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STRIPPABLE COAL RESERVES OF ILLINOIS

Part 3 – Madison, Macoupin, Jersey,
Greene, Scott, Morgan, and Cass Counties

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DIVISION OF THE
ILLINOIS STATE GEOLOGICAL SURVEY
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CIRCULAR 311 1961

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ABSTRACT

This third report of a series published by the Illinois State Geological Survey describing and evaluating strippable coal reserves of Illinois is concerned chiefly with large reserves of No. 2 and No. 6 Coals in the western parts of Madison and Macoupin Counties and in Jersey, Greene, Scott, Morgan, and Cass Counties. Strippable coals are currently defined as beds 18 inches or more thick and having overburden not exceeding 150 feet.

There is now practically no mining in this area of comparatively thin coal, although at one time there was considerable local mining. However, proximity to the Mississippi and Illinois Rivers, increasing demands for electrical energy, and improvements in excavating equipment have resulted in renewed interest in the large reserves of coal in these counties.

The information concerning strippable coal reserves is compiled on two maps, one for No. 2 and one for No. 6 Coal, published on a scale of one-half inch to the mile. They show outcrops, mined-out areas, and thickness of the coal at 12-inch isopach intervals. Isopach lines divide the overburden into thickness categories of 0 to 50, 50 to 100, and 100 to 150 feet. The reserves are divided into primary and secondary categories. The quantity of strippable coal (estimated according to coal thickness, overburden thickness, and reliability of estimate) are tabulated by township for each county.

A third map, also on the scale of one-half inch to the mile, delineates structure contours drawn on the top of No. 2 and No. 6 Coals. Stratigraphic relationships in the Pennsylvanian strata of the various counties are shown on three north-south cross sections.

A total of approximately three billion tons of strippable coal reserves has been estimated for these seven counties, divided about equally between the Colchester (No. 2) Coal and the Herrin (No. 6) Coal. Minor areas of strippable reserves available in the Danville (No. 7), Roodhouse, and Kerton Creek Coals are described.

INTRODUCTION

This third report of a series being issued by the Illinois State Geological Survey on the strippable coal reserves of Illinois summarizes information available concerning strippable reserves in seven counties of western Illinois — Madison, Macoupin, Jersey, Greene, Scott, Morgan, and Cass (fig. 1).

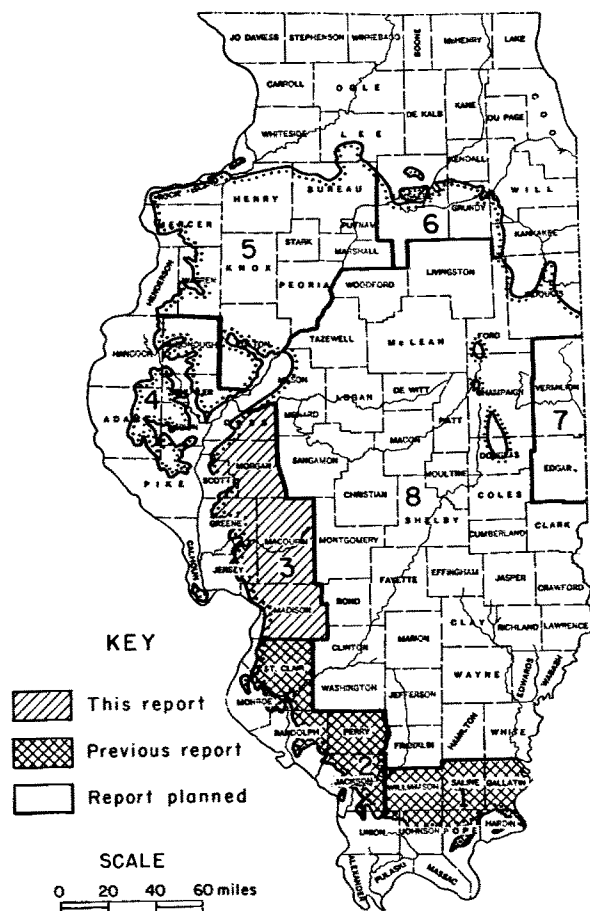


Fig. 1 - Index map showing boundary of the Pennsylvanian rocks in Illinois, location of area of this report, the previous reports, and reports planned to complete mapping of strippable coal resources of the state.

Approximately three billion tons of strippable coal reserves are estimated to be available in these counties (table 3), a quantity about equal to the amount of strippable coal estimated for the five-county area to the south (fig. 1) which was described in Part 2 of this series (Smith, 1958). In the area covered by the second report, however, approximately 75 percent of the total estimated strippable coal reserves was in beds having an average thickness of 72 or more inches, whereas in the area of this report approximately 75 percent of the total estimated strippable reserves is in beds having an average thickness of 30 to 36 inches. In the area of the Part 2 report, more than 100 square miles of coal with overburden depth of less than 150 feet has been mined out to date, and extensive areas are being strip mined. In the area of this report, less than 10 square miles of coal have been mined out, and there has been practically no strip mining.

The counties described in this report contain extensive areas of strippable reserves in relatively thin coal. These reserves are currently being viewed with much more interest by the coal industry than in the past.

Reserves are classified and mapped for the Herrin (No. 6) and Colchester (No. 2) Coals. The report also considers small areas of strippable coal in the Danville (No. 7) Coal and in other coal beds that are generally quite thin but locally attain minable thickness.

PREVIOUS INVESTIGATIONS

Worthen (1866, 1868, 1870) was the first to report on the geology of the area. He described numerous outcrops and collected logs of mine shafts and other details concerning much of the early coal mining in the counties included here. Cady (1921) described the coal resources of Cass County; Collingwood (1922), in an unpublished manuscript, described the Pennsylvanian strata and coal beds in Jersey, Greene, and parts of Madison and Macoupin Counties and compiled work maps of coal structure which are on open file at the Illinois State Geological Survey; Culver (1925) described the coal resources of Jersey, Greene, Scott, Morgan, and Cass Counties. Payne (1941, 1942) mapped the structure of the Herrin (No. 6) Coal in most of the area and constructed several cross sections illustrating stratigraphic relationships in the various counties. Coal reserves were evaluated by Cady (1952) for all of the counties. Although the 1952 report considered strippable reserves, it did not differentiate strippable reserves in computing total minable reserves.

Other publications relating to the geology and coal resources of the area that have been used in this investigation are listed at the end of the report.

ACKNOWLEDGMENTS

Mining companies have been most helpful in furnishing data resulting from exploration for coal in these counties, and numerous individuals residing in the area have cooperated in supplying information relative to long-abandoned mining operations.

Work on the report was carried out under the direction of Jack A. Simon, Head of the Coal Section of the Survey, and Margaret Parker assisted by calculating reserves and preparing the tabulations. E. K. Norman, W. F. Near, D. J. Berggren, and D. H. Roy helped collect data and compiled the maps.

METHODS OF PREPARING RESERVE ESTIMATE

SOURCES OF INFORMATION

Data for estimating thickness and distribution of coal beds and the geologic character of associated strata were obtained principally from study of well logs and other records and notes on file at the Illinois State Geological Survey.

The distribution of datum points was adequate for a fairly reliable inventory of strippable coal reserves in western Madison County where there has been a moderate amount of mining and considerable test drilling in the unmined areas. In the remaining counties discussed, which extend northward from Madison County to the Illinois River, only minor areas have been mined for coal and only a few places have been extensively test drilled. Therefore, in Jersey, Macoupin, Greene, Morgan, Scott, and Cass Counties the distribution of data permit only a preliminary inventory of the strippable coal reserves. The maps with this report are based on (1) observations at outcrops, some widely separated because of thick glacial deposits; (2) records from the many small-scale, long-abandoned mining operations that were prevalent in a number of areas; and (3) drilling records.

Only a few records of diamond drill core holes are available for the area north of Madison County. For much of the area, records of churn drill test holes for water, gas, and oil constitute the only source of geologic information from which the distribution of coal deposits can be inferred.

Structure of the No. 6 Coal is based on data from mine and drill hole records in the Survey files and on previous structure mapping in parts of the area by Collingwood (1922) and Payne (1941, 1942). Unpublished field notes and maps by J. R. Van Pelt, Jr., T. A. Hendrix, D. M. Collingwood, H. R. Wanless, G. H. Cady, E. F. Taylor, and others were used extensively for areas near the coal outcrops in Greene, Scott, and Macoupin Counties.

Mined-out areas shown on the accompanying maps were obtained from maps prepared for use in the report by Cady (1952) and subsequently revised to include all mining to July 1, 1959.

SELECTION OF MAPPING AREAS

Illinois has been divided into eight areas for convenience in preparing reports and maps of strippable coal reserves. Figure 1 shows the area covered in this study as well as the two already reported and the five yet to be mapped. Areas 1 through 7 incorporate the margins of the Eastern Interior Coal Basin where the minable coals of the McCormick and Kewanee Groups crop out within the state. The eighth area embraces a large part of the deeper portion of the Eastern Interior Coal Basin where coal beds of the Kewanee Group lie at depths too great for strip mining. In the eighth area, strippable reserves are restricted to coals of the McLeansboro Group, which are known to attain minable thickness only locally. Reports for the first two areas already have been published (Smith, 1957, 1958).

DEFINITION OF STRIPPABLE COAL

In this report strippable coal reserves include coal beds that are 18 inches or more thick and have an overburden not more than 150 feet thick. Evaluation of strippable reserves is based principally upon thickness of coal and depth of overburden.

Certain of the reserves will not be recoverable because they lie beneath towns, cities, highways, and the like. However, the scale on which the coal is mapped does not permit the omission of such non-recoverable coal from the estimate.

In this report, as in earlier reports on coal reserves in Illinois (Cady, 1952; Smith, 1957, 1958), the tonnage estimate is based on an assumption of 1800 tons of coal per acre foot. This conforms to the figure used in estimating reserves of high-volatile coal by the United States Geological Survey. However, a figure of 1770 tons per acre foot is probably more representative for coals in Illinois. The estimates are based on total coal in place, and no estimate of recoverable coal is presented.

DELINEATION OF COAL OUTCROPS

The accuracy with which the outcrop boundary of coal beds can be mapped depends upon the number and distribution of visible outcroppings, test holes, nature of the topography, and the amount of unconsolidated material present in the area. Faults and other structural features, erosional cutouts, and areas in which the coal is lenticular or lacks persistence also make it difficult to map the coal outcrop accurately.

In much of Illinois the bedrock is masked by various thicknesses of glacial deposits, and in some areas it is covered by deposits of loess (a nonstratified, primarily wind-blown sediment, dominantly composed of silt-sized particles) deposited during glacial time. The term outcrop, therefore, is herein used broadly to describe the border of a coal bed, whether it is exposed at the surface or concealed beneath unconsolidated surface materials.

All of the area under discussion is covered by glacial deposits except where these deposits have been removed by postglacial stream erosion. There are large areas in Morgan, Scott, and Cass Counties where limits of the coals are not known. In such places outcrops have been interpolated on the basis of the coal structure contours, contours of the bedrock surface, and surface topography.

Wherever sufficient data were available to permit delineation of even a very provisional line representing the border of the coal beneath glacial deposits, such lines have been shown on the accompanying maps (pls. 1, 2). This seems justified even though further drill information will modify the outcrop lines shown. Such provisional outcrop lines provide an opportunity to illustrate on the maps and in the text discussion areas where coal at strippable depth may be encountered.

The outcrop of No. 6 Coal in most of Madison County and southeastern Jersey County is known in some detail and generally follows previous mapping (Payne, 1942). North of Madison County through Macoupin, Greene, Morgan, Scott, and Cass Counties, the outcrop of No. 6 Coal has been extensively modified from that shown in previous reports. The outcrop as shown on plates 2 and 3 has been drawn largely by comparison and interpretation of the structure contour maps prepared for this study and bedrock topography maps prepared by Horberg (1950). The outcrop of No. 2 Coal is based on scattered data in most of Madison, Jersey, Greene, and Scott Counties. However, in the vicinities of Alton in Madison County, Delhi in Jersey County, the areas south and east of Roodhouse, Greene County, and near Alsey, Winchester, and Exeter in Scott County, numerous small mines have operated near the outcrop and provided sufficient outcrop observations of the coal to permit reasonably accurate delineation of the outcrop on the maps.

OVERBURDEN CATEGORIES

Thickness of overburden is shown on the maps by isopach lines representing 50-foot intervals and showing thickness categories of 0-50, 50-100, and 100-150 feet. In selecting overburden categories, we realize that 100 feet of overburden probably represents the upper limit for overburden in Illinois strip mining to date. It is beyond the scope of the report to predict future economic and technologic factors that may govern the ultimate future utilization of coal reserves classified in this study. It seems appropriate, however, to include resources at depths greater than those currently considered strippable.

DELINEATION OF STRIPPABLE COAL

The lines on the maps delineating the various categories of overburden thickness were constructed by interpreting between contours of surface topography and contours of coal elevation. Surface topography was obtained from United States Geological Survey topographic maps on a scale of 1:62,500, or about an inch to the mile.

Coal structure data for Madison and Macoupin Counties were obtained by revising part of the area mapped by Payne (1942). For Jersey and Greene Counties, coal structure maps were compiled largely from unpublished maps and field notes

of D. M. Collingwood, J. R. Van Pelt, Jr., T. A. Hendrix, H. R. Wanless, and G. H. Cady. For Scott, Morgan, and Cass Counties there were no existing maps of coal outcrops or coal structure which were adequate for use in this study, and it was necessary to compile structure maps incorporating all of the available data for those counties. Inasmuch as these data varied greatly in quality and distribution, the overburden for strippable coal shown on the map for these counties may be subject to gross errors.

GEOLOGIC STRUCTURE OF COAL BEDS

Structure maps of the coal beds are essential for evaluation of strippable coal reserves and are very useful in the exploration and development of the coal. In the counties included in the two previous reports on strippable coal reserves (Smith, 1957, 1958) there generally were adequate structure maps available from other published sources so that structure maps were not included in those reports. A structure map of No. 2 and No. 6 Coals (pl. 3) is included with this report because much of the area was not adequately covered by coal structure maps and because it is felt that this structure map, even though very provisional in areas with little information, will be useful in coal exploration and other geologic investigations.

STRIPPABLE COAL RESERVES

CLASSIFICATION OF RESERVES

Coal reserves are divided into categories to designate the reliability of the estimate. On the maps and the tables of this report reserves are divided into primary and secondary classes.

Class I - Primary Reserves

Class I reserves includes coal in areas where there is enough information from outcrop measurements, mine and pit workings, and drill holes to establish the presence of the coal with reasonable certainty. This class ordinarily includes all coal within two miles of the last point of reliable information of coal thickness (mines, outcrops, diamond drill holes, and churn drill coal test holes). This is equivalent to the proved (Class I-A) and probable (Class I-B) categories for reserves in the statewide inventory of coal reserves compiled by Cady (1952). Where available data suggest uncertainty as to the persistence of occurrence or thickness of the coal, the limits above defined have been reduced in making the appraisal.

Class II - Secondary Reserves

Class II reserve estimates are based on projection of geologic information from the Class I areas outward into areas in which only scattered information is available from records of test holes drilled for oil, gas, or water and in which data on coal thickness are not reliable enough for classifying the coal as primary reserves. Coal in areas adjacent to places where the coal is lenticular or erratic in its occurrence, or where there is doubt regarding the continuity of the coal in the thickness indicated, is included with the Class II reserves even though it lies within two miles of the last point of reliable information on thickness and would ordinarily be included with the Class I reserves.

The principal value in recognizing Class II reserves is to indicate areas where indirect evidence plus geologic interpretation suggest that coal may be present at the thickness indicated on the maps and where prospecting for strippable coal might advantageously be conducted.

The Class II reserves of this report correspond to those classified by Cady (1952) as II-A (strongly indicated) and II-B (weakly indicated).

THICKNESS OF COAL

Thickness of the coal is indicated on the maps (pls. 1 and 2) by isopach lines wherever datum points were spaced closely enough to permit them to be drawn. In areas for which it was not practical to construct isopach lines, an estimated average thickness value for coal is shown. Average values for coal thickness have been divided along township lines on the maps in this report wherever it was convenient to do so; elsewhere the boundary between thickness categories is indicated by line symbols.

Isopach lines are drawn on the maps at intervals, beginning with 18 inches and progressing by 12-inch increments, as follows: 18, 30, 42, 54, 66, and 78 inches. Thus the average thickness of coal reserves falling between successive isopach lines is calculated in even feet (for example, between 18- and 30-inch isopach lines, average 24 inches). These average thickness values were used to calculate the coal tonnage within each of the overburden and reliability classifications delineated.

The average thickness values given above coincide with those used by Cady (1952) for calculating the total minable coal reserves of Illinois with the exception of the lowest thickness limit, which generally was 28 inches in the earlier study.

For some areas in the counties mapped there are virtually no reliable data concerning the thickness of coal beds. However, for some of these areas there is enough information from records of oil or water well drilling to permit making a coal structure map and classifying the coal into the various categories of overburden depth outlined for this study. Areas in which there are not sufficient data for classification of reserves by thickness are designated by hachures on the maps.

MINED-OUT COAL

Areas where the coal is known to be mined out are shown on maps compiled by the Illinois State Geological Survey (Cady, 1952) which have subsequently been revised to include all mining to July 1, 1959.

At a number of places the coal reserves have been depleted chiefly by large numbers of very small local mines which mined only a fraction of an acre to several acres. In most cases, there is no record of the areas mined out by these operations. As many of these local mines as can be shown, or as many as are known from available records, are shown on plates 1 and 2. Mined-out areas, where known, also are shown on the maps and these areas have been excluded in computing the reserve tonnages. The total area of mined-out coal probably is less than 10 square miles for all of the counties of this report.

GEOLOGY OF THE COAL BEDS

The counties of this report (fig. 1) are near the western margin of the Eastern Interior Coal Basin. Here the Pennsylvanian sediments containing the coal

beds under discussion lie disconformably upon an uneven surface that was developed by the erosion and deformation of the underlying Mississippian sediments before Pennsylvanian deposition began.

The thickness and character of Pennsylvanian sediments change markedly from the shelf area eastward to the deeper part of the Eastern Interior Coal Basin. Figure 2 and the cross sections (pl. 4) illustrate differences in thickness of the sediment, differences in the interval between coal beds, and variation in the number and thickness of coal beds encountered when passing from the shelf area toward the deeper basin area. The shelf area embraces a large part of the strip-pable coal beds discussed here.

The Pennsylvanian or coal-bearing strata in Illinois are divided into three groups: the McCormick (the lowest or oldest), Kewanee, and McLeansboro (Kosanke et al., 1960). Figure 2 illustrates the sequence of strata encountered in the area of this report. The principal geologic features of the coal beds and their associated strata in each geologic group are discussed below with emphasis on the correlation of coal beds.

McCormick Group

The McCormick Group includes all strata from the top of the Mississippian System upward to the top of the Bernadotte Sandstone (Kosanke et al., 1960). Rocks of the McCormick Group are present in some drill holes in the eastern part of the area of this report (pl. 4), but generally are absent or too thin to be recognizable where No. 2 and No. 6 Coals crop out in the western part of the area.

Kewanee Group

The Kewanee Group includes all strata from the top of the Bernadotte Sandstone to the top of No. 7 Coal (Kosanke et al., 1960). It is divided into the Spoon Formation, which contains the strata below the base of No. 2 Coal, and the Carbondale Formation, which includes strata from No. 2 Coal through No. 7 Coal.

Spoon Formation

Rocks of the Spoon Formation commonly lie disconformably on the eroded surface of Mississippian age rocks in the counties discussed here. The Spoon Formation ranges in thickness from 10 to 100 feet, depending upon the irregularities of the pre-Pennsylvanian erosion surface and the position of a given locality with respect to the shelf-slope relationship.

Coals of the Spoon Formation have been encountered in drill holes in nearly all of the counties included in this study. The number and stratigraphic distribution of coal members in the Spoon Formation is illustrated in figure 2 and on plate 4.

Exposures of the Spoon Formation have been reported from only a few localities in the counties of this report. Nevertheless, it is likely that there are occurrences of minable coal in the Spoon Formation at strippable depth at several places in the area. Because of the lenticular nature of most of these coals, however, they probably add but little to the total reserves of the area.

The Seahorne Limestone Member, which is a significant stratigraphic marker, occurs near the top of the Spoon Formation. Throughout at least most of the area of the counties of this report, the Seahorne Limestone generally occurs close below the underclay of No. 2 Coal. It is this relationship of the Seahorne

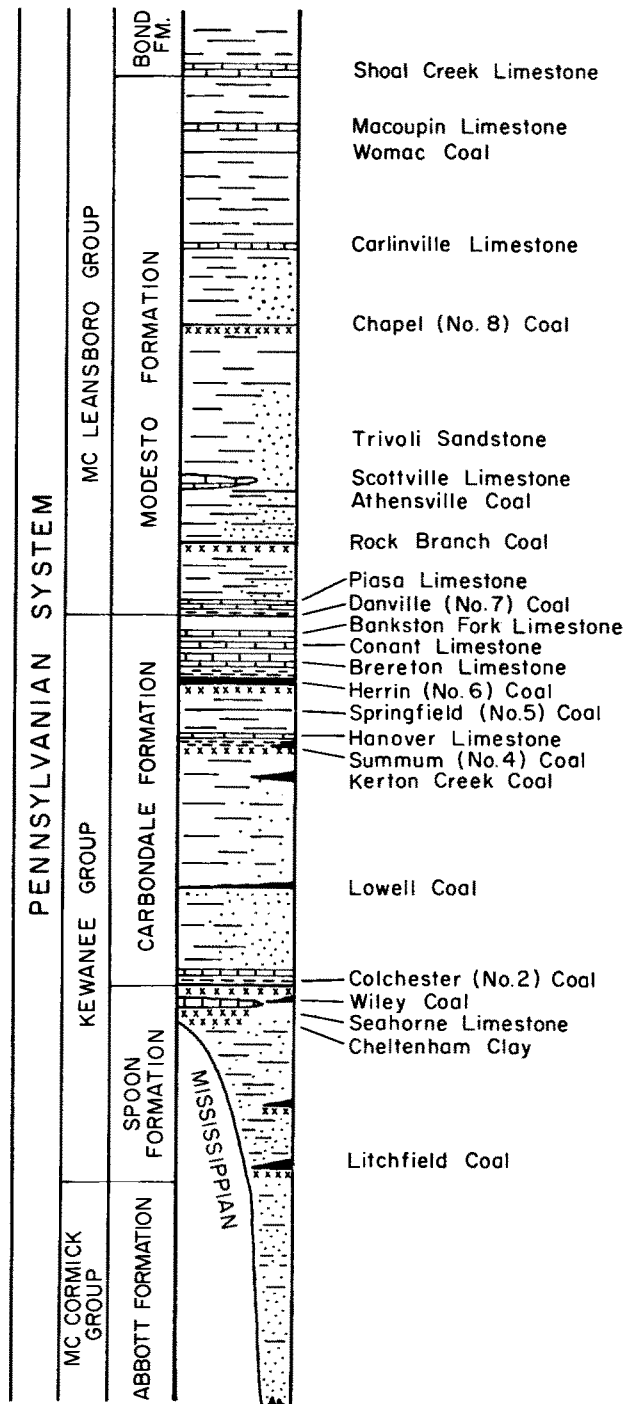


Fig. 2 - Generalized section of Pennsylvanian rocks in Madison, Macoupin, Jersey, Greene, Scott, Morgan, and Cass Counties.

Limestone to the No. 2 Coal which permits ready identification of the No. 2 Coal in outcrops and drill holes throughout much of the area. Eastward, however, the Wiley Coal and associated strata occur between the Seahorne Limestone and No. 2 Coal.

In the Alton-St. Louis area, the Seahorne Limestone and No. 2 Coal occur 25 feet or less above the Mississippian-Pennsylvanian unconformity. Where this situation prevails, as it does also in the area between White Hall (Greene County) and Winchester (Scott County), the interval consists largely of the Cheltenham Clay.

Carbondale Formation

Essentially all of the strippable coal reserves described in this report are in the Carbondale Formation, which contains the Colchester (No. 2) Coal at its base, the Lowell Coal, Sumnum (No. 4) Coal, Harrisburg (No. 5) Coal, Herrin (No. 6) Coal, and Danville (No. 7) Coal at the top. The stratigraphic relationships and principal geologic features of each of these coal beds are described briefly. Figure 2 illustrates the position of coals of the Carbondale Formation.

Colchester (No. 2) Coal. - The No. 2 Coal is an excellent stratigraphic marker in northern and western Illinois where it has been extensively mined and prospected, but unlike most coals in the Eastern Interior Coal Basin, it thins southward and eastward to thicknesses commonly of the order of 10 inches or less in southern Illinois, Indiana, and western Kentucky, where it is not mined. It is generally recognized in those areas by the presence of the prominent Palzo Sandstone (the Sebree of Kentucky) close below it at many places and by its relations to the higher widespread No. 4 and No. 5 Coals. The No. 2 Coal is correlated with the Whitebreast Coal of Iowa, the Croweburg Coal of Missouri and northeastern Oklahoma in the Western Interior Basin (Searight, 1953), and tentatively with the Lower Kittanning Coal of the northern and central Appalachian Field (Wanless, 1955), each of which is an important stratigraphic marker in its respective area. Thus, the No. 2 Coal and its correlatives probably constitute the most widespread coal member in the Pennsylvanian strata of North America.

No. 2 Coal is remarkably persistent in the seven counties of this report where it is commonly about 30 inches thick. It has been the principal coal mined in all of the counties described in the report except Madison County and eastern Macoupin County where mining has been much more extensive in No. 6 Coal. No. 2 Coal furnishes a convenient reference member for correlation of the less persistent coal beds in the Kewanee Group on the cross sections (pl. 4).

A number of distinctive features exhibited by the rocks associated with the No. 2 Coal aid in distinguishing it in outcrops or diamond drill cores. Along the belt of its outcrop (pl. 1) and in many of the drill holes shown on the cross sections (pl. 4) the No. 2 Coal commonly occurs only a few feet above the Seahorne Limestone, which is typically a dense, blue-gray rock containing irregular, dark gray, subangular, dense limestone fragments. In outcrops the Seahorne typically exhibits a very irregular, knobby, or nodular structure.

No. 2 Coal is overlain by a black slaty shale generally containing phosphatic nodules which give a distinctive pimply appearance to the bedding surfaces. In most of the area of this report, except near Virginia, Cass County, this distinctive black slaty shale lies immediately over No. 2 Coal, but at Virginia and at numerous places in western Illinois, it is separated from the coal by soft gray shale (Francis Creek Shale Member) up to 20 feet or more thick.

In the area west of Illinois River, the black slaty shale is overlain by interbedded limestone and shale beds (Oak Grove Limestone Member), which may have an aggregate thickness of 10 feet or more. In most of the area of this report, only the lowermost of these limestone beds generally is present and lies immediately above the black slaty shale. Although the Oak Grove Member may contain one or more beds of limestone, commonly a very fossiliferous, argillaceous limestone less than one foot thick overlies the black slaty shale and contains the distinctive fusulinids and other fauna associated with parts of the Oak Grove Limestone Member.

Coal Members in the Interval Between No. 2 and No. 4 Coals. - In Madison, Macoupin, and Jersey Counties, at an interval of 30 to 40 feet above the Colchester (No. 2) Coal, there is a thin coal or coaly zone which in this report is tentatively correlated with the Bevier Coal in Missouri (Searight, 1959) and with the Lowell Coal (Willman and Payne, 1942) in northern Illinois. This coal has been recognized only occasionally near the outcrop of No. 2 Coal and generally has not been correlated in drill holes east of the belt of No. 2 Coal outcrops.

In compiling data concerning the No. 2 Coal for this report, it has been established that a thin carbonaceous zone consisting of four to six inches of very fossiliferous dark shale noted in some outcrops near Delhi, Jersey County (pl. 4, No. 38, sec. A-A'), probably immediately overlies a thin coal that is noted in some outcrops and drill holes (No. 949, sec. A-A') in the vicinity of Alton. This coal zone, traced eastward from the Alton-Delhi outcrops, becomes a recognizable coal in most drill records (pl. 4) and bears the same relationships to the underlying No. 2 Coal as observed in the outcrops near Alton and Delhi.

This coal, which lies about 35 feet above No. 2 Coal, can be traced on the cross sections (pl. 4) and on the electric logs of oil wells from Madison and Macoupin Counties, where it is generally easily identified in most logs, northward into Morgan and Cass Counties. In Greene and Scott Counties it becomes difficult to trace with certainty but appears to be represented by a dark fossiliferous shale that has relationships similar to those seen in the outcrops near Delhi, Jersey County; the interval, however, above the No. 2 Coal here is only about 15 feet. This coal zone has not yet been definitely correlated into counties west of the Illinois River and into counties north of Cass County, but it is believed to be equivalent to the Lowell Coal of northern Illinois, which has stratigraphic relationships very similar to those of the coal 30 feet above No. 2 Coal at Alton, Delhi, and in various diamond drill cores in Madison and Macoupin Counties.

No strippable reserves are attributed to the coal thought to be the Lowell-Bevier equivalent in the counties of this report. However, east of Roodhouse, Greene County, there is a local occurrence of a thick coal, generally regarded as the Kerton Creek Coal (pl. 4, No. 3, sec. A-A'), occurring at a stratigraphic position which suggests that it may possibly be equivalent to the Lowell Coal. At Neelys, four miles west of Chapin, Morgan County, there is a similar local occurrence of coal 4 feet thick, 30 or 35 feet above No. 2 Coal, which is described by Worthen (1868, p. 10-11, 138; 1870, p. 152-153), that possibly may also be correlative with the Lowell Coal but more probably is correlative with the Kerton Creek Coal which occurs at the top of the Pleasantview Sandstone in Fulton County (Wanless, 1957).

In Madison and Macoupin Counties the coal tentatively correlated with the Lowell is commonly reported as 1 to 2 feet thick in drill records but at some places is 3 to 4 feet thick. Payne (1942) correlated this coal with the Colchester (No. 2) Coal, and the coal 30 to 40 feet lower which was mined at Medora, Shipman, and

Chesterfield, Macoupin County, he called the Medora Coal and considered it to be the equivalent of the Wiley Coal of western Illinois. In the study of Illinois coal reserves, Cady (1952) followed Payne's correlations in part in Madison and Macoupin Counties where the coal tentatively correlated with the Lowell in this report was correlated with the No. 2 Coal in the 1952 report.

Sumnum (No. 4) Coal Member. - Within the counties discussed in this report, Sumnum (No. 4) Coal occurs 20 to 40 feet below No. 6 Coal and commonly is the first coal below No. 6 Coal that is identified in drilling and at some places in outcrops. This is attributed to the absence, or very poor development, of the Springfield (No. 5) Coal (which, where identifiable, often occurs 10 to 15 feet below No. 6 Coal and consists of no more than a thin carbonaceous streak). The No. 4 Coal is quite persistent in the counties of this report but is generally thin. Its stratigraphic position is often marked by 1 to 2 feet of black slaty shale above the coal position, which in turn is overlain by the Hanover Limestone Member, one of the principal stratigraphic reference markers in Jersey and Greene Counties. No. 4 Coal has been mined only locally in the vicinity of Hanover School, Greene County, but is not known in minable thickness elsewhere in the area.

Springfield (No. 5) Coal Member. - Springfield (No. 5) Coal is not identifiable in the interval below No. 6 Coal in most of the area of this report except where close observations have been made. It is then described as a thin, coaly streak 8 to 15 feet below the No. 6 Coal. No. 5 Coal has been mined extensively in the vicinity of Springfield, Sangamon County, and is generally of minable thickness in the northern part of Sangamon County and much of Menard County (Clegg, 1961). In southern Sangamon County No. 5 Coal undergoes a marked thinning, and in southwestern Sangamon, southern Morgan, and northeastern Macoupin Counties it is generally thin or absent. In western Macoupin and western Madison Counties, No. 5 Coal is likewise thin and seldom is noted except at some good outcrops or in occasional well described diamond drill cores.

The area in northeastern Morgan and eastern Cass Counties that is adjacent to Sangamon and Menard Counties may contain No. 5 Coal in minable thickness, but, because of lack of enough drill hole information, the coal has either been unrecognized or has been miscorrelated with the No. 6 Coal in that area.

Herrin (No. 6) Coal Member. - Herrin (No. 6) Coal is the most extensively mined coal in Illinois. In Madison County and the southern and eastern parts of Macoupin County, No. 6 Coal is generally known to be present in minable thickness and is contiguous with the southern and central Illinois districts of No. 6 Coal mining. In the remaining counties of the report, extending northward from Madison County through Jersey, Greene, Morgan, and Cass Counties to the Illinois River, there are sizable areas where data regarding the extent and thickness of No. 6 Coal are inadequate for delineating the coal outcrop or evaluating its thickness except in a preliminary fashion.

In the area of this report No. 6 Coal generally lies about 125 feet above No. 2 Coal (see cross section, pl. 4). The No. 6 Coal generally is closely overlain by the Brereton Limestone Member and, at an interval of about 25 feet higher, by the No. 7 Coal and the Piasa Limestone Members. The No. 7 Coal and the Piasa Limestone are often used as important markers for identifying No. 6 Coal in drill records.

Danville (No. 7) Coal Member. - Danville (No. 7) Coal and the overlying Piasa Limestone Member are not as well developed in the northern counties of this report as they are in northwestern Madison, southeastern Jersey, and southern Macoupin Counties where the coal locally attains minable thickness and the

Piasa Limestone, which commonly is associated with red shale, is typically up to several feet thick. In the northern part of the area No. 7 Coal at many places is represented by only a few inches of coal or carbonaceous shale, and the Piasa Limestone is represented by a nodular bed of limestone, associated with red clayey shales which often serve to distinguish it and aid in identifying the position of No. 7 Coal in some drill logs.

McLeansboro Group

The McLeansboro Group includes all strata above the top of the Danville (No. 7) Coal. McLeansboro rocks are divided into three formations — Modesto, Bond, and Mattoon (Kosanke et al., 1960). The strata of all but the lowermost, the Modesto Formation, have been removed by erosion from most of the area described here. There is a maximum of about 125 feet of McLeansboro strata in the study area in Madison and Macoupin Counties. Rocks of the Modesto Formation contain a number of thin coal beds, which are shown in figure 2. So far as known, the only McLeansboro coal of minable thickness is the Rock Branch Coal which lies about 50 to 60 feet above No. 6 Coal and occasionally attains a thickness of 18 inches or more in northwestern Macoupin County and in Morgan County.

DESCRIPTION OF COALS AND STRIPPABLE RESERVES

COLCHESTER (NO. 2) COAL

The Colchester Coal, named for exposures near Colchester, McDonough County, is present in minable thickness over most of the area of the seven counties mapped in this report. Available data indicate that the thickness of No. 2 Coal is remarkably uniform over most of this area for it is commonly 24 to 30 inches and rarely exceeds 36 inches.

Reserves totaling approximately $1\frac{1}{2}$ billion tons of coal at depths less than 150 feet (table 1) have been mapped for No. 2 Coal in the area. Reserves are summarized in table 4 for each township in which strippable reserves of No. 2 Coal have been estimated.

Along the western margin of the Illinois coal fields, the No. 2 Coal has been mined at many places from the vicinity of Alton northward across all of the counties included in this report. Plate 1 illustrates the places where No. 2 Coal has been mined near its outcrop by shallow mining methods and at greater depths in shafts near Alton, Madison County, at Shipman, Medora, and Chesterfield, Macoupin County, near Athensville, Greene County, and at Alsey and Winchester, Scott County. No. 2 Coal also has been mined at considerable depth by shafts at Jacksonville, Chapin, and Prentice in Morgan County and at Ashland and Virginia in Cass County.

The maps and tables included in this report illustrate that there are a number of places in these counties where large quantities of No. 2 Coal should be available for strip mining under favorable economic conditions. The principal geologic features of No. 2 Coal and areas most suitable for strip mining are discussed below.

Madison County

No. 2 Coal has been mined at a number of places in Madison County in the area north of Alton, mostly by small mines that were operated before 1900. Worthen (1866) described the coal near Alton and published analyses of the coal

TABLE 1 - SUMMARY OF STRIPPABLE RESERVES OF NO. 2 COAL

County	Overburden thickness (ft.)	Class I	Class II (In thousands of tons)	Total
CASS				
	0-50	6,922	6,025	12,947
	50-100	26,358	20,374	46,732
	100-150	<u>50,201</u>	<u>79,139</u>	<u>129,340</u>
	TOTAL	83,481	105,538	189,019
GREENE				
	0-50	89,984	16,674	106,658
	50-100	156,540	59,495	216,035
	100-150	<u>130,416</u>	<u>47,539</u>	<u>177,955</u>
	TOTAL	376,940	123,708	500,648
JERSEY				
	0-50	17,683	25,278	42,961
	50-100	22,503	26,426	48,929
	100-150	<u>38,308</u>	<u>32,927</u>	<u>71,235</u>
	TOTAL	78,494	84,631	163,125
MACOUPIN				
	0-50	-	-	-
	50-100	2,298	2,886	5,184
	100-150	<u>10,341</u>	<u>9,270</u>	<u>19,611</u>
	TOTAL	12,639	12,156	24,795
MADISON				
	0-50	36,565	1,345	37,910
	50-100	52,802	15,945	68,747
	100-150	<u>27,828</u>	<u>31,582</u>	<u>59,410</u>
	TOTAL	117,195	48,872	166,067
MORGAN				
	0-50	30,909	588	31,497
	50-100	69,957	34,021	103,978
	100-150	<u>73,366</u>	<u>132,894</u>	<u>206,260</u>
	TOTAL	174,232	167,503	341,735
SCOTT				
	0-50	16,281	-	16,281
	50-100	100,940	6,221	107,161
	100-150	<u>48,201</u>	<u>48,846</u>	<u>97,047</u>
	TOTAL	165,422	55,067	220,489
ALL COUNTIES				
	0-50	198,344	49,910	248,254
	50-100	431,398	165,368	596,766
	100-150	<u>378,661</u>	<u>382,197</u>	<u>760,858</u>
	TOTAL	1,008,403	597,475	1,605,878

from four of the mines near Alton. Udden and Shaw (1915) described a mine at Collinsville where the clay beneath this coal was mined. At Alton and East Alton the clay beneath this coal also was mined.

No. 2 Coal, which was mined in the Alton area, may be seen in the south bank of a tributary to the west fork of Wood River in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 6 N., R. 9 W., where it was stripped in a small way along the stream bed. This coal has been mined at a few places northward nearly to the Madison-Jersey County line.

Jersey County

No. 2 Coal has been mined at a number of small mines in the western part of Piasa Township (T. 7 N., R. 10 W.), Jersey County. The coal can be seen at a number of outcrops along Piasa Creek and its tributaries. Outcrop notes of Cady, Collingwood, Hendrix, and Wanless record all of the stratigraphic units between Mississippian age limestone and the Piasa Limestone (overlying No. 7 Coal) within this township. The composite section compiled from the outcrop sections of Cady (1928) along Piasa Creek (pl. 4, sec. A-A', No. 38) supplemented by drill hole information has afforded a basis for correlating the principal stratigraphic members from the base of the Pennsylvanian upward to the No. 7 Coal, northward from St. Clair County (Smith, 1958) to Morgan and Cass Counties.

Plate 1 illustrates sizable areas in T. 7 N., Rs. 10 and 11 W., where the coal thickness and overburden appear to be favorable for strip mining of No. 2 Coal. In the northern half of Jersey County, there are essentially no data relating to No. 2 Coal. A provisional outcrop has been extended across this area on the basis of structure contours supplemented by widely scattered outcrop data. Although no attempt was made to map the thickness of No. 2 Coal or to compute reserves, provisional overburden lines based on the available structure data are shown as a guide to areas where prospecting for strippable No. 2 Coal might be most advantageous.

Greene County

Greene County has extensive areas of strippable No. 2 Coal that is uniformly about 30 inches thick over most of the area mapped (pl. 1). In former years many small local mines worked in the No. 2 Coal in the area between Roodhouse and Athensville and, to a lesser extent, on the south side of Apple Creek in the vicinity of Wrights. At present there is only one active mine in the area — a small strip mine in sec. 24, T. 12 N., R. 11 W.

Roodhouse Coal

East of Roodhouse, in parts of secs. 19, 20, and 21, T. 12 N., R. 11 W., there is a lens of coal that contains some canneloid coal, locally as much as 8 feet thick, called the Roodhouse Coal, which lies about 30 feet above the No. 2 Coal. This has been regarded as probably equivalent to the Kerton Creek Coal (fig. 2) and is not known to be present beyond the small area east of Roodhouse, where it was formerly mined rather extensively.

Macoupin County

Along Macoupin Creek, Ts. 9 and 10 N., R. 9 W., and along Apple Creek, T. 12 N., R. 9 W., are the only two places in Macoupin County where No.

2 Coal is present at strippable depth. It was mined farther east at greater depths in Macoupin County at Medora, Shipman, and Chesterfield where Payne (1942) referred to it as the Medora Coal and considered it to be the probable equivalent of the Wiley Coal.

Scott County

In eastern Scott County, there are extensive reserves of No. 2 Coal. The outcrop is reasonably well defined, the coal is uniformly about 30 inches thick, and it has been worked in local mines at many places near the outcrop.

In the vicinity of Alsey (NW $\frac{1}{4}$ sec. 14, T. 13 N., R. 12 W.), the coal is exposed at a strip mine in the Cheltenham Clay. This clay underlies the No. 2 Coal a short distance (pl. 4, sec. A-A', Co. No. 59). Cheltenham Clay has been mined for many years in this area for the manufacture of refractory products at Alsey. At Winchester and at Exeter the coal was formerly worked at a number of places near the outcrop, as indicated by mine symbols on the map (pl. 1).

Morgan County

No. 2 Coal is at strippable depths in southern Morgan County only where it borders Greene County on the south and Scott County on the west. In these areas, thickness and other characteristics of the No. 2 Coal are very similar to those in the adjacent parts of Greene and Scott Counties previously discussed.

In northwestern Morgan County, the area of strippable No. 2 Coal shown on the maps is extensive because the land is flat and the structural dip of the coal is low. The glacial deposits are thick over much of the area, and on the west there are thick deposits of wind-blown silt (loess) along the Illinois River bluff, which the outcrop follows. For this reason, there are practically no natural outcrops, and the principal information concerning the coal has come from the occasional places where it has been mined and from drillers' logs of rather widely scattered water wells and oil test holes.

At Neelys a few miles west of Chapin (SW $\frac{1}{4}$ sec. 7, T. 15 N., R. 12 W.), No. 2 Coal has been shaft mined, and nearby a coal 35 feet higher, said to be about 4 feet thick, also was mined. This upper coal (Kerton Creek Coal?) is 7 feet 2 inches thick (including 31 inches of partings) at nearby outcrops. The same coal has been mined in secs. 33 and 34 of the next township north (mines shown on pl. 3) where it was reported in thicknesses of 3 to 4 feet.

Cass County

In Cass County the outcrop of No. 2 Coal follows the general contour of the bluff line along the Illinois and Sangamon Rivers. It has been mined locally at several places along the outcrop as indicated by the mines shown on plate 1.

With the exception of information concerning mines that formerly exposed this coal along the bluffs and along Panther Creek southeast of Chandlerville, the only data regarding No. 2 Coal comes from scattered drill hole records. Therefore, in Cass County large areas of No. 2 Coal are mapped as Class II reserves.

In both Morgan and Cass Counties, the area of strippable reserves of No. 2 Coal probably is somewhat less than shown on plate 1 because additional drill hole information may well establish areas where the glacial deposits are thicker than the overburden interval shown on the maps. One instance of preglacial erosion

of the coal is mapped in the area north of Arenzville. This is undoubtedly a large preglacial valley with a depth of 125 or more feet, but there are insufficient data to delineate its features except in a very generalized fashion. Undoubtedly, there are smaller erosional features where No. 2 Coal is cut out, but they cannot be mapped at present because of the scarcity of available drill hole data.

HERRIN (NO. 6) COAL

The Herrin (No. 6) Coal provides important reserves of strippable coal in northwestern Madison County and in southwestern Macoupin and southeastern Jersey Counties. In the remainder of the seven counties described in this report, there are only local areas where No. 6 Coal is known to be minable at strippable depths. The map of No. 6 Coal (pl. 2) illustrates the places where there is sufficient information to estimate strippable reserves of No. 6 Coal.

In all of the counties except Madison, there are large areas (hachured on map) where there are insufficient data concerning the thickness of No. 6 Coal to permit any reasonable estimate of reserves. Provisional outcrop and overburden lines have been extended across these areas based on the data available as of 1960. In some areas of very limited information, future drilling will make necessary many modifications in the outcrop and cover lines shown here. Nevertheless, it is hoped that these provisional extensions of No. 6 Coal into areas of little or no information will prove sufficiently useful to persons interested in prospecting for strippable No. 6 Coal in these places to justify their inclusion on the maps of this report.

Reserves that have been estimated for No. 6 Coal in each county are summarized in table 2 and given in detail in table 4.

Madison County

From Collinsville northward to Edwardsville, Ts. 3 and 4 N., R. 8. W., the outcrop of No. 6 Coal follows the bluff line of the Mississippi Valley, and there is little prospect for strippable coal because of excessive overburden depth and extensive areas where the coal has been worked out by underground mining.

North of Edwardsville the outcrop swings westward, and there are considerable areas of coal at strippable depth. No. 6 Coal appears to be eroded from the valley of Cahokia Creek north of Edwardsville. One mile northwest of Edwardsville a number of mines worked No. 6 Coal along Cahokia Creek. The structure map (pl. 3) shows a structural depression of No. 6 Coal there which apparently places the coal below the level of preglacial erosion. The extent of erosion of No. 6 Coal from the valley of Cahokia Creek north and east of Edwardsville is based principally on bedrock topography as mapped by Horberg (1950) and on projected structure of No. 6 Coal.

In the vicinity of Bethalto and Fosterburg, No. 6 Coal has been mined near its outcrop at a number of small mines. There also has been a considerable amount of drilling in the area so that the strippable coal areas and coal thicknesses are shown in some detail on plate 2. In secs. 25 and 36, T. 6 N., R. 9 W., there is an area designated "coal absent" on the map. It appears that this is an area of non-deposition of No. 6 Coal or a post-coal-erosional cutout.

South of Bethalto in T. 5 N., R. 8 W., there is a prominent indentation in the No. 6 Coal outcrop line, which is based on the absence of No. 6 Coal in one drill hole in sec. 18 and one in sec. 20 (see pl. 3 for location of holes). These

TABLE 2 - SUMMARY OF STRIPPABLE RESERVES OF NO. 6 COAL

County	Overburden thickness (ft.)	Class I	Class II (In thousands of tons)	Total
CASS				
	0-50	-	-	
	50-100	14,600	14,729	29,329
	100-150	<u>5,100</u>	<u>21,455</u>	<u>26,555</u>
	TOTAL	19,700	36,184	55,884
GREENE				
	0-50	13,831	9,069	22,900
	50-100	23,988	12,555	36,543
	100-150	<u>37,540</u>	<u>291</u>	<u>37,831</u>
	TOTAL	75,359	21,915	97,274
JERSEY				
	0-50	18,159	807	18,966
	50-100	23,910	4,887	28,797
	100-150	<u>8,452</u>	<u>1,121</u>	<u>9,573</u>
	TOTAL	50,521	6,815	57,336
MACOUPIN				
	0-50	36,967	246	37,213
	50-100	64,264	16,949	81,213
	100-150	<u>90,371</u>	<u>42,013</u>	<u>132,384</u>
	TOTAL	191,602	59,208	250,810
MADISON				
	0-50	31,789	1,883	33,672
	50-100	165,036	14,942	179,978
	100-150	<u>195,200</u>	<u>40,433</u>	<u>235,633</u>
	TOTAL	392,025	57,258	449,283
MORGAN				
	0-50	4,081	7,466	11,547
	50-100	61,759	202,510	264,269
	100-150	<u>26,622</u>	<u>183,442</u>	<u>210,064</u>
	TOTAL	92,462	393,418	485,880
SCOTT				
	0-50	583	-	583
	50-100	5,537	-	5,537
	100-150	<u>-</u>	<u>-</u>	<u>-</u>
	TOTAL	6,120	-	6,120
ALL COUNTIES				
	0-50	105,410	19,471	124,881
	50-100	359,094	266,572	625,666
	100-150	<u>363,285</u>	<u>288,755</u>	<u>652,040</u>
	TOTAL	827,789	574,798	1,402,587

are the only data available for this area, and it is possible that further drilling will reveal the presence of No. 6 Coal west of the provisional outcrop line shown for it in the southwest part of T. 5 N., R. 8 W.

Jersey County

From the Bethalto-Fosterburg area of Madison County, the No. 6 Coal outcrop continues northwestward into the southeasternmost township of Jersey County. In this township (T. 7 N., R. 10 W.) the outcrop is rather well defined and there have been many local mines. No. 6 Coal is somewhat thinner here than in Madison County and shows marked variations in thickness, often within short distances. In this township No. 7 Coal overlies No. 6 Coal at an interval of only 20 to 25 feet and at many places attains a thickness of 24 to 36 inches. Because of this short interval between No. 6 and No. 7 Coals and the fact that No. 7 Coal may be as much as 36 inches thick, considerable care is required to be certain that No. 7 Coal is not mistaken for No. 6 Coal when drilling in this area.

Northward from the above area into the two remaining townships of Jersey County in which the No. 6 Coal crops out (Ts. 8 and 9 N., R. 10 W.), there is no information on the thickness of No. 6 Coal. There are some widely scattered outcrop data on No. 7 Coal and higher beds, and west of the No. 6 outcrop are some outcrops of strata thought to lie between No. 2 and No. 6 Coals. Thus, the outcrop, coal structure, and overburden lines of No. 6 Coal are based on very meager data in the northeastern part of Jersey County.

Macoupin County

There are large areas in western Macoupin County where No. 6 Coal lies at strippable depths. However, so little data are available on thickness of the coal that there are only four areas where strippable reserves have been estimated. One is near Brighton in the southwestern corner of the county, one is on Macoupin Creek near Macoupin, another is near Chesterfield in the west-central part of the county, and the last is in the Scottville area in the extreme northwest corner of the county.

Throughout the eastern one-half to two-thirds of Macoupin County there are important reserves of No. 6 Coal with thickness ranging from 4 to 8 feet, but nearly all of the coal known to be this thick is at depths of more than 150 feet. In the western part of the county there are large areas where the No. 6 Coal is at strippable depths, but there is no information concerning the thickness of No. 6 Coal there, and these areas are hachured on the map (pl. 2).

In the vicinity of Brighton, in the southwest corner of Macoupin County, No. 6 Coal is at strippable depth, but because there are so few data on which to base the mapping, part of the strippable No. 6 Coal is in the Class II category of reserves. Thickness values shown on the maps for much of this area are based on only a few widely scattered outcrops, and therefore future drilling for strippable coal may establish that the coal is thicker than 24 inches.

In the west-central part of Macoupin County, in the area north and west of Chesterfield and east of Rockbridge, Greene County, there is a small area where No. 6 Coal attains a thickness of 7 feet or more and was formerly worked at a number of small mines, principally in sec. 30, T. 10 N., R. 9 W. The coal thins rapidly to an average thickness of 4 feet elsewhere in this area. Below No. 6 Coal in the area of thick coal, there are in places thick accumulations of coal

and black shale which probably correlate with the No. 4 and/or Kerton Creek Coal. It seems likely that the depositional situation responsible for the unusual local thickening of coals here may be much the same as that encountered in the Greenfield area six miles to the northwest.

In the Scottville area No. 6 Coal crops out in the valley of Apple Creek and its tributaries. In sec. 4, T. 12 N., R. 9 W., it has been mined on both the north and south sides of Apple Creek. The coal apparently thins markedly away from this local area of mining. The limited number of outcrops and drill holes available suggest No. 6 Coal is only 18 to 24 inches thick elsewhere in the Scottville area.

Greene County

No. 6 Coal is present only along the eastern edge of Greene County, with the principal reserves being in the vicinity of Greenfield (T. 11 N., R. 10 W.). One mile north of Greenfield along Rubicon Creek and its tributaries, several mines have worked coal that attained thicknesses of as much as 9 feet. This local thickening of No. 6 Coal appears to be similar to that in the local area of very thick coal northwest of Chesterfield in Macoupin County and a small area four miles northeast of Roodhouse, Greene County, where Collingwood (1922) described a section from shafts and outcrops at the Walker and Tate mines (Co. No. 199, 224; pl. 3) in secs. 3 and 10, T. 12 N., R. 11 W., as follows:

	Thickness	
	Feet	Inches
Limestone, fossiliferous, containing <i>Fusulina girtyi</i>	2	6
Shale (soapstone)	4±	-
Coal (No. 6), with blue clay band 20 inches from base	4	6
Fireclay, gray, rather hard	1	6
Coal ("block" coal), top one foot resembles good bituminous coal and has many plant fossils; lower 2 feet, "block" coal, dull, impure	3	0
Shale, sandy	6	0
Sandstone, shaly	-	-

Collingwood (1922) stated that "there are 8 to 9 feet of coal locally where these coals come together. The 'block' coal has a high ash, is very impure, and the carbonaceous material composing it was apparently finely divided before deposition."

Farther west in the Greenfield area on Little Bear Creek in secs. 29 and 30, T. 11 N., R. 10 W., several outcrops have recorded about 26 inches of No. 6 Coal and one mine reportedly worked 42 inches in the NE $\frac{1}{4}$ of sec. 30. Farther south in secs. 31 and 32, a number of water well records indicate 36 to 60 inches of coal at the approximate elevation expected for No. 6 Coal.

In the SW $\frac{1}{4}$ of sec. 6 in the next township south (T. 10 N., R. 10 W.) Van Pelt observed a coal outcropping just beneath the alluvium which he identified as probably the "block" coal beneath No. 6 Coal. On Little Bear Creek and its

tributaries (sec. 24, T. 11 N., R. 11 W.), there are outcrops of the "block" coal which appears to be not far below No. 6 Coal, and, as worked out by field studies by Van Pelt and by Collingwood, this coal is about 80 feet above No. 2 Coal which was mined near Wrights (NE $\frac{1}{4}$ sec. 26, T. 11 N., R. 11 W.) at a depth of 94 feet.

The outcrop of No. 6 Coal in the Greenfield area and northward to the vicinity of Athensville is not well defined because of inadequate data. Collingwood described several mines in No. 6 Coal on Cole Branch in sec. 4, T. 11 N., R. 10 W., but did not note the thickness of the coal. North of Athensville are several outcrops which suggest that No. 6 Coal is only 18 to 24 inches thick there. Prospecting in the area between Greenfield and Athensville to better define the outcrop of No. 6 Coal and to obtain more information on the thickness might establish areas of No. 6 Coal favorable for strip mining.

Morgan County

In this report the area in Morgan County underlain by No. 6 Coal is considerably more extensive than has been shown in previous reports (pl. 2). For the western part of Morgan County, there is very little information relating to the No. 6 Coal except in two small areas — one south of Murrayville (T. 13 N., R. 10 W.) where No. 6 Coal was formerly worked in a number of small mines and another four miles south of Jacksonville where there were two small shaft mines which recent investigation suggests were operated in the No. 6 Coal. In northwestern Morgan County, there are outcrops of fossiliferous limestone containing *Fusulina girtyi* along the tributaries of Willow Branch (sec. 29, T. 15 N., R. 11 W.). These outcrops are rather poor and no coal has been observed, but the lithology and fossil content of the limestone resembles either the caprock of No. 6 Coal or that of No. 4 Coal, which in this area probably lies no more than 25 feet below No. 6 Coal.

Except in the aforementioned areas, the glacial deposits are relatively thick. There are few bedrock outcrops in the northern or western parts of Morgan County so that the western margin of No. 6 Coal shown on the maps is a very generalized line inferred from the structure of No. 6 and No. 2 Coals, the surface topography, and scattered drill hole information. There are only widely scattered drill holes, mostly water wells, in this area. The glacial deposits are thick and the terrain is very flat. Therefore, it is not possible to differentiate between areas where the bedrock topography indicates that the No. 6 Coal is present and areas where its absence is obscured by glacial deposits thicker than the estimated overburden depth indicated on the map.

In central and eastern Morgan County, there are numerous records of oil and water wells, many of which record three to six feet of coal at the position of the No. 6 Coal. Four feet of No. 6 Coal was mined at Franklin in the southeastern part of the county. Thirty inches of coal was reported at a depth of 84 feet in the sinking of a 203-foot shaft to No. 2 Coal at Ashland in Cass County just beyond the northeast corner of Morgan County. This 30-inch coal 119 feet above No. 2 Coal compares favorably with other No. 6 Coal correlations in eastern Morgan County; however, the coal reported at 85 feet in the Ashland shaft may be the No. 5 Coal, which has been mined at numerous places a few miles farther east in the vicinity of Pleasant Plains in Sangamon County (Clegg, 1961).

Because the information concerning No. 6 Coal thickness in this area is based on data from water well and oil well drilling, all of the coal in eastern Morgan County except a small area of Class I reserves near Franklin is included with the Class II (secondary reserves).

Cass County

So far as known, there are no outcrops of No. 6 Coal in Cass County. The projected outcrop of No. 6 Coal on plate 2 passes from Morgan County into Cass County three miles west of the southeast corner of Cass County and probably extends northward eight to ten miles to include a band about three miles wide along the eastern edge of Cass County before the outcrop passes eastward into Menard County. Classified reserves of strippable coal are shown only for part of the southeasternmost township of Cass County and are based primarily on the data obtained from the shaft record of the mine in No. 2 Coal at Ashland which was previously described in the Morgan County descriptions.

STRIPPABLE COAL RESERVES

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TABLE 3 - SUMMARY OF STRIPPABLE COAL RESERVES BY COUNTY,
COAL BED, AND RELIABILITY CLASSIFICATION
(In thousands of tons)

Coal	Class I Reserves at overburden depths (ft.)				Class II Reserves at overburden depths (ft.)				Total I and II
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total	
CASS COUNTY									
No. 6 Coal	-	14,600	5,100	19,700	-	14,729	21,455	36,184	55,884
No. 2 Coal	6,922	26,358	50,201	83,481	6,025	20,374	79,139	105,538	189,019
Total	6,922	40,958	55,301	103,181	6,025	35,103	100,594	141,722	244,903
GREENE COUNTY									
No. 6 Coal	13,831	23,988	37,540	75,359	9,069	12,555	291	21,915	97,274
No. 2 Coal	89,984	156,540	130,416	376,940	16,674	59,495	47,539	123,708	500,648
Total	103,815	180,528	167,956	452,299	25,743	72,050	47,830	145,623	597,922
JERSEY COUNTY									
No. 6 Coal	18,159	23,910	8,452	50,521	807	4,887	1,121	6,815	57,336
No. 2 Coal	17,683	22,503	38,308	78,494	25,278	26,426	32,927	84,631	163,125
Total	35,842	46,413	46,760	129,015	26,085	31,313	34,048	91,446	220,461
MACOUPIN COUNTY									
No. 6 Coal	36,967	64,264	90,371	191,602	246	16,949	42,013	59,208	250,810
No. 2 Coal	-	2,298	10,341	12,639	-	2,886	9,270	12,156	24,795
Total	36,967	66,562	100,712	204,241	246	19,835	51,283	71,364	275,605
MADISON COUNTY									
No. 6 Coal	31,789	165,036	195,200	392,025	1,883	14,942	40,433	57,258	449,283
No. 2 Coal	36,565	52,802	27,828	117,195	1,345	15,945	31,582	48,872	166,067
Total	68,354	217,838	223,028	509,220	3,228	30,887	72,015	106,130	615,350

TABLE 3 - Continued

Coal	Class I Reserves at overburden depths (ft.)				Class II Reserves at overburden depths (ft.)				Total I and II
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total	
	MORGAN COUNTY								
No. 6 Coal	4,081	61,759	26,622	92,462	7,466	202,510	183,442	393,418	485,880
No. 2 Coal	30,909	69,957	73,366	174,232	588	34,021	132,894	167,503	341,735
Total	34,990	131,716	99,988	266,694	8,054	236,531	316,336	560,921	827,615
SCOTT COUNTY									
No. 6 Coal	583	5,537	-	6,120	-	-	-	-	6,120
No. 2 Coal	16,281	100,940	48,201	165,422	-	6,221	48,846	55,067	220,489
Total	16,864	106,477	48,201	171,542	-	6,221	48,846	55,067	226,609
GRAND TOTAL									
	303,754	790,492	741,946	1,836,192	69,381	431,940	670,952	1,172,273	3,008,465

STRIPPABLE COAL RESERVES

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TABLE 4 - Continued

Coal Township Thickness	Class I Reserves at overburden depths (ft.)			Class II Reserves at overburden depths (ft.)				Total I & II
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total
JERSEY COUNTY - Continued								
8N-11W 30"	-	-	-	-	869	8,463	4,988	14,320
Coal Bed	17,683	22,503	38,308	78,494	25,278	26,426	32,927	163,125
County	35,842	46,413	46,760	129,015	26,085	31,313	34,048	220,461
MACOUPIN COUNTY								
NO. 6 COAL								
7N-8W	-	-	1,513	1,513	-	-	-	1,513
36"	-	-	2,870	2,870	-	-	-	2,870
48"	-	-	336	336	-	-	-	336
60"	-	-	4,719	4,719	-	-	-	4,719
Total	493	3,273	7,152	10,918	22	3,049	3,385	17,374
7N-9W	639	10,391	5,885	16,915	-	-	-	16,915
24"	-	1,345	8,116	9,461	-	-	-	9,461
36"	-	3,475	4,596	8,071	-	-	-	8,071
48"	1,132	18,484	25,749	45,365	22	3,049	3,385	51,821
60"	-	-	6,995	6,995	-	-	-	6,995
Total	-	-	4,170	4,170	-	-	-	4,170
9N-8W	-	-	6,389	6,389	-	-	-	6,389
36"	-	-	1,345	1,345	-	-	-	1,345
48"	-	-	18,899	18,899	-	-	-	18,899
60"	-	-	15,693	15,693	-	-	-	15,693
72"	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-

STRIPPABLE COAL RESERVES

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TABLE 4 - Continued

Coal Township Thickness	Class I Reserves at overburden depths (ft.)			Class II Reserves at overburden depths (ft.)				Total I & II
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total
MADISON COUNTY								
NO. 6 COAL								
3N-8W 72"	-	5,112	17,218	22,330	-	-	-	22,330
4N-7W 72"	-	-	2,354	2,354	-	-	-	2,354
Total	-	-	<u>2,354</u>	<u>2,354</u>	-	-	-	<u>2,354</u>
4N-8W 48"	-	2,914	3,228	6,142	-	-	-	6,142
60"	-	4,764	2,690	7,454	-	-	-	7,454
72"	-	2,488	21,926	24,414	-	-	-	24,414
Total	-	<u>10,166</u>	<u>27,844</u>	<u>38,010</u>	-	-	-	<u>38,010</u>
5N-7W 60"	-	-	6,838	6,838	-	-	-	6,838
72"	-	6,793	30,198	36,991	-	-	-	36,991
Total	-	<u>6,793</u>	<u>37,036</u>	<u>43,829</u>	-	-	-	<u>43,829</u>
5N-8W 48"	1,435	5,067	-	6,502	762	-	-	7,264
60"	3,027	33,180	3,531	39,738	1,121	953	-	41,812
72"	7,196	37,798	22,060	67,054	-	11,030	28,181	106,265
Total	<u>11,658</u>	<u>76,045</u>	<u>25,591</u>	<u>113,294</u>	<u>1,883</u>	<u>11,983</u>	<u>28,181</u>	<u>155,341</u>
5N-9W 60"	224	4,932	-	5,156	-	-	-	5,156
72"	404	1,614	-	2,018	-	-	-	2,018
Total	<u>628</u>	<u>6,546</u>	-	<u>7,174</u>	-	-	-	<u>7,174</u>
6N-7W 72"	-	67	24,481	24,548	-	-	-	24,548

TABLE 4 - Continued

Coal Township Thickness	Class I Reserves at overburden depths (ft.)				Class II Reserves at overburden depths (ft.)				Total I & II
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total	
	MORGAN COUNTY - Continued								
14N-9W 36 "	-	-	-	-	-	773	26,129	26,902	26,902
14N-10W 36 "	1,480	28,685	14,897	45,062	-	2,556	18,193	20,749	65,811
15N-8W 36 "	-	-	-	-	-	-	53,234	53,234	53,234
15N-9W 36 "	-	-	-	-	2,320	78,119	46,844	127,283	127,283
15N-10W 36 "	-	4,910	-	4,910	2,657	35,074	336	38,067	42,977
16N-8W 30 "	-	2,158	785	2,943	-	-	-	-	2,943
36 "	-	-	-	-	-	21,354	37,865	59,219	59,219
Total	-	2,158	785	2,943	-	21,354	37,865	59,219	62,162
16N-9W 36 "	-	-	-	-	1,480	57,942	841	60,263	60,263
16-10W 36 "	-	-	-	-	1,009	6,692	-	7,701	7,701
Coal Bed	4,081	61,759	26,622	92,462	7,466	202,510	183,442	393,418	485,880
NO. 2 COAL									
13N-9W 30 "	-	-	-	-	-	84	2,326	2,410	2,410
13N-10W 30 "	-	673	7,903	8,576	-	2,158	10,901	13,059	21,635
13N-11W 30 "	-	1,177	4,316	5,493	-	-	785	785	6,278

STRIPPABLE COAL RESERVES

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TABLE 4 - Continued

Coal Township Thickness	Class I Reserves at overburden depths (ft.)			Class II Reserves at overburden depths (ft.)				Total I & II	
	0-50	50-100	100-150	Total	0-50	50-100	100-150		Total
MORGAN COUNTY - Continued									
14N-11W 30"	-	-	-	-	1,149	15,133	16,282	16,282	
15N-10W 30"	-	-	-	-	-	588	588	588	
15N-11W 30"	-	1,653	5,268	6,921	-	4,316	33,236	37,552	
15N-12W 30"	168	5,156	36,094	41,418	-	-	-	44,473	
16N-9W 24"	-	-	-	-	-	-	2,332	2,332	
16N-10W 24"	-	2,197	12,106	14,303	-	-	2,242	16,545	
30"	-	-	-	-	-	4,484	16,310	20,794	
Total	-	2,197	12,106	14,303	-	4,484	18,552	37,339	
16N-11W 30"	7,706	18,271	4,232	30,209	588	19,588	49,041	99,426	
16N-12W 30"	23,035	40,830	3,447	67,312	-	2,242	-	69,554	
Coal Bed	30,909	69,957	73,366	174,232	588	34,021	132,894	341,735	
COUNTY	34,990	131,716	99,988	266,694	8,054	236,531	316,336	827,615	
SCOTT COUNTY									
NO. 6 COAL									
13N-11W 24"	583	5,537	-	6,120	-	-	-	6,120	
Coal Bed	583	5,537	-	6,120	-	-	-	6,120	

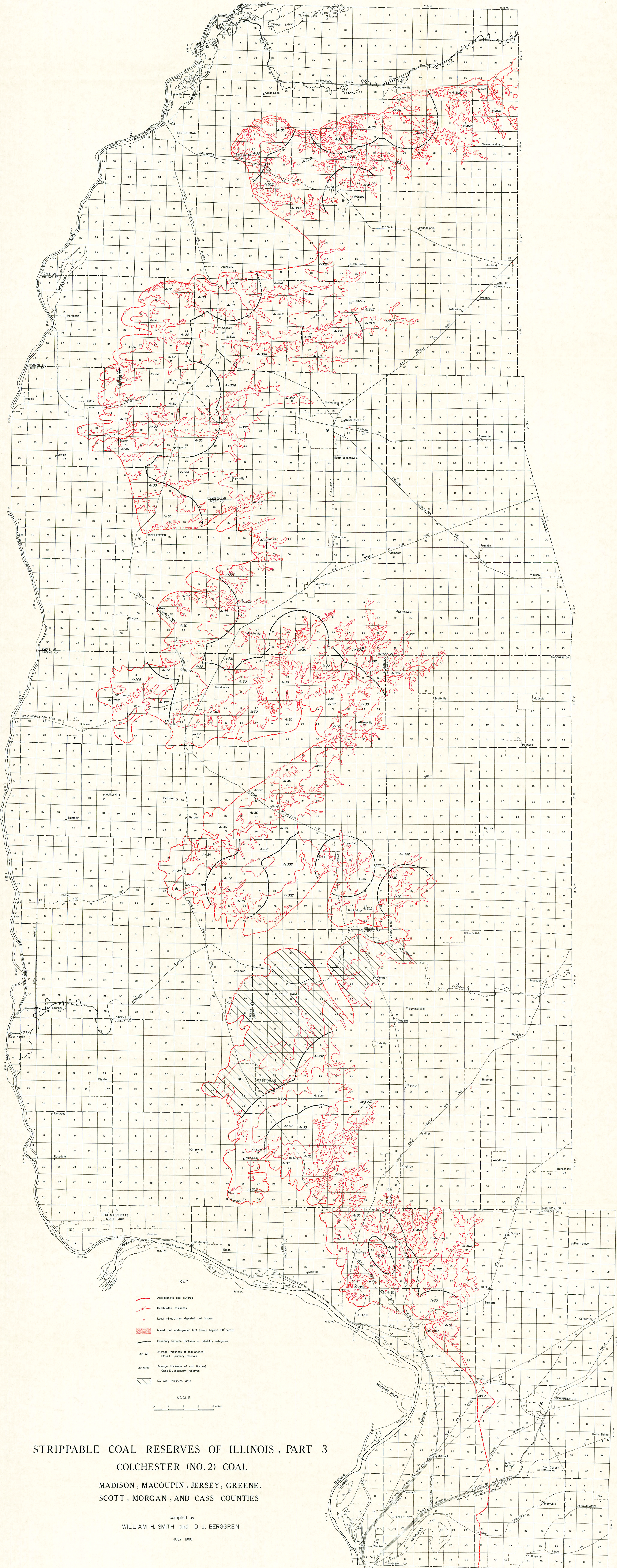
TABLE 4 - Continued

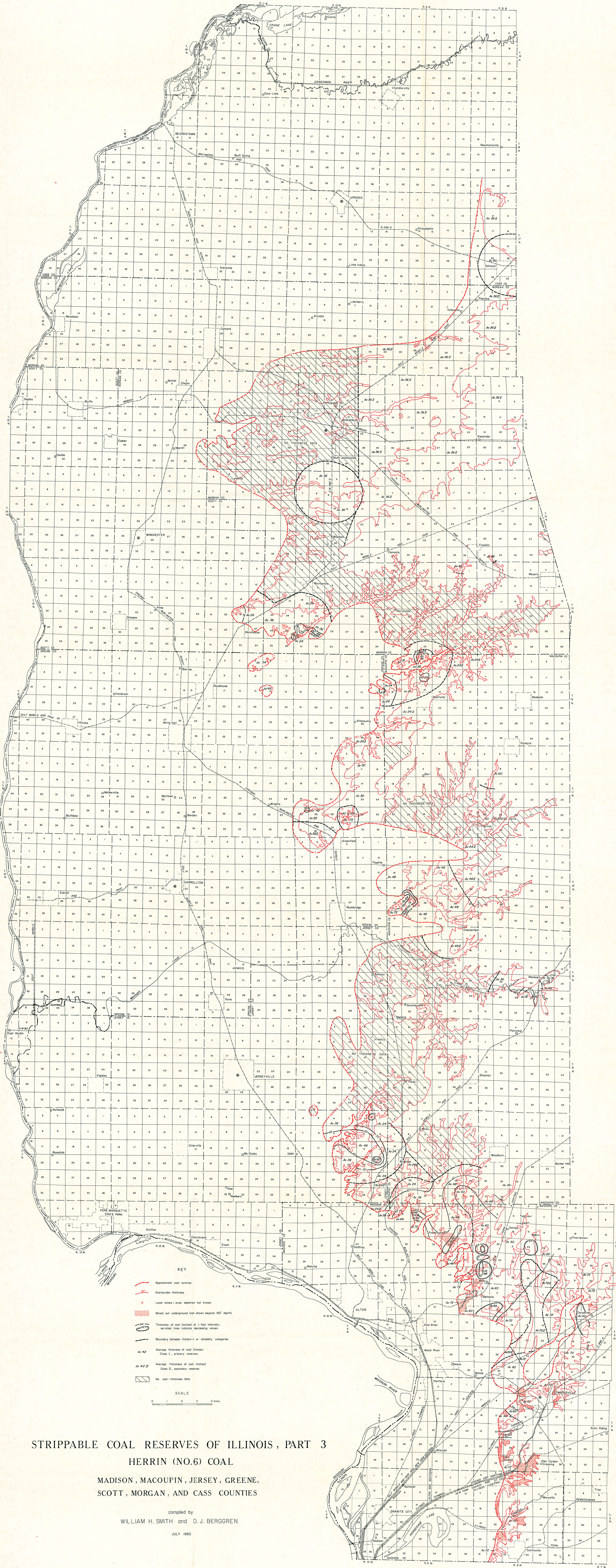
Coal Township Thickness	Class I Reserves at overburden depths (ft.)			Class II Reserves at overburden depths (ft.)			Total I & II
	0-50	50-100	100-150	Total	0-50	50-100	Total
SCOTT COUNTY - Continued							
NO. 2 COAL							
13N-11W 30"	56	5,044	12,919	18,019	-	1,205	19,813
13N-12W 30"	3,839	27,827	2,046	33,712	-	-	33,712
14N-11W 30"	-	-	-	-	-	729	10,005
14N-12W 30"	4,007	28,500	3,447	35,954	-	4,035	54,365
15N-12W 30"	2,382	25,249	29,397	57,028	-	252	63,866
15N-13W 30"	5,997	14,320	392	20,709	-	-	20,709
Coal Bed	<u>16,281</u>	<u>100,940</u>	<u>48,201</u>	<u>165,422</u>	-	<u>6,221</u>	<u>55,067</u>
County	16,864	106,477	48,201	171,542	-	6,221	226,609

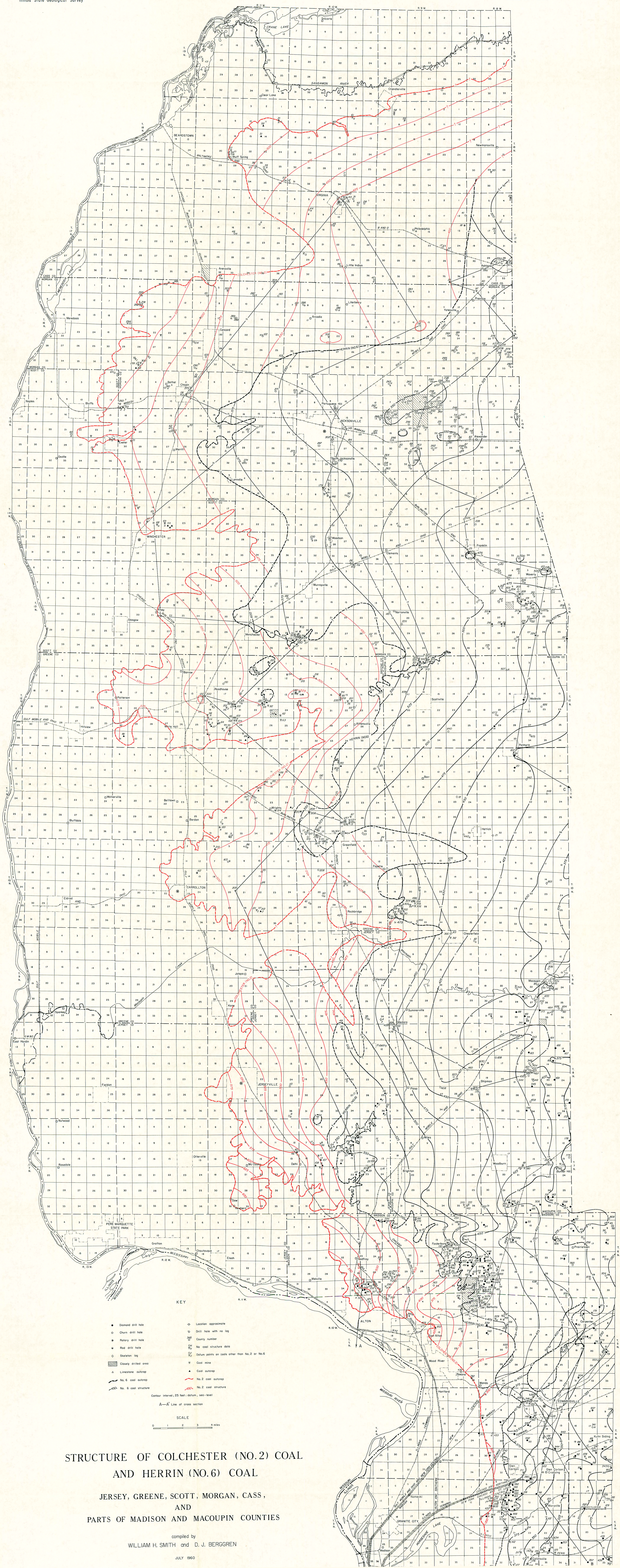
REFERENCES

- Cady, Gilbert H., 1921, Coal resources of District IV: Illinois Geol. Survey Min. Inv. Bull. 26.
- Cady, Gilbert H., 1928, Jersey County field notes: Illinois Geol. Survey unpublished field notes.
- Cady, Gilbert H., and others, 1952, Movable coal reserves of Illinois: Illinois Geol. Survey Bull. 78.
- Clegg, Kenneth E., 1961, Subsurface geology and coal resources of the Pennsylvanian System in Sangamon, Macon, Menard, and parts of Christian and Logan Counties, Illinois: Illinois Geol. Survey Circ. 312.
- Collingwood, D. M., 1922, Geology of Jersey, Greene, Macoupin, and Madison Counties: Illinois Geol. Survey unpublished ms DMC-9.
- Culver, Harold E., 1925, Coal resources of District III: Illinois Geol. Survey Min. Inv. Bull. 29.
- Horberg, Leland, 1950, Bedrock topography of Illinois: Illinois Geol. Survey Bull. 73.
- Kosanke, R. M., Simon, J. A., Wanless, H. R., and Willman, H. B., 1960, Classification of the Pennsylvanian strata of Illinois: Illinois Geol. Survey Rept. Inv. 214.
- Payne, J. N., 1941, 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. Notes on oil and gas possibilities by A. H. Bell: Illinois Geol. Survey Circ. 71.
- Payne, J. N., 1942, Structure of Herrin (No. 6) Coal bed in Macoupin County, eastern Greene and Jersey, southeastern Scott and southern Morgan and Sangamon Counties, Illinois. Discussion of oil and gas possibilities by W. H. Easton: Illinois Geol. Survey Circ. 88.
- Searight, Thomas K., 1959, Post-Cheltenham Pennsylvanian stratigraphy of the Columbia-Hannibal region, Missouri: Unpublished doctoral thesis, University of Illinois.
- Searight, W. V., et al., 1953, Classification of Des Moinesian (Pennsylvanian) of northern mid-continent: Am. Assoc. Petroleum Geologists Bull., v. 37, no. 12, p. 2747-2749.
- Smith, William H., 1957, Strippable coal reserves of Illinois. Part I. - Gallatin, Hardin, Johnson, Pope, Saline, and Williamson Counties: Illinois Geol. Survey Circ. 228.
- Smith, William H., 1958, Strippable coal reserves of Illinois. Part II. - Jackson, Monroe, Perry, Randolph, and St. Clair Counties: Illinois Geol. Survey Circ. 260.
- Udden, J. A., and Shaw, E. W., 1915, Geologic atlas of the United States, Belleville-Breeze Folio No. 195: U. S. Geol. Survey.
- Wanless, H. R., 1955, Pennsylvanian rocks of Eastern Interior Basin: Am. Assoc. Petroleum Geologists Bull., v. 39, no. 9, p. 1753-1820.

- Wanless, H. R., 1957, Geology and mineral resources of the Beardstown, Glasford, Havana, and Vermont quadrangles: Illinois Geol. Survey Bull. 82.
- Willman, H. B., and Payne, J. N., 1942, Geology and mineral resources of the Marseilles, Ottawa, and Streator quadrangles: Illinois Geol. Survey Bull. 66.
- Worthen, A. H., 1866, Geology: Geol. Survey of Illinois, Vol. I.
- Worthen, A. H., 1868, Geology and paleontology: Geol. Survey of Illinois, Vol. III.
- Worthen, A. H., 1870, Geology and paleontology: Geol. Survey of Illinois, Vol. IV.







CORRELATIONS OF KEY PENNSYLVANIAN MEMBERS IN MADISON, JERSEY, MACOUPIN, GREENE, SCOTT, MORGAN, AND CASS COUNTIES BY W.H.SMITH AND D.J.BERGREN 1960

