STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION
DIVISION OF THE
STATE GEOLOGICAL SURVEY
M. M. LEIGHTON, *Chief*

Cooperative Mining Series
BULLETIN 32

COAL STRIPPING POSSIBILITIES IN SALINE AND GALLATIN COUNTIES NEAR EQUALITY

BY
LLOYD G. HENBEST

ILLINOIS MINING INVESTIGATIONS

Prepared under a cooperative agreement between the Illinois State Geological Survey Division, and the Engineering Experiment Station of the University of Illinois

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URBANA, ILLINOIS
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COAL STRIPPING POSSIBILITIES IN SALINE AND GALLATIN COUNTIES NEAR EQUALITY

By Lloyd G. Henbest

INTRODUCTION

In Saline and Gallatin counties within a short distance of the town of Equality are several areas underlain by coal at shallow depths. The various tracts include about 6000 acres and represent a total of more than 40,000,000 tons of coal. Although mining companies have owned the deeper coal for several years, but little interest has been taken in the possibility of recovery of the coals along their outcrops by open-cut mining. Examination shows, however, that conditions for coal recovery are probably as favorable as they are in other regions where strip-mining methods have been successfully employed.

In the area of this report, five tracts which are described separately are recommended for prospecting. Two tracts of No. 6 coal and one of No. 5 lie north of the Cottage Grove fault, and one tract each of Nos. 5 and 6 coal lies to the south of the fault.

ACKNOWLEDGMENTS

This report was prepared under the direction of Dr. Gilbert H. Cady, Senior Geologist, Illinois State Geological Survey, as a part of the Survey's investigations of coal stripping possibilities in the State.[1] Some of the field data were collected by Mr. Louis McCabe.

SOURCES OF INFORMATION

The geologic data which form the basis of this report were obtained from records of coal test borings and water wells and from field observations. The records of coal test borings in the western and northern parts of the area were supplied by the O'Gara Coal Company, Saline County Coal Corporation, and Wasson Coal Company, all of Harrisburg. For information about coal near Equality the writer is indebted to Dr. L. W. Gordon, physician at Equality, who shared the data that

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1 Other reports on coal stripping possibilities in Illinois are:
Culver, H. E., A preliminary report on coal stripping possibilities in Illinois: Illinois State Geol. Survey Mining Investigations Series Bull. 28, 1925.
Cady, Gilbert H., Coal stripping possibilities in southern and southwestern Illinois: Illinois State Geol. Survey Mining Investigations Series Bull. 31, 1927.

he and Mr. Hugh Murray, also of Equality, have been collecting for several years.

The rest of the geologic data were obtained from farm wells, local coal mines, and outcrops of coal beds or of rocks that have a known position relative to the coal beds. There are but few outcrops in the area of this report.

The geologic information is summarized on the map (Plate I) and in the Table of Field Data, pages 18-26.

TOPOGRAPHY[2]

The areas recommended for testing are mostly lowlands bordering Saline River and its tributaries. Those portions of the tracts rising above the lowland are low, rolling hills. In the hills the bedrock is close to the surface, but in most of the lowland tracts the bedrock is deeply buried under alluvium.

The alluvial plains lie at elevations between 340 and 380 feet. The average water level at the junction of North Fork and Saline River is estimated at about 330 feet. The gradient of Saline River is low, causing a slow run-off. Sudden and heavy rains occasionally flood the lowlands to a shallow depth, but only exceptional floods such as that of 1913 would seriously interfere with strip mining in any of the areas recommended for testing. With proper precautions all danger from floods could readily be avoided. Among the lowland areas, those most favorable for open-cut mining are least endangered by possibility of inundation.

GENERAL GEOLOGY

Stratigraphy[3]

The rocks exposed in the vicinity of Equality belong to two quite different groups of rock formations. The lower group is the coal-bearing or Pennsylvanian system and the upper or mantle rock belongs to the Pleistocene (glacial) and Recent systems.

The Pennsylvanian rocks are much the older and are subdivided into the Pottsville, Carbondale, and McLeansboro formations, named

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2 The areas described are included in the south part of Eldorado quadrangle and the north part of Equality quadrangle topographic maps which may be obtained for ten cents each by addressing a request to the Chief, State Geological Survey, Urbana, Illinois, or to the Director, U. S. Geological Survey, Washington, D. C.

3 The Pennsylvanian rocks are described in greater detail in the following reports:

Cady, G. H., Coal resources of District V: Illinois State Geol. Survey Coal Mining Investigations Bull. 19, 1919.

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

in the order of deposition. The Pennsylvanian rocks are mostly shales and sandstones but include beds of limestone, clay, and coal. Numerous coal beds exist throughout the Pennsylvanian strata, but only a few are thick enough to be mined under present economic conditions. In the vicinity of Equality the thickest beds of coal are in the Carbondale formation. The Herrin (No. 6) coal is at the top and the Harrisburg (No. 5) coal is 110 to 120 feet below the top of the formation. The Herrin coal is locally known as "No. 7" and the "Bench Coal".

The mantle rock of the region is alluvium which varies greatly in thickness and composition, depending upon the topographic position of the deposits. In the valleys the alluvium is composed of gravel, sand, clay, and possibly some loess,[4] in various associations. The thickness is greatest in Saline River valley south and southwest of Equality where in places it exceeds 100 feet. The mantle rock in the upland and hilly tracts is mostly loess but consists partly of residual clay, sand, and gravel derived by weathering processes from the Pennsylvanian rocks. The loess has an average thickness of about 10 feet, though in some places it may be as much as 20 feet thick.

Igneous Rocks

Igneous dikes have been encountered in coal mines near Harco, Carrier Mills, Harrisburg, and Eldorado. The only dike known within this area was encountered in Mine No. 6 of the Saline County Coal Corporation at the west side of sec. 35, T. 8 S., R. 7 E. It trends N. 20°± W., and has been traced about three-fourths of a mile in this mine. Apparently the same dike was penetrated in Mine No. 8 of the O'Gara Coal Company in the SW. ¼ sec. 22, T. 8 S., R. 7 E.

The dikes commonly are accompanied by little or no vertical displacement; however, they may be associated with the system of faults that are nearly parallel to them although the dikes and faults are not known to be so associated.

The dike in Mine No. 6 is about 8 feet thick (exclusive of minor extensions) at the base of the coal bed, but widens out to about 20 feet at the top of the coal. The dike probably does not greatly exceed these dimensions at any place. The zone of altered coal is not more than 25 feet wide.

No surface exposures of dikes have been found in Saline and Gallatin counties north of the hills although efforts have been made to discover them above places where they have been encountered in

[4] Loess is a wind-transported, ocher-yellow silt that commonly contains fossil snail shells.

coal mines. The dike rock is thought to be very deeply weathered, an opinion supported by the composition of similar rock exposed in Hardin County.

If dikes exist in the areas recommended for prospecting, they probably are too deeply weathered and too narrow to affect stripping operations seriously.

Structure

The rock layers in most of the area are inclined northward 50 to 100 feet per mile but local variations occur near faults.

An anticlinal structure in the NW. ¼ T. 9 S., R. 7 E., lies between Grayson, Cottage Grove, and Equality and is terminated on the south by the Cottage Grove fault. The anticlinal structure is indicated by the altitude of the coal in several wells and by the dip of the coal in the mine at Grayson. The outline of the anticline is delineated fairly well by the northward swing of the outcrop of No. 6 coal (Pl. I). The steepest dip is toward the north.

The Cottage Grove fault is supposed to be about 12 miles long, extending from near Equality through a mine north of Harrisburg. The maximum displacement is in secs. 14 and 15, T. 9 S., R. 7 E., where No. 6 coal is displaced vertically 185 feet between two points about 2000 feet apart. This displacement causes a repetition of the outcrop of No. 6 coal north and south of the fault.

A fault was encountered near the center of the E. ½ sec. 35, T. 8 S., R. 7 E., when the main east entry was being driven for Mine No. 6 of the Saline County Coal Corporation, but it is not known to extend to the line of outcrop. The downthrow is said to be on the east and the displacement is reported as 12 feet.

AREA 1

No. 6 Coal North of Equality

LOCATION AND TRANSPORTATION FACILITIES

North of Equality and east of the Louisville and Nashville Railroad (Pl. I), in secs. 1 and 2, T. 9 S., R. 7 E., and in secs. 3 to 10, T. 9 S., R. 8 E., is about 2400 acres of No. 6 coal in which the overburden is less than ten times the thickness of the coal. An additional 1000 or more acres of coal has an overburden ten to fourteen times the thickness of the coal.

Two railroads are near the tract recommended for prospecting. The Louisville and Nashville Railroad crosses the west end of the area as mentioned above and the Shawneetown division of the Baltimore and Ohio Railroad which extends from Beardstown to Shawneetown is about two miles from the east end. No place in the tract is more than three miles from a railroad.

THICKNESS AND CHARACTER OF THE COAL

No. 6 coal in this tract is thought to have the common thickness of 4½ feet. This is the thickness reported for two drill holes in sec. 1, T. 9 S., R. 7 E., and for two drill holes in sec. 4, T. 9 S., R. 8 E. One drill hole in the former section is reported to have passed through 4 feet 10 inches of coal. Estimates of the strip-coal resources of this area are based on an assumed thickness of 4½ feet.

In most of the area the coal is probably well preserved from the effects of weathering by a covering of shale which separates the coal from the limestone cap rock and the porous sandstone above. This sandstone, because of its porosity, does not protect the coal from weathering as does the shale, especially where the hard rock cover is only a few feet thick.

A water well, not shown on the map, and a test boring for No. 6 coal in the NW. ¼ sec. 9, T. 9 S., R. 8 E., located about 500 to 600 feet apart in a north-south direction, are both reported to have encountered decayed coal. The belt of weathered coal is thought to be exceptionally wide here because the sandstone extends to or nearly to the top of the coal and cuts out the usual shale cover. At the exposure of No. 6 coal in the bed of North Fork, Saline River, NE. ¼ sec. 9, T. 9 S., R. 8 E., the sandstone lies directly upon the coal. Here, however, the sandstone is thick and the coal appears to be well preserved.

THICKNESS AND CHARACTER OF THE OVERBURDEN

The overburden in the upland and intermediate tracts is mostly loess. The usual thickness of the loess is 10 to 15 feet but it may vary considerably. East of North Fork, Saline River, the loess is widely distributed and probably composes a large part of the alluvium. In the lowlands the upper 10 to 30 feet of the overburden is alluvium.

The lower portion of the overburden is consolidated rock. Sandstone composes about one-third to two-thirds and limestone and shale the rest wherever the cover of solid rock is less than 40 feet thick. The shale is more or less sandy. The limestone varies up to six feet thick, averaging about three feet. The limestone is close above the

coal and is commonly called the cap rock of No. 6 coal. It has been named the Herrin limestone by Cady.[5] The sandstone is massive, cross-bedded and friable and is believed to form fully half of the entire cover in secs. 4 and 9, T. 9 S., R. 8 E.

The great thickness of sandstone above No. 6 coal is the chief impediment to profitable stripping in the area. The hardness of the sandstone varies from place to place because of differences in its composition and also because of variations in weathering and secondary cementation.

ESTIMATE OF RESOURCES

The following table shows the probable acreage and amount of strippable coal in each section. The thickness is assumed to be 4½ feet and the acre-tons 7965.

TABLE 1.—*Resources of coal No. 6 north of Equality*

Location			Cover 0 — to — 8 1 — 1		Cover 8 — to — 10 1 — 1		Cover 10 — to — 14 1 — 1	
Sec.	Twp. S	Range E	Acres	Tonnage[b]	Acres	Tonnage[b]	Acres	Tonnage[b]
3[a]	9	8	60	478,000	100	796,000	95	757,000
4	9	8	120	956,000	103	820.000	400	3,186,000
5	9	8	60	478,000	125	996,000	190	1,513,000
6	9	8	140	1,115,000	85	677,000	160	1,274,000
7	9	8	255	2,031,000	155	1,235,000	..	.....
8	9	8	85	677,000	5	40,000	..	.....
9[a]	9	8	175	1,394,000	13	104,000	..	.....
10	9	8	155	1,235,000	95	757,000	70	558,000
11	9	8	50	398,000	35	279,000	35	279,000
14	9	8	130	1,035,000	..	.....	..	.....
1	9	7	235	1,872,000	120	956,000	85	677,000
2	9	7	45	358,000	35	279,000	..	.....
12	9	7	30	239,000	45	358,000	..	.....
		Total	1540	12,266,000	916	7,297,000	1035	8,244,000

Grand total: 3491 acres; 27,807,000 tons.

a Area very uncertain.
b To the nearest thousand.

5 Cady, Gilbert H., The areal geology of Saline County: Trans. Illinois State Acad. Sci., vol. 19, pp. 250-273, 1926.

AREA 2

No. 6 Coal North of the Cottage Grove Fault

LOCATION AND TRANSPORTATION FACILITIES

North of the Cottage Grove fault and west of the Louisville and Nashville Railroad is a tract of 1400 to 1500 acres where the overburden is less than 50 feet thick. This area is in sections 2, 3, 9, 10, 11, and 14, T. 9 S., R. 7 E., Saline County. The belt of shallow coal is about three miles long and half a mile wide.

The whole tract lies within three miles of the Louisville and Nashville Railroad. The west end of the tract is three and a half miles from the Cleveland, Cincinnati, Chicago, and St. Louis Railroad, Cairo division.

THICKNESS AND CHARACTER OF THE COAL

No. 6 coal is 4 to 5 feet thick in this area, the average is probably 4 feet 8 inches. Coal of this thickness will provide 8000 tons per acre if it is entirely recovered. At the abandoned Davis mine, near the center of the NE. ¼ SW. ¼ SE. ¼ sec. 10, T. 9 S., R. 7 E., two thin clay seams were reported to be present in the coal. Records of drilling in the area do not, however, indicate the presence of important clay seams in the coal. Even the characteristic "blue band" which ordinarily lies about one foot above the bottom of the coal seam is not recorded, although it is probably present.

There appears to be no available information about the chemical character of No. 6 coal in this general region, but it is supposed to be somewhat higher in ash and sulfur than No. 5 coal which is more commonly mined in the Equality-Cottage Grove region.

THICKNESS AND CHARACTER OF THE OVERBURDEN

The character of the overburden varies greatly because the present land surface does not correspond, except in a general way, to the surface of the hard rocks below the alluvium and yellow silt; therefore, in the absence of records from closely spaced test-borings, it is impossible to make accurate estimates of the kind and the amount of overburden. The overburden where less than eight times the thickness of the coal consists on the average of about one-third clay and silt, one-half shale and sandstone, and one-sixth limestone and "slate". On the uplands a considerable part of the limestone cap rock is probably separated into blocks, due to solution by ground-water along joint-cracks.

Such blocks could probably be removed without much blasting. The cap rock is thought to be exposed in a ditch in the SE. ¼ SE. ¼ sec. 2, T. 9 S., R. 7 E. In the Davis mine, mentioned above, the black "slate" or shale roof of the coal bed contains large concretions or "nigger-heads". The weathered limestone and the concretionary shale make a poor roof for shallow subsurface mining. The maximum thickness of the first bed of sandstone above the coal as shown by drill records is 25 feet, and the minimum thickness recorded is less than 15 feet. The sandstone is poorly cemented and not very hard.

Where the overburden of hard rock exceeds 40 feet a second limestone and sandstone occur. The second limestone is probably the Bankston Creek limestone of the Harrisburg region. This limestone is thin but is persistent in certain localities. It may be observed in outcrop along the road near the center W. ½ sec. 9, T. 9 S., R. 7 E., where the base of the overlying sandstone is also exposed. The full thickness of the upper sandstone is possibly as much as 15 feet. It is thought to be lenticular and would probably not be encountered everywhere in the same thickness.

ESTIMATE OF RESOURCES

The area underlain by No. 6 coal, in which the overburden is less than eight times as thick as the coal, is estimated at about 970 acres and the coal resources are about 8,000,000 tons. In addition there are about 500 acres in which the overburden is between eight and ten times the thickness of the coal and in which the coal resources are about 4,000,000 tons.

AREA 3

No. 6 Coal South of the Cottage Grove Fault

Attention has already been directed to the extension of No. 6 coal south of the Cottage Grove fault and west of Equality as shown on Plate I. Most of this coal is known to be concealed beneath a thick cover of alluvium, but small areas were found that have an overburden less than eight times the thickness of the coal.

LOCATION AND TRANSPORTATION FACILITIES

The outcrop of No. 6 coal extends through secs. 14 to 22, T. 9 S., R. 7 E., and sec. 13, T. 9 S., R. 6 E., but neither of the small areas of strippable coal extends into secs. 13 and 14 (Pl. I).

The areas are two to four and a half miles from the Louisville and Nashville Railroad and are four to five miles from the Cleveland, Cincinnati, Chicago and St. Louis Railroad, Cairo division.

THICKNESS AND CHARACTER OF THE COAL

The thickness of the coal ranges from 4 to 5 feet. An exceptional thinness of 29 inches was reported in sec. 18, but it is probable that the average thickness is 4½ feet. The estimates of resources are based upon that thickness.

THICKNESS AND CHARACTER OF THE OVERBURDEN

Where the overburden is less than 50 feet thick about two-fifths of it is composed of yellow silt and alluvium and the rest is hard rock. The hard rock consists of a lenticular, cross-bedded sandstone, 0-25 feet thick, averaging 10 feet; limestone 0-6 feet thick, averaging 3-4 feet; and shale. The sandstone is notably variable in thickness and probably also in hardness. The presence and character of the sandstone can not be predicted except by systematic exploration with a drill. The limestone is absent in some places and may be absent where the sandstone is thickest.

ESTIMATE OF RESOURCES

In secs. 17, 18, 19, and 20, T. 9 S., R. 7 E., it is estimated that there are about 240 acres of No. 6 coal where the cover is less than 35 feet thick. The thickness of No. 6 coal is assumed to be 4½ feet, which makes 7965 acre-tons of coal; therefore the amount for 240 acres is almost 2,000,000 tons. In the same vicinity about 185 acres of coal lie at a depth of 35 to 45 feet. The total resources of this area are almost 1,500,000 tons. The total estimate of all the coal at a depth of less than 45 feet is about 3,400,000 tons.

In secs. 15, 16, 21, and 22, is an area of 100 acres where the cover over No. 6 coal is less than 35 feet thick, and 120 acres where it is between 35 and 45 feet thick. Under the 100-acre area there are about 796,000 tons of coal. Under the 120-acre area there are about 956,000 tons. The total resources of the area recommended for testing then are about 1,750,000 tons. The figures for the acreage are considered to be nearer a maximum than a minimum estimate.

AREA 4

No. 5 Coal South of the Cottage Grove Fault

LOCATION

In secs. 19, 20, 21, and 22, T. 9 S., R. 7 E., No. 5 coal outcrops under the thick alluvium of the Saline River valley. The line of outcrop is shown on Plate I.

THICKNESS AND CHARACTER OF THE COAL

The usual thickness of the coal is from 4 to 5 feet. An exceptional thickness of 8 feet was found in one test hole located in sec. 21, T. 9 S., R. 7 E., but in sec. 19 two tests showed respectively only 12 and 26 inches. These wide differences have been disregarded and the estimates of tonnage given below are based on an assumed average thickness of 4½ feet or 7965 acre-tons.

THICKNESS AND CHARACTER OF THE OVERBURDEN

The overburden is nowhere less than ten times the thickness of the coal and only in a very small area is the ratio less than 12:1. About 450 acres of coal are overlain by an overburden less than twenty times the thickness of the coal.

The cover is composed mainly of alluvium. At the south margin of coal No. 5 the alluvium is 90 to 120 feet thick, and the same thickness probably continues northward except near the low hills that stand as islands of Pennsylvanian rocks in the surrounding alluvium. Wherever the coal remains covered by the original rocks it is probably of good quality, because the roof shales of the coal are almost impervious to water. No very hard rocks exist in the 450-acre tract, if the roof is of the usual kind.

ESTIMATE OF RESOURCES

The coal present beneath the 450-acre tract in the S. ½ secs. 19, 20, and 21 is estimated to be over 3,500,000 tons. Most of the coal is owned by the O'Gara Coal Company.

AREA 5

No. 5 Coal North of the Cottage Grove Fault

LOCATION AND TRANSPORTATION FACILITIES

Due to the anticlinal structure in the NE. ¼ T. 9 S., R. 7 E., described on page 10, No. 5 coal probably rises nearly to the surface in the central portion of secs. 12 to 14, and in sec. 18, T. 9 S., R. 8 E. The area is crossed by the Louisville and Nashville Railroad.

THICKNESS AND CHARACTER OF THE COAL

The thickness and character of the coal can be predicted only on the basis of records of tests and mining operations in adjacent areas.

From this informaton the coal is estimated to be between 4 and 5 feet thick. It is possible that the coal in parts of this area may be much fractured and affected by igneous activity and faults.

THICKNESS AND CHARACTER OF THE OVERBURDEN

The absence of any reliable sources of information within the tract makes it impossible to predict accurately the thickness and character of the overburden. Judging by adjacent areas where the conditions are well known, most of the overburden is thought to be alluvium and the rest shale. There are probably no thick sandstones or limestones where the cover of Pennsylvanian rocks is less than 30 feet thick. The total thickness of the overburden is probably not less than 35 feet at any place.

ESTIMATE OF RESOURCES

It appears possible that there are 300 to 600 acres of coal at a depth of less than 60 feet in this area. If the supposition is correct, the resources of shallow coal are from 2,000,000 to 5,000,000 tons.

Due emphasis should be placed on the fact that in estimating the resources and position of No. 5 coal in this tract no direct or reliable information about the coal was obtainable. The structure and position of No. 5 and No. 6 coals in the adjacent areas are almost the only basis for recommending the testing of this tract.

TABLE 2.—*Field data*

Location Township Sec.	¼	¼	Company and Description	Altitude of surface	Elevation method	Depth to coal No. 6	Depth to coal No. 5	Thickness of coal No. 6	Thickness of coal No. 5	Altitude of coal No. 6	Altitude of coal No. 5
				Feet		*Feet*	*Feet*	*Feet In.*	*Feet In.*	*Feet*	*Feet*
GALLATIN COUNTY Equality T. 9 S., R. 8 E.											
1	NE	NW	Community coal test	350	Est.	140	255	.. ..	.. ..	210	95
2	Near center			385	Est.	99	....	.. ..	.. ..	286	....
3	Center E. side	SE	Farm well, thin coal at 40 feet	410	Est.	150	....	4 6	.. ..	260	....
4	SW	SE	Coal test	370-375	Est.	28	....	4 2	.. ..	342-347	....
4	SW	SW	Farm well	405	Est.	60	....	.. ..	.. ..	345	....
4	SE	NW	Coal test	....	....	60	....	.. ..	.. ..	....	....
5	SW corner		Coal test	358	Est.	....	....	E	.. ..	....	....
5	SE	NE	Farm well	....	....	70	....	4 6	.. ..	....	....
5	NE	NE	Coal test, No. 5a coal at 125 feet	365	Est.	66	187	4 3	?	299	178
6	SE	SE	Coal test	363	Est.	30	....	?	.. ..	333	....
7	NE	SW	Coal test	395	Est.	....	169	.. ..	5 3	....	226
8	Near center										
		NW	Coal test	354	Est.	....	....	E	.. ..	....	....
9	SW	NW	Coal test, hand drill	365?	Est.	No information	....	.. ..	.. ..	....	....
9	NE	NW	Coal test, hand drill	365	Est.	23	....	18	.. ..	342	....
9	NW	NE	Drift mine, local. Coal No. 6 outcrops in river bed	340	Est.	....	....	4 5	.. ..	340	....

9	NW	NE	Strip mine, local. Coal No. 6 near river	345	Est.	....	....	..	..	..	345	....
10	SW	NW	Shaft mine, local, abd., well drilled in shaft	360	Est.	41	161	?		4 2	319	199
10	Center	NW	Slope mine, not completed, abd.	375	....	?	....	?		.. ..	....	....
13	SE	SE	Local mine, coal No. 5a	....	....	....	....	..	..	.. ..	....	....
13	SW	NW	Farm well	410	Est.	....	165	..	..	.. ..	....	245
14	SW	SW	Drift mine, local, abd.	365	Est.	....	....	..	..	?	....	....
14	NE	SW	Air shaft, Hickory Hill Mine, depth not known	420	Est.	....	....	..	..	.. ..	....	....
14	Center	E½	Coal test	380	....	....	116	..	..	?	....	264
14	NW	SE	School District water well	425	Est.	....	65	..	..	4 6	....	360
14	SE	NW	Farm well, coal No. 5a at 78 feet	410	Est.	....	....	..	..	.. ..	....	....
14	SE	NW	Hickory Hill Mine, pump exhaust hole	400	Est.	....	126	..	..	?	....	274
14	NW	SW	Hickory Hill Mine, coal test	375	Est.	....	103	..	..	?	....	372
15	SE	NW	Gallatin Coal and Coke Co., alluvium 67 feet deep	....	....	....	....	E		E	....	....
16	Center	NW	Well for bridge abutment, coal No. 5a	340	Est.	....	....	..	..	.. ..	....	....
16	NW (NW corner)[a]	NW	Drift mine, local, abd., coal No. 6	385	Est.	5-10	....	..	..	.. ..	385±	....
16	NW (SW corner)	NW	Drift mine, local, abd., coal No. 6	375	Est.	5-10	....	..	..	.. ..	370±	....

Abbreviations: Est., estimated; c, confidential; E., eroded; NDE, not deep enough; abd., abandoned.
[a] Shown on Plate I in SW. corner sec. 9.

TABLE 2.—*Field data*—continued

Location Township Sec.	¼	¼	Company and Description	Altitude of surface	Elevation method	Depth to coal		Thickness of coal		Altitude of coal	
						No. 6	No. 5	No. 6	No. 5	No. 6	No. 5
GALLATIN COUNTY Equality T. 9 S., R. 8 E.				*Feet*		*Feet*	*Feet*	*Feet In.*	*Feet In.*	*Feet*	*Feet*
16	NW	NW	Drift mine, local, abd., coal No. 6	385	Est.	10	....	.. ..	.. ..	375±	....
16	SW	NW	Shaft mine, cooperative local	372	Est.	....	130?	.. ..	4 6±	....	....
16	NW	SW	Drift mine, local, abd., coal No. 6	....	....	....	....	.. ..	4 ..	....	....
16	SW	SW	East Side Mine, coal No. 5	362	Level	....	32	.. ..	4 7	....	330
16	SW	SW	Equality Sisk, Mine No. 6, drift	460	Est.	?	....	.. ..	4 ..	....	....
17	NE	NE	Drift mine, local, abd., No. 6	395	Est.	10±	....	?	.. ..	385	....
17	SE	SE	Outcrop, coal No. 5a 32½ inches thick	....	....	....	....	.. ..	.. ..	....	....
18	SE	SE	West Side Mine	377	....	....	94	.. ..	4 8	....	283
20	NW	NW	Shaft mine, abd.	....	....	....	....	.. ..	.. ..	....	....
23	NE	NW	Drift mine; Hickory Hill, dip is about 3°N.	390	Est.	....	....	.. ..	4 4 (Average 56″)	....	382

Eldorado											
T. 8 S., R. 7 E.											
34	NE	NW	O'Gara Coal Co. 5	385	Level	183	303	6 ..	5 ..	202	82
34	SE	NE	Saline County Coal Corp., Mine No. 6 or Grayson Mine	408	Level	....	332	.. ..	.. ..	....	74
35	SW	NE	Saline County Coal Corp., coal test	423.10	Level	....	359	.. ..	.. ..	....	64.10
35	W side		Igneous dike in mine, coal disturbed	....	....	....	....	.. ..	.. ..	....	....
36	SW	SW	Saline County Coal Corp., coal test	380	Level	156	278	c	c	224	102
36	SE	SE	Water well, 36 feet deep, stopped on coal No. 8?	....	....	....	....	.. ..	.. ..	....	....
SALINE COUNTY											
Cottage Grove											
T. 9 S., R. 7 E.											
1	NE	NW	Farm well	....	....	45?	NDE	.. ..	.. ..	....	....
1	SE	NW	Leper mine, local	377	Level	53	NDE	4 2	.. ..	324	....
1	SW	NW	Swinney mine, local	386	Level	43	NDE	4 6	.. ..	343	....
1	SE	NW	Farm well	....	....	32	NDE	4 ..	.. ..	....	....
1	NE	SW	Drill hole	....	....	21	NDE	4 10	.. ..	....	....
1	Center	S½	Farm well	....	....	25½	NDE	4 10	.. ..	....	....
1	Center	S½	Farm well	....	....	20	NDE	1 6	.. ..	....	....
1	SE	SW	Well, 30 feet deep	....	....	....	....	E	.. ..	....	....
2	NW	NW	Drill hole	380	Est.	165±	279±	.. ..	.. ..	215	101
2	SW	NE	Drill hole	....	....	80	....	3 8	.. ..	....	....
2	SE	NE	Well, 30 feet deep	....	....	NDE	NDE	.. ..	.. ..	....	....
2	NW	SE	Local mine, abd.	....	....	?	NDE	?	.. ..	....	....

Abbreviations: Est., estimated; c, confidential; E., eroded; NDE, not deep enough; abd., abandoned.

TABLE 2.—*Field data*—continued

Location Township Sec.	¼	¼	Company and Description	Altitude of surface	Elevation method	Depth to coal		Thickness of coal		Altitude of coal	
						No. 6	No. 5	No. 6	No. 5	No. 6	No. 5
				Feet	*Feet*	*Feet*	*Feet*	*Feet In.*	*Feet In.*	*Feet*	*Feet*
SALINE COUNTY Cottage Grove T. 9 S., R. 7 E.											
2	Center	SW	Cap rock coal No. 6, outcrop	....	....	....	....	.. ..	.. ..	....	....
3	NE	NW	Whoolery 26	370	Level	128	247	c	c	242	123
4	NE	NW	Lancaster C-1	365	Est.	132	251	5 ..	3 9	233	114
4	SW	SE	Whoolery 25	365	Est.	98	215	5 ..	4 6	267	150
5	NW	NE	Lancaster C-2	370	Level	161	283	2 ..	5 ..	209	87
5	NW	SW	Danforth 1	370	Est.	138	266	6 4	4 10	232	104
5	SW	SE	Whoolery 24	370	Est.	101	224	4 6	5 3	269	146
6	SE	NE	Whoolery 23	370	Est.	144	268	4 7	4 10	226	102
7	SE	NW	Whoolery 10	368	Est.	128	251	3 9	4 7	240	117
8	NE	SW	Danforth 25	368	Level	176	NDE	c	.. ..	192	....
9	Center	W½	Outcrop of Bankston Creek limestone	385	Est.	40±	....	.. ..	.. ..	345±	....
9	SW	NE	Farm well, Bankston Creek limestone at 10 feet	400	Est.	50±	....	.. ..	.. ..	350±	....
9	NW	SE	Farm well, Bankston Creek limestone at about 10 feet	430	Est.	50±	....	.. ..	.. ..	380±	....
9	SE	NE	Bridgett 5, coal test	380	Est.	53	c	c	c	327	....
10	NE	NW	Whoolery 28, coal test	377	Est.	75	c	c	c	302	....

10	NE	SW	Saline County Coal Corp. 154, coal test	425	Est.	36	155	4 ..	4 6	389	270
10	SW	SE	Davis Mine, local, abd., No. 6	425	Est.	10?	....	4 8	.. ..	415±	....
11	SW	NW	Bridgett 2, coal test	398	?	33	150	c	c	365	248
11	NE	SW	Bridgett ?, coal test	425	Est.	?	150	.. ..	.. ..	....	275
11	NE	NW	Coal test	378	Est.	?	160	.. ..	.. ..	....	218
11	SW	SW	Outcrop of coal No. 6 at road corner	....	Est.	....	....	.. ..	.. ..	430	....
12	NW	NE	Coal test	395±	Est.	35-40	160	Thin	5 6	355-60	235±
12	NW	NE	Farm well, 15 feet deep, no coal	....	....	....	....	.. ..	.. ..	....	....
12	NE	NE	Farm well, 35 feet deep, no coal	....	....	....	....	.. ..	.. ..	....	....
13	Center	NW	Farm well, 60 feet deep, no coal	....	....	....	....	.. ..	E?	....	....
13	Center	S½	Drift mine, local, coal No. 5, dip is N. 1°-3°	....	Est.	....	Out-crop	.. ..	4 4	....	405
14	NE	SE	Drift mine, local, abd., coal No. 5	....	....	....	....	.. ..	.. ..	....	400±
14	NW	SE	Farm well	430	Est.	....	65	.. ..	6?	....	365
14	NE	NW	Drift mine, local, abd., coal No. 6, outcrop of sandstone	....	....	....	....	.. ..	.. ..	....	425±
15	NE	SE	Bridgett 1, coal test	375	Est.	91	c	c	c	284	....
15	SW	NE	Saline County Coal Corp. 177, coal test	379	?	121	....	4 8	.. ..	258	....
15	SW	SW	Farm well, 28 feet to cap rock	377	Est.	28+	....	.. ..	.. ..	....	....
15	SW	SW	Farm well	380	Est.	25	....	.. ..	.. ..	355	....

Abbreviations: Est., estimated; c, confidential; E., eroded; NDE, not deep enough; abd., abandoned.

TABLE 2.—*Field data*—continued

Location Sec.	Township ¼	¼	Company and Description	Altitude of surface	Elevation method	Depth to coal No. 6	Depth to coal No. 5	Thickness of coal No. 6	Thickness of coal No. 5	Altitude of coal No. 6	Altitude of coal No. 5
				Feet		*Feet*	*Feet*	*Feet In.*	*Feet In.*	*Feet*	*Feet*
SALINE COUNTY											
Cottage Grove											
T. 9 S., R. 7 E.											
16	SE	SE	Bridgett 4, coal test	375	Est.	40	152	c	c	335	223
17	SE	SW	Whoolery 11, coal test	395	Barometer	51	168	c	c	344	227
18	SW	SE	O'Gara 6, coal test	372	Level	69	194	c	c	303	178
18	SE	SE	Farm well	385	Est.	25	....	4 5	.. ..	360	....
19	SW	NE	Farm well	410	Est.	22	....	4 6	.. ..	388	....
19	SW	NE	Farm well, on hill	405	Est.	22	....	4 5	.. ..	383	....
19	NW	SE	O'Gara 19, coal test	376	Level	....	110	.. ..	c	....	266
19	SW	SW	O'Gara 18, may not be No. 5	356	Level	....	103	.. ..	1 ..	....	....
20	SW	NW	Drift mine, local, abd.	400?	Est.	Outcrop	....	.. ..	.. ..	....	....
20	SW	SW	O'Gara 22, coal test	380	....	....	85	.. ..	c	....	295
20	NW	SE	O'Gara 20, coal test	376	....	....	83	.. ..	c	....	293
20	SW	NE	Farm well	....	....	....	NDE	E	.. ..	....	....
20	SW	NE	Farm well, coal reported	....	....	Less than 30	....	4 6 ?	.. ..	....	....
20	NW	NE	Farm well, 23 feet deep, no coal	....	....	....	....	.. ..	.. ..	....	....
21	NW	SW	O'Gara 23, coal test	376	?	....	90	.. ..	c	....	286
21	NE	NW	O'Gara 24, coal test	372	?	....	119	.. ..	c	....	253

21	SE	NE	Coal test	370	Est.	....	86	..	..	..	..	284
22	NE	NE	Farm well, weathered coal surface	410	Est.	No. 6? out-crop	....	..	..	..	..	410	....
22	SW	NE	Cottage Oil Company, oil test	370-380	Est.	....	110	..	..	..	..	....	....
22	NW	SE	Drift mine, local, coal No. 6	....	....	Out-crop	....	..	..	..	..	....	....
22	SE	SE	Drift mine, local, coal No. 5a	....	....	....	....	..	..	..	..	....	....
23	NW	NW	School District, water well, 40-50 feet deep, no coal	....	....	....	....	..	..	..	..	....	....
23	SW	SE	Drift mine, local	....	....	Out-crop	....	..	..	..	..	....	....
23	SW	SE	Drift mine, local	....	....	Out-crop	....	..	..	..	..	....	....
24	NE	NE	Drift mine, local	....	....	Out-crop	....	..	..	..	..	....	....
27	NW	NW	O'Gara, 4 feet coal No. 5 (?) at 116 feet	....	....	....	....	..	..	..	..	....	....
27	NW	NW	O'Gara, 3 inches coal at 112 feet	....	....	....	....	..	..	..	..	....	....
Harrisburg T. 9 S., R. 6 E.												
1	NE	SE	Coal test	370	Est.	203	324	5	1	4	8	167	46
12	SE	NW	O'Gara	360	Level	227	348	6	6	4	7	133	12
12	SE	SE	O'Gara	360	Est.	157	273	2	9	4	9	203	87
13	NW	SW	O'Gara	350	Level	87	209	5	..	5	8	263	141

Abbreviations: Est., estimated; c, confidential; E., eroded; NDE, not deep enough; abd., abandoned.

TABLE 2.—*Field data*—concluded

Location Township Sec.	¼	¼	Company and Description	Altitude of surface	Elevation method	Depth to coal		Thickness of coal		Altitude of coal	
						No. 6	No. 5	No. 6	No. 5	No. 6	No. 5
				Feet		*Feet*	*Feet*	*Feet In.*	*Feet In.*	*Feet*	*Feet*
SALINE COUNTY											
Harrisburg											
T. 9 S., R. 6 E.											
13	SW	SE	O'Gara	357	Level	....	196	E	4 10	....	161
24	SW	NW	O'Gara	360	Level	....	135	E	2 2	....	225
24	SW	NE	O'Gara	358	Level	....	134	E	4 11	....	224
25	NW	NE	O'Gara	355	Level	....	....	E	E	....	....

Abbreviations: Est., estimated; c, confidential; E., eroded; NDE, not deep enough; abd., abandoned.

PUBLICATIONS

ILLINOIS MINING INVESTIGATIONS

Illinois State Geological Survey Division
Urbana, Illinois

Bulletin 1. Preliminary report on organization and method of investigations, 1913.
Bulletin 3. Chemical study of Illinois coals, by S. W. Parr, 1916.
Bulletin 10. Coal resources of District I (Longwall), by G. H. Cady, 1915.
Bulletin 11. Coal resources of District VII, by Fred H. Kay, 1915.
Bulletin 14. Coal resources of District VIII (Danville), by Fred H. Kay and K. D. White, 1915.
Bulletin 15. Coal resources of District VI, by G. H. Cady, 1916.
Bulletin 16. Coal resources of District II (Jackson Co.), by G. H. Cady, 1917.
Bulletin 17. Surface subsidence in Illinois resulting from coal mining, by Lewis E. Young, 1916.
Bulletin 18. Tests on clay materials available in Illinois coal mines, by R. T. Stull and R. K. Hursh, 1917.
Bulletin 19. Coal resources of District V, by G. H. Cady, 1919.
Bulletin 20. Carbonization of Illinois coals in inclined gas retorts, by F. K. Ovitz, 1918.
Bulletin 21. The manufacture of retort coal-gas in the central states, using low-sulphur coal from Illinois, Indiana, and western Kentucky, by W. A. Dunkley and W. W. Odell, 1918.
Bulletin 22. Water-gas manufacture with central district bituminous coals as generator fuel, by W. W. Odell and W. A. Dunkley, 1918.
Bulletin 23. Mines producing low-sulphur coal in the central district, by G. H. Cady, 1919.
Bulletin 24. Water-gas operating methods with central district bituminous coals as generator fuel. A summary of experiments on a commercial scale, by W. A. Dunkley and W. W. Odell, 1919.
Bulletin 25. Gas purification in the medium-size gas plants of Illinois, by W. A. Dunkley and C. E. Barnes, 1920.
Bulletin 26. Coal resources of District IV, by G. H. Cady, 1921.
Bulletin 27A. Analyses of Illinois coals, compiled by G. W. Hawley, 1923.
Bulletin 28. Preliminary report on coal stripping possibilities in Illinois, by Harold E. Culver, 1925.
Bulletin 29. Coal resources of District III, by Harold E. Culver, 1925.
Bulletin 30. Coal losses in Illinois, by C. A. Allen, 1925.
Bulletin 31. Coal stripping possibilities in southern and southwestern Illinois, by G. H. Cady, 1927.
Bulletin 32. Coal stripping possibilities in Saline and Gallatin counties near Equality, by L. G. Henbest, 1929.

Engineering Experiment Station
Urbana, Illinois

Bulletin 2. Coal mining practice in District VIII (Danville), by S. O. Andros, 1913.
Bulletin 4. Coal mining practice in District VII, by S. O. Andros, 1914.
Bulletin 5. Coal mining practice in District I (Longwall), by S. O. Andros, 1914.
Bulletin 6. Coal mining practice in District V, by S. O. Andros, 1914.
Bulletin 7. Coal mining practice in District II, by S. O. Andros, 1914.
Bulletin 8. Coal mining practice in District VI, by S. O. Andros, 1914.
Bulletin 9. Coal mining practice in District III, by S. O. Andros, 1915.
Bulletin 12. Coal mining practice in District IV, by S. O. Andros, 1915.
Bulletin 13. Coal mining in Illinois, by S. O. Andros, 1915. (Complete resumé of all the district reports.)
Bulletin 91. Subsidence resulting from mining, by L. E. Young and H. H. Stoek, 1916.
Bulletin 100. Percentage of extraction of bituminous coal with special reference to Illinois conditions, by C. M. Young, 1917.
Bulletin 113. Panel system of coal mining, by C. M. Young, 1919.
Bulletin 119. Some conditions affecting the usefulness of iron oxide for city gas purification, by W. A. Dunkley, 1921.
Bulletin 125. The distribution of the forms of sulphur in the coal bed, by H. F. Yancey and Thomas Fraser, 1921.
Bulletin 132. A study of coal mine haulage in Illinois, by H. H. Stoek, J. R. Fleming and A. J. Hoskin, 1922.
Bulletin 144. Power studies in Illinois coal mining, by A. J. Hoskin and T. Fraser, 1924.
Bulletin 151. A study of skip hoisting in Illinois coal mines, by A. J. Hoskin, 1925.
Bulletin 158. Measurement of air quantities and energy losses in mine entries, Part I, by A. C. Callen and C. M. Smith, 1926.
Bulletin 170. Measurement of air quantities and energy losses in mine entries, Part II, by A. C. Callen and C. M. Smith, 1927.
Bulletin 184. Measurement of air quantities and energy losses in mine entries, Part III, by A. C. Callen and C. M. Smith, 1928.

U. S. Bureau of Mines
Washington, D. C.

Bulletin 72. Occurrence of explosive gases in coal mines, by N. H. Darton, 1915.
Bulletin 83. The humidity of mine air, by R. Y. Williams, 1914.
Bulletin 99. Mine ventilation stoppings, by R. Y. Williams, 1915.
Bulletin 102. The inflammability of Illinois coal dusts, by J. K. Clement and L. A. Scholl, Jr., 1916.
Bulletin 137. Use of permissible explosives in the coal mines of Illinois, by J. R. Fleming and J. W. Koster, 1917.
Bulletin 138. Coking of Illinois coals, by F. K. Ovitz, 1917.
Bulletin 203. Central district bituminous coals as water-gas generator fuel, by W. W. Odell and W. A. Dunkley, 1924.
Bulletin 234. The screen sizing of coal, ores and other minerals, by E. A. Holbrook and Thomas Fraser, 1924.
Bulletin 238. Subsidence due to coal mining in Illinois, by C. A. Herbert and J. J. Rutledge, 1927.
Technical Paper 190. Methane accumulations from interrupted ventilation, with special reference to coal mines in Illinois and Indiana, by H. I. Smith and Robert J. Hamon, 1918.
Technical Paper 246. Water-gas apparatus and the use of central district coal as generator fuel, by William W. Odell, 1921.
Technical Paper 268. Preparation and uses of tar and its simple crude derivatives, by W. W. Odell, 1922.
Technical Paper 284. Coal and coke mixtures as water-gas generator fuel, by W. W. Odell, 1921.
Technical Paper 304. Water-gas tar emulsions, by W. W. Odell, 1923.
Technical Paper 326. Fires in steamship bunker and cargo coal, by H. H. Stoek, 1923.
Technical Paper 330. Small hose streams for fighting mine fires, by L. D. Tracy and R. W. Hendricks, 1924.
Technical Paper 332. Conditions affecting the activity of iron oxides in removing hydrogen sulphide from city gas, by W. A. Dunkley and R. D. Leitch, 1924.
Technical Paper 335. Bituminous coal as generator fuel in large water-gas sets with waste-heat boilers, by W. A. Dunkley, 1925.
Technical Paper 361. Cleaning tests of central Illinois coal, by Thomas Fraser and H. F. Yancey, 1925.