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DEVELOPMENTS IN EASTERN INTERIOR BASIN IN 1942¹

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ABSTRACT

Exploratory drilling in the Eastern Interior basin continued in 1942 at about the same rate as in 1941 and resulted in the discovery of 54 new pools, all of which are small. In Illinois, the largest pools discovered in 1942 as measured in number of wells at the end of the year were the Covington pool, Wayne County, with 32 wells and a total yield to the end of 1942 of 1,070,000 barrels and the Bible Grove pool, Clay County, with 32 wells and a total yield of 55,000 barrels. The Markham City pool, Jefferson County, with 12 wells at the end of the year, had a total production during the year of 143,000 barrels.

The total number of completions, including both wildcat and pool wells, in the Eastern Interior basin was 2,518 (excluding gas input and salt water disposal wells) in 1942 as compared with 4,680 in 1941, a decline of nearly one-half. The reduction of drilling in pools was probably mainly the result of Federal Conservation Order M-68 issued December 23, 1941, which limited drilling to one well to 40 acres. A modification of this order was issued August 31, 1942, M-68-5, which permitted closer spacing for sandstone wells. With the wider well spacing there was a notable increase in the proportion of dry holes from 27 per cent in 1941 to 44 per cent in 1942.

Nearly all of the new pools discovered during 1942 produce from the Mississippian system, including both the Chester and Iowa series. A few of the new pools produce from the Pennsylvanian and Devonian systems and one, the St. Jacob pool, Madison County, Illinois, produces from the "Trenton" limestone of the Ordovician system. This caused a considerable revival of interest in the "Trenton" possibilities of western Illinois, but numerous tests resulted in no additional discoveries to March 1, 1943.

Production in the Eastern Interior basin in 1942 amounted to approximately 117,671,000 barrels which was a decline of 19 per cent from the figure of 145,534,000 barrels in 1941. (These totals include a small amount of production in northeastern Indiana and eastern Kentucky outside of the Eastern Interior basin.) These figures represent 8.5 per cent of the national total in 1942 as compared with 10.3 per cent in 1941.

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INTRODUCTION

The number of well completions in the Eastern Interior basin in 1942 was 2,518 as compared with 4,615 in 1941, a decline of nearly half. The decrease was due partly to the Federal regulation of well spacing and partly to the failure to find new major pools. At least 54 new minor pools were discovered during the year, of which 40 are in Illinois, 11 in southwest Indiana, and 3 or more in western Kentucky.

Table I shows the comparative amount of drilling in 1941 and 1942.

TABLE I
COMPARATIVE AMOUNT OF DRILLING IN 1941 AND 1942

	<i>Number of Completed Wells</i>	
	<i>1941</i>	<i>1942</i>
Illinois	3,838	2,017
Southwestern Indiana	463	315
Western Kentucky	314	186
	<hr style="width: 50px; margin: 0 auto;"/> 4,615	<hr style="width: 50px; margin: 0 auto;"/> 2,518

The total oil production from the Eastern Interior basin in 1942 amounted to approximately 117,671,000 barrels which was a decline of 19 per cent from 145,534,000 barrels in 1941. Both figures include a small amount of production in northeastern Indiana and eastern Kentucky outside of the Eastern Interior basin. These represent 8.5 per cent of the national total in 1942 as compared with 10.3 per cent in 1941.

For further information on the statistics of oil and gas development in 1942 the reader is referred to the annual transactions of the A.I.M.E. Petroleum Division for 1943.



FIG. 1.—Index map of the Eastern Interior basin and of Illinois basin (deep part of Eastern Interior basin).

Figure 1 is an index map showing the extent of the Eastern Interior basin in Illinois, Indiana, and Kentucky, and the Illinois basin which is the term used for the central deep part of the Eastern Interior basin.

ILLINOIS

Figure 2 is an index map showing the Illinois basin counties (deep part of Eastern Interior basin), the marginal counties, and the outside counties. A comparison of the amount of wildcat drilling in 1942 and its relative success in the discovery of new pools and extensions in the three areas is given in Table II.

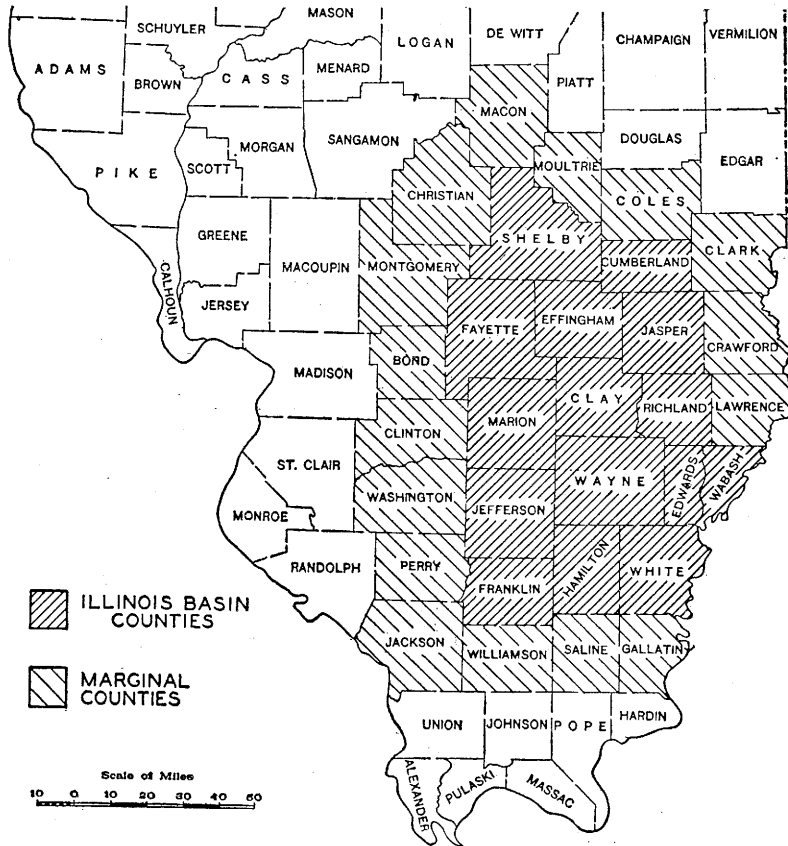


FIG. 2.—Index map of counties with respect to Illinois basin.

The pattern of new discoveries in 1942 with respect to regional structure, therefore, follows closely that of 1941.

EXPLORATORY METHODS

Of the 549 wildcat wells completed in Illinois in 1942, 360 were located by geology (including 82 located by "trend" only), 29 were located by seismograph, and 19 by a combination of seismograph and geology. Of the remaining 141 wells, 90 were not located by any scientific method and for 51 the method of location is unknown.

TABLE II
DISTRIBUTION OF ILLINOIS WILDCAT WELLS

	<i>Wildcat Wells</i>	<i>New Pools</i>	<i>Extensions</i>	<i>Total</i>	<i>Per Cent Productive</i>
Illinois basin counties	345	31	43	74	21
Marginal counties	131	7	4	11	8
Outside counties	73	2	1	3	4
	549	40	48	88	16

DEVELOPMENTS IN EASTERN INTERIOR BASIN IN 1942 817

TABLE III
METHOD OF LOCATION OF WILDCAT WELLS IN ILLINOIS IN 1942

	<i>Wildcats</i>	<i>Producers*</i>	<i>Per Cent Successful</i>
Geology	360	68	19
Seismograph	29	5	17
Seismograph and geology	19	5	26
Total scientific	408	78	19
Non-scientific	90	7	8
Unknown	51	11	20
	549	96*	17

* Includes 6 small gas wells from which no gas has been marketed and 2 small oil wells which were not commercial, but which might be edge wells.

STRATIGRAPHIC DISTRIBUTION OF NEW POOLS AND EXTENSIONS

Nearly all of the new pools and extensions discovered in 1942 produce from formations of Mississippian age and were about equally divided between the Chester series (Upper Mississippian) and the Iowa series (Lower Mississippian). Three small pools were discovered in Pennsylvanian sandstones, one in the vicinity of the old field in Clark County and two in western Illinois. There was one Devonian discovery—Bartelso South (Clinton County), with only one well producing at the end of the year. The discovery of a new “Trenton” limestone (Ordovician) pool—the St. Jacob pool, Madison County, caused considerable activity in western Illinois but without any additional “Trenton” discoveries. The St. Jacob pool, approximate depth to top of “Trenton” 2,300 feet, had 23 producing wells at the end of 1942, a proved area of 720 acres, and total yield of 261,000 barrels.

DEEP TESTING

The test drilling of formations below the McClosky “lime” in 1942 has been largely confined to the marginal areas around the Illinois basin. About 20 wildcat “Trenton” tests were drilled in Madison, St. Clair, Clinton, and Monroe counties in western Illinois following the discovery of the St. Jacob pool in Madison County, June 2, 1942. Seven Devonian and one St. Peter tests were drilled in Edgar, Coles, Clark, and Crawford counties, in or near the old Southeastern Illinois oil field. The deepest Devonian tests were two located in Jefferson County, one of them about one mile north of the King pool. Several “Trenton” tests were drilled in the vicinity of the Colmar-Plymouth pool, McDonough County.

GEOLOGICAL SOURCE OF OIL

Because many leases in Illinois produce from formations of more than one age and the oil is run into the same tanks, no separate record is kept of the amount of oil from the different formations. However, in the pools producing in part from the Devonian and “Trenton” formations, the oil companies are able to estimate with some degree of assurance the relative amount of oil from these deeper formations. The estimated figures for Devonian and “Trenton” production were

arrived at after consultations with companies concerned. The estimates for the Pennsylvanian production take into consideration the number of wells producing from the Pennsylvanian in each pool in comparison with the total number of producing wells in the pool. This estimate is of course subject to a large error but

TABLE IV

STRATIGRAPHIC DISTRIBUTION OF NEW POOLS AND EXTENSIONS DISCOVERED IN 1942		
<i>System or Series; Formation</i>	<i>New Pools</i>	<i>Extensions</i>
Pennsylvanian system		
Sandstone	3	1
Mississippian system		
Chester series		
Palestine	0	1
Waltersburg	1	0
Tar Springs	0	1
Cypress	3	3
Bethel	4	6
Aux Vases	10	14
Iowa series		
Ste. Genevieve		
Levias	2	3
Rosiclare	0	5
Fredonia (McClosky)	17	15
Devonian system		
Limestone	1	0
Ordovician system		
"Trenton" limestone	1	1
	42*	50*

* These numbers exceed the actual number of new pools and extensions (40 and 48, respectively) because some of the discovery wells produced from more than one formation.

it is more likely to be too high than too low. The remainder of the production of the state, after subtracting the estimates for the Pennsylvanian, Devonian, and Ordovician, was assigned to the Mississippian. No attempt has been made to divide the Mississippian production between the Chester series and Iowa series as this is regarded as too uncertain.

INDIANA

The following statement on oil and gas activity in Indiana in 1942 was contributed by Ralph E. Esarey, State geologist, and George V. Cohee, assistant State geologist, Division of Geology, Department of Conservation, Indianapolis, Indiana.

During the past year 349 wells were drilled for oil and gas in the state. Of this number, 125 oil wells and 21 gas wells were successfully completed and 203 were dry holes. Drilling activity declined 37 per cent in 1942 as compared with the previous year, 1941. This reduction of drilling was brought about largely by Federal Conservation Order M-68, restricting drilling to one well on 40 acres in order to save steel. This order was later supplemented to permit closer spacing of wells drilled to sandstone formations in southwestern Indiana.

DEVELOPMENTS IN EASTERN INTERIOR BASIN IN 1942 819

Most of the drilling in 1942 was in the southwestern part of the state. Posey County ranked first with 94 completions and 44 producers and Gibson County was second, with 77 completions and 38 producing oil wells and 2 gas wells. A total of 589,734 feet of hole was drilled, of which 231,702 feet was wildcat footage. The total initial production of the oil wells completed was 9,974 barrels, and of the gas wells, 11,148,000 cubic feet.

Of the 349 wells completed last year 122 were wildcat wells. Twenty-six wildcat wells were completed as oil wells, 17 were extensions to proved fields, and 9 discovered new pools. Thirty-five per cent of the wells drilled in 1942 were wildcat as compared with 25.5 per cent in 1941. It is anticipated that the percentage of wildcat wells drilled in 1943 will be greater, although the total number of wells drilled will probably be less.

TABLE V
OIL PRODUCTION IN ILLINOIS IN 1942, ESTIMATED BY GEOLOGICAL SYSTEMS

<i>System</i>	<i>Barrels</i>	<i>Per Cent</i>
Pennsylvanian	3,000,000	2.8
Mississippian	96,644,000	90.7
Devonian	5,626,000	5.3
Ordovician ("Trenton")	1,320,000	1.2
	<hr/> 106,590,000	<hr/> 100.0

The new discoveries in Indiana in 1942 were, for the most part, one-well pools in the southwestern part of the state, in Posey, Gibson, and Spencer counties. Most of the development in pools took place in the Hazleton and Kirksville pools in Gibson County, the Mt. Vernon pool in Posey County, and the Vernon Heights pool in Vanderburgh County. Deeper production was obtained from the Osage limestone in the Hazleton pool at a depth of 2,402 feet, 650 feet below the productive McClosky limestone. The well had an initial production of 140 barrels.

Extensions to 17 pools in the southwestern part of the state were successfully completed. There were 7 extensions in Posey County, 5 in Gibson County, 2 in Knox County, and 1 each in Spencer, Vanderburgh, and Warrick counties.

An interesting development was new production from the Devonian limestone in the Dodds Bridge pool in Sullivan County. The Ohio Oil Company deepened one of its wells, which had been producing from a shallow sand, to the Devonian, and it was completed, with an initial production of 77 barrels. Five other Devonian producing wells were completed in that area.

Crude-oil production in Indiana in 1942 was 6,641,000 barrels. The Griffin field, Gibson and Posey counties, which produced approximately 3,550,000 barrels, accounted for more than half of the production in the state. The Mt. Vernon and New Harmony fields were next in importance of production, with 684,000 and 523,000 barrels, respectively.

Natural gas produced and marketed during the year totaled 1,630,000,000 cubic feet. The Rockport gas field in Spencer County ranked first with the production of 594,316,000 cubic feet. The Unionville field in Monroe County and

Greensburg field in Decatur County were second and third with 239,856,000 and 210,827,000 cubic feet, respectively.

There was very little pipe-line activity in the State during 1942. Short lines were constructed in southwestern Indiana to provide outlets to the new fields. The Gulf Pipe Line Corporation completed the loops in its main line to Dublin, Indiana.

Repressuring is being conducted in the Griffin field with the dry gas from the Warren Petroleum Company's natural gasoline plant on the Illinois side of the Wabash River. This plant was put in operation in August, 1942, and to the end of the year it had processed approximately 500,000,000 cubic feet of gas from the Griffin field. At present approximately 1,530,000 cubic feet of dry gas is injected daily into the producing sands in the field through 14 input wells. The Waltersburg sand in the Ribeyre Island part of the New Harmony field is being repressured with 360,000 cubic feet of dry gas per day from the same plant through 4 input wells.

KENTUCKY

The following statement on development in western Kentucky in 1942 was furnished by D. J. Jones, State geologist, Lexington, Kentucky.

During the second half of 1942, western Kentucky, as a result of the completion of Burbank No. 1 in the Smith Mills area of Henderson County, had a revival of drilling activities. More than 20 producing wells were drilled, and the field is still in the development stage. The main "pay" is the Cypress sand of Chester age, and the McClosky of the Lower Mississippian has also proved productive. Some wells in this pool have attained a flush production of more than 750 barrels per day, and the general average seems to be approximately 500 barrels.

This discovery led to the drilling of numerous wildcat wells in Henderson and Union counties. As a result, new pools were discovered at Uniontown in Union County, and the Wathen pool was discovered a few miles southwest. The productive sand in the Uniontown pool is the Waltersburg (Chester) and in the Wathen pool the Waltersburg and McClosky. Later development indicates that any of the Chester sands now producing in the tri-state fields may be expected to produce in this general area.

Likewise, it is evident that other pools will be discovered in the basin area north and south of the Rough Creek fault zone. Several large companies are increasing their holdings in the Western Kentucky coal basin, and it is certain that drilling activities in that area will increase rapidly during 1943.

A recapitulation of drilling operations in 20 counties of western Kentucky for the year reveals that 186 tests were drilled, of which 99 were dry. Of the 87, there were 5 gas and 82 oil wells, resulting in a total initial production of slightly more than 14,000 barrels. Production was found in beds ranging in age from Pennsylvanian to Silurian. The sands of Chester age accounted for nearly 70 per cent of

the new production. The McClosky of the Lower Mississippian is being found productive in several places, and pools comparable with those found in the Illinois basin may be expected.

The over-all picture for western Kentucky in 1942 has focused anew the attention of large and small operators upon this area of comparatively shallow drilling.

Spacing regulations do not present a serious problem. However, the low price of crude oil is discouraging wildcatting to the extent that new productive areas are not discovered with sufficient rapidity to prove any large amount of new reserves so important at this time.