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## 1938'S DEVELOPMENTS IN ILLINOIS

By  
ALFRED H. BELL

## ECONOMIC POSITION OF THE ILLINOIS OIL INDUSTRY

By  
WALTER H. VOSKUIL

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# 1938'S DEVELOPMENTS IN ILLINOIS

By

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Exploration and development in Illinois during the past three years has now revealed what is probably one of the largest shallow reserves of oil known on the continent. The possibilities for deeper production remain largely unexplored. The favorable location of these reserves with respect to existing pipe lines, railroads, and refineries and to large markets for refined products in the rich industrial and agricultural Middle West has given these reserves an importance in the eyes of the industry that is beyond their proportionate contribution to the nation's daily output. In spite of the fact that Illinois' daily production has increased seven-fold since 1936, it still amounts to less than 2½ per cent of the total for the United State.

The writer's purpose in this article is to review briefly some of the outstanding events in the Illinois oil and gas industry since January 1, 1938. Previously most of the new development was in fields producing from limestone—the McClosky "sand"—an oolitic limestone in the Ste. Genevieve formation of the lower Mississippian or Iowa series. The development of the McClosky fields has gone forward during 1938, but it has recently been overshadowed by that of the shallower sandstone fields on the western side of the basin area. At the end of September 55 per cent of the production from the new areas came from the sandstone fields and 45 per cent from the limestone fields.

## Course of Development

The course of development since the beginning of 1938 in three principal areas of new production is graphically illustrated in Figure 2. The development of the Lake Centralia (Salem) field is not shown graphically because its discovery was so recent (July 6, 1938). For an index map of the fields discussed see Figure 1.

In the Central basin fields producing from the McClosky, the rate of drilling has been rather steady through the first nine months of 1938. A rise in the rate of drilling is noted in August and September, following the discovery of the North Aden or Fairfield pool in which average initial production of 850 bbls. has been recorded for seven wells. Average production per well per day in the McClosky fields shows a general decline; the exceptions to this are a rise in April due to the drilling of several large wells in the Noble pool and a rise in September as a result of the large wells in the North Aden pool. Total production per month has fluctuated, with a notable rise to a new peak

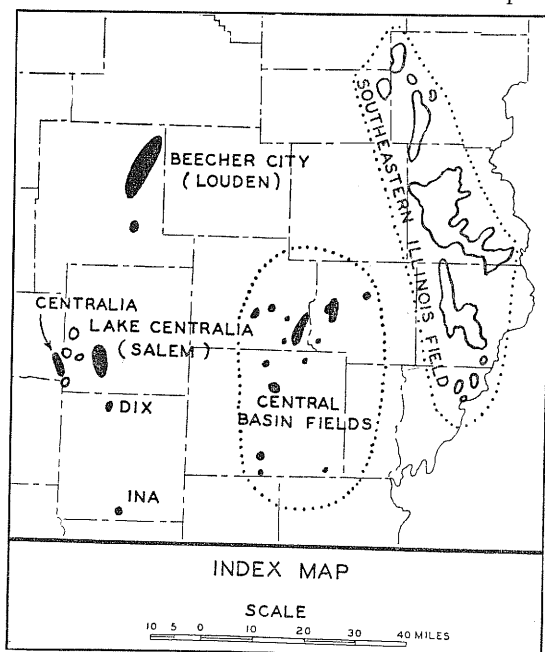


Fig. 1.—Index map. New fields are shown in solid black; old fields in outline

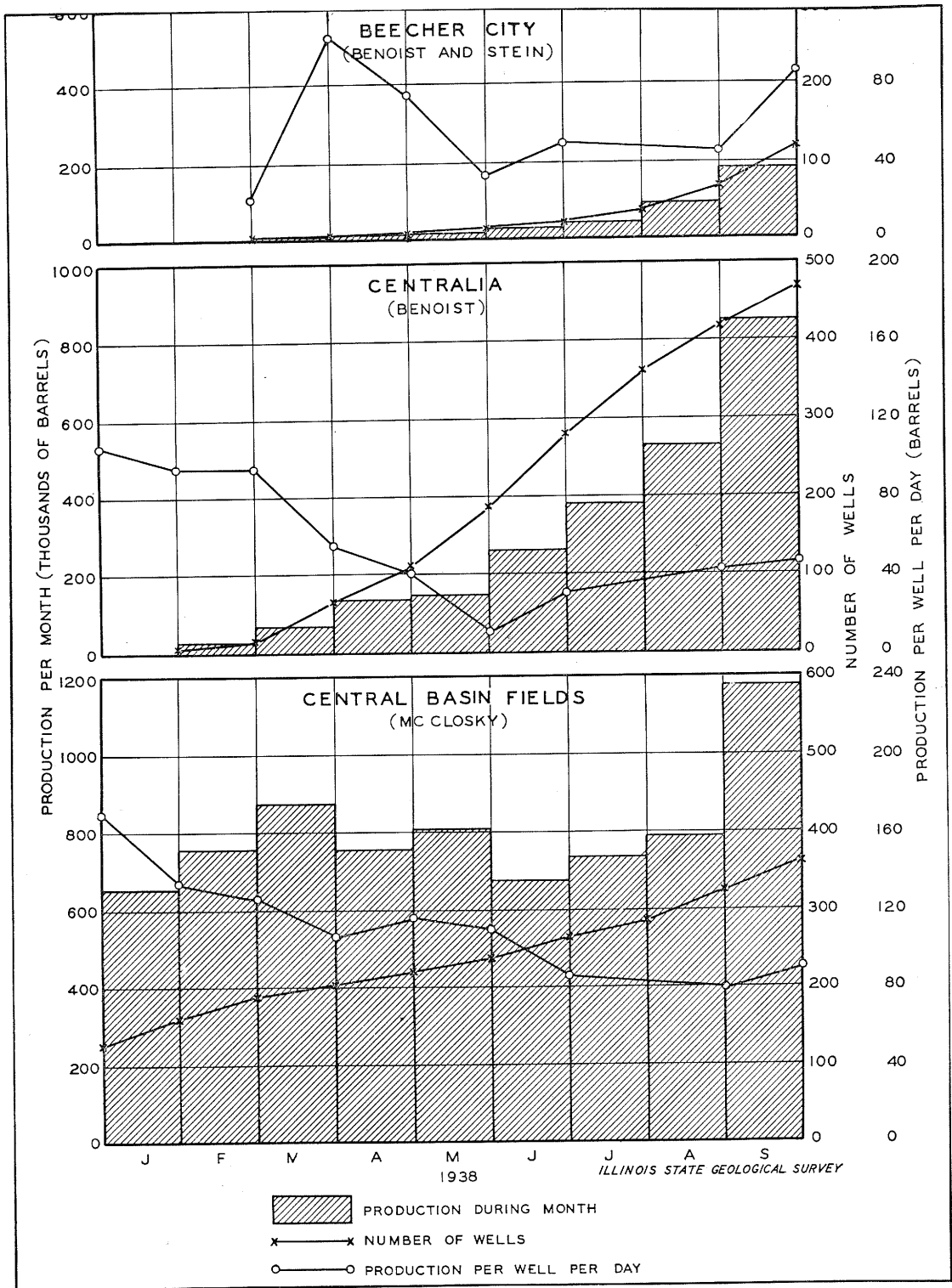


Fig. 2—Monthly production, number of wells, and average production per well per day from January 1, 1938, to September 30, 1938, in the Illinois areas

in September. There has been practically no artificial curtailment of production in the McClosky pools.

The Centralia field was discovered by a well completed November 30, 1937, about 2 miles northwest of the city of Centralia. The very rapid rate of drilling in this field in the summer of 1938 was due to the location of a part of the productive area within the city limits. A reduction in the rate of drilling beginning in July may be noted in the graph.

Curtailment of production by oil buyers in the Centralia field began April 20 when purchases were reduced to an amount equivalent to an average of 20 bbls. per well per day. Although curtailment was in effect up to August 8, the allowable per well was raised by steps until it equaled the potential. It is interesting to observe that a notable drop in average production per well per day, from 96 to 54 bbls., occurred during the month of March prior to any artificial curtailment. However, in spite of declines in average production per well, the trend of the total production has been steadily upward, with an exceptionally large increase in September.

In the Beecher City (Louden) field the rate of drilling has been comparatively slow, because the major part of the acreage is owned by one company and because there is as yet little or no town lot drilling. Nevertheless, the rate of drilling is now rising rapidly. The curve of average production per well per day reflects artificial curtailment of production in varying amounts.

Total production of the Beecher City field up to the end of September, 1938, has been small as compared with the Centralia or Central basin fields. However, there is a large undrilled acreage proved for production (estimated at more than 15,000 acres) and several oil-bearing zones, only two of which (the Stein and Benoist) are as yet being exploited. September's production was approximately double that for August and probably a much higher production level will be reached before the field is fully developed.

The Lake Centralia or Salem field, the most recent of the new fields, is remarkable for several reasons. First, the Benoist sand wells, some with initial flows of more than 1,000 bbls., are considerably larger than those in other fields (Centralia

and Beecher City). Second, it has rich saturation in the McClosky, thus extending McClosky production about 30 miles farther west than previously known. Third, it has oil saturation in the Aux Vases (basal sandstone of the Chester series) that may prove to be commercial. On September 28 this field had 42 oil wells producing a total of 8,834 bbls. per day, an average of 210 bbls. per well. This is much higher than for any other field in the state. The productive area has not yet been defined, but at least 8,700 acres appears proved for production.

Drilling development in all the new fields of the state and the resultant increases in oil production over a period of 19 months from March 1, 1937, to September 30, 1938, are shown in Figure 3.

The lower bar chart shows monthly production for the state, divided into old and new fields, beginning June, 1937. A rapid increase in production during July, August, and September, 1937, was the result of the early drilling in the Central basin fields where many wells having initial productions from 1,000 to 2,500 bbls. per day were drilled. However, these wells also had rapid early declines, and this is reflected in the gradual flattening of the production curve during the next nine months, especially during the three months, April to June, 1938. About this time the added production due to the increased drilling in the Beecher City field began to be noticeable, and this was further augmented by the discovery of the rich Lake Centralia and North Aden fields.

Up to date (October 14, 1938), the new fields of Illinois have produced about 15,000,000 bbls. of oil in 16 months and about 1,200 wells are producing. At the end of September average production per well per day in the new fields was 67 bbls. This is in contrast to an average production per well per day of 0.9 of a barrel (12,698 bbls. from 13,935 wells) in the oil fields of the state. The daily production for the whole state (88,000 bbls. per day at the end of September) is approaching the peak rate of production (approximately 100,000 bbls.) for the old fields which was reached in 1908. It seems probable that this peak rate may be reached or exceeded by the end of 1938.

A conception of the small size of the Illinois production in comparison with that of Texas and of the United States during the past 19 months may be gained from the upper bar chart (Fig. 3, p. 8).

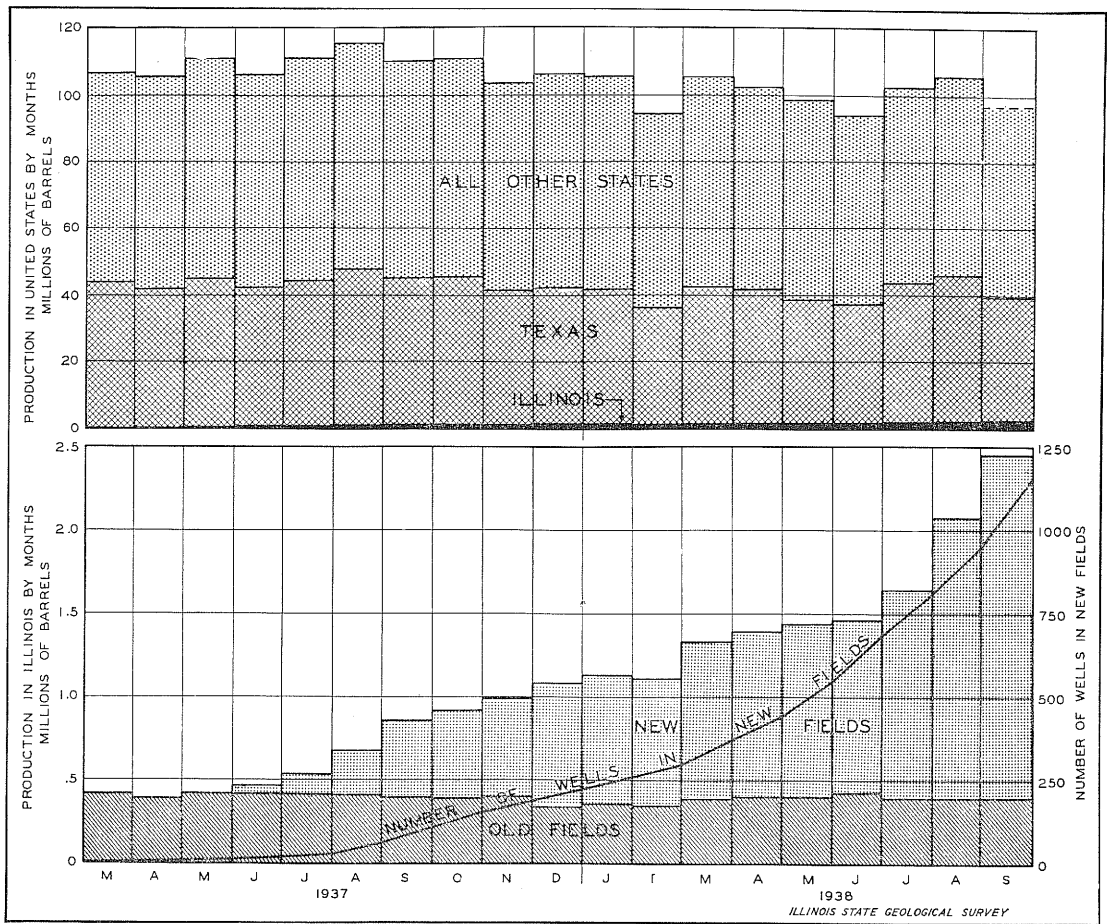


Fig. 3—Monthly production of crude oil in the old and new fields of Illinois, Texas, and the United States, March, 1937, to September, 1938

# ECONOMIC POSITION OF THE ILLINOIS OIL INDUSTRY

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Widespread interest in the recent developments in the oil industry in Illinois have occasioned this brief analysis of the economic position of the industry in this state. The elements that will be considered in this discussion include the past and present positions of Illinois in the national oil picture, the relation of new production in Illinois to supply and demand for oil products in 1937 and 1938; the position of Illinois in its local oil market, and the competitive position of Illinois among oil producing states.

From a peak production of 33,700,000 bbls. in 1908, obtained mainly in the old southeastern field, Illinois production fell to the low ebb of approximately 4,500,000 bbls. in 1936, or roughly 0.4 per cent of the national output. With the discovery and development of oil deposits in the deep basin, production has increased to a point which leads us to believe that it will reach approximately 20,000,000 bbls. for 1938, or 60 per cent of the 1908 output and 1.6 per cent of the estimated total for the nation for 1938.

In order to gain a true perspective, Table 1 is presented, showing production, contribution to the daily national demand, and per cent of United States production during the period following the opening of the new fields.

TABLE 1—ILLINOIS PRODUCTION, 1936-38

Year—	Illinois production (thous.)	Contribution to daily U. S. demands, in days' supply	U. S. production (thous.)	Illinois per cent of U. S. total
1936 .....	4,475	1.5	1,099,687	0.4
1937 .....	7,426	2.3	1,277,653	0.6
1938 (7 months)	9,498	3.0	705,744	1.3
1938 (est. for yr.)	20,000	6.3	1,230,000	1.6

With respect to conditions of supply and demand during the period of new developments in Illinois, the United States output of crude petro-

leum in 1937 increased 177,966,000 bbls. over 1936, or equal to 16 per cent. Of this increase, Illinois contributed 2,751,000 bbls., or 1.7 per cent. The principal contribution to this added supply came from Texas, followed by substantial quantities from California, Oklahoma, Kansas, New Mexico, and Louisiana. During the first seven months of 1938, there was a decrease in national production of 25,143,000 bbls. over the first seven months of the previous year, although Illinois increased its contribution by 6,582,000 bbls. This increase was not sufficient, however, to account for the increase in surplus of certain classes of refined products in the first half of the year 1938.

An examination of Table 2 shows a 9.5 per cent increase in stocks of crude petroleum and principal refined products on December 31, 1937, over the previous year. The principal increase occurred in stocks of gasoline. From December 31, 1937, to July 31, 1938, there was a decline of 1.2 per cent in total stocks. The decrease during this period was effected entirely in the supply of crude petroleum. The supply of gasoline remained virtually unchanged, whereas kerosene, gas oil and distillate fuel and residual fuel oil showed substantial increases. The program of production curtailment beginning in May with Saturday and Sunday shutdowns in Texas aided materially in reducing stocks of crude petroleum and gasoline below the level of July 31, but stocks of fuel oil continued to increase. The increase in gas oil and distillate fuel from which most of the heating oils are obtained, was seasonal, since purchases of oil for domestic and commercial heating decline rapidly after March. A decline in stocks of this refined product may be expected in September and continue until February, 1939. In view of the annual increment in the number of oil burners installed each year, the present stocks do not appear to be excessive.

**TABLE 2—STOCKS OF CRUDE OIL AND REFINED PRODUCTS ON SPECIFIED DATES\***

(Thousands of barrels)

	Dec. 31, 1936	Dec. 31, 1937	July 31, 1938
Crude petroleum .....	288,184	306,084	288,664
Gasoline .....	62,885	76,990	76,732
Kerosene .....	5,633	7,083	10,112
Gas oil and distillate fuel..	22,719	22,566	26,620
Residual fuel .....	84,199	95,019	99,363
<b>Total .....</b>	<b>463,620</b>	<b>507,742</b>	<b>501,491</b>

\*Source: U. S. Bureau of Mines, monthly petroleum statements.

The unusually long-continued and large increase in stocks of residual fuel oil cannot be related entirely to fluctuations in seasonal demand. This type of fuel finds its principal outlet as an industrial fuel. With the recession in industrial production beginning in 1937 and continuing through a large portion of the year 1938, demand for the residual fuel oil fell off sharply so that the large supply of stocks accumulated as a result of increased runs to stills in 1937, continued to increase in 1938, in spite of a curtailed production program. The disposal of this product is currently one of the critical problems of the petroleum industry and can be solved only by a hoped-for increase of industrial activity.

### Illinois Petroleum and the Local Market

The Illinois oil-producing districts are located in close proximity to a large gasoline, heating oil and industrial fuel market. The principal outlet for the products of refineries located in Illinois and Indiana are in the states of Illinois, Indiana, Wisconsin, Minnesota, and Iowa.

Consumption of major oil products in Illinois amounted to 47,000,000 bbls. in 1936 and is estimated at 52,000,000 bbls. in 1937. Gasoline continues to be the most important oil product used, followed by oil for domestic and commercial heating. The smallest of the specialized oil markets is that of range oil, but this is of particular interest because of the rapid expansion of this market within a few years and the continuing expanding sales of small oil burners using this type of oil.

The four refinery products included in Table 3 represent approximately 91 per cent of the crude oil required for their manufacture. On this basis, the estimated crude requirements for Illinois were

54,500,000 bbls., and for the entire group of states named above, they were 130,000,000 bbls. in 1936.

Table 3 shows the demand for principal products in Illinois and adjacent states—Indiana, Wisconsin, Minnesota, and Iowa. Data on consumption of gasoline by states is available for 1936 and 1937. For other major products, data on consumption is available for 1936 and is estimated for 1937.

For heating oils, an increase of 13 per cent in 1937 over 1936 is assumed, based upon past records of growth of the heating oil market. For residual fuel oil, an increase of 6 per cent in 1937 over 1936 is estimated on a basis of increased industrial activity in the latter year. For range oil, an increase of 20 per cent is assumed, based upon the rapidly expanding use of this product during the depression and immediately after.

**TABLE 3—SUMMARY OF DEMAND FOR PRINCIPAL OIL PRODUCTS IN 1936 WITH ESTIMATES FOR 1937, ILLINOIS AND ADJACENT MARKET STATES (INDIANA, WISCONSIN, MINNESOTA, AND IOWA)\***

(Thousands of barrels)

Product—	Illinois	Adjacent states	Total
Gasoline:			
1936 .....	28,379	47,786	76,165
1937 .....	30,794	51,602	82,396
Heating oils:			
1936 .....	11,505	9,250	20,755
1937 .....	13,000	10,450	23,450
Residual fuel oil:			
1936 .....	6,846	8,188	15,034
1937 .....	7,250	8,680	15,930
Range oil:			
1936 .....	595	641	1,196
1937 (est.) .....	665	775	1,440
Total of above products:			
1936 .....	47,285	65,865	113,150
1937 (est.) .....	51,709	71,507	123,216
Estimated crude requirements necessary to meet above demands:			
1936 .....	54,500	75,750	130,250
1937 .....	59,500	82,200	141,700

\*Minerals Yearbook, 1937, U. S. Department of the Interior, Bureau of Mines.

The crude petroleum requirements estimated to meet the above needs are calculated on a basis that the above products are equal to 91 per cent of the crude oil required to produce them.

### Refineries

For the supply of oil to consumers in the Illinois oil market area, refineries are located in the



Chicago area, in southeastern Illinois, in the St. Louis area, and at scattered points elsewhere. The Illinois refineries are included by the Bureau of Mines, for statistical purposes, in the Central West refining district which comprises Illinois, Indiana, Kentucky, western Ohio and Michigan. The total capacity of the refineries in this district is 522,530 bbls. daily, of which 248,500 bbls. capacity, or 47.6 per cent, is located in the Chicago industrial area in Cook and Will counties, Illinois, and Lake County, Indiana. This refining district, therefore, is the principal center of supply of refined products. The distribution and capacity of refineries in the Central district are as follows:

TABLE 4

Location—	Number of plants	Daily capacity (bbls.)
Chicago district (incl. Indiana) .....	15	248,500
Other Illinois .....	6	98,500
Ohio .....	13	85,430
Kentucky .....	8	27,600
Michigan .....	23	62,500
Total .....	65	522,530

The largest aggregate and individual capacities are located in the Chicago industrial area including Lockport, and from these plants are shipped oil products to the heavily populated districts bordering Lake Michigan. The other important refinery locations in Illinois are in the St. Louis area near Alton and in the southeastern Illinois field. Refineries in Indiana are all located in the Chicago industrial districts with the exception of a small refinery of 200 bbls. daily capacity, located at Troy.

Refineries in Kentucky are all small in size, the largest being at Latonia, near Cincinnati, Ohio, with a capacity of 8,000 bbls. These refineries probably serve a local market and do not extend their activities into the Illinois area.

The principal refineries in western Ohio affecting the central states' oil market are concentrated mainly in the Toledo area, with smaller refinery capacity located at Findlay and Lima. About 80 per cent of this refinery capacity is located at Toledo. A portion of the Minnesota oil market is supplied by these refineries through shipments over the Great Lakes through the Sault Ste. Marie canal. The extent of this market is indicated by shipment of oil products through the American and Canadian canals at Sault Ste. Marie, Mich., and Ontario, for the period 1931 to 1937.

In addition to refineries in existence previous to 1937, four small refineries have been erected to serve the new fields. Three are located in Centralia with a reported daily capacity of 2,000 bbls. each, and one at St. Elmo with a daily capacity of 3,500 bbls. These refineries are entering the market in a particularly difficult period in view of the keenly competitive conditions in the residual fuel oil market. Unless market outlets for this product are established in industrial markets such as St. Louis or Chicago, a local market must be developed. In view of the abundant supplies of coal locally, this may be somewhat difficult to do.

### Competitive Position of Illinois

The revival of oil production in Illinois has aroused considerable interest as to its competitive effect upon other oil-producing states, particularly in the Mid-Continent field. The total added contribution to date, as has been shown above, is as yet of small significance, measured in terms of the nation's daily demand for crude oil. The contribution from Illinois rose from 1.5 days' supply in 1936 to 2.4 days' supply in 1937, or an additional 0.9 of a day's supply. In that same year, production in the entire oil industry rose to an equivalent of 56 days' added supply.

The apparent competitive effect of this new supply from Illinois has been restricted mainly to fields in Oklahoma, Arkansas and Kansas, which states have in part supplied the Illinois oil market territory with both crude oil and gasoline.

Shipments of crude oil from Mid-Continent fields in 1937 were reported as follows:

TABLE 5—CRUDE OIL RECEIPTS AT REFINERIES IN ILLINOIS, INDIANA, AND WESTERN OHIO\*

From:/To:	Indiana	Illinois	W. Ohio	Total
Oklahoma .....	40,367	21,445	17,575	79,387
Texas .....	6,265	3,291	2,918	12,474
Other states .....	24,035	15,734	6,922	46,691
Total .....	70,667	40,470	27,415	138,552

\*Source: Minerals Yearbook, 1938, page 486.

The added supply of petroleum produced in Illinois in 1937 over 1936 (2,951,000 bbls.), all of which is presumably disposed of in refineries in these states, is equivalent to about 2 per cent of crude oil also received by refineries in these states from Mid-Continent fields. In 1938, increased production in Illinois from the new fields, estimated at 15,000,000 bbls. above 1936 production, may displace about 10 per cent of Mid-Continent crude.