . . . . .	—	—	426,561	—	426,561
42 . . . . .	—	—	332,068	—	332,068
48 . . . . .	—	—	1,029,834	—	1,029,834
54 . . . . .	—	—	344,320	—	344,320
Total, coal bed . . . . .	—	—	2,163,621	186,174	2,349,795
Harrisburg No. 5					
28 . . . . .	—	—	328,511	88,614	417,126
35 . . . . .	—	—	911,514	—	911,514
42 . . . . .	—	—	213,389	—	213,389
48 . . . . .	—	—	158,546	—	158,546
Total, coal bed . . . . .	—	—	1,611,960	88,614	1,700,575
Total, county . . . . .	—	—	3,775,581	274,788	4,050,369

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>WHITE CO.</b>					
Herrin No. 6					
28 . . . . .	—	—	5,963	—	5,963
35 . . . . .	—	—	20,238	—	20,238
48 . . . . .	—	—	625,532	—	625,532
54 . . . . .	4,086	—	514,362	—	518,448
60 . . . . .	26,959	308,540	837,401	—	1,172,900
72 . . . . .	—	21,051	—	—	21,051
Total, coal bed . . . . .	31,045	329,591	2,003,496	—	2,364,131
Harrisburg No. 5					
35 . . . . .	—	—	73,497	—	73,497
42 . . . . .	—	—	79,643	—	79,643
48 . . . . .	7,309	76,852	539,533	—	623,693
54 . . . . .	—	47,517	1,160,328	—	1,207,845
60 . . . . .	9,024	75,832	210,177	—	295,032
Total, coal bed . . . . .	16,332	200,201	2,063,178	—	2,279,710
Dekoven					
28 . . . . .	—	—	10,645	—	10,645
42 . . . . .	3,178	—	—	—	3,178
Total, coal bed . . . . .	3,178	—	10,645	—	13,823
Davis					
35 . . . . .	2,648	—	—	—	2,648
42 . . . . .	—	—	14,555	—	14,555
Total, coal bed . . . . .	2,648	—	14,555	—	17,204
Total, county . . . . .	53,203	529,792	4,091,874	—	4,674,869
<b>WILL CO.</b>					
LaSalle No. 2					
35 . . . . .	13,732	—	—	—	13,732

WILLIAMSON COUNTY

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RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Continued)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>WILLIAMSON CO.</b>					
Herrin No. 6					
28 . . . . .	288	—	—	—	288
48 . . . . .	1,794	—	—	—	1,794
54 . . . . .	252	—	—	—	252
60 . . . . .	94,383	785	—	—	95,168
66 . . . . .	58,569	—	—	—	58,569
72 . . . . .	258,131	2,556	—	—	260,687
78 . . . . .	9,545	—	—	—	9,545
84 . . . . .	88,431	—	—	—	88,431
90 . . . . .	88,442	—	—	—	88,442
96 . . . . .	150,386	—	—	—	150,386
102 . . . . .	45,068	—	—	—	45,068
108 . . . . .	20,177	—	—	—	20,177
120 . . . . .	3,251	—	—	—	3,251
132 . . . . .	986	—	—	—	986
Total, coal bed . . . . .	819,703	3,340	—	—	823,044
Harrisburg No. 5					
28 . . . . .	2,746	—	—	—	2,746
35 . . . . .	785	2,191	—	—	2,975
42 . . . . .	7,023	6,356	—	—	13,378
48 . . . . .	486,400	346,013	—	—	832,413
54 . . . . .	38,538	30,619	—	—	69,157
Total, coal bed . . . . .	535,492	385,178	—	—	920,669
Summum No. 4					
35 . . . . .	2,648	—	—	—	2,648
Dekoven					
28 . . . . .	4,237	31,439	1,883	—	37,559
35 . . . . .	6,898	233,338	353,882	—	594,119
42 . . . . .	3,413	42,607	64,107	—	110,127
48 . . . . .	3,363	—	—	—	3,363
60 . . . . .	—	4,540	—	—	4,540
66 . . . . .	4,994	—	—	—	4,994
Total, coal bed . . . . .	22,906	311,924	419,872	—	754,702
Davis					
28 . . . . .	2,119	28,091	146,836	255,041	432,087
35 . . . . .	15,432	68,462	118,320	—	202,214
Total, coal bed . . . . .	17,550	96,553	265,156	255,041	634,300
Stonefort					
60 . . . . .	4,540	—	—	—	4,540
Bald Hill					
28 . . . . .	2,119	2,119	549	1,229	6,016
35 . . . . .	—	—	4,479	—	4,479
Total, coal bed . . . . .	2,119	2,119	5,028	1,229	10,495
Murphysboro					
35 . . . . .	—	—	2,060	—	2,060
42 . . . . .	1,883	3,884	55,083	—	60,850
48 . . . . .	—	2,735	21,746	—	24,481
54 . . . . .	908	—	—	—	908
60 . . . . .	1,009	3,923	15,805	—	20,737
72 . . . . .	10,828	9,416	—	—	20,244
78 . . . . .	—	—	4,736	—	4,736
84 . . . . .	—	6,670	—	—	6,670
90 . . . . .	—	10,173	—	—	10,173
Total, coal bed . . . . .	14,628	36,801	99,431	—	150,859
Total, county . . . . .	1,419,585	835,914	789,487	256,270	3,301,257

## MINABLE COAL RESERVES

RESOURCES BY COUNTY: FOUR CATEGORIES OF RESERVES—(Concluded)  
(In thousands of tons)

Coal bed; Average thickness, inches	I-A Proved	I-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total
<b>WOODFORD CO.</b>					
Sparland No. 7					
28 . . . . .	—	27,149	8,762	—	35,911
35 . . . . .	2,648	—	—	—	2,648
Total, coal bed . . . . .	2,648	27,149	8,762	—	38,560
Springfield No. 5					
28 . . . . .	—	—	27,463	—	27,463
35 . . . . .	—	42,274	75,033	—	117,307
Total, coal bed . . . . .	—	42,274	102,496	—	144,770
LaSalle No. 2					
28 . . . . .	9,913	82,834	350,089	498,913	941,750
35 . . . . .	—	37,958	—	—	37,958
42 . . . . .	11,142	—	—	—	11,142
Total, coal bed . . . . .	21,055	120,792	350,089	498,913	990,850
Total, county . . . . .	23,703	190,215	461,348	498,913	1,174,179

SUMMARY BY COAL BED

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SUMMARY BY COAL BED: FOUR CATEGORIES OF RESERVES AND MINED-OUT AREA  
(In thousands of tons)

Coal Bed	1-A Proved	1-B Probable	II-A Strongly indicated	II-B Weakly indicated	Total	Mined- out area (in sq. mi.)
Trowbridge	8,396	7,873	—	—	16,269	—
Friendsville	—	24,449	70,018	5,388	99,855	.14
Danville (Sparland) No. 7	1,003,028	3,413,502	2,924,154	499,698	7,840,381	18.23
Jamestown	42,147	191,363	367,425	—	600,934	—
Herrin No. 6 (includes Grape Creek)	12,299,737	21,100,547	25,143,881	4,093,391	62,637,556	672.93
Harrisburg (Springfield) No. 5	4,168,131	9,593,325	19,776,703	4,971,819	38,509,978	261.55
Sumnum No. 4	51,592	62,359	67,585	—	181,537	.77
Indiana IV	11,946	58,072	61,024	—	131,042	—
LaSalle (Colchester) No. 2	1,359,365	3,622,676	6,216,399	6,287,748	17,486,188	103.52
Dekoven	92,150	845,075	1,548,149	—	2,485,374	—
Indiana III	167,452	687,898	965,550	—	1,820,900	.03
Davis-Wiley	123,448	1,061,644	1,882,935	364,056	3,432,084	—
Campbell Hill	8,833	—	—	—	8,833	.10
Stonefort	4,540	—	—	—	4,540	—
Bald Hill	27,245	39,033	5,028	1,229	72,535	—
Murphysboro	34,064	86,016	147,370	124,343	391,794	8.55
Rock Island No. 1	111,286	65,230	85,904	6,539	268,960	11.73
Assumption-Litchfield	27,794	265,473	1,010,768	—	1,304,035	.44
Willis	6,892	—	—	—	6,892	—
Makanda	1,962	—	—	—	1,962	—
Coals of unknown correlation lower than No. 6	21,186	—	6,375	—	27,561	—
Total	19,571,192	41,124,535	60,279,271	16,354,211	137,329,208	1,077.99

MINED-OUT AREAS BY COUNTY AND COAL BED  
(In square miles)

County	Friendsville	Danville (Spartan) No. 7	Herrin No. 6	Harrisburg (Springfield) No. 5	Sumnum No. 4	LaSalle (Colchester) No. 2	Indiana III	Murphysboro	Rock Island No. 1	Assumption	Total
Bond	—	—	4.14	—	—	—	—	—	—	—	4.14
Bureau	—	.05	3.38	—	—	13.26	—	—	—	—	16.69
Christian	—	—	52.74	.70	—	—	—	—	—	.44	53.88
Clinton	—	—	12.70	—	—	—	—	—	—	—	12.70
Crawford	—	—	.14	.04	—	—	—	—	—	—	.18
Douglas	—	.15	—	—	—	—	—	—	—	—	.15
Edgar	—	.18	—	1.12	—	—	.03	—	—	—	1.33
Franklin	—	—	117.81	—	—	—	—	—	—	—	117.81
Fulton	—	—	4.74	60.91	—	1.37	—	—	—	—	67.02
Gallatin	—	—	—	1.64	—	—	—	—	—	—	1.64
Greene	—	—	—	—	.77	.14	—	—	—	—	.91
Grundy	—	.28	.99	—	—	32.38	—	—	—	—	33.65
Hancock	—	—	—	—	—	.06	—	—	—	—	.06
Henry	—	—	2.54	—	—	4.11	—	2.53	—	—	9.18
Jackson	—	—	13.94	1.24	—	—	8.38	—	—	—	23.56
Jefferson	—	—	3.81	—	—	—	—	—	—	—	3.81
Kankakee	—	.15	—	—	—	.44	—	—	—	—	.59
Knox	—	—	5.80	3.38	—	.69	—	—	1.47	—	11.34
LaSalle	—	1.08	11.10	—	—	14.34	—	—	—	—	26.52
Livingston	—	.17	3.03	—	—	.24	—	—	—	—	3.44
Logan	—	—	—	6.55	—	—	—	—	—	—	6.55
McDonough	—	—	—	—	—	6.24	—	—	—	—	6.24
McLean	—	.29	—	—	—	.94	—	—	—	—	1.23
Macon	—	—	—	2.45	—	—	—	—	—	—	2.45
Macoupin	—	—	71.39	—	—	.95	—	—	—	—	72.34
Madison	—	—	49.26	—	—	.47	—	—	—	—	49.73
Marion	—	—	11.81	.04	—	—	—	—	—	—	11.85
Marshall	—	.84	—	—	—	3.96	—	—	—	—	4.80
Menard	—	—	—	3.66	—	—	—	—	—	—	3.66
Mercer	—	—	—	—	—	—	—	4.80	—	—	4.80
Montgomery	—	—	23.41	—	—	.67	—	—	—	—	24.08
Morgan	—	—	.22	—	—	—	—	—	—	—	.22
Moultrie	—	—	.68	—	—	—	—	—	—	—	.68
Peoria	—	—	.70	35.41	—	.45	—	—	—	—	36.56
Perry	—	—	52.75	.27	—	—	—	—	—	—	53.02
Putnam	—	—	—	—	—	3.33	—	—	—	—	3.33
Randolph	—	—	20.33	.98	—	—	—	—	—	—	21.31
Rock Island	—	—	—	—	—	—	—	2.90	—	—	2.90
St. Clair	—	—	61.12	—	—	—	—	—	—	—	61.12
Saline	—	—	2.25	62.33	—	—	—	—	—	—	64.58
Sangamon	—	—	18.38	65.22	—	—	—	—	—	—	83.60
Schuyler	—	—	—	.19	—	.10	—	—	—	—	.29
Shelby	—	—	.47	.48	—	—	—	—	—	—	.95
Stark	—	—	.30	—	—	—	—	—	—	—	.30
Tazewell	—	—	—	6.35	—	—	—	—	—	—	6.35
Vermilion	—	15.04	37.84	—	—	—	—	—	—	—	52.88
Wabash	.14	—	—	—	—	—	—	—	—	—	.14
Warren	—	—	—	—	—	.10	—	—	.03	—	.13
Washington	—	—	5.46	—	—	—	—	—	—	—	5.46
White	—	—	.75	—	—	—	—	—	—	—	.75
Will	—	—	—	—	—	16.52	—	—	—	—	16.52
Williamson	—	—	78.95	8.59	—	—	—	.17	—	—	87.71
Woodford	—	—	—	—	—	2.76	—	—	—	—	2.76
Total	.14	18.23	672.93	261.55	.77	103.52	.03	8.55	11.73	.44	1,077.89

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ILLINOIS STATE GEOLOGICAL SURVEY  
BULLETIN 78, 1952