Press Bulletin Series — For the Oil and Gas Industry

STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION
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No. 17 — **ILLINOIS PETROLEUM** — March 2, 1929

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THE DUPO OIL FIELD

By Alfred H. Bell

Introduction

The Dupo area has recently claimed attention because of the new oil pool discovered by the Ohio Oil Company on the northward extension of the Waterloo anticline in St. Clair County. Following the discovery of the Waterloo field in 1920 a number of wildcat wells were drilled in the surrounding territory and several brief articles dealing with the geology and structure of the area were published by the Survey.[1] In one of these, dated February 10, 1921, it was pointed out that the Waterloo-Columbia anticline continues northward to the Mississippi River bluffs near Sugar Loaf School. Because several wells drilled along the crest of the anticline to the north of the Waterloo field failed to produce oil in commercial quantities, the interest of oil operators in that part of the structure subsided until the recent successful tests were made by the Ohio Oil Company on the recommendation of their geologist, Mr. E. R. Brockway.

In this paper, data on the geology and development of an area of about nine square miles in the vicinity of the Dupo oil field are briefly summarized. The structure of this area is shown in figure 1 by 50-foot contours giving the elevation of the top of the Kimmswick ("Trenton") limestone. The relation of the new field to the Waterloo field seven miles to the south and to some old gas wells in St. Louis, Missouri, nine miles to the north, is shown on a smaller scale by 100-foot contours based on the same key horizon (fig. 2).

[1] Culver, H. E., Geology and oil and gas possibilities in the vicinity of Waterloo, Monroe County: Illinois State Geol. Survey Press Bulletin, April, 1920.
Mylius, L. A., Oil and gas in Monroe County, Illinois: Illinois State Geol. Survey Press Bulletin, February 10, 1921.
Mylius, L. A., Oil possibilities of the Posten School structure, Monroe County, Illinois: Illinois State Geol. Survey Press Bulletin, November 19, 1921.
Lamar, J. E., Notes on the Waterloo anticline: Illinois State Geol. Survey Press Bulletin, 1922. (Reprinted from Trans. Illinois State Acad. Sci., Vol. 15.)

Former Work and Acknowledgments

The geology of the St. Louis quadrangle has been described[2] in detail. The late Dr. Stuart Weller made detailed field studies of the area and his results are embodied in an unpublished manuscript, "Report on parts of Monroe and Randolph counties, Illinois". Data from this manuscript and also from unpublished manuscripts and maps by Mr. J. E. Lamar were used in preparing the present report. Messrs. L. A. Mylius, D. M. Collingwood, Gail F. Moulton, and J. E. Lamar made field studies during and after the development of the Waterloo field. In a brief field study of an area in the vicinity of the new wells in January 1929, the writer was assisted by Mr. E. R. Fritz. The courtesy of the operators who supplied information on recent drilling is also acknowledged.

Topography

The topography of the part of the area east of the Mississippi River bluff is controlled by the structural features of the bedrock, modified by erosion. In this respect it differs from the topography of the greater part of Illinois where glacial drift completely masks the structure of the underlying bedrock. The outstanding topographic features are the Mississippi valley flat, the steep bluffs that border the east side of the valley, and the upland east of the bluffs.

Areal Geology

Outcrops of Mississippian limestone occupy a considerable area along the bluff and the stream valleys; on the upland the bedrock is covered by a thin mantle of loess. The concentric distribution of the three outcropping formations, the Warsaw, Spergen and St. Louis, with the oldest—the Warsaw—in the center, indicates clearly the anticlinal structure shown in figures 1 and 2.

The outcrop of Warsaw limestone occurs at the junction of two streams 2000 feet east of Sugar Loaf School. The outcrop extends about 1500 feet east along Cement Hollow and about the same distance northeast along the tributary valley. The patch of Warsaw is completely surrounded by an area of Spergen limestone which extends from the bluffs northeast of Sugar Loaf School for about a mile and a half to the southeast. With the exception of three small patches of Spergen limestone in secs. 3 and 10, T. 1 S., R. 10 W., the remainder of the contoured area shown in figure 1 is underlain by St. Louis limestone.

Stratigraphy

The succession of strata found in drilling in the Dupo area is similar to that of the Waterloo field and is briefly described in the following table:

[2] Fenneman, N. M., Physiography of the St. Louis area: Illinois State Geol. Survey Bull. 12, 1909.
—— Geology and mineral resources of the St. Louis quadrangle: U. S. Geol. Survey Bull. 428, 1911.

Generalized stratigraphic table for the Dupo area

	Thickness *Feet*
Cenozoic	
Recent and Pleistocene systems:	
Soil, alluvium, loess and drift	0–30
Paleozoic	
Mississippian system	
St. Louis—limestone, light gray, dense and semi-lithographic to finely crystalline; chert present in beds and nodules	0–300
Spergen (Salem)—limestone, light gray or light brown; some beds appear to consist entirely of small fragments of fossils; chert usually absent	0–110
Warsaw—limestone and shale interbedded; limestone is gray and buff, moderately hard, crystalline, locally argillaceous	60±
Keokuk-Burlington—limestone, light gray to white, coarsely crystalline; much interbedded chert	125–180
Kinderhook—limestone, argillaceous, greenish, red and gray, soft; includes considerable shale	100–150
Chattanooga (?)—black shale	0–15
Devonian-Silurian systems	
Limestone or dolomite, brown	50–70
Ordovician system	
Maquoketa—shale, greenish-gray, and limestone, argillaceous, gray	115–150
Kimmswick—limestone, light brown to white, crystalline; in places contains gas and oil; Plattin and Joachim—limestone, denser and more fine-grained than Kimmswick; a little shale interbedded	up to 440
St. Peter—sandstone	155±

Whether any of the shale assigned to the Kinderhook is of Devonian age has not been ascertained. The black or chocolate-brown Chattanooga (?) shale, considered by some geologists as Devonian in age and by others as Mississippian, apparently is absent along the axis of the anticline, but is present at the Dyroff well (No. 1, figs. 1 and 2) on the east flank of the anticline, where its thickness as determined by sample studies is 15 feet. The divisions between the Kimmswick, Plattin, and Joachim limestones are not clearly shown in the logs or samples studied. The thicknesses for the Kimmswick-Plattin-Joachim and St. Peter formations given in the above table are those found in the Dyroff well in sec. 26, T. 1 N., R. 10 W. (No. 1, figs. 1 and 2). None of the other five wells shown in figure 1 has penetrated more than 80 feet of the Kimmswick limestone and therefore the thicknesses of these deeper formations along the axis of the structure is not known.

Structural Geology

REGIONAL STRUCTURE

The structure of the Dupo field and the surrounding territory is shown in figure 2 by 100-foot contours which give the elevation of the top of the Kimmswick formation.

The principal structural feature of this region is the Waterloo anticline trending in general slightly west of north and extending from the vicinity of Waterloo in Monroe County, into the city of St. Louis. So far two local domes, separated by a saddle, have been discovered along this axis. The first, near the south end of the anticline, is the site of the productive Waterloo field, and the second, seven miles to the north, is the site of the new Dupo field. Between these two fields the anticline is consistently asymmetrical, having a steeply dipping west flank and a more gently dipping east flank, but toward the north the fold flattens and apparently dies out in the city of St. Louis.

FAULTS

In his unpublished geological map of the area Dr. Stuart Weller shows a fault parallel to the anticline bounding it on the west side, running from the Mississippi River bluff to within two miles of Waterloo. He also shows a number of transverse faults near Columbia in secs. 10 and 15, T. 1 S., R. 10 W. No evidence for the major fault is presented in his manuscript. Concerning the transverse faults he says, "At Columbia, and for about two miles north of the town where the southerly and northerly plunging portions of the anticline meet, several more or less diagonal faults have been developed which cause the outcrops of the older formations exposed in the ravines which cut the axis of the fold to be offset." He does not mention, however, any actual exposure of a fault and gives no data on the direction and amount of displacement. Furthermore, no direct evidence of faulting in the Dupo area was obtained during the field investigation. Therefore the faults shown on Dr. Weller's map are not included in the accompanying structure contour maps. Although it is quite possible that further evidence of faulting may be brought to light it seems probable that there are no faults of large displacement within the contoured area (figs. 1 and 2).

DATA USED IN PREPARING STRUCTURE MAPS

The interpretation of the structure presented by the maps (figs. 1 and 2) is based on outcrops of upper formations and the elevations and records of wells which penetrated the Kimmswick. In the Waterloo field the top of the Kimmswick was found to be essentially parallel to the outcropping Mississippian beds, and it seems probable that a similar parallelism exists

in the Dupo area. This condition has been assumed in drawing the contours. Data concerning the numbered wells are given in the table on page 7. The dry wells in the vicinity of the Waterloo field are not included in the table inasmuch as the structure in that area is not discussed in detail. The data from wells Nos. 9 to 14 (fig. 2 and table of well data) in the city of St. Louis are taken from the United States Geological Survey Bulletin 438. The logs of wells 10 to 13 do not show the top of the Kimmswick; the elevations used were estimated by correlation of higher horizons (particularly the red rock of the Fern Glen formation in the Kinderhook series) in these wells and the Insane Asylum and the Belcher wells.

STRUCTURE BETWEEN WATERLOO AND THE DUPO FIELD

The structure in its general features is fairly well known between Waterloo and the Dupo field. In the vicinity of the Waterloo oil field, well records provide a large amount of data on structural conditions. From Waterloo to the Mississippi River bluff near Dupo the structure is evident both from its topographic expression and from the numerous exposures where the attitude of the rock beds may be observed. A line of low loess-covered hills facing the west extends from the vicinity of Sugar Loaf Hill through the east edge of Columbia to Waterloo and reflects the structural dip on the west limb of the anticline.

STRUCTURE OF THE DUPO FIELD

Details of the structure in the vicinity of the Dupo field are shown in figure 1. In figure 2 the locally closed anticline, long and narrow in outline, is shown to have a closure of more than 100 feet. The structure is well shown in a natural cross-section exposed along the Mississippi River bluff extending northeast from Sugar Loaf Hill. The steeply dipping beds on the west flank of the anticline are seen just east of State Highway No. 3 and north of Sugar Loaf Hill. Here the strike is N. 30° W. and the maximum dip about 32°. Going northeast along the bluff toward the Ohio Oil Company's Dyroff No. 1 well (No. 4, figs. 1 and 2) the dip becomes less steep, and in the vicinity of the well the beds are apparently flat. Northeast from the well for about two and a half miles the beds dip gently (about 2°) to the east.

From the Tarleton (map No. 3) and Dyroff wells (No. 4) to the Mueller (No. 5) and Reichert (No. 2) wells the anticline plunges to the southeast and here the trend of the axis is about N. 30° W., or considerably west of the general trend. A rather abrupt change in strike was observed on the bluff about 1000 feet east of State Highway No. 3. East of this point the beds dip south and this is taken to indicate the presence

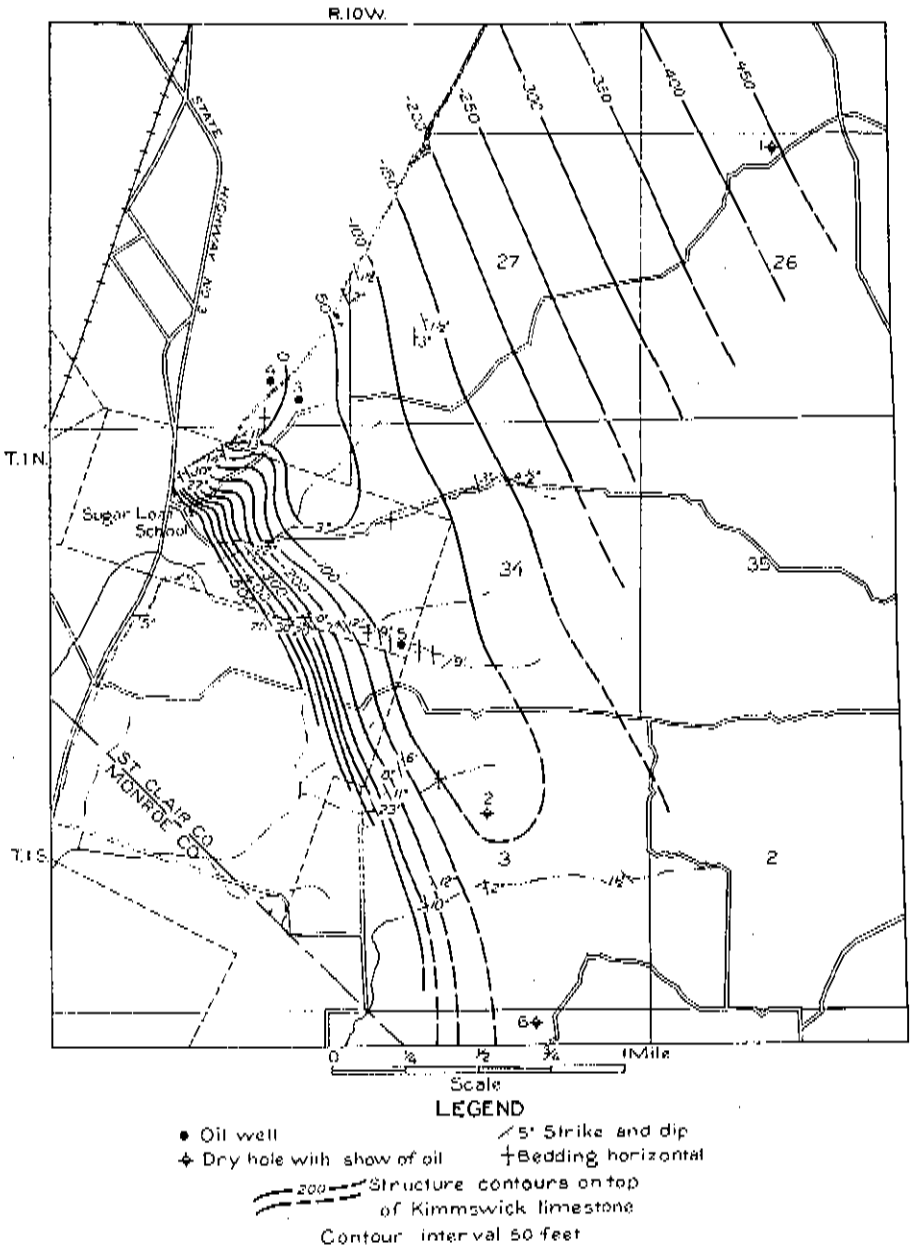

FIG. 1. Structure contour map of the Dupo field and vicinity.

Table of well data

Map No.[a]	Company	Farm	No.	Location			Curb Elev.	Top of Kimmswick	
				Sec.	T.	R.		Depth	Elevation
1	I. G. Lockwood	George Dyroff..	1	26	1 N.	10 W.	590	1040	—450
2	Ohio Oil Co....	Joseph Reichert.	1	3	1 S.	10 W.	630	725	—95
3	Ohio Oil Co....	Tarleton	1	28	1 N.	10 W.	663	666	—3
4	Ohio Oil Co....	Matilda Dyroff..	1	28	1 N.	10 W.	403	396	+7
5	Petty et al.....	O. G. Mueller...	1	34	1 N.	10 W.	520	595	—75
6	Ohio Oil Co....	Leo Menner.....	1	10	1 S.	10 W.	604	720	—116
7	Noble Oil Co...	Leo Menner.....	1	10	1 S.	10 W.	520	655	—135
8	Petrol Co.....	John Toenjes ..	1	23	1 S.	10 W.	620	595	+35
	(Wells Nos. 9–14 are located in the city of St. Louis, Missouri)								
9	Insane Asylum well						590	1022	—432
10	Beuther well, Vanderventer and Laclede streets						480	[b]755	—275
11	Welle-Boettler Bakery, northwest corner Vandeventer and Forest Park Boulevard (3 wells drilled within 200 feet of each other)						470	[b]745	—275
12	Tamm's Glue Factory, 618 S. Vandeventer Street						460	[b]725	—265
13	Fruin-Bambrick Construction Company's Quarry						...	....	.....
14	Belcher well, Second and O'Fallon Streets						420	1045	—625

[a] Wells Nos. 1-6 are shown on both figures 1 and 2; Nos. 7-14 are shown only on figure 2.
[b] Depth estimated.

of a local syncline having an axis transverse to that of the main structure, and approximately parallel to the road northeast from Sugar Loaf School.

STRUCTURE BETWEEN THE DUPO FIELD AND ST. LOUIS

Between the Dupo field and the west side of Mississippi River no data on structure are available. Therefore a hypothetical interpretation of the structure in this part of the area is presented for the guidance of operators until additional drilling provides more definite information.

On the west bank of Mississippi River, as pointed out by Fenneman,[3] the axis of the anticline passes approximately through the Workhouse quarry opposite the north end of Arsenal Island. Here beds of St. Louis limestone dip gently toward the southwest. In St. Louis the anticline continues west of north, flattening out beyond the Tamm's glue factory well (No. 12, fig. 2). From the vicinity of Tamm's well the amount of dip shown for the top of the Kimmswick to the east toward the Belcher well (No. 14) and to the west toward the Insane Asylum well (No. 9) is

[3] Fenneman, N. M., Geology and mineral resources of the St. Louis quadrangle: U. S. Geol. Survey Bull. 438, p. 36, 1911.

essentially that shown by Fenneman in a cross-section.[4] In a footnote[5] Fenneman mentions a number of other wells in St. Louis, drilled from 1906 to 1911, which found gas and oil shows in the Kimmswick. Although data on these and later wells drilled in St. Louis were not available for inclusion in figure 2, it was considered worth which to present a generalized interpretation of the structure in this area.

Recent Development

Among the unsuccessful wells which were drilled along the crest of the anticline north of the Waterloo field are the Petrol Company's John Toenjes (No. 8, fig. 2) and the Noble Oil Company's Leo Menner (No. 7, fig. 2) drilled in 1924. In the same year I. G. Lockwood's Dyroff well (No. 1, figs. 1 and 2) was drilled on the east slope of the anticline. All these wells had shows of oil in the Kimmswick except the last named which was reported to have had shows in the deeper formations (Ordovician and Cambrian).

In 1928 the Ohio Oil Company began drilling in the territory. Their first well, the Joseph Reichert No. 1, completed September 1928 (No. 2, figs. 1 and 2), had a show of oil in the Kimmswick but was not a producer. Early in November, 1928, the second well, Tarleton No. 1 (No. 3, figs. 1 and 2) was completed and produced 150 barrels of oil naturally in the first 24 hours. Production was from the Kimmswick limestone. Owing to lack of storage facilities the well was shut in. The second producer drilled by the Ohio Oil Company was the Matilda Dyroff, located 500 feet northwest of the Tarleton and 260 feet lower in surface elevation; a preliminary test indicated an initial production of about 200 barrels natural.

A well drilled by Petty et al., completed in January 1929, on the O. G. Mueller farm (No. 5, figs. 1 and 2) had a show of oil in the Kimmswick. The well was shot with 80 quarts of nitro-glycerine and according to recent reports will probably make a small commercial producer. The following is the driller's log of the well; correlations were made by the writer.

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[4] Fenneman, N. M., Physiography of the St. Louis area: Illinois State Geol. Survey Bull. 12, Pl. 1, 1909.
—— Geology and mineral resources of the St. Louis quadrangle: U. S. Geol. Survey Bull. 438, Pl. 11, 1911.

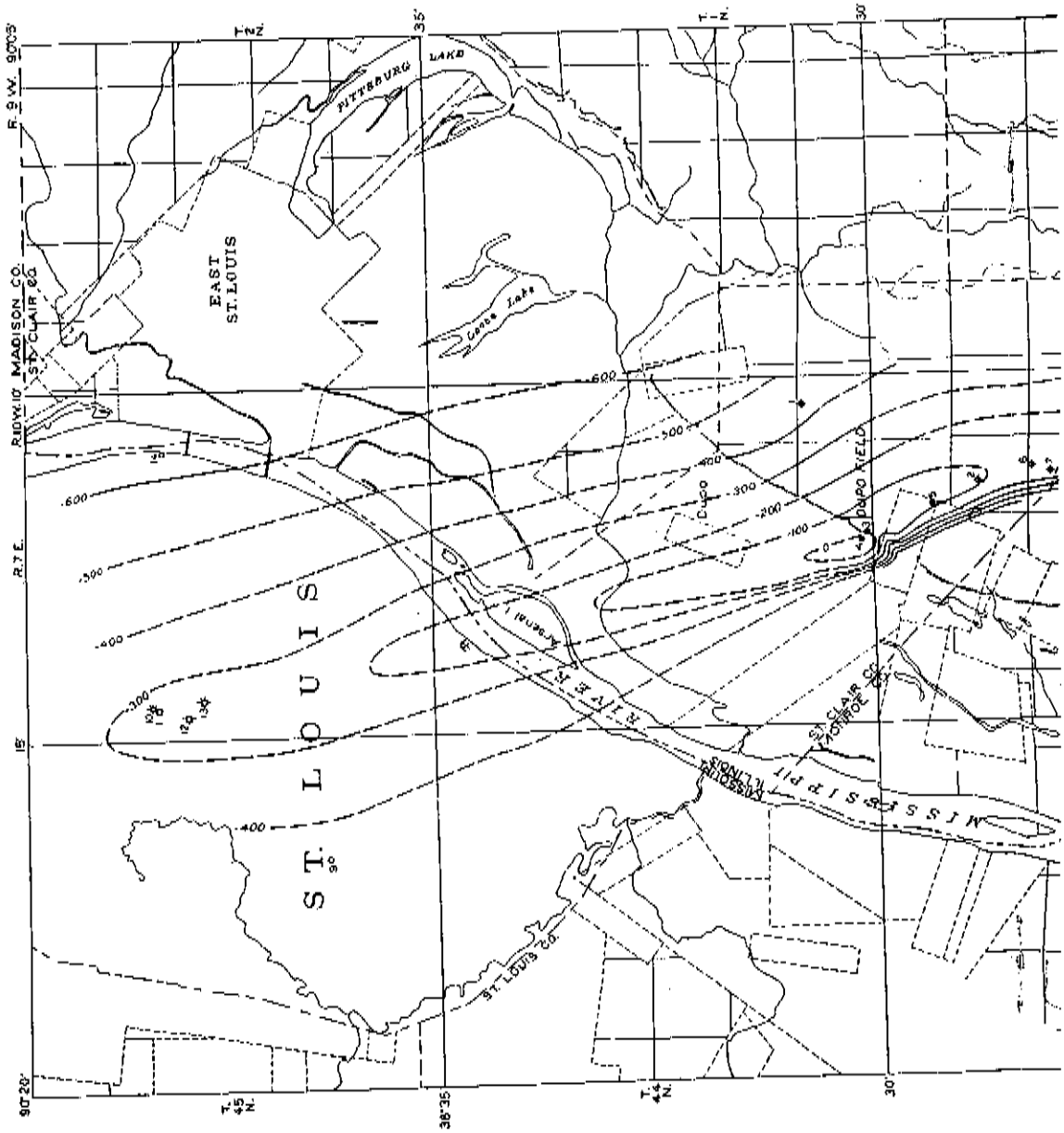
[5] Fenneman, N. M., Geology and mineral resources of the St. Louis quadrangle: U. S. Geol. Survey Bull. 438, p. 58, 1911.

Log of Petty et al. O. G. Mueller No. 1 well, sec. 34, T. 1 N., R. 10 W.
(Map No. 5) Elevation 520 feet

	Thickness *Feet*	Depth *Feet*
Pleistocene system		
Soil	5	5
Mississippian system		
Spergen		
Lime	60	65
Warsaw		
"Slate"	10	75
Lime	5	80
Sandy "slate"	40	120
Keokuk-Burlington		
Lime, broken	28	148
Lime, hard	92	240
Lime, rotten	20	260
Lime, hard	19	279
Kinderhook		
"Slate"	40	319
Lime, hard	11	330
"Slate"	10	340
Shale, sandy	22	362
Sand	13	375
Shale	5	380
Red rock	20	400
"Slate"	3	403
Lime	7	410
Red rock	18	428
Devonian-Silurian systems		
Lime, brown	8	436
Lime, white	14	450
Lime, broken	30	480
Ordovician system		
Maquoketa		
Shale	60	540
Lime	5	545
"Slate"	15	560
Lime, broken	15	575
"Slate"	5	580
Shale	15	595
Kimmswick		
Lime	61½	656½

Producing Horizon

A comparison of the logs of the new Dupo wells with those of wells in the Waterloo field indicates that the oil-producing formation is the same


EAST ST. LOUIS
ST. LOUIS
PITTSBURG LAKE
Grass Lake
MISSISSIPPI RIVER
ST. LOUIS CO.
MADISON CO.
ST. CLAIR CO.
R. 9 W. 90°05'
R. 7 E.
T. 45 N.
T. 44 N.
38°35'
90°20'
30'
35'
600
500
400
300
200
100
0

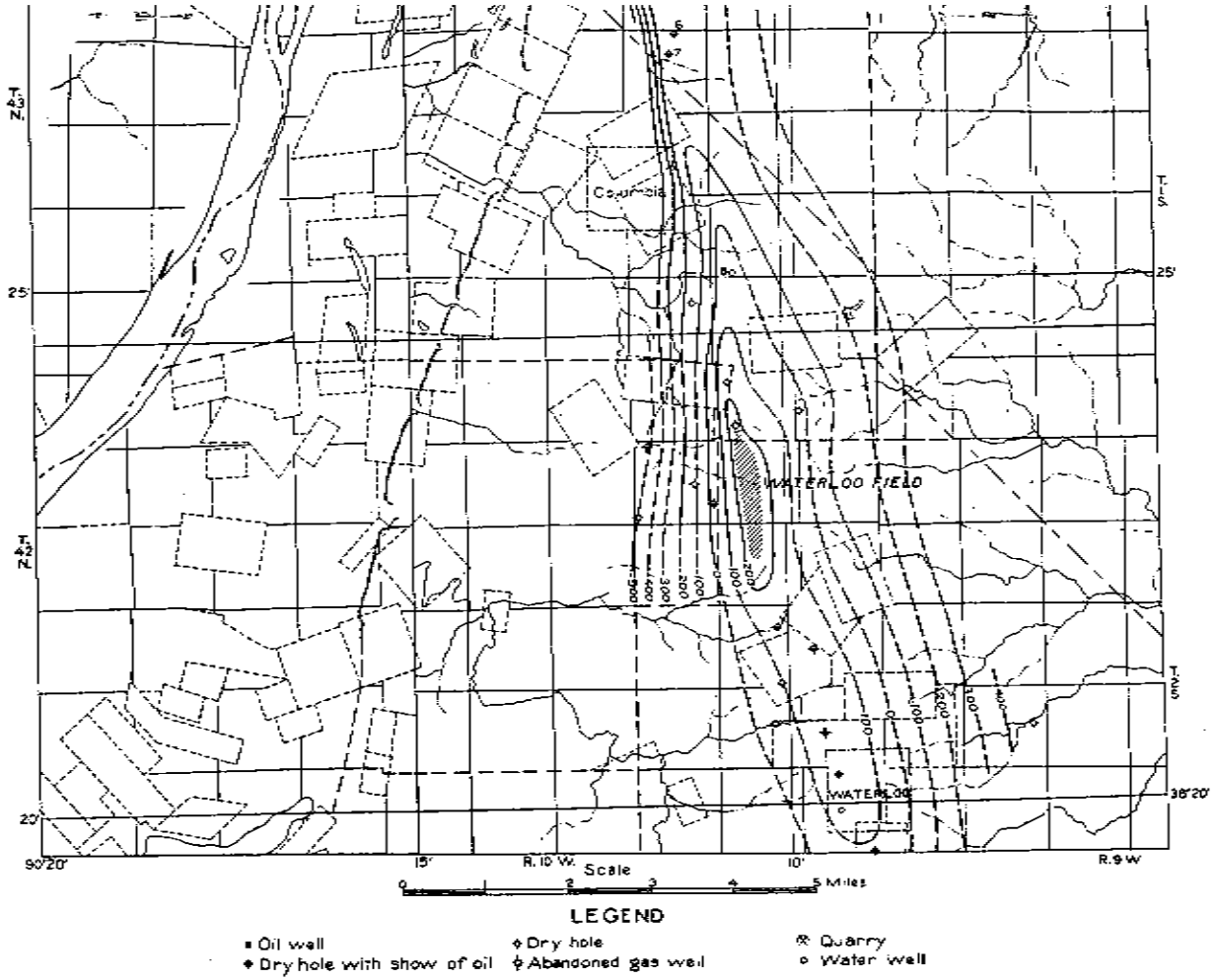


FIG. 2. Structure contour map of the Waterloo anticline. Key horizon, top of the Kimmswick formation; contour interval, 100 feet.

in each, namely the Kimmswick limestone of Ordovician age, usually referred to as the "Trenton" by the drillers. Samples from the Ohio Oil Company's Tarleton No. 1 well (No. 3, figs. 1 and 2) show the formation to be a pure, light brown, crystalline limestone. These cuttings were too finely broken to give information on the kind and amount of porosity. Data on the porosity and other physical characters of the cap rock and reservoir rock could be obtained by coring. The value of such information in future development would justify the expense.

The Kimmswick is overlain by the Maquoketa formation which in some places is reported as shale throughout but in others as limestone in its lower part. For this reason the top of the Kimmswick is erroneously reported in some drillers' logs to be about 50 feet higher than it actually is. The Maquoketa limestone is gray, argillaceous, and comparatively soft in contrast to the hard, crystalline, light brown Kimmswick limestone. In order that accurate determination of structure may be made from the logs of wells drilled in the future it is desirable that especial care be taken to differentiate the Maquoketa and Kimmswick formations and to determine the depth to the top of the Kimmswick.

Prospects for New Kimmswick Production

DUPO FIELD

Prospects for extending the productive area in all directions, especially to the north, from the new wells, (Tarleton [map No. 3] and Dyroff [map No. 4]) appear good. The top of the Kimmswick formation rises 10 feet to the northwest between the Tarleton and Dyroff wells and probably continues to rise slightly for some distance northwest of the Dyroff well. However, as the position of the crest of the anticline is not well known it is impossible to estimate the probable northward extension of the productive area. South of the Tarleton well the structural data suggest that a continuous productive tract may extend as far as the Mueller well (map No. 5) provided the porosity of the reservoir rock is favorable. The most favorable territory appears to be that inside the -50-foot contour (Fig. 1), while that outside the -100-foot contour appears unfavorable. The presence of a small commercial well, the Mueller (map No. 5), between these two contours suggests that some of the territory between them has fair possibilities of production.

SOUTHWESTERN ILLINOIS

The only wells which have so far yielded production from the Kimmswick formation in southwestern Illinois are located on closed structures along the crest of the Waterloo anticline. This suggests a close relation between structure and oil accumulation in the Kimmswick which should

[6] Mylius, L. A., Oil possibilities of the Posten School structure, Monroe County, Illinois: Illinois State Geol. Survey Press Bulletin, Nov. 19, 1921.

be considered in future prospecting. Available data do not suggest any other anticlinal folds comparable in size to the Waterloo anticline within the area shown in figure 2. Another large anticline,[6] extending southeast from the river bluffs near Valmeyer, nine miles west of Waterloo, has been tested by two wells favorably located near its axis. In both wells the Kimmswick was found to contain salt water. It is very probable that any oil formerly accumulated here escaped to the surface at the outcrop where the Kimmswick is cut into by stream erosion.

Shows of oil in the Kimmswick limestone have been reported at a number of places in Madison and St. Clair counties. At some places in this area salt water is reported in the Kimmswick; at other places where the Kimmswick has been drilled, neither oil shows nor salt water have been reported. So far as available data show, the unsuccessful Kimmswick tests in this area were not drilled on favorable structures. The Mason et al. Gundlack well, two miles east of Belleville in sec. 24, T. 1 N., R. 8 W., St. Clair County, was drilled on a slight anticlinal nose in Pennsylvanian strata, but because of the important unconformity at the base of the Pennsylvanian beds, structure favorable for oil accumulation is not necessarily indicated for the older strata.

A considerable area in the central part of the Illinois basin between the Waterloo anticline and the La Salle anticline has not yet been tested to the Kimmswick. In this area a number of rather large structures are known to exist in Pennsylvanian strata, for example, the Centralia monocline, the Sandoval dome, the Ayers anticline, and the Sorento dome.[7] Some of these structures undoubtedly reflect more pronounced structures in the older strata,[8] for in the Sandoval and Ayers structures the dips of the Chester beds are steeper than those of the Pennsylvanian. Any of these structures may have influenced oil accumulation in the Kimmswick, as well as in some younger formations which have not been tested. These include the Mississippian and Devonian-Silurian limestones, in which shows of oil have been found in Clinton and Bond counties in wells not located on known anticlines in Pennsylvanian strata. The Plattin limestone and St. Peter sandstone, which underlie the Kimmswick, have been tested on the margins of the Illinois basin but have not yielded shows of oil. Accordingly, possibilities of production from these deeper formations on the structures mentioned above are doubtful.

Present conditions in the oil industry do not seem to warrant drilling wildcat wells to such great depths as would be necessary to test the Kimms-

[7] For descriptions see the following numbers of Illinois Petroleum: Centralia, Nos. 4, 5, 10; Sandoval, No. 10; Ayers, Nos. 5, 16; Sorento, No. 6.

[8] Moulton, Gail F., The bearing of the structural relations between the Pennsylvanian and older formations on petroleum prospecting in western Illinois: Illinois State Geol. Survey Illinois Petroleum No. 3, July, 1926.

wick on the structures in the central Illinois basin. When oil prices become substantially higher than at present, the prospects for obtaining production from deeper formations down to the Kinmswick on these folds will probably lead to a considerable amount of deep wildcat drilling.

PETROLEUM PRODUCTION AND DEVELOPMENT IN ILLINOIS DURING 1928

By Gail F. Moulton

The general condition of the petroleum industry in Illinois was rather unsatisfactory in 1928, for the price of oil remained at a low level, and production from most of the wells in the State has declined to such a small daily average that revenue has amounted to but little if any more than operating expenses. The proved productive areas were largely developed before the start of the year, and low prices for crude oil discouraged wildcat drilling. As a result of this combination of conditions, the number of wells drilled in Illinois fields fell below that for any year since the development of commercially important oil production in the State. Because of a reduction in the price of oil on January 24, 1929, to a figure lower than the average for any recent year, and the improbability of increased prices during the present year at least, it is very probable that drilling activity will not be much greater during 1929 than it was during 1928.

Although no new pools were under development at the beginning of the year, one pool of apparent commercial importance was discovered in 1928 by the Ohio Oil Company in southwestern Illinois near Dupo, in St. Clair County, and favorable showings of oil were found in a well in southeastern Illinois, near Harrisburg in Saline County. These wells were the only successful wildcat operations in the State during the year. Other developments consisted of extending proved producing areas or drilling to deeper sands in producing fields.

The total production of Illinois continued to decline during 1928, although the decline was slightly less than for the previous year. Probably the decrease in production decline was due to the fact that in 1926 an appreciable portion of the State total was flush production which declined rapidly during 1927. During 1928, however, the decline approximates the normal decreased production of the old wells, unaffected by flush production. As the production curve (fig. 1) shows, the total production for Illinois declined from about 8,000,000 barrels in 1924 to about 6,500,000 barrels in 1928. The largest part of this decline took place during 1927 and 1928, because no important new production was brought in during these years as had been during the other years.

In spite of the low price which will probably be maintained during all of 1929 for Illinois oil, the prospects are that new production from the Dupo area will help to check the rate of decline of the State production as a whole, and that the total for the year will be about 6,000,000 barrels.

Field developments as reported by the Oil and Gas Journal and supplemented by reports of the State Geological Survey scout are given in the following table.

Summary of drilling in 1928 by counties

County	Completions	Total initial daily production (Barrels)	Dry holes	Gas wells	Old wells abandoned
Clark	9	85	5	0	0
Crawford	44	501	12	6	6
Cumberland	3	3	2	0	0
Henderson	3	2	2	0	0
Jefferson	1	0	1	0	0
Knox	2	0	2	0	0
Lawrence	28	403	4	0	21
Livingston	1	0	1	0	0
Macon	1	0	1	0	0
Madison	2	0	2	0	0
Marshall	1	0	1	0	0
Marion	1	0	1	0	3
Morgan	1	8	0	0	0
McDonough	1	0	1	0	0
Saline	1	5	0	0	0
Shelby	1	0	1	0	0
St. Clair	4	165	2	0	0
Tazewell	1	0	1	0	0
Wabash	40	668	19	2	15
Total	145	1840	58	8	45

As the table shows, the greatest number of wells was drilled in Crawford County, namely 44 wells. Wabash County had practically the same number. More than half the total number of wells drilled in the State were located in these two counties. One of the interesting features of the developments of the year was the widespread distribution of the wildcat drilling, which was undertaken in Morgan, McDonough, Tazewell, Marshall, Madison, Marion, St. Clair, Macon, Shelby, Clay, Knox, Warren, Saline, Rock Island, and Livingston counties.

The Dupo field, described in the first paper in this number of Illinois Petroleum, was the most important discovery made during 1928 in Illinois oil operations. A second discovery of considerable promise was made in a well drilled by Barnes, Rodgers, and others, about five miles southeast of Harrisburg in Saline County. A gas blowout took place in this well at a depth of 1413 feet in the early part of November, 1928, and as a result the drilling rig was destroyed. During the interval that followed the fire and preceded the resumption of drilling operations, considerable

excitement was current in Harrisburg. Arrangements were completed for drilling three additional wells in the vicinity of the first one, and a well was started in Hamilton County near McLeansboro. Deeper drilling in the first well, however, showed that the sand was thin. The best available information indicates that this well will probably produce 5 barrels or less per day.

A comparison of the logs of the various wells which have been drilled southeast of Harrisburg has failed to demonstrate the presence of any folded structure which might explain the accumulation of the oil, and information available at present suggests that lenticular sand bodies in the Chester formation is the controlling factor in oil accumulation. If this is correct, the discovery of other producing areas of a similar character will probably be expensive and difficult.

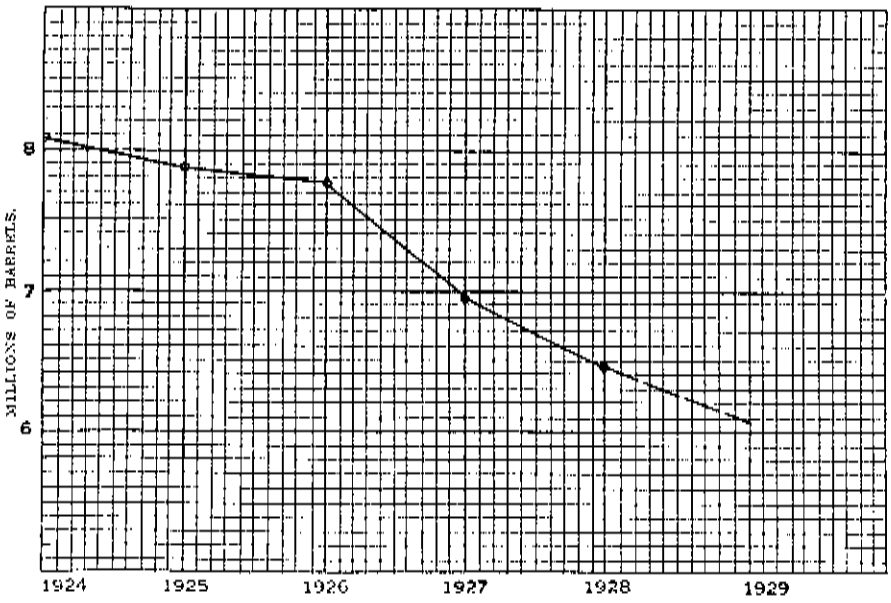


FIG. 1. Curve showing annual petroleum production in Illinois, 1924 to 1928 inclusive. (Data from U. S. Bureau of Mines Reports.)

Wabash County operators were successful in extending the producing area in that field during the year, but compared with the amount of drilling done a few years ago, the field was fairly quiet. The principal developments were made in the vicinity of Allendale. One deep well to the Ste. Genevieve lime was drilled south of Allendale but there was little other development except in drilling to the Biehl sand.

During the early part of 1928 two developments seemed to be promised for Lawrence County. The first was in the southeast part of the county

about a mile south of the old Murphy pool; three wells were drilled here but the production obtained was not large enough to warrant more extensive development. The second was in the north part of Petty Township along the Crawford County line, where drilling resulted in a northward extension of the producing area. Production here was obtained from lower Chester sands corresponding to the Kirkwood, Tracey, and possibly the McClosky sands of the Lawrence County fields. A portion of this development also took place in Southwest and Martin Townships, Crawford County and is still in progress.

In Crawford County, outside of the south part, there was scattered development, mostly within five or six miles of Robinson. Core-drilling with a cable-tool core-bit, undertaken by the Associated Producers Company in the area of their repressuring project north of Robinson, was one of the outstanding features of the other developments in this county.

The most interesting well drilled in Clark County was a test by the Trenton Rock Oil and Gas Company on the Martinsville dome. The new well was drilled through the producing pays in the Kinderhook shale and the top of the Devonian limestone to test the Kimmswick ("Trenton") limestone. Although this well was drilled so late in the year that definite information on its rate of production is not available, reports are that it will not be very profitable.

A second deep well was drilled during the year in Clark County about three miles south of West Union. As a report on the geology of this area contained in Illinois Petroleum No. 14 shows, the West Union area is not favorable for oil accumulation because it lies in a synclinal structure of regional importance. The results of drilling this well were largely anticipated by the geologic investigation.

The testing of the Media structure in Henderson County by Pendarvis et al. was one of the interesting developments in that area. The geologic features of the area were determined by the State Geological Survey, and reported in Illinois Petroleum No. 13. The well drilled most nearly in the location recommended in this report found a fairly good showing of oil at the horizon of the Hoing sand, which is the producing bed in the Colmar-Plymouth field about 30 miles to the south. Probably a well drilled a little higher on this structure will obtain production of commercial importance.

An additional well was completed south of Macomb in McDonough County in the Gin Ridge district. This location is about four miles east of the producing area at Plymouth, and is only a short distance from a well completed in 1926 which produced about 7 barrels of heavy oil daily from the Hoing sand.

Other interesting wildcat wells were drilled in Clay County about 25 miles south of Effingham, in Marion County about ten miles south of Salem, near the town of Kell, and in Jefferson County about seven miles south of Mt. Vernon near Ina. All of these wells have been drilled to a depth of more than 2000 feet. The Clay County well is still being drilled; the other wells have been abandoned.

The prospects of new developments in Illinois outside of the Dupo and Harrisburg areas do not appear particularly good at the present time. Furthermore, as stated above, the general conditions of the oil industry are not favorable for extensive new work. Accordingly, it is expected that there will be but little wildcat drilling in the State during 1929.