AN ECONOMIC HISTORY OF THE DEVELOPMENT OF
THE OIL INDUSTRY IN SOUTHEAST TEXAS

THESIS

Presented to the Graduate Council of the
North Texas State College in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

197068
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Port Arthur, Texas
January, 1952
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CHAPTER I

INTRODUCTION

The business pulse of Texas is synchronized with the heartbeat of the state's Number 1 industry: petroleum production and processing. It would be hard to conceive of Texas as an important industrial state without petroleum. Without it, the state likely would be relegated to the usual role of a largely agricultural province, which it actually was prior to the mammoth discovery of oil at Spindletop in Beaumont, Texas, on January 10, 1901.

To illustrate how rapidly the petroleum industry has grown in this state and how large a part Spindletop has played in that development, it is interesting to note that in 1895 the production of oil in Texas amounted to only fifty barrels annually; in 1901, thanks chiefly to Spindletop, the total was over 4,000,000 barrels, and in 1902, the state's production leaped to 18,000,000 barrels, of which all but 662,000 barrels came from the Spindletop field. It is easily seen why many writers consider Spindletop as being the impetus which ushered in the "Age of Petroleum." True, oil had been discovered and used in various ways many hundreds of years before this great Gulf Coast discovery, but Spindletop changed the Texas economy overnight, for it proved beyond any shadow of a doubt that
oil existed in vast quantities and was a force to be reckoned with in our industrial development.

No list of names of geographical lines can define the petroleum industry in Texas because oil and gas permeate the whole state's life, economy, and culture. On January 1, 1950, 183 counties in Texas were producing oil and gas; eight counties had production discovered, and sixty-three counties showed evidences of acreage under lease for exploration; in short, all 254 counties of the state are either producing, or being developed to produce, oil and gas. Table 1 contains statistical data on the crude oil production record of Texas and the United States from 1889 to 1949, inclusive.

**TABLE 1**

**CRUDE OIL PRODUCTION**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production in barrels (Texas)</th>
<th>Total U. S. production</th>
<th>Per cent produced by Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1889-1896</td>
<td>1,000</td>
<td>767,073,000</td>
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<tr>
<td>1897</td>
<td>66,000</td>
<td>60,476,000</td>
<td>0.1</td>
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<tr>
<td>1898</td>
<td>546,000</td>
<td>55,364,000</td>
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<tr>
<td>1900</td>
<td>836,000</td>
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<tr>
<td>1901</td>
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<td>69,389,000</td>
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<tr>
<td>1902</td>
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<td>1903</td>
<td>17,956,000</td>
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<tr>
<td>1904</td>
<td>22,241,000</td>
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<td>1905</td>
<td>28,136,000</td>
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<td>1906</td>
<td>12,568,000</td>
<td>126,494,000</td>
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<tr>
<td>1907</td>
<td>12,323,000</td>
<td>166,095,000</td>
<td>7.4</td>
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<td>1908</td>
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<td>9,526,000</td>
<td>220,449,000</td>
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<td>1912</td>
<td>11,735,000</td>
<td>222,935,000</td>
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<td>1913</td>
<td>15,010,000</td>
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TABLE 1--Continued

<table>
<thead>
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<th>Total U.S. production</th>
<th>Per cent produced by Texas</th>
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<td>1914</td>
<td>20,068,000</td>
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<td>27,645,000</td>
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<td>1934</td>
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<td>1935</td>
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<td>1937</td>
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<td>475,850,000</td>
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<td>1943</td>
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<td>1944</td>
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<td>1945</td>
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<td>1946</td>
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<td>1949</td>
<td>743,990,000</td>
<td>1,840,307,000</td>
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Total 12,892,141,000 38,913,881,000 33.1

1Texas Oil and Gas Association, Texas Oil and Gas, 1800 M. & W. Tower, Dallas 1, Texas, Summary, 1950 Operations, p. 21.
An examination of these statistics shows that the number of barrels produced in Texas through 1896 was 1,000. By 1949, the cumulative record totaled 12,892,141,000 barrels. This shows that the State of Texas has been able to produce over one third of the total amount of petroleum ever produced in the United States. Today, Texas produces nearly 45 per cent of the nation's crude oil; Texas has almost 55 per cent of the proven crude oil reserves of the United States—more than 13 1/2 billion barrels.

But, before Spindletop, the greatest gusher of them all, Texas held a very minute and insignificant position on the oil map of the world. In 1900, just prior to the Lucas gusher, Texas produced only 1.3 per cent of the total production of petroleum in the United States; in 1902, just after the Spindletop discovery, Texas produced 20.4 per cent of the nation's total production. The Spindletop discovery set the Sabine district, the State of Texas, and the entire nation upon the road to industrial progress and prosperity.

Spindletop Golden Anniversary Celebration

On January 10, 1951, Spindletop Oil Field celebrated its "Golden Anniversary." To commemorate this eventful day in Texas history, the Spindletop Fiftieth Anniversary Commission was appointed by the Honorable Allan Shivers, Governor of Texas. It is a non-profit, educational
organization, incorporated under the laws of the State of Texas, for the purpose of planning and supervision all commemorative events and exercises held in connection with the Spindletop Anniversary observance. The membership included the following individuals:

John W. Newton ......................... Chairman
Magnolia Petroleum Company, Beaumont

Phil S. Justice ......................... Vice-Chairman
Sun Oil Company, Beaumont

Scott W. Myers ......................... Vice-Chairman
Independent Oil Operator, Beaumont

I. F. Betts ............................ Treasurer
American National Bank, Beaumont

W. W. Leach ........................... Secretary
Magnolia Petroleum Company, Beaumont

Marion E. Brock ....................... Member
Gulf Oil Corporation, Houston

Dr. A. M. McAfee ....................... Member
Chairman Board of Regents, Lamar State College of Technology, Port Arthur

F. L. Wallace .......................... Member
The Texas Company, Port Arthur

C. W. Cooper .......................... Member
Pure Oil Company, Nederland

Howard J. Hicks ....................... Recording Secretary
Vice-President and General Manager, Beaumont Chamber of Commerce

Spencer W. Robinson ................... Executive Director
Spencer Robinson and Associates, Houston

Dwight H. Plackard .................... Publicity Director
Dallas, Texas

It is very fitting that the fiftieth anniversary of our industrial renaissance should be observed in Beaumont, Texas, its birthplace. Activities connected with this gigantic celebration will continue throughout 1951, but the focal point was reached during the week preceding January 10, with events reaching a climax on that date. Various national radio broadcasts, such as DuPont's "Cavalcade of America" and Gulf Oil's "We the People," originated in Beaumont during this hectic week. Top industrialists, such as Charles E. Wilson of General Motors, Walter S. Carpenter, Jr. of DuPont, and B. Brewster Jennings of Socony-Vacuum Oil Company, were the featured speakers at the Chamber of Commerce's "Spindletop" banquet, attended by more than 2,300 people. In addition to the above events, parades, barbecues, musical dramatizations, and other traditional ceremonies took place. A Spindletop Exhibits hall is to be maintained for an indefinite period at the South Texas State Fair grounds in Beaumont. All in all, this was quite a celebration, or as Newsweek magazine puts it:

Texas is so big that a civic celebration in one town could well go unnoticed in the next town, 200 miles away. This week, however, when Beaumont started a round of festivities, the whole state took heed. . . . Beaumont, which has grown on the strength of the oil boom from a town of 9,000 to a city of 94,000, was whooping it up for seven straight days. National radio programs originated in the civic auditoriums, parades, luncheons, receptions, and dinners kept the populace on the move; distinguished guests. . .
delivered speeches; in all, about $500,000 will be spent by the Spindletop 50th Anniversary Commission, including funds for 'one of the finest educational and historical displays ever arranged by the petroleum and allied industries.' Part of the amount went into the construction of a permanent copy of the original Lucas gusher. For two reasons, the copy won't gush. There is no oil under it--and gushers are now strictly forbidden by Texas conservation laws.

At least four major conventions will be held in Beaumont in 1951 by oil men: The American Petroleum Institute, Southwestern Division, Spring Production Meeting; Texas Independent Producers and Royalty Owners; National Oil Scouts and Landmen's Association; Texas Mid-Continent Oil and Gas Association.

Method of Approach and Sources

The main body of this thesis is composed of four chapters: Chapter II is concerned with the development of the oil industry in Texas prior to the discovery of Spindletop; Chapter III deals with Spindletop; Chapter IV sets forth the later developments of the oil industry in Southeast Texas or Railroad Commission District No. 3; Chapter V is the concluding chapter, complete with summary, evaluation, present status and future possibilities of the oil industry in Southeast Texas.

The material and facts contained herein were gathered from various sources including books, newspapers, magazines, bulletins and pamphlets.

CHAPTER II
DEVELOPMENT OF THE OIL INDUSTRY IN TEXAS PRIOR TO SPINDLE TOP DISCOVERY

Petroleum history in Texas began in 1866 with the discovery of oil at Oil Springs, about fifteen miles south of Nacogdoches and near the present town of Chireno. Oil had long been known to the inhabitants of the region, and the oil springs located there had attracted attention for a long time. As early as 1790 those associated with Antonio Gil y Barbo used the oily liquid secured from the surface of a spring and a small creek near Melrose in Nacogdoches County as an external application for themselves and as a lubricant for their carts and wagons.¹

Prior to 1860, the known seepages of oil were confined almost entirely to the general area now known as eastern Texas, and the first efforts to secure greater quantities of oil through artificial openings in the ground were made in the vicinity of Tar Springs in what is now Angelina County. Sometime before the Civil War, Jack Graham dug a pit near the tar spring and collected the sparse supply of oil.²

¹ C. A. Warner, Texas Oil and Gas Since 1543, p. 2.
² Gerald Forbes, Flush Production, p. 8.
The first real oil well completed in Texas was drilled by Lynis T. Barrett in 1866. Seven years prior to this date he had attempted to drill for oil but the Civil War disrupted his plans. Immediately after the close of the war, Barrett renewed his efforts to secure oil by boring. This first well passed through several veins of oil before reaching a depth of one hundred six feet, where the auger, according to Barrett, "dropped through a vein six inches deep, when oil, water, and gas gushed to the top of the well." Barrett, very well satisfied with his well, and convinced of the possibilities of other discoveries, went to Pennsylvania in October, 1866, to secure financial aid for further development. He convinced John F. Carll of the probability of oil deposits and Carll lost over $5,000 before he lost faith and went back to Pennsylvania with oil. Barrett was unable to secure the necessary financial aid for further operations and development, and the Oil Spring area remained dormant for nearly twenty years. In 1881 Standard Oil drilled a couple of test wells but had very little showing of oil. There was a strong revival of interest at Nacogdoches beginning in 1886. In that year B.F. Hitchcock and E. H. Farrar completed a well in Nacogdoches County and started the first oil boom in Texas. These two men organized the Petroleum Prospecting Company for the

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purpose of drilling wells at Oil Spring. Their first well was drilled to a depth of seventy feet and came in with a flow of from two hundred fifty to three hundred barrels per day. However, the well did not continue to flow after the first day and was later completed as a small pumper.

Of the companies and individuals who entered the area, the Petroleum Prospecting Company and the Lubricating Oil Company were the most active, the former being under the management of J. E. Pierce of New Orleans, and Hitchcock, and the latter was under the management of H. H. Sawyer and D. H. Criswell.

The Petroleum Prospecting Company operated in the vicinity of the oil spring, where it drilled some forty wells and completed thirty as producers prior to 1890. This company gets credit for the construction of the first pipeline in Texas.

The Lubricating Oil Company operated in the valley of Bayou Vistador, some three or four miles northeast of the oil spring. It had a rather extensive plant and according to all information available, should be credited with the first crude refining of oil in Texas.

Soon after 1890 there was little activity in the field. The decline of oil production in Pennsylvania in 1887 and

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1888 influenced many to seek fame and fortune in the area; and the increase in production in Pennsylvania in 1890, together with the recognition of the fact that production at Oil Spring was not exceptionally prolific, was doubtless no small factor contributing to the decline and abandonment of the field.

Bexar County

Concurrent with the activity in the Nacogdoches field, development was also being carried on in another section of the state several hundred miles to the southwest. In 1886, while drilling for water on his ranch about six miles south-east of San Antonio, George Dullnig had encountered a flow of heavy oil at a depth of two hundred thirty-five feet. A second test was put down by Dullnig about fifteen feet from the first one, and it produced similar oil at a depth of three hundred feet. His third test was carried to a depth of nine hundred feet without encountering any additional oil below the depths at which it was being secured in the other two wells. The oil was of a reddish-brown color and was used as a lubricant in its natural state. Another test, northwest of the first three, was completed as a gas well, and the gas was used as a fuel supply in the oil operations and on the ranch.


The first appearance of Texas in statistical tables as an oil and gas producing state was in 1889. Reports of the United States Geological Survey and the Census of Mineral Industries of the United States for that year credited Texas with a total production of forty-eight barrels of oil and with natural gas valued at $1,728. Both the gas and the oil were produced from the Dullnig wells.

Unlike Nacogdoches, where skilled men from Pennsylvania were employed, all work at the Dullnig wells was carried on by ranch hands. There was only a minor local demand for the oil, and it retailed in barrels at twenty cents per gallon. In five-gallon containers the price was thirty cents per gallon, and smaller quantities were retailed at thirty-five cents per gallon.

The reported value of the gas consumed was arrived at in a unique way. Accurate knowledge was readily available as to the amount of coal, wood, or other fuel required to fire the boiler for any certain length of time; and the value of the fuel which would have been consumed, had it not been displaced by natural gas, was therefore assigned to the gas utilized.

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8 Warner, op. cit., p. 17.
9 Ibid.
Development on the Dullnig ranch continued intermittently from 1886 to the late 1930's, and the majority of the wells drilled produced varying quantities of oil.

Oil and gas development in Texas was more or less desultory and disappointing in the years between 1890 and 1895. Although exploratory drilling was carried on in many areas, the results were generally unsuccessful.

Navarro County

The actual development of the oil industry in Texas dates from the accidental discovery of oil at Corsicana. Prior to this discovery, oil was produced but not in quantities sufficiently large to give the industry commercial importance.

The city of Corsicana desired to secure a more adequate supply of water and accordingly contracted with the American Well and Prospecting Company for the boring of three wells for water. The first test encountered a good showing of oil at a depth of 1,027 feet on June 9, 1894. This showing was considered a nuisance, particularly since difficulty was encountered in casing the oil off, and it continued to rise to the surface outside the casing. This incident excited considerable interest on the part of many, and it is reported that three derricks were burned down as a result of the oil becoming ignited at different times before the well was finally completed.
with a good flow of warm artesian water at a depth of more than 2,470 feet. 10

Some of the citizens of Corsicana began to visualize the possibilities for developing oil production in the vicinity of the water well, and the Corsicana Oil Development Company was organized by Ralph Beaton and H. G. Damon, of Corsicana, and John Davidson, an experienced oil man from Pennsylvania. One of the first leases was acquired on September 6, 1894, from A. Bunert and wife, Bertha Bunert. It was for a term of twelve years, or as long as oil was found there in paying quantities, and conveyed... "the exclusive right to dig, bore, and mine for and gather all oil, gasses, coal or other minerals from, in and upon or under two certain tracts of land..." 11

Other leases were acquired by this partnership, and on September 14, 1895, an agreement was entered into between the Corsicana Oil Development Company and John H. Galey of Pittsburgh, Pennsylvania. In this agreement, Mr. Galey agreed to drill and equip five wells, free of cost to the company, for an undivided one-half interest in all oil and gas leases then owned or thereafter acquired by it.

10 C. C. Rister, Oil! Titan of the Southwest, p. 43.

The first test for oil was bored two hundred feet south of the artesian well. It was completed October 15, 1895, for an initial production of two and one-half barrels of oil per day from a depth of 1,040 feet. The story of successive drilling activity has been told as follows:

A second well was drilled north of the Cotton Belt tracks and a third at Fourth and Collins Streets got oil and gas at 1,040 feet and settled down to a daily flow of twenty-two barrels. These and others were completed in 1896 and that year Corsicana was credited with a production of 1,450 barrels. 12

Additional completions in 1897 resulted in a total production of 65,975 barrels of oil from forty-seven wells for that year.

Evidence was now apparent for the existence of an oil field at Corsicana, and it was readily recognized that a refinery was needed if development was to progress. The mayor of Corsicana, James E. Whitesell, contacted J. S. Cullinan of Pennsylvania, who had been highly successful in that type of work. Cullinan came to Texas, investigated the possibilities for commercial development, and immediately entered into a contract whereby he was to purchase 150,000 barrels of oil at fifty cents per barrel; and he agreed to install a pipeline system, storage tanks, and a refinery, and to develop a market for the oil.

Cullinan began building his refinery in the latter part of 1898, and it was completed on January 3, 1899. His products were illuminating oil and gasoline, the paraffin in the crude oil not being of sufficient quantity to justify its manufacture. It was left in the residuum that was sold as fuel and used at the refinery. The refinery was an imposing Corsicana business enterprise of 1,000 barrel capacity, with storage tanks to accommodate 1,000,000 barrels of oil. The stills of the new refinery were fired on Christmas Day, 1898, and the first shipment of refined oil left Corsicana on February 24, 1899.

Texas had made its first step up the ladder to its present exalted position in the oil and gas industry. Navarro County, particularly Corsicana, was largely responsible for this progress, for Corsicana was the location of the first major production of oil in Texas, as well as the site of the first refinery to operate extensively and continuously. It was also the testing ground for the use of oil as a fuel in locomotives, as well as for the oiling of streets and roads. Corsicana has contributed its part to the development of the oil industry in Texas.

13 Rister, op. cit., p. 28.
14 Ibid., p. 47.
15 Warner, op. cit., p. 28.
Hardin County

Sour Lake, in Hardin County, was widely and favorably known by both the Indians and the white settlers as a source of "pitch"—residue of petroleum. R. C. Taylor in his *Statistics of Coal*, published in Philadelphia in 1848, refers to a "pitch lake" in Texas which undoubtedly is Sour Lake. This locality was vividly described by Frederick Law Olmstead in *A Journey Through Texas*, published in 1857 by Dix Edwards and Company, 321 Broadway, New York. He wrote:

Near the western limit of Jefferson County is the odd natural phenomenon of a 'fountain of Lemonade.' . . . There are two springs of cold, clear, acid, slightly astringent water, boiling with the outburst of an inflammable gas, having a slight odor of sulphuretted hydrogen. The overflow forms a pond of an acre in extent, which gives to the locality its name of 'Sour Lake.' 1 Upon the banks and bottom is a deposit of sulphur. The approach to the rude bathing-houses is over a boggy margin, sending up a strong bituminous odor, upon pools in which rises a dense brown, transparent liquid, described as having the properties of the Persian and Italian naphthas.17

A. R. Roessler, a civil and mining engineer formerly connected with the Texas Geological Survey, referred to Sour Lake under the heading "Mineral Resources of Texas" in the *Texas Almanac* for the year 1872, published by Richardson and Company, Galveston. He stated:

Tar, or more properly petroleum, springs occur here over a space of about 50 square yards, and are situated some forty feet south of the acid springs. The surface of the area which they occupy is covered with a dark crust of indurated bitumen, from, one to several feet thick, which is used for illuminating the hotel grounds during the watering season. . . . It is not improbable that large supplies of petroleum or rock-oil might be obtained from deep excavations. 18

Later explorations seemed to substantiate the above statement. There had been some minor development in this region in 1893, and Savage Brothers had drilled several wells there in 1895. W. B. Sharp put down a test well there in 1896 for the Trinity Lubricating Oil Company, of Dallas; and that company had a small test refinery built there. This refinery, which was located south of the lake, was destroyed by fire in 1898. 19

The continued interest in this area was manifested by the organization in Galveston of the Gulf Coast Refining Company, with a capitalization of $25,000 to operate at Sour Lake. It constructed a one-hundred barrel refinery and on March 29, 1898, contracted with Savage and Company for the delivery of fifty barrels of crude oil per day. Two tanks were erected near the wells and approximately one-half mile of two-inch pipe line connected the wells, tanks, and refinery. However, the supply of oil later proved to be insufficient and the refinery was closed. 20

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18 Ibid., p. 4. 19 Warner, op. cit., p. 22.
20 Ibid., p. 23.
The first actual operation of an oil refinery in Texas was therefore at Sour Lake, although a crude method of evaporation to secure the heavier lubricants had been utilized at Oil Springs, in Nacogdoches County, nearly ten years before.

These early efforts to develop oil production in the region of the Gulf Coast were unsuccessful financially, but they paved the way for later development on a scale never before witnessed.

Summary

The annual report of the United States Geological Survey upon the petroleum industry for 1898 has the following to say in regard to the early development of the oil industry in Texas:

Crude petroleum is produced in four counties in Texas: Navarro, Nacogdoches, Bexar and Hardin. The first named county produced 54,620 barrels of light petroleum of 38 degrees to 40 degrees Baume Gravity. The other counties furnished 1,450 barrels of heavy, dark lubricating petroleum, ranging from 16 degrees to 26 degrees Baume.

In the Navarro County field, there was a total of 374 wells drilled in 1898. Of this number, 342 produced oil, four produced gas, and 32 were dry.

Hardin County produced a heavy oil with good natural lubricating qualities. The wells are about 300 feet in depth and produce 10 to 12 barrels per day. In Nacogdoches County, a lubricating oil is also produced. The wells are about 300 feet deep and produce from 4 to 15 barrels per day. A small amount of heavy oil is produced from two wells near San Antonio, Bexar County.
Many intelligent and experienced petroleum men believe that there are vast deposits of oil in Texas.

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CHAPTER III

SPINDLETOP

Beaumont in 1900 was a rice-market town, going lazily about its way, not suspecting the hectic, mad swirl soon to come its way.

Nor did Texas, for that matter. Its population in 1900 was only 2,235,527, less than one third its present status. Neither manufacturing nor mining was of great importance in Texas. There were flour mills in the northern portion of the state and saw mills in East Texas, but none of these were of major importance. Texas featured cattle raising and agriculture, with cotton as its main money crop. Railroad mileage was limited but adequate to take care of the state's industrial needs.

As has been pointed out, the earliest commercial oil field in Texas was at Corsicana. By the end of 1901 this field had produced an accumulated total of only 753,424 barrels of crude oil, a relatively insignificant amount considering the fact that during 1945 oil fields in the Southwest produced a slightly larger quantity each six hours, or nearly fifteen hundred times as much during the entire year.

The Lucas gusher at Spindletop on January 10, 1901, marked the dawn of a new era in the Southwest. The history
of petroleum falls within (1) the lamp and lubrication period, 1859 to 1900; (2) the fuel-oil period, 1900 to 1910, and (3) the gasoline or motor-fuel age since 1910. Thus, in 1900, Texas stood on the threshold of the fuel-oil period.

Today there are Beaumonters who declare that the word "Spindletop" was first applied locally to an inverted cone-shaped tree standing on a bluff near the present turning basin of the Neches River, just east of town; and that it was so named by up-river voyagers of rice and lumber boats. What today is known as "Spindletop Hill," they say, was then "Sour Spring Mound" because of oil seeps, known to exist from earliest times of settlement, although little use was made of them.

The first notice taken of oil in Jefferson County, so far as the white man was concerned, was 358 years before the booming advent of Spindletop in 1901. In the year 1543, DeSoto's expedition, returning to Mexico, found oil tar on the Gulf beaches near Sabine Pass on the coast of what was to become Jefferson County.

Peculiarly, the discovery was made not more than thirty miles from what was to become the site, more than three centuries later, of America's first great oil field, in the same Texas county.

C. A. Warner of Houston, oil historian, found what he believes to be the spot where the vessels lay and where the oil-tar caulking of their ships took place.

Woven colorfully into the cloth of Jefferson County's oil story was also the large "oil pool" or "Big Slick," lying just off the coast beyond Sabine Pass, and to which ships ran for refuge in time of storm. This maritime phenomenon occurred within a few miles of the spot where DeSoto's brigantines put in Oil and "cope" are still found in the Gulf, but the pool disappeared long ago. It seemed, oil men say, to have left when the once tremendous gas pressure was taken from Spindletop Hill, although this is not known definitely to have been the cause.

The Gladys City Oil, Gas and Manufacturing Company first sought to exploit these oil prospects. On August 24, 1892, this company was organized with G. W. Carroll as president and G. W. O'Brien as vice-president. A contract was entered into with M. B. Looney on February 17, 1893; he, in turn, subleased to Walter B. Sharp, who used a "70-foot derrick, a light rotary rig, a 25 horsepower bailer, and a 16 horsepower engine" to drill an experimental well. But the well was abandoned after it had reached a depth of 418 feet.

\[2\] C. C. Rister, Oil! Titan of the Southwest, p. 52.
On May 27, 1895, Savage and Company of West Virginia agreed to sink a second test well, but they also failed to find oil. Then on June 4, 1896, the Gladys City Company entered into a third contract with the Texas Oil and Mineral Company, of which W. A. Savage served as manager, but this effort was also unsuccessful. "They had all failed to pass through the immense thickness (500 feet) of quicksand which underlies the surface soil," said Lucas at a later date. ³

Finally, a lease and option sale contract were given given to A. F. Lucas, a mining engineer of Washington, D. C., and a former salt-dome prospector in Louisiana, on June 20, 1899. Lucas, whose real name was Anthony F. Luchich, was born on the island of Hvar on the Dalmatian coast, and was educated at Trieste and Graz in mining engineering. In 1899, he was mining prosaic salt and dreaming of making a lucky strike, when he noticed in an advertisement that the Gladys City Oil, Gas and Manufacturing Company's property near Beaumont was for sale. The Yugoslav, now known as Lucas, wrote to Patillo Higgins, veteran oil-seeker whose faith in Gladys City was not matched by money. Higgins accepted a deposit on his $33,500 price and Gladys City, a


⁴ Harvey O'Connor, Mellon's Millions, p. 93.
shack or two, a weather-beaten rig crumbled to rot, and a grass-grown road passed to Lucas.  

When this first agreement between Lucas and the Gladys City Company expired on September 18 of the next year, he was given another lease. This was a fortunate move for the Gladys City Company as there was no other man in the United States, in all probability, who knew as much about salt domes as Captain Lucas.  

Lucas now became the soul of Spindletop operations. He rewarded Higgins for his efforts in securing the lease with a one-tenth interest in the "said option or lease." Then Lucas sank a test well to a depth of 575 feet and bailed a little oil. But his money ran out, and he had to abandon the well.  

Lucas could not secure financial aid locally. Oil experts told him that there was no oil in that vicinity and that he had better return to salt mining. However, William Battle Phillips of the Texas Geological Survey had faith in his enterprise and suggested that he go for aid to Guffey and Galey, the former operators at Corsicana, who knew the Gulf Coast prospects. Lucas accepted Phillips' advice, went

5 Ibid.

to Pittsburgh and laid the matter before Guffey and Galey who agreed to assume the financial obligations of the Gladys City Company for a considerable interest in its holdings and secured from this firm a new twenty-year lease on September 18, 1800.  

A short time later Galey informed the Hamill brothers, who drilled wells for him at Corsicana, that Lucas would ask them to drill a test well south of Beaumont, under the new agreement by which Guffey and Galey would assume full financial responsibility. Hence, Lucas had no difficulty in securing the services of these men. J. G. Hamill, the drilling firm's business manager, went to Beaumont to look over the field and to sign a final agreement with Lucas who agreed to pay two dollars a foot for drilling a 1,200 foot test with Guffey and Galey furnishing all the pipe.

Early in October the Hamills loaded their rotary drilling equipment for shipment to the proposed well site.

Al Hamill, in charge of drilling, tells an interesting story of their progress on the well. After he had begun drilling, he set about twenty feet of ten-inch surface pipe. Drilling progressed nicely until the well reached a depth of about 160 feet when circulation was lost. Hamill sought repeatedly to overcome this situation but failed. He then

7 Rister, op. cit., p. 53.
decided to retake and wash in all the eight-inch pipe that he could. After that, he put in the four-inch drill pipe for wash pipe and rigged up a heavy drive block to work around the drill pipe, with a heavy drivehead for the eight-inch pipe. The drillers used the drive block on the order of a pile driver, giving it a quick slip from the cathead to deliver the hardest blow possible. Members of the crew took turns on this man-killing job, working the cat-line, and every little while they would start the circulating pump to wash out the sand from below the bottom of the eight-inch pipe. In this manner they made headway every day, some days only a few feet, and at times the sand would wash out better, this permitting the sand around the eight-inch pipe to settle more freely and to assist their driving. This method was continued until the gumbo formation was reached at 445 feet, making 285 feet that the workers had mauled down with cathead and drive block.

From these experiences it was apparent why the Sharp Brothers and others had failed to get through this thick formation of quicksand. This was the fifth attempt to drill for sulphur or oil at what came to be known as "Spindletop."

From the gumbo seat of the eight-inch casing, drilling progressed satisfactorily for about 200 feet. At that depth the drillers noticed the circulating mud bailing and flowing

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8 Ibid., p. 55.
up through the rotary table, which presently was displaced by muddy water and gas spewing halfway up the derrick. This did not last long, and the workers concluded that they had struck a gas pocket. But it caused them to change their drilling procedure. Formerly, they had worked only during the day. Now, they decided to drill during the night and to keep their circulating pumper going at night. The new drilling procedure imposed an additional burden on the three workmen, Al and Curt Hamill and Peck Byrd, and made necessary an eighteen-hour schedule. That is, one man would work eighteen hours every third shift, but all would work during the day. At night it was necessary only for the lone driller to keep the pumps in motion and the drill pipe rotating slowly. This would prevent gas blowouts and keep the pipe from sticking. Al Hamill tells of his experiences in a memorandum written at a later date:

On December 9 it was my turn to get up at midnight for my eighteen-hour shift. As usual, I tried to make all the bale I could. The evening before we had put up an additional joint of drill pipe. At about 3 o'clock in the morning I noticed the pump working more freely and the rotary turning very easily, so I began to let the pipe down, and soon had most of it down. As daylight began to appear, I could detect oil on the ditch and slush pit. When Curt and Byrd appeared with my little bit of breakfast, the slush pit had a big showing of oil on it. We at once sent Byrd for Captain Lucas, who lived about a mile and a half from where we were drilling.

On his arrival, he showed some excitement and asked how much of a well I thought it would make. The only experience any of us had was in drilling small wells in the Corsicana Field, but I thought
it would easily make 50 bbl. a day. Captain Lucas asked us to put up another joint of drill pipe to see how much oil formation there was. After making about 35 feet through the soft sand, we struck hard going at about 880 feet. 9

Captain Lucas then decided to wire Mr. Galey and have him add his knowledge to that of the group. As Al Hamill tells it:

Captain Lucas wired Mr. Galey today and told us to set our four-inch drill pipe as a test string. We did this, and on the arrival of Mr. Galey, started bailing out with a small flow resulting. In running the bailer again, we found that the soft sand had heaved up in the pipe more than 300 feet. It was then decided to wash out the well with two-inch pipe, but without great success. The washing and bailing was attempted several times, with no definite results. After Mr. Galey had spent a week with us, he decided we would try to pull the four-inch pipe, if possible. We were then to set the string of six-inch pipe that we had on hand through this heaving sand and see if we would get any more showing in the next 300 feet. Fortune favored us in pulling out the four-inch pipe and in a short time, we had the six-inch pipe landed at the 880 feet on the hard formation below the oil sand. 10

On December 24, Galey saw that the drillers were exhausted. He suggested that they shut down for Christmas and gave them some money on their contract account. After the Hamills had spent the Christmas season in Corsicana, they were back on the job by January 1, 1901. Within a week they had made about 140 feet of hole, making a total of 1,020 feet

9 American Petroleum Institute, Spindletop--A Texas Titan, pp. 5-9.

10 Rister, op. cit., pp. 56-57.
at which depth the drill "seemed to hit a crevice," driving it off center.\footnote{Ibid., p. 57.}

On January 9, Al Hamill wired his brother, Jim, in Corsicana to send him a fishtail bit, with the hope of better results. The next day after the bit arrived, it was fastened on the drill pipe and put again into the well to a depth of 700 feet when the rotary mud began once more to flow through the rotary table. It increased rapidly in power and force so that Curt Hamill, who was in the rig's double boards, was drenched with mud and water before he could climb down. Scarcely had he descended before the drill pipe catapulted up through the derrick, knocking off the crown block and breaking off in several joints at a time as it shot upward.

All this happened in a matter of moments. Gas followed the eruption of mud, water, and drill pipe; then the well was quiet and the men returned to the derrick to find things in a terrible mess, with mud covering the entire derrick floor. The men began shoveling the mud away when, again without warning, a large volume of heavy mud shot out of the well like the sound of a cannon shot, followed by a flow of gas, then came oil in hard flows. The flow increased in force so that within a short time rocks shot
upward for hundreds of feet. Then black oil in a powerful stream, increasing in volume, gushed skyward for more than twice the height of the derrick, crested, and settled back to earth in a greasy shower.

In a short time spectators began to arrive by horseback, in buggies, hacks, and wagons, and some on foot. Nearby farmers had heard the roar of the escaping gas and had seen the oil cascading. Before nightfall five hundred people were on the ground, standing transfixed and awe-inspired, watching the wild gusher, heedless of danger.

Figuratively, the roar of that gusher was heard around the world. By nightfall, the news had traveled far. An oil gusher flowing at the unbelievable rate of from 75,000 to 100,000 barrels of oil daily had been found on the Texas Gulf Coast! The oil flow "was estimated," said Lucas, "by officials and engineers of Standard Oil Company, to be at least 3,000 forty-two gallon barrels of oil per hour or about 75,000 barrels per day."

The evening edition of the Beaumont Daily Enterprise, dated January 10, 1901, had this to say about the momentous discovery of oil at Spindletop:

"About 10 o'clock this morning, while the men employed by Mr. A. F. Lucas, who has been prospecting for oil at Gladys City, for the past year, were

boring for oil, an explosion occurred that forced the tubing into the air like it was a mere plaything, and then immediately followed a stream of black petroleum and it has been spouting an eight-inch flow since that time. A representative of the Enterprise saw a big spouter, throwing black oil into the air at least a hundred feet high and there was no dissenting opinion, but all who saw it said that it was oil and conservative estimates are that it has already yielded 5,000 barrels of oil. The well is phenomenal for Texas, as none of the wells in the Corsicana district are spouters and this will no doubt equal any ever struck in the best fields in the United States... To say that people were excited, especially owners of Gladys City lots, would be putting it mildly. There was nothing else talked about and men began to feel like millionaires who could not have paid taxes on the same property a year ago.... This discovery will no doubt induce capitalists to prospect on the lands which are not leased, and the result will be very beneficial to Beaumont.

The writer of the above article was correct in many ways. Beaumont was benefited. An avalanche of oil experts, prospectors, speculators, and oil-company executives from the East and from Colorado, California, and even from Europe descended on Beaumont.

Texas railroads advertised, "In Beaumont, you'll see a Gusher Gushing!" Within a matter of hours, crowded trains left Dallas, San Antonio, Corsicana, and Houston, bound for Beaumont.

Oil men came from the East because the Standard Oil Company marked down the price it paid for Pennsylvania and other eastern oil as a result of the Lucas gusher.

The *Daily Enterprise*, in its January 11, 1901, issue had this to say about the geyser at Spindletop:

The big oil geyser is still spouting though this flow is not near as strong as it was last night. At 10 o'clock this morning a representative of the *Enterprise* visited the well and it was throwing oil about fifty feet in the air and the volume seems great enough to fill 10,000 barrels a day. Mr. Lucas has not yet made an effort to stop the flow as he says it is too strong yet to control. In the meantime, Perry McFaddin has a force of men and teams at work trying to save the oil that is flowing without letup or hindrance. He is throwing up a levee to make a pond that will hold thousands of barrels of oil. There is oil all over the prairie around the well and the air is impregnated with the smell of oil for a distance of half a mile. 14

The great Lucas gusher spewed oil over southwest Beaumont for over ten days before it was finally capped. It is estimated that over one million barrels of crude oil was lost during those hectic ten days. Finally, on January 22, 1901, the geyser was harnessed and the flow was entirely shut off, or as the January 22 *Beaumont Journal* stated:

The flow from the Lucas well has been entirely stopped and the tremendous energies and forces which have been such a spectacle for the thousands who have traveled to see it are now contained within the confines of the well. At 11 o'clock Captain Lucas, Mr. Galey, and the Hamill Bros. gathered at the well and decided to make the test of closing the valves. There is a T pipe on the casing and a valve on each branch of the pipe. The pipe was slowly shut off while the pressure on the gauge was carefully watched. Without a tremor, or the slightest accident, the valve was closed and the powerful well which had been spouting oil for over nine days was closed. Captain Lucas is nearly as happy over the closing of the well as he

was over the discovery of the geyser. All parties concerned with the well decline to state the pressure of the flow as indicated by the gauge. 15

Beaumont enjoyed its prosperity and mushroomed into a boisterous, oil-crazed metropolis, increasing its population from 10,000 to over 30,000 in three months, claiming to be the "Queen of the Neches."

Wild speculation followed the oil boom. At the Cardava Hotel "Madame La Monte" did a thriving business foretelling to many who sought her service where rich oil lands and gushers were to be found. Land-lease and sale transactions were made at all hours of the day and night; prospectors sought salt domes for each other near the coast, hoping that each mound might become another Spindletop.

Fabulous land deals were a daily occurrence in Beaumont. A woman garbage collector sold her pig pasture for $35,000; blocks of real estate, 25 by 34 feet, brought $6,000 each.

A year after the Lucas gusher blew in, land within the proven field was selling for nearly $1,000,000 an acre; no sales were made for less than $200,000 an acre, and acreage within fifty miles of Beaumont was selling for $1,000 an acre.


16 "The Beaumont Oil Field, with Notes on Other Oil Fields of the Texas Region," Journal of the Franklin Institute, (August--October, 1902), p. 27.
At Spindletop many wells were spudded in and hundreds of companies were organized. Within five months there were fourteen producers, three wells abandoned, fifteen being drilled, and eighteen rigs being built over drilling sites—all on an eighty-acre tract. Within eight months after Lucas' geyser, there were 214 wells at Spindletop owned by about one hundred companies, 120 of which were drilled upon fifteen of the 200 producing acres.

Within a few weeks after the discovery, derricks stood so close together that in some instances plank runways were built from one to the other, so that the workmen could escape in case of fire; in many places from one to four wells were drilled under one floor. The Hogg-Swayne Syndicate did a thriving business selling drilling sites just large enough for a derrick.

The Lucas gusher brought many problems in its wake, among which storage space, pipe lines and tank cars, refineries and new markets were foremost. First, the rapidly accumulating oil in the temporary ground reservoirs made urgent the securing of permanent iron-tank sites and of pipe lines from wells to sites, the erection of the tankage,

17 Rister, op. cit., p. 61.

and access to shipping and loading facilities. Even having a well, a tank site, tankage, pipe line connections, a loading rack, and all other facilities, the producer was still confronted with his more difficult problem of the sale of his oil when the market was already many times over-supplied. For example, by midsummer of 1901, oil was actually cheaper than drinking water. Oil sold for as low as three cents a barrel; water was five cents a cup.\(^{19}\)

The storage problem was ever present. By March 1, 1902, tank storage exceeded 5,000,000 barrels. Among those tanks of 37,000 barrel capacity and over, there were twenty-two at El Vista, twenty-eight at Gladys City adjacent to the field, and thirty-three at Port Arthur. These tanks, however, were hardly adequate to accommodate the producer's needs. Yet a partial solution of the problem of storage was found by making available better transportation facilities. In February, 1902, the railroads had added 500 tank cars, thus increasing the total to 1,500.

"Tank-steamers" had also been put into service. The Guffey Company started construction on five tankers, one of which was to carry 60,000 barrels of oil.\(^{20}\) This last tanker was reported to be the largest ever made in the United States up to that time and equal to any in the world.

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\(^{20}\) Rister, op. cit., p. 64.
Local refining, too, helped to solve the petroleum supply problem. By 1902 the Guffey Company had built two refineries at Port Arthur and had under construction another of 2,500-barrel daily capacity. These refineries made it possible for the firm to reduce the tanker's hazards in handling crude oil, by bumping the flash point up from 120 degrees to 145 and 150 degrees and by taking out naphtha and kerosene.

The shipments for 1901 were 1,750,000 barrels of crude oil; by April of the next year the total shipments of the previous year had been exceeded, those of March alone being more than 800,000 barrels and the shipment of upward of 20,000,000 being possible by the end of the year.

Within a year after the Lucas well was discovered, Beaumont truly became "Queen of the Neches," with a population exceeding 30,000. It could boast of the largest iron works in the South, three sawmills and three planers, two shingle mills, three rice mills, one creosoting plant, two brickyards, six oil-tank factories, one boiler works, one shipyard, four bottling works, a marble works, and numerous other smaller enterprises. Paved streets, an adequate water supply and sewerage system, and electric lights completed the town's transformation. "We are wealthy beyond our calculations" boomed the editor of the Daily Enterprise.

Ibid., p. 65.
The financial statements of local banks proved that Beaumont was indeed wealthy. The Enterprise, August 20, 1901, announced that local banks enjoyed the greatest increases in deposits in the history of the South.

Beaumont, Port Arthur, and the entire Gulf Coast, thanks to Spindletop, had begun to take their place on the oil map of Texas.

An interesting article appeared in the January 11, 1901, Beaumont Enterprise. It was written by a far-sighted youth by the name of Jimmie Clark, and was concerned with the potentialities and possibilities of the discovery of oil at Spindletop. The article appeared as follows:

A hundred thousand barrels of oil a day is shooting skyward out of a wildcat prospect on Spindletop Mound at Gladys City today....This city is preparing to become America's first boom town.

Observers are already saying this may herald the beginning of an oil age.

This could mean tens or hundreds of thousands of new automobiles. Some are so bold as to predict that it presages an air age with the Wright Brothers' invention being developed to the point where the airplane could become militarily and commercially valuable.

This discovery, some flabbergasted citizens are saying, could bring about development that would place America as the first power of the world.

It could, they say, rapidly affect the economic losses in this young nation's life suffered by the war between the states.

It could place America on a par with or ahead of such great powers as Great Britain, France, Germany, Austria, Russia and Italy.

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Oil men here today went so far as to predict that this new field and others like it along the Gulf Coast will soon make the United States the world's leading oil producing country. Today Russia leads the world in oil production....

What the Lucas gusher means to the world is yet to be seen. What we can say tonight is that if it holds up and the oil is of good quality, it could mean a new era in progress. It can be a milestone in the history of the world. Today oil is used generally for lamp fuel and for lubrication. Now, it could become a fuel of abundance to supply the energy necessary to create an entirely new world of thinking and action.

This well could open new avenues of thought for transportation, for geology, for manufacturing and for finance. This well could bring new pipe lines, new refineries, larger and more fantastic than the mind can conceive today. Some see great drilling programs, throughout the Southwest and demands on the steel industry unheard of in the past. One even predicted that this nation may become a network of macadamized highways and that city streets will be paved everywhere.

The gas coming out of the well and forcing the oil to 200 feet into the air opens even another source of energy that could become vital to the nation.

This discovery certainly means new Gulf Coast prosperity. Some are even saying tonight that this agricultural country could some day become a great industrial section.... 23

Little did Clark realize the prophetic accuracy of his statements. Spindletop was responsible for practically all he forecast and more. Spindletop was the spark and was responsible for starting a series of explorations for petroleum all over the country; especially in similar topographic areas. Before many years had elapsed, Texas was No. 1 on the "Oil Parade" in the United States, and the United States was No. 1 on the "Oil Parade" of the world.

It was in January, 1901, that Captain Lucas found oil in the cap-rock area overlying the top of the huge mound of rock salt lying 2,000 feet below the surface. By October of 1901 there were sixty-five flowing wells, any one of which was equal to the famous first, the Lucas geyser. In that year Spindletop field produced over 3,500,000 barrels of crude oil. By the following year, the field had risen to an annual production of 17,500,000 barrels, a record which was to stand for twenty-five years.

When Spindletop was discovered, Russia was the world's largest producer of petroleum. Three years earlier, it had overtaken the United States which had led the world for forty years. However, by 1902, as a result of the prolific Spindletop production, the United States took the lead and has never lost it since that time.

Spindletop steadily declined until 1925 when production was 412,000 barrels, a daily average of 1,100 barrels. In that year Yount-Lee Oil Company began exploring around the salt dome for flank production. The company drilled two dry holes, but early in 1926 the company's efforts were liberally rewarded. The drillers hit "good pay" at 2,518 feet. This well set off the second Spindletop boom--a boom which has enabled the field to produce over one and one-half times as much oil in its second twenty-five years as in the initial quarter century.
Peak production year for the second twenty-five year period was 1927 when the field produced over 21,000,000 barrels (58,000 barrels daily). A total of 2,200 wells have been drilled in the 430 acres comprising the field. Cumulative oil production to January 1, 1951, has been 129,952,000 barrels.

The major oil production at Spindletop field now comes from the south, southwest, and west flanks of the dome. The sands are very lenticular and irregular, and the correlation from well to well is difficult.

Spindletop field still holds a high rank among the fields of the Texas Gulf Coast. It has been a giant in this area of prolific oil fields, where only five fields have surpassed its cumulative production.
CHAPTER IV

LATER OIL DEVELOPMENT IN SOUTHEAST TEXAS

Following the discovery of Spindletop, explorations were started on many favorably considered prospects along the Gulf Coast, and before the end of the year minor production was proven at Saratoga and Sour Lake. Both areas had been of especial interest for more than forty years, and small production had been secured at each locality long prior to the completion of the Lucas gusher at Spindletop.

The first substantial production at Saratoga was secured in the late fall of 1901 when the Hooks No. 1 test was completed for an initial production estimated at twenty-five to one hundred barrels per day from a total depth of 980 feet. Hooks No. 2, located about 700 yards south of the No. 1, and less than one-half mile from the Cotton well which had been drilled in 1865, was completed in the latter part of 1902 for an initial production of approximately 500 barrels per day at a depth of 1,000 feet.1 It was followed soon by other discoveries, and by June, 1903, there were fourteen locations in the new field. Both the Guffey and Texas Companies soon started pipe lines from Saratoga.

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1 Rister, op. cit., p. 75.
to Beaumont, by way of Sour Lake, and the first oil was delivered by the Guffey Company. The largest annual production from the Saratoga field was during 1905 when it totaled 3,125,028 barrels.²

Sour Lake, which had been producing small quantities of oil for several years, began to attract increasing attention in the summer of 1901, when the J. M. Guffey Company drilled a well that made spasmodic flows of loose sand and mud, accompanied by considerable oil and some gas from a depth of about 900 feet. Although not commercially productive, the showings encountered in the well from depths below those previously producing provided the impetus for additional development. In November, 1901, a well was completed at a depth of 1,500 feet for the Great Western Oil Company. This test, which encountered hot salt water impregnated with sulphur between 800 to 850 feet, the water having a temperature of about 100 degrees F., had four oil sands about ten feet thick at a depth of approximately 1,040 feet.³ Encouraged by the showings in its first test, the Great Western drilled a second one about 400 yards north of the old hotel building and in the vicinity of the old shallow wells. This well secured gusher production

³ Rister, op. cit., p. 75.
at a depth of approximately 683 feet on March 7, 1902. The well penetrated forty feet of oil sand, upon which the eight-inch casing was seated; when the six-inch pipe was pulled up after penetrating the sand, the well began to flow a solid eight-inch stream of oil about twenty-five feet above the top of the derrick. The flow of oil was accompanied by a considerable amount of loose sand, and it was necessary to close the well in from time to time and bail out the sand, after which the well would respond with excellent flows.

Several wells having initial productions varying from 500 to 10,000 barrels daily were completed in the field during 1902, and by the end of the year, the J. M. Guffey Company had completed a pipe line connecting this district with Beaumont, and another line was in process of construction. The development in this field was particularly rapid during the first year or two of its life, and especially so during 1903. The average production of the field during August and September, 1903, was from 50,000 to 60,000 barrels per day, but it declined rapidly to only 18,00 to 20,000 barrels daily in December of the same year. This rapid decline was caused by the close drilling of wells along the "shoestring tract," and, although they had been

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completed as good producers, their closeness depleted the reservoir very rapidly and caused the abandonment before the end of 1903 of seventy-five of the one hundred fifty wells which had been completed as producers up to that time. The price per barrel of Sour Lake oil in May, 1903, when rapid development began, was from sixty to seventy cents per barrel, but it had declined to fifteen cents per barrel by the following August as a result of greatly increased production. Facilities for the transportation of oil from the field had been increased, and at the close of 1903 they included one eight-inch and four six-inch pipe lines to Beaumont, a six-inch line to Saratoga and a four-inch line to Raywood, and several shorter lines to loading rocks.

Although a limited quantity of very dark heavy oil had been secured from depths of less than 400 feet at Sour Lake prior to 1901, the development in the years immediately following was in horizons at depths of approximately 750, 850, and 1,050 feet. The latter two sands were the most productive, the initial production of some of the wells completed in them amounting to as much as 20,000 barrels per day.

As in many of the earlier fields, Sour Lake was the scene of a disastrous fire, which broke out on August 24,

5 Rister, op. cit., p. 76. 6 Warner, op. cit., p. 191.
1903, and destroyed several derricks and a large amount of equipment but only about 1,500 barrels of oil. A serious effect of the fire, however, was that when the wells were repaired and reopened, they refused to flow, and many of them had to be abandoned.  

Table 2 shows statistical data on the production record of petroleum by years at Sour Lake from 1902-1947.

**TABLE 2**

**SOUR LAKE PETROLEUM PRODUCTION RECORD**

(thousands of barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production in bbls.</th>
<th>Year</th>
<th>Production in bbls.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1902</td>
<td>45</td>
<td>1925</td>
<td>1,444</td>
</tr>
<tr>
<td>1903</td>
<td>8,848</td>
<td>1926</td>
<td>2,004</td>
</tr>
<tr>
<td>1904</td>
<td>6,442</td>
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<tr>
<td>1905</td>
<td>3,362</td>
<td>1928</td>
<td>1,185</td>
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<tr>
<td>1906</td>
<td>2,156</td>
<td>1929</td>
<td>946</td>
</tr>
<tr>
<td>1907</td>
<td>3,354</td>
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<tr>
<td>1908</td>
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<td>1910</td>
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</tr>
<tr>
<td>1911</td>
<td>1,365</td>
<td>1934</td>
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<tr>
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<td>1,175</td>
<td>1935</td>
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<tr>
<td>1913</td>
<td>1,348</td>
<td>1936</td>
<td>561</td>
</tr>
<tr>
<td>1914</td>
<td>5,209</td>
<td>1937</td>
<td>569</td>
</tr>
<tr>
<td>1915</td>
<td>4,115</td>
<td>1938</td>
<td>441</td>
</tr>
<tr>
<td>1916</td>
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<td>1919</td>
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<td>1,802</td>
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<td>1,675</td>
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<td>1923</td>
<td>1,906</td>
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<td>602</td>
</tr>
<tr>
<td>1924</td>
<td>1,588</td>
<td>1947</td>
<td>970</td>
</tr>
</tbody>
</table>

7 Ibid., p. 192.  
8 Rister, op. cit., p. 408.
An examination of the statistics in Table 2 shows that the number of barrels produced prior to 1902 was 45,000 barrels. By 1947 Sour Lake, after nearly a half-century of production, produced almost one million barrels of crude oil with her yearly production record increasing for the sixth straight year.

Following the discovery of production at Saratoga and Sour Lake, Batson added another producing salt dome to the Gulf Coast district. The Libby Oil Company had secured a little oil and large quantities of hot salt water at a depth of about 1,000 feet in a test well drilled there in 1901. On October 31, 1903, the Paraffin Oil Company completed its Fee No. 1, which flowed 600 barrels of twenty-four gravity oil per day from thirty-five feet of pay horizon at a depth of 790 feet. It was followed on December 19, 1903, by the second well of the Paraffin Oil Company, which blew in, making sand and mud and then began to flow a solid stream of oil to the top of the derrick and was closed in with difficulty. On December 23, the Paraffin No. 3 well began to flow at a rate of 15,000 barrels per day, and no doubt existed as the potential value of the Batson field. The average daily production for the field amounted to 151,000 barrels early in March, 1904, but it declined to about 35,000 barrels per day later, and by the end of 1904,

9Rister, op. cit., p. 77.
260 wells were producing a daily average of only 11,700 barrels. The reported sale of oil from the field during 1903 was only 4,500 barrels valued at twenty-five cents per barrel, while for 1904, it was approximately 11,000,000 barrels valued at about $3,708,000.

The next discovery in this district was the Humble field of Harris County. Gas seepages had been known there for many years, and in the fall of 1902, a test being drilled by George Hart was abandoned after it blew out. In the summer of 1904, C. E. Barrett of Houston, drilled several shallow wells on the top of the hill, none of which were successfully completed as producers, but in October of that year, the Higgins Oil and Fuel Company secured a large gas well about one-half mile southeast of the Barrett wells. Development was rapid, and within two months the field was producing approximately 90,000 barrels per day, and by March, 1905, this field had produced a total of approximately 3,000,000 barrels of oil. The production began to decline soon after the middle of March as a result of water intrusion; but development continued, and following additional completions, the production began to increase until it averaged 93,272 barrels per day during June, 1905, and at one

10 Ibid.
12 Oil and Gas Journal (May, 1951), p. 165.
time it exceeded 130,000 barrels for one day.\textsuperscript{13} New wells completed were unable to halt the decline in production more than temporarily, and at the end of 1905, the field was averaging about 20,000 barrels daily. The Humble field also had its disastrous fire, in which approximately 2,000,000 barrels of oil were lost in July, 1905.\textsuperscript{14}

Big Hill in Matagorda County was a minor discovery of 1904, and, although it was rather actively developed during that year, the total production amounted to only 151,936 barrels of dark green nineteen gravity oil. Kiser Hill in Brazoria County was also producing some oil in 1904, but it was not too important.

Commercial production of oil in the North Dayton field was established in April, 1905, by the completion of the Higgins-Paraffin No. 2 test, for an initial production of 100 barrels per day from a depth of 800 feet, and on August 28, 1904, Higgins-Paraffin No. 4 was completed for 5,000 barrels daily from a sand at 740 feet.\textsuperscript{16}

Five fields of importance had now been added to the total for Texas in the five years which had elapsed since the discovery of Spindletop, and exploration had been

\textsuperscript{13} Warner, \textit{op. cit.}, p. 193.
\textsuperscript{14} Texas Almanac, 1910, p. 68.
\textsuperscript{15} Warner, \textit{op. cit.}, p. 193.
\textsuperscript{16} \textit{Ibid.}, p. 194.
carried on with scant success from a standpoint of production in many sections of the district. The J. M. Guffey Petroleum Company had discovered salt at Damon Mound and Cap Rock at Big Hill in Jefferson County, and had developed gas at Bryan Heights, Brazoria County, in 1901.

Accompanying the development of the new fields, there had been a substantial growth in transportation and refining facilities. Pipe lines had been immediately laid to move oil from the Spindletop field to loading racks on the railroad or to terminals along the water front; and with the discovery of each new field, additional lines were constructed to furnish it an outlet. During 1902 an active program of pipe line construction was carried on in the general Beaumont district by the J. M. Guffey Company, the Sun Pipe Line Company, the National Oil and Pipe Line Company, the Burt Refinery, and others. There were no oil pipe lines in southeast Texas on January 10, 1901, but at the end of 1904, a total of 513½ miles of pipe line had been constructed for the transportation of oil.

Movement of oil by water began in 1902 when the tanker Atlas left Port Arthur with a cargo of Spindletop crude oil, and in 1903 shipments of Gulf Coast crude oil by water amounted to 8,000,936 barrels. The storage facilities

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17 Ibid. 18 Ibid. 19 Ibid., p. 195.
had also been increased in the coastal district until they totaled 19,226,800 barrels in 1903.  

Facilities for the refining of production from Spindletop and other early Gulf Coast fields were rapidly provided by the erection of the Guffey Oil Company Refinery, now the Gulf Refinery, at Port Arthur in 1901; the Burt Refinery, now the Magnolia, at Beaumont in 1902; and the Texas Company Refinery at Port Arthur in 1902 and 1903. In the nine years elapsing between 1903 and 1912, other plants were constructed, and in that year eight of the eleven refineries in Texas were located in the Gulf Coast district. These eight plants, located at Beaumont, Gates, Orange, Port Arthur, and Texas City, had a total daily capacity of 90,000 barrels of crude oil; or ninety per cent of the total for Texas. The construction of additional refineries and the enlargement of those previously constructed has continued since 1912, and the spring of 1938 showed nineteen refineries with a total daily capacity of 856,125 barrels in the Gulf Coast district.

During the years 1906 and up to 1915, there were few, if any, developments of outstanding importance in the Gulf Coast district. The year 1906 was marked by a general falling off in the quantity of oil produced from all of the five

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20 Oil and Gas Journal, p. 164.

principal pools of the coastal plain with the exception of Saratoga. New shallow sands were developed at Spindletop and Humble during 1906, but they did not prove capable of halting the decline in production from such fields.

In 1908 a well drilled by a syndicate of Houston people was brought in at Goose Creek on June 2, flowing intermittently at the rate of thirty barrels per hour from a depth of 1,600 feet. Three days later the Hardy Oil Company completed its No. 1 Hudson at Markham for an initial production of approximately 1500 barrels per day from a sand at 1,370. This well was closed in immediately until storage could be built, but it declined to 150 barrels daily within six months. Many good producers were completed in the Humble pool during 1908 and helped to check the general decline in production from the state. W. S. Farish completed his Nos. 20 and 21 Hargreaves at Humble in August for initial productions of 1400 barrels and 1200 barrels respectively; and development there was quite active during the remainder of the year with eight wells completed for initial productions of more than 1,000 barrels per day each, twenty-eight wells with initials in excess of 500 barrels each, and forty-eight wells each good for 200 or more barrels per day. 23

22 Warner, op. cit., p. 50.

23 Ibid., p. 196.
The year 1910 was marked by a 2,000 barrel gusher at Haskins Mound early in March, a new deep horizon on the eastern flank of the Humble Field in April, and a 10,000 barrel well at Markham in April and another of equal size in December to revive interest in that otherwise disappointing field.24

The next discovery in the Gulf Coast was made on August 13, 1913, when Rio Bravo Oil Company completed its No. 1 Bland for an initial production of 500 barrels at a depth of 3,128 feet.25 This well was not only the discovery well of the Orange field, it was also the deepest producing oil well in Texas at that time.

Approximately two years after the discovery of the Orange field, the Brenham Oil Company secured production on October 8, 1915, at a depth of 1340 feet on the Brenham dome of Austin and Washington Counties. Considerable importance was attached to the discovery of the Brenham field because it was the first salt dome to produce oil some distance inland from the coast.

The Humble field advanced from a position of secondary importance in 1914 to first place in the Gulf Coast area during 1915, as a result of the completion of gusher wells

24 Rister, op. cit., p. 103.
from deeper pays at depths of 2,900 feet and 3,300 feet on the Landslide and Stephenson leases. The daily production of the pool increased from 25,302 barrels in August to 68,900 barrels in November of 1915.

While exploratory development had been rather disappointing for the discovery of new fields from 1905 to 1916, the latter year was apparently a turning point in the exploration work. In that year, the Humble field, through continued deep drilling, retained its primary importance; Batson and Sour Lake were the scenes of development in new pay horizons and extension areas; and production at Goose Creek began to increase perceptibly after August.

Development continued at Goose Creek during 1917, and sixty-two per cent of the wells completed were oil wells with an average initial production of 1,181 barrels daily. The feature well of 1917 was the No. 11 Sweet of Simms-Sinclair, which was brought in on August 4 for an initial production of 35,000 barrels daily from a depth of 3,050 feet, ran wild for three days, sanded up, and was finally brought under proper control as a 1,500 barrel well in March, 1918.

26 Ibid., p. 216.
27 Rister, op. cit., p. 55.
In addition to the development at Goose Creek in 1917, Humble was extended to the southwest; Sour Lake was extended to the northeast and south, and renewed drilling at Spindletop was followed by increased production in that field; Bland Oil Company completed its No. 2 test in the Orange field as the second producer there since the discovery of the field in 1913; and the Republic Production Company - Houston Oil Company of Texas test well at Hull encountered showings of oil and gas at 2,200 feet and salt at 2,700 feet. 29

The first important discovery of 1918 was the West Columbia field in Brazoria County; the second important Gulf Coast discovery during 1918 was at Hull in Liberty County on July 22 when the Republic Production Company and Houston Oil Company of Texas completed their No. 3 Fee for an initial production of 1,000 barrels per day from a depth of 2,352 feet. 30

Barbers Hill was another discovery credited to 1918. The presence of gas in this vicinity had been observed in 1889 in a shallow water well being dug by E. W. Barber, and exploration there naturally followed the discovery of oil at Spindletop. Attempts to secure commercial oil production were more or less continuous from that time until 1918, but the development of the new field was relatively slow until 1926 when the No. 1 A. E. Barber of Mills Bennett

Production Company and Humphreys Corporation was completed on May 21 for an initial production of 500 barrels per day at a depth of 2,245 feet.  

Field operations during 1919 and 1920 resulted chiefly in the discovery of new horizons in and extensions to older producing fields, but the total production secured during those years amounted to practically the same as or more than that for the years of 1917 and 1918, years which had been of major importance.

Pierce Junction was the important coastal discovery during 1921 when the Gulf Production Company No. 2 Taylor, which had previously been completed as a gas well at a depth of 3,490 feet, began to produce oil on February 19. This field, in which production was developed in a more or less circular ring around the crest of the dome, produced a total of 1,403,940 barrels of oil during the remainder of 1921.

On December 27, 1921, the No. 5 Chesson of the Humble Oil and Refining Company in the Orange field, came in for an initial production of 4,000 barrels per day from a total depth of 3,916 feet, went wild later in the day after cutting its connections, and flowed at an estimated rate of 25,000 barrels daily. This well proved the fourth

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31 Ibid., p. 199. 32 Ibid., p. 201. 33 Warner, op. cit., p. 203.
productive horizon at Orange, others having been developed at depths of approximately 1,800 to 2,000 feet, 3100 feet, and 3,350 feet.

In 1922 field explorations were followed by the discovery of new fields at Big Creek and High Island. Big Creek had been of interest to several prospectors after gas had been noticed in a water well on the J. W. Slaven Survey, and a well drilled in that vicinity to a depth of 1,155 feet in 1905 encountered some gas at a depth of 400 feet. A test well was completed on May 10, 1922, as a 150 barrel producer.

On May 16, 1922, the Patton Oil Company test on the Cade land at High Island bailed some eighteen gravity oil from a depth of 155 feet. This was the first production to be secured from this prospect, which had been tested intermittently since the completion of the Lucas gusher, and the well was shut in after it had filled 1,000 barrels of storage capacity.

No new discoveries of importance were made in the Gulf Coast district during 1923 and 1924, although the shallow pay at Goose Creek, which had remained practically dormant following the discovery of deeper horizons there in

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34 Ibid. 35 Ibid. 36 Warner, op. cit., p. 203.
1916, yielded a 1,000 barrel well at 1,100 feet on the east side of the dome in March, 1923; minor production was secured at Big Hill in Jefferson County on September 7, and some extensions were made at Hull, Sour Lake, Saratoga, and Blue Ridge. The total production from the district during these two years showed a marked decline from the previous high of 1922, but it began to increase again in 1925, following the discovery of the new fields of South Liberty and Boling and the discovery of new horizons at Batson, Dayton, High Island, Orange and Spindletop. The Spindletop field had furnished the Gulf Coast district with commercial production on January 10, 1901, and it had produced approximately 49,002,610 barrels over a period of twenty-four years. Indications that this field was far from depleted or completely explored were given on November 16, 1925, when Yount-Lee No. 2 McFaddin encountered a new sand at 2,588 feet, approximately 1,500 feet below the horizons previously producing. On January 13, 1926, Yount-Lee No. 3 McFaddin came in making 5,000 barrels per day from a sand at 2,780 feet, and six days after completion, this well was flowing 6,000 barrels daily through a one-inch choke.

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37 *Oil and Gas Journal, op. cit.*, p. 173.

The new discovery on the south flank of this old dome started another orgy of drilling, and the production from the field during 1926 amounted to 14,838,281 barrels, or more than its total production for the twenty years immediately preceding. 39

A feature of 1926, not directly associated with production and development in the Gulf Coast alone, was the installation in June of the first centrifugal pumps on oil pipe lines in Texas, such installations having been made by the Magnolia Pipe Line Company at its Westbury station near Beaumont.

Geophysical investigations, which had been introduced into Texas in the Gulf Coast district in 1922, were more actively conducted during 1926 and 1927 than in previous years. Prospects located by geophysical instruments during 1927 included Brookshire, Lost Lake, and Sugarland.

The Fannett prospect in Jefferson County had been located and mapped by seismograph surveys in 1925, and it was proven for production on January 20, 1927, with a daily production of fifty barrels from a depth of 5,000 feet.

Although geophysical investigations had located many new fields in preceding years, only one of four new fields

discovered in 1928 can be attributed solely to that type of work. The first discovery of the year was Sugarland, which was proven for production on March 26 as an 800 barrel well at a depth of 3,561 feet.

The second discovery of 1928, that of Clay Creek, was a result of surface geological reconnaissance followed by core tests. The first production was secured by Sun Oil Company on October 9 for an initial production of approximately 125 barrels per day at a depth of 1,154 feet. The discovery and development of this dome clearly indicated that production might be anticipated from other interior salt domes of the Gulf Coast district, and that productive horizons in the district were not confined to cap work and strata of Pliocene, Miocene, and Oligocene ages. First production on salt domes from the deeper horizons of the Mount Selman and Wilcox formations was secured at Clay Creek.

Long Point and Rockland were the two other discoveries of 1928, but both proved to be of little importance. The discovery of prolific production from a new flank sand at a depth of approximately one mile at Barber's Hill in 1928 was followed in 1929 by a rapid development. The Humble field was again the scene of active drilling in 1929 after

\[41\] Warner, op. cit., p. 205.  \[42\] Ibid., p. 208.
the South Texas Petroleum Company completed a test on the south side of the dome for an initial production of 5,280 barrels per day from a depth of 5,347 feet. Development in these two fields, a substantial expansion of lease holdings by the majority of the operating companies, the discovery of five new fields, and a considerable increase in the total production for the year, made 1929 an important one in the Gulf Coast district.

Port Neches, located by a seismograph survey in 1928, was the first field discovered in 1929, when the Texas Company completed its No. 1 Kuhn on May 9 for an initial production of 1900 barrels per day from a depth of 3,162 feet. On June 6, Gulf Production Company's No. 2 Boyt began flowing 700 barrels per day from a depth of 2,674 feet to add Hankamer to the list of producing fields.

A new peak production record of 50,665,006 barrels was established in the Gulf Coast during 1930 as a result of activity in the newly discovered fields of 1928 and 1929, continued development at Barber's Hill and Humble, extension at Raccoon Bend, and the discovery of Oil production at Danbury and Mykawa.

One of the outstanding events of 1930 was the discovery of important production below the overhanging cap

of a salt dome at Barber's Hill. Another feature of the year was the discovery of ten geophysical prospects in the counties of Brazoria, Chambers, Colorado, Harns, Liberty, Matagorda and Orange.

The major discovery of 1931, and the one which was to have a far-reaching effect on future activity in the Gulf Coast district, was made on December 13, approximately six and one-half miles southeast of Conroe. Gas seeps in that vicinity had been noted more than twelve years before, and efforts to secure test wells there date back to 1919. George W. Stroke began the actual development of this field; skepticism regarding the value of the discovery was expressed by many of the coastal operators, but when Stroke's second well came in for an initial production of 900 barrels per day through a one-half inch choke from a depth of 5,036 feet, then much interest was shown in the new field.

Tomball, discovered by the completion on May 22, 1933, of Magnolia Petroleum Company and Humble Oil and Refining Company's No. 1 Kobs proved another field of the Conroe type, although it has not been nearly so important for the production of oil as was first anticipated. The discovery well produced sixty-nine barrels of oil per hour through a one-half inch choke at a depth of 5,569 feet.

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46 Ibid., p. 212.  
47 Ibid., p. 213.
The Old Ocean field, discovered on November 8, 1934, furnished visible proof that the apparent depth limit of production in the Gulf Coast will be increased in direct ratio to the ability of man and machinery to drill wells to greater and greater depths. The discovery well was completed for approximately 500 barrels of oil per day from a total depth of 8,651 feet, and operations in the field since that time have resulted in the discovery of at least seven additional productive levels at depths from 9,800 feet to depths below 10,600 feet. 48

Anahuac, another major field for Texas, was discovered on March 16, 1935, when the No. 1 Middleton of the Humble Oil and Refining Company was completed for an initial production of thirty-two barrels of 35.6 gravity oil per hour through a three-eighths inch choke at a total depth of 7,088 feet. This field has been actively developed, and has produced a total of 7,301,831 barrels to January 1, 1938. 49

The development of oil production from the Gulf Coast district to a daily average production, even under strict proration, of approximately 198,275 barrels during December, 1937, has been accompanied by the discovery and development of tremendous reserves of natural gas. The gas produced

48 Ibid., p. 214. 49 Ibid.
from these early fields frequently contained a high sulphur content and was poisonous to human beings, cattle and fowls; it also resulted in numerous blow-outs from high pressure "pockets" above the oil horizons. Many operators endeavored to produce and market the gas secured, but the supply diminished rapidly in the salt dome fields, and it was a generally accepted theory that it would not pay to lay gas lines to them.

Gas for fuel in cities and towns of the Gulf Coast section was therefore secured from other sections of the state and transported hundreds of miles through major pipeline systems.

One phase of development activity which has been particularly noticeable in the Gulf Coast district is the depth to which wells are drilled in the search for new oil and gas fields and new horizons in older fields. In the period from October, 1936, when the Shell Petroleum Corporation No. 1 Stewart on the Hitchcock prospect in Galveston County passed the 10,000 foot mark and reached a total depth of 10,460 feet, to July 1, 1938, twenty-four tests had been drilled to depths of more than 10,000 feet in the counties of Brazoria, Galveston, Harris, Liberty and Matagorda. The first test in the Gulf Coast district to be drilled to a depth below 10,000 feet was the No. 1 Stewart mentioned above; the first test in Texas to secure production from below 10,000 feet was the No. 3 Bernard River of
Harrison and Abercrombie at Old Ocean, which was completed for an estimated thirteen barrels per hour through a one-fourth inch choke at approximately 10,400 feet on March 13, 1937; the deepest well thus far drilled in the district was Continental Oil Company's No. 2 Robbins at Citrus Grove in Matagorda, which was abandoned at a total depth of 11,612 feet on May 18, 1937.  

The Gulf Coast district, which had produced a total of 1,076,818,392 barrels of oil to the end of 1937 and accounted for approximately twenty-one per cent of the total production from Texas, has been of especial importance since 1901. Prior to 1930, discoveries of new fields and reserves were made at a rate substantially in accord with the total production, but during the years 1930-38, new reserves had been discovered until the proven reserves were estimated to be approximately twice as much as the total production from the district during the past thirty-seven years had been.

During the latter part of 1938, drilling activity and development was limited. Two new producing horizons were opened in the League City field, Galveston County, and production was extended east and west on the flanks. In the Cheek field, Jefferson County, the completion of

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50 Ibid., p. 216.

51 Oil and Gas Journal (December 29, 1938), Vol. XXXVII, No. 33, p. 304.
Humble's No. 3 Jefferson progressed satisfactorily. Limited production was secured, but production did not reach expectations.52

There were also completions and extensions in proven fields in Brazoria, Chambers and Harris counties, but no discoveries to warrant much attention.

During the years 1940-45, oil exploration proceeded at a fast pace along the Gulf Coast, but generally the results were disappointing. New production was secured, but no fields of outstanding importance were secured. Technology, the art of utilizing existing supplies to the best degree, seemed to be the theme throughout the war years. More technological advancement was made during these five years than had been made during the previous twenty years.

In 1940 the Magnolia Petroleum Company began operating the first Houdry Catalytic cracking unit at their Beaumont refinery. In that same year, Pan American installed the first hydroforming unit for catalytic reforming of heavy naphtha at its plant in Texas City, Texas.53 Gulf Oil Corporation, in 1943, began operating the first catalytic cracking units of the T. C. C. type in the Southwest at its

52 Ibid.
Port Arthur refinery. Also in 1943, Gul Oil Corporation, Magnolia, Atlantic Refining Company, and Pure Oil started a cooperative project to install one of the largest butadiene plants in the world at Port Neches, Texas, with a capacity of 110,000 long tons of G. R. S. rubber.\footnote{Ibid., pp. 178-9.}

In 1942 additions were made to the Big Katy Gas and Distillate field, extending it from Waller County into western Harris County.\footnote{Oil and Gas Journal (December 31, 1942), Vol. XLI, No. 34, p. 75.}

In 1943, the completion of a major extension at the Stovall field, which opened production in Chambers County, was the highlight of Texas' upper Gulf Coast exploration. The new producer was drilled by Gulf Oil Corporation, about 4,500 feet northwest of former production on the Jefferson County side of the Stovall field. The well was drilled to 7,814 feet and made 350 barrels per day through a one-fourth inch choke.\footnote{Oil and Gas Journal (December 23, 1943), Vol. XLII, No. 33, p. 81.}
In oil prospecting the last two decades have been characterized by the discovery of deep oil horizons, horizons which disclosed different subsurface patterns that were beyond the reach of southwestern pioneer drillers with their primitive equipment. Technology—modern science has unlocked these subterranean treasure chambers.

The early twentieth century oilman could hardly conceive of the radical methods soon to transform southwestern oil operations. For example, the airplane enabled geologists to make aerial maps revealing structural faults and details not apparent from ground surveys. Science evolved new prospector gadgets: torsion balance and gravimeter to measure gravitational attraction, the seismograph to gauge the depth to the reflecting beds, and the magnetometer to register sensitive pencilings of the direction and intensity of the earth's magnetic field. These instruments now used to find deep oil zones represent a decided advantage in prospecting; a long distance from the early twentieth century soothsayer's predictions, the peach tree limb, and the Ouija board.
Engineers and manufacturers improved the rotary rigs and techniques necessary for deep explorations, far beyond the reach of early-day drilling practices. Rotary derricks of better steel were built higher and sturdier than those used by early Gulf Coast drillers, with drill pipe of greater tensile strength. By the 1930's, drillers were using a 122-foot steel derrick, twenty-four feet square at its base and about five feet at the top. Designers made better drill bits; the fish tail, with hard surfacing, the cone and roller, to meet all kinds of drilling conditions and for all sizes of holes, and several other patented kinds, all to drill deep, straight rotary holes economically. Mud fluids, with heavy barite and hermetical compounds, weighing as much as 135 pounds per cubic, enabled the rotary driller to hold back a high pressure in the hole and to prevent blowouts and the premature coming-in of the well. All these and other revolutionary innovations of the last two decades have made profitable the oilman's search for deep horizons.

The Gulf Coast is the second oldest oil producing district of Texas. By 1940 it had reached an annual output of 122,000,000 barrels of petroleum, having more than doubled its production within five years, and production climbed to 253,000,000 barrels within the next five years.¹

Humble, through 1946, became the greatest salt-dome field, having a cumulative production of 130,753,923 barrels of crude oil as compared with 128,215,936 for Spindletop. Such formerly great fields as Batson, Goose Creek, Sour Lake, and Spindletop were now fully developed and less productive, so that new fields were primarily responsible for upholding the state's oil production.

The Texas-Louisiana Gulf Coast is the site of eight of the nation's fifteen major refineries, each with a daily capacity of 100,000 or more barrels; the Gulf and Texas Companies at Port Arthur, the Humble at Baytown, the Esso Standard Oil at Baton Rouge, the Cities Service at Lake Charles, the Magnolia at Beaumont, the Pan American at Texas City, and the Shell at Houston. Each refinery is the focus of railroads and pipe lines daily feeding large quantities of crude oil into storage tanks for processing. And ocean-going tankers and coastwise and canal barges slip in and out of port with their hulls laden with valuable cargoes.

The Texas refineries are concentrated in three areas: Beaumont-Port Arthur, Houston-Texas City, and Corpus Christi. These three centers account for eighty per cent of the Gulf Coast's refined oil.

The Beaumont-Port Arthur area has its Texas Company, Gulf, Magnolia, and Atlantic refineries, processing daily
over one-half million barrels of crude oil; with many millions of dollars invested in complementary plants, it rivals Houston in potential industrial greatness. Both Beaumont and Houston are inland cities, but both support heavy Gulf Coast and overseas commerce, Beaumont with its Neches-Sabine waterway and Houston with its Ship Canal. Both cities receive daily many thousands of barrels of crude oil from Arkansas and Louisiana fields, from North Texas, from the Panhandle, and from the Permian Basin country of Western Texas, and from East Texas.

Mid-1948 found the Beaumont-Port Arthur refining area engaged in a comprehensive construction program. The Texas Company is building facilities to increase its capacities by about 25,000 barrels daily of finished oils, all at a cost of $15,000,000. The Gulf Oil Corporation has just completed or has under construction three topping and vacuum units and a catalytic desulphurization plant. At Beaumont, the Magnolia Petroleum Company is building dewaxing solvent-extraction, and vacuum units and a crude still.

In the Houston-Texas City area more than $70,000,000 had been earmarked for construction by June, 1948. Since the discovery of the first Spindletop gusher in 1901, oil's impacts on Texas have been decisive, just as Texas oil has been decisive in the nation's economy.
A Texas authority recently stated that the bringing in of the Spindletop Oil Field "and the succession of discoveries that have followed have done more than anything else to send Texas along the path of industrialization." ²

"Texas economically and culturally would have been a quarter century behind its present point of progress had there been no petroleum," declares another expert. ³

Of oil's other influences on the Gulf Coast, its effect on cities has been most noticeable. Beaumont is the first Texas city that oil money built. Since 1901 it has become the center of a vast industrial area, including Port Arthur, the refinery center. Beaumont claims the support of thirty-four Gulf Coast oil fields and approximately 1,943 producing wells; on its Sabine-Neches waterway are situated three of the world's largest refineries, with a total daily production of 365,000 barrels.

Table 3, on the following page, lists in alphabetical order the various refineries of the Gulf Coast which were operating as of 1948. ⁴

³ Ibid., 1945-46, p. 238.
⁴ Oil and Gas Journal (June 24, 1948), p. 177.
TABLE 3
GULF COAST OPERATING REFINERIES (1948)

<table>
<thead>
<tr>
<th>Company</th>
<th>Crude oil</th>
<th>Cracking</th>
<th>Type of refinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alamo Refining Co.</td>
<td>35,000</td>
<td>11,000</td>
<td>C</td>
</tr>
<tr>
<td>American Mineral Co.</td>
<td>13,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Atlantic Refining Co.</td>
<td>33,000</td>
<td>40,000</td>
<td>C</td>
</tr>
<tr>
<td>Bennett Oil Refining Co.</td>
<td>1,500</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Coastal Refineries</td>
<td>7,000</td>
<td>2,500</td>
<td>S-L-A</td>
</tr>
<tr>
<td>Crown Central Petroleum</td>
<td>26,000</td>
<td>21,000</td>
<td>C-L</td>
</tr>
<tr>
<td>Danahoe Refining Co.</td>
<td>4,000</td>
<td>600</td>
<td>C</td>
</tr>
<tr>
<td>Eastern States Petroleum</td>
<td>35,000</td>
<td>27,000</td>
<td>C-A</td>
</tr>
<tr>
<td>Eddy Refining Co.</td>
<td>2,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Great Southern Corp.</td>
<td></td>
<td>4,000</td>
<td>C</td>
</tr>
<tr>
<td>Gulf Oil Corp.</td>
<td>206,000</td>
<td>98,000</td>
<td>Comp.</td>
</tr>
<tr>
<td>Hamman Oil &amp; Refining Co.</td>
<td>2,100</td>
<td></td>
<td>S-W</td>
</tr>
<tr>
<td>Humble Oil &amp; Refining Co.</td>
<td>200,000</td>
<td>140,000</td>
<td>Comp.</td>
</tr>
<tr>
<td>Hutex Petroleum Co.</td>
<td>750</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Magnolia Petroleum Co.</td>
<td>135,000</td>
<td>99,000</td>
<td>Comp.</td>
</tr>
<tr>
<td>Maritime Oil Co.</td>
<td>5,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>McBride Refining Co.</td>
<td>3,000</td>
<td></td>
<td>S-L-A</td>
</tr>
<tr>
<td>Pan American</td>
<td>104,000</td>
<td>23,000</td>
<td>C</td>
</tr>
<tr>
<td>Petrol Terminal Corp.</td>
<td>50,000</td>
<td>16,500</td>
<td>C</td>
</tr>
<tr>
<td>Pioneer Oil &amp; Refining Co.</td>
<td>2,000</td>
<td></td>
<td>S-L-A</td>
</tr>
<tr>
<td>Pontiac Refining Corp.</td>
<td>20,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Prichard Refining Co.</td>
<td>1,500</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Pure Oil Co.</td>
<td>60,000</td>
<td>108,000</td>
<td>C</td>
</tr>
<tr>
<td>Rado Refining Co.</td>
<td>3,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Republic Oil Refining Co.</td>
<td>35,000</td>
<td>8,500</td>
<td>C</td>
</tr>
<tr>
<td>Shell Oil Co., Inc.</td>
<td>100,000</td>
<td>71,000</td>
<td>C</td>
</tr>
<tr>
<td>Sid Richardson Refining Co.</td>
<td>18,500</td>
<td>2,000</td>
<td>C</td>
</tr>
<tr>
<td>Sinclair Refining Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corpus Christi</td>
<td>21,000</td>
<td>20,000</td>
<td>C</td>
</tr>
<tr>
<td>Houston</td>
<td>73,000</td>
<td>62,000</td>
<td>Comp.</td>
</tr>
<tr>
<td>Southwestern Refining Co.</td>
<td>18,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Taylor Refining Co.</td>
<td>22,500</td>
<td>3,800</td>
<td>C</td>
</tr>
<tr>
<td>The Texas Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houston</td>
<td>27,000</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Port Arthur</td>
<td>135,000</td>
<td>170,000</td>
<td>Comp.</td>
</tr>
<tr>
<td>Port Neches</td>
<td>40,000</td>
<td></td>
<td>S-A</td>
</tr>
<tr>
<td>Three Rivers Refinery</td>
<td>1,500</td>
<td></td>
<td>L-A</td>
</tr>
<tr>
<td>United Gas Pipe Line Co.</td>
<td>600</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,455,150</td>
<td>933,900</td>
<td></td>
</tr>
</tbody>
</table>

C—Crackling A—Asphalt
S—Skimming W—Wax
L—Lube oil Comp.—Complete
An examination of these statistics reveals that the Gulf Coast has thirty-five operating refineries, with a total crude oil capacity of nearly 1,500,000 barrels daily. And, comparing the Gulf Coast's crude oil runs to refineries with the total for the United States, the figures for this year again exceed thirty-one percent, as they did for 1946, 1947, and 1949. These data give additional emphasis to the important portion of the area in the nation's total facilities for manufacturing petroleum products.

Continental Shelf

Development of the extensive oil and gas potentialities believed to exist along the Continental Shelf in the open waters of the Gulf of Mexico off the Texas coast is beginning to assume major proportions. Drilling, rigging up, or building drilling structures now is under way at twenty-one different locations. At least a half dozen additional drilling projects are definitely scheduled to be started in the immediate future. Before the year is up, it is considered probable that the total number of active operations in the Gulf will be nearly doubled.

Broadly defined as that part of the gently sloping continental land mass extending from shore to the point where the water depth reaches approximately 100 fathoms (600 feet), and where the floor of the sea begins to drop steeply into the abysmal ocean depths, the Continental Shelf of the Gulf
Coast embraces an area of approximately 132,000 square miles or about 84,500,000 acres. Although the entire area is regarded as a potential hunting ground of new oil and gas reserves, the outer reaches at most places are beyond the concepts of any exploration and development for many years to come. Present exploration and development is confined to that zone within the territorial limits claimed by the states, or in the case of Texas and Louisiana, to a distance of twenty-seven nautical (31.4 statute) miles off the coast line.

Area within this zone along the Texas-Louisiana coast approximately measures 66,000 square miles or about 42,240,000 acres. That portion of this zone off the Texas coast embraces approximately 29,500 square miles, or almost 19,000,000 acres. Of this, 378,155 acres (exclusive of a few small tracts adjacent to the shore), or about two percent of the total, have been leased.

The first leases in the Gulf of Mexico off the Texas coast, except for the few small tracts adjacent to the shore, were awarded November 18, 1917. All leases are located off the upper southeast Texas coast in the area embraced by Jefferson, Chambers, Galveston, Brazoria, and Matagorda counties.

For the purpose of leasing, the offshore area of Texas is divided into tracts, each one being designated by numbers.
Along the shore line the standard tract is a square of 640 acres. Further out, the standard is a square of 5,760 acres.

Geophysical exploration, although still far from complete, already has given definite indications of the existence of at least thirty salt domes along the Texas Gulf Coast.

Offshore development is not exactly new to the Gulf Coast. As early as 1929 and 1930, exploration was being carried on in various bays, as well as in the vast marginal marshes immediately bordering the coastline. Numerous fields have been found, but most drilling has been done in locations relatively close to shore and in comparatively shallow water.

At McFaddin Beach, in Jefferson County, Humble Oil and Refining Company in 1940 drilled a well several hundred feet off shore in the Gulf. It was abandoned but was drilled into salt, proving the presence of a dome. Near Sabine Pass, at the southeastern tip of Jefferson County, Harwell and Associates in 1941 drilled a well 150 feet offshore. It was completed as an oil producer but was abandoned a short time later after having produced a little more than 10,000 barrels. Both High Island and Caplan fields of Galveston County extend

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5 Oil and Gas Journal (June 24, 1948), p. 153.
out into the Gulf, although in these places the wells are drilled directionally from surface locations on the beach.

So far, no offshore tests are actually drilling off the Texas coast. However, Stanolind has started erection off a platform for one southeast of Port Bolivar, in Galveston County.

For some time now, the discovery of new reserves on the Gulf Coast has not been keeping pace with the rapidly increasing oil consumption, and it is now recognized that the chief hopes for changing this picture lie in the extension of exploration and development seaward along the coast line.

Tidelands Controversy

In spite of the Supreme Court ruling in the Texas and Louisiana tideland oil cases, it is probable that we have seen only the beginning of an historic fight. The court opinions, unanimous as to Louisiana and four to three on Texas, were careful not to assert for the federal government outright ownership of the submerged lands, incalculably rich in oil, but claimed that the nation rather than the states had "paramount rights" to the territory. Justice Douglas, speaking for the majority in the Texas case, conceded that "dominium" (ownership) and "imperium" (power to regulate and control) were ordinarily separate, but contended that this was a case "where property interests are so subordinated to
the right of sovereignty as to follow sovereignty." If the federal government has full rights to the three-mile belt of ocean, which it has always enjoyed in connection with navigation and defense, then surely the states cannot claim control over submerged lands beyond this marginal sea. The court, further, made short work of the special argument of Texas that in the Act of Annexation provision was made for retention by the state of "waste and unappropriated lands" and that these included the coastal areas in question. Nevertheless, it is widely believed that failure of the court to settle the issue unequivocally leaves it to Congress to decide whether the areas are to be turned over to the states or to the federal government. The issue is heavy with political overtones. Oil from the tidelands has been a major source of funds for the states' rights movement in the South, and loss of the battle would prove an even deadlier blow to the Dixiecrats than the Supreme Court's Anti-Jim Crow decisions not so long ago.

The Dallas Morning News had this to say about the tidelands controversy or, "Big Grab," as the editors called it.

There was a bit of talk around Texas a few years ago about the actions of Atty. Gen. Price Daniel. Why, asked some, was the Attorney General

6 The Nation, No. 24, Vol. CLXXV (Saturday, June 17, 1950).
of Texas spending so much of his time worrying about a California lawsuit? What difference did it make to Texas if the Federal Government confiscated California offshore oil lands? After all, wasn't Texas secure? Didn't Texas have a special agreement with the Federal Government that gave it the right to keep all its unsold lands after joining the union? Attorney General Daniel wasn't so sure that the 'Big Grab' crowd would respect that title. Neither was Governor Beauford Jester.

As things have panned out, Attorney General Daniel was as right as a fox with a crystal ball. The 'Big Grab' plotters in Washington were using the strategy of divide and conquer. They weren't going after all the states at once. They first would pick off California, apparently the weak sister. Then they would use a Supreme Court opinion in the California case to slick Texas and Louisiana. And then, who knows?

Daniel helped California defend its lawsuit because he was dead sure the divide-and-conquer scheme would hit Texas eventually. He argued on behalf of the National Association of Attorneys General who appeared as amicus curiae (friend of the court).

Aided by Governor Jester, Daniel tried to line up nation-wide sentiment against this obvious creeping paralysis of super-federal powers. Congress tried to help with a resolution that the states had full ownership, but President Truman slapped it down with a veto. The 'Big Grab' was stretching for the critical gobble and wasn't to be trifled with.

Even while Daniel worked in the California case, efforts were made to lull him and Texans generally.

After arguing for the State Attorneys General in the California case, Daniel got a friendly pat on the back from Atty. Gen. Tom Clark, who has presented the federal side. Said Clark:

'Well, you've had a nice trip up here, but that's all it amounts to. Texas is different from California and we'll never be sued. I have just handed the press a written statement to that effect.'

Many a Texan read with relief that written statement by Texas-born Tom Clark. It said the lawsuit 'involves only the area off the coast of California.'

... When the California opinion by Mr. Justice Black was read, Daniel and Jester were more apprehensive than ever.

Lawyer Daniel and Lawyer Jester read the opinion more carefully than the average layman. The language
did far more than take control of thousands of acres of off-shore lands in California. An entirely new philosophy of government seemed to have been set up—not by revolution, nor by act of Congress, but by action of the Supreme Court.\(^7\)

This monumental controversy is raging on even today. The Federal Government is claiming the sub-marginal soils, and the states are still trying to muster sufficient strength in Congress to override a presidential veto.

The old age of "To the victor goes the spoils" is especially true in this instance, for the victor will get an area immensely wealthy and pregnant with possibilities for further development and exploitation.

Petrochemical Industry

The synthetic-hydrocarbon chemical industry which skyrocketed into being in a few short years on the Gulf Coast is continuing its phenomenal expansion. Though it consumes only a minute fraction of the total supply of oil and natural gas, its thousands of products are becoming of increasing importance every year.

The petrochemical industry now has an investment of approximately $1,365,000,000 in the Gulf Coast, the exact amount depending on how one defines a petrochemical plant.\(^8\) Much building still remains to be completed, and technical

\(^7\)The Dallas Morning News, March 10, 1951, p. 1.

\(^8\)Oil and Gas Journal (November 2, 1950), p. 50.
discoveries, both as to processes and product application, promise further growth indefinitely.

One natural development appears to be taking place in the Gulf Coast petrochemical industry as it attains increasing stature in the organic chemical field. This is a trend toward diversification of production and manufacture of end products in the area. While a relative few basic intermediates were made at first, the list has now been greatly expanded.

Practically all the Gulf Coast petrochemical plants are operating at full capacity at the present time with an eye toward the future expansion of facilities. It has been estimated that, with facilities completed and planned, the Gulf Coast will have about eighty-five per cent of the nation's capacity to produce chemicals from petroleum hydrocarbons.\(^9\)

Many Gulf Coast chemical plants operate near and in conjunction with existing petroleum refineries, using waste refinery gasses as raw material. In this respect, they are important in utilizing what might have been wasted. However, it is generally recognized that chemical plants consume only a minute fraction of the total available petroleum; theirs is an industry where much can be made from little.

\(^9\) *Oil and Gas Journal* (June 24, 1948), p. 237.
Synthetic rubber is probably the most important single branch of the petrochemical industry at the present time. Petroleum is now providing raw material for virtually all the nation's production of butadiene. The Texas Gulf Coast area was the location for about thirty percent of the nation's war-built butadiene facilities, and at the present time, three large butadiene plants are operating on the Gulf Coast. Among them is the Neches Butane Products Company's plant at Port Neches, which, with a production capacity of 100,000 tons annually, is the largest plant of this kind ever built. This project was built by the government and is operated by the five nearby refining companies from which it draws raw material: Gulf Oil Corporation, The Texas Company, Magnolia Petroleum Company, Pure Oil Company, and Atlantic Refining Company.

Other Gulf Coast butadiene plants operating are located at Baytown, which is owned by Humble, and at Lake Charles, owned by Cities Service.

While a major part of the chemical industry on the Gulf Coast is directly linked with the petroleum industry, it is also true that a great many plants have been built in the area to draw on other resources of the Southwest. For example, Diamond Alkali Company has a new plant in Houston. This plant produces chlorine, caustic, and hydrochloric acid. The Aluminum Company of America is building an
aluminum-reduction plant at Port Lavaca. In the Freeport area, where Dow Chemical Company operates its unique magnesium plant from seawater process and other chemical units, raw materials include not only natural gas from Old Ocean, Anchor, and Bay City fields, but salt from domes at Bryan Mound and Stratton Ridge, sulphur from New Gulf and Haskins Mound; oyster shells producing lime from Galveston and Matagorda bays, and light petroleum from the Katy and Old Ocean cycling plants. Dow's operations typify the diversity of the resources upon which the Gulf chemical industry operates. Besides a diversity and abundance of necessary raw materials, the Gulf Coast also gives the chemical industry deep-water transportation and ample low-cost fuel. These are the main reasons why we shall probably see continued expansion of facilities along the Gulf Coast region.

Future Possibilities of the Gulf Coast

It has long been realized that real wealth is created solely by the processing of resources. It is the processing of products, and the subsequent upgrading of these products, through manufacturing operations, that makes an area economically strong. Few areas in the world have the quality and the quantity of potential resources enjoyed by the Gulf Coast area. Other areas in the nation have a preponderance of one or two sources of potential resources, and their opportunities in the future, although good, will be limited to the further
development of these existing materials. But the Gulf Coast with its diversified potential and real resources, stands at the threshold of industrialization. Truly, no area of the state can compare potentialities with those of the Gulf Coast area.

As people of this nation, and as people of the world, we have extended our geographical frontiers to the limit. The world population increases at the rate of approximately 250 million people every ten years, and we begin to realize more than ever before that the increasing wants of these people now and in the future can be met only through the process of technology, which is the only multiplier of our resources. We have seen enough of the fruits of science in its ability to produce more and more from less and less to feel confident that for untold generations ahead, all of the material wants of man can be met.

In recent years we have observed the phenomenal development of the Gulf Coast area, particularly in the petroleum and petrochemical industries. As a matter of fact, this development has been so rapid as to have directed the attention of many people from many other materials and potential resources which the area possesses. In the next fifty years, we will not only see continued growth in the petroleum industry, but will likewise see great development in mining and agricultural operations. In addition, we
will see development of the use of the Gulf of Mexico not only for transportation and offshore drilling, but also for the production of food.

Considering the mining possibilities, new methods of exploration will be developed which will reveal valuable mineral deposits of great variety for exploitation. The Gulf Coast is already a great source of supply for many minerals. We have great quantities of sulphur mined in Brazoria, Wharton, and Big Bend Counties, as well as silver and gold, copper, manganese, zinc, and nitrates in Presidio County. Magnesium is produced in commercial quantities at Freeport, Texas. This plant became one of the country's principal sources of metal magnesium during the war, and post-war production has continued on a large scale. This has been one of the larger industrial developments in the state in recent years.

Great quantities, and a wide diversity of kinds, of clays are found along the lower coast. Salt, shells, peat, bromine and molding sands are also commercially profitable, and are mined.

In recent years we have seen a rapid shift in the petroleum industry from the production of fuels and lubricants almost exclusively, to the production of tremendous quantities

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of petrochemicals as well. This shift is only the first step in the further inevitable development in the years ahead of the so-called petroleum industry to that of a hydrocarbon industry. It is noteworthy that more of the processing of hydrocarbon resources, and they are evidencing more and more interest in the processing of natural gas, and intermediates from crude oil. Some have already made substantial research investments in these other hydrocarbons as long-range considerations of their processing when economies justify.

With such vast sources of hydrocarbons in the Gulf Coast and with great increases in our petroleum reserves and the forthcoming developments in recovery, it is inconceivable that the industry will ever wane in the Gulf Coast district.

Thus as technology—modern science and know-how increase the tools and resources which man has at his disposal, so shall man progress and prosper.
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