Development of the crude oil industry in Montana

Douwe Douma

The University of Montana

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DEVELOPMENT OF THE CRUDE OIL INDUSTRY

IN MONTANA

by

Douwe Douma

Presented in partial fulfillment
of the requirements for the degree of
Master of Arts

MONTANA STATE UNIVERSITY

1952
This thesis has been approved by the Board of Examiners in partial fulfillment of the requirements for the degree of Master of Arts.

Chairman

Dean of the Graduate School

Date 3/7/52
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PART I

THE PLACE OF CRUDE OIL IN MODERN SOCIETY
CHAPTER I
INTRODUCTION

Crude oil is inseparable from the growth of modern industrial civilization. According to L. M. Fanning, oil is the "vital spoke in the wheel which we call progress." Modern society is hard to imagine without machines and motors, for which the supply of gasoline, fuel oils and adequate lubricants is a matter of life and death. In less obvious form crude oil products have penetrated everyday life in hundreds of ways, ranging from medicines and toilet-articles to cameras and plastics. Crude oil has been a leading factor in the development of modern society. Hand in hand with the rising standard of living oil has supplied in ever increasing amounts many of the products that bring satisfaction.

---

1E. W. Zimmermann points out on page 496 of his World Resources and Industries (New York: Harper and Brothers, 1951), that some experts insist that the word petroleum includes all hydrocarbons other than coal, thus including: crude oil, natural gas, natural gasoline and shale oil. In this sense Petroleum is used in the statistical annual of the American Petroleum Institute, where a sharp distinction is made between crude oil reserves and petroleum reserves, the latter including natural gas. As natural gas is not included in this study, the term crude oil will be used.

to human wants. "Since 1859, the standard of living and the
development of the United States have increased in direct
proportion to the increased use of petroleum."^3

Early in the nineteenth century crude oil was looked
upon as a nuisance, especially by the salt well drillers on
the western slopes of the Allegheny Mountains, because it
invaded and ruined their salt wells. A few pharmacists
brought the mineral oil on the market as a medicine capable
of curing all ills, but its strategic importance in society
was not to be recognized for many years to come.

By 1850 the need for a new illuminant was developing
because of the dwindling resources of the then generally used
whale oil, which formed for many years one of the principal
illuminants in this country. Around 1850 the supply of this
commodity was becoming precariously low and consequently the
need for finding an adequate substitute became more and more
urgent. Several experiments with coal-gas and coal-oil ended
in failure, because of the lack of an efficient burner. Of­
fensive odors, smoke, and occasional explosions discouraged
the use of gas until the Bunsen-burner (1855) was invented.^4

Not until kerosene was processed from crude oil (1859), was
there a satisfactory illuminant provided for the market.

^3American Petroleum Institute, Facts About Oil,
p. 30.
^4Fanning, op. cit., p. 19.
Kerosene Phase

The kerosene phase of crude oil was started by a journalist and teacher, George H. Bissell, who recognized the commercial possibilities of "rock oil," as people used to call kerosene. In 1857 he bought a plot of one hundred acres near Titusville in western Pennsylvania, and organized the first oil company of the United States, the "Pennsylvania Rock Oil Company." Samples of the oil found on the company's land were sent to Silliman, a noted Yale University chemist, who reported that rock oil was as good an illuminant as the world had ever known; moreover, it yielded gas, paraffin and lubricating oils. This report was the go-ahead for Bissell and his company.

Before the company could start working, however, an efficient method had to be found by which to bring the oil to the surface. This problem was solved by an accidental discovery. One day, when Bissell walked into an apothecary's shop, he noticed a picture of a salt plant and while looking at it he got the idea for pumping oil. Out of Bissell's discovery evolved the invention of the drilling and pumping technique, now found throughout the oil industry.

As soon as plans were ready for drilling the first

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5Ibid., p. 14.
well, Bissell hired Edwin L. Drake, a former railroad conductor and stockholder in the Pennsylvania Rock Oil Company, to supervise the drilling. After working all summer oil was struck at a depth of sixty-nine and one-half feet on August 29, 1859. "Drake's Folly," as people in that region called the experiment, became the "father" of the American oil industry. The well produced twenty-five barrels a day and the oil was sold at a price of eighteen dollars a barrel. The rumor of large profits brought prospectors in by the thousands in search for the "liquid gold." The result was a boom rivalled only by the California Goldrush.7

More wells were drilled in the newly discovered oil district, some of them producing two, three and sometimes four thousand barrels a day. Though most of the drillings brought disappointment to the prospectors, they brought the attention of the nation to mineral oil.

The ready demand for the new illuminant called for the establishment of refineries, the first of which appeared in Pittsburgh and then in other eastern cities. By 1869 American oil was known throughout the world with exports going to every nation on the globe.

Lubricant Phase

However important crude oil was as an illuminant, its

---

7Fanning, op. cit., p. 16.
great uses were still to be discovered. Up until 1880 animal and vegetable oils were used as lubricants, but when steam-engines of increased power and speed were introduced in factories and mills, these lubricants became more and more unsatisfactory. The increased friction heat on the faster, new machines caused oxidation of the animal and vegetable lubricating oils which had a ruinous effect on the bearings. Friction therefore became an urgent problem. The lack of an adequate lubricant threatened to slow down industrial development. Fanning points out:

... though engine and machinery design and metallurgy were showing the way for power and speed, one essential element was lacking—lubricants to insure efficient operation—to permit, in fact, the use of the power and speed available.  

As early as 1870 crude oil refiners made efforts to develop a lubricant from the residue left after kerosene, gasoline and other light oils had been separated. The first successful use made of the remaining heavy oils was in curing leather, followed by use in the lubrication of carriage and car wheels.

In their application on machines, mineral lubricants met with many difficulties. Rumors of burned bearings and wrecked machines made it hard to find a market for them. After a period of experimentation several oil refiners discovered that the animal and vegetable lubricants were the source of trouble. Mineral lubricants, when mixed with other...

---

6 Fanning, op. cit., p. 36.
oils, dissolved the latter and caused overheating of the bearings. However, when only mineral oils were used on new machines they showed far better results, and from this time on crude oil became rapidly a key-commodity in modern industry.

During the 1880's the solution of lubrication problems made rapid progress. Scientists in the United States and Europe were making one discovery after another in the science of friction, and in the chemical laboratories of large refineries new and better types of lubricants were developed. New greases and oils were made for greater speeds, heavier loads and higher temperatures.

In this decade the road for machine progress was paved. The steam-turbine, the electric-dynamo and all kinds of new machines for industrial, agricultural and domestic use were introduced on the market. The solution of the friction problem had made it possible to make efficient use of all these new inventions.

Fuel Phase

The latter part of the nineteenth century witnessed not only the successful introduction of mineral lubricants on the market, but also the birth of the internal-combustion engine, destined to make crude oil one of the top ranking minerals. The internal-combustion engine found one of its major

\[9\text{Fanning, op. cit., p. 36.}\]
applications in the automobile, which appeared on the scene in the last decade of the nineteenth century. During the 1890's three major types of automotive carriages were competing for leadership on the market: the steam-car, the electric-car and the gasoline-car. The first light steam-car appeared in the United States in 1889, when S. H. Roper of Massachusetts made his first daring drive,\(^\text{10}\) and in 1896 several people took up the manufacture of the light steam-car.\(^\text{11}\) In 1892 the first electric-car was demonstrated on the streets of Chicago.\(^\text{12}\) In the same year Henry Ford built the first gasoline-car and enjoyed a successful demonstration in the spring of the following year. Ten years later Ford started the manufacture of gasoline-cars for the market.\(^\text{13}\)

Even as late as the opening of the twentieth century it was still uncertain which of the three major types of automobiles would prove to be superior and thus come into general use. From the standpoint of durability and all-round performance the steam-car proved to be the best, whereas the gasoline-car had its strongest point in speed and efficiency. The electric-car was favored for health and ease of handling.

Gasoline was one of the main factors which turned the balance in favor of the gasoline-car. The light and

\(^{10}\)Fanning, \textit{op. cit.}, p. 74.  
\(^{11}\)\textit{Ibid.}, p. 74.  
\(^{12}\)\textit{Ibid.}, p. 75.  
\(^{13}\)\textit{Ibid.}, p. 75.
compact fuel, used as direct power, was far superior to the heavy and bulky boiler of the steam-car. No batteries had to carried and recharged, as with the electric-car. As fuel for the gasoline engine, oil found another of its major uses.

The leaders of the oil industry foresaw that quantity production of the automobile would create a considerable demand for their products. That their foresight was not mistaken is evidenced by the rapid rise in the importance of gasoline as a marketable product. In 1909 the production of gasoline amounted to hardly more than ten per cent of the total refinery yield, whereas within twenty years it had risen to forty per cent.¹⁴ Thus, the former by-product, which had been wasted for a long time, became one of the main crude oil products.

The development and improvement of the automobile created a strong demand for a better and more adequate road system, for which purpose a large portion of the funds was gathered from motorists via gasoline taxes and license fees. Credit is due here to refiners and road engineers for the development of modern asphalt, which furnished smooth, durable and dustless highways. In turn better roads stimulated the production of more and better automobiles. The gasoline-car thus became a challenge to initiative and ingenuity of the crude oil industry, continually demanding better fuels

and more suitable lubricants. This brought the development of higher octane gasoline and lighter and more durable lubricants.

As a fuel, oil has become a serious competitor of gasoline in the last few decades. With the introduction of oil burners and Diesel engines, the demand for oil has mounted rapidly. In the beginning of the twentieth century, oil came into use as a fuel in steam-locomotives in California and in the Southwest. Because coal had to be hauled from fields lying at considerable distance from the Southwestern states, its cost of transportation was practically prohibitive. Oil was found much nearer to the points where needed, so the railroads began using oil in place of coal in these areas. Moreover, oil proved to be more efficient than coal in producing heat. At the same time oil came into use as a fuel in ships. Before the first World War marine transportation was turning more and more toward the use of oil burners, as savings in storing-space, labor and fueling time made oil much more economical than coal. During the years following the war this development was speeded up considerably, so that at present practically the entire merchant marine and navy are burning oil.\textsuperscript{15} The Diesel engine\textsuperscript{16} replaced oil burners.

\textsuperscript{15}Zimmermann, \textit{op. cit.}, revised edition 1951, p. 499.

\textsuperscript{16}Fanning, \textit{op. cit.}, p. 83. In 1897 a German engineer, Rudolf Diesel, invented the principle of the engine which has been named for him. The successful experiments with the engine attracted the interest of Krupp, as well as that of the
on a large scale during the years following the first World War. Reduction in the size and weight of the engine made it possible to use the new invention not only in ships, but also in locomotives and in heavy-duty trucks and busses. The increasing importance of fuel oil is shown in the following figures, showing the share of fuel oil and gasoline in the total refinery output of the United States for certain years.

**TABLE I**

SHARE OF GASOLINE AND FUEL OIL IN TOTAL REFINERY OUTPUT OF THE UNITED STATES, SELECTED YEARS, 1930-1948.

<table>
<thead>
<tr>
<th></th>
<th>1930</th>
<th>1940</th>
<th>1947</th>
<th>1948</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>42.0</td>
<td>43.1</td>
<td>40.2</td>
<td>40.3</td>
</tr>
<tr>
<td>Fuel oil (Distillate and Residual)</td>
<td>38.4</td>
<td>37.5</td>
<td>39.5</td>
<td>40.2</td>
</tr>
</tbody>
</table>


Crude oil was also an important factor in the development of aviation. Since the successful flight of the Wright brothers in 1903, the advances in aviation went hand in hand

American Adolphus Busch, who built the first commercial Diesel engine in St. Louis in 1898. In 1903 the German navy launched its first Diesel-engined submarine, soon followed by other nations.
with improvements in fuel and lubricants. Engines with more horsepower and greater speed, relative to the weight, were developed requiring more and more from fuel and lubricating oil. Especially during the first World War great progress was made in oil refining. In the postwar years the newly developed lubricants were important factors in the spread of aviation throughout the entire civilized world.

Around 1930 another major advance was made in the development of aviation, *viz.*, the invention of the cracking process. This new chemical process provided the 87 octane gasoline, from which an engine derived one-third more horsepower per cubic-inch of displacement than formerly. In 1934 a 100 octane fuel was developed for the United States Air Force, which increased the engine power from fifteen to thirty per cent.17

All these improvements in fuel and lubricants contributed in a considerable degree to the development of better and cheaper air transportation in the commercial field. Engines of increased horsepower, lower fuel consumption and lower maintenance cost were made possible by the new lubricants and high octane gasolines.

The key position of crude oil in our modern economic system is based not only on its importance to modern transportation, but on its essential significance for modern mass

17Fanning, *op. cit.*, p. 98.
Industries as well. Mass production brought new lubrication problems to be solved. For the many different types of machines used in mass industry special lubricants were developed, each with its own characteristics and adjusted to the required temperatures, speed and load. Scientific research of friction and lubrication proved that also in the mass production process, mineral oils were superior to vegetable oils. This gave the lubricant manufacturer his present key position in modern mass industry. As Zimmermann states: "Lubricating oil is perhaps the most important key-commodity of modern machine civilization."18

Oil in Modern War

Two World Wars of this century show clearly that crude oil is not only of strategic importance for construction, but no less for destruction. A modern war is global, requiring long supply lines and mobility of the armed forces. Oil is vital in keeping these supply lines open, and in keeping all the equipment running. Zimmermann states that during the second World War a single American armored division used 75,000 gallons of motor fuel a day.19 Former Premier Clemenceau of France said concerning the role of oil in modern war: "Oil is the blood of the battle which wins the wars."20

Because of the great strategic importance of oil, wars are partly fought for oil. All the fighting countries strive for control of as large a part of the world crude oil resources as they possibly can. Military victory stands and falls with the access to adequate crude oil resources. The strategy of Germany and Japan during the second World War can partly be explained in the light of crude oil needs. Oil was mainly responsible for Germany's attempt to conquer the Caucasus and for Japan's attack and occupation of the Indonesian archipelago. Access to the leading crude oil fields of the earth was an important factor in the victory of the Allies in both World Wars. At present the vast crude oil resources of the Middle-East make this area one of the main trouble spots in the Cold War between East and West. The crude supplied by these oil fields is of vital importance to the Western European defense and would mean a considerable addition to the crude oil output of the Soviet Union. Control of the Middle-Eastern crude oil resources might prove a decisive factor in case the present struggle for military power should end in another world war.
CHAPTER II
RELATIVE IMPORTANCE OF THE UNITED STATES AND MONTANA IN PROVED RESERVES AND PRODUCTION OF CRUDE OIL

With respect to crude oil reserves distinction is usually made between "proved reserves" and "reserves." Since different meanings are given to each of these concepts, it is necessary to explain what is meant by each of them.

Proved reserves are defined by Zimmermann as "the resources of crude oil known to be recoverable under existing economic and operating conditions." Reserves are defined by Zimmermann as "all oil actually found by drilling." Reserves of crude oil is thus a considerably wider concept than proved reserves, as the latter only include those quantities which can be recovered under the present price-cost relationship. Zimmerman estimates that proved reserves amount to about half the reserves.

When studying data on proved reserves it should be realized that these figures are by no means absolute, but instead are relative in character. Several factors account

\[^1\]Zimmermann, op. cit., Rev. Ed. 1951.
\[^2\]Ibid., p. 506.
\[^3\]Ibid., p. 509.
\[^4\]Ibid., p. 509.
for the relativity of existing data on proved reserves and these should be taken into consideration when such data are interpreted or when conclusions are drawn from them.

The first of these factors is the existing price-cost relationship. Reserves which cannot be recovered economically under the present price-cost conditions are out of bounds, which makes the data given on proved reserves considerably more important than those on reserves. Rising prices and/or falling cost will increase the amount of proved crude oil reserves. Falling prices and/or rising cost will decrease the amount of proved crude oil reserves. The rapid advance in technology makes it physically possible to drill at greater depths than ever before, enabling the utilization of new quantities of oil below the older fields.\footnote{The revival of oil production in the Gulf Coast area and the surprising endurance of other fields are examples. (Zimmermann, Ed. 1933, p. 490.)}

Drilling at greater depths increases cost, however, more than proportionately. A well of 10,000 feet costs at present about three times as much as one of 7,000 feet; drilling costs increase from $10 a foot at the 7,000 feet level to $100 a foot at the 10,000 feet level.\footnote{Zimmermann, \textit{op. cit.}, Rev. Ed. 1951, p. 527.} Depth increases by about 43 per cent, whereas drilling cost increases by 900 per cent. The existing price-cost relationship determines ultimately the depth of drilling.
Another factor accounting for the relativity of data on proved reserves refers to technical advances in the methods of recovery. New methods or techniques, such as proper use of the pressure of natural gas, application of air pressure where no natural gas is available and the flooding of oil sands with water, enable a producer to secure a second "crop" from partly depleted fields.\(^7\) Zimmermann states that in the early days of the industry often as little as ten per cent and seldom more than twenty per cent of the oil in a given reservoir could be recovered. At present as much as sixty per cent can be brought to the surface.\(^8\)

A third consideration covers the improvements in refining techniques. More advanced refining techniques have made it possible to obtain a much larger amount of products out of a given quantity of crude oil than formerly. According to Zimmermann it has been improved refining which has made it possible to utilize one hundred per cent of the crude oil, while during the early stages of the industry little more than twenty to thirty per cent of the crude was converted into useful products.\(^9\)

The price-cost relationship forms the dividing line between proved reserves and reserves, as it determines which part of the reserves will belong to the proved reserves.

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\(^7\)Zimmermann, *op. cit.*, Ed. 1933, p. 490.

\(^8\)Ibid., Rev. Ed., p. 507.

\(^9\)Ibid., p. 508.
The increased physical volume of production, resulting from the application of technological improvements, will lower the amount by which each unit of product shares in total fixed cost. If prices are not lowered accordingly, the declining cost will enable production of crude oil which had been economically prohibited before. Better methods of recovery and improved refining techniques are increasing total proved reserves by transferring a certain part of the "non proved" to the proved sector of total reserves.

United States in World Proved Reserves and Production

The main crude oil fields outside the United States are:

1. The Near and Middle East fields or the area around the Black, Caspian and Red Seas, the Persian Gulf and the eastern end of the Mediterranean. Fanning states that, excluding the Russian oil fields, the proved reserves for this area amount to about nineteen billion barrels or thirty-seven per cent of the proved reserves of the world.

2. The Russian oil fields comprise the region between the Black and Caspian Seas, the more recent Emba fields, located east of the Caspian Sea, and the Perm area,

west of the Ural.\textsuperscript{12} Fanning reports the Russian proved reserves as amounting to 5.7 billion barrels or eleven per cent of the total proved reserves of the world.\textsuperscript{13} Fanning states that this figure should be regarded as a minimum estimate, because Soviet engineers are claiming substantially larger proved reserves.\textsuperscript{14} He states further that the Union of Soviet Socialist Republics "possesses within its own borders more potential resources in petroleum than any other nation. Its proved reserves are small but these deficiencies result from lack of development."\textsuperscript{15}

3. The oil fields of Venezuela with total proved reserves of 5.6 billion barrels make up a third field and amount to eleven per cent of the total proved reserves of the world.\textsuperscript{16}

4. The Indonesian oil fields found on Sumatra, Java, Borneo and New Guinea with proved reserves of one billion barrels or two per cent of the world total.\textsuperscript{17}

5. Almost the entire area around the North Pole, extending from northern Canada and Alaska, through northern

\textsuperscript{12}Zimmermann, \textit{op. cit.}, p. 516.
\textsuperscript{13}Fanning, \textit{Our Oil Resources}, p. 121.
\textsuperscript{14}\textit{Ibid.}, p. 123.
\textsuperscript{15}\textit{Ibid.}, p. 123.
\textsuperscript{16}\textit{Ibid.}, p. 121.
\textsuperscript{17}\textit{Ibid.}, p. 121.
Siberia to northern Europe. No figures are given on this area as very little exploring has been done here. Fanning states that in Alaska thousands of square miles are showing oil seepages and the same can be said for the Arctic coast of Siberia.  

The total proved reserves of the world amount, according to Fanning, to 51.3 billion barrels, of which the United States has twenty billion barrels within its borders or thirty-nine per cent of the total. Zimmermann states in this respect that the American Petroleum Institute estimated the United States proved reserves as amounting to 23,280,444,000 barrels on December 31, 1948. According to the same authority this is the highest estimate of the proved reserves of the United States on record.

It should be emphasized here that the United States area has been explored far more thoroughly for oil than any other in the world. About 1,250,000 wells have been drilled within its borders, so that proved reserves within the United States are "more proved" than the figures given for the other fields. World proved reserves contain a larger element of estimation than those given for the United States, and the former are thus less dependable and accurate.

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18Ibid., pp. 122, 123.
19Ibid., p. 121.
The total world production of crude oil from 1860 to 1949 amounted to 58.3 billion barrels. Of this the United States produced 37.1 billion barrels or 63.6 per cent, which makes this country at present the leading crude oil producing nation. During 1948 the United States alone produced more than two million barrels or 59.2 per cent of the total world production of 3.4 million barrels.

The United States is not only the largest producer of crude oil in the world, but at the same time it is the largest consumer of crude oil products. Zimmermann points this out by stating that the people of this country consume about sixty per cent of all the crude oil produced in the world, whereas they constitute only six per cent of the total world population.

Montana in United States and Rocky Mountain Production and Proved Reserves

The crude oil producing areas of the United States are usually divided into seven districts. These are: Appalachian, Lima-Indiana-Michigan, Illinois-Indiana, Midcontinent, Gulf coast, California and Rocky Mountain dis-

\[\text{Ibid.}, \text{p. 510.}\]
\[\text{Ibid.}, \text{p. 514.}\]
\[\text{Ibid.}, \text{p. 514.}\]
\[\text{Ibid.}, \text{p. 496.}\]
Since 1900 the Rocky Mountain district has been gaining gradually in importance. This is shown in the following figures:

**TABLE II**

**ROCKY MOUNTAIN CRUDE OIL PRODUCTION AND ITS SHARE IN TOTAL UNITED STATES PRODUCTION, SELECTED YEARS, 1900-1948.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Physical production in millions of barrels</th>
<th>Per cent of total United States production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>1935</td>
<td>20.3</td>
<td>2.0</td>
</tr>
<tr>
<td>1940</td>
<td>34.3</td>
<td>2.5</td>
</tr>
<tr>
<td>1946</td>
<td>60.1</td>
<td>3.4</td>
</tr>
<tr>
<td>1947</td>
<td>69.1</td>
<td>3.7</td>
</tr>
<tr>
<td>1948</td>
<td>80.6</td>
<td>4.0</td>
</tr>
</tbody>
</table>


The share of the Rocky Mountain region in the production of crude oil increased from 0.5 per cent in 1900 to four per cent in 1948. At the latter date the district ranked fourth, as against fifth place in 1900.

Within the Rocky Mountain district Montana ranked third in volume of production in 1949, with a total crude

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25Ibid., p. 516.

26The American Institute of Mining and Metallurgical Engineers, *Statistics of Oil and Gas Development and Production*, (Petroleum branch) Wyoming, Colorado, Montana and Utah are considered in the above publication as the main crude oil producing states of the Rocky Mountains.
oil production of 9,149,000 barrels, out of a total physical production of 80,631,000 barrels\textsuperscript{27} for the entire Rocky Mountain district. In 1949 Wyoming produced 46,935,000 barrels, Colorado 24,083,000 barrels and Utah 464,000 barrels;\textsuperscript{28} Wyoming thus ranks first among the oil producing states of the Rocky Mountain district. From the given data it can be seen that Montana produced 11.3 per cent of the total production of the Rocky Mountain district in 1949. In the preceding year the Rocky Mountain district produced four per cent of the total crude oil production of the United States.

Montana's share in the total production of the United States amounted to 0.50 per cent in 1949.

Table III shows the rank of Montana among the main crude oil producing states of the United States as of January 1, 1950. Considered are the accumulated production up to January 1, 1950, the total physical production during 1949, and the total proved reserves on January 1, 1950. The data in the Table show that Montana ranks sixteenth among the main crude oil producing states of this country, when considering the accumulated physical production up to January 1, 1950. In 1949 Montana ranked fifteenth in physical production.

The total proved reserves of the United States were

\textsuperscript{27}Independent Petroleum Association of America, The Oil Producing Industry in Your State, 1950, Oklahoma, Independent Petroleum Association of America.

\textsuperscript{28}See footnote p. 21.
### TABLE III

PRODUCTION AND PROVED RESERVES OF THE MAIN OIL STATES OF THE UNITED STATES

(in thousands of barrels)

<table>
<thead>
<tr>
<th>States</th>
<th>Accumulated Production by January 1, 1950</th>
<th>Per cent</th>
<th>Production during 1949</th>
<th>Per cent</th>
<th>Proved Reserves on January 1, 1950</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>36,872,514</td>
<td>100.00</td>
<td>1,832,227</td>
<td>100.00</td>
<td>28,273,436</td>
<td>100.00</td>
</tr>
<tr>
<td>Arkansas</td>
<td>764,522</td>
<td>2.07</td>
<td>29,936</td>
<td>1.63</td>
<td>353,105</td>
<td>1.25</td>
</tr>
<tr>
<td>California</td>
<td>8,291,813</td>
<td>22.88</td>
<td>332,839</td>
<td>18.17</td>
<td>4,143,026</td>
<td>14.65</td>
</tr>
<tr>
<td>Colorado</td>
<td>123,083</td>
<td>0.33</td>
<td>24,083</td>
<td>1.31</td>
<td>369,002</td>
<td>1.31</td>
</tr>
<tr>
<td>Illinois</td>
<td>1,444,300</td>
<td>3.92</td>
<td>64,583</td>
<td>3.52</td>
<td>494,804</td>
<td>1.75</td>
</tr>
<tr>
<td>Indiana</td>
<td>189,565</td>
<td>0.51</td>
<td>9,556</td>
<td>0.52</td>
<td>50,335</td>
<td>0.18</td>
</tr>
<tr>
<td>Kansas</td>
<td>1,991,888</td>
<td>5.40</td>
<td>101,868</td>
<td>5.56</td>
<td>844,795</td>
<td>3.00</td>
</tr>
<tr>
<td>Kentucky</td>
<td>241,433</td>
<td>0.65</td>
<td>8,656</td>
<td>0.47</td>
<td>69,413</td>
<td>0.25</td>
</tr>
<tr>
<td>Louisiana</td>
<td>2,351,890</td>
<td>6.38</td>
<td>190,715</td>
<td>10.41</td>
<td>2,506,191</td>
<td>8.86</td>
</tr>
<tr>
<td>Michigan</td>
<td>306,281</td>
<td>0.83</td>
<td>16,495</td>
<td>0.90</td>
<td>67,699</td>
<td>0.24</td>
</tr>
<tr>
<td>Mississippi</td>
<td>245,904</td>
<td>0.67</td>
<td>37,966</td>
<td>2.07</td>
<td>459,267</td>
<td>1.62</td>
</tr>
<tr>
<td>Montana</td>
<td>160,176</td>
<td>0.43</td>
<td>9,149</td>
<td>0.50</td>
<td>116,103</td>
<td>0.41</td>
</tr>
<tr>
<td>New Mexico</td>
<td>635,276</td>
<td>1.72</td>
<td>47,932</td>
<td>2.62</td>
<td>677,941</td>
<td>2.40</td>
</tr>
<tr>
<td>New York</td>
<td>172,828</td>
<td>0.47</td>
<td>4,248</td>
<td>0.23</td>
<td>62,900</td>
<td>0.22</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>6,095,921</td>
<td>16.53</td>
<td>151,902</td>
<td>8.29</td>
<td>1,563,948</td>
<td>5.53</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1,113,167</td>
<td>3.02</td>
<td>11,374</td>
<td>0.62</td>
<td>105,999</td>
<td>0.37</td>
</tr>
<tr>
<td>Texas</td>
<td>12,892,737</td>
<td>34.97</td>
<td>743,990</td>
<td>40.61</td>
<td>15,653,443</td>
<td>55.36</td>
</tr>
<tr>
<td>Wyoming</td>
<td>851,973</td>
<td>2.31</td>
<td>46,935</td>
<td>2.56</td>
<td>735,465</td>
<td>2.60</td>
</tr>
</tbody>
</table>

estimated at 23,280,444,000 barrels on December 1, 1948 by the American Petroleum Institute.\textsuperscript{29} On January 1, 1950 the total United States proved reserves were estimated at 28,378,501,000 barrels, according to the 1950 publication of the Independent Petroleum Association of America.\textsuperscript{30} Table III shows further the distribution of proved reserves over the main crude oil producing states; it can be seen here that Montana ranks twelfth in proved reserves. Montana's proved reserves amounted to 0.5 per cent of the total United States proved crude oil reserves by January 1, 1950.

Montana's Crude Oil Industry

Although the crude oil industry is relatively young, when compared to the other mining industries of the Treasure State, yet when once started it came rapidly to the foreground. In recent years crude oil has ranked second among the minerals produced in Montana, its value of production surpassed only by the copper industry. When studying the yearly value of production of copper, crude oil and zinc in Montana, several factors can be seen concerning the place of the crude oil industry in Montana mining. To bring out these factors, figures are given below on the yearly value of production of the three leading minerals of Montana over the period 1930-1949.

\textsuperscript{29}See p. 18.

\textsuperscript{30}\textit{Independent Oil Producing Association of America, op. cit.}, p. 58.
### TABLE IV
VALUE OF PRODUCTION OF COPPER, CRUDE OIL AND ZINC IN MONTANA, SELECTED YEARS, 1930-1949.

<table>
<thead>
<tr>
<th>Years covered</th>
<th>Value of copper production</th>
<th>Value of crude oil production</th>
<th>Value of zinc production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>$25,504,378</td>
<td>$5,420,000</td>
<td>$2,536,373</td>
</tr>
<tr>
<td>1931</td>
<td>16,794,572</td>
<td>2,730,000</td>
<td>512,809</td>
</tr>
<tr>
<td>1932</td>
<td>5,345,383</td>
<td>2,560,000</td>
<td>131,791</td>
</tr>
<tr>
<td>1933</td>
<td>4,190,488</td>
<td>2,220,000</td>
<td>1,740,854</td>
</tr>
<tr>
<td>1934</td>
<td>5,061,200</td>
<td>4,380,000</td>
<td>2,642,017</td>
</tr>
<tr>
<td>1935</td>
<td>12,861,470</td>
<td>6,150,000</td>
<td>4,820,705</td>
</tr>
<tr>
<td>1936</td>
<td>20,155,096</td>
<td>7,700,000</td>
<td>4,971,700</td>
</tr>
<tr>
<td>1937</td>
<td>34,975,776</td>
<td>7,300,000</td>
<td>5,091,840</td>
</tr>
<tr>
<td>1938</td>
<td>15,133,748</td>
<td>5,190,000</td>
<td>849,024</td>
</tr>
<tr>
<td>1939</td>
<td>20,348,016</td>
<td>5,860,000</td>
<td>3,618,096</td>
</tr>
<tr>
<td>1940</td>
<td>28,564,366</td>
<td>6,660,000</td>
<td>6,625,962</td>
</tr>
<tr>
<td>1941</td>
<td>30,216,496</td>
<td>8,000,000</td>
<td>9,106,500</td>
</tr>
<tr>
<td>1942</td>
<td>34,168,948</td>
<td>8,950,000</td>
<td>10,176,990</td>
</tr>
<tr>
<td>1943</td>
<td>34,976,500</td>
<td>9,500,000</td>
<td>8,122,896</td>
</tr>
<tr>
<td>1944</td>
<td>31,912,300</td>
<td>10,700,000</td>
<td>8,236,956</td>
</tr>
<tr>
<td>1945</td>
<td>23,896,620</td>
<td>10,810,000</td>
<td>4,002,690</td>
</tr>
<tr>
<td>1946</td>
<td>18,947,844</td>
<td>12,710,844</td>
<td>4,091,880</td>
</tr>
<tr>
<td>1947</td>
<td>24,318,000</td>
<td>16,701,000</td>
<td>11,054,270</td>
</tr>
<tr>
<td>1948</td>
<td>25,281,368</td>
<td>23,989,343*</td>
<td>15,719,270</td>
</tr>
<tr>
<td>1949</td>
<td>22,304,734</td>
<td>23,894,640*</td>
<td>13,440,360</td>
</tr>
</tbody>
</table>


*Oil Conservation Board of the State of Montana, Statement of Crude Oil Produced and Valuation of All Montana Fields, Great Falls, Montana, 1950.
From the above data the following conclusions can be
drawn:

1. During the entire period covered copper shows
sharp fluctuations in the yearly value of production.

2. When considered on the basis of value copper
ranked first in Montana mining up to 1949.

3. Zinc shows considerable fluctuation in value
produced. With exception of 1941 and 1942, the value of pro­
duction of zinc remains considerably below that of crude oil
over the entire period covered.

4. From 1930 to 1937 the value of crude oil produc­
tion fluctuated rather widely. From 1938 to 1948 its value
of production increased steadily with a relatively small de­
cline in 1949.

5. When value of production is considered crude oil
ranked second in Montana mining up to 1949.

6. In 1949 crude oil became Montana's first mineral,
surpassing copper by more than 1.5 million dollars in value.

Conclusions

The relative importance of the Montana crude oil
industry in the mining industry of this state can be summar­
ized as follows:

1. In 1949 Montana ranked fifteenth in physical vol­
ume of production among the crude oil producing states of the
United States, producing 0.497 per cent of the total oil pro­
duction of this country. In proved reserves Montana ranked
twelfth among the oil producing states, with 0.5 per cent of the total proved reserves of the United States by January 1, 1950.

2. Within the Rocky Mountain district Montana ranked third as an oil producing state, with 11.3 per cent of the total crude oil production of this district in 1949.

3. Since 1937 crude oil has shown a steady increase in its value of production and, with the exception of 1941 and 1942, it has been Montana's second mineral. In 1949 crude oil drove copper from first rank in Montana mining, the place which copper held for many years.
PART II

DEVELOPMENT OF THE CRUDE OIL INDUSTRY
IN MONTANA
Montana's crude oil industry is relatively young when compared to those of other crude oil producing states of the United States, yet the presence of crude oil in Montana has been known since 1864, only five years after Drake struck oil near Titusville, Pennsylvania. The first crude oil discovery in Montana was made by members of an immigrant train, August 10, 1864. While repairing a tire on one of the wagons, a group of men was sent out in search of water. Upon discovering a pool of water about twelve and one-half miles northwest of where the Bozeman trail crosses the Big Horn River, the men were surprised to find it covered with a thin coat of grease, some of which they skimmed from the top and took along to use on their wagons. The next report about oil in Montana came from Granville Stuart who traveled a northwest course from the Musselshell river to Flat Willow creek, in present-day Musselshell and Petroleum counties, May 11,

1Reported by David B. Weaver, who was a member of the group which found the grease-covered pool, in the Great Falls Daily Leader. Oil Edition, February 24, 1921.

2See Chapter I, p. 4.
1880. Stuart reported that "there are petroleum indications all through here and some day Montana will produce oil."³

In 1892 oil seepages were found around Kintla Lake, in the extreme northern end of what was then Missoula county, four miles south of the Canadian border.⁴ The presence of oil on the Canadian side had been known for several years, but until this time no attention had been given to it. When it became known that the oil showings on the American side of the border were even better than those on the Canadian side, interest was quickly aroused and soon the records of old Missoula county were burdened heavily with placer locations. During the following year most of the claims were abandoned, however, as it proved to be impossible to raise sufficient capital for development of the field.

Seven years later the Kintla Lake field attracted attention again when a few Butte businessmen organized the Butte Company and took out claims around the lake. This started another oil boom and many more claims were filed. Practically every foot of the country along the north fork of the Flathead river from the international boundary to the


⁴Old Missoula county covered a much larger area than at present. The northern part of Missoula county became Flathead county by Act of February 6, 1893.

⁵Anaconda Standard, November 24, 1901.
Great Northern Railroad was covered with claims. Speculators came in and by the end of the year claims, originally bought for five dollars each, were selling at prices varying from $25 to $100. The Butte Company soon undertook an active development program, starting out with the construction of a wagon road from Belton on the Great Northern Railroad to Kintla Lake. Drilling was started in November, 1901, and by the end of the year the Butte Company had invested around $30,000 in the development of the field. Several other companies were organized, all by Montana interests, such as the Kintla Oil Company formed by a Helena group and the Kintla Lake Oil Company, by Kalispell men.

The high quality of the Kintla crude, being of paraffin base which commanded a much better price in the market than the asphaltum crudes of Texas and California, was one of the main factors in reviving interest in the field. Expectations ran high and it was estimated that the Flathead oil fields were capable of producing an annual output of about fifty million dollars worth of crude oil. The general optimism concerning the future of Montana's first oil field is expressed in the following quotation taken from a contemporary publication: 6

Perhaps there is no more beautiful region in the whole northwest than this virgin wilderness, which the enterprise of man will soon convert into a populous and busy territory, with all the industries of

---

a great oil field in full blast.

My firm conviction is that the Flathead field will prove the most profitable new oil territory opened in twenty years. I am willing to predict that the output of Montana oil wells will equal in value the output of Montana copper mines inside of ten years.

It took nearly fifty years for P. W. Francis' prediction to be fulfilled, for not until 1949 did the value of the output of Montana's oil wells exceed that of its copper mines. The "great oil field in full blast" never came and the excitement soon calmed down when it became clear that the Kintla Lake field was unable to yield commercial production. Nevertheless, the Kintla Lake oil field should be remembered as having caused Montana's first oil boom, which served to call further attention to a new mineral in the Treasure State.

In the meantime, another oil strike had been made in Montana, indicating the presence of crude oil in other parts of the state. A well drilled during the month of January 1902 by the Montana Coal and Fuel Company fourteen miles south of Dillon reported showings of oil. But here as elsewhere, commercial production could not be obtained and further development was never undertaken.

Up until now most of Montana's crude oil indications had been found in the area west of the Continental Divide,

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8Anaconda Standard, January 9, 1902.
but during the year 1903, the discovery of oil in the Swift Current creek district, north of St. Mary Lake, turned attention to the area east of the Divide. The presence of oil in this area was first discovered by a mining prospector, Sam D. Somes, in the spring of 1901, while digging a tunnel into the side of a mountain in search for copper. After blowing up part of the rock, he found oil standing in little pools on the bottom of his tunnel. As Somes found more and more of these oil seepages he became convinced of the existence of a crude oil pool within close distance. Soon his plans were made to quit metal mining and follow the more promising prospect of the liquid mineral. After gathering a sample of the oil found in the tunnel, Somes went to Great Falls where he succeeded in interesting a few friends in his plans. They organized the Montana Swift Current Oil Company, with Somes as general manager, and took up the development of the Swift Current oil field. After numerous difficulties in the transport of tools and drilling equipment through the mountainous area, a drilling location was selected and drilling started in 1902. In the spring of the following year Somes' enterprise was rewarded by striking oil at a depth of five hundred feet. Before further development work could be done more funds had to be raised. For this purpose Somes went to Great Falls Daily Leader, Oil Edition, March 28, 1930.
Falls again. Here he supported his request for additional funds by pouring oil, found in the newly drilled well, over floors and desks of the bank offices.

Somes' discovery started another oil boom in northern Montana. Several new companies were organized and expectations ran high again. A road was built to the Swift Current creek area and new rigs went up in a hurry. After a sixty-barrel-a-day well was brought in during the spring of 1904, the excitement reached its peak and by 1906 every acre of a sixty mile long and fifteen mile wide field had been claimed by prospectors or speculators. By this time twelve wells were in operation of which five were producing crude oil in paying quantities. The Anaconda Standard of that year wrote: "Montana is steadily forging to the front and in few years we will have an oil field second to none in the world." However, as was the case with the Kintla Lake oil boom, the Swift Current boom did not last very long. Soon production declined, as wells were lost due to penetrating water. When the available funds ran low the field was abandoned. Most of the ground where the wells were drilled is now overflowed, forming the bottom of the Sherburne lakes.

New stimulus to prospecting for crude oil in Montana came in 1910 and the years following, when the Great Northern

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11Ibid., March 28, 1930.
12Anaconda Standard, January 21, 1906.
13Ibid., January 21, 1906.
Railroad started the conversion of some of its coal burning locomotives into oil burners. This brought a ready market for fuel oil in northern Montana and a challenge for new oil prospecting.

It was to take a full decade before Montana would start its real oil career. Nevertheless, the years between 1910 and 1920 added much to the evidence of Montana's future as an oil producing state. First came the discovery of oil in a water-well, drilled on the now almost fabulous Miller ranch in 1912. It took about ten years before a drilling test was made here and the Miller ranch, twenty miles north of Shelby, became the site of the discovery well of the famous Kevin-Sunburst oil field.

In August 1915 drilling operations started in Wyoming in an area known as the Elk Basin, close to the Montana line. When the Elk Basin wildcat struck oil the following November interest was aroused quickly for testing the Montana part of the basin. A month later, on December 12, 1915, the Ohio Oil Company struck oil in a well drilled on the Montana side.

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15 *The Billings Gazette*, Billings, Montana, April 21, 1940.

16 According to E. W. Zimmermann (*World Resources and Industries*, Rev. Ed. 1951, p. 527) a wildcat is a well drilled in areas in which no proved reserves of petroleum have been located as yet. This can be either at least one mile away from a proven field, or at a greater depth in the proven field.
of the Elk Basin. The Ohio Oil Company No. 1 opened up the first permanent oil field in this state. For a long time the Elk Basin oil field was one of Montana's smaller fields, until drilling into a rich sand, below the producing horizon, made it one of the major Montana oil fields. After reaching its peak production in 1917, when it produced 99,399 barrels of crude oil, the production of the Elk Basin field declined gradually.

The Elk Basin discovery, with its promise of profitable production, brought new interest to oil prospecting in Montana during the following years. In 1917 W. H. Louther from Oklahoma made energetic attempts to raise the necessary funds for a wildcat in the area northwest of Fort Benton. His attempts failed, however, and the well he had planned to drill here was never started.

Around this time Gordon Campbell, one of the "fathers of the Montana oil industry" appeared on the scene.

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17 The Billings Gazette, April 21, 1940.
20 Ibid., February 24, 1921. As petroleum geologist and engineer Campbell spent several years in the Oklahoma, Wyoming and Canadian oil fields. On a surveying trip through southwest Canada in 1914, he accidentally entered Montana where he noticed favorable structures in Toole county. After finishing his work in Canada, Campbell returned to Montana in 1915, to make a survey of northern and central Montana. His
Campbell's eye fell on the Devils Basin, near the town of Roundup, where he started a wildcat in 1918. Despite Campbell's many attempts to save the well, it had to be abandoned finally due to lack of funds. Not discouraged, Campbell continued his efforts to prove the presence of crude oil in this area. In the latter part of 1919 he succeeded by obtaining a contract to drill a test well in the Devils Basin area for the Van Duzen Oil and Gas Company. A few months later, November 1919, Campbell struck oil in the new well, known as the Van Duzen discovery well. Though the Van Duzen well was never a commercial producer, Gordon Campbell had proved the presence of crude oil in central Montana.

Montana's early crude oil discoveries and the short oil booms in the Kintla Lake and St. Mary's Lake districts mainly served to draw the attention of the inhabitants of this state to a new mineral. When men like Gordon Campbell and W. H. Louther entered the state, believing in Montana's findings made him decide to drill a test well in the Devils Basin, near Roundup. With this in mind Campbell then went to his native California, to interest some oil people there in his plans. After several unsuccessful attempts here, as the Californians did not believe in the oil prospects of Montana, Campbell returned to this state. Here he finally succeeded in interesting some Butte people. With their funds Campbell started a wildcat in the Devils Basin. Before the well could be completed the available funds were depleted. After raising additional funds from some Roundup people, drilling operations could be continued. After a while money troubles appeared again, and as no additional funds could be raised this time, drilling had to be stopped before the test well could be completed.

21 See footnote 20, p. 36.
favorable geological structures, their enterprise was made possible by funds provided by Montana people. With the exception of the Elk Basin discovery all exploration work during the early stage of Montana's oil industry was financed by Montana people, as out of state oil interests did not believe in the oil possibilities of this state. Though the funds raised in Montana were insufficient to bring about any sizeable testing and development program in this state, they enabled the drilling of the wells which brought in the crude oil fields of central and northwestern Montana.
CHAPTER IV

MAJOR CRUDE OIL DISCOVERIES IN MONTANA

DECEMBER 1919 - JANUARY 1931

At the time Gordon Campbell completed the Van Duzen well in Devils Basin, drilling operations had been started on a structure to the northeast by the Frantz Oil Corporation of Denver, Colorado, where about a month later, December 8, 1919, it struck oil in an unusually rich horizon. The Frantz Oil Corporation had discovered another oil field in Montana, later on known as the Cat Creek field. The crude found in the Cat Creek field proved to be of a high gravity, yielding about fifty per cent gasoline. The high quality of the Cat Creek crude, together with the shallow depth from which it was produced, made the new oil field extremely profitable. The Frantz Oil Corporation's discovery had brought in Montana's first commercial field, which makes it outstanding in the history of the Montana crude oil industry. When the Frantz well started producing in February the following year it proved to be an excellent promoter for the Cat Creek

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1Frantz, former governor of Oklahoma, organized the Frantz Oil Corporation to drill test wells in favorable structures in Montana.

field. Within a short time several oil companies secured a considerable acreage of oil leases here and new drilling was started immediately. By the end of 1920 close to sixty rigs were scattered all over the Cat Creek structures and it was estimated that the field would produce not less than one million dollars worth of crude oil during its first year of production. That expectations were usually somewhat optimistic in the early days of a new oil field was shown again in this case, as the actual production amounted to a total value of $734,181.00 during 1920.

Many people living in the Cat Creek area prospered from the near-by crude oil discovery. Scores of homesteaders lived in comfortable conditions from the sale of leases and royalties. Lewistown especially flourished from the new wealth made available by the oil discoveries in its vicinity. It soon became known as "the gate city to the 1,000 barrel oil fields of Fergus county." A rapidly growing population and a heavy building program, scheduled for the near future, gave the town all the characteristics of the booming early-day mining town.

The Frantz Oil Corporation's enterprise was well re-
warded when it sold its holdings in the Cat Creek oil field for $450,000 to the Mutuel Oil Company, a Wyoming group, in the summer of 1920. A few years later the Mutuel Oil Company sold out to the Continental Oil Company which controls at present the main producing area of the Cat Creek oil field.

While Cat Creek was rapidly increasing its production, considerable activity was going on in other parts of the state. In Miles City the construction of a two thousand barrel crude oil refinery was well underway by the beginning of 1921, built for the Miles City Oil Refining Company. This plant was Montana's first refinery and thus the forerunner of one of the leading industries in this state.

Drilling activities were started on structures located in different parts of the state during 1921. The preceding year had been marked by much leasing activity following the discovery of the Cat Creek field. Together with Cat Creek the Fort Benton area had attracted much attention, where twenty-two thousand acres had been leased by the Transcontinental Oil Company during the summer of 1920. Since W. H. Louther's attempts to drill a test well near Fort Benton in 1917, this area had been forgotten.

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7Great Falls Daily Leader, op. cit., Feb. 24, 1921.
8Ibid., Feb. 24, 1921.
9Ibid., Feb. 24, 1921.
10See Chapter III, p. 36.
Company considered the structures here as very favorable and started its test-well about six miles southeast of Fort Benton, in 1921. At the same time drilling operations were conducted in the southern part of the state on the Crow Indian Reservation, thirty-eight miles south of Hardin. In February, 1921, the Western States Oil and Land Company (subsidiary of the Midwest Oil Company) of Denver, Colorado, brought in a well here with an initial production of two hundred barrels a day.\(^{11}\) The Western States well marked the discovery of a new oil field, located in Big Horn county and known as Soap Creek.

More important than any other development taking place during 1921 was the start of drilling activities in northern Montana. Despite the fact that crude oil indications had been found here several years earlier,\(^{12}\) no development had taken place in this part of the state. The discoveries of crude oil in southern and central Montana had absorbed all attention and enterprise up until March, 1921, when Gordon Campbell returned to Toole county and made a more precise survey of the structures which he had noticed here in 1914.\(^{13}\) After he found every evidence indicating the presence of a large oil pool in that area, Campbell decided

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\(^{11}\)The Billings Gazette, April 21, 1940.

\(^{12}\)See Chapter III, pp. 30, 34 and 35.

\(^{13}\)See Chapter III, p. 36, footnote 20.
to drill a test-well here as soon as possible. As drilling location he chose the Miller ranch where oil showings had been reported in a water well about ten years earlier. In the latter part of 1921 Campbell started his drilling operations and, after working at it all winter, he struck oil on March 22, 1922. With the Gordon Campbell well one of Montana's top fields had been discovered. For several years the Kevin-Sunburst field ranked first in crude oil production among Montana's oil fields. Campbell had proved definitely that he was right in expecting crude oil in this area and though his well was never a good producer, it brought in the second field discovered by Gordon Campbell in Montana.

As before, the new discovery of oil brought new excitement and expectations were optimistic. Established and newly formed oil companies were rushing in for leases in northern Montana, in the area east and west of the Gordon Campbell well, where the Kevin oil pool was believed to extend itself. At the same time another wildcat was started near the town of Sunburst, at considerable distance from the area proven by the Gordon Campbell well. Great excitement was aroused again when oil was struck in the Sunburst wildcat three months after Campbell's discovery of the Kevin oil

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14 See Chapter III, p. 35.

Moreover, the Sunburst well was producing in paying quantities, yielding fifty barrels of crude per day.\textsuperscript{16} It was first believed that the Sunburst well had opened a second pool to the north of the Kevin pool, but when more drilling had been done in the area between the two original wells, it became clear that the Gordon Campbell well and the Sunburst well were producing from the same pool, forming the major part of the Kevin-Sunburst oil field.

During the decade of the 1920's Montana's crude oil industry was dominated by the activity in and the rapidly increasing production of the Kevin-Sunburst field. Wildcats were started in numbers heretofore unknown in Montana, many of them adding considerably to the proven area of the new field as well as to its total daily production. Among the new discoveries the famous Fulton-Rice pool deserves attention.\textsuperscript{17} The pool was named after its discoverers, W. M. Fulton\textsuperscript{18} and W. E. Rice, who can be considered as belonging

\begin{itemize}
  \item \textsuperscript{16}\textit{Ibid.}, March 25, 1926.
  \item \textsuperscript{17}\textit{Ibid.}, March 25, 1926.
  \item \textsuperscript{18}\textit{Ibid.}, March 25, 1926. W. M. Fulton was a widely known western oil prospector before he came to the Kevin-Sunburst field. In 1912 he drilled several wildcats in Montana without much success. After leaving this state again, Fulton prospected in several western states in search for new oil fields. As he drilled dry hole after dry hole, he soon became known as the "Dry Hole King." Soon after the discovery of the Kevin-Sunburst field, Fulton returned to Montana from Colorado, planning to stop wildcatting and drill from now on only in proven areas, first of all in the new Kevin-Sunburst field.
\end{itemize}
to the group of "fathers of the crude oil industry in Montana." Attracted by the rumors of a great oil field recently discovered in northern Montana, Fulton came to the Kevin-Sunburst field where he secured some leases. In Shelby, Fulton entered into partnership with W. E. Rice, another "dry hole prospector" up to that time. The two men pooled their resources and started drilling a well on the acreage taken out by Fulton. This time they did not hit a dry hole, but brought in the biggest well drilled so far in Montana, producing three thousand barrels of crude oil during the first twenty-four hours. New wells drilled in the vicinity proved to be big producers too and after one year, during which the area of approximately one thousand acres produced about one million dollars worth of crude oil, the Fulton-Rice pool had become famous. Its discoverers were richly rewarded, for by 1926 the Fulton-Rice properties in the Kevin-Sunburst field were estimated to have a total value of two million dollars.

Fulton and Rice were not the only successful operators, who made a fortune in the Kevin-Sunburst oil field during the 1920's. Several newly organized independent companies were able to pay attractive dividends after only two years of production. Outstanding among these was the

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19Ibid., March 25, 1926.

20Ibid., March 25, 1926.
Kalispell Kevin Company, organized by some Kalispell and Kevin people, which paid during the first part of the decade a return of $12,000 per annum on each $500 originally invested, which amounts to a total dividend of 2,400 per cent.\textsuperscript{21} Fortunes were made, too, by several landowners from the sale or proceeds of royalties on their oil-containing land holdings. Rumors of the large profits made in Kevin-Sunburst field brought new prospectors into this area, bringing the further development of the field.

New stimulus for further and more rapid development of Kevin-Sunburst came in 1926, when the Canadian government, on a conference held with officials from the northwestern states of the United States, asked for the full development of the Kevin-Sunburst oil field. This was to supply Canadian refineries in Alberta with the additional crude needed during that part of the year in which the demand for refined products in Canada exceeded the crude supply. Until that time all crude imported from the United States had been purchased in Wyoming or Midcontinent oil fields. Purchase in northern Montana would mean a considerable saving in cost of transportation for the Canadian refiner. To stimulate production the Canadian refiners were willing to pay the Kevin-Sunburst producer part of the saving on transportation cost in the form

\textsuperscript{21}\textit{Ibid.}, March 25, 1926.
of a higher price for the crude.\textsuperscript{22}

To care for the increasing production of crude oil from the Kevin-Sunburst field, the Sunburst Refining Company had been organized for the construction of a refining plant at Great Falls. Construction of the plant started in 1923, but proving too small the plant had been enlarged a few times so that by 1926 it had a total daily refining capacity of three thousand barrels and occupied together with its storage tanks a plot of twenty-two acres.\textsuperscript{23} This made the Sunburst Refining Company plant the largest in the state at that time. During the first part of the 1920's the Kevin-Sunburst oil field had a rapidly increasing production. Compared with a total physical production of 441,531 barrels during 1923, the field produced 6,457,217 barrels during 1926,\textsuperscript{24} which means an increase of 1362.5 per cent in three years. In 1926 it reached its all-time maximum production and from then on Kevin-Sunburst's crude oil production declined to less than two million barrels a year in 1930. From 1926 to 1930 the total annual production decreased from 6,457,217 to 1,910,893\textsuperscript{25} or by seventy per cent in four

\textsuperscript{22}\textit{Ibid.}, March 25, 1926.

\textsuperscript{23}\textit{Ibid.}, March 25, 1926.

\textsuperscript{24}Montana Oil Conservation Board, \textit{Statements of Crude Oil Produced}, May 20, 1950.

\textsuperscript{25}\textit{Ibid.}, May 20, 1950.
years. From 1930 on the annual production of the Kevin-Sunburst oil field never exceeded two million barrels again. No definite reason to account for the declining production after 1926 could be found. Based on experiences with the Kevin-Sunburst field during the 1930's it is evident, however, that the main factor causing the fall in production was a decline in new drilling activity due to the lack of a market for the sharply increased production of the early years of the field. The excitement of the early years had resulted in an over-supply of Kevin-Sunburst crude and the declining production of 1927 and the following years gradually adjusted supply to the existing demand conditions.

While the developments in the Kevin-Sunburst field dominated Montana's crude oil industry during the decade of the 1920's, important events were happening in other parts of the state. Prospecting for new crude oil had continued and proved to be unusually successful as several new oil fields were discovered during the latter part of the 1920's. Two years after the discovery of crude oil in Kevin-Sunburst, oil was struck in a test-well drilled in the Lake Basin, Stillwater county, in 1924. The presence of natural gas in the Lake Basin had been discovered three years before in a well drilled by Barnsdall Foster Company. No production had followed, however, as the well took fire and became a total loss.²⁶ Lake Basin started out as a good field but after it

²⁶The Billings Gazette, April 21, 1940.
reached its maximum production of 49,522 barrels in 1926. Its production fell off and it always has remained a small field.

As the Kevin-Sunburst field is geologically a part of a large structure, the Sweetgrass Arch, extending from south of Great Falls nearly to the Canadian border, it was generally expected that more crude oil pools were hidden in this area. One of the firm believers in the Sweetgrass Arch was Ralph Arnold, a noted petroleum geologist. After much exploration and surveying in this area, Arnold decided to drill a few test-wells in the southern end of the Sweetgrass Arch. After that he was planning to test its northern end in the area known as the Sweetgrass Hills. For this purpose he organized the Montana Pacific Oil Company, which started its first well on the Pondera structure, near the town of Conrad.


28Ralph Arnold, personal adviser to President Coolidge in oil matters, had considerable influence on drilling operations in this state. In a speech before the Rocky Mountain Oil and Gas Association in 1927, Arnold stated that drilling in Montana would prove to be more successful when more attention would be paid to the typical geological characteristics of this state. The greater part of the wells drilled in Montana up until 1927, according to Arnold, were put down on locations chosen on the advice of geologists from Wyoming, using Wyoming criteria. It was Arnold's opinion that these criteria could only be applied to southern Montana, as geological conditions differ from those in Wyoming in the central and northern parts of Montana. The result of using Wyoming criteria had been that many wells in this state had been drilled either not deep enough or "off structure." Arnold supported his theory by pointing at the Kevin-Sunburst field, which had been discovered in an area condemned by Wyoming petroleum geologists.
in Pondera county, in the fall of 1926. After being halted for some time by severe winter weather, drilling operations were resumed the next spring. A few months later, in June 1927, the Montana Pacific Oil Company struck oil and with this it introduced another commercial oil field to the Montana crude oil industry. Soon new wildcats were started on the Pondera structure and its crude production increased rapidly. In 1929 the Pondera field produced almost one million barrels of crude oil and had a probable producing area of about two thousand acres.

Another test-well was started by the Montana Pacific Oil Company on the Bannatyne farm, thirty-nine miles northwest of Great Falls, where a gas flow had been discovered in a wildcat drilled here in 1913. Arnold chose his drilling location about five miles north of the old gas well and struck oil in July 1927, following the Pondera discovery by about a month. Tests of the Bannatyne crude showed that it contained fifty-three per cent lubricants of a fine quality which made the crude valuable for Montana refiners, as

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30Ibid., March 29, 1927.
31Ibid., March 29, 1927. In 1913 a syndicate of Great Falls businessmen drilled a wildcat on the Bannatyne farm in search for oil. The well was not drilled deep enough so that no oil was discovered.
32Ibid., March 29, 1927.
the Cat Creek and Kevin-Sunburst crudes contain little or no lubricants. The high quality of the crude found in the new Bannatyne field provided a strong stimulus for additional drilling. Soon other companies\textsuperscript{33} secured leases and started drilling operations. The Bannatyne field reached its maximum production in 1930;\textsuperscript{34} from then on its annual production showed sharp fluctuations until it was abandoned in 1935.

While Ralph Arnold was concentrating his attention on the southern part of the Sweetgrass Arch, the Bear's Den Oil Company secured oil leases in the north, the Sweetgrass Hills country, considered by Arnold as oil bearing. After completing its leasing activity the Company started a wildcat on the Bear's Den structure, Liberty county. Oil was struck here in June 1929, adding more proven area to Montana's

\textsuperscript{33}Ibid., March 29, 1927. The greater part of the new leases were taken out by the "56 Petroleum Corporation," outstanding independent operator in the Cat Creek field. This company should be mentioned moreover, because of its almost fabulous success in the Montana crude oil industry. Organized in Miles City in 1919, it engaged in the crude oil production in the recently discovered Cat Creek field. It got its name from the fact that it had 56 original stockholders. By 1927 the company had paid a total return of $1,336,640.70 on the original investment of $14,000. This means that each of the 56 original investors received a dividend of more than 9500 per cent. The 56 Petroleum Corporation is the outstanding example of the independent Montana operator and the small investor, who made fortunes in the crude oil industry. Typical for the Montana oil industry is that a large part of the leases is held by small independents.

\textsuperscript{34}Montana Oil Conservation Board, \textit{Statements of Crude Oil Produced}, May 20, 1950.

\textsuperscript{35}Great Falls Daily Leader, \textit{Montana Oil and Industry Edition}, March 28, 1930.
crude oil fields. The Bear's Den discovery well was considered as of great importance in Montana oil circles, because it did not produce the usual black oil of northern Montana oil fields. Instead a high gravity crude of paraffin base was found here commanding a substantial premium over the prices paid for the crudes of adjacent fields. Moreover, the Bear's Den well had showings of oil in two horizons below the sand from which it was producing. These factors furnished enough evidence for Montana operators that another commercial crude oil field would be opened in the Sweetgrass Hills in the near future, and it was generally expected that more drilling would follow soon.

When Canadian wildcatters discovered oil in a well, located 281 feet north of the international border along Toole county, interest was quickly aroused for testing the Montana side where the structure extended. A commercial producer was completed on the Montana side in October, 1929, which proved to be the discovery-well of a new oil field. The field became known as the Border field, because of its location partly in Montana and partly in Alberta. As crude oil could be produced in commercial quantities in the Border field and geologists considered the structure worthy of further testing, an extensive drilling campaign was planned for the near future. When started several new producers were

Ibid., March 28, 1930.
brought in and the annual production of the Border field subsequently jumped from 92,756 barrels of crude oil in 1930 to 138,366 barrels in 1931.  

While the discoveries of several new oil fields in the northern part of the state had attracted almost all attention, prospecting had not been given up in southern Montana. New interest in this part of the state was aroused when, in August 1930, the Ohio Oil Company (subsidiary of Standard Oil) brought in a gas well, flowing eleven million cubic feet of gas per day yielding about thirty-five barrels of gasoline. The Ohio Oil Company well was drilled in Carbon county in the region between the towns of Red Lodge and Bridger, known as Dry Creek. Continued drilling by the Ohio Oil Company during 1931 opened a few big wells which brought the new Dry Creek oil field quickly into the center of attention and caused its daily output to increase sharply. Much excitement was started by the Ohio-Robinson No. 1, which flowed 18,000 barrels of crude during the first twenty-four hours and was rated as the largest well ever completed in Montana up to 1931. The exceptionally high quality of the Dry Creek crude, being of sixty-two gravity which is almost

39 Ibid., February 25, 1933.
pure gasoline, added much to the excitement. No great scrambles for leases was started, however, as the Ohio Oil Company had secured much of the available acreage around the Dry Creek structure before starting its drilling operations. Moreover, the cost of drilling was very high in the Dry Creek field as it produced from an average depth of 5,500 feet, which was considerably deeper than in the other Montana oil fields. By 1933 the Ohio Oil Company had spent more than one million dollars for the drilling of eight wells, which made the average cost of a Dry Creek well amount to $125,000.\footnote{Great Falls Daily Leader, Montana Oil and Industry Edition, February 25, 1933.} This made the risk of drilling great, and as long as profitable production could be obtained elsewhere many operators were not in the least attracted to the Dry Creek field. Despite all the excitement about the big wells in the southern part of the state, northern Montana remained the favorite region for wildcatters.

Around the time of the discovery of oil in the Border field, oil had been discovered by Drumheller and Yunck, wildcatters, in a well drilled about six miles north of the town of Cut Bank.\footnote{Ibid., February 25, 1933.} Strange enough the discoverers did not pay much attention to their discovery, proving the presence of crude oil in the Cut Bank area. About a year later, 1930, a second well was drilled in this region which, after many
misadventures, finally produced about ten barrels of crude per day. Despite the fact that these two wells gave definite proof of the presence of oil in the Cut Bank region, development was not started until the end of the year. During the latter part of 1930, a Wyoming oil operator, R. C. Tarrent, came to northern Montana and took over a large amount of the acreage held by the Drumheller interests. After securing these leases, Tarrent started his first well four miles north of the town of Cut Bank. In January 1931 he struck oil in his Cut Bank well, showing an initial production of eighty barrels a day. The news of Tarrent's well turned the interest toward the Cut Bank region and when Tarrent completed another commercial well in this area, just inside the Blackfeet Indian Reservation, other operations followed in rapid succession. Enthusiasm mounted as well after well proved to be commercial producers. Rapid development was assured and by 1933 the new field had an estimated producing area of ten square miles. Though not the discoverer, R. C. Tarrent had brought on the development of the Cut Bank field which would soon rank first among Montana's oil fields.

42Bid., February 25, 1933.
43This was the first oil well ever drilled on the Blackfeet Indian Reservation.
44Great Falls Daily Leader, op. cit., February 25, 1933.
After Gordon Campbell had proved that crude oil pools existed in central as well as in northern Montana and the new Cat Creek and Kevin-Sunburst fields were showing profitable production, sufficient evidence had been furnished to attract out of state capital to Montana's oil fields. The first major oil company to enter the state was the Continental Oil Company which purchased the producing properties of the Mutuel Oil Company in the Cat Creek field in 1926. The definite proof of the commercial possibilities of Montana's oil fields, supplied by Cat Creek and Kevin Sunburst during the 1920's, solved the major problem of the preceding years. Shortage of funds had heretofore prevented any sizeable testing campaign of Montana's structures. A better supply of capital enabled the many new discoveries of crude oil made in this state during the 1920's.

The drilling campaign of the 1920's resulted in a considerable increase in the crude oil output of Montana. Most of the crude not demanded by Montana refiners found a ready market in Canada, as Alberta refiners did not find sufficient crude in Canada. This situation made it not necessary, for the time being, for northern Montana oil producers to create additional refining capacity to care for their increased production. The resulting complete dependency of many northern Montana crude producers on the Canadian market was to be the cause of much economic grief during the following decade. For instance, as Canadian buyers reduced their crude purchases from the northern Montana oil fields
during the 1930's, the failure of northern Montana companies to expand their refining capacity during the 1920's resulted in serious dislocations in the oil markets of Montana producers.45

45See p. 68.
The preceding period had been a real prosperity decade for Montana's crude oil industry. The decade of the 1920's had witnessed the birth of the crude oil industry in this state, as it brought upon the discovery and development of Montana's four leading oil fields. Furthermore, some six smaller fields had been added to the series of discoveries taking place during the 1920's. Two figures on annual crude oil production express most clearly the rapid development of the oil industry in this state during the decade of the 1920's. The total value of the annual output of Montana's oil fields increased from the relatively insignificant total of $184,500 during 1919\(^1\) to the more impressive total of $5,420,000 during 1930.\(^2\)

However, Montana's oil industry was not spared from the effects of the depression in the economic life of the country. Gradually the lower prices of refined products in the national market made themselves felt in Montana's oil

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\(^1\)Montana Oil Conservation Board, *Statements of Crude Oil Produced*, May 20, 1950.

\(^2\)See Chapter II, p. 25.
fields in the form of lower prices paid for crude, most of all in the Kevin-Sunburst field. The higher gravity crude of the rapidly developing Cut Bank field was making deep inroads into the Kevin-Sunburst market, securing refinery demand formerly supplied by Kevin-Sunburst operators. This fact, combined with the declining crude prices, discouraged new drilling activities in the Kevin-Sunburst field. In 1932 drilling activities here reached the lowest point since the discovery of the field.\(^3\) The total physical production of the Kevin-Sunburst field declined from 1,910,893 barrels in 1930 to 1,185,935 barrels in 1933, or by almost thirty-eight per cent.\(^4\)

Lack of new drilling marked Montana's crude oil industry as a whole during the first part of the 1930's though in less degree than was true for the Kevin-Sunburst field. From 1930 to 1933 the total physical production of all oil fields within the state declined from 3,349,000 barrels in 1930 to 2,273,000 barrels in 1933, a decline of more than thirty-two per cent.\(^5\) This decline in Montana's oil output was due mainly to the lack of new drilling which normally makes up for the natural decline in the output of producing wells.\(^6\)

The young Cut Bank field formed a remarkable exception

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\(^3\)Great Falls Daily Leader, Montana Oil and Industry Edition, February 25, 1933.
\(^6\)Great Falls Daily Leader, op. cit., Feb. 25, 1933.
to the general decline in the production of Montana's oil fields. Here drilling activity increased as more and more operators entered the field, and all completed wildcats proved to be producers. The reputation that no dry hole could be drilled in the Cut Bank field formed a potent factor in its development during the first part of the 1930's. While the annual production of the Kevin-Sunburst field declined, the output of the Cut Bank field increased rapidly. From 1932 to 1937 Cut Bank's annual physical production increased from 20,639 barrels in 1932 to 3,368,234 barrels in 1937.\(^7\) From 1935 on Cut Bank ranked first among the Montana oil fields.

The Cut Bank oil field owed its rapid development in large degree to the major companies which secured considerable acreage soon after R. C. Tarrent's well had called attention to the Cut Bank area.\(^8\) The annual physical output of the Cut Bank field made rapid progress when these "majors" invested several million dollars in the development of their leases. The largest holder of acreage, by 1934, was the Montana Power Gas Company with a block of two hundred square miles in the gas-producing northeastern part of the field.\(^9\)

\(^7\) Montana Oil Conservation Board, op. cit., May 29, 1950.

\(^8\) Great Falls Daily Leader, February 28, 1934. These companies were: The Texas Company, Montana Power Gas Company, Ohio Oil Company and Continental Oil Company.

ever leased to any one oil or gas company in the United States.\textsuperscript{10} Second largest producer in the Cut Bank field was The Texas Company, with more than sixty thousand acres under lease secured before any other major company entered. The Texas Company's early interest in the new oil field was due partly to the presence of the International Refining Company's (subsidiary of The Texas Company) plant at Sunburst. The short distance from the Cut Bank field to its Sunburst refinery made it possible for The Texas Company to supply it partly with the high quality crude from Cut Bank.\textsuperscript{11}

In the meantime a new refinery had been added to Montana's refining industry. Organized by W. M. Fulton and W. E. Rice, the Home Oil and Refining Company had built a modern, 1,200 barrel plant at Great Falls during 1931 and 1932.\textsuperscript{12} It soon became clear that W. E. Rice, vice-president of the Company, would become one of the leading refiners in this state, when in the spring of 1933 he organized and became president of the Independent Refining Company and purchased the property of the Laurel Oil and Refining Company at Laurel. Two years later Rice increased his properties

\textsuperscript{10}The International Refining Company had so far obtained its crude from the Kevin-Sunburst field. This was from The Texas Company's own wells here, with the balance purchased from independent operators.

\textsuperscript{11}\textit{Great Falls Daily Leader, op. cit.}, February 25, 1933.

\textsuperscript{12}\textit{Ibid.}, February 28, 1934.
again, when he purchased the stock held by Stanolind (subsidiary of Standard Oil of Indiana) and by the Ohio Oil Company in the Pondera Pipeline Company. This transaction put Rice in complete control of the pipeline to use it solely for the transport of crude oil from the Fulton-Rice properties in the Pondera field, Montana's third oil field at that time, to their refinery at Great Falls.  

In spite of the lack of new drilling, the 1934 production of Kevin-Sunburst showed an increase of more than 400,000 barrels over its 1933 output. The increase was due to the introduction of a new technique, the treatment of dry holes and slowly producing wells with hydrochloric acid. When poured into a well producing from a limestone formation, the acid opened new oil containing cavities by eating its way

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13 *Montana Oil and Mining Journal*, March 30, 1935: Pondera Pipeline Company was organized originally by Fulton, Rice and the Ohio Oil Company for the construction of a pipeline from the Pondera field to Conrad, on the Great Northern railroad. Later on Stanolind came in.

14 Pondera properties operated by the Fulton Petroleum Corporation, originally organized for the development of the Fulton-Rice pool in Kevin-Sunburst.


16 *Great Falls Daily Leader, op. cit.*, February 28, 1934. The application of hydrochloric acid had long been used by geologists to detect the presence of lime in drill cuttings. A Michigan oil operator got the idea to apply the acid to oil wells producing from the lime. After the practice had proved very successful elsewhere, it was introduced to the Kevin-Sunburst field by W. E. Rice in 1933.
through the lime. The "shots" of acid proved to be of utmost significance to Montana's oil industry and brought new life to Kevin-Sunburst, as many of its wells were drilled into the limestone. The average Kevin-Sunburst well showed a twenty per cent increase in production, after it had been treated with acid.\textsuperscript{17} In Pondera the 1934 output increased by almost ten thousand barrels over its 1933 production, due to the use of acid as new drilling had almost come to a complete standstill here during the first part of the 1930's.\textsuperscript{18}

The main problem confronting Montana's oil industry during the latter part of the 1930's was the difficulty in finding a market for the crude produced from the fields of northern Montana, especially from the Kevin-Sunburst and Pondera fields. During the season the high quality crude from the Cut Bank field usually succeeded in finding a market in Canadian refineries. Because of the uncertainty of finding a market, new development of the fields was curbed and existing wells were caused to produce considerably below capacity. This is expressed in the figures on the physical production of Cut Bank and Kevin-Sunburst, for the years 1936 through 1939, which show only slight variations from year to year. After a rapid annual increase in production the Cut Bank field produced 3,334,847 barrels in 1936;

\textsuperscript{17}Ibid., February 28, 1934.

\textsuperscript{18}Montana Oil Conservation Board, \textit{op. cit.}, May 20, 1950.
ing 1939 the field produced 3,541,679 barrels. Kevin-Sunburst's output during 1936 amounted to 1,537,795 barrels; in 1939 its total physical production had risen to 1,543,006 barrels. The relatively small increases in the annual production of Montana's leading oil fields during these years was due mainly to lack of stimulus for new developments, caused by insufficient demand for crude by the Montana refineries.

To analyze the contemporary refinery situation in Montana, all refining plants operating in this state on January 1, 1935, have been listed on the following page. This date has been chosen because it is about in the middle of the decade and forms the beginning of the period when marketing troubles became more and more serious. From Table V it can be seen that the daily refining capacity, available to the oil fields of northern Montana on January 1, 1935, amounted to 7,800 barrels. The average total daily crude oil output of the northern Montana fields amounted to 13,759 barrels, of which Cut Bank produced 7,747 barrels, Kevin-Sunburst 4,581 barrels and Pondera 1,431 barrels.

19 Ibid.

20 *Montana Oil and Mining Journal*, October 26, 1935. This was composed of Big West Oil Company at Kevin, 800 barrels; Conrad Refining Company at Conrad, 1,000 barrels; Home Oil and Refining Company at Great Falls, 1,000 barrels; and the International Refining Company at Sunburst, 5,000 barrels of daily refining capacity.

21 Ibid., November 30, 1935.
TABLE V
OPERATING MONTANA REFINERIES, THEIR CAPACITY
AND LOCATION ON JANUARY 1, 1935

<table>
<thead>
<tr>
<th>Company</th>
<th>Daily Capacity (in barrels)</th>
<th>Location</th>
<th>Part of the State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arro Oil and Refining Co.</td>
<td>1500</td>
<td>Lewistown</td>
<td>central</td>
</tr>
<tr>
<td>B. and M. Refining Co.</td>
<td>300</td>
<td>Roundup</td>
<td>central</td>
</tr>
<tr>
<td>Bears Den Refinery</td>
<td>25</td>
<td>Bears Den</td>
<td></td>
</tr>
<tr>
<td>Big Horn Oil and Refining Co.</td>
<td>1000</td>
<td>Billings</td>
<td>south</td>
</tr>
<tr>
<td>Big West Oil Company</td>
<td>800</td>
<td>Kevin</td>
<td>north</td>
</tr>
<tr>
<td>Conrad Refining Company*</td>
<td>1000</td>
<td>Conrad</td>
<td>north</td>
</tr>
<tr>
<td>Consumers Refining Co.</td>
<td>500</td>
<td>Collins</td>
<td></td>
</tr>
<tr>
<td>Continental Oil Company</td>
<td>1500</td>
<td>Lewistown</td>
<td>central</td>
</tr>
<tr>
<td>Dunlap Refining Company</td>
<td>75</td>
<td>Cat Creek</td>
<td>central</td>
</tr>
<tr>
<td>Hart Refineries</td>
<td>100</td>
<td>Hedgesville</td>
<td></td>
</tr>
<tr>
<td>Hart Refineries</td>
<td>300</td>
<td>Missoula</td>
<td>west</td>
</tr>
<tr>
<td>Home Oil and Refining Co.</td>
<td>1000</td>
<td>Great Falls</td>
<td>north</td>
</tr>
<tr>
<td>Eugene Hunt</td>
<td>200</td>
<td>Winnett</td>
<td></td>
</tr>
<tr>
<td>Independent Refining Co.</td>
<td>3000</td>
<td>Laurel</td>
<td>south</td>
</tr>
<tr>
<td>International Refining Co.</td>
<td>5000</td>
<td>Sunburst</td>
<td>north</td>
</tr>
<tr>
<td>Red Lodge Refinery</td>
<td>70</td>
<td>Red Lodge</td>
<td>south</td>
</tr>
<tr>
<td>The Russel Oil Company</td>
<td>1000</td>
<td>Billings</td>
<td>south</td>
</tr>
<tr>
<td>Unity Petroleum Corp.</td>
<td>800</td>
<td>Kalispell</td>
<td>west</td>
</tr>
<tr>
<td>Yale Oil Company of South Dakota</td>
<td>2000</td>
<td>Billings</td>
<td>south</td>
</tr>
<tr>
<td>Yale Oil Company of South Dakota</td>
<td>500</td>
<td>Butte</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,670</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Conrad Refining Company plant at Conrad not in operation on January 1, 1935 because of bankruptcy. In August of the same year the Conrad Refining Company plant taken in lease by W. E. Rice and put into operation again. Rice purchased the Conrad plant at a bankruptcy sale for $16,500 in June 1936. (Montana Oil and Mining Journal, June 20, 1936.)

Source: Montana Oil and Mining Journal, October 26, 1935, p. 5.
Of the average daily production of 13,759 barrels northern Montana refineries were thus able to handle only 7,800 barrels, which left about 6,000 barrels without a market every day. Other parts of the state, however, had a considerable surplus of refining capacity. Southern Montana had on January 1, 1935, a total daily refining capacity of 7,070 barrels, of which the oil fields of this part of the state claimed on the average 172 barrels daily, leaving a surplus capacity of about 6,900 barrels daily. Most of the crude processed by the refineries of southern Montana was imported from oil fields in northern Wyoming.

From the data given here, it can be concluded that northern Montana's marketing problems were not caused by insufficient refining capacity available to the crude oil producers in this state. Instead, the marketing difficulties in northern Montana's oil fields were due basically to a faulty geographic distribution of refining capacity in this state. High cost of transportation made it impossible to ship the surplus crude from the oil fields in the north to Billings and Laurel, where large refineries ran mainly on crude pur-

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22Ibid., October 26, 1935. This was composed of the daily refining capacities: Big Horn Oil and Refining Company at Billings, 1,000 barrels; Independent Refining Company at Laurel, 3,000 barrels; The Russel Oil Company at Billings, 1,000 barrels; Yale Oil Company at Billings, 2,000 barrels; and the Red Lodge Refinery, 70 barrels.

23Ibid., November 30, 1935. This was composed of the daily production of Elk and Lake Basin, 88 barrels, and Soap Creek, 84 barrels.
chased in the near-by oil fields of northern Wyoming. Lower rail rates between the oil fields in the northern part of the state and the refineries in the southern part, would be a way to restore the maladjustments in Montana's oil industry. The existing freight rates in Montana made things worse, however, as they were considered to be the highest in the nation by the middle of the 1930's. Because of Montana's location between lower rate structures on the east and the west, the railroads were able to maintain short haul inter-state rates, which were higher than many long haul rates into the state. This situation given, northern Montana crude oil producers had to look for a market elsewhere or construct additional refining capacity in the northern part of the state. As long as Canadian refiners (Imperial Oil Company and British American Oil Company) provided a market for northern Montana's surplus crude, no serious difficulties appeared. The greater part of the crude oil exports to Canada was purchased in the Cut Bank field by the Imperial Oil Company for its refining plants at Regina (daily capacity 3,500 barrels) and Calgary. The importance of the Canadian market to northern Montana's crude oil producers at that time is evident from the fact that the Canadian refiners purchased during 1934 on the average eight thousand barrels of Montana crude daily,\(^{25}\) and

\(^{24}\) *Montana Oil and Mining Journal*, May 2, 1936. This information taken from an article giving the views of B. C. Stone, traffic expert of Denver (Colorado) on this matter.

by the middle of 1935 the Imperial Oil Company was purchasing seventy-five per cent of the total Cut Bank production for its refinery at Regina.26 Purchases usually started in April and continued until the end of the year, when they were stopped or curtailed as need required. Difficulties came when a large crude oil field, Turner Valley, was discovered in Canada during 1936, and the Imperial Oil Company as well as the British American Oil Company, started the curtailment of their crude oil purchases in northern Montana.27 Imperial Oil Company stopped its purchases in Montana entirely on October 1, 1937,28 leaving all to the British American, which still purchased restricted amounts of Montana crude for its refining plant at Coutts (opposite Sweetgrass, Montana, on the international border). Because of the much higher cost of transportation on Turner Valley crude, the Coutts refinery worked entirely with Montana crude. When it was shut down in October 1937, the purchases by Canadian refiners stopped entirely.29 Montana petroleum engineers believed that the Canadian market was definitely lost for northern Montana, as the Turner Valley had by that time already a daily potential of between 20,000 and 50,000 barrels. Their opinion is ex-

26Montana Oil and Mining Journal, June 8, 1935.
27Ibid., July 11, 1936.
28Ibid., September 25, 1937.
29Ibid., October 30, 1937.
Turner Valley oil field will be able to care for the Canadian crude market for many years to come—certainly for five years and probably for many more. To all intents and purposes, Montana crude is out of the Canadian market for all time.

The loss of the Canadian market caused overproduction of crude oil in northern Montana. Large quantities of crude had to be stored for lack of a market, and producing wells were curtailed considerably. Surveys held at the end of 1937 showed that the Cut Bank, Kevin-Sunburst and Pondera fields had no market for fifty per cent of their production. Temporary relief came when the Great Northern Railroad lowered its rate on crude oil from twenty-three cents to seventeen cents per one hundred pounds for hauls from Cut Bank to Billings, effective April 1, 1938. The only permanent solution to the problem would be the construction of additional refining capacity in northern Montana.

From January 1, 1935, to the time when the Canadian refiners left northern Montana, some 2,700 barrels of daily refining capacity were added to the refining industry of this part of the state. During 1935 many rumors had been heard in Montana oil circles about new refineries to be constructed by certain companies. It was expected that Continental Oil

30Ibid., December 18, 1937.
31Montana Oil and Mining Journal, December 18, 1937.
32Ibid., December 11, 1937.
Company was planning to build a modern refining plant in the southern part of the state, and persistent rumors were heard that the Home Oil and Refining Company of Great Falls would be sold to Standard Oil of California.\(^{33}\) Nothing happened, however, till new rumors appeared about plans for the construction of a refinery at Shelby, to care for the surplus of three thousand barrels per day in the Kevin-Sunburst field.\(^{34}\) It would take another six months before the first addition to northern Montana's refining capacity was actually made, when the Big West Oil Company expanded the daily capacity of its Kevin plant from 800 to 1,000 barrels.\(^{35}\) A few months later, August 1936, L. B. O'Neil, president of the Santa Rita Oil and Gas Company, announced that his company would build a modern 2,500 barrel refinery at Cut Bank, primarily to handle the company's increasing crude production from the Cut Bank field.\(^{37}\) The new refinery, operating under the name

\(^{33}\)Ibid., July 13, 1935.

\(^{34}\)Ibid., November 9, 1935.

\(^{35}\)Ibid., June 13, 1936.

\(^{36}\)L. B. O'Neil was a prominent figure in the Montana oil industry. As one of the pioneers in the Cat Creek field, he took part in the organization of the Lewistown Oil and Refining Company, later on he sold his interests to Continental Oil Company. Soon after its discovery O'Neil entered the Kevin-Sunburst field. Here he built, for the Santa Rita Oil and Gas Company, the first refinery in northern Montana, the present Interntional Refining Company plant at Sunburst. Santa Rita sold the plant to The Texas Company.

\(^{37}\)Montana Oil and Mining Journal, August 22, 1936.
of Northwestern Refining Company, started its production in March 1937. Shortly after the retreat of the Canadians from the Montana crude market in October 1937, the construction of additional refining capacity for northern Montana really started. The following December, 1937, Yale Oil and Refining Company of Billings announced its plans for the construction of a 1,500 barrel refinery at Kalispell. Several five-year contracts with Cut Bank producers, for the purchase of the crude, had been made already securing the plant's future crude supply. Yale Oil and Refining Company's announcement was soon followed by more news, when, in January 1938, it became known that the Wasatch Oil and Refining Company of Salt Lake City was planning to build a modern cracking plant at Pocatello, Idaho. It was expected that the two new refineries would give a steady market for a daily Cut Bank crude production of 1,000 to 1,500 barrels.

That the Wasatch Oil and Refining Company would become an important buyer of northern Montana crude oil became clear when it announced plans to construct another modern refinery at Spokane. The crude for the 2,200 barrel Spokane plant would be furnished by the Glacier Production Company (subsidiary of Montana Power Company), which had no market

38 Ibid., March 20, 1937.
39 Ibid., December 18, 1937.
40 Ibid., January 8, 1938.
for a daily production of about two thousand barrels of crude from the Cut Bank field, since the Canadian refiners had stopped their purchases. In order to secure a market for its crude in the future, the Glacier Production Company made a large investment in the Spokane refinery. The Inland Empire Refinery, under which the new plant at Spokane operated, was put into production in the spring of 1939. To enable the transport of crude from the Cut Bank field to Spokane, the Great Northern Railroad lowered its rate from 27.5 cents per 100 pounds of crude to 20 cents per 100 pounds. Upon protest of California oil and trucking interests, fearing to lose their market in the Spokane area to northern Montana, the Interstate Commerce Commission suspended the new rate. After much uncertainty the issue was finally settled in October 1939, when the Interstate Commerce Commission established the rate at 22 cents per 100 pounds. The lower rail rate on crude, together with a lower rate on gasoline, was of great importance for Montana's oil producers as it opened the large market of Idaho and eastern Washington. After the establishment of the new rail rates it was possible for the

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41 Montana Oil and Mining Journal, March 19, 1938.
42 Ibid., December 24, 1938.
43 Ibid., October 7, 1938.
44 The rate on gasoline was lowered from 50 cents to 33.5 cents per 100 pounds in the same ruling of the Interstate Commerce Commission.
Montana oil industry to compete successfully with the Californians in the Midland Empire area.

In the meantime arrangements had been made for the construction of another refinery, this time in northern Montana. In March, 1939, an agreement had been reached between the Glacier Production Company, the Producers Refining Company and the Socony Vacuum Company, to construct a modern 3,500 barrel refinery at Cut Bank in a joint enterprise. According to the agreement the Glacier Production Company had to build the refining plant, the Producers Refining Company had to guarantee a continuous crude supply of at least 1,500 barrels daily, while the Socony Vacuum Oil Company would make its vast distributing system available to the new refinery. The Glacier Production Company - Socony Vacuum Oil Company plant was put into operation the following September.

The construction of considerable additional refining capacity during 1938 and 1939, had greatly improved the outlook for Montana's oil industry. New activity had followed, especially in the northern Montana oil fields. The results

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45 Montana Oil and Mining Journal, April 2, 1933. Several independent producers of the northern Montana oil fields had formed the Producers Refining Company in March 1938, with the purpose of building a refinery in Shelby to provide a market for operators who were still without. All oil operators in the Cut Bank, Kevin-Suhbrust and Pondera fields could subscribe to the enterprise.

46 Glacier Production Company had been planning to build a 1,500 barrel refinery at Cut Bank, and had a laboratory and storage facilities for 80,000 barrels here.

47 Montana Oil and Mining Journal, September 23, 1939.
could be seen in figures on the total physical production of Montana's oil fields; in 1939 they produced 5,960,000 barrels of crude oil, surpassing the 1938 output of 4,946,000 barrels by considerably more than one million barrels. The improvements in the refinery situation in Montana justified the further development of its oil fields.

The serious marketing difficulties prevailing in the oil fields of northern Montana during the greater part of the 1930's, had not been felt in the Cut Bank field until October 1, 1937, when the Imperial Oil Company, largest buyer in the Cut Bank field, withdrew from the crude oil market of northern Montana. After losing its Canadian market, the total crude oil output of the Cut Bank field dropped from 3,368,234 barrels in 1937 to 2,833,146 in 1938, or by more than fifteen per cent. Before that, the high quality crude produced by Montana's youngest oil field had found a ready market. This is one of the factors accounting for Cut Bank's rapidly increasing production up until 1937. Remarkable advances in the field's output were made during 1935 and 1936, when an active drilling campaign brought the discovery of new oil pools and opened up a few big wells. During the summer of 1935 wildcatters had discovered a new oil pool in the

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49 See this chapter, p. 68.

50 Montana Oil Conservation Board, op. cit.
extreme south of the Cut Bank field, south of the town of Cut Bank. This part of the field, which became known as the Valier area, drew much attention at that time, as it was expected that the main crude oil pool of the Cut Bank field would be found here. Attention had been drawn to this part of the field when The Texas Company and the Montana Power Gas Company each completed a wildcat showing a considerably higher daily production than the average Cut Bank well.\textsuperscript{51} Expectations seemed to be confirmed when A. B. Cobb\textsuperscript{52} completed a well in the southern Cut Bank field, producing five hundred barrels of crude during the first twenty-four hours. The completion of the Cobb-Young No. 1\textsuperscript{53} started a scramble for leases on the acreage adjacent to the big well, of which 2,900 acres were taken out on the Blackfeet Indian Reservation, yielding an initial amount of $36,000 to be divided among the members of the tribe.\textsuperscript{54} These new leases would bring considerable development to the south Cut Bank field, as the contracts required the drilling of fifty wells during

\begin{footnotes}
\item[51] Montana Oil and Mining Journal, June 22, 1935.
\item[52] Ibid., August 3, 1935. A. B. Cobb came to Montana as a contractor in the fall of 1933 from Wyoming. Soon he took out leases for himself, and his success started with the completion of the Cobb-Young No. 1. A few years later Cobb became one of the leading persons in the Montana oil industry.
\item[53] Young was the owner of the land on which the well was located. He had won the land in a poker game twelve years previously.
\item[54] Montana Oil and Mining Journal, September 28, 1935.
\end{footnotes}
1936, estimated to involve an investment of one million dollars.

At the same time much drilling activity took place in other parts of the Cut Bank field, adding more acreage to its proven area. Much excitement was aroused when the Santa Rita Oil and Gas Company brought in the largest well so far completed in the Cut Bank field in January, 1936. The Santa Rita-Lander No. 1, a gusher producing 1,400 barrels of crude per day, was completed on the Lander farm in the northwest sector of the Cut Bank field. As the sensational Lander No. 1 gusher continued to produce at its original rate during 1936, the crude supply of the Santa Rita Oil and Gas Company in Cut Bank increased sharply. In order to secure a permanent market for its crude, the Company decided a few months later to construct its own refinery at Cut Bank.

While new oil producing acreage was added to the Cut Bank field, a new crude oil discovery had been made in the Sweetgrass-Hills, Liberty county, by the J. H. Hamilton Company. The Hamilton Company wildcat was drilled on the Flat Coulee structure, just north of the Bear's Den structure, where oil had been discovered in 1929. Completed in June

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55Ibid., February 1, 1936.
56See this chapter, p. 68.
57Montana Oil and Mining Journal, June 8, 1935.
58See Chapter IV, p. 51.
1935, the Hamilton Company well\(^{59}\) started out with a very promising production, which brought new drilling operations on the structure. After a few more producers were completed during 1936, drilling activity on Flat Coulee slowed down, because of the growing difficulties in marketing northern Montana's crude.

Other wildcats, which attracted much attention during the 1930's, were the deep tests drilled by the Montana Dakota Utilities Company on the Baker-Glendive structure, near the Montana-Dakota line. Many Montana petroleum geologists believed that the mother-pool of Montana's crude oil was the Devonian horizon, located considerably below the Sunburst, Cut Bank, Ellis or Madison sands, from which Montana's oil fields were producing at that time. The experience in the Midcontinent, Texas and Canadian oil fields confirmed this theory. As the Devonian horizon had never been tested in Montana, the progress of the Montana Dakota Utilities Company's wildcat, which was planned to test the Devonian formation, was closely observed by Montana oil circles. If oil were found here in commercial quantities, it would mean that no well in the state would be complete without drilling into the Devonian.

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\(^{59}\)Montana Oil and Mining Journal, June 8, 1935. The Hamilton Company well did not discover the presence of oil in the Flat Coulee structure. In 1928 oil had been discovered here by the Sunburst Oil and Refining Company. The well was lost due to mechanical troubles and drilling was not resumed as the Company was swept away by the depression. Its leases were taken over by the J. H. Hamilton Company.
When in May, 1936, the well struck oil at a depth of 6,700 feet and showed an initial production of 7,500 barrels of crude per day, the general interest turned quickly into excitement. Though the well was not drilled into the Devonian horizon, it proved the presence of oil in the deeper horizons of eastern Montana.

As the Montana Dakota Utilities Company controlled all the acreage surrounding its well, no great scramble for leases followed the discovery. Further testing of the structure followed almost immediately, when the Company started two new wells the following month. Since the first deep test had not been drilled into the Devonian formation, one of these wells was scheduled to go down to a depth of 7,700 feet to make a test of the Devonian. When this well failed to find oil in the Devonian, August, 1936, a third deep test was started, which found oil in the Devonian horizon at a depth of 8,200 feet, about a month later. The significance of the discovery made by the Montana Dakota Utilities Company's third deep test was judged as very high in Montana oil circles. This is expressed in the following quotation, taken from an editorial in the Montana Oil and Mining Journal:

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The service that Montana Dakota Utilities has rendered the State of Montana will be little appreciated by the present generation, for it has opened up such tremendous possibilities in future Montana oil development that it virtually leaves the state unprospected.

There are fully one hundred fully enclosed oil and gas structures in Montana, which have the Devonian within reach of the drill at a lesser depth than the Baker deep test. What that means to the economic welfare of Montana in years to come, cannot be guessed, let alone appreciated.

As in the early phase of Montana's oil industry, expectations ran too high. All Baker-Glendive wells had to be closed down in 1938, because the Montana Dakota Utilities Company was unable to find a market for its crude.65

Though the immediate results of the Devonian test on the Baker-Glendive structure were thus disappointing, it had proved the presence of crude oil in the Devonian formation in Montana for the first time. This knowledge was mainly responsible for new Devonian tests in Montana during the following decade.

When comparing the developments taking place in Montana's oil industry during the decade of the 1930's with those of the 1920's, a great difference can be noticed. Whereas the decade of the 1920's was a period of considerable expansion, witnessing the discovery and development of Montana's main crude oil fields, the decade of the 1930's was truly a depression decade for many crude oil producers and especially for those in the northern part of the state. Lack

65 Ibid., December 31, 1938.
of a market for northern Montana crude caused its producers to curtail their production and to cancel their plans for new drillings.

At the same time a parallel can be drawn between the decades of expansion and depression. Whereas the 1920's brought a remarkable expansion in the production sector of Montana's oil industry, the 1930's witnessed a similar expansion in the refining sector of the industry. Enlargement of the refining capacity available to northern Montana crude producers became an urgent problem when the Canadian refiners stopped all their crude purchases in northern Montana in October, 1937. Rapid construction followed and by the end of the 1930's northern Montana crude producers had found a new market in about eleven thousand barrels of daily refining capacity constructed in northern Montana, Idaho and Washington. The additional refining capacity created during the latter part of the 1930's was badly needed when the nation's defense demanded large amounts of crude oil products a few years later.

66See pp. 71, 72 and 73.
CHAPTER VI

MONTANA CRUDE OIL INDUSTRY DURING THE WAR YEARS,
1940 - 1945

The new decade was ushered in by the announcement of
the Inland Empire Refinery at Spokane that it planned to
construct a six-inch pipeline from Cut Bank to Spokane, a
distance of 320 miles.¹ This was good news to the oil in­
dustry of northern Montana. The daily capacity of the pipe­
line would amount to 6,000 barrels and the total cost of the
project was estimated at $2,500,000.

The construction of this pipeline was considered
necessary by the Inland Empire Refinery officials for more
effective competition in the Spokane area. California oil
interests were able to ship their oil products for the great­
er part by water and undersell Spokane refiners. The current
rail rate of 22 cents per 100 pounds from Cut Bank to Spokane²
was considered as too high to compete with the low-cost water
transportation available to the California refiners. The
actual start of the project was postponed, when the Great
Northern Railroad, fearing to lose the crude transport, pro-

¹Montana Oil and Mining Journal, January 27, 1940.
²The current rate had been established by the Inter­
state Commerce Commission in October, 1938.
posed to lower its rate on crude shipped from Cut Bank to Spokane. About a month later the Great Northern Railroad lowered the rate from 22 cents to 18 cents per 100 pounds, effective April 13, 1940.\textsuperscript{3} Though the Inland Empire Refinery officials had demanded a rate of 16 cents per 100 pounds, the lower rail-rate would strengthen the position of Montana crude in the Spokane market considerably. That the lower rate, granted by the Great Northern Railroad, would be allowed to become effective became uncertain when the California oil and trucking interests filed a protest with the Interstate Commerce Commission.\textsuperscript{4} Despite the pending decision of the Interstate Commerce Commission, the Inland Empire Refinery announced that it had given up its plans to construct the pipeline, as the lower rail-rate had made the project economically unfeasable.\textsuperscript{5} The issue was decided definitely when the Interstate Commerce Commission turned the protest down and refused to change the new rate.\textsuperscript{6} The construction of a pipeline into the state of Washington was definitely out of the picture now.

The market for northern Montana crude continued to improve during 1940. In addition to the lower rail-rate to

\begin{itemize}
\item \textsuperscript{3}\textit{Montana Oil and Mining Journal}, March 16, 1940.
\item \textsuperscript{4}\textit{Ibid.}, March 23, 1940.
\item \textsuperscript{5}\textit{Ibid.}, May 4, 1940.
\item \textsuperscript{6}\textit{Ibid.}, June 29, 1940.
\end{itemize}
Spokane, and the enlargement of the refining capacity of the
Spokane plant from 2,200 barrels per day to 3,000 barrels, a
new refinery was completed in northern Montana in October,
built by the Production Refining Corporation of Shelby. 7
The new refinery, built at Shelby, was able to process a
maximum of 2,500 barrels of crude daily, all of which would
be purchased in the Kevin-Sunburst field. Moreover, the
Canadian market had been opened up again for Montana crude,
due to the large demand for refined products by the Canadian
armed forces. Since Turner Valley was unable to supply the
sharply risen demand, the British American Oil Company turn-
ed to northern Montana crude oil producers in July, 1940,
announcing that it would purchase at least 3,000 barrels of
crude daily for an indefinite period. 8

The rapidly increased refining capacity, available
to northern Montana crude oil producers, together with the
return of the Canadian buyers placed northern Montana's crude
oil market in the healthiest situation in its history. 9  Market
demand exceeded the current crude production during 1940
by about one thousand barrels per day, so that the large
amounts of storage oil, held over from the preceding depres-
sion years, were depleted considerably. 10

7Ibid., October 12, 1940.
8Ibid., July 27, 1940.
9Ibid., August 24, 1940.
10Ibid., December 28, 1940. Total 1940 crude produc-
tion amounted to 6,650,431 barrels, whereas the total 1940
crude consumption was 7,014,459 for Montana.
This situation caused unusual activity in Montana's oil fields, especially in the Cut Bank and Kevin-Sunburst fields. In Cut Bank, for the first time since late 1937, every oil well was producing at capacity by August, 1940.\textsuperscript{11} During 1940, eighty-nine oil producing wells were completed here, of which several proved to be large producers. Three miles south of the town of Cut Bank, in the area of the Big Bend oil pool, discovered by the Glacier Production Company in June, 1939,\textsuperscript{12} additional drilling had extended the proven area of the Cut Bank field by about 640 acres.\textsuperscript{13} The annual crude output of the Cut Bank field reached the four million mark during 1940 (4,086,464 barrels), as compared with a total production of 3,541,679 barrels during 1939.\textsuperscript{14} The Kevin-Sunburst field experienced an identical revival during 1940, though in less degree. Here many wells which had been idle for years, were put into operation again. The problem caused by large amounts of storage oil, held by some Kevin-Sunburst producers, was solved when the International Refining Company of Sunburst, purchased all Kevin-Sunburst storage crude in February.\textsuperscript{15} Drilling operations, which were consid-

\textsuperscript{11}\textit{Ibid.}, August 24, 1940.

\textsuperscript{12}\textit{Ibid.}, June 10, 1939.

\textsuperscript{13}\textit{Ibid.}, December 28, 1940.

\textsuperscript{14}\textit{Montana Oil Conservation Board, Statements of Crude Oil Produced}, May, 1950.

\textsuperscript{15}\textit{Montana Oil and Mining Journal}, February 17, 1940.
ered to be the greatest in a decade, were resumed all over the field, especially in the central and western sectors.\textsuperscript{16} During the first part of 1941, drilling activity in the Kevin-Sunburst field slowed down, however, caused by a considerable cut in the crude purchases of the principal buyer in Kevin-Sunburst, the International Refining Company of Sunburst. The cut was due to the increased crude runs from The Texas Company's producing properties in the south Cut Bank field where, during January, 1941, another rich oil pool had been discovered.\textsuperscript{17} The new pool, called the Tribal pool as it was located on Indian land south of the Big Bend pool,\textsuperscript{18} was considered as much greater than the Big Bend pool. The completion of a few large wells, all with an initial production of around five hundred barrels per day, brought the Tribal pool quickly in the center of leasing activity.\textsuperscript{19} The new drillings, required by the leasing contracts, brought rapid development to the new southward extension of the Cut Bank field. Interest in the Tribal pool mounted when the largest well, since the completion of the Lander No. 1,\textsuperscript{20} was brought in by R. C. Jeffries, independent operator, in July, 1941.\textsuperscript{21}

\textsuperscript{16}Ibid., June 1, 1940.
\textsuperscript{17}Ibid., February 1, 1941.
\textsuperscript{18}See p. 84, footnotet 12.
\textsuperscript{19}Montana Oil and Mining Journal, March 8, 1941.
\textsuperscript{20}See Chapter V, p. 76.
\textsuperscript{21}Montana Oil and Mining Journal, July 26, 1941.
The Jeffries-Tribal No. 1 showed an initial production of one thousand barrels during the first twenty-four hours, and remained one of Montana's largest wells for several years.

A new pool was added to Kevin-Sunburst's producing area, when the Santa Rita Oil and Gas Company completed a 135 barrel per day well in the extreme northern end of the field. As the Darling pool, named after the Santa Rita petroleum geologist who had mapped the structure a few years ago, showed a promising production, it attracted considerable drilling activity during the following years.

Elsewhere in the state, the oil fields also showed much activity during 1941. Rising crude prices, due to the increasing purchases of refined products by the allied nations, gave great stimulus to drilling operations.

Stimulated by the discovery of crude oil in the Devonian horizon on the Baker-Glendive structure, new deep tests were started during 1941. One test was drilled by Carter Oil Company (subsidiary of Standard Oil of New Jersey) on the leases of the Montana Dakota Utilities Company, near the town of Baker. After an extensive geophysical survey, Carter Oil Company had decided to drill another deep test on the structure, despite the discouraging results of the 1936

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22Ibid., August 16, 1941.

23See p. 77.

24Montana Oil and Mining Journal, February 8, 1941.
Devonian test of the Montana Dakota Utilities Company. The decision was made in favor of another test, because the survey showed that the 1936 test had been drilled on the wrong spot. The progress of the Carter Oil Company's deep test was closely followed by Montana oil circles, as this well would decide the future of the structure, as well as the value of the leases taken out in this area on millions of acres, by several major companies. Interest in the Baker-Glendive structure cooled quickly, when Carter Oil Company abandoned its deep test in January of the following year, as it had become clear that the crude, found in the Devonian horizon, could not be produced in commercial quantities.

A second Devonian test was drilled in the Cat Creek field by the Arro Oil and Refining Company of Lewiston, in April, 1941, taken over and continued by the California Company (subsidiary of Standard Oil of California). The findings of the California Company brought another disappointment to the believers in the possibilities of the Devonian horizon, however, when the Company reported the following August that it found only small showings of oil in the Devonian.

While the 1941 drilling campaign was contributing

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26 *Ibid.*, November 1, 1941.
considerably to the development of Montana's oil fields, im-
portant developments took place in the refining industry of
the state. On June 18, 1941, A. B. Cobb\textsuperscript{30} had purchased the
Home Oil and Refining Company plant at Great Falls, together
with the Conrad refinery and W. E. Rice properties in the
Pondera oil field, involving a transaction of about one mil-
lion dollars.\textsuperscript{31} This transaction made the former Wyoming
contractor one of Montana's leading refiners.

The entrance of the United States into the second
World War, brought the nation's oil industry under supervi-
sion of the federal government, in order to achieve the
greatest possible contribution to the war effort from this
vital defense industry. For this purpose the Office of the
Petroleum Co-ordinator was created early in 1942 and was del-
egated by Congress with the following authorities:\textsuperscript{32}

1. The prices of crude oil and refined products were
made subject to a ceiling, to be set by the Office.

2. New drilling operations could not be started
without authorization of the Office.

3. The Office could grant priority for the purchase
of drilling equipment.

4. The Office had to set the allowable production
for each state, to be divided among the separate fields by

\textsuperscript{30}\textit{See p. 75, footnote 53.}

\textsuperscript{31}\textit{Montana Oil and Mining Journal}, June 21, 1941.

\textsuperscript{32}\textit{Ibid.}, January 24, 1942.
the Oil Conservation Board of the state. These powers put the Office of the Petroleum Co-ordinator in almost complete control of the nation's oil industry, as it controlled directly all drilling activity, as well as the prices of crude and refined products. That the new regulations would not enjoy a favorable reception by the members of Montana's oil industry, was clear from the beginning. Aside from that, the often vague generalities of the regulations concerning new drilling caused much confusion among the oil operators of the state, resulting in interruptions in new drilling operations. In the Cut Bank, as well as in the Kevin-Sunburst field, drilling activity was less than normal during the spring, 1942. The fact that the Office allowed the drilling of only one well on every forty acres threatened to form a serious obstacle in the further development of the Kevin-Sunburst field, as it would soon cause a shortage of drilling locations. Kevin-Sunburst operators therefore proposed to change the regulation to one well on every ten acres for their field. The issue was decided during the latter part of April, when the Office of the Petroleum Co-ordinator allowed the Kevin-Sunburst operators to drill one well in every twenty acres.

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33The Oil Conservation Board of the State of Montana was created by the Montana Oil Conservation Law, which was passed during the 1933-1934 session of the Legislature.

34Montana Oil and Mining Journal, March 21, 1942.


36Ibid., May 2, 1942.
While Montana's oil operators were gradually adjusting to the government supervision, the war situation created an unusually large demand for Montana crude oil and refined products. By May, 1942, a daily total of 2,500 barrels of Cut Bank crude was shipped to Canada to fill up the surplus capacity of the Alberta refineries. When the daily crude production of Turner Valley began to show a considerable decline during the latter part of 1942, northern Montana was called upon to supply an additional three thousand barrels of crude per day.\(^37\) A ban on the delivery of gasoline by railroad from the Midcontinent oil fields to North and South Dakota brought new demand for Montana oil products. As Montana refiners were allowed to ship their products by railroad tank car into North and South Dakota, these states had to be supplied by Montana's oil fields.\(^38\) Moreover, the shortage of tankers on the Pacific Coast, limiting the shipments of refined products from California into Oregon and Washington, put additional pressure on the output of Montana's oil fields.\(^39\)

The sharply increased war demand for the crude oil products of Montana, resulted in an excess demand of six thousand barrels of crude per day, during the latter part of 1942.\(^40\) This situation brought a great need for a more

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\(^37\)Ibid., November 14, 1942.
\(^38\)Ibid., August 29, 1942.
\(^39\)Ibid., March 28, 1942.
\(^40\)Ibid., November 28, 1942.
intensive wildcatting campaign to bring about the urgent increase in the crude oil output of the state. September, 1942, brought the outstanding discovery of the year, when Ed Reagan opened a producing well drilled north of the Cut Bank field, near the Canadian border.41 The Reagan well, producing about one hundred barrels of crude per day, was considered as a very important discovery in Montana oil circles, as it produced from a deeper horizon than found in the adjacent Cut Bank and Kevin-Sunburst fields. This fact indicated that oil might be present in the Reagan horizon of Cut Bank and Kevin-Sunburst.

Another important wildcat was drilled on the Midway structure between Bannatyne and Pondera during 1942, where R. C. Tarrent, leading independent in the Cut Bank field, discovered a 43- gravity crude at a shallow depth.42 Considerable drilling activity followed in the area of the Midway structure here during 1943, as several Cut Bank operators were holding leases here at the time of R. C. Tarrent's discovery. Several small oil wells were brought in, all producing from shallow depth, which made production on the Midway structure very profitable.43

One of the outstanding developments taking place in Montana's oil fields during the war years was the remarkable

41Ibid., September 5, 1942.
42Ibid., September 19, 1942.
43Ibid., October 2, 1943.
revival of the Elk Basin field. When deeper drilling brought in a 1,500 barrel a day well in the Wyoming part of the field, December 1942, definite proof was furnished of the existence of a rich sand below the present producing horizon. Additional drilling done during the following year brought in more large wells in the Elk Basin and Frannie oil fields, south of the Montana line. Stimulated by the success of deeper drilling in northern Wyoming, the Stanolind Oil and Gas Company drilled a test well on the Montana side of the Elk Basin, and when, in July, 1943, it brought in a large well, Montana's Elk Basin had been rediscovered. The Elk Basin oil field was decisively removed from its long-time obscurity when the Ohio Oil Company completed a 3,000 barrel a day well in the state's oldest oil field a few months later. A lively interest for the reborn field was started and excessive prices were paid for leases on some government land, which was sold in December, 1943. Highest bidder was the Stanolind Oil and Gas Company, which paid $26,216.12 per acre for oil leases on a tract of seventy-five acres, establishing a national record of prices paid for oil leases on government land.

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44Ibid., December 19, 1942.
45Montana's part of the Frannie oil field was discovered in 1940. It is for the greater part located in Wyoming.
46Montana Oil And Mining Journal, October 16, 1943.
47Ibid., December 11, 1943.
The revival of the Elk Basin field during the first part of the 1940's is clearly expressed in figures on its physical production, before and after the discovery of the lower sand. Crude oil output in this basin increased from 16,044 barrels in 1942 to 940,215 barrels in 1945, an increase of more than 5,760 per cent.\(^4^8\)

While the first part of the 1940's was marked by considerable wildcatting activity in Montana, increasing the state's total annual crude oil output from 5,960,000 barrels in 1939 to 8,647,000 barrels in 1944,\(^4^9\) important developments took place among the companies producing in this state. From 1941 to 1944 a series of transactions brought great changes in the pattern of interests which controlled the crude oil industry in Montana. The first important change was made in 1941 with the purchase of the Home Oil and Refining Company plant and the Conrad refinery by A. B. Cobb of Cut Bank.\(^5^0\) More changes in the ownership of Montana's oil industry came when the Standard Oil Company of New Jersey purchased the controlling stock in the Santa Rita Oil and Gas Company in November, 1942.\(^5^1\) "The March of the Majors"\(^5^2\)

\(^4^8\) Montana Oil Conservation Board, \textit{op. cit.}, 1950.
\(^4^9\) Ely, \textit{Montana's Production 1930-1949}, \textit{op. cit.}, p. 50.
\(^5^0\) See p. 88.
\(^5^1\) \textit{Montana Oil and Mining Journal}, November 28, 1942.
\(^5^2\) \textit{Ibid.}, February 5, 1944.
continued when The Texas Company took over the pipeline system of the Illinois Pipeline Company, a subsidiary of the Ohio Oil Company, in the Kevin-Sunburst field, October, 1942. A few months later The Texas Company acquired all the Ohio Oil Company producing properties in the Kevin-Sunburst field. In the meantime the Farmers Union Central Exchange, Incorporated had purchased the plant of the Independent Refining Company at Laurel, from which it had been buying sixty to seventy per cent of the daily refinery output.

The discovery of a rich second sand on the Wyoming side of the Elk Basin oil field, brought rumors that the Continental Oil Company was planning to dismantle its refinery at Lewistown and build a modern refining plant at Billings on a site which it had purchased some time before. Pending the plans for the construction of a new refinery at Billings, the Union Oil Company of California purchased ninety thousand acres of oil and gas land in the Cut Bank field, as well as the Cut Bank refinery, from the Glacier Production Company, November, 1943. A few months later, February 1944, the Carter Oil Company purchased all the Elk Basin producing

53Ibid., October 17, 1942.
54Ibid., January 30, 1943.
55Ibid., January 23, 1943.
56Ibid., May 8, 1943.
57Ibid., November 20, 1943.
properties and the Billings refinery from Yale Oil Company.58

The first half of the 1940's brought several developments the consequences of which are not limited to this particular period of time. First of all came the approval by the Interstate Commerce Commission of a considerable lower rail-rate granted by the Great Northern Railroad on crude transports to Spokane. The new rate gave Montana's oil industry a firm hold of the markets of northern Idaho and eastern Washington. A growing population in these districts indicates a steady demand for Montana crude and refined products in future years.

Another development of great significance which took place during the war years in Montana's oil industry is formed by the wildcatting done in older fields by deeper drilling. The remarkable success met in the Elk Basin field will undoubtedly lead to similar ventures in other oil fields in this state in years to come.

A third important development taking place during the first half of the 1940's was formed by the transactions which put major oil companies in control of large producing properties in Montana. This "March of the Majors" into Montana's oil industry can be considered as a favorable sign concerning the potentialities of Montana as an oil producing state.

58 Ibid., February 5, 1944.
CHAPTER VII

MONTANA CRUDE OIL INDUSTRY DURING THE
POST WAR YEARS, 1946 - 1950

When the year 1945 brought international hostilities to an end, a sudden relaxation took the place of the high pressure put on the nation's oil industry during the years of World War II. The general slow-down in production tempo, during the latter part of 1945,\(^1\) accounts for the decline in Montana's crude oil output from 8,647,820 barrels produced during 1944, to 8,417,903 barrels during 1945.\(^2\)

When studying the figures on Montana's total annual physical production of crude oil during the post-war years, it is noticed that, with the exception of the relatively small decline in the 1945 and 1947 annual output, the increasing trend of the war years continued during the latter part of the decade.\(^3\) During the same period, however, Montana's two leading crude oil fields showed a steady decline in annual output. From 1945 to 1949 the annual crude production of the Cut Bank field declined from 4,872,738 barrels, \(^\text{1R. P. Jackson, "Montana Petroleum Developments in 1945," Rocky Mountain Petroleum Year Book, p. 198.}

\(^2\text{See Appendix, Table VI, p. 113.}

\(^3\text{See Appendix, Table VI, p. 113.}
produced during 1945, to 3,436,516 barrels in 1949, a drop of about one and one-half million barrels of crude oil. In less degree the same trend is shown in the annual crude oil output of the Kevin-Sunburst field, which declined from 1,914,655 barrels during 1945 to 1,559,127 barrels in 1949. In spite of the substantial decline in the annual production of Montana's largest oil fields during the latter part of the 1940's, the total output of the state as a whole increased considerably during the same period. An all-time record production was reached in 1948, when Montana's total annual crude oil output amounted to 9,381,708 barrels. The increasing annual crude output of the state as a whole, despite the declining trend in the annual output of Montana's largest oil fields, was due mainly to increased production from fields elsewhere in the state. The remarkable revival of the Elk Basin, started in 1943, continued during the latter part of 1940's. Annual crude oil production of the Elk Basin field increased from 940,215 barrels in 1945, to 2,330,417 barrels in 1949, an increase of more than 147 per cent. Stimulated by the success of others, more wells were drilled into the rich second sand of the Elk Basin field, most of them making a substantial contribution to its annual crude output.

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4See Appendix, Table VII-a, p. 114.
5See Appendix, Table VII-a, p. 114.
6Ibid., Table VI, p. 113.
7Ibid., Table VII-a, p. 114.
Elk Basin operators believed that additional, large oil reserves might be present in the Madison Horizon, located below the second sand. This theory proved to be true when a test well, drilled by the Sinclair Wyoming Company during 1947, struck oil in the Madison horizon and produced five thousand barrels of crude oil during the first twenty-four hours. The Sinclair Wyoming Company wildcat formed the outstanding development of Montana's oil industry during 1947. When it opened up a new rich oil sand in the Elk Basin, it made this basin Montana's second largest oil field.

The satisfactory results of deeper drilling in Montana's oldest oil field renewed the interest for testing the lower horizons of the Cat Creek field. Plans to drill a well into formations below the producing sands of Cat Creek had existed for a long time but had been prevented until 1945 by high royalties. In some cases Cat Creek royalties ran as high as fifty-six per cent of the total crude production, which made it economically impossible for the operator to bear the higher cost of lower drilling. When the lower horizons of the Cat Creek field were finally tested during the latter part of 1945, in a well on the Mosby Dome, Cat Creek became the second oil field in Montana which experienced

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9 *See Appendix, Table VII-a, p. 114.
a remarkable revival.\textsuperscript{11} The Mosby Dome well, which had been drilled into the Ellis sand about 150 feet below the Cat Creek producing horizon, produced three hundred barrels of crude per day. A new oil boom was started in the central part of the state, as more wells were drilled into the Ellis sand, all producing from one hundred to three hundred barrels of crude per day.\textsuperscript{12} The annual crude oil output of the Cat Creek field, which had been on the decline since 1922, showed an increase during 1945, for the first time in twenty-three years. From 1944 to 1949 Cat Creek's annual crude oil production increased from 114,553 barrels in 1944 to 459,349 barrels in 1949.\textsuperscript{13}

Rising crude oil prices following the abandonment of price controls in 1946 formed a strong stimulus for oil prospecting in the unproven areas of the state.\textsuperscript{14} Renewed wildcatting activity brought about the discovery of four small oil fields in Montana during the latter part of the 1940's. In 1947 the Texas Company brought in Ragged Point, twenty miles south of the East Dome of the Cat Creek field in Musselshell county.\textsuperscript{15} As The Texas Company discovery well


\textsuperscript{12}\textit{Ibid.}, p. 273.

\textsuperscript{13}See Appendix, Table VII-a, p. 114.


\textsuperscript{15}\textit{Ibid.}, 1947-1948, pp. 102 and 107.
showed an initial production of 228 barrels per day, the newly discovered area attracted attention almost immediately after the discovery, and several large oil companies secured leases around the Ragged Point structure. The following year witnessed the discovery of crude on other structures in central Montana, when wildcatters brought in the Big Wall and Melstone fields in Musselshell county. The Big Wall structure proved to be the best discovery of the latter part of the decade, producing 224,874 barrels of crude oil during 1949.\textsuperscript{16} The fourth discovery of the period was made in 1949, when a small oil strike was made on the Sumatra structure, in the northwestern part of Rosebud county.\textsuperscript{17}

The substantial gains in the crude oil production of the Elk Basin field created a new demand for additional refining capacity in Billings. To meet this situation, two modern refineries were constructed here during the latter part of the 1940's. Montana's largest refinery, with a daily capacity of twenty thousand barrels, was built by the Carter Oil Company during the latter part of the 1940's, and formally placed in operation August 26, 1949.\textsuperscript{18} The same year saw the completion of the Continental Oil Company refinery at Billings, which added another eight thousand barrels of daily refining capacity to Montana's refining


\textsuperscript{17}Ibid.

\textsuperscript{18}American Institute of Mining and Metallurgical Engineers, \textit{op. cit.}, 1949, p. 345.
Serving the new refineries was a new 12-inch pipeline, constructed during the same period, from the Elk Basin field to the new refineries, a stretch of sixty-eight miles. The new pipeline replaced a smaller one in the transport of crude from the Elk Basin to the Billings refineries.

The writer does not feel competent to make any positive statement concerning the future possibilities and development of the crude oil industry in Montana. Most valid statement in this respect is the following statement made in 1927 by the well known petroleum-geologist, Ralph Arnold, in a speech given before the Rocky Mountain Oil and Gas Association:

Montana is one of the new oil states, and as such her oil history lies in the future, rather than in the past. The total area of Montana is 146,131 square miles, and of this area 99,307 square miles, or 68 per cent, is underlain by rocks possibly oil bearing. This comprises the bulk of the eastern two-thirds of the state, or that portion east of the Rocky Mountains. With the exception of Texas and Colorado, Montana contains a greater area of possible oil bearing rocks than any other state in the Union.

Montana's crude oil output has increased considerably since the time Ralph Arnold made his statement. Fur-

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19Ibid., p. 345.
20Ibid., p. 344.
21See Chapter IV, p. 49, footnote 28.
22Montana Oil and Mining Journal, September 7, 1935.
ther exploration will give more certainty about the size of the crude oil reserves of this state. The extent of the latter will decide the future of Montana's crude oil industry.

At the moment it is possible to indicate a few factors concerning the role of petroleum in Montana's future. In 1949 the total value of the output of the crude oil wells in this state exceeded that of its copper mines for the first time. If this should remain true during the 1950's, crude oil would have replaced copper as Montana's first mineral. In this case the decade of the 1950's would form the fourth phase in the state's mining history.

The increasing interest of the major oil companies in Montana's oil industry, witnessed by the large investments made in producing properties and in large modern refineries during the 1940's, indicate that crude oil will play an important role in Montana's future economy. The large investments have created new employment possibilities, direct as well as indirect, which have made it possible for many Montanans to stay in this part of the country. A prospering mining industry has, moreover, a stabilizing effect on the economy of the state as it makes Montana less dependent on its agriculture. The further development

23 See Chapter II, p. 25, Table IV.
of the crude oil industry in this state will be an important factor in the general economic prosperity of Montana.
CHAPTER VIII

SOME ECONOMIC PROBLEMS OF MONTANA'S
CRUDE OIL INDUSTRY

The first problem to consider is the question of proved reserves. When dealing with the meaning of the concepts of crude oil "reserves" and "proved reserves," it has been pointed out that these quantities are relative in character depending upon the prevailing price-cost relationship.¹ Technological improvements in production and refining of crude oil, which made it possible to derive a considerable larger amount of marketable products from a given crude oil well than previously, lowered the share of each final product in total fixed cost. The declining cost level, while changing the existing price-cost relationship, made it possible to recover certain quantities of crude, the production of which had been economically prohibited before.

Other leading factors determining the size of proved reserves of crude oil by bringing about changes in the prevailing price-cost relationship, are royalties and taxation. Royalties form a substantial part of the total cost of production of crude oil and as such they are an important factor in determining the size of the proved reserves of a certain

oil field. A good example of the influence exerted by the level of royalties on the development of an oil field, is the Cat Creek field which experienced a remarkable revival during the latter part of the 1940's, when lower royalties made it possible to test and produce from a deeper horizon. Another important component of the cost of production of crude oil is the amount of taxes levied upon crude oil production. High taxes tend to restrict total proved reserves by increasing cost, whereas lower taxes enlarge the quantity of crude oil which can be recovered economically. The taxation policy to be followed with respect to the crude oil industry, is thus a factor which demands careful consideration by the responsible government officials, where crude oil plays an important role in the economic progress and security of the country. Taxation should not interfere with the production of this essential mineral. As to state taxes, another problem needs consideration. When Montana crude entered into competition with California oil products in Idaho and Eastern Washington and with Midcontinent and Wyoming products in North and South Dakota, during the first part of the 1940's, taxes levied by this state upon the proceeds of its oil industry became an important factor. In order to be able to maintain their position in out of state markets,

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2 See Chapter VII, pp. 98 and 99.

3 See Chapter VI, pp. 87 and 88.
Montana's crude oil producers and refiners are subject to a tax structure which lies considerably above that prevailing in the competing states. Taxation should not curtail the development of one of Montana's leading mineral industries.

Another question concerns the role of the independent company in the development of the crude oil industry in Montana. Typical for the development of the crude oil industry in Montana is the fact that by far the greater part of the exploratory work was done by independent operators. All major oil fields of this state were discovered by independents. Almost all of these discoverers came to Montana from Midcontinent or Wyoming oil fields, where they received their training. After arriving in Montana they usually started out as drilling contractor or as a petroleum geologist, employed by a certain oil company. After making some money they started a drilling venture on their own account, supported by money raised from local interests. Among the independents and small oil companies formed by Montana people, which brought about the development of a crude oil industry in this state, the following are outstanding: Gordon Campbell, W. M. Fulton, W. E. Rice, R. C. Tarrent, A. B. Cobb, The Butte Company, Frantz Oil Corporation, Kalispell Kevin Company and the Montana Pacific Coal and Oil Company.

Major oil companies did not enter the state before an oil field had been discovered and had proved to be able to produce crude oil in commercial quantities. In the period before the discovery of the Kevin-Sunburst oil field,
out-of-state oil interests did not believe in Montana as a future oil state. The unsuccessful efforts of Gordon Campbell in California, where he tried to raise money for his wildcat in the Devils Basin, proved this clearly. After the Kevin-Sunburst field had been discovered major oil companies entered this state for the first time. They secured the most promising acreage surrounding the discovery wells, whereas the lower-priced, less-promising land was leased by entering independent operators. When crude oil was discovered in this unproven part of the field by the independents, major companies tried to take out new acreage here.

The first major oil company to enter Montana was The Texas Company, which leased acreage in the Kevin-Sunburst field and purchased the International Refining Company plant at Sunburst from the Santa Rita Oil and Gas Company during the latter part of the 1920's. The major oil companies almost completely controlled the oil industry in this state during 1942, 1943 and 1944, when several majors moved into Montana for the first time. This development has been indicated as the "March of the Majors."

A general characteristic of the refining industry of the United States is the fact that the major company

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4See Chapter III, p. 36, footnote 20.
5See Chapter V, p. 70, footnote 36.
6See Chapter VI, pp. 93 and 95.
refineries are usually found near the large consuming centers, whereas independent refineries are mostly located near the oil field. The construction of refineries near large consuming centers, where the final products are marketed, is economically more feasible than location near the source of the raw material. This is mainly because the latter makes the plant entirely dependent upon the crude supplied by that one field. The general lack of stability in the crude supply of one field makes it economically unsound to construct a large, specialized plant near the source of supply. A refinery constructed near a large consuming center is usually not dependent on one source for its crude supply, but upon several oil fields, which accounts for a far more stable supply.

As the major oil companies control between eighty and ninety per cent of the trunk lines of the United States, they are in a position to build their refineries near the large consuming centers, enabling them to construct large and specialized plants. Large-scale production makes it possible for the large oil companies to produce their products at lower cost per unit than the smaller independent refineries, which are usually not as well equipped as the large company plants.

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7W. B. Nelson, The Oil Industry: A Case Study in Imperfect Competition, p. 88. Study is an unpublished dissertation written in the Department of Economics of the State University of Iowa, August, 1950.

8Ibid., p. 73.
Another competitive advantage of the major oil company refineries over the independent refiner is found in their control of the pipelines of this country. As it is usually impossible for the independent refiner to use the major company owned pipeline, he has to transport his crude or gasoline by rail or truck. Cost of transportation by rail or truck is considerably higher than by pipeline, as can be seen from the following figures: ⁹

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Cost per ton-mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railroad</td>
<td>$0.01695</td>
</tr>
<tr>
<td>Truck</td>
<td>.06125</td>
</tr>
<tr>
<td>Pipeline (crude)</td>
<td>.00344</td>
</tr>
<tr>
<td>Pipeline (gasoline)</td>
<td>.00445</td>
</tr>
</tbody>
</table>

The position of the independent refiner in Montana is more favorable than is true for the country as a whole. The lack of large consuming centers in this state makes it less feasible for the major companies to construct large refineries in Montana. On this point Montana independent refiners are not so much at a competitive disadvantage as the independent in other states, as they do not have to compete with large-scale production in the same degree as in the eastern and midwestern states.

From Tables VIII and IX in the Appendix, pages 116 and 117, respectively, it can be seen that almost all pipelines in this state are owned by the major companies, with the exception of the old Yale Oil Company line from the Elk

⁹Ibid., p. 65.
Basin to Laurel and the pipelines owned by the Toronto Pipeline Company and the Interstate Oil Pipeline Company. On this point Montana independent refiners are thus on the same competitive disadvantage as is true in other states. The fact that costs of transportation are higher in this state than the average for the country as a whole, puts Montana's major oil companies, which are able to transport their crude by pipeline, in a more favorable position than independents elsewhere.

Another point for consideration is the high price of gasoline in Montana. A general characteristic of the oil industry in the United States is the complete absence of price competition between major companies in marketing gasoline and lubricating oil. Occasional differences in the prices of major company gasoline in certain localities are caused by price wars between local service station operators, who have to take the price cut out of their profit margins. All major companies supply their stations at uniform prices determined by the price-leader for that district, which is the largest single company marketing in that area. All other major companies follow suit and charge the same prices for their products. All prices charged by the price leader are based on the selling price at its main refinery, and for other places they are increased by the amount of freight charged

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10 Ibid., p. 108.
for transporting the gasoline from the main refinery to that particular locality. This system of pricing, known as the "Basing Point System," accounts for the relatively high price of gasoline in Montana. Price leader in this state is the Continental Oil Company, which uses Tulsa, Oklahoma, where its headquarters are located, as its basing point. The price at which the Continental Oil Company sells its gasoline to its Montana service station operators is thus determined by the Tulsa selling price plus the freight to Montana. Though most of the gasoline sold in Montana is produced and refined in this state, Montanans have to pay the Tulsa price plus imaginary freight charges.

The lack of price competition between the major companies, which makes basing point pricing possible, together with a state tax of six cents a gallon, accounts for the high price of gasoline in Montana.

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11 Nelson, op. cit., p. 111, Table XIII.
PART III

APPENDIX
### TABLE VI

**TOTAL ANNUAL PHYSICAL PRODUCTION AND VALUE OF PRODUCTION OF CRUDE OIL IN MONTANA, 1916-1949**

<table>
<thead>
<tr>
<th>Year</th>
<th>New Field(s)</th>
<th>Physical Prod. (in barrels)</th>
<th>Value of Prod. (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1916</td>
<td>Elk Basin</td>
<td>44,917</td>
<td>44,019</td>
</tr>
<tr>
<td>1917</td>
<td></td>
<td>99,399</td>
<td>146,272</td>
</tr>
<tr>
<td>1918</td>
<td></td>
<td>69,323</td>
<td>125,828</td>
</tr>
<tr>
<td>1919</td>
<td></td>
<td>90,000</td>
<td>184,500</td>
</tr>
<tr>
<td>1920</td>
<td>Cat Creek</td>
<td>333,833</td>
<td>1,025,181</td>
</tr>
<tr>
<td>1921</td>
<td>Devils Basin and Soap Creek</td>
<td>1,443,475</td>
<td>3,227,744</td>
</tr>
<tr>
<td></td>
<td>Kevin-Sunburst</td>
<td>2,306,414</td>
<td>3,500,567</td>
</tr>
<tr>
<td>1922</td>
<td>Lake Basin</td>
<td>2,553,920</td>
<td>3,718,873</td>
</tr>
<tr>
<td>1923</td>
<td></td>
<td>2,680,899</td>
<td>3,609,049</td>
</tr>
<tr>
<td>1924</td>
<td></td>
<td>3,984,170</td>
<td>6,560,238</td>
</tr>
<tr>
<td>1925</td>
<td></td>
<td>7,528,426</td>
<td>9,916,422</td>
</tr>
<tr>
<td>1926</td>
<td></td>
<td>4,876,108</td>
<td>7,058,331</td>
</tr>
<tr>
<td>1927</td>
<td>Pondera and Bannatyne</td>
<td>3,974,882</td>
<td>6,611,894</td>
</tr>
<tr>
<td>1928</td>
<td>Sweet Grass Hills, Border, Dry Creek</td>
<td>3,236,219</td>
<td>5,141,274</td>
</tr>
<tr>
<td>1929</td>
<td>Cut Bank</td>
<td>2,853,008</td>
<td>2,716,297</td>
</tr>
<tr>
<td>1930</td>
<td></td>
<td>2,484,230</td>
<td>2,613,922</td>
</tr>
<tr>
<td>1931</td>
<td></td>
<td>2,321,680</td>
<td>2,336,167</td>
</tr>
<tr>
<td>1932</td>
<td></td>
<td>3,624,719</td>
<td>4,856,421</td>
</tr>
<tr>
<td>1933</td>
<td></td>
<td>4,617,875</td>
<td>6,099,534</td>
</tr>
<tr>
<td>1934</td>
<td>Cedar Creek</td>
<td>5,865,107</td>
<td>7,513,891</td>
</tr>
<tr>
<td>1935</td>
<td></td>
<td>5,842,208</td>
<td>7,225,501</td>
</tr>
<tr>
<td>1936</td>
<td></td>
<td>4,942,432</td>
<td>4,955,971</td>
</tr>
<tr>
<td>1937</td>
<td></td>
<td>5,958,349</td>
<td>5,721,590</td>
</tr>
<tr>
<td>1938</td>
<td>Frannie</td>
<td>6,709,038</td>
<td>6,373,526</td>
</tr>
<tr>
<td>1939</td>
<td></td>
<td>7,524,017</td>
<td>7,909,407</td>
</tr>
<tr>
<td>1940</td>
<td></td>
<td>8,072,354</td>
<td>8,365,727</td>
</tr>
<tr>
<td>1941</td>
<td></td>
<td>7,901,590</td>
<td>9,425,957</td>
</tr>
<tr>
<td>1942</td>
<td>Reagan, Midway</td>
<td>8,647,820</td>
<td>10,324,479</td>
</tr>
<tr>
<td>1943</td>
<td>Utopia, Gage Dome</td>
<td>8,417,903</td>
<td>9,951,733</td>
</tr>
<tr>
<td>1944</td>
<td></td>
<td>8,838,788</td>
<td>12,075,650</td>
</tr>
<tr>
<td>1945</td>
<td>Ragged Point</td>
<td>8,743,716</td>
<td>16,590,608</td>
</tr>
<tr>
<td>1946</td>
<td>Big Wall, Melstone</td>
<td>9,381,708</td>
<td>23,989,343</td>
</tr>
<tr>
<td>1947</td>
<td>Sumatra</td>
<td>9,117,827</td>
<td>23,894,640</td>
</tr>
</tbody>
</table>

Source: Oil Conservation Board of the State of Montana, Statements of Crude Oil Produced and Valuation All Montana Fields.
TABLE VII-a

ANNUAL PHYSICAL PRODUCTION OF MONTANA'S MAJOR
CRUDE OIL FIELDS FROM DATE OF DISCOVERY
UP TILL DECEMBER 31, 1949

<table>
<thead>
<tr>
<th>Year</th>
<th>Cut Bank (barrels)</th>
<th>Kevin-Sunburst (barrels)</th>
<th>Cat Creek (barrels)</th>
<th>Elk Basin (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1916</td>
<td>44,917</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1917</td>
<td></td>
<td>99,399</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1918</td>
<td></td>
<td>69,323</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1919</td>
<td></td>
<td>90,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1920</td>
<td></td>
<td></td>
<td>236,833</td>
<td></td>
</tr>
<tr>
<td>1921</td>
<td></td>
<td></td>
<td>1,350,529</td>
<td></td>
</tr>
<tr>
<td>1922</td>
<td>28,987</td>
<td></td>
<td></td>
<td>47,011</td>
</tr>
<tr>
<td>1923</td>
<td>441,153</td>
<td></td>
<td></td>
<td>28,085</td>
</tr>
<tr>
<td>1924</td>
<td>1,127,573</td>
<td>1,529,202</td>
<td></td>
<td>24,019</td>
</tr>
<tr>
<td>1925</td>
<td>2,704,838</td>
<td>2,134,456</td>
<td></td>
<td>21,286</td>
</tr>
<tr>
<td>1926</td>
<td>6,457,217</td>
<td>1,003,233</td>
<td></td>
<td>18,454</td>
</tr>
<tr>
<td>1927</td>
<td>4,035,170</td>
<td>775,699</td>
<td></td>
<td>17,200</td>
</tr>
<tr>
<td>1928</td>
<td>3,149,183</td>
<td>610,732</td>
<td></td>
<td>17,875</td>
</tr>
<tr>
<td>1929</td>
<td>2,388,477</td>
<td>487,554</td>
<td></td>
<td>18,842</td>
</tr>
<tr>
<td>1930</td>
<td>1,910,893</td>
<td>414,814</td>
<td></td>
<td>16,041</td>
</tr>
<tr>
<td>1931</td>
<td>1,577,248</td>
<td>356,934</td>
<td></td>
<td>10,089</td>
</tr>
<tr>
<td>1932</td>
<td>20,639</td>
<td>1,328,905</td>
<td></td>
<td>13,170</td>
</tr>
<tr>
<td>1933</td>
<td>278,513</td>
<td>1,185,935</td>
<td></td>
<td>17,232</td>
</tr>
<tr>
<td>1934</td>
<td>1,201,521</td>
<td>1,613,567</td>
<td></td>
<td>16,065</td>
</tr>
<tr>
<td>1935</td>
<td>2,324,021</td>
<td>1,374,107</td>
<td></td>
<td>8,218</td>
</tr>
<tr>
<td>1936</td>
<td>3,334,847</td>
<td>1,537,795</td>
<td></td>
<td>12,680</td>
</tr>
<tr>
<td>1937</td>
<td>3,368,234</td>
<td>1,626,166</td>
<td></td>
<td>8,994</td>
</tr>
<tr>
<td>1938</td>
<td>2,833,146</td>
<td>1,277,696</td>
<td></td>
<td>7,221</td>
</tr>
<tr>
<td>1939</td>
<td>3,541,679</td>
<td>1,548,086</td>
<td></td>
<td>16,412</td>
</tr>
<tr>
<td>1940</td>
<td>4,086,464</td>
<td>1,881,090</td>
<td></td>
<td>16,148</td>
</tr>
<tr>
<td>1941</td>
<td>5,057,201</td>
<td>1,738,785</td>
<td></td>
<td>17,635</td>
</tr>
<tr>
<td>1942</td>
<td>5,521,545</td>
<td>1,959,726</td>
<td></td>
<td>16,044</td>
</tr>
<tr>
<td>1943</td>
<td>5,339,083</td>
<td>1,832,886</td>
<td></td>
<td>246,125</td>
</tr>
<tr>
<td>1944</td>
<td>5,443,486</td>
<td>1,913,774</td>
<td></td>
<td>685,719</td>
</tr>
<tr>
<td>1945</td>
<td>4,872,738</td>
<td>1,914,655</td>
<td></td>
<td>940,215</td>
</tr>
<tr>
<td>1946</td>
<td>4,570,519</td>
<td>1,795,453</td>
<td></td>
<td>1,370,522</td>
</tr>
<tr>
<td>1947</td>
<td>4,244,338</td>
<td>1,625,218</td>
<td></td>
<td>1,725,151</td>
</tr>
<tr>
<td>1948</td>
<td>4,074,232</td>
<td>1,623,022</td>
<td></td>
<td>2,415,289</td>
</tr>
<tr>
<td>1949</td>
<td>3,436,516</td>
<td>1,559,127</td>
<td></td>
<td>2,330,417</td>
</tr>
</tbody>
</table>

Source: Oil Conservation Board of the State of Montana, Statements of Crude Oil Produced and Valuation All Montana Fields.
## TABLE VII-b

ANNUAL PHYSICAL PRODUCTION OF MONTANA'S MAJOR CRUDE OIL FIELDS FROM DATE OF DISCOVERY UP TILL DECEMBER 31, 1949

<table>
<thead>
<tr>
<th>Year</th>
<th>Pondera (barrels)</th>
<th>Dry Creek (barrels)</th>
<th>Border (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td>158,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>976,869</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>747,793</td>
<td>14,555</td>
<td>92,756</td>
</tr>
<tr>
<td>1931</td>
<td>573,326</td>
<td>163,920</td>
<td>133,366</td>
</tr>
<tr>
<td>1932</td>
<td>432,490</td>
<td>188,024</td>
<td>160,469</td>
</tr>
<tr>
<td>1933</td>
<td>351,099</td>
<td>128,476</td>
<td>52,071</td>
</tr>
<tr>
<td>1934</td>
<td>361,069</td>
<td>11,593</td>
<td>73,377</td>
</tr>
<tr>
<td>1935</td>
<td>429,234</td>
<td>60,420</td>
<td>66,627</td>
</tr>
<tr>
<td>1936</td>
<td>421,180</td>
<td>214,875</td>
<td>58,298</td>
</tr>
<tr>
<td>1937</td>
<td>413,645</td>
<td>99,140</td>
<td>52,053</td>
</tr>
<tr>
<td>1938</td>
<td>217,506</td>
<td>330,350</td>
<td>29,943</td>
</tr>
<tr>
<td>1939</td>
<td>285,721</td>
<td>311,364</td>
<td>32,529</td>
</tr>
<tr>
<td>1940</td>
<td>308,170</td>
<td>171,468</td>
<td>31,370</td>
</tr>
<tr>
<td>1941</td>
<td>284,033</td>
<td>166,262</td>
<td>25,759</td>
</tr>
<tr>
<td>1942</td>
<td>261,539</td>
<td>107,093</td>
<td>25,830</td>
</tr>
<tr>
<td>1943</td>
<td>208,762</td>
<td>95,495</td>
<td>21,858</td>
</tr>
<tr>
<td>1944</td>
<td>239,238</td>
<td>93,608</td>
<td>21,654</td>
</tr>
<tr>
<td>1945</td>
<td>258,642</td>
<td>162,910</td>
<td>15,874</td>
</tr>
<tr>
<td>1946</td>
<td>302,582</td>
<td>158,368</td>
<td>19,957</td>
</tr>
<tr>
<td>1947</td>
<td>317,904</td>
<td>128,920</td>
<td>16,973</td>
</tr>
<tr>
<td>1948</td>
<td>361,014</td>
<td>104,736</td>
<td>17,903</td>
</tr>
<tr>
<td>1949</td>
<td>515,140</td>
<td>108,710</td>
<td>16,869</td>
</tr>
</tbody>
</table>

**Source:** Oil Conservation Board of the State of Montana, Statements of Crude Oil Produced and Valuation All Montana Fields.
### TABLE VIII

**MONTANA CRUDE OIL REFINERIES, THEIR CAPACITY AND LOCATION ON MARCH 15, 1948**

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Capacity (barrels)</th>
<th>Under Construction (barrels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big West Oil Company</td>
<td>Kevin</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Carter Oil Company</td>
<td>Billings</td>
<td>11,000</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>Cut Bank</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Continental Oil Company</td>
<td>Billings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer's Union Central</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange, Incorporated</td>
<td>Laurel</td>
<td>8,800</td>
<td></td>
</tr>
<tr>
<td>Hole Brothers Refinery</td>
<td>Cut Bank</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Home Oil and Refining Co.</td>
<td>Great Falls</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>North Star Refining Co.</td>
<td>Laurel</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Solar Oil and Refining Co.</td>
<td>Soap Creek</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>The Texas Company</td>
<td>Sunburst</td>
<td>7,500</td>
<td></td>
</tr>
<tr>
<td>Treasure State Refining Co.</td>
<td>Shelby</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Tri Petroleum Corporation</td>
<td>Hardin</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Union Oil Company</td>
<td>Cut Bank</td>
<td>4,500</td>
<td></td>
</tr>
<tr>
<td>Unity Petroleum Corporation</td>
<td>Kalispell</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>47,450</strong></td>
<td><strong>26,800</strong></td>
</tr>
</tbody>
</table>

### TABLE IX

**MONTANA OIL PIPELINES AND THEIR LOCATION**
**ON MARCH 15, 1946**

<table>
<thead>
<tr>
<th>Company</th>
<th>From Location</th>
<th>To Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big West Oil Company</td>
<td>Cut Bank Field</td>
<td>Kevin-Sunburst</td>
</tr>
<tr>
<td>Canadian Trunk Line</td>
<td>Kevin-SunburstField</td>
<td>Winnett</td>
</tr>
<tr>
<td>Continental Oil Company</td>
<td>Cat Creek Field</td>
<td>Kevin-Sunburst Field</td>
</tr>
<tr>
<td>Coolidge and Coolidge</td>
<td>Kevin-Sunburst Field</td>
<td>Winnett</td>
</tr>
<tr>
<td>Interstate Oil Pipeline Co.</td>
<td>Network of lines in Montana</td>
<td>Network of lines in Montana</td>
</tr>
<tr>
<td>Ohio Oil Company</td>
<td>Kevin-Sunburst</td>
<td>Sunburst</td>
</tr>
<tr>
<td>Texas Pacific Coal and Oil Company</td>
<td>Kevin-Sunburst</td>
<td>Riverton</td>
</tr>
<tr>
<td>The Texas Pipeline Company</td>
<td>Cut Bank Field</td>
<td>Riverton</td>
</tr>
<tr>
<td>Toronto Pipeline Company</td>
<td>Cut Bank Field</td>
<td>(Wyo)</td>
</tr>
<tr>
<td>Union Oil Company</td>
<td>Elk Basin Field</td>
<td>Billings</td>
</tr>
<tr>
<td>Yale Oil Pipelines</td>
<td>Frannie</td>
<td>and Laurel</td>
</tr>
</tbody>
</table>

Oil and Gas Map of Montana by Jas. C. Bransford - 1934.

Oil Conservation Board of the State of Montana. Statements of crude oil produced.

Name of field followed by: year of first production, rank in total value produced up to December 31 - 1949.

[Map of Montana with field names and production dates]
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