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SUBSURFACE GEOLOGY AND COAL RESOURCES OF THE PENNSYLVANIAN SYSTEM IN CLARK AND EDGAR COUNTIES, ILLINOIS

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ABSTRACT

Pennsylvanian rocks of Clark and Edgar Counties in eastern Illinois were studied to determine structure and stratigraphy and to evaluate reserves of minable coal.

Most of the data were obtained from electric logs of petroleum test drilling, but records of several coal test holes, coal mines, and a few available outcrops also were used.

Oldest and youngest Pennsylvanian strata are absent or have limited areal distribution because of long erosional periods preceding and following Pennsylvanian time. Major emphasis has therefore been placed on strata within the Carbondale, Modesto, and Bond Formations because they are more widespread in occurrence, they include all but one of the known commercially important coals of the area, and they contain the more significant key members useful in subsurface study.

The larger structural features of the two counties and their relation to major structures in adjacent areas are described and discussed briefly. Structural and stratigraphic cross sections and an isopach map of the Carbondale Formation illustrate the structural deformation that has taken place in the area since deposition of Colchester (No. 2) Coal.

The investigation has led to a clearer understanding of structure and stratigraphy, especially of proper correlation of Danville (No. 7), Herrin (No. 6), and Colchester (No. 2) Coals, not only within the report area but also in adjacent counties.

An accurate evaluation of minable coal reserves could not be made because of limited data on coal thickness, but there is evidence that test drilling designed to obtain such information would show reserves considerably in excess of what can be proved with the limited information currently available. Coal reserves are shown by structure contour maps drawn on the tops of Danville (No. 7), Herrin (No. 6), and Colchester (No. 2) Coals, by consideration of those areas thought to be underlain by coals of minable thickness, and by a table of available thickness data of Danville (No. 7), Herrin (No. 6), Harrisburg (No. 5), and Seeleyville Coals.

INTRODUCTION

This subsurface study of the geology and coal resources of the Pennsylvanian System in Clark and Edgar Counties, Illinois, is one of a series of investigations of coal reserves of Illinois published by the Illinois State Geological Survey.

Geographically the two counties are located in the east-central part of the state, adjacent to the Illinois-Indiana boundary. They extend approximately 25 miles east to west, and about 50 miles north to south, and they have a combined area of 1,133 square miles.

Geologically they are situated on the eastern shelf area of the Illinois Basin, immediately northeast of the Fairfield Basin (fig. 1). Major structural features of the area are the Oakland Anticline and the Marshall Syncline. The anticline runs roughly along the western side of the area, parts of it being in adjacent counties to the west. The syncline extends generally north-south through the central part of the area, with its steeper west flank being in common with the east flank of the Oakland Anticline.

Stratigraphic study was limited, in the main, to strata included in the Carbondale, Modesto, and Bond Formations of the upper part of the Kewanee and the lower part of the McLeansboro Groups, because it is within this interval that the more important key strata and minable coals are found. Data on thickness, depth, and areal extent of coals were obtained from mine records, diamond drill core tests, electric logs of petroleum test holes, sample studies of rock cuttings from coal and petroleum test holes, and from drillers logs of oil test holes in cases where other information was scarce and the drillers logs were supported by more reliable data from nearby drilling.

Many, if not most, of the coals mined in other parts of Illinois are present in Clark and Edgar Counties, and maps showing structure and areal extent of three of the more important ones have been prepared as a part of this study. Unfortunately, a dearth of reliable data on coal thickness from most of the area makes it difficult to assess accurately the total reserves of minable coal.

A knowledge of the area underlain by coal and of approximate depths to the coal aids in the intelligent planning of drilling programs designed to obtain thickness information. This report, therefore, has two major objectives: (1) to organize and show in useful form all available information on coal reserves in the area, and (2) to present structural and stratigraphic information that, if judiciously used, will help in planning and conducting a program of future prospecting.

Additional knowledge of structural and stratigraphic relationships of strata in the two counties, when considered with what is known of other areas in Illinois, also will help to achieve a better understanding of the Pennsylvanian geology of the state as a whole.

Acknowledgment

Some of the preliminary gathering and organizing of logs and records was done by Margaret A. Parker who initiated the study while she was a member of the Illinois Geological Survey staff. In the earlier stages of the study, George M. Wilson showed me numerous places where outcrops could be advantageously studied in the field. Other members of the Survey staff contributed useful suggestions toward clarification, general organization, and presentation of the information.

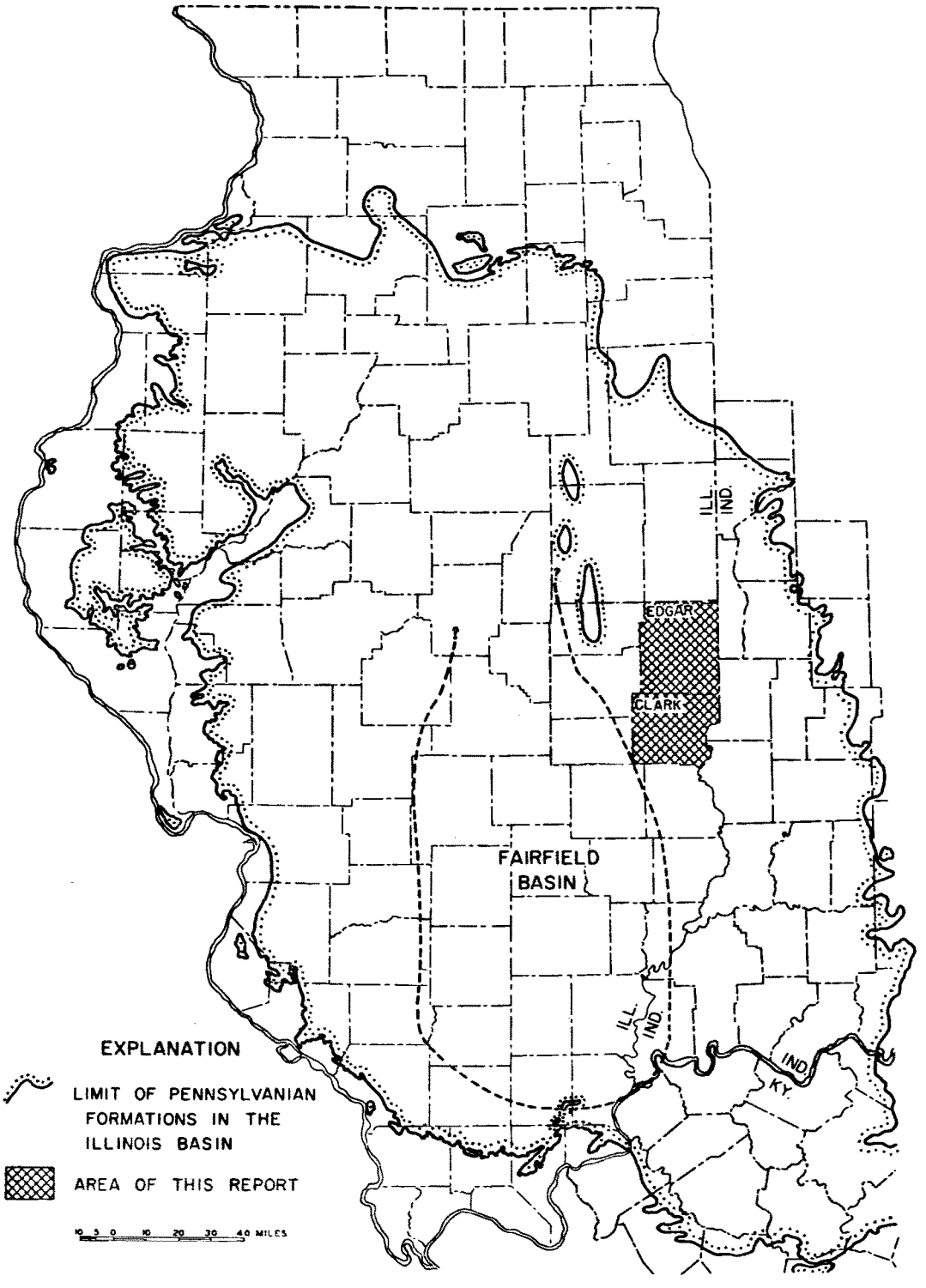


Figure 1 - Index map of report area showing its position in the Illinois Basin and relative to the Fairfield Basin.

Previous Investigations

While this is the first Illinois Geological Survey report that deals exclusively with Pennsylvanian geology and coal resources of Clark and Edgar Counties, it is not the first investigation made of the area.

Among the earliest geological studies of the two counties were those of Bradley (1870) and Worthen (1875). Their findings were published as part of an over-all survey of the geology of Illinois and were therefore somewhat limited, due both to the scope of their survey and to the paucity of data available at that time.

Mylius (1927) included both counties in a rather intensive study of the geology of east-central Illinois. Although his report was directed toward the occurrence of and exploration for petroleum, he dealt in considerable detail with Pennsylvanian strata and included a number of structure maps of local areas. The most detailed portion of his work was limited to the western half of Clark County because it was in this area that oil and gas were being produced from Pennsylvanian sandstones.

Newton and Weller (1937) included Clark County in a report dealing with Pennsylvanian stratigraphy of a part of southeastern Illinois. Their report was based primarily upon observation of outcrops.

An evaluation of coal reserves of the two counties was included in a statewide survey of minable coals (Cady and others, 1952).

Numerous other publications of the Illinois State Geological Survey refer to the geology and mineral resources of the two counties, but these references are generally brief and, for the most part, not especially pertinent to the present study.

Pennsylvanian stratigraphy, structure, and coal resources of Cumberland, Coles, and Douglas Counties, immediately west of the area of this report, with structure contour maps of Colchester (No. 2), Herrin (No. 6), and Danville (No. 7) Coals, and a contour map of the pre-Pennsylvanian erosional surface have been reported by Clegg (1959).

The results of a study of Crawford and Lawrence Counties, the former being adjacent to the south boundary of Clark County, also have been published (Potter, 1956). Structure contour maps of Herrin (No. 6) and Harrisburg (No. 5) Coals and a number of stratigraphic cross sections are included in the report.

The Indiana Geological Survey has made investigations of coal reserves, along with structural and stratigraphic studies, of Sullivan County (Wier, 1953) and Vigo County (Wier, 1952) to the east of Clark and Edgar Counties.

Friedman (1960) studied channel-fill sandstones, some of which have cut into commercially important coals in parts of Indiana adjacent to Clark and Edgar Counties.

STRUCTURE

The geology of Clark and Edgar Counties is somewhat more complex than that encountered in many parts of Illinois. The two counties are situated on a structural shelf and include within and adjacent to their boundaries numerous anticlines, synclines, and domes, all of which add to the normal complexities encountered in a geologic study.

Figure 2 indicates in diagrammatic form the location and trend of the most significant of these structural features. The west flank of the LaSalle Anticlinal Belt runs north-northwest to south-southeast through Douglas, Coles, and Cumberland Counties. It forms a structural boundary between the Fairfield Basin and the eastern structural shelf area of the Illinois Basin. Several anticlines, synclines, domes, and basins are present within the Fairfield Basin.

Marshall Syncline

The Marshall Syncline extends northward through central Clark County into Edgar County, where it swings slightly westward, passing into southwestern Vermilion and southeastern Champaign Counties. As mapped on Pennsylvanian strata, it is a doubly plunging syncline, tilted slightly southward along its axis. Lack of subsurface data makes determination of the exact location and nature of its northern extremity impossible at the present time, although it probably extends northward at least as far as Iroquois County. The southern terminus of the Marshall Syncline, also as mapped on Pennsylvanian strata, is in Crawford County about 20 or 25 miles south of the southern boundary of Clark County, where it appears to terminate against a generally east-west trending cross-fold on the LaSalle Anticlinal Belt.

The Marshall Syncline is an asymmetrical fold with a comparatively steep west flank. Smaller structures, the most prominent of which are domes, are present along both synclinal flanks. Some of those along the east limb are known to result from draping of younger strata over deeply buried Silurian reefs. Limited subsurface data preclude mapping the east synclinal flank in the same detail as the west. Further drilling may reveal additional structures along the east flank that are as yet unknown.

LaSalle Anticlinal Belt

One of the major structural features of Illinois is the LaSalle Anticlinal Belt, a series of en echelon folds extending south-southeastward from LaSalle and Lee Counties to northeastern Wabash County. Within and adjacent to Clark and Edgar Counties (fig. 2) it forms a roughly triangular-shaped wedge occupying approximately the central part of the mapped area. Its west flank forms the northeastern boundary of the Fairfield Basin in Douglas, Coles, and Cumberland Counties, and its east flank, in Clark and Edgar Counties, is also the west flank of the Marshall Syncline. Its numerous folds make the LaSalle Anticlinal Belt a rather complex structure within and adjacent to Clark and Edgar Counties.

The Tuscola Anticline, one of the many subsidiary structures of the LaSalle Anticlinal Belt, extends south-southeastward from north of Tuscola in Douglas County to near Charleston in Coles County, its west flank being also the west flank of the LaSalle Anticlinal Belt in this part of Douglas and Coles Counties. The anticline plunges southeastward and is broader at the north than at the south.

East of the Tuscola Anticline, and sharing a common flank with it, is the Murdock Syncline. Like the Tuscola Anticline, the Murdock Syncline has a slight southward plunge. Because of limited subsurface data, the northern and southern ends of the Murdock Syncline are not well known. The structure probably dies out a short distance to the north, in Champaign County. Southward it can be

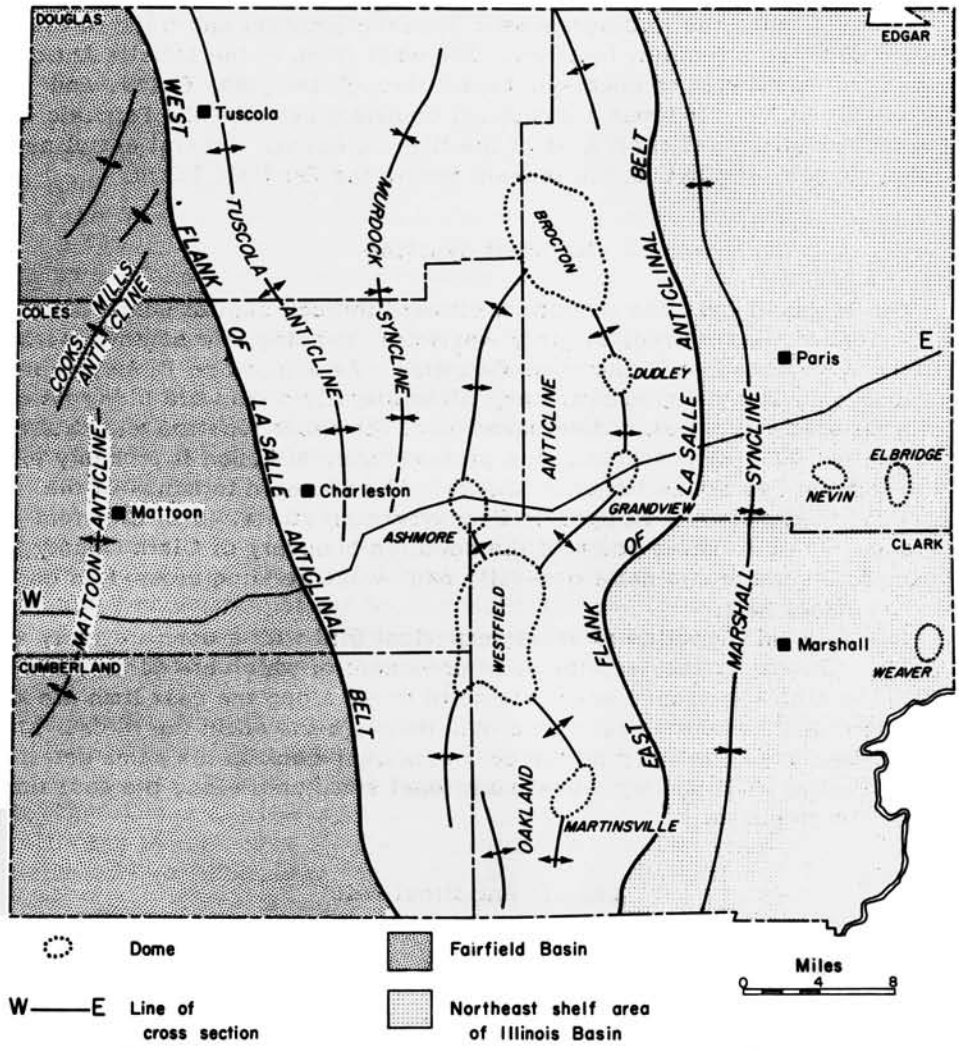


Figure 2 - Major geologic structures in and adjacent to Clark and Edgar Counties. Cross section appears in figure 4.

traced in subsurface only as far as the vicinity of Charleston. It is possible that it bends southwestward around the south end of the Tuscola Anticline and forms a cross fold in the west flank of the LaSalle Anticlinal Belt somewhere south of Charleston.

South of Charleston the west flank of the LaSalle Anticlinal Belt dips less steeply than it does farther north. The flexure appears to be monoclinal from the Fairfield Basin to the west flank of the Oakland Anticline.

The Oakland Anticline, the dominant subsidiary structure of the LaSalle Anticlinal Belt in the report area, is a composite structure consisting of several individual anticlinal and synclinal folds as well as domes and poorly defined basins. It strikes from north to south along the west side of Clark and Edgar Counties, but some of its individual folds extend westward into Cumberland, Coles, and Douglas Counties. The most prominent subsidiary structures of the Oakland

Anticline are the Brocton Dome in western Edgar County and the Westfield Dome in northwest Clark County (fig. 2). The east flank of the Oakland Anticline is common to the east flank of the LaSalle Anticlinal Belt and the west flank of the Marshall Syncline. The west anticlinal flank is very irregular, dipping steeply westward from the Brocton Dome into the Murdock Syncline in Douglas County and from the west sides of the Ashmore and Westfield Domes in Coles and Cumberland Counties. Between these domes the westward dip is more gentle.

Structural History

The LaSalle Anticlinal Belt has played an important role in the structural and stratigraphic history of Clark and Edgar Counties and the counties immediately to the west. In this area it stood structurally higher than the Fairfield Basin and Marshall Syncline throughout much of Pennsylvanian time and probably was a peninsula or archipelago extending southward into shallow Pennsylvanian seas during periods of marine inundation of the lower areas. The presence of Pennsylvanian marine limestones and shales over the top of the structure, however, indicates that it was completely submerged during periods of maximum marine transgression.

An isopach map (fig. 3), a progressively developed stratigraphic cross section and a structural cross section (fig. 4) were prepared to help interpret the structural history of the LaSalle Anticlinal Belt and related structures in and adjacent to Clark and Edgar Counties. Isopach maps show, by lines connecting points of equal thickness, the distribution and thickness of a rock unit or of the sediments between twc chosen units. Stratigraphic cross sections serve a similar purpose but are somewhat more limited because they show geologic conditions only along the line of the section. Such maps and cross sections are useful in studies involving structure and its effect upon sedimentation.

Evaluation of structural development such as that demonstrated in figures 3 and 4 must be made with an awareness of the possible role played by differential compaction. How much of the total deformation was due to this agency and how much to tectonic folding cannot be determined. It seems likely, however, that structural trends and most of the folding were due to tectonic control, and that differential compaction merely increased the degree of stratigraphic dip.

Because coals and limestones originally were deposited over essentially level surfaces, isopach maps of intervals between two such rock units show the structural attitude of the lowest unit as it was at the time the upper one was formed. Thus the isopach map (fig. 3) of the Carbondale Formation, which includes the strata between the top of Danville (No. 7) Coal and the bottom of Colchester (No. 2) Coal, shows the structural deformation that No. 2 Coal had undergone from the time of its formation to the time of formation of No. 7 Coal. The map also shows that during this time a greater thickness of sediment was accumulating in eastern and northeastern Clark and Edgar Counties than in the west and southwest. A greater thickness of sediment also had accumulated in the Fairfield Basin between the Mattoon Anticline and the west flank of the LaSalle Anticlinal Belt, indicating slight downwarping in this part of the basin. Thickening of strata east of the axis of the Marshall Syncline demonstrates that there had been no tendency towards formation of the east flank of the syncline in Illinois during the time interval involved.

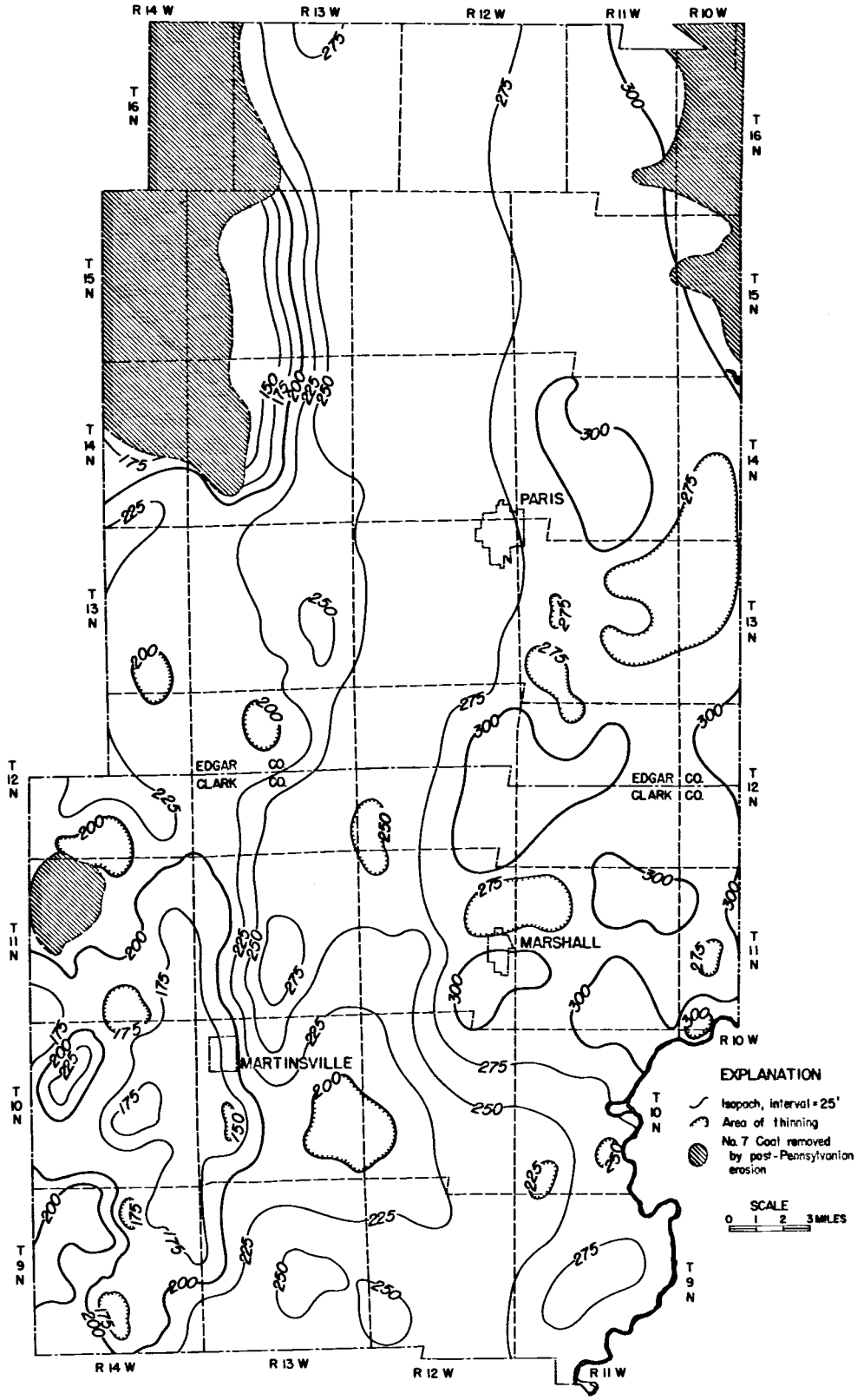


Figure 3 - Isopach map of the Carbondale Formation in Clark and Edgar Counties.

Figure 4 is a progressively developed stratigraphic cross section from western Coles County to the east edge of Edgar County with a successively higher and younger key stratum used for the horizontal datum of each phase. The line of the section is indicated on figure 2, which shows the various structures traversed by it.

Phase A of figure 4 reveals the amount of deformation No. 2 Coal had undergone by the time No. 4 Coal had developed, assuming both coals had originated on level surfaces. Phase B, shows that No. 4 Coal had undergone structural movement by the time No. 6 Coal was formed. No. 2 Coal had undergone even further deformation during this second phase, but its position relative to No. 4 Coal had, of course, remained unchanged.

In this manner each successively higher phase of the cross section shows the structural development that had taken place prior to deposition of the uppermost key stratum. Phase D shows that when the Shoal Creek Limestone (lowermost member of the Bond Formation) was deposited in Clark and Edgar Counties, all the underlying strata down to and including No. 2 Coal still were dipping gently eastward from the Oakland Anticline. Not until about the time the Livingston Limestone (uppermost member of the Bond Formation) was deposited, had incipient folding of these strata to form the east flank of the Marshall Syncline begun (Phase E). This first noticeable folding along the east synclinal flank in Illinois may have been due in part to differential compaction of the thicker accumulation of sediments in the eastern part of the area.

Phase F of figure 4 is a structural cross section with mean sea level as the datum horizon, showing the structure as it is at the present time. When Phase F is evaluated in conjunction with Phase E, it becomes evident that almost all of the folding of the east limb of the Marshall Syncline took place after deposition of the Livingston Limestone. Pronounced folding also took place on the LaSalle Anticlinal Belt during this late phase of structural movement. The Oakland Anticline, which had maintained an elevation approximately equal to the rest of the LaSalle Anticlinal Belt during the earlier stages of folding, is shown to be considerably higher in the structural cross section.

The exact time of this last folding cannot be determined because youngest Pennsylvanian strata have been removed by post-Pennsylvanian erosion. In other parts of Illinois, however, where strata of the upper part of the Mattoon Formation are present they also reflect structural folding, indicating that considerable structural movement took place near the end, or following the close, of the Pennsylvanian Period.

While structural development interpreted from cross sections normally can be applied with certainty only to the area adjacent to the line of traverse, the isopach map of the Carbondale Formation (fig. 3), and the coal structure maps (pl. 1, 2, and 3) strongly suggest that the structural history depicted in the cross sections can be applied logically to the area as a whole.

Movement of considerable magnitude is, of course, known to have taken place along the LaSalle Anticlinal Belt prior to deposition of No. 2 Coal, so the structural development indicated in figures 3 and 4 of this report reflect only a small part of the entire structural development of the LaSalle Anticlinal Belt and related features. The illustrations do, however, show step by step the total movement that has taken place since formation of Colchester (No. 2) Coal.

Evaluation of the coal structure maps (pl. 1, 2, and 3) should be made with an awareness of the quantity, quality, and distribution of data used in their

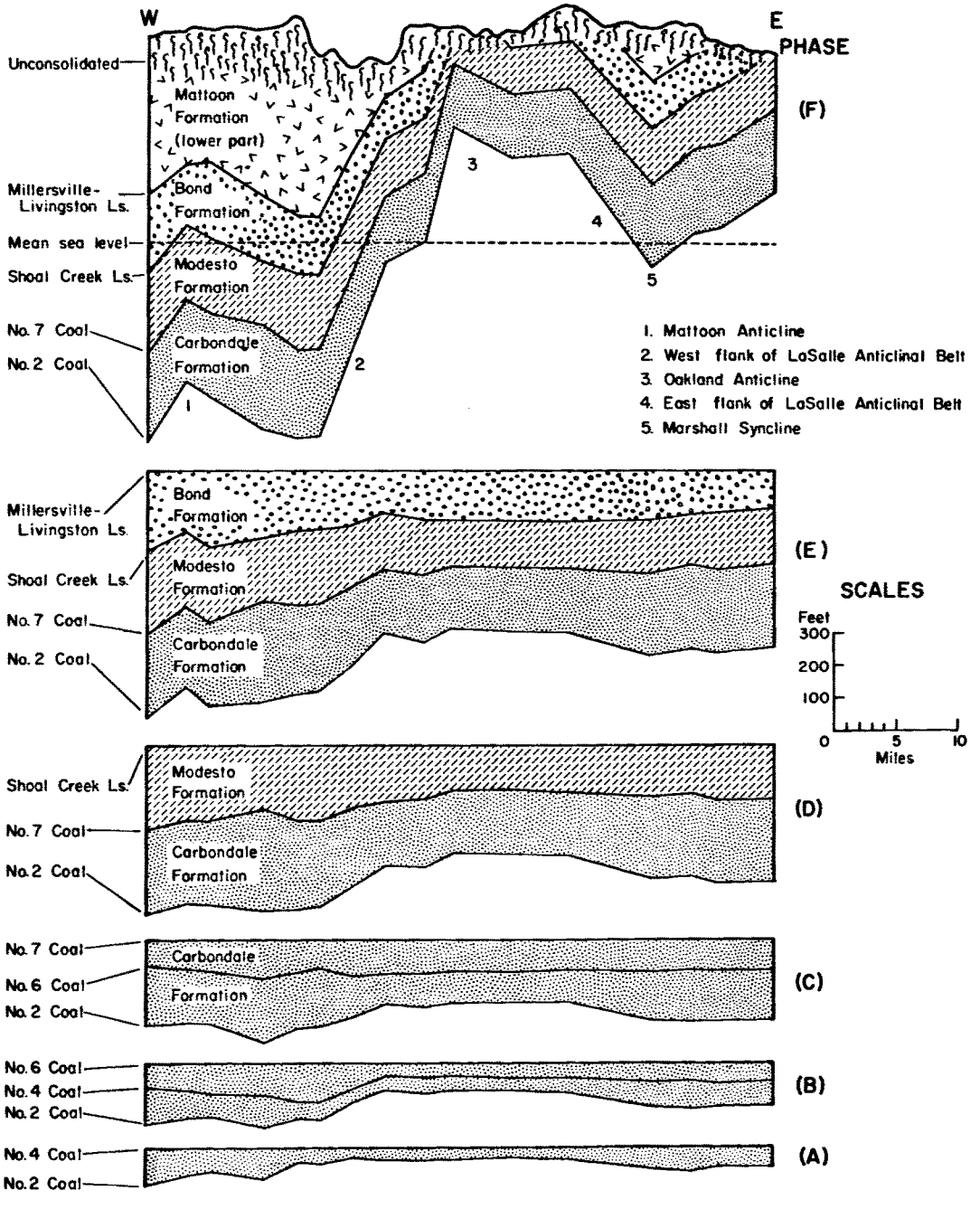


Figure 4 - Progressive development and present day structure of the LaSalle Anticlinal Belt and adjacent structures in Coles and Edgar Counties, Illinois since deposition of Colchester (No. 2) Coal. Line of cross section is shown in figure 2.

preparation. In the oil and gas fields along the west side of the area, electric log data are plentiful, and structure is outlined in greater detail than in areas of less control. The relatively steep west flank of the Marshall Syncline adjacent to some of these oil fields has been established from these data. As there appears to be no reason for supposing that the strata do not continue to dip fairly steeply in the intervening areas for which data is sparse, general parallelism of contours has been maintained to indicate a relatively steep flank along the entire trend even though data may not be sufficient to prove the interpretation.

In the central part of the Marshall Syncline, and especially in the northern part of Edgar County where subsurface information is generally sparse, structural interpretation is of necessity more generalized.

The notable similarity of over-all structure of the three coals is to be expected because distribution of control is similar in all three cases and because most of the folding of Pennsylvanian strata came about after all three coals had had been deposited.

STRATIGRAPHY

Earliest Pennsylvanian sedimentation in the Illinois Basin began in southeastern Illinois and adjacent parts of Kentucky and Indiana. Wanless (1955) has estimated that more than 1200 feet of Pennsylvanian sediment had accumulated in some parts of this area before the beginning of deposition in the LaSalle County area of northern Illinois.

The first Pennsylvanian sediments in Illinois were deposited over a deeply eroded and highly uneven surface that had resulted from a long period of post-Mississippian erosion and weathering. A long erosional period also followed final deposition of Pennsylvanian strata, and an unknown thickness of the uppermost Pennsylvanian rocks was removed during that time. This second erosional period appears to have continued with little or no interruption throughout much of Illinois until Pleistocene ice sheets advanced into the state from the north, northwest, and northeast. Additional Pennsylvanian and, in some parts of the state, older strata were removed by ice scour and meltwater erosion during Pleistocene time.

Final retreat of Pleistocene glaciers left a blanket of unconsolidated drift over the eroded bedrock surface of the glaciated region so that outcrops of bedrock are found only in areas where the drift layer is thin enough to have been removed locally by artificial excavation or by stream erosion.

As a result of the long erosional periods preceding and following deposition of Pennsylvanian sediments, both the uppermost and lowermost surfaces of the Pennsylvanian System of rocks in Illinois are highly uneven, and youngest and oldest Pennsylvanian strata have limited and irregular distribution.

The Pennsylvanian System in Illinois has been divided into three stratigraphic groups — McCormick, Kewanee, and McLeansboro, named from oldest to youngest (Kosanke et al., 1960). Each stratigraphic group has been subdivided into formations that in turn are further divided into members, only the more important of which are named in figure 5.

Uppermost and lowermost rocks of the Pennsylvanian System are not present in Clark and Edgar Counties. The two counties are situated within an area northeast of, and relatively higher structurally than, the deep part of the Illinois Basin (fig. 1). Because this relationship has existed since before the beginning of Pennsylvanian time, permanent deposition and retention of Pennsylvanian sediments had not advanced into Clark and Edgar Counties until near the end of, or after, Caseyville time. Consequently, if Caseyville rocks are present in the report area,

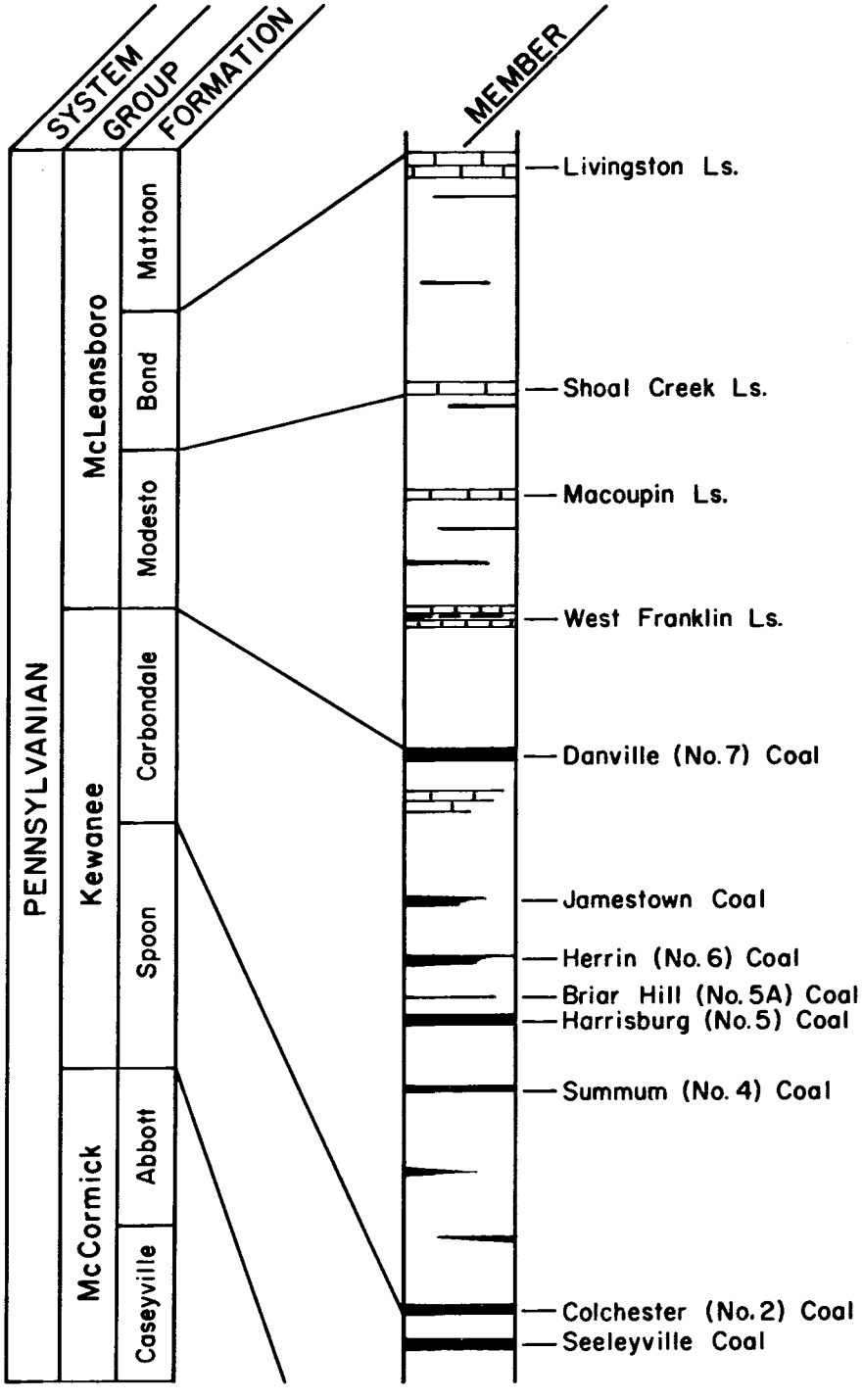


Figure 5 - Simplified diagram of the stratigraphic section discussed, showing its relation to the Pennsylvanian System of Illinois (not drawn to scale).

they probably are equivalent in age to the upper part of the formation as it is developed in southeastern Illinois and are limited in distribution to the southern and southeastern parts of Clark County.

Both counties also were covered by Pleistocene glaciers. Post-Pennsylvanian subaerial erosion and glaciation have removed some of the highest Pennsylvanian strata that once were present in the area. As a result, the upper Pennsylvanian strata remaining after retreat of the ice sheets also have limited and irregular distribution.

Figure 5 is a simplified diagrammatic columnar section of Clark and Edgar Counties, showing the formations and members discussed in this report and their relationship to the Pennsylvanian System of Illinois. Except for the Seeleyville Coal, all members named in the figure are within the Carbondale, Modesto, and Bond Formations. Members other than those shown also are present within these three formations, but, because they often are not readily recognizable and generally are of somewhat limited areal extent, only the more significant or key members have been given detailed consideration. Members of formations above the Bond and below the Carbondale also are present in Clark and Edgar Counties, but most commercial coals and diagnostic marker beds in the area are included within the Carbondale, Modesto, and Bond Formations.

Correlation

Drilling records and mine data have provided the main basis for correlation and lithology. Of the drill records, the diamond drill core can afford by far the greatest amount of dependable information. Accurate depth measurements to key members, thickness of coals, and the lithology of these beds and intervening strata can be determined if a core has been carefully cut and retrieved, and if the driller has kept accurate depth measurements. Information of comparable quality also can be obtained from a good record of a mine shaft.

Electric logs, sample studies, and drillers records are of less value from the standpoint of determining thickness and lithology. Many of them are useful, however, especially for depth information, and, because such records are by far the most plentiful ones available, they have been extensively used in this study.

Sample studies, especially of cable tool drill holes where cuttings have been carefully collected and labeled, afford reasonably accurate depth measurements and an opportunity for limited lithologic study. Sample studies of rotary drill holes usually are not as reliable as those of cable tool holes, but if cuttings are carefully taken at sufficiently frequent intervals, and especially if a good drilling-time record also is available, they may be quite valuable. A few records of petroleum tests contain 5-foot sample cuttings and 2-foot drilling time and are supported by electric logs. Samples and drilling time records from these holes were collected and studied by members of the Coal Section of the Illinois Geological Survey. With the exception of good diamond drill core logs and mine shaft records, these are the most dependable records available. Using them, it is possible even to make fairly accurate estimates of coal thickness.

Electric logs probably are most dependable of all for accurate depth information because the chance for human error of measurement is far less than in other types of drilling information. They also frequently indicate the position of poorly developed strata that may be overlooked in all but good diamond drill cores. Electric logs also yield some information about the lithology of rock units between key strata. They cannot, however, be depended upon for accurate coal thickness information. However, within an area where dependable supporting data show coal thick-

ness, the electric log may occasionally permit a reasonable assumption regarding the general thickness of coal between the area of known thickness and the site of the electrically recorded drill hole.

Most drillers logs of petroleum test holes are of very limited value and many are practically useless for study of Pennsylvanian rocks. In the western part of the Clark and Edgar County area, however, where petroleum reservoir rocks are in the Pennsylvanian System, many drillers keep reasonably accurate and detailed records. In numerous instances where no other information was available and where they are supported by nearby control, such drillers logs were used for correlation purposes in this study.

Figure 6 is a stratigraphic cross section of the area from northwestern Clark County east-northeast to the eastern side of Edgar County. The line of the section is indicated on plates I, II, and III. As will be noted, hole 1 is located fairly well up on the northeast flank of the Westfield Dome, hole 2 is on the Grandview Dome, and holes 3 and 4 are located in the lower part of the Marshall Syncline. The next two holes, 5 and 6, are located progressively farther up the east synclinal flank. The thickness interval between the various key units generally remains constant from the bottom of the syncline eastward. Some widening of intervals, especially that between No. 4 Coal and No. 2 Coal, takes place from the first two drill holes eastward into the deeper part of the syncline.

Hole 3 is at essentially the same structural elevation as hole 4, a diamond drill core hole. The two records afford an excellent example of the degree of correlation that can be achieved by using electric logs in conjunction with good supporting control.

The presence of variegated clay and shale, and of abundantly scattered, small, black, phosphatic pebbles or nodules associated with the Shoal Creek Limestone has been observed in outcrops in Edgar County north and east of Paris. The nodules stand out prominently, and in outcrops may be in bold relief, being more resistant to weathering than the enclosing limestone.

The variegated beds and black pebbles appear to be fairly diagnostic of the Shoal Creek Limestone in this locality, but caution must be exercised in placing excessive dependence upon them. Variegated clay and shale also are associated with the West Franklin Limestone throughout Clark and Edgar Counties, as well as the state as a whole, and black nodules have been observed in association with a great many other Pennsylvanian limestones in Illinois, although as a rule they are more scarce and much less prominent than those in the outcrops mentioned above. It also is true that a core through the Shoal Creek in Edgar County might contain only two or three black nodules even though they appear very abundantly in the limestone on the outcrop.

Although variegated clay and shale may be a dependable indicator of the West Franklin Limestone throughout many areas of Illinois, in Clark and Edgar Counties where beds of similar color also may be associated with the Shoal Creek Limestone, they must be used with greater caution. This is especially true in the western part of the area where the West Franklin and Shoal Creek Limestones may be relatively close together due to a shortened stratigraphic interval. No cores of the stratigraphic interval between these limestones are available from the western part of the area, but many drillers logs and a few sample study records note variegated clay throughout the entire interval from the Shoal Creek Limestone down through and even below the West Franklin, suggesting that variegated beds are present not only in association with but also within the strata between these key members. It seems more likely, however, that multicolored clay and shale may have caved from higher in the hole or have been picked up in returning drilling fluid and mistakenly identified with specific depths where they actually are not present.

MC LEANSBORO GROUP

Bond Formation

Livingston Limestone Member

The Livingston Limestone Member, the uppermost member of the Bond Formation, is correlative with the Millersville Limestone Member of south-central Illinois. The type area is in the SE$\frac{1}{4}$ NW$\frac{1}{4}$ sec. 6, T. 11 N., R. 11 W., Clark County (Kosanke et al., 1960).

In Clark and Edgar Counties the limestone is restricted in distribution to a strip about 10 to 12 miles wide that extends through the central part of Clark County and northward about halfway through Edgar County. It extends south of the report area into Crawford County, almost to the north line of Lawrence County. This area of occurrence is within the lowest part of the Marshall Syncline.

Subsurface and outcrop data show that at its periphery where it comes to the bedrock surface, the limestone is beveled and only the lower part remains directly beneath a cover of glacial drift. The presence of numerous small outliers at the perimeter of its main area of occurrence indicates that it originally must have extended beyond its current limit in Clark, Edgar, and Crawford Counties. When considered in its entirety, there is little doubt that the Livingston Limestone of the Clark and Edgar area is an outlier of limestone that originally was continuous with its correlatives in the deeper basin area of Illinois.

Its present limited occurrence in and immediately south of the report area is a result of its structurally low position in the Marshall Syncline where it was under a sufficiently thick cover of younger Pennsylvanian strata to escape post-Pennsylvanian erosion and removal.

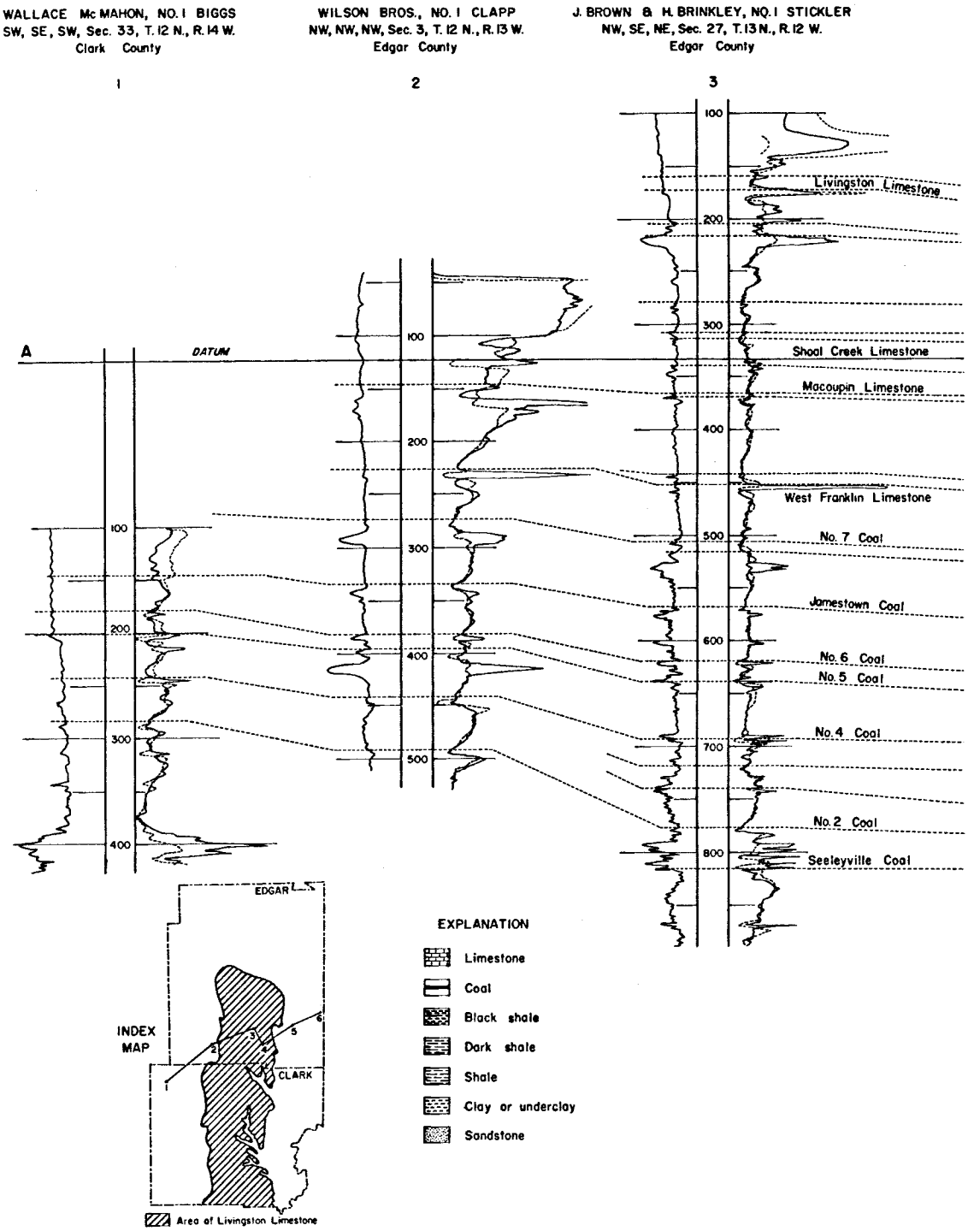
Where it is best developed in Clark and Edgar Counties, the Livingston Limestone has a maximum thickness of about 30 feet, but it generally is divided into two or more benches, separated by clay or shale. This benched characteristic of the Livingston Limestone in Clark and Edgar Counties also is found throughout other areas of Illinois and in Indiana. Surface outcrops of the Livingston are found at scattered localities, mostly around its border, where recent stream erosion has reached bedrock.

Lithologically, the Livingston Limestone is light colored, compact, hard, clastic, and very fossiliferous. The thicker beds may be relatively pure, except in zones adjacent to the clay and shale partings. In its purer form, the Livingston Limestone consists essentially of an assemblage of fossils and finely comminuted fossil fragments bound together by hard calcareous cement.

Shoal Creek Limestone Member

The Shoal Creek Limestone Member derives its name from Shoal Creek in Clinton County, Illinois, along which it can be observed in outcrop at numerous localities. In the Clark and Edgar area the Shoal Creek lies from 150 to 175 feet below the Livingston Limestone along the axis of the Marshall Syncline.

Like the Livingston, the Shoal Creek Limestone underlies a large area within the Marshall Syncline and is present in this area because it was deep enough to escape post-Pennsylvanian erosion. Its subcrop (below the Pleistocene drift) roughly parallels that of the Livingston on the north and east sides of this central area of occurrence in a line ranging from 3 to 5 miles beyond that of the


WALLACE Mc MAHON, NO. 1 BIGGS
SW, SE, SW, Sec. 33, T. 12 N., R. 14 W.
Clark County
1
WILSON BROS., NO. 1 CLAPP
NW, NW, NW, Sec. 3, T. 12 N., R. 13 W.
Edgar County
2
J. BROWN & H. BRINKLEY, NO. 1 STICKLER
NW, SE, NE, Sec. 27, T. 13 N., R. 12 W.
Edgar County
3
A
DATUM
100
200
300
400
500
600
700
800
Livingston Limestone
Shoal Creek Limestone
Macoupin Limestone
West Franklin Limestone
No. 7 Coal
Jamestown Coal
No. 6 Coal
No. 5 Coal
No. 4 Coal
No. 2 Coal
Seelyville Coal
INDEX MAP
EDGAR
CLARK
Area of Livingston Limestone
EXPLANATION
Limestone
Coal
Black shale
Dark shale
Shale
Clay or underclay
Sandstone

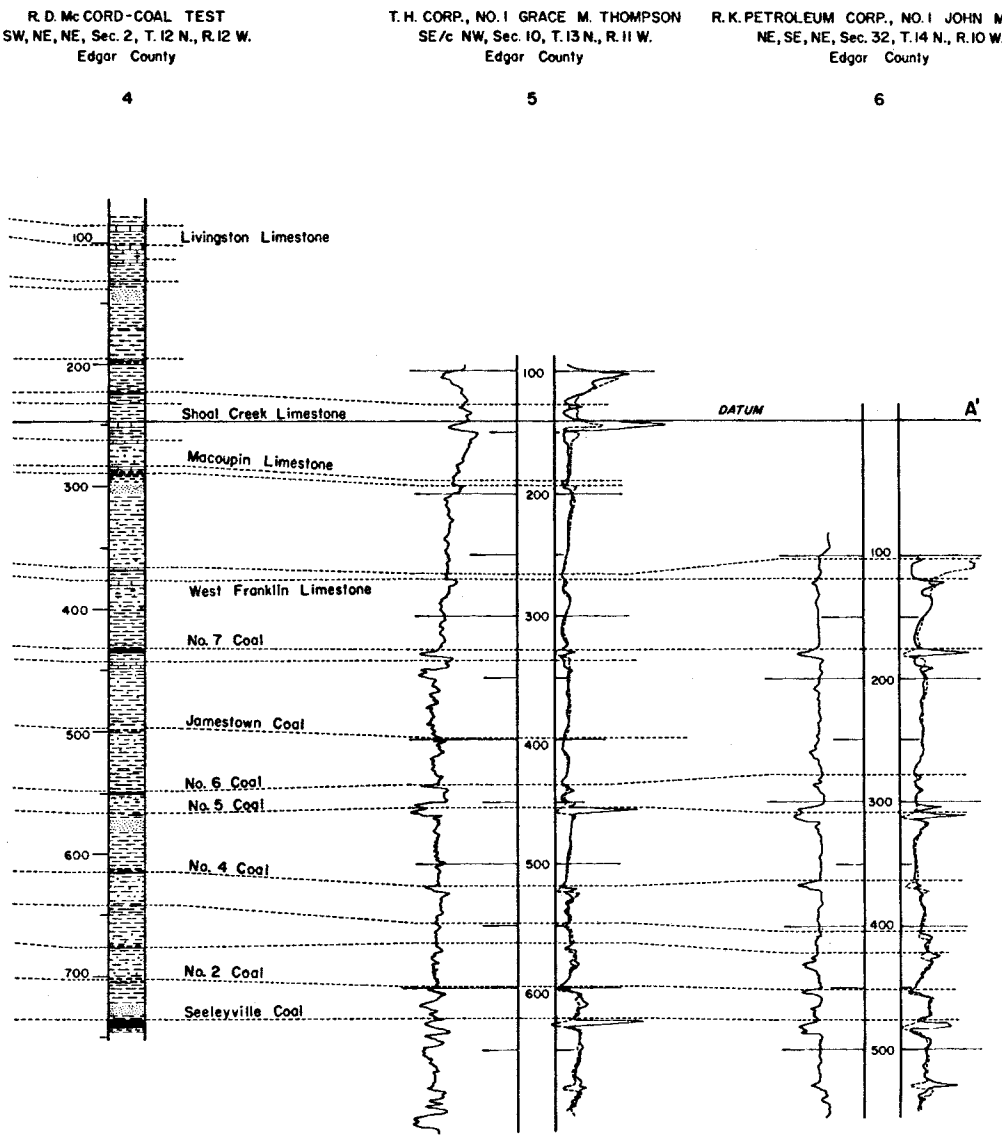


Figure 6 - Stratigraphic cross section from northwestern Clark County to eastern Edgar County. Single ozalid copies of the cross section on a scale of 1 inch = 50 feet are available upon request from the Illinois State Geological Survey, Urbana.

Livingston subcrop, the variation in distance between the two being largely a function of bedrock surface topography.

The Shoal Creek Limestone also underlies considerable areas west and northwest of the Marshall Syncline, but where the vertical interval between key members is shortened and where the members themselves generally are thinner, positive identification of its position in drilling records is frequently difficult. Due to these factors, plus the limited quantity and poor quality of data in much of this area, its subcrop boundary cannot be defined accurately.

Except in western Clark and Edgar Counties, the Shoal Creek Limestone is generally well developed and readily recognizable on electric logs, and usually is noted in drill records. It sometimes grades laterally into a sandy and silty phase, but even under this condition its position on electric logs can be easily recognized.

Where it can be observed in outcrop in the Clark and Edgar area, the Shoal Creek Limestone is gray, hard, and compact. It usually contains an abundance of small, black, and rounded phosphatic pebbles or nodules scattered throughout. It also is associated with a variegated clay or shale that helps to identify it. However, in drill records from the western part of the area where the stratigraphic interval is thin, the variegated shale often adds to confusion in proper correlation because similar colored clays and shales also are associated with the West Franklin Limestone, which occurs a short distance below the Shoal Creek.

The Shoal Creek Limestone is an excellent marker stratum within the Marshall Syncline, but its over-all usefulness is limited by its restricted area of occurrence and by the aforementioned difficulties of identification in the western parts of the two counties. It is the basal member of the Bond Formation.

Modesto Formation

Macoupin Limestone Member

The Macoupin Limestone Member of the Modesto Formation underlies most of the Clark and Edgar area. Its stratigraphic position is about 30 feet below the Shoal Creek Limestone throughout the central and eastern parts of the two counties. In the structurally higher western part, however, where rock strata are thin and vertical intervals between key members is shortened, the interval between these two limestones may be no more than 10 to 15 feet. Like the Shoal Creek Limestone, the Macoupin cannot always be identified in this part of the area, and accurate limits of its areal extent cannot be determined. It probably is absent in much of the same part of this area as the Shoal Creek.

In general, the Macoupin Limestone is not as well developed as the Shoal Creek, and it frequently is overlooked in drilling records. On electric logs of drilling in the eastern two-thirds of Clark and Edgar Counties, however, its position is readily recognizable. It can almost always be identified in diamond drill cores. Like the Shoal Creek Limestone, the Macoupin may also contain small black nodules or pebbles that can lead to confusion in differentiating between the two limestones in isolated outcrops. Usually, however, the Macoupin is not as well developed as the Shoal Creek, nor are the black pebbles as prominent or as abundant.

In an outcrop along Coal Creek near the west side of sec. 9, T. 14 N., R. 10 W., Edgar County, the Macoupin Limestone is about 18 inches thick, abundantly fossiliferous, notably clastic, and distinctly cross-bedded.

Because the Macoupin Limestone generally is poorly developed and may be overlooked in some well records, its usefulness as a stratigraphic marker is somewhat limited. Nevertheless, an awareness of its presence may help in avoiding errors of correlation simply by leading to more careful examination of cores and drilling samples.

West Franklin Limestone Member

The West Franklin Limestone lies about 60 to 70 feet below the Macoupin Limestone throughout the eastern two-thirds of Clark and Edgar Counties, but this interval may be only 15 to 20 feet in the western part of the area.

Throughout most of its area of occurrence in Illinois, the West Franklin consists of benches of limestone separated by zones of clay. There are at least three beds of limestone separated by soft clay or clayey shale in the West Franklin, but they are seldom all present at one locality, making it difficult to identify which beds are present. In the Clark and Edgar area, the West Franklin Limestone generally is present as one or two poorly developed, nodular, and argillaceous limestone beds associated with variegated clay or clayey shale.

KEWANEE GROUP

Carbondale Formation

Danville (No. 7) Coal Member

The Danville (No. 7) Coal, Coal VII of Indiana, is the topmost member of the Carbondale Formation. It is widely distributed throughout Illinois and southwestern Indiana and is an important commercial coal in both states.

Structure and areal extent of No. 7 Coal within Clark and Edgar Counties are shown on plate 1. The coal originally must have been present over the entire area, subsequently being removed from isolated localities of northwestern Clark County and northeastern and western Edgar County by post-Pennsylvanian erosion. Maximum depth to No. 7 Coal is almost 600 feet in south-central Clark County where it is less than 25 feet above mean sea level in the lowest part of the Marshall Syncline. It is structurally higher, and generally shallower, on the flanks, and more northerly part of the syncline.

No. 7 Coal has been mined at several scattered localities in eastern and northeastern Edgar County, but the limited thickness data available indicate that it probably is of less than minable thickness where it lies at relatively shallow depths along the western margins of both Clark and Edgar Counties. Reliable thickness data for No. 7 Coal in the two counties are sparse, but the information that is available shows the coal to be generally too thin for mining in all but the northeastern part of the area where thicknesses of about 4 to 5 feet are recorded in a few drill records. Although electric logs are not reliable indicators of coal thickness, they do in this instance suggest that No. 7 Coal may be from 3 to 5 feet thick, with an average of about 4 feet, throughout a considerable portion of the eastern third of the report area.

The coal being mined at Murdock, west of Edgar County, has in the past been considered to be the No. 7 Coal (Cady and others, 1952; Clegg, 1959). However, for this report, considerably more subsurface data were evaluated and

it is evident that No. 7 Coal lies from 90 to 120 feet above the coal being mined at Murdock. That coal is now considered to be the Herrin (No. 6) Coal.

Cady and others (1952) estimated that there was a total of 316,655,000 tons of minable No. 7 Coal in Clark County and 1,423,169,000 tons in Edgar County. However, some of the coal in northwestern Edgar County that was known to be correlatable with the coal being mined at Murdock was classified as No. 7 Coal in Cady's report. On the basis of present information, 472,605,000 tons of the coal classified as No. 7 Coal by Cady has been reclassified as No. 6 Coal in this report.

Jamestown Coal Member

Throughout much of Illinois the Jamestown Coal Member of the Carbondale Formation is either absent or so poorly developed that it escapes detection in drill hole studies. It is thick enough for profitable mining in some areas of Indiana, however, and well enough developed in adjacent parts of eastern Illinois to be rather easily identified in drilling records.

It is present in and adjacent to southwestern Clark County as a thin coal lying as close as 10 feet above Herrin (No. 6) Coal. The interval separating the two coals widens toward the east until, near the Illinois-Indiana boundary in southeastern Clark County, they are as much as 40 to 50 feet apart. The Jamestown Coal is unusually well developed in that area and is more prominently recorded on electric logs than the underlying No. 6 Coal. The electric log recording of No. 6 Coal in this vicinity is unusually small, suggesting that the coal itself is very thin. The comparatively prominent recording of the Jamestown Coal can easily lead to its being mistakenly identified as No. 6 Coal on electric logs, thus creating confusion in correlation in and adjacent to southeastern Clark County.

As a result of this investigation, the proper stratigraphic position of the Jamestown Coal has been shown to be the same as a coal designated Coal VI (Wier, 1953) in a report of coals in Sullivan County, Indiana.

The Jamestown Coal is poorly developed and of limited distribution in much of Illinois and is usually a dependable marker stratum only in those areas of the state where it is well developed.

The Jamestown Coal generally is not considered minable in Illinois and no estimate of its reserves was made by Cady and others (1952) in a report of minable coals of Illinois. Test drilling in southeastern Clark County and adjacent parts of northeastern Crawford County might, however, show some minable reserves in that locality.

Herrin (No. 6) Coal Member

The Herrin (No. 6) Coal of the Carbondale Formation is one of the major coals of economic importance in Illinois. Like No. 7 Coal, it is widely distributed in the state and, because it is well developed and readily identifiable in drill records from large areas, is a dependable key member for structural and stratigraphic studies. In Clark and Edgar Counties, No. 6 Coal lies from about 40 feet to as much as 125 feet below No. 7, the thicker interval between the two being in the northeastern part of the area and the thinner interval in the southwestern part. Along the west side of the area there is a south-to-north increase in this interval from about 40 feet to at least 110 feet. Thus, while in southern Clark County the interval between No. 6 and No. 7 Coals increases toward the east, in northern Clark and central Edgar Counties it remains rather constant from west to east.

No. 6 Coal lies as close as 15 feet below No. 7 Coal in some areas of Vermilion County and has been called Grape Creek Coal from outcrops along Grape Creek in that county. Some doubt has at times existed as to whether the Grape Creek Coal of Vermilion County is the equivalent of No. 6, but careful correlation in conjunction with this study has demonstrated that they are in fact the same. The name Herrin (No. 6) Coal has already been extended to eastern Illinois to replace the name Grape Creek Coal, (Kosanke et al., 1960). The coal designated Coal V-b in Indiana by the Indiana Geological Survey (Wier, 1953) is now considered to be the equivalent of No. 6 Coal of Illinois, and the coal in Indiana called Coal VI in the same report is considered to be the same as the Jamestown Coal of Illinois.

As mentioned in the discussion of No. 7 Coal, the current investigation has shown the coal being mined at Murdock in Douglas County to be No. 6 Coal instead of No. 7.

The structure of No. 6 Coal (pl. 2) in the report area is very similar to that of No. 7. It has a slightly greater over-all distribution than No. 7 Coal, being absent only over the Brocton Dome in Edgar County and over part of the Westfield Dome in northwestern Clark County, where, like No. 7, it probably once was present but subsequently was removed by post-Pennsylvanian erosion.

Data on the thickness of No. 6 Coal in the area is sparse. An old diamond drill record from sec. 6, T. 15 N., R. 13 W., Edgar County, records a thickness of 5 feet 11 inches near the coal's subcrop along the flank of the Brocton Dome. Diamond drill cores from holes in secs. 1 and 13, T. 16 N., R. 13 W., Edgar County, record thicknesses of 5 feet 6 inches and 4 feet 11 inches, respectively. A similar record of a drill hole in sec. 5, T. 16 N., R. 12 W., shows a thickness of only 3 feet 2 inches. Although these records indicate that No. 6 Coal is well developed in north-central and northwestern Edgar County, it appears doubtful that thickness of this magnitude is generally prevalent throughout the report area. A few diamond drill holes in T. 14 N., R. 10 W., Edgar County, show thicknesses of only 1 or 2 feet. Similar measurements are recorded in the logs of diamond drill holes between Paris and Elbridge in southeastern Edgar County.

There are no reliable thickness data of No. 6 Coal for Clark County. Such evidence as is available, however, indicates that the coal probably is too thin for mining in most of the county. Electric logs from most of the eastern part of Clark County indicate a poorly developed coal in that part of the area. While it is possible for a well developed coal to be recorded by a poorly developed electric log pattern, the persistence of unusually small recordings on so many logs from this part of the area suggests strongly that the coal is in fact poorly developed.

A total of 11,848,000 tons of minable No. 6 Coal in Clark County, and of 248,758,000 tons in Edgar County was estimated by Cady and others (1952). The total tonnage of Edgar County, however, has now been increased by 472,605,000 tons as a result of reclassifying a portion of the No. 6 Coal in northwestern Edgar County that formerly was considered to be No. 7 Coal.

Other than the changes made as a result of reclassifying the coal from northwestern Edgar County, the current investigation provided no basis for altering the estimates made by Cady because no significant amount of reliable data on thickness has become available since the earlier study. It does appear likely, however, that test drilling would show that a considerable portion of northwestern Edgar County is underlain by sizable reserves of No. 6 Coal that were not included in the Cady report.

Harrisburg (No. 5) Coal Member

The Harrisburg (No. 5) Coal Member of the Carbondale Formation is known as Springfield (No. 5) Coal in central and western Illinois and as Coal V in Indiana. It is of considerable economic importance to both states.

A reliable marker member for stratigraphic correlation, No. 5 Coal is present in practically all of Clark and Edgar Counties, being locally absent over the Brocton Dome of western Edgar County and over part of the Westfield Dome in northwestern Clark County. It was removed from these two localities by post-Pennsylvanian erosion. Its recording on electric logs is prominent and distinctive. The coal is sufficiently thick in the central and eastern parts of both counties to be noted on a great many drilling records.

A rather consistent vertical interval, ranging from about 20 to 30 feet, separates No. 5 Coal from the Herrin (No. 6) Coal throughout all but the western part of the two counties, where the interval may be no more than 10 feet.

Mining of No. 5 Coal has been limited to the east side of Ts. 14 and 15 N. R. 10 W., Edgar County. It was reported at a depth of 277 feet, with an average thickness of $5\frac{1}{2}$ feet, in the Edgar County Coal Company Mine located in $NW\frac{1}{4}$ $NE\frac{1}{4}$ $SE\frac{1}{4}$ of sec. 20, T. 14 N., R. 10 W., and in the Illiana Coal Company's shaft located in the $SW\frac{1}{4}$ $SW\frac{1}{4}$ $NE\frac{1}{4}$ of sec. 29, T. 16 N., R 10 W., it was reported as being 4 feet thick and 160 feet deep. No. 5 Coal has been mined extensively by both stripping and underground methods in Sullivan and Vigo Counties, Indiana. Some of these mines have been extended eastward across the state line a short distance into Edgar County.

In Cady's report (1952) total reserves of 511,149,000 tons of minable No. 5 Coal were estimated for Clark County and 441,330,000 tons for Edgar County. Most of these estimates consisted of coal in reserve categories based upon data less reliable than diamond drill holes and mine records. The estimates do not appear to be excessive, however, and it seems likely that diamond drill testing would verify most of them. If any reliance is to be placed upon electric logs, the implication is that Cady's mapped classification boundaries could be extended somewhat. However, considering the known unreliability of electric log data for coal thickness determinations, the risk of using them for this purpose cannot be overemphasized.

In summary, Harrisburg (No. 5) Coal appears to be of minable thickness throughout a considerable portion of Clark and Edgar Counties, and it seems to merit further exploration for more accurate evaluation of its potential reserves.

Summum (No. 4) Coal Member

Summum (No. 4) Coal, Coal IV-a of Indiana, is present in all of Clark and Edgar Counties except a small area over the Brocton Dome where, like the overlying strata, it has been removed by post-Pennsylvanian erosion.

No. 4 Coal may be as little as 15 feet to as much as 85 or 90 feet below No. 5 Coal, the thinner interval prevailing in the western part of the report area. Its usefulness as a stratigraphic marker is somewhat limited because its position on electric logs frequently is not as prominently indicated as that of other key strata and because it generally is thin throughout the report area and hence may not be noted in drilling records. It did prove valuable in a number of instances, however, in locating the position of No. 5 Coal where the No. 4 was known to be close beneath No. 5 and where No. 5 Coal was not prominently recorded in drilling records.

Information about the thickness of No. 4 Coal in the Clark and Edgar County area is extremely scant. Available records indicate that, in general, the coal is of less than minable thickness in the two counties. No reserve estimates of No. 4 Coal for either county were given in the Cady report (1952).

Colchester (No. 2) Coal Member

The Colchester (No. 2) Coal Member is the lowest member of the Carbondale Formation. In Indiana it is known as Coal III-a. Because it is probably the most continuously widespread coal of Illinois, it is especially valuable as a marker for stratigraphic studies involving large areas.

Its position usually is distinctly recorded on electric logs of Clark and Edgar County drilling, even though the coal itself may be very thin. Only at the top of the Brocton Dome and in adjacent areas to the north in Edgar County, where drilling information is scant and where higher coals are missing as a result of post-Pennsylvanian erosion, is it difficult to identify No. 2 Coal with certainty. Its wide distribution and distinctive electric log recording make it probably the most useful Pennsylvanian marker unit for the Clark and Edgar area.

Within the report area, No. 2 Coal lies at depths varying from about 150 feet on the Brocton Dome, where it is near the top of bedrock, to more than 800 feet in the lowest part of the Marshall Syncline in south-central Clark County. Elevations in these areas range from slightly more than 525 feet above mean sea level on the Brocton Dome to more than 225 feet below mean sea level in south-central Clark County.

The vertical distance between No. 2 and No. 4 Coals is somewhat irregular in the Clark and Edgar area. In general, there is a tendency in this area for the stratigraphic interval between any two given strata to increase eastward from the structurally high western border of the area. However, the interval separating No. 2 and No. 4 Coals is greater in southwestern and western Clark County than in southeastern Clark County, being about 100 feet in the west and southwest and as little as 55 to 60 feet in the southeast. In Edgar County the interval does increase toward the east but not as much as do the intervals separating other key members (fig. 6). The variation in Edgar County ranges from about 60 feet in the west to about 90 feet in the east. Intervals of less than 60 feet occur on top of some of the local structures of western Clark and Edgar Counties, however.

The structure of No. 2 Coal (pl. 3) is essentially the same as that of No. 6 and of No. 7 Coals, but bedding dips are somewhat more pronounced because No. 2 Coal was subjected to some structural movement prior to deposition of the higher coals. Local dips in bedding due to draping over the pre-Pennsylvanian structures also are slightly more accentuated in the No. 2 Coal structure than that of No. 6 and of No. 7 Coals, because differential compaction of the greater thickness of rock separating the higher coals from the original pre-Pennsylvanian structures tends to have a leveling effect on the higher strata. Structure is delineated in greater detail, of course, in those areas where drilling information is more plentiful.

No. 2 Coal probably is not of minable thickness anywhere in Clark and Edgar Counties. No minable reserves for the area were reported by Cady and others (1952).

Spoon Formation

Seeleyville Coal Member

The Seeleyville Coal Member, known as Coal III in Indiana, has been named from the village of Seeleyville in Vigo County, Indiana (Kosanke et al., 1960). Its stratigraphic position is in the upper part of the Spoon Formation, Kewanee Group, and it is the only member below the Carbondale Formation to be discussed in this report. It is encountered about 20 to 30 feet below Colchester (No. 2) Coal in eastern Edgar County, the interval between the two coals consisting of shale, siltstone, and sandstone.

The Seeleyville Coal can be traced in subsurface throughout large areas of eastern Clark and Edgar Counties, being readily identifiable on most electric logs and frequently noted in other types of drilling records. Difficulty is encountered, however, in tracing it through the central and western parts of the two counties. Coals lying a short distance below No. 2 Coal are indicated in drilling records from the entire area of both counties, but it was not possible to identify those in the western half of the area or to correlate them with the Seeleyville. Coals are present below No. 2 Coal throughout much of Illinois, and those noted in western and central Clark and Edgar Counties may be correlative with them. There is some evidence that the Seeleyville thins and ultimately pinches out a few miles west of the Indiana-Illinois boundary. Because of its apparently limited areal extent in Illinois, the Seeleyville Coal is not a good stratigraphic marker.

Snow Hill Coal Company mined the Seeleyville Coal in their Green Valley Mine at West Terre Haute, Indiana, where average thicknesses of about 7 feet were encountered. This mine was extended westward for a short distance into eastern Edgar County, Illinois, before being abandoned in 1963. Electric log data, although by no means a reliable criterion of coal thickness, do indicate that the coal is sufficiently thick to have commercial value in this general area of Edgar County. Three diamond drill core records from secs. 26 and 27, T. 13 N., R. 11 W., about 3 miles northeast of Elbridge, show a thickness of about 6 feet in that vicinity. Figure 7 shows the areas of Clark and Edgar Counties that, according to Cady and others (1952), are underlain by minable reserves of Seeleyville Coal. The Class I reserves are those based upon information obtained from diamond drill cores and mine records. Class II estimates were based upon other types of data, generally less reliable than those used for Class I.

A rather persistently occurring sandstone, the Coxville of Indiana, develops a channel phase that cuts down to, and even into, the coal in some localities of Indiana, including the vicinity of West Terre Haute (Friedman, 1960). These channels were encountered in the Green Valley Mine where they created localized water and related mine roof problems. Several electric logs show sandstone immediately above the Seeleyville Coal near Elbridge in Edgar County, suggesting the possibility of cutouts in some localities in that part of the county.

A total of 1,219,538,000 tons of minable Seeleyville Coal in Clark County and of 2,992,160,000 tons in Edgar County has been estimated (Cady and others, 1952; table 1). On the basis of the information used, and abiding by the classification restrictions adhered to in arriving at these estimates, it is not practical to alter Cady's tonnage estimates. There does seem to be enough evidence, however, to suggest that test drilling would verify the accuracy of some of the less certain classifications of the earlier survey, and show additional reserves.

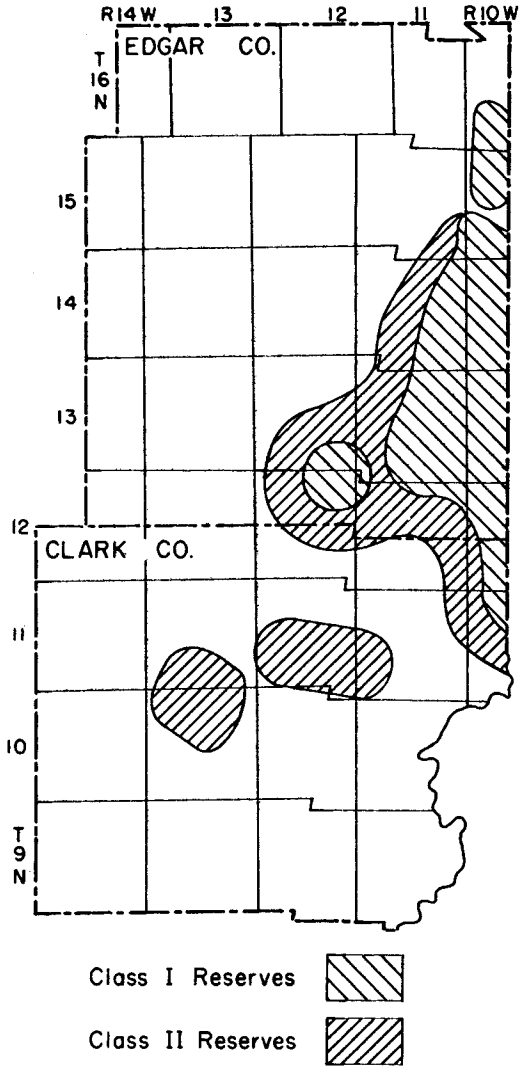


Figure 7 - Area of Clark and Edgar Counties underlain by minable Seeleyville Coal. (Modified from Cady and others, 1952).

Older Strata

As mentioned earlier, the very oldest Pennsylvanian strata are not, and probably never were, present in Clark and Edgar Counties. It is true, however, that strata older than the Seeleyville Coal, i.e. of the Spoon, Abbott, and possibly upper Caseyville Formations, are present, but due to the complete absence of good drill hole control data, individual members have not been recognized and identified. Some of the stratigraphically lower coals are being mined in other parts of Illinois and Indiana, and numerous strata of the older formations are sufficiently well developed to serve as reliable marker members over sizable areas. It is unlikely, however, that any of them, even if they could be positively identified in subsurface, have sufficient areal persistence to be useful for this purpose in Clark and Edgar Counties.

COAL MINING AND PRODUCTION

Coal mining in Clark and Edgar Counties has never attained the major importance that it has enjoyed in many other Illinois counties. Very earliest mining in the area was restricted to thin coals that lie near the surface. Worthen (1875) mentions local mining in southwestern Clark County where the coal was removed by land owners and sold locally to blacksmiths and for home heating. The coals are stratigraphically high, generally thin beds, not mentioned in the previous discussion.

The first coal mine in the area to to be listed in the annual report of the Illinois State Department of Mines and Minerals was that of the Illiana Coal Company in sec. 29, T. 16 N., R. 10 W., Edgar County, near the Illinois-Indiana boundary. According to the report, this mine began producing in about 1883 and mined the Harrisburg (No. 5) Coal at a depth of about 160 feet. The average thickness was given as 4 feet.

Since then, several relatively small mines have operated from time to time in eastern Edgar County. Three coals, Danville (No. 7), Harrisburg (No. 5), and Seeleyville have been mined in the area. No. 7 Coal has been mined both by stripping and underground methods, but No. 5 Coal is too deep for strip mining in Edgar County. The No. 2 Mine of Interstate Coal Company, Binkley No. 8 Mine,

and Bickett Coal Company's No. 2 Mine, all of Indiana, have extended workings in No. 5 Coal westward into Illinois in T. 14 N., R. 10 W., Edgar County. More recently the Snow Hill Coal Company's Green Valley Mine, located at West Terre Haute, Indiana, extended its workings in the Seeleyville Coal westward into Illinois before the mine was abandoned in 1963.

Illinois State Department of Mines and Minerals reports have listed only one mine ever operated in Clark County. This was the Rock Hill Mine, a small stripping operation that mined a thin coal lying below the Livingston Limestone near West Union in the southeast corner of the County. The mine operated for only two years, 1954 and 1955, employed from two to four men, and removed a total of 4,480 tons of coal. The coal was sold for local consumption.

Cady and others (1952) completed a survey of minable coal reserves of Illinois. Table 1 shows the tonnage estimates for Clark and Edgar Counties arrived at as a result of this study. Reserves of No. 7 and No. 6 Coals of Edgar County on the table show the shift made in this report of 472,605,000 tons of coal formerly considered to be No. 7 Coal in the northwest part of the county to the reserves of No. 6 Coal. The total tonnage of all minable coals in Edgar County is, of course, not affected by the shift.

Class I information was based upon data obtained from diamond drill cores, outcrops and churn drill coal tests. Class II information was obtained from less reliable sources including churn drill petroleum tests with unusually good records, control rotary drill petroleum tests in which geologists from the Illinois State Geological Survey had collected 5-foot samples and 1-or 2-foot drilling time, and from knowledge of geologic probablility based upon all available information. Obviously, Class I data are the more reliable, but there is strong probability that test drilling would verify Class II reserves in many instances.

Table 2 shows locations and sources of information about coal thickness that are considered to be reasonably accurate, i.e., diamond drill holes and mine-shaft data.

TABLE 1 – MINABLE COAL RESOURCES OF CLARK AND EDGAR COUNTIES*
(in thousands of tons)

CLARK COUNTY	Class I	Class II	Total
No. 7 Coal	65,270	251,385	316,655
No. 6 Coal		11,848	11,848
No. 5 Coal	69,258	441,892	511,150
Seeleyville Coal	33,931	345,954	379,885
County Total	168,459	1,051,979	1,219,538
EDGAR COUNTY			
No. 7 Coal	511,464	439,100	950,564
No. 6 Coal	333,504	387,859	721,363
No. 5 Coal	332,011	109,318	441,329
Seeleyville Coal	572,992	305,911	878,903
County Total	1,749,971	1,242,188	2,992,159
Area Total	1,918,430	2,293,267	4,211,697

*Modified from Cady and others, (1952). 472,605,000 tons in Edgar County, formerly correlated with No. 7 Coal, are now included in reserves total for No. 6 Coal.

TABLE 2 - COAL THICKNESS DATA

DD Diamond Drill Record
SM Strip Mine
UM Underground Mine

D Depth to Top of Coal
E Elevation of Top of Coal
T Thickness of Coal

North T.	West R.	Sec.	Location	Type	No. 7 Coal D	No. 7 Coal E	No. 7 Coal T	No. 6 Coal D	No. 6 Coal E	No. 6 Coal T	No. 5 Coal D	No. 5 Coal E	No. 5 Coal T	Seeleyville Coal D	Seeleyville Coal E	Seeleyville Coal T
							CLARK COUNTY									
11	10	6	NE NE SW	DD	721	+339	3'9"		-			-			-	
							EDGAR COUNTY									
12	12	2	SW NE NE	DD	431	+188	3'0"	548	+ 71	2'0"	566	+533	0'6"	735	-116	5'0"
13	10	20	SE SE	DD	224	+401	4'7"		-			-			-	
13	11	26	NE SW	DD	251	+338	0'6"		-		365	+224	4'2"	552	+ 37	6'2"
13	11	26	SW SW	DD		-		349		2'2"	372		4'3"	554		4'11"
13	11	27	NE SE SE	DD	303	+330	1'7"	402	+230	2'3"	425	+207	0'9"	604	+ 28	6'0"
14	10	4	NW	SM			5'0"		-			-			-	
14	10	5	SE NE	UM	50		5'2"		-			-			-	
14	10	6	NE	UM	150	+453	4'4"		-			-			-	
14	10	9	SW NW	DD	133	+487	2'10"	239	+381	2'0"	263	+361	4'6"		-	
14	10	9	SW SW	DD	155	+465	3'6"	268	+352	1'0"	287	+333	4'11"		-	
14	10	20	NW NE SE	UM		-			-		277	+298	4'6"		-	
14	14	10	SW SW	DD		-		149	+508	4'2"	163	+494	trace		-	
15	10	32	SW NW SW	UM	131	+471	4'6"		-			-			-	
15	10	32	NW SE NW	UM	148	+471	4'2"		-			-			-	
15	10	32	SE SE	DD	36	+494	4'8"	142	+388	1'6"	162	+368	3'6"		-	
15	10	32	SE NW NW	DD	55	+474	7'0"	144	+384	1'0"	164	+364	7'6"		-	
15	13	6	NW SE SE	DD		-		118	+543	5'11"		-			-	
16	10	29	NW NE SE	DD		-		115	+505	1'6"	140	+480	3'6"	328	+292	3'0"
16	10	29	SW NE	DD		-		120	+500	1'2"		-		324	+296	4'0"
16	11	25	NW NW	UM	47	+561	3'6"		-			-			-	
16	11	36	NW NE	UM			3'6"		-			-			-	
16	12	5	SW NW SW	DD	304	+401	2'6"	390	+314	3'2"		-			-	
16	13	1	SE SE NW	DD	348	+371	3'11"	419	+300	5'6"		-			-	
16	13	13	SW NW NW	DD	295	+399	3'8"	365	+329	4'11"		-			-	

A revision of the tonnage estimates arrived at in 1952 could hardly be justified on the basis of the current study because such a re-evaluation would of necessity be based upon essentially the same information used in the original survey. However, numerous drillers records and electric logs, while not being reliable in themselves, do suggest that a judiciously planned and executed drilling program designed to obtain accurate thickness information not only would substantiate the information obtained from many of the less reliable Class II datum points, but also would reveal minable thicknesses of coal in areas where total lack of information now precludes making estimates of any kind. Such a drilling program probably would reveal the presence of many additional acres of minable coal in Clark and Edgar Counties.

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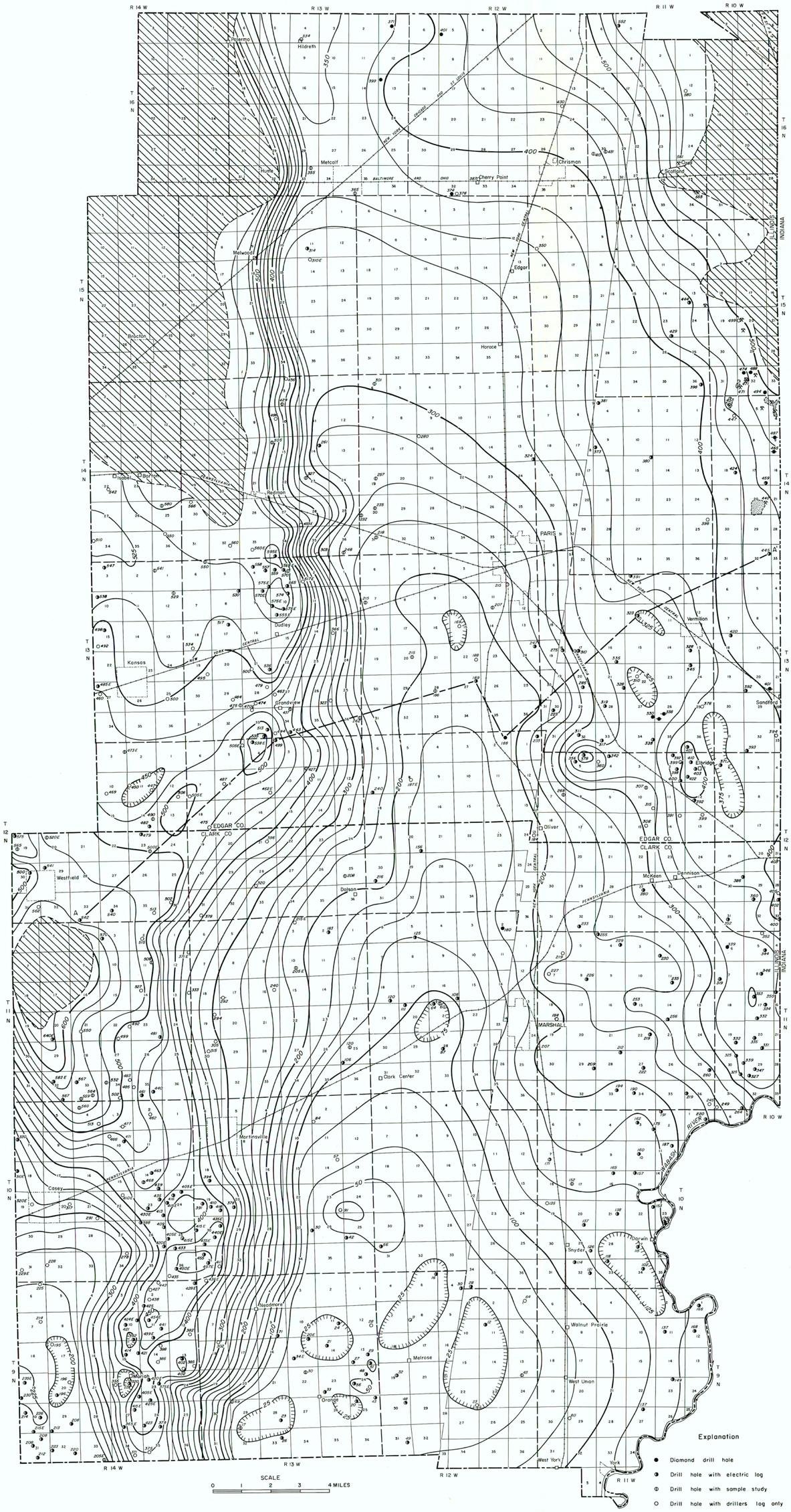


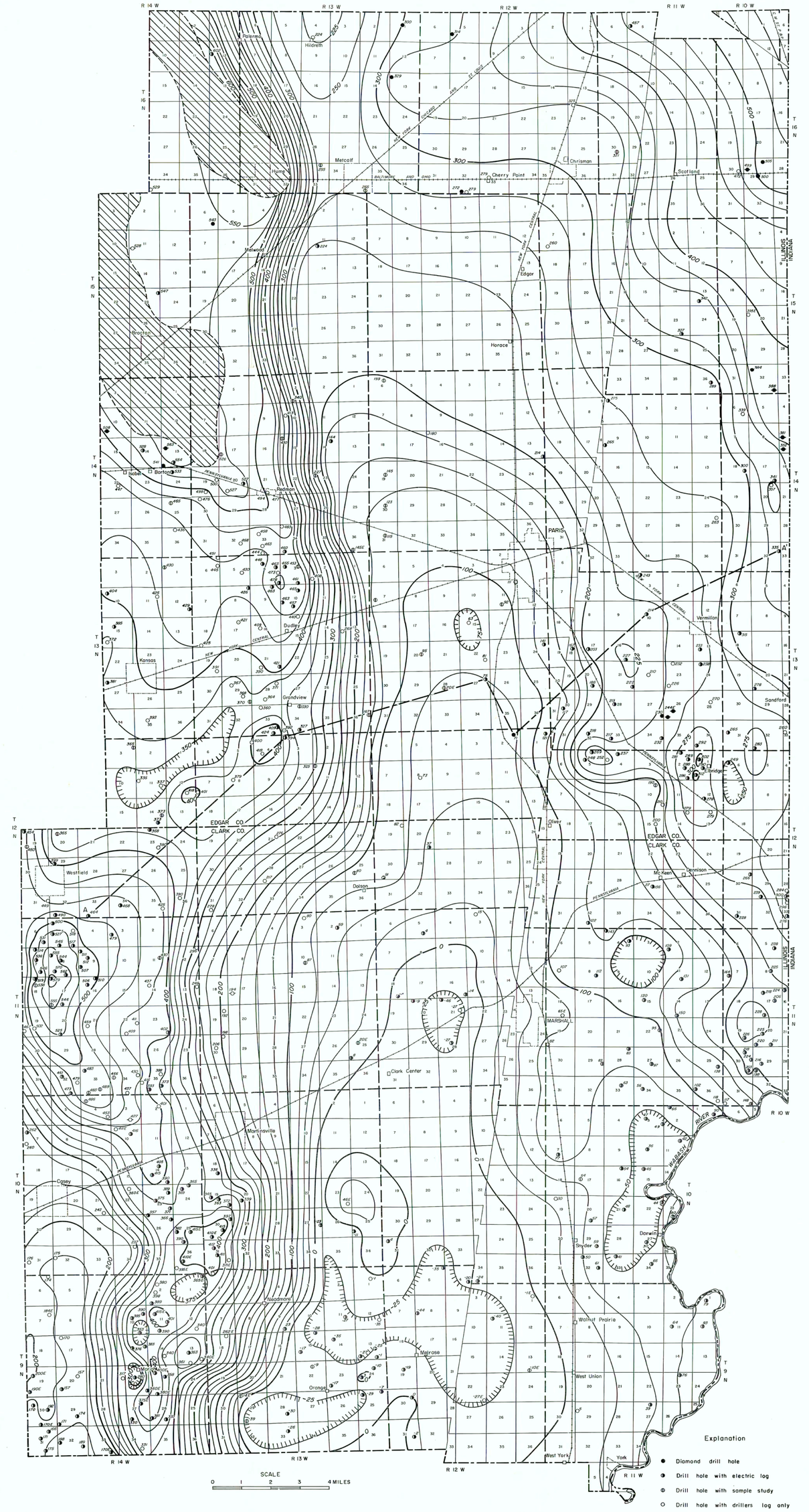
STRUCTURE OF TOP OF DANVILLE (NO. 7) COAL IN CLARK AND EDGAR COUNTIES, ILLINOIS

Kenneth E. Clegg
1964

Explanation

- Diamond drill hole
- Drill hole with electric log
- Drill hole with sample study
- Drill hole with drillers log only
- Drill hole with location approximate
- Contour, interval 25 feet
- Depression contour
- Cross section of figure 6
- No. 7 Coal removed by post-Pennsylvanian erosion
- No. 7 Coal mined out
- Mine

Numbers of datum points indicate elevation of coal relative to mean sea level. "E" indicates elevation computed from known elevation of a higher or lower key member.



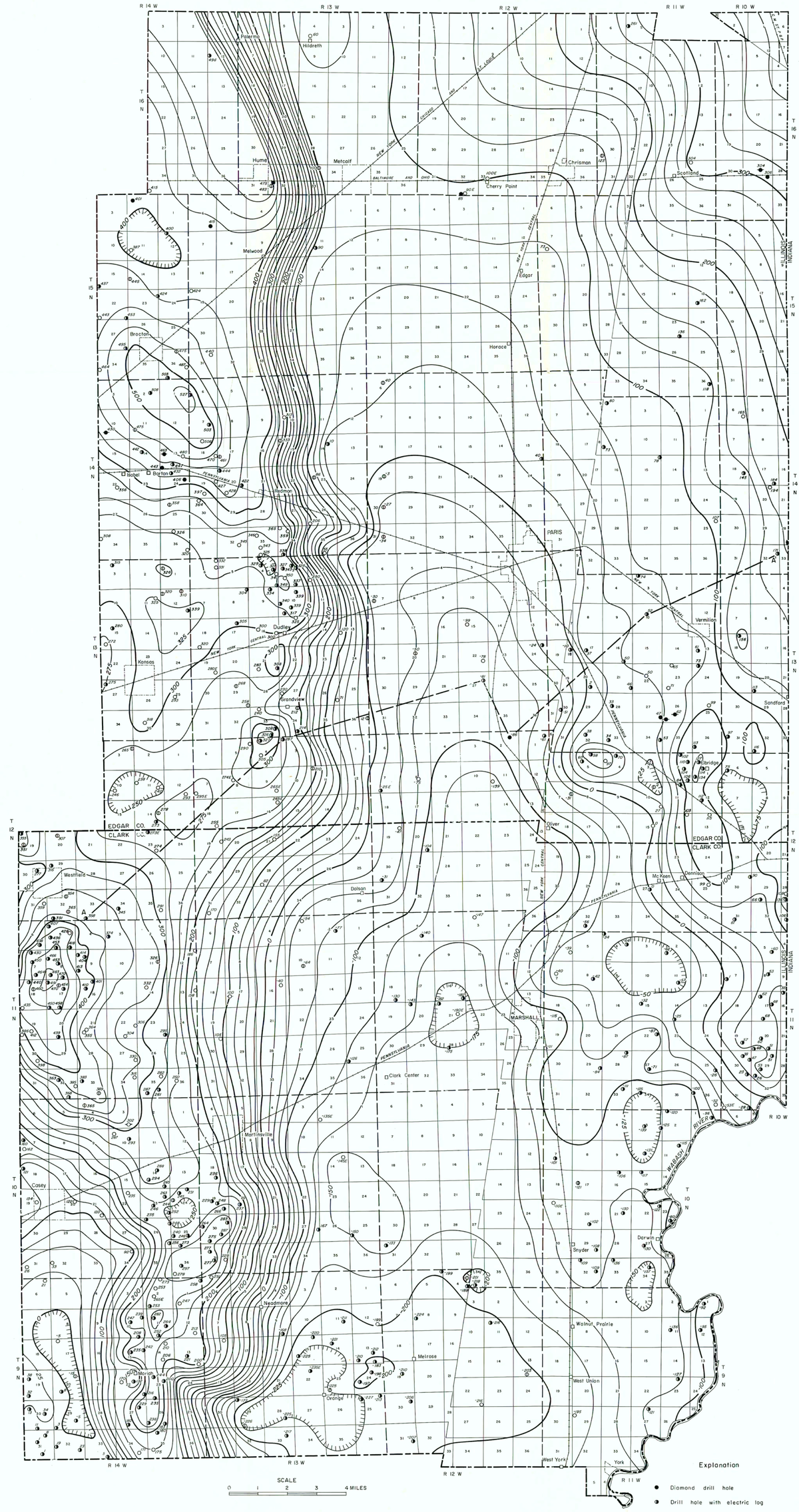
STRUCTURE OF TOP OF HERRIN (NO. 6) COAL IN CLARK AND EDGAR COUNTIES, ILLINOIS

Kenneth E. Clegg
1964

Explanation

- Diamond drill hole
- Drill hole with electric log
- Drill hole with sample study
- Drill hole with drillers log only
- Drill hole with location approximate
- Contour, interval 25 feet
- Depression contour
- Cross section of figure 6
- No. 7 Coal removed by post-Pennsylvanian erosion

Numbers of datum points indicate elevation of coal relative to mean sea level. "E" indicates elevation computed from known elevation of a higher or lower key member.



STRUCTURE OF TOP OF COLCHESTER (NO. 2) COAL IN CLARK AND EDGAR COUNTIES, ILLINOIS

Kenneth E. Clegg
1964

Explanation

- Diamond drill hole
- Drill hole with electric log
- Drill hole with sample study
- Drill hole with drillers log only
- Drill hole with location approximate
- Contour, interval 25 feet
- Depression contour
- Cross section of figure 6

Numbers of datum points indicate elevation of coal relative to mean sea level. "E" indicates elevation computed from known elevation of a higher key member.

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