STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

STRIPPABLE COAL RESERVES OF ILLINOIS

Part 6—LaSalle, Livingston, Grundy, Kankakee, Will, Putnam, and parts of Bureau and Marshall Counties

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ABSTRACT

Strippable coal reserves, defined as coal 18 inches or more thick with overburden not exceeding 150 feet, are being evaluated in a series of reports covering the coal fields of Illinois. This report describes strippable coal reserves in all or parts of eight counties in northeastern Illinois, in the sixth area being mapped. Maps scaled at one-half inch to the mile show coal outcrops, mined-out areas, coal thickness, and overburden thickness at intervals of 0 to 50, 50 to 100, and 100 to 150 feet. On a smaller scale map, the structure on top of the Colchester (No. 2) Coal is shown. Strippable reserves were estimated and are mapped in detail for the Colchester (No. 2), Summum (No. 4), Herrin (No. 6), and Danville (No. 7) Coals. Several locally occurring, but nonpersistent coals at strippable depth are described, but no estimate of strippable reserves is made for them.

The geology and stratigraphy of the principal coal deposits in the area are described briefly and illustrated by cross section diagrams. The quantity of strippable coal, categorized by thickness of coal, thickness of overburden, and reliability of estimates, is tabulated by township for each county.

Approximately 734 million tons of strippable coal reserves are estimated for counties considered in this report. These reserve estimates include 555 million tons in the Colchester (No. 2) Coal, 99 million tons in the Herrin (No. 6) Coal, 69 million tons in the Summum (No. 4) Coal, and 10 million tons in the Danville (No. 7) Coal.

INTRODUCTION

Strippable coal areas are mapped and reserves summarized for all or parts of eight counties of area six of the series of reports shown in figure 1. This area lies in the northern part of the Illinois coal fields and is traversed east to west by the Illinois River, along which many mines were located during the early history of coal mining in Illinois.

Much of the early mining in the area was done by the longwall method. After 1900, however, coal production in northern Illinois began to decline, because of the development of more profitable mining operations in the thicker seams of southern Illinois. In about 1928, with the development of strip mining technology, this new form of mining began in the area, and, subsequently, all underground mines closed. Since that time, practically all of the coal mined in northern Illinois has been by strip mining, which is still an important industry in Grundy and western Kankakee Counties.

Estimated reserves of 734 million tons are classified and mapped for the Nos. 2, 4, 6, and 7 Coals. Reserves are tabulated according to average coal thickness at depths of 0 to 50, 50 to 100, and 100 to 150 feet.

Plate 1 (in pocket), on a scale of one-half inch to the mile, shows the strippable areas of the four coals for which reserves are tabulated. Cross sections (pl. 2, in pocket) show the succession of coals and associated strata. Figure 2 shows the structure on the top of the Colchester (No. 2) Coal.

Previous Investigations

The first comprehensive reports on the geology and coal resources of counties within the study area were those of Freeman (1868) on LaSalle County and Bradley (1870) on Grundy and Will Counties. Cady (1915) described the coals of the Longwall District, which included all of the counties of this report. He reported on the distribution and mining activity in each of the coals and compiled estimates, by counties, of the remaining reserves. At a later date, when topographic mapping in the area had been completed, a series of more detailed reports on the quadrangle map base were made by Cady (1919), Culver (1923), and Willman and Payne (1942).

Cady (1937) summarized information on areas possibly suitable for

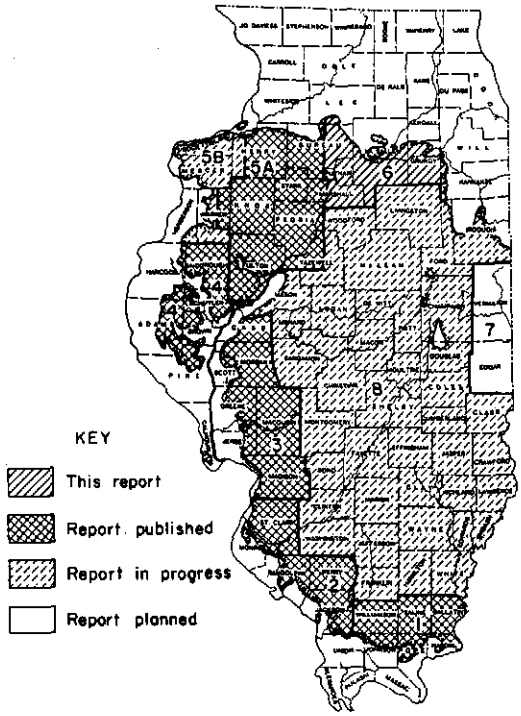

Figure 1 - Index map showing boundary of the Pennsylvanian strata of Illinois, study area of this report, reports in progress, previous reports, and reports planned to complete the mapping of strippable coal resources of the state.

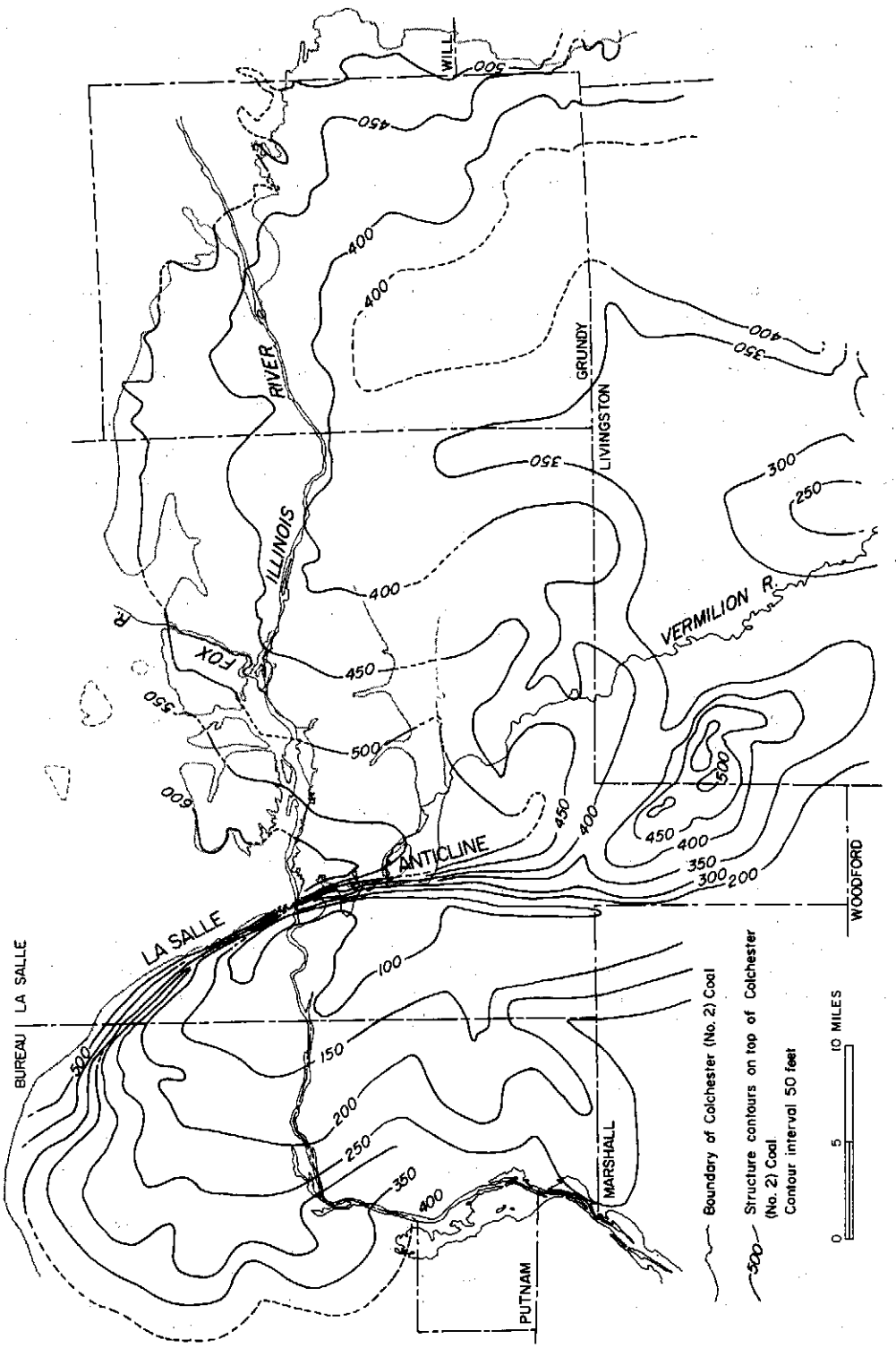

Figure 2 - Structure on top of Colchester (No. 2) Coal.

strip mining, which included parts of the area mapped in this report. Later, Cady et al. (1952) considered strippable reserves in a report on the minable coal reserves of Illinois, but did not differentiate strippable reserves in computing the total minable coal reserves.

METHOD OF PREPARING RESERVE ESTIMATE

Sources of Information

The present estimates have been prepared from existing maps and reports relating to the counties included within this report area. The report by Willman and Payne (1942) furnished much information used in mapping coal outcrops in the Marseilles, Ottawa, and Streator Quadrangles as well as much detailed information on geology and stratigraphy. Study of drilling records of holes drilled for coal exploration and in the search for underground gas storage reservoirs in recent years has considerably modified the mapping of geologic structures and has added additional details regarding the nature of the geologic succession and the correlation of coals within the area.

Structure contour maps of each coal were prepared from mine, drill hole, and outcrop records in the Illinois State Geological Survey files and from previous structure mapping in parts of the area by Cady (1919), Culver (1923), and Willman and Payne (1942). Maps of the bedrock surface, prepared by Horberg (1950), were used to determine the extent of coals concealed beneath glacial deposits. In mapping the extent of coal eroded in the Ticona Valley, a map prepared by Randall (1955) was also used.

Areas of mined-out coal were obtained from maps prepared for the report on coal reserves by Cady et al. (1952).

Selection of Mapping Areas

Areas 1 through 7 of the strippable coal reports (fig. 1) incorporate the margins of the Eastern Region of the Interior Coal Province, 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 Illinois Basin, where coals 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.

Definition of Strippable Coal

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

Certain of the reserves are not recoverable because they lie beneath towns, cities, and highways, or because of other factors such as pipelines or lakes that limit their recoverability. However, because the estimates are based on total coal in place, and no estimate of the percentage of the coal that may be recoverable is presented, nonrecoverable coal cannot be excluded from the estimate.

In this report, as in earlier reports on coal reserves in Illinois (Cady et al., 1952; Smith, 1957, 1958, 1961; Smith and Berggren, 1963; and Reinertsen, 1964), the tonnage estimate is based on an assumption of 1800 tons of coal per acre foot. This conforms to the figure used by the U. S. Geological Survey in estimating reserves of high-volatile coal. However, a figure of 1770 tons per acre foot is probably more representative for coals in Illinois.

Mapping of Coal Outcrops

In the counties of this report, a series of valleys exist that are a part of a preglacial drainage system. In these valleys, the coal has been eroded and the valleys subsequently have been filled by glacial deposits and often are not distinguishable in the surface topography. The most prominent preglacial valley is the Ticona Valley, which in LaSalle County is roughly parallel to the Illinois River Valley and lies about 6 miles south of the present valley. The approximate extent of coal eroded in the Ticona Valley and its major tributaries is indicated by broken lines on the map of the Colchester (No. 2) Coal (pl. 1A).

Throughout the study area, except along the Illinois Valley and its major tributaries, the bedrock is masked by varying thicknesses of glacial drift and loess (wind-blown silt). Provisional outcrops have been drawn on the maps (pl. 1) representing the border of the coal beneath these unconsolidated deposits. The approximate position of coal outcrops beneath the glacial drift have been mapped by interpolation using contours of coal structure, bedrock topography, and surface topography. Additional drilling information will modify the provisional outcrops shown. These lines, however, provide an opportunity to illustrate on the maps and to discuss in the text areas where coal may be found at strippable depths.

On the maps, coal exposures and small mines near the outcrop illustrate, in a general way, areas of relatively close control. In contrast, question marks inserted along the outcrop line indicate areas where projections of the outcrop are based on limited data.

Overburden Categories

Thickness of overburden is shown on the map by isopach lines representing 50-foot intervals. These lines divide the overburden into three thickness categories: 0 to 50, 50 to 100, and 100 to 150 feet. Reserves tabulated in tables 1 through 6 show the amount of strippable coal in each of these categories. Although 100 feet of overburden generally represents the maximum limit of overburden in Illinois strip mining to date, it seemed advisable to project overburden thicknesses beyond this present limit. It is, however, beyond the scope of this report to predict future economic and technologic factors that may govern the ultimate recovery of coal reserves classified in this study.

STRIPPABLE COAL RESERVES

Classification of Reserves

Coal reserves are divided into two classes—primary and secondary reserves—to designate the reliability of the estimate.

Class I - Primary Reserves

Class I reserves include coal in areas where enough information is available to establish its presence with reasonable certainty. This class ordinarily includes all coal within 2 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 et al. (1952). Where available data suggest uncertainty regarding the persistence of the coal or marked variations in its thickness, the limits defined above 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 into areas in which data on coal thickness are not reliable enough for classifying the coal as primary reserves. 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, the coal is included with the Class II reserves. This is done even though the coal lies within 2 miles of the last point of reliable information of thickness and ordinarily would 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, suggests that coal may be present at the thickness indicated on the maps. In these places, prospecting for strippable coal might be conducted advantageously.

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

Thickness of Coal

Thickness of coal is indicated on plate 1 by average thickness categories. These average thickness values have been divided along township lines wherever convenient; elsewhere, the boundary between average thickness categories is indicated by line symbols. Average thickness values estimated were used to calculate the coal tonnage within each of the overburden and reliability classifications delineated.

The average thickness values and isopach intervals used in this study coincide with those used by Cady et al. (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 series of reports on strippable coal reserves, the minimum coal thickness for which reserves are classified is 18 inches.

For some areas shown on plate 1, virtually no reliable data are available concerning the thickness of the coals. Enough information, however, can be obtained 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 thickness outlined for this study. A pattern has been used on the map to indicate areas where the coal is thought to be at strippable depth, although no reliable thickness data are available.

Mined-out Coal

Mined-out coal areas shown on plate 1 are taken from maps previously compiled (Cady et al., 1952, p. 16), which were later revised to include all mining to July 1, 1959, plus minor extensions in the areas of strip mining in Grundy and Kankakee Counties.

In certain areas, a large part of the geologic information relating to the distribution and thickness of the coal has come from observations at local mines. On the maps in this report, all mines are shown for which records are available, except where they are too numerous to be shown conveniently. It was necessary to generalize mined-out coal for areas of extensive mining in order to represent this information at the scale of these maps. Therefore, individual small mines are not shown in areas of extensive mining.

Quality of the Coals

The quality of the coals described in this report is summarized in Appendix A, which lists the county average values for the various analytical properties of each coal. Most of these values have been obtained from reports of analyses of Illinois coals by Cady (1935, 1948) and modified by later analyses.

Structure of the Coals

Isopach lines dividing overburden thickness into categories of 0 to 50, 50 to 100, and 100 to 150 feet were constructed by interpreting intervals between contours of surface topography and contours of coal elevation. Surface topography was obtained from U. S. Geological Survey topographic maps on a scale of 1:62,500. Structure contour maps were prepared for each of the coals for which reserves were estimated. Figure 2 shows the structure of the No. 2 Coal generalized from the larger scale structure map used in compiling the reserve estimates. The structure maps are based on information obtained from logs of holes drilled for coal, oil, and water, as well as a number of previously published coal structure maps by Cady (1919), Willman and Payne (1942), and Culver (1923).

The counties of this report lie near the northern boundary of the Illinois coal field. Structurally, the area of this report lies along and on both sides of the LaSalle Anticline (figs. 2 and 3). In pre-Pennsylvanian time, uplift on the LaSalle Anticline had occurred, but by the beginning of Pennsylvanian sedimentation, erosion had reduced the pre-Pennsylvanian surface to one of relatively low relief. The area along the LaSalle Anticline, however, remained slightly elevated during early Pennsylvanian time but not enough to prevent the accumulation of later coals. As a result of uplift and truncation of pre-Pennsylvanian sediments along the LaSalle Anticline, the Pennsylvanian rocks within the report area rest on formations ranging in age from middle Ordovician to upper Silurian.

Following the deposition of Pennsylvanian sediments in the area, uplift was renewed along the LaSalle Anticline. This resulted in folding of the Pennsylvanian sediments along the anticline and their subsequent removal from the highest parts of the structure. Figure 2 shows the outcrop and structure of the No. 2 Coal in the area and indicates the structural relationships discussed.

GEOLOGY AND STRATIGRAPHY OF THE COALS

Rocks of Pennsylvanian age in Illinois are classified into groups and formations on the basis of variations in their gross lithologic character (Kosanke et al., 1960). All of the reserves classified in this report are for coals of the Carbondale Formation of the Kewanee Group. However, in a few places, coals of the underlying Spoon Formation of the McCormick Group have been mined in small areas. A generalized geologic section (fig. 4) shows the classification of strata encountered in the counties of this report.

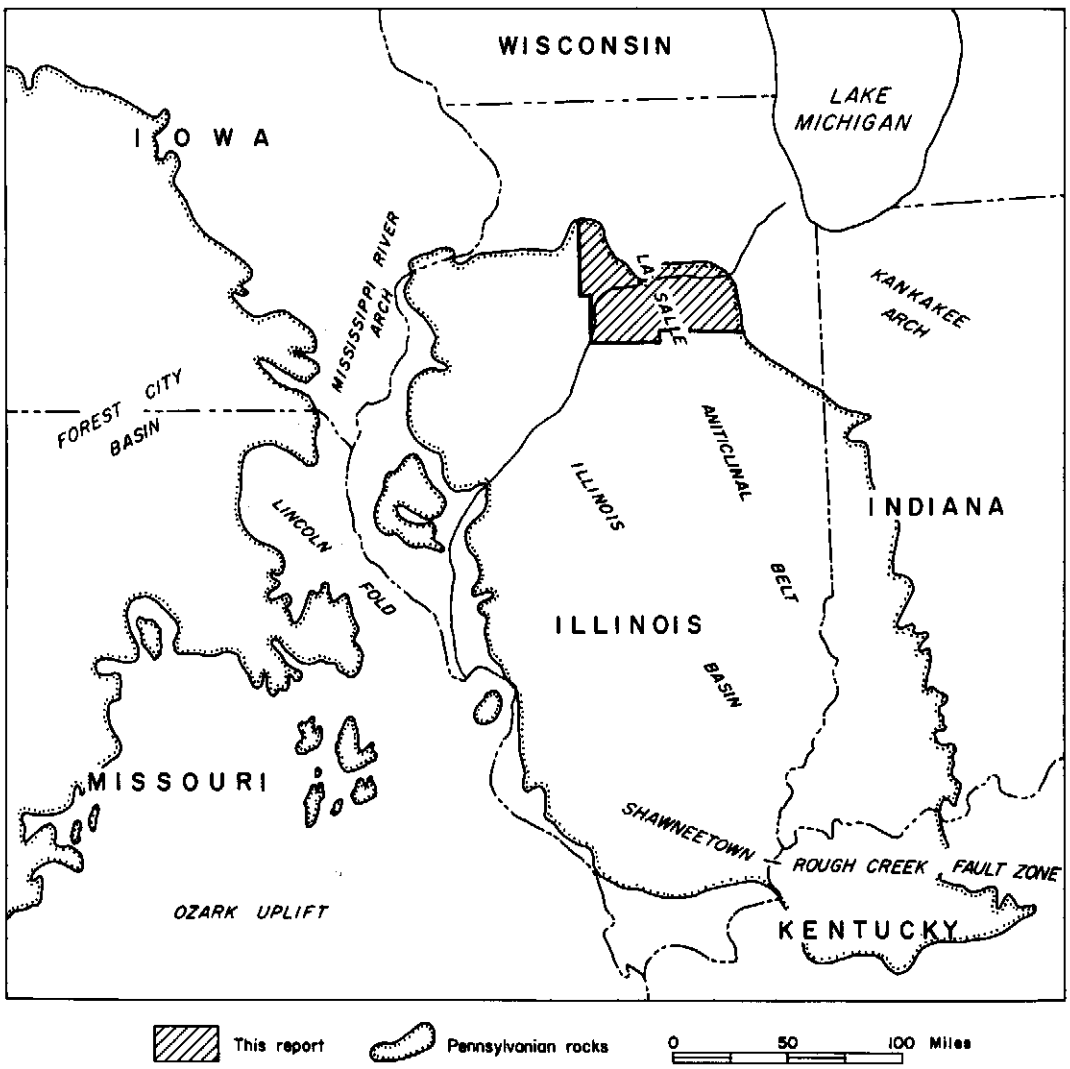

Figure 3 - Tectonic map showing relation of the report area to regional structural features.

McCormick Group

The McCormick Group includes strata between the base of the Pennsylvanian and the top of the Bernadotte Sandstone Member; it is subdivided into the Caseyville and Abbott Formations (Kosanke et al., 1960). The exact age relationships of the oldest Pennsylvanian strata in the northern Illinois coal field are not known. In this report, all strata between the base of the No. 2 Coal, which is the lowest of the coals that can be extensively mapped, and the base of the Pennsylvanian are placed in the Spoon Formation of the Kewanee Group.

Future studies may demonstrate, however, that some of the strata here classified in the Spoon Formation may be in the Abbott Formation.

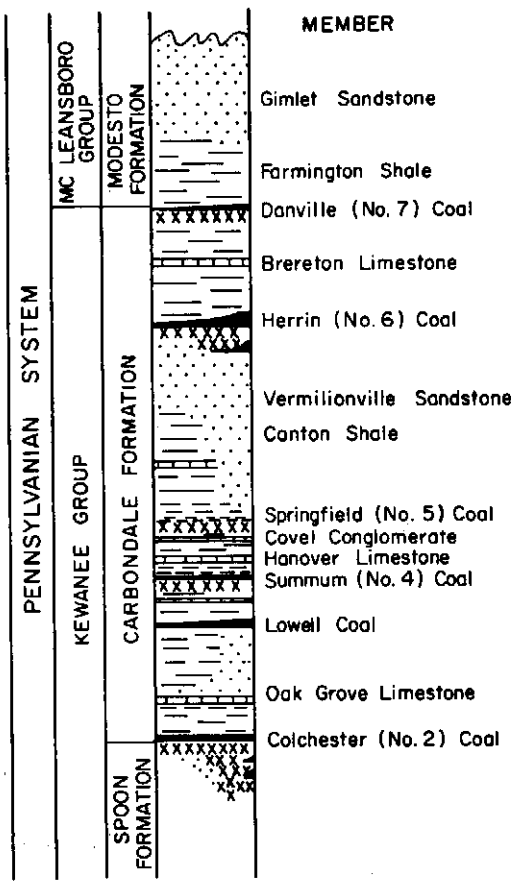

Figure 4 - Generalized section of a part of the Pennsylvanian strata in northern Illinois, which include the strippable coal reserves.

Kewanee Group

The Kewanee Group includes strata from the top of the Bernadotte Sandstone Member to the top of the No. 7 Coal Member (Kosanke et al., 1960). The group is divided into the Spoon Formation, which contains strata below the base of the No. 2 Coal, and the Carbondale Formation, which includes strata between the base of the No. 2 Coal and the top of the No. 7 Coal. All of the coals for which strippable reserves have been classified in this report are in the Carbondale Formation.

Spoon Formation

Near the axis of the LaSalle Anticline, where it is crossed by the Illinois River, the No. 2 Coal is separated from the St. Peter Sandstone Formation by only a few feet of claystone, which constitutes the entire thickness of the Spoon Formation. The underlying St. Peter Sandstone of middle Ordovician age is the oldest formation on which the basal Pennsylvanian is known to rest in Illinois. Eastward and westward from the LaSalle Anticline, Pennsylvanian rocks rest on progressively younger strata, and the Spoon Formation becomes as much as 100 feet thick and perhaps more. The cross sections on plate 2 graphically illustrate variations in thickness of the Spoon Formation in different parts of the area. These sections also show the over-

lap of the Spoon Formation onto progressively older formations from the eastern part of the area toward the LaSalle Anticline.

Willman and Payne (1942, p. 94) mapped the thickness of Pennsylvanian strata below the No. 2 Coal in the Marseilles and Ottawa Quadrangles where they reported thicknesses varying from 2 to 34 feet. Culver (1923) described the pre-No. 2 Coal strata of the Morris Quadrangle where the Spoon Formation attains thicknesses of as much as 100 feet. There the Spoon Formation is primarily composed of sandstones, shale, and claystones, with thin coals, which locally develop into thick coal lenses, that have been mined in a few places. These locally thick accumulations of coal appear to have formed in northeast-southwest-trending channel-like depressions. Near the center of these depressions, coal may attain a thickness of 4 to 5 feet or more but thins rapidly laterally and disappears. In the area between the outcrop of the No. 2 Coal and the Kankakee River, in T. 33 N., R. 8 E., Grundy County, two linear belts of an uncorrelated coal in the Spoon Formation, 20 to 30 feet below the No. 2 Coal, were discovered and mined in connection with the strip mining of the No. 2 Coal immediately to the south (pl. 1A). One of these channels extended as far north as the Kankakee River, where 3 to 4 feet of coal was reportedly worked in the bed of the river (NW$\frac{1}{4}$ sec. 8, T. 33 N., R. 9 E.) with only a few feet of clay intervening between the coal and the pre-Pennsylvanian surface (Bradley, 1870, p. 210). According to Bradley, this was the first occurrence of coal known in Grundy County. The first mine in the area was the Schoonmaker shaft, a short distance to the southwest of the outcrops along the Kankakee River. Apparently the coal in these outcrops was the same as in the Schoonmaker shaft, where the coal reportedly was 8 to 10 feet thick.

Small quantities of coal have been strip mined in secs. 10 and 11, T. 33 N., R. 8 E. These mines were primarily clay mines, but lenses of coal up to 2 feet or more thick were encountered and mined (Culver, 1923, p. 136). Doehler (1957) noted that as many as three thin coals separated by clay occur within these clay pits, but their correlation with named coal members of the Spoon Formation elsewhere has not been determined.

Carbondale Formation

The Carbondale Formation includes all strata from the base of the No. 2 Coal to the top of the No. 7 Coal. In the area of this report, it averages about 200 feet thick where the entire formation is present; however, over most of the area east of the anticline, the upper part has been removed by post-Pennsylvanian erosion. The following named coal members are included in the Carbondale Formation: Colchester (No. 2) Coal, Lowell Coal, Summum (No. 4) Coal, Springfield (No. 5) Coal, Herrin (No. 6) Coal, and Danville (No. 7) Coal. Strippable reserves of these coals are described later in this report for each county in which they occur; a brief description of each of the coals and their stratigraphic relationships follow.

Colchester (No. 2) Coal Member.—The No. 2 Coal is the only widely distributed coal in the area, and it contains most of the minable reserves. It is the most widely traced coal in Illinois and has been correlated by Wanless (1955) with Coal III-A of Indiana, the Whitebreast Coal of Iowa, the Croweburg Coal of Missouri, and, tentatively, the Lower Kittanning Coal in the Appalachian Coal Province.

In northern Illinois, the No. 2 Coal has been mined much more extensively than it has elsewhere in Illinois. Its thickness varies from about 2 feet near the LaSalle Anticline, where it is thinnest, to 3$\frac{1}{2}$ to 4 feet near its eastern border, where

it has been the principal minable coal (pl. 1A). It attains a maximum thickness of 4 feet or more in the synclinal trough immediately west of the LaSalle Anticline, where in some places it is more than 500 feet deep. The No. 2 Coal is too deep for strip mining throughout the area west of the LaSalle Anticline, where it is commonly 36 to 42 inches thick, and thus has been mined at a number of places principally by the longwall method.

In the strata overlying the No. 2 Coal, a persistent bed of black fissile shale is overlain by one or more limestones that have distinctive lithologies and contain characteristic fossils that permit them to be correlated throughout much of the Eastern Region of the Interior Coal Province. Wanless (1931, 1957) has described and named many of the characteristic individual members and beds overlying the No. 2 Coal in western Illinois, many of which Willman and Payne (1942) have also described in LaSalle and Livingston Counties. In the counties of this report, the No. 2 Coal is immediately overlain by the Francis Creek Shale Member. It varies considerably in thickness in different parts of the area. In western LaSalle County, it is commonly 20 to 30 feet thick, but its thickness increases to 70 feet or more in Grundy and Will Counties, where it often constitutes the entire bedrock portion of the highwall in the strip mines of that region. In the strip mine highwalls in the vicinity of Coal City (Grundy County) and Wilmington (Will County), the Francis Creek Shale contains numerous flattened concretions, many of which contain well preserved fossils of Pennsylvanian age plants and occasionally fossils of insects and crustaceans that have been widely sought by collectors. The Mazon Creek flora has been described in numerous publications, the more recent of which are those of Collinson and Skartvedt (1960), Langford (1958, 1963), and Johnson and Richardson (1966). These publications include bibliographies of the extensive literature on these remarkably well preserved fossils.

The Francis Creek Shale is overlain by a bed of black fissile shale commonly 2 to 3 feet thick that is present over most of the western and southern part of the area but absent in Grundy, Will, and eastern LaSalle Counties where the Francis Creek Shale is 70 or more feet thick. The black fissile shale is overlain by a persistent limestone similar in lithology and stratigraphic position to a bed at the base of the Oak Grove Limestone Member in western Illinois. The limestone outcrops on the Vermilion River, half a mile west of Lowell ($SE\frac{1}{4}$ $SW\frac{1}{4}$ sec. 8, T. 32 N., R. 2 E.) in LaSalle County, where it occurs as large septarian concretions. However, it locally attains a thickness of 3 feet (Willman and Payne, 1942, p. 101). It often consists of argillaceous limestone 6 inches to 1 foot thick, contains abundant small marine fossils, and is gradational into the overlying Purington Shale Member.

Lowell Coal Member.—The Lowell Coal, which is named for outcrops near Lowell on the Vermilion River (Willman and Payne, 1942, p. 102), occurs at an interval of 30 to 50 feet or more above the No. 2 Coal and is present over most of the area. The coal varies in thickness from less than 1 inch to 2 feet or more and typically is underlain by argillaceous siltstone or sandstone containing abundant plant root impressions.

In the vicinity of Cardiff, Livingston County, and near Essex and Clarke City, near the northwest corner of Kankakee County, locally occurring deposits of coal have been worked within an interval of up to 30 feet above the No. 2 Coal. Cady (1915) applied the name Cardiff Coal to these deposits, which reached a thickness of 12 feet near Cardiff. In both of these areas, the coal, which apparently formed in a channel-like depression, has been largely mined out.

R. A. Peppers (personal communication), who has used plant spore assemblages in this and other coals of the area as a means of correlation, has tentatively correlated the Cardiff Coal with the Lowell Coal.

The interval between the Lowell and the No. 4 Coals consists of shales and claystone and, in some places, one or more thin beds of marine limestone. Over much of LaSalle and Grundy Counties, the interval between the Lowell and the No. 4 Coals is about 15 feet; however, as shown on plate 2, this interval is quite variable.

Summum (No. 4) Coal Member.—The Summum (No. 4) Coal is present over most of the area of this report; however, it varies considerably in thickness in places. Willman and Payne (1942, p. 111) noted that the No. 4 Coal varies from a thin streak to as much as 4 inches along the Vermilion River in LaSalle County and that it is generally absent in Starved Rock State Park. Near Streator, thicknesses of 2 feet, 6 inches to 3 feet have been reported in a number of borings. In borings made on the Ancona-Garfield Structure, a short distance southwest of Streator, the No. 4 Coal varies from a few inches to 21 inches thick. Near Pontiac, Livingston County, borings showed the No. 4 Coal to be thin or absent (pl. 2).

The No. 4 Coal is overlain by several feet of dark gray to black shale containing concretions of dense limestone. The dark shale often contains thin lenticular beds or mottling of light greenish shale and grades upward into a series of beds of greenish shale, claystone, limestone, and limestone conglomerate that comprise most of the 10- to 15-foot interval between the No. 4 and No. 5 Coals. The Hanover Limestone and overlying Covel Conglomerate, both of which have very distinctive lithologies, occur in this interval and have been described in detail by Willman and Payne (1942, p. 112-198). The Hanover Limestone is light brownish gray, often brecciated, and commonly quite nodular in a matrix of greenish claystone. The Covel Conglomerate consists of limestone pebbles and fossil fragments in a matrix of sand-size grains of limestone mixed with some silt and clay. The conglomerate is commonly 1 to 2 inches thick but is remarkably widespread over much of the area of occurrence of the No. 4 Coal throughout northern Illinois.

In eastern Grundy, western Kankakee, and northeastern Livingston Counties, a coal 65 to 85 feet above the No. 2 Coal, which is currently being strip mined, is tentatively correlated with the No. 4 Coal in this report (pls. 1C and 2). This coal has not been directly correlated with the western part of the area because the rocks are concealed by glacial drift. Outcrops and drill hole data are lacking in western Grundy and northern Livingston Counties. In Grundy County, Bradley (1870, p. 194) noted coal outcrops and old coal openings on Waupecan Creek (sec. 20, T. 33 N., R. 7 E.) where coal, which he correlated with the No. 4 Coal, was locally as much as 5 feet thick. Culver (1923, p. 192) further described this coal, placed it about 75 feet above the No. 2 Coal, and commented that in the area between Waupecan Creek and Coal City, its maximum thickness was 18 inches, but that in most places, it pinched out to a mere streak in short distances. Cady et al. (1952, p. 51) followed Bradley's and Culver's correlations for this coal and classified reserves for it in a small area along the Mazon River in sec. 12, T. 32 N., R. 7 E., west of Coal City.

Although it is uncertain whether or not all of the scattered occurrences of this coal shown on plate 1C are at the same stratigraphic position, it seems likely that they are. In addition, the scattered occurrences of coal in the area west of Coal City and Braceville are probably at the same stratigraphic position as the coal about 85 feet above the No. 2 Coal that is currently being strip mined east of South Wilmington. Cady (1915) classified the coal 65 to 85 feet above the No. 2 Coal, in the area between South Wilmington and Reddick, as the Sparland (No. 7) Coal. Later, however, Cady et al. (1952) were uncertain of the correlation of this coal and

correlated it tentatively with the Herrin (No. 6) Coal. R. A. Peppers (personal communication), after study of the fossil spore assemblages of the coal in question, has tentatively concluded that it is probably as low stratigraphically as the No. 4 Coal or lower.

Where it is being strip mined in eastern Grundy County, the overburden above the coal has commonly consisted mostly of glacial drift, and because of the relatively few exposures of strata above the coal, correlation in this area has been difficult.

Springfield (No. 5) Coal.—The horizon of the No. 5 Coal is recognized over most of the area; however, the coal is absent or very thin. The horizon has been traced throughout all but the easternmost part of the area on the basis of the distinctive sequence of rocks that overlie the thin coal or its underclay.

In LaSalle and Livingston Counties, where the No. 5 Coal is thin or absent, a hard, black, fissile shale, 6 inches to 2 feet thick, that lies immediately over the thin coal or its horizon has been widely correlated (pl. 2). The black shale is persistent, fossiliferous, and is characterized by an abundance of Aviculopecten rectilaterarius, particularly in the bottom few inches. Willman and Payne (1942, p. 121) found the abundance of this fossil pelecypod to be a distinguishing characteristic of the shale overlying the No. 5 Coal horizon throughout northern Illinois. The fossiliferous black shale is overlain by the Canton Shale Member, which is a gray shale of rather uniform lithology that varies in thickness from a few feet, where it has been eroded prior to deposition of the overlying Vermilionville Sandstone Member, to as much as 75 feet, where the Vermilionville Sandstone is absent. The Canton Shale, especially in the basal part, often contains marine fossils.

The Vermilionville Sandstone, which ranges up to 75 feet thick, overlies the Canton Shale. In many areas, especially where thick, it fills channels eroded into the underlying Canton Shale. In the vicinity of Streator, there are probably channels that remained unfilled at the end of Vermilionville Sandstone deposition. The thick deposits of the No. 6 Coal in the Streator area appear to be restricted to these unfilled channels. Locally, where the No. 6 Coal was of exceptional thickness, an additional coal that is not known to occur elsewhere in the area was occasionally mined 10 to 15 feet below it. These relationships are shown graphically on plate 2. Elsewhere, shale and underclay make up the interval between the top of the Vermilionville Sandstone and the overlying No. 6 Coal.

Herrin (No. 6) Coal.—The Herrin (No. 6) Coal is thin over much of the area east of the LaSalle Anticline, except in the vicinity of Streator, where it was formerly mined extensively by underground methods (pl. 1A). West of the anticline, the No. 6 Coal is of minable thickness but is below strippable depth. Within the area of this report, the No. 6 Coal is 60 to 80 feet above the No. 5 Coal and 40 to 50 feet below the No. 7 Coal. The coal is generally overlain by several feet of black, hard shale, which is in turn overlain by the Brereton Limestone Member. In the vicinity of Streator, however, the coal is locally overlain by up to 50 feet of light gray sandy shale that has been used in the manufacture of clay products at Streator.

The Brereton Limestone varies in thickness from a few inches to 4 feet. It is typically gray, hard, very fossiliferous, and quite variable in lithology and thickness. At some places, it consists of irregular nodules of limestone interbedded with shale, and at other places, it has a brecciated texture.

Danville (No. 7) Coal.—The Danville (No. 7) Coal has been mined underground in a few places west of the LaSalle Anticline but is below strippable depths.

East of the anticline, it has been mapped (pl. 1B) only in a relatively small area south of Streator in southern LaSalle and northwestern Livingston Counties, where it commonly is 18 to 30 inches thick. The No. 7 Coal lies about 50 feet above the No. 6 Coal and has been eroded from most of the area east of the anticline that is shown on plate 1B.

McLeansboro Group

The McLeansboro Group includes all strata above the Danville (No. 7) Coal. It is divided into three formations: Modesto, Bond, and Mattoon. In the region west of the LaSalle Anticline, strata of the Modesto and Bond Formations are present over extensive areas (pls. 1 and 2). However, east of the anticline, only the lowest strata of the Modesto Formation are present. Strata of the Modesto Formation, overlying the No. 7 Coal in areas where it has been mapped at strippable depths (pl. 1B), consist mainly of gray shale and siltstone. West of the LaSalle Anticline, the McLeansboro Group is much thicker and contains several prominent limestones (pl. 2), including the LaSalle Limestone, which has been extensively quarried in the region.

DESCRIPTION OF COALS AND STRIPPABLE RESERVES

Colchester (No. 2) Coal

The No. 2 Coal is much more widely distributed than any of the other coals that have been mapped. More than 75 percent of the strippable coal reserves estimated in this report are in the No. 2 Coal. It contains estimated reserves of 555 million tons of strippable coal that are distributed among the counties of the area as shown in table 1. Table 6 lists the reserves in more detail for each county and township in the area.

The No. 2 Coal was extensively mined in northern Illinois, principally by the longwall method, from the late 1800's to the beginning of strip mining in the area. The many conical piles of mine refuse that may still be seen in the region mark the sites of former underground mines. Sauer (1916) attributes the founding and growth of many of the cities and villages of the region almost entirely to coal mining. After 1915, underground mining in the area declined rapidly because of the development of the mining industry in southern Illinois, where much thicker coal was available. Large-scale strip mining, which began in northern Illinois in 1928 in areas of relatively thin overburden, has continued to be an important industry there because mechanical improvements in strip mining equipment have enabled the removal of increasingly higher amounts of overburden from the relatively thin coal.

LaSalle County

Coal from outcrops of the No. 2 Coal along the valley of the Illinois River was probably known and used by the North American aborigines since prehistoric time. In 1673, Marquette and Joliet noted the occurrence of coal along the valley (Andros, 1915), and later the pioneer settlers worked the coal from these outcrops. The first commercial mine in the area was sunk west of the anticline at LaSalle in

TABLE 1 - SUMMARY OF STRIPPABLE RESERVES OF NO. 2 COAL (In thousand tons)

County	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total		
NO.2 COAL										
GRUNDY	8,071	102,881	201,567	312,519					312,519	31.38
KANKAKEE	471	6,188	4,842	11,501					11,501	3.10
LASALLE	40,747	74,946	56,478	172,171	2,242	8,968	26,331	37,541	209,712	3.56
WILL	6,423	13,922	1,278	21,623					21,623	15.41
TOTAL	55,712	197,937	264,165	517,814	2,242	8,968	26,331	37,541	555,355	53.45

1855. The most extensive mining in LaSalle County has been in the vicinity of La-Salle (pl. 1A). However, the city of LaSalle lies west of the LaSalle Anticline where the No. 2 Coal is too deep for strip mining. Throughout Putnam, Bureau, and western LaSalle Counties, the No. 2 Coal is below strippable depth, and, therefore, only the mined-out area and approximate outcrop are shown on plate 1A.

In the region east of the LaSalle Anticline, the No. 2 Coal has been mined near its outcrop at many small local mines along both sides of the Illinois River Valley and along the Vermilion River Valley near Lowell. It has also been mined by stripping at a number of places along the valley eastward from the anticline to the vicinity of Marseilles. In the easternmost part of LaSalle County, the No. 2 Coal is at strippable depth only in a narrow band along the valley of the Illinois River (pl. 1A). It was formerly mined by shaft mining in the vicinity of Marseilles and Seneca where the coal was only 30 to 36 inches thick and mining was not extensive.

The thickness of the No. 2 Coal averages only 24 inches in much of the strippable area of LaSalle County. Most of the past strip mining has been along the north bluff of the Illinois Valley between Utica and Ottawa. The overburden did not exceed 20 to 30 feet in many of the strip-mined areas shown on plate 1A, and in many places, the refractory clay underlying the coal was extensively mined. In some of these pits, the mining was carried on primarily for the clay for use in the manufacture of fire brick. The clay and coal together have provided the basis for much industry in the area. The St. Peter Sandstone, which lies immediately beneath the underclay of the No. 2 Coal, has also been mined extensively by open-cut operations along the northern bluff of the Illinois River Valley from Ottawa west to the vicinity of Starved Rock.

The most favorable area for strip mining in LaSalle County, with regard to coal thickness and overburden depth, is in the area immediately east of the LaSalle Anticline from the vicinity of Lowell on the Vermilion River northward to the vicinity of Starved Rock on the Illinois River. In this area, the No. 2 Coal averages 36 inches thick, and over most of the area it is at depths of less than 100 feet. However, like much of the region north of the Illinois River and along the valley of the Illinois River, this area is also near urban and industrialized areas.

The presence of a preglacial stream valley a mile or more wide extending across the southern part of T. 32 N., R. 2 and 3 E., has resulted in the erosion of some areas of strippable coal in west-central LaSalle County. This preglacial valley, known as the Ticona Valley (Willman and Payne, 1942), is roughly parallel to the present Illinois River Valley and is about 6 miles south of it. The Ticona Valley has been completely filled by debris from later glaciation, and the present Illi-

nois River Valley was subsequently formed by glacial meltwaters that cut a new channel. The approximate area of strippable coal that has been removed by the post-Pennsylvanian Ticona Valley erosion and subsequently filled with glacial deposits is shown by dashed lines on plate 1A. No trace of this large preglacial valley is visible at the surface, and the mapping of its extent has been based entirely on information from water well drilling. The dashed lines on plate 1A, which show the extent to which strippable coal may have been affected by the Ticona Valley, are based on a map of the bedrock surface compiled by Randall (1955). As more drilling information becomes available and the exact configuration of the Ticona Valley and its tributaries becomes better known, the area of strippable coal affected will undoubtedly be modified from that shown on plate 1A.

Grundy, Will, and Kankakee Counties

Large amounts of No. 2 Coal have been mined from these counties by both underground and strip mining. The large area from which the coal has been mined includes the eastern portion of Grundy County and small adjacent parts of Will and Kankakee Counties (pl. 1A). The No. 2 Coal is somewhat thicker here than it is in western Grundy and LaSalle Counties. Despite the large amount of past mining in the area, much coal at strippable depths remains, especially in eastern Grundy County. Table 1 shows the amounts of coal mined out and the estimated strippable reserves remaining in each of these counties.

In Will County, almost all of the No. 2 Coal is less than 100 feet below the surface, and as can be seen by examination of plate 1A, most of the available coal has been mined out. In Kankakee County, much of the strippable coal has also been mined out. Eastern Grundy County has very large areas where the coal has been mined out, and most of the remaining strippable reserves are in the thicker overburden categories (table 1). The Peabody Coal Company operates a large strip mine in the west-central part of T. 33 N., R. 8 E., and employs a large bucket wheel excavator (fig. 5) capable of removing 50 feet or more of the Francis Creek Shale, plus 20 feet or more of unconsolidated glacial material above it, in a single operation. This has enabled the recovery of large areas of relatively thin (30 to 36 inches) No. 2 Coal beneath overburden of up to nearly 100 feet.

Another important area of strippable reserves of the No. 2 Coal in Grundy County is in the part of the county lying north of the Illinois River. This includes the area from the vicinity of Morris, westward to the Grundy-LaSalle County line. The only mining in the area has been in the vicinity of Morris, where the No. 2 Coal, averaging about 30 inches thick, was mined by shallow shaft mines and by stripping. Large unmined areas of strippable reserves west of the areas of past mining near Morris constitute one of the most favorable remaining areas of strippable coal in Grundy County. The No. 2 Coal, however, averages only 30 inches thick there and is nearly all at depths greater than 50 feet.

Summum (No. 4) and Lowell Coals

A coal averaging about 42 inches thick that lies about 85 feet above the No. 2 Coal is being strip mined in the vicinity of South Wilmington in southeastern Grundy County. This coal has been strip mined over an area of about $1\frac{1}{2}$ square miles where the overburden, which consists almost entirely of unconsolidated glacial deposits, is not much over 50 feet. The coal has been mapped at strippable

depth (pl. 1C) in an elongate area extending southward from this mine for about 6 miles. It is also present in a few outliers to the north. The area over which it has been mapped in this report totals 20 square miles, which is mainly in southeastern Grundy County, with some extensions into adjacent parts of Kankakee and Livingston Counties. It is difficult to correlate this coal with coals above the No. 2 Coal to the west in LaSalle County because bedrock in the intervening area is concealed by glacial drift and drill hole data are generally lacking. In earlier reports, Cady (1915) correlated this coal in the South Wilmington area with the Sparland (No. 7) Coal and later (Cady et al., 1952) thought it to be the Herrin or possibly the No. 7 Coal. As discussed earlier, the identification of this coal has been in doubt for many years. In this report, however, it has been tentatively correlated with the No. 4 Coal and appears to be restricted to the area shown on plate 1. Table 2 summarizes the classified reserves of this coal.

Because it lies close beneath glacial drift, the coal has been eroded from the region surrounding the classified areas shown on plate 1C, and even within the classified areas, more closely spaced drilling would probably reveal places where the coal has been removed locally by preglacial and glacial erosion. The interval between this coal and the underlying No. 2 Coal is about 85 feet over most of the

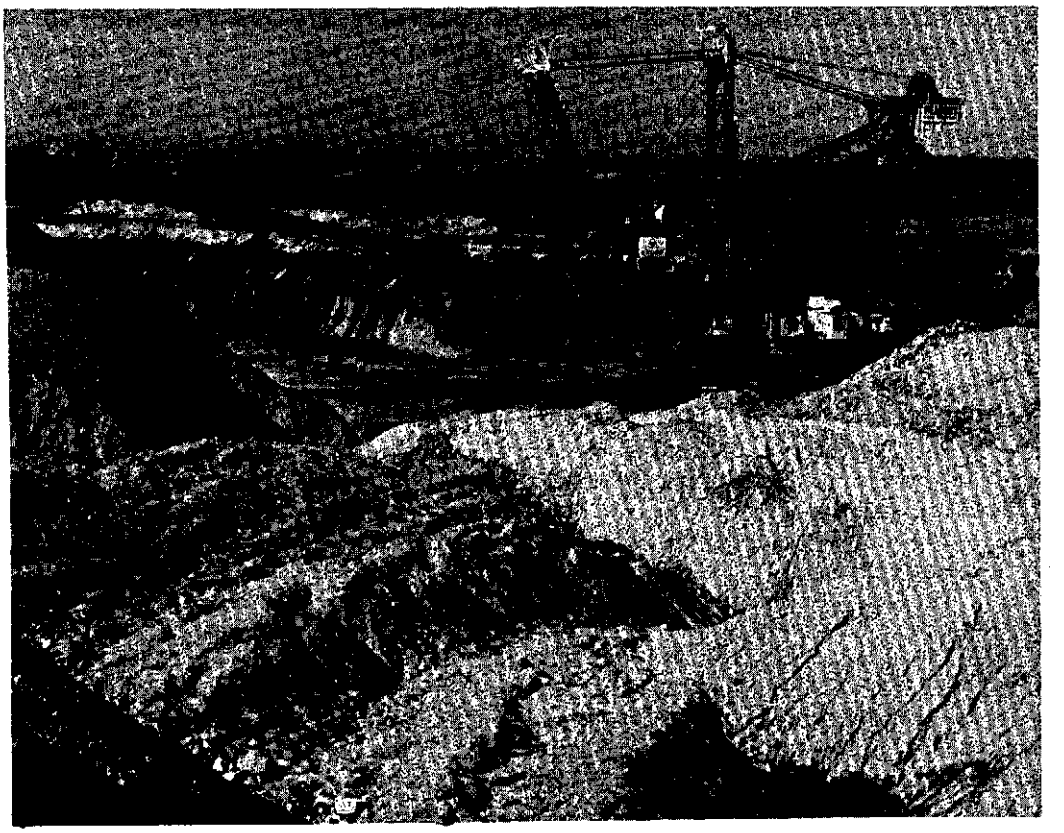

Figure 5 - Bucket wheel excavator used in strip mining No. 2 Coal.

TABLE 2 – SUMMARY OF STRIPPABLE RESERVES OF NO. 4 COAL (In thousand tons)

County	Class I reserves at overburden thickness (ft)				Mined out (square miles)
	0–50	50–100	100–150	Total	
NO.4 COAL					
GRUNDY	5,682	27,765	10,111	43,558	1.55
KANKAKEE		14,691	824	15,515	.10
LIVINGSTON		4,966	5,358	10,324	
TOTAL	5,682	47,422	16,293	69,397	1.65

area mapped on plate 1C but varies locally from as little as 60 to more than 100 feet.

Locally occurring coals of minable thickness have been noted in the interval between the No. 2 Coal and the coal that is thought to be the No. 4 Coal in the vicinity of Clarke City (Kankakee County) and near Cardiff in northeastern Livingston County. The coal was formerly called the Cardiff Coal after mines near Cardiff in T. 30 N., R. 8 E., Livingston County, where it was described by Cady (1915). He reported that near the bottom of the trough, the coal was within 10 feet of the underlying No. 2 Coal, but that it rose to a height of 15 to 30 feet above the No. 2 Coal at the sides of the trough. The thick coal near Cardiff was mostly 100 to 150 feet deep and was essentially mined out in the early period of mining. No additional strippable reserves of this coal have been mapped in Livingston County in this study.

In strip mining the No. 2 Coal, the Peabody Coal Company encountered a similar troughlike deposit near Clarke City, where unusual thicknesses of coal were found 5 to 20 feet above the No. 2 Coal in a local area, in secs. 19 and 30, T. 31 N., R. 9 E., Kankakee County. R. A. Peppers (personal communication) has tentatively correlated this coal with the Lowell Coal in LaSalle County.

Herrin (No. 6) Coal

The Herrin (No. 6) Coal is present in minable thickness and at strippable depth in the vicinity of Streator. Most of the remaining strippable coal (pl. 1A) is adjacent to areas where the No. 6 Coal has been mined out underground, and much of it is 100 feet or more deep. In table 3, strippable reserves of the No. 6 Coal are summarized.

Many of the shaft mines in the Streator field were less than 100 feet deep, and the coal was as much as 8 to 9 feet thick in some of the mines. Cady (1915) correlated the coal mined at Streator with the No. 7 Coal, but later he correlated it with the No. 6 Coal (Cady, 1935). Willman and Payne (1942), in a more detailed study of the area, also correlated the coal mined at Streator with the Herrin (No. 6) Coal. The thicker areas of No. 6 Coal in the Streator area appear to have resulted from coal accumulation in a topographic depression where the conditions for coal deposition and preservation were more favorable than in the surrounding areas. The thick No. 6 Coal of the Streator area seems to occupy an unfilled stream channel or some other form of depression in the underlying Vermilionville Sandstone,

TABLE 3 - SUMMARY OF STRIPPABLE RESERVES OF NO. 6 COAL (In thousand tons)

County	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total		
NO.6 COAL										
LASALLE	14,897	24,480	9,574	48,951	8,732	12,521		21,253	70,204	9.19
LIVINGSTON	5,829	17,553	1,671	25,053	1,794	2,197		3,991	29,044	3.33
TOTAL	20,726	42,033	11,245	74,004	10,526	14,718		25,244	99,248	12.52

for at the edges of the thick coal area, the coal appears to become thin and to overlie a greater thickness of the underlying sandstone. This relationship can best be seen near the eastern edge of the large mined-out area near Streator (pl. 1A) where the coal was reported to become thin and of poor quality in the eastern extremities of the mines. The available drill hole information indicates that south and east of the mined-out areas near Streator, the coal overlies a thick section of Vermilionville Sandstone and is probably less than 2 feet thick.

West and northwest of Streator, previously mined-out areas extend essentially to the outcrop of the coal, and only small remnants of coal at strippable depth remain. Southwest of Streator, however, an area of several square miles is mapped on plate 1A where the No. 6 Coal, 4 to 5 feet thick, is believed to be present at strippable depth. This area lies near the LaSalle-Livingston County line (T. 30 and 31 N., R. 2 and 3 E.) and is just a few miles north of the large anticlinal structure in the vicinity of Ancona and Garfield. The No. 6 Coal has been eroded from the crest of this structure and is only a few inches thick in holes drilled on the north flank of the structure. Elsewhere in the area, surrounding the old mine workings at Streator and along the flanks of the Ancona-Garfield structure, no reliable data are available on the thickness of the No. 6 Coal.

Willman and Payne (1942) and Currier (1930) have described locally occurring deposits of No. 6 Coal as much as 5 feet thick that were mined in small drift mines near Marseilles. These mines were located along Gum Creek near the centers of secs. 17 and 18, T. 33 N., R. 5 E., LaSalle County. The coal in these mines has been described by Willman and Payne (1942) as being of local extent, and probably most of the thick coal was mined out. Water wells north and east of these mines have reported coal 8 to 24 inches thick, mostly at depths of 100 feet or more, so that it is unlikely that any sizable areas of the No. 6 Coal at strippable depth will be found in this area. Figure 6 shows the distribution of drill holes in the area and the location of the small mines in which the No. 6 Coal was formerly mined.

North of Verona, in west-central Grundy County, coal believed to be the No. 6 Coal was formerly mined from an area of less than 2 square miles. The coal ranged to 8 feet in thickness and was mined at a depth of 80 to 100 feet. The coal there appears to have been a localized deposit that was essentially all mined out. The few available drill holes in the region surrounding the mined-out area on plate 1A showed either no coal or only a few inches at the depth at which the coal would be expected.

Danville (No. 7) Coal

The Danville (No. 7) Coal is present at strippable depth in a small area south of Streator (pl. 1B). Reserves at strippable depths that have been calculated for the

TABLE 4 – SUMMARY OF STRIPPABLE RESERVES OF NO. 7 COAL (In thousand tons)

County	Class I reserves at overburden thickness (ft)				Mined out (square miles)
	0–50	50–100	100–150	Total	
NO.7 COAL					
LASALLE	224	280		504	
LIVINGSTON	8,575	1,283		9,858	
TOTAL	8,799	1,563		10,362	

No. 7 Coal in the area of this report are shown in table 4 and are tabulated by township in table 6.

The No. 7 Coal crops out along the Vermilion River south of Streator, where it was formerly mined very locally. Its thickness ranges from 18 inches or less to 30 inches in the mapped area west of the outcrops and in a small area on the north flank of the Ancona-Garfield anticlinal dome (pl. 1B). In other areas east of the La Salle Anticline, where the No. 7 Coal may be present, data from drill holes or outcrops are insufficient for mapping its thickness.

The No. 7 Coal is 3 to 4 feet thick over much of the area west of the LaSalle Anticline, but it is below strippable depth throughout all of that region. It was formerly mined to a small extent near Cherry, in Bureau County, and near LaSalle. However, most of the mining in the area west of the LaSalle Anticline has been in the No. 2 Coal.

SUMMARY

Strippable coal reserves totaling 734 million tons have been mapped in the counties of the report area. The largest remaining reserves of coal at strippable depth are in Grundy County where slightly more than 356 million tons have been estimated. Grundy County is also the leading county in the area in strippable coal production. LaSalle County, with slightly more than 280 million tons of estimated strippable coal, is second to Grundy County in reserves but has little or no current strip mine production. Reserves totaling 49 million tons are estimated for Living-

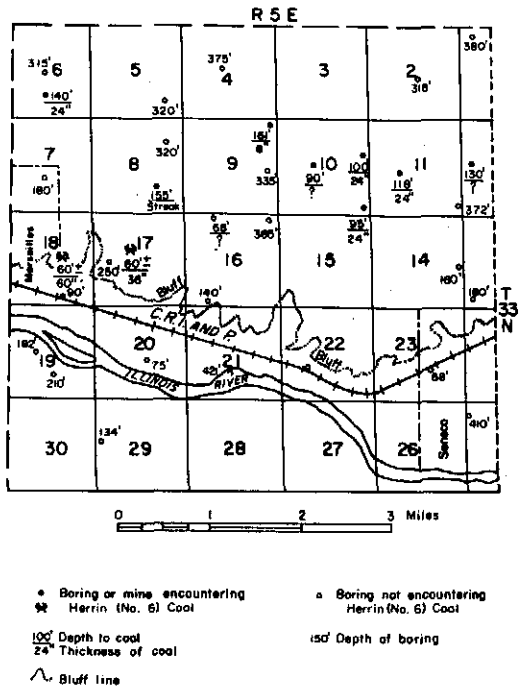

Figure 6 - Thickness of Herrin (No. 6) Coal and its overburden north and east of Marseilles.

ston County. Remaining reserves of strippable coal estimated for Kankakee County (27 million tons) and Will County (21.6 million tons) are small compared with reserves in Grundy and LaSalle Counties, because much of the coal favorably located for strip mining in Will and Kankakee Counties has been previously mined out.

Table 5 summarizes reserves by county and coal. Table 6 classifies the reserves by county, township, and thickness for each of the overburden and reliability categories shown on the maps.

No reserves of strippable coal have been estimated in this study for Bureau, Putnam, Marshall, and western LaSalle Counties, as these areas are located west of the LaSalle Anticline where the coals are structurally deep and the unconsolidated glacial deposits generally of such thickness that even in the area of outcrops, the coals are below strippable depth.

TABLE 5 – SUMMARY OF STRIPPABLE COAL RESERVES BY COUNTY, COAL BED, AND RELIABILITY CLASSIFICATION (In thousand tons)

Coal	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0–50	50–100	100–150	Total	0–50	50–100	100–150	Total		
GRUNDY COUNTY										
NO.4 COAL	5,682	27,765	10,111	43,558					43,558	1.55
NO.2 COAL	8,071	102,881	201,567	312,519					312,519	31.38
TOTAL	13,753	130,646	211,678	356,077					356,077	32.93
KANKAKEE COUNTY										
NO.4 COAL		14,691	824	15,515					15,515	.10
NO.2 COAL	471	6,188	4,842	11,501					11,501	3.10
TOTAL	471	20,879	5,666	27,016					27,016	3.20
LASALLE COUNTY										
NO.7 COAL	224	280		504					504	
NO.6 COAL	14,897	24,480	9,574	48,951	8,732	12,521		21,253	70,204	9.19
NO.2 COAL	40,747	74,946	56,478	172,171	2,242	8,968	26,331	37,541	209,712	3.56
TOTAL	55,868	99,706	66,052	221,626	10,974	21,489	26,331	58,794	280,420	12.75
LIVINGSTON COUNTY										
NO.7 COAL	8,575	1,283		9,858					9,858	
NO.6 COAL	5,829	17,553	1,671	25,053	1,794	2,197		3,991	29,044	3.33
NO.4 COAL		4,966	5,358	10,324					10,324	
TOTAL	14,404	23,802	7,029	45,235	1,794	2,197		3,991	49,226	3.33
WILL COUNTY										
NO.2 COAL	6,423	13,922	1,278	21,623					21,623	15.41
TOTAL	6,423	13,922	1,278	21,623					21,623	15.41

TABLE 6 – DETAILED SUMMARY OF STRIPPABLE COAL RESERVES SHOWING THICKNESS OF OVERBURDEN, THICKNESS OF COAL, AND RELIABILITY CLASSIFICATION, BY COUNTY AND TOWNSHIP
(In thousand tons)

Coal	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0–50	50–100	100–150	Total	0–50	50–100	100–150	Total		
				GRUNDY COUNTY						
NO.4 COAL										
31N–8E										
36	605	4,943	6,423	11,971					11,971	
42		12,947	3,688	16,635					16,635	
TOTAL	605	17,890	10,111	28,606					28,606	1.55
32N–7E										
18	656			656					656	
24		359		359					359	
TOTAL	656	359		1,015					1,015	
32N–8E										
18	168			168					168	
24	1,345	717		2,062					2,062	
30	112	8,799		8,911					8,911	
36	1,816			1,816					1,816	
TOTAL	3,441	9,516		12,957					12,957	
33N–7E										
30	588			588					588	
60	392			392					392	
TOTAL	980			980					980	
COAL BED	5,682	27,765	10,111	43,558					43,558	1.55
NO.2 COAL										
31N–8E										
36		1,648	10,425	12,073					12,073	
TOTAL		1,648	10,425	12,073					12,073	4.39
32N–7E										
36			8,407	8,407					8,407	
TOTAL			8,407	8,407					8,407	
32N–8E										
36		4,405	74,688	79,093					79,093	
TOTAL		4,405	74,688	79,093					79,093	9.60
33N–6E										
30	953	32,087	20,962	54,002					54,002	
TOTAL	953	32,087	20,962	54,002					54,002	
33N–7E										
30	4,708	19,645	31,442	55,795					55,795	
TOTAL	4,708	19,645	31,442	55,795					55,795	1.32
33N–8E										
30	420	15,105	5,156	20,681					20,681	
TOTAL	420	15,105	5,156	20,681					20,681	12.69
34N–6E										
24		90	13,496	13,586					13,586	
30		10,845	36,991	47,836					47,836	
TOTAL		10,935	50,487	61,422					61,422	
34N–7E										
30	1,990	19,056		21,046					21,046	
TOTAL	1,990	19,056		21,046					21,046	3.38
COAL BED	8,071	102,881	201,567	312,519					312,519	31.38
COUNTY	13,753	130,646	211,678	356,077					356,077	32.93

TABLE 6 – Continued

Coal	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0–50	50–100	100–150	Total	0–50	50–100	100–150	Total		
KANKAKEE COUNTY										
NO.4 COAL										
30N-9E										
36		471		471					471	
42		11,103	667	11,770					11,770	
TOTAL		11,574	667	12,241					12,241	
31N-9E										
36		841		841					841	
42		2,276	157	2,433					2,433	
TOTAL		3,117	157	3,274					3,274	.10
COAL BED		14,691	824	15,515					15,515	.10
NO.2 COAL										
31N-9E										
36	471	6,188	4,842	11,501					11,501	
TOTAL	471	6,188	4,842	11,501					11,501	3.10
COAL BED	471	6,188	4,842	11,501					11,501	3.10
COUNTY	471	20,879	5,666	27,016					27,016	3.20
LASALLE COUNTY										
NO.7 COAL										
30N-2E										
30	224	280		504					504	
TOTAL	224	280		504					504	
COAL BED	224	280		504					504	
NO.6 COAL										
31N-2E										
48						942		942	942	
60					1,737	4,876		6,613	6,613	
TOTAL					1,737	5,818		7,555	7,555	
31N-3E										
48	2,735	4,932	2,870	10,537	269	1,659		1,928	12,465	
60	12,162	13,171	2,130	27,463	6,726	5,044		11,770	39,233	
96		717		717					717	
TOTAL	14,897	18,820	5,000	38,717	6,995	6,703		13,698	52,415	7.23
31N-4E										
48		3,766	4,529	8,295					8,295	
TOTAL		3,766	4,529	8,295					8,295	1.96
32N-3E										
48		269	45	314					314	
60		1,625		1,625					1,625	
TOTAL		1,894	45	1,939					1,939	
COAL BED	14,897	24,480	9,574	48,951	8,732	12,521		21,253	70,204	9.19
NO.2 COAL										
32N-2E										
24					1,121	6,726	11,725	19,572	19,572	
36	1,547	11,635	2,993	16,175					16,175	
TOTAL	1,547	11,635	2,993	16,175	1,121	6,726	11,725	19,572	35,747	
32N-3E										
24					717	1,637	11,860	14,214	14,214	
TOTAL					717	1,637	11,860	14,214	14,214	

TABLE 6 – Continued

Coal	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0–50	50–100	100–150	Total	0–50	50–100	100–150	Total		
32N–4E										
36							336	336	336	
TOTAL							336	336	336	
33N–2E										
24	7,847	2,399		10,246					10,246	
30	3,251	8,127	8,407	19,785					19,785	
36	7,835	8,104		15,939					15,939	
TOTAL	18,933	18,630	8,407	45,970					45,970	1.80
33N–3E										
24	5,874	13,922	22,262	42,058					42,058	
36							1,177	1,177	1,177	
TOTAL	5,874	13,922	22,262	42,058			1,177	1,177	43,235	.80
33N–4E										
24	8,878	10,627	8,721	28,226					28,226	
36							404	404	404	
TOTAL	8,878	10,627	8,721	28,226			404	404	28,630	.86
33N–5E										
30		16,730	12,078	28,808					28,808	
36		538	1,412	1,950					1,950	
TOTAL		17,268	13,490	30,758					30,758	.10
34N–2E										
18	5,313	1,698		7,011					7,011	
TOTAL	5,313	1,698		7,011					7,011	
34N–3E										
24	202	1,166	605	1,973					1,973	
TOTAL	202	1,166	605	1,973					1,973	
34N–4E										
24					404	605	829	1,838	1,838	
TOTAL					404	605	829	1,838	1,838	
COAL BED	40,747	74,946	56,478	172,171	2,242	8,968	26,331	37,541	209,712	3.56
COUNTY	55,868	99,706	66,052	221,626	10,974	21,489	26,331	58,794	280,420	12.75
				LIVINGSTON COUNTY						
NO. 7 COAL										
30N–3E										
18	2,522			2,522					2,522	
24	3,766	291		4,057					4,057	
30	1,149	308		1,457					1,457	
TOTAL	7,437	599		8,036					8,036	
30N–4E										
18	437	488		925					925	
30	701	196		897					897	
TOTAL	1,138	684		1,822					1,822	
COAL BED	8,575	1,283		9,858					9,858	
NO. 6 COAL										
30N–3E										
48	2,242	4,887	135	7,264	1,794	2,197		3,991	11,255	
60	3,251	560		3,811					3,811	
TOTAL	5,493	5,447	135	11,075	1,794	2,197		3,991	15,066	3.18

TABLE 6 – Continued

Coal	Class I reserves at overburden thickness (ft)				Class II reserves at overburden thickness (ft)				Total I & II	Mined out (square miles)
	0-50	50-100	100-150	Total	0-50	50-100	100-150	Total		
30N-4E										
48		2,018	135	2,153					2,153	
60	336	10,088	1,401	11,825					11,825	
TOTAL	336	12,106	1,536	13,978					13,978	.15
COAL BED	5,829	17,553	1,671	25,055	1,794	2,197		3,991	29,044	3.33
NO.4 COAL										
30N-8E										
36		572	572	1,144					1,144	
42		4,394	4,786	9,180					9,180	
TOTAL		4,966	5,358	10,324					10,324	
COAL BED		4,966	5,358	10,324					10,324	
COUNTY	14,404	23,802	7,029	45,235	1,794	2,197		3,991	49,226	3.33
				WILL	COUNTY					
NO.2 COAL										
32N-9E										
36	4,506	13,922	1,278	19,706					19,706	
TOTAL	4,506	13,922	1,278	19,706					19,706	10.87
33N-9E										
36	1,917			1,917					1,917	
TOTAL	1,917			1,917					1,917	4.54
COAL BED	6,423	13,922	1,278	21,623					21,623	15.41
COUNTY	6,423	13,922	1,278	21,623					21,623	15.41

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APPENDIX A - COAL ANALYSES-COUNTY AVERAGES

Samples		Proximate					Heat values			
County Number of mines Coal	Condition[a]	Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Calories	B.T.U.	Rank index	Unit coal index
LaSalle	1	15.6	37.0	39.6	8.3	5.48	5967	10740		
3 mines[b]	2		43.6	46.7	9.7	6.38	7028	12651		
Colchester(No. 2)Coal	3		48.3	51.7		7.12	7790	14022		
	4	17.2	38.8	44.0			6625	11925	119	
	5		46.8	53.2			7983	14370		144
LaSalle	1	13.2	39.5	38.7	8.6	3.7	6249	11250		
2 mines[c]	2		45.6	44.5	9.9	4.2	7197	12960		
Herrin(No. 6)Coal	3		50.6	49.4		4.7	7992	14390		
	4	14.9	42.2	42.9			6933	12480	125	
	5		49.5	50.5			8143	14660		147
Grundy	1	17.1	37.4	39.7	5.8	2.8	6139	11050		
4 mines[c]	2		45.1	47.9	7.0	3.3	7402	13320		
Colchester(No. 2)Coal	3		48.5	51.5		3.5	7959	14330		
	4	18.6	38.8	42.6			6574	11830	118	
	5		47.7	52.3			8009	14520		145
Grundy	1	13.8	38.7	38.3	9.3	3.54	6052	10894		
1 mine	2		44.8	44.4	10.8	4.11	7020	12636		
No. 4 Coal	3		50.2	49.7		4.60	7868	14162		
	4	15.6	41.5	42.9			6765	12171	122	
	5		49.2	50.8			8019	14401		144
Will	1	15.4	34.2	45.3	5.1	1.6	6299	11340		
1 mine[c]	2		40.5	53.5	6.0	1.9	7449	13410		
Colchester(No. 2)Coal	3		43.1	56.9		2.1	7928	14270		
	4	16.5	35.4	48.1			6682	12030	120	
	5		42.4	57.6			7998	14400		144
Kankakee	1	15.0	36.4	42.8	5.8	2.77	6394	11510		
1 mine	2		42.8	50.4	6.8	3.25	7520	13536		
Colchester(No. 2)Coal	3		45.9	54.1		3.49	8066	14520		
	4	16.3	37.8	45.9			6851	12331	123	
	5		45.1	54.9			8176	14717		147
Kankakee	1	14.4	38.0	38.8	8.9	3.42	6072	10930		
1 mine	2		44.4	45.3	10.4	3.99	7093	12767		
No. 4 Coal	3		49.5	50.5		4.45	7911	14239		
	4	16.2	40.6	43.2			6752	12154	122	
	5		48.4	51.6			8004	14403		144

[a]Type of analysis is denoted as follows:
1 - sample as received at laboratory
2 - moisture free
3 - moisture and ash free
4 - moist mineral matter free
5 - dry mineral matter free

[b]Data modified from Cady (1935, 1948).

[c]Data from Cady (1935).

APPENDIX B - LOCATION OF DRILL HOLES SHOWN ON PLATE 2

County no.	¼	¼	¼	Sec.	T.	R.	Year drilled
				LA SALLE COUNTY			
				Section B–C			
49		SE	SE	14	31N	1E	
	Cen.	SE	SW	8	32N	2E	
47		SE	NW	32	33N	2E	1912
	NW	SE	NE	31	31N	2E	
45	Cen.	SW	SE	19	33N	2E	1912
119	SW	SW	SW	8	33N	3E	1916
145	NE	NW	NE	31	33N	4E	1940
159	NE	NW	NE	33	33N	4E	
129		NE	SW	5	33N	4E	
163	SW	NW	NW	22	34N	4E	1944
172	SW	SE	SW	20	34N	5E	1940
23	NE	NE	NE	22	34N	5E	1940
24	SE	NE	NE	26	34N	5E	
153	SW	NW	NE	25	33N	5E	1942
				Section A–B–D			
28		SE	SW	16	31N	1E	1931
49		SE	SE	14	31N	1E	
1844	SW	NW	NW	8	31N	2E	1963
1846	SW	SW	SW	10	31N	2E	1963
1817	SW	SW	SW	12	31N	2E	1963
66			NE	21	31N	3E	
31	SE	NW	SW	24	31N	3E	
70	SW	NW	SW	19	31N	4E	1950
1807	NE	SE	NE	31	31N	4E	1963
				Section B–D–E			
49		SE	SE	14	31N	1E	
1749	NW	NW	SE	10	30N	2E	1963
1696	SW	SW	NW	15	30N	2E	1963
1783	NW	SW	SE	14	30N	2E	1963
1695	SW	SE	SE	14	30N	2E	1963
1603	SW	SE	SW	24	30N	2E	1962
1697	SE	SE	SE	27	30N	2E	1963
				LIVINGSTON COUNTY			
				Section A–B–D			
161	NW	NW	NW	3	30N	4E	1963
32	SE	SE	SE	16	30N	5E	1929
				Section B–D–E			
264	SE	SE	NE	31	30N	3E	1962
273	NE	NE	NW	33	30N	3E	1962
269	NE	NW	SE	34	30N	3E	1962

County no.	¼	¼	¼	Sec.	T.	R.	Year drilled
				LIVINGSTON COUNTY			
				Section B–D–E (cont.)			
267	NE	NE	NW	3	29N	3E	1962
32	SE	SE	SE	16	30N	5E	1929
630	SW	SW	SW	7	28N	6E	1964
627	SW	SW	SW	21	28N	6E	1964
699	NW	NW	NE	2	27N	6E	1964
629	SW	SW	NE	9	27N	6E	1964
				GRUNDY COUNTY			
				Section B–C			
26		N½	NW	21	33N	6E	1916
1034	Cen.	S½	NW	12	33N	6E	1951
19		NW	NW	23	34N	6E	1916
2		NW	NE	19	34N	7E	
9		SE	SW	35	34N	7E	1907
32		SW	SW	10	33N	7E	1933
774		Cen.	NW	36	33N	8E	
579	Cen.	NW	NE	35	32N	8E	1903
695	NW	NE	NW	23	31N	8E	1926
				WILL COUNTY			
				Section B–C			
4	SW	NW	NE	4	32N	9E	1926
9				8?	32N	9E	1889
				KANKAKEE COUNTY			
				Section B–C			
27	SW	SW	SW	30	31N	9E	1896
5	Cen.	SW	SE	6	30N	9E	

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