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The history of the North Dakota oil industry

Dominic Schaff

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THE HISTORY OF THE NORTH DAKOTA OIL INDUSTRY

by

Dominic Schaff

B.S. in English and Social Studies

Dickinson State Teachers College 1957

A Thesis

Submitted to the Faculty

of the

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of the

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in partial fulfillment of the requirements

for the Degree of

Master of Arts

Grand Forks, North Dakota

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This thesis submitted by Dominic Schaff in partial fulfillment of the requirements for the Degree of Master of Arts in the University of North Dakota, is hereby approved by the Committee under whom the work has been done.

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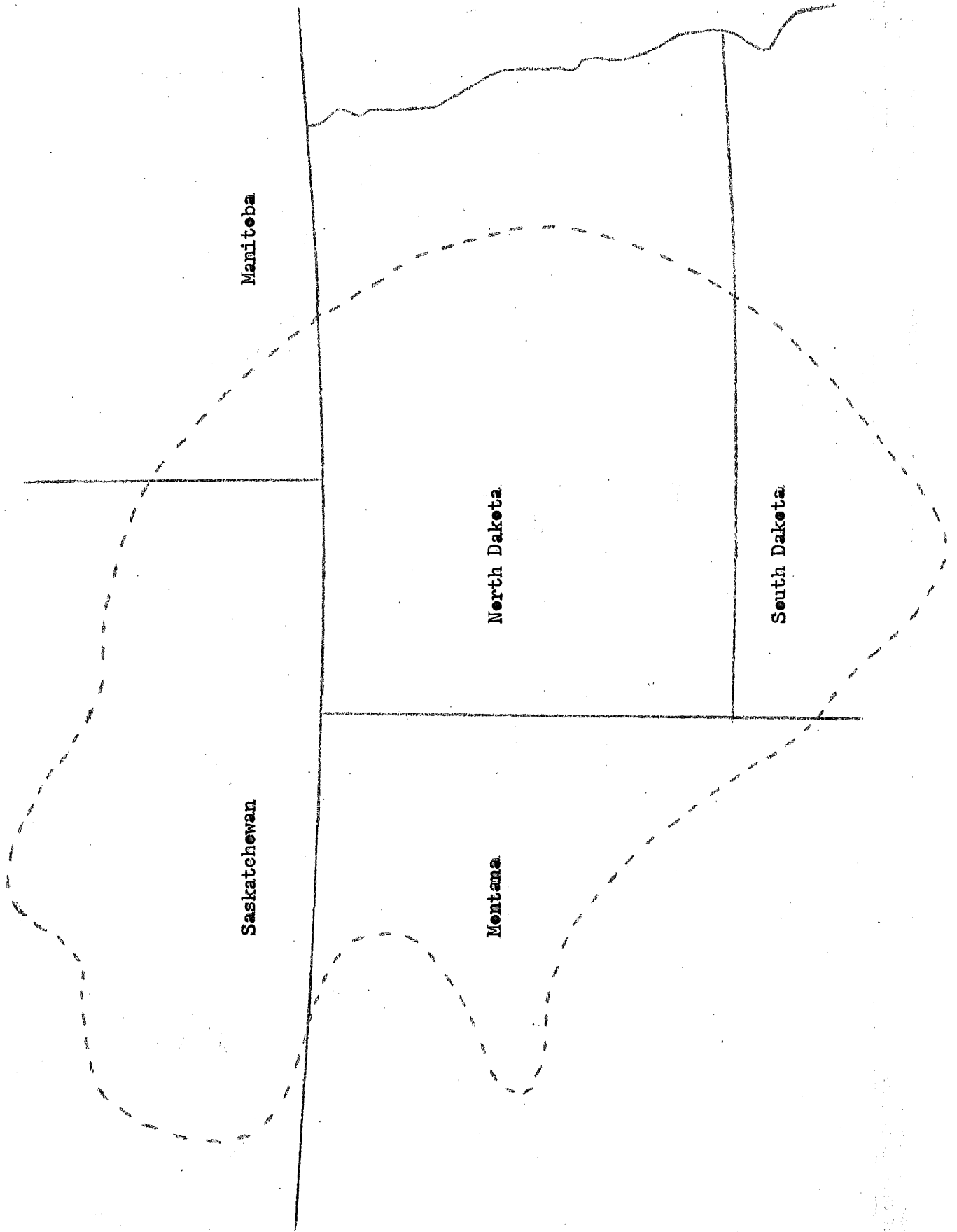
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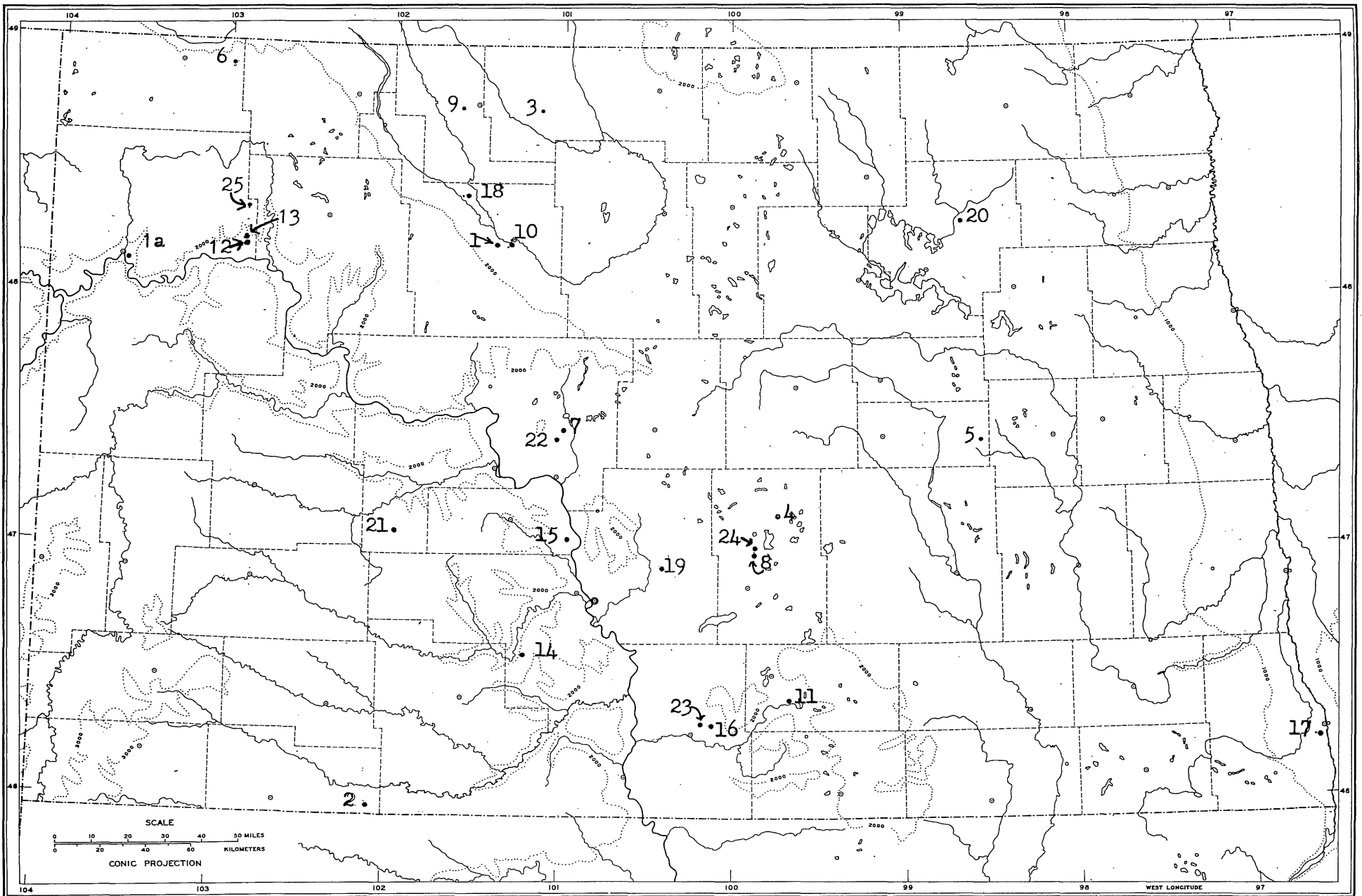
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THE OUTLINE OF THE WILLISTON BASIN



NORTH DAKOTA

No. 151



LOCATIONS OF EARLY OIL WELLS

-17-

SCALE
 0 10 20 30 40 50 MILES
 0 20 40 60 KILOMETERS
 CONIC PROJECTION

GOODE'S SERIES OF BASE MAPS
 HENRY M. LEPPARD, EDITOR

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Prepared by Henry M. Leppard
 Published by the University of Chicago Press, Chicago, Illinois
 Copyright 1939 by the University of Chicago

EARLY NORTH DAKOTA OIL WELLS, 1916-1951^a

1. Pioneer Oil and Gas No. 1 in Williams County. Abandoned in 1920 at 2,107(?) feet.
2. Des Lacs Western Oil Company in Ward County. Abandoned in 1923 at 3,980 feet.
3. Davis Well in Adams County. Abandoned in 1923 at 2,800(?) feet.
4. A.C. Townley Interests in Kidder County. Abandoned in 1926 at 2,400(?) feet.
5. Glenfield Oil Company in Foster County. Abandoned in 1928 at 3,240 feet.
6. Noreast Oil Company in Divide County. Abandoned in 1927(?) at 1,452 feet.
7. Herman Hanson Oil Syndicate in McLean County. Abandoned in 1929 at 1,840 feet.
8. Prairie Oil and Gas in Kidder County. Abandoned in 1930 at 3,884 feet.
9. A.R. Jones Oil and Operating Company in Renville County. Abandoned in 1931 at 3,872 feet.
10. Velva Petroleum Company in Ward County. Abandoned in 1931 at 520 feet.
11. D.J. Carter in Logan County. Abandoned in 1933(?) at 2,284 feet.
12. Big Viking Oil Company in Williams County. Abandoned in 1935 at 4,642 feet.
13. California Oil Company in Williams County. Abandoned in 1938 at 10,281 feet.
14. Carter Oil Company in Morton County. Abandoned in 1940 at 4,930 feet.
15. Carter Oil Company in Oliver County. Abandoned in 1942 at 8,850 feet.
16. Northern Ordinance in Emmons County. Abandoned in 1943 at 5,359 feet.
17. H.W. Snowden in Richland County. Abandoned in 1948 at 695 feet.
18. Price Drilling Company in Ward County. Abandoned in 1949 at 8,435 feet.

19. Continental and Pure Oil Companies in Burleigh County. Abandoned in 1949 at 6,957 feet.
20. Union Oil Company in Ramsey County. Abandoned in 1949 at 3,223 feet.
21. Kelly-Plymouth in Mercer County. Abandoned in 1950 at 12,526 feet.
22. Samedan Oil Corporation in McLean County. Abandoned in 1950 at 9,032 feet.
23. Roeser-Pendleton in Emmons County. Abandoned in 1950 at 5,556 feet.
24. Magnolia Petroleum Company in Kidder County. Abandoned in 1950 at 5,609 feet.
25. Amerada Petroleum Corporation in Williams County. Completed in 1951 at 11,955 feet.

^aOil well depths, dates, and locations compiled by the University of North Dakota Geology Department, Grand Forks. Data is printed on loose sheets with data from some fifty wells on each sheet.

CHAPTER I

EARLY EXPLORATION

When Amerada Petroleum Corporation brought in North Dakota's first successful oil well on April 4, 1951, it climaxed many years of exploration, drilling, and hoping. For several decades the people of the state had waited with anticipation for some promise of diversification of the economy. While throughout the United States agriculture had ceased to be the dominant industry and was greatly overshadowed by manufacturing, in North Dakota agriculture remained the cornerstone of the economy. Farm income in 1946 made up 46.3 per cent of the total income for North Dakota.¹ In this same year, agricultural income for the United States was only 9.4 per cent of the total, the highest that it had been in recent years.² North Dakota remained the most agricultural and least industrialized state in the nation, and there seemed little evidence of a trend toward less dependence on agriculture.

Ever since the first settlers had come to North Dakota, the people had depended solely on the soil for their existence. This relation was either direct or indirect, and it affected both town resident and farmer. Everyone was part of the pattern, understood it, and accepted it.

¹ During the height of the depression this dropped to only 4.1 per cent. Glen W. Fisher, Income in North Dakota, 1929-1956, North Dakota Institute for Regional Studies, Social Science Monograph No. 1 (Fargo: North Dakota Agricultural College, 1958), p. 10. Cited herein as Fisher, North Dakota Income.

² Ibid.

Being thus so closely dependent on the soil, the people of North Dakota had a considerably lower level of income and a far more unstable economic system than did the people of states favored by industry.³ Lower incomes were the result of market fluctuations, depression, technological changes, and dependence on agricultural income. In 1929 North Dakota's share made up slightly less than 0.30 of one per cent of the nation's personal income.⁴ For those who did not wish to accept the harsh realities, the only alternative was to move to another area. Many of them did.

This migration had adverse effects on the residual population. It was up to them to bear the financial responsibilities for public and private services. To provide a bigger tax base and to provide more employment opportunities, North Dakota tried to encourage new industries to move in.

This was not easy and the state was at a disadvantage in competing with other states. The population was thin and therefore did not provide a concentrated market for goods. The labor, which was plentiful, was unskilled, while natural resources, a definite requirement for industry, were lacking. In addition, there were the high transportation costs which would exclude manufacturers in North Dakota from eastern markets. Consequently, the chances of North Dakota's becoming an industrial state seemed very small. The possibility which held the most promise was oil.

³In 1956 per capita personal income was \$1,365 in North Dakota. Only South Dakota and seven other states had lower per capita incomes. Ibid., p. 4. By 1960 per capita income in the state was \$1,741 with only ten states in the Southeast having less. U.S. Department of Commerce, Survey of Current Business, August 1961, p. 13.

⁴Fisher, North Dakota Income, p. 4.

Oil, however, was not easy to find, and many people scoffed at the idea of finding it in North Dakota.

There was a definite reason for their pessimism. All attempts to find oil in the state prior to 1951 had ended in failure. Nonetheless there were people, among them geologists and oilmen, who held North Dakota to be a promising area. Arthur Leonard, professor of geology at the University of North Dakota, stated in 1920 and again in 1928 that there were several locations in North Dakota where structures favorable for oil and gas accumulations had been found.⁵ L.P. Dove, assistant director of the state geological survey, had somewhat similar feelings but he thought: "Prospects for gas in quantity seem rather better than for oil."⁶ The vice president of Standard Oil of New Jersey, Wallace E. Pratt, stated in Oil in the Earth (1942) that of all the potential areas for oil the one most promising for the United States was the Williston Basin.⁷

The first promise had come in 1907. In that year gas was discovered at the W.B. Parker farm nine miles south of Westhope. Westhope, Lansford, Mohall, and Sherwood had several wells yielding good dry gas which was used by farmers in the area. Westhope and Lansford tried to

⁵ Arthur G. Leonard, "The State Geological Survey During the Past Twenty-five Years," The Quarterly Journal of the University of North Dakota, XVII (January 1928), p. 126.

⁶ L.P. Dove, "The Geology and Structure of the East Side of the Nesson Anticline," The Quarterly Journal of the University of North Dakota, XII (April, 1922), p. 249.

⁷ Wallace E. Pratt, Oil in the Earth (Lawrence: University of Kansas Press, 1942), pp. 39-40.

use the gas but had trouble with repeated clogging of pipes and plugging of wells by fine sand, pebbles, and even small boulders. An attempt was made by a North Dakota gas company to drill a deep gas well on the Parker farm, but casing trouble caused abandonment at the 1954-foot level.⁸ Meanwhile gas was being found in other parts of the state, where many water wells showed its presence.

A series of geological studies were to focus attention on the Williston Basin. In 1912, W.T. Thom Jr., a Princeton sophomore studying geology, discovered some coral in a creek bed in the general area of the Cannonball River.⁹ The coral led to the belief that the area was once inundated by an ancient sea. Thom continued his study and with the help of a colleague, Dr. Carol E. Dobbing of the United States Geological Survey, further concluded that the basin was one of a sedimentary nature.¹⁰ Other studies showed that the deepest part of the basin was quite near Williston. The basin is located in the western two-thirds of the state and the eastern quarter of Montana. It also extends in a northerly direction, covering the southern part of Saskatchewan and the southwestern part of Manitoba. In total area it covers approximately 130,000 square miles.¹¹ It is shaped like a big dish or basin and lies, for the most

⁸Report from Assistant State Geologist Howard Simpson to the governor and legislature in the spring of 1923 in the files of the North Dakota Geology Department, University of North Dakota, Grand Forks, North Dakota.

⁹Williston Plains Reporter, June 14, 1961.

¹⁰Ibid.

¹¹North Dakota Geology Department, Contributions to the Geology of North Dakota (Fargo, 1955), p. 98, Cited herein as Contributions to Geology.

part, beneath western North Dakota. In that area, its thickest sections, the sedimentary formations, have a total thickness of over 15,000 feet.¹² In the approximate center of the Williston Basin is located the Nesson Anticline, a geologic "freak" subdividing the Basin. As it was located about forty miles from Williston and near the village of Nesson it took its name from that town.¹³

For several decades oilmen and others explored the area for traces of oil. The Nesson Anticline was first mapped in 1910 by A.J. Collier of the United States Geological Survey who published a report of his findings.¹⁴ In 1920, A.G. Leonard, state geologist, published a pamphlet entitled The Possibilities of Oil and Gas in North Dakota and discussed the Nesson Anticline. He emphasized the Mouse River Loop as "perhaps the most promising gas field in the state" and said that it was highly possible that oil would be discovered.¹⁵ In 1922 L.P. Dove, working for the North Dakota Geological Survey and the University of North Dakota, wrote a short article on the structure of the Nesson Anticline.¹⁶

Exploration showed that the anticline extended roughly in a north-south direction from the Canadian border to the Little Missouri River, although the northern structure is not known from surface

¹² Robert B. Campbell et al., The Williston Report: The Impact of Oil on the Williston Area of North Dakota (Grand Forks: University of North Dakota, 1958); p. 20. Cited herein as Campbell, Williston Report.

¹³ Williston Plains Reporter, June 14, 1961.

¹⁴ Contributions to Geology, Page 104.

¹⁵ Williston Plains Reporter, June 1961. This is a special edition published in commemoration of the 1961 oil centennial.

¹⁶ Contributions to Geology, p. 104.

indications. From the border to the Missouri, the area is a glaciated plain on which dry-land farming is the chief occupation. In the immediate area of the Missouri and the Little Missouri rivers, the topography becomes more rugged with sharp ravines cutting into the plateau surface. In this region numerous buttes stand out prominently above the general level of the terrain. Here farming gives way to grazing. The anticline is sixty-six miles in length and varies in width from one to four miles. The oil-producing area extends to both sides of the Missouri which cuts through the formation about thirty miles east of Williston.¹⁷

The earlier geological reports stimulated oil activity. In 1916 Pioneer Oil and Gas Company sank a wildcat well three miles southeast of Williston.¹⁸ This wildcat was the first one for North Dakota.¹⁹

¹⁷ Wilson M. Laird and Clarence B. Folsom Jr., North Dakota Nesson Anticline (Grand Forks: University of North Dakota, 1956); Unpaged, Cited herein as Laird and Folsom, Nesson Anticline.

¹⁸ Stanley Voelker, Mineral Rights and Oil Development in Williams County in North Dakota, North Dakota Agricultural Experiment Station Bulletin No. 395 (Fargo, 1954), p. 4. Cited herein as Voelker, Mineral Rights and Oil Development.

¹⁹ Former Congressman Usher L. Burdick denied this, saying that the first oil well drilled in North Dakota was drilled in 1915 on the Pete Hendrickson farm one-and-a-half miles southeast of Williston to a depth of 2,107 feet, by a Mr. Phillips from California. Burdick said: "I'm sure of the date because I was running for governor. [Burdick is somewhat confused here, there was no election in 1915] I know the farm because Hendrickson lived across the road from my place. Phillips had started drilling and I set up a small outfit on my place but I was only looking for water for my cattle and I brought in the country's first artesian well of 20 gallons a minute at about 600 feet." Phillips hit gas and there was an oil slick on the overflow. The well remained an artesian well. Burdick also said that flaring of wells was nothing new to early stockmen as the artesian water was sometimes so contaminated that cows wouldn't drink it. Williston Basin Oil Review, July 1952, p. 24.

Little information is available on Pioneer's activities, but the next year the Williston Herald reported that the company had reached a depth of 900 feet and officials felt that oil would be reached at another 2 or 300 feet. The Herald further reported that a small amount of crude had been encountered and that this was thought to be the forerunner of vastly bigger results.²⁰ Drilling continued slowly, apparently plagued by difficulties, both financial and otherwise. By April 29, 1920, the well was down only 1,700 feet, and the drillers were having trouble with bent casing. Enthusiasm, however, was still in evidence. Two Fargo businessmen who looked over the area said that they wished Fargo had the prospects of being a future oil city as Williston apparently did.²¹ On July 29, 1920, the Herald reported that work had been discontinued because of broken casing. The company had reached to within fifty feet of the depth they had planned to drill. The rig was being moved to the Poplar Field in Montana and there was mention of waiting for a standard rig.²² Pioneer's activity did not seem to arouse a great deal of interest; there was little speculation in mineral rights.²³

It is interesting to note that this well was drilled in Township 154 North, Range 100 West while Amerada's Clarence Iverson No. 1, North Dakota's discovery well, came in at Township 155 North, Range 95 West.²⁴

²⁰ Williston Herald, May 10, 1917.

²¹ Ibid., July 29, 1920.

²² Ibid.

²³ Voelker, Mineral Rights and Oil Development, p. 4.

²⁴ Campbell, Williston Report, p. 19.

While Pioneer was having its problems, another early oil well was being sunk farther to the east. This was the Blum Well in Ward County, started in 1917 by the Des Lacs Western Oil Company of Minot.²⁵ Blum organized the company after discovering traces of oil in a newly dug water well in the fall of 1916.²⁶ In addition to organizing a company,²⁷ Blum hired William R. Jewell who was a mining expert and formerly a geologist with the United States Department of Interior. Jewell made an examination of the territory near Des Lacs and Burlington and recommended that the Blum Organization drill for oil or gas to a depth

²⁵Report on oil properties of the Des Lacs Western Oil Company by William R. Jewell, June 19, 1917. All source material regarding Des Lacs' activity is in the files of the geology department, University of North Dakota, Grand Forks, North Dakota.

²⁶Ward County Independent (Minot), January 18, 1917.

²⁷The company is described in a circular published from Minot July 14, 1919, which states: "The Des Lacs Western Oil Company is a North Dakota corporation incorporated for 275,000 shares, all common stock and nonassessable. We now have a lease acreage of more than 60,000 located favorable for both oil and gas by prominent geologists and oil men. We encountered showings of oil in seven test wells and also established our "Blum Anticline." We are encountering some very nice seepages of oil and natural gas in "Blum Well" which has now reached a total depth of 2,125 feet. We are still carrying 8½ casings and have sufficient casings now on ground for a 3,000 foot well. Yes, Blum Well will be carried down 3,000 to 3,500 feet or even deeper in order to bring in commercial production which we sincerely believe will be encountered when the big drill taps the proper formation." The circular continued: "This is a North Dakota proposition. Commercial oil has been encountered in our Sister state, South Dakota, and we believe that it will be only a matter of reaching the proper formation to put North Dakota in the oil producing column. A small block of stock is being offered at \$5.00 per share. All stock participates in lease property of the company. We are now below sea level and nearing formations which have been known to be productive of commercial oil and gas. You can help develop the natural resources of your home state by becoming a stockholder with us now."

2,500 to 3,000 feet in the vicinity of the Blum ranch.²⁸

The company made several tests, the first of which reportedly resulted in the recovery of a large quantity of oil. This oil supposedly was tried in a one-and-a-half horsepower engine and gave the engine the same power as ordinary gasoline.²⁹

The reports of oil shows stirred up considerable enthusiasm. The Ward County Independent said on January 25, 1917: "In ones mind's eye he sees numerous oil refineries at work in the Mouse River Valley and countless trainloads of the refined product of hundreds of oil wells wending their way to the marts of trade in the east, west, and south."

This enthusiasm was encouraged by the Des Lacs circulars. A typical one stated: "Everything is in our favor. Do you know that the deepest well in the United States is located in West Virginia and is more than 7,500 feet deep? We guarantee a square deal to all and when we win you win with us."³⁰

In addition to the circulars, numerous advertisements in local papers pointed out the prospects of finding oil. One such published in the Business Bulletin, the official publication of the Minot Association of Commerce, on April 15, 1919, stated that seven test wells drilled before the Blum enterprise began all had oil showings according to testimony given under oath by the driller. It went on to say: "A square deal to all. If we win you win with us. If you lose we lose with you."

²⁸ Report on oil properties of the Des Lacs Western Oil Company by William R. Jewell, June 19, 1917.

²⁹ Ward County Independent, January 18, 1917.

³⁰ In the geology department files.

Are you a stockholder? Are you a pioneer? Are you showing your patriotism to your home state by helping to put down the first oil well in North Dakota? "Several hundred gallons of crude oil has been taken out of our seven test wells." The advertisement further stated that when organized the company had 800 acres under lease and now held 48,000 acres.³¹

The enthusiasm was not shared by Assistant State Geologist Howard Simpson. Upon completion of tests at the well, he told the company: "The evidence does not, in my judgment, indicate the presence of oil in commercial quantities and further prospect by means of deep drilling is not therefore at present warranted."³²

This was probably not the response that officials of the company hoped for. As time went on, they had an increasing problem in raising of funds and hoped that Simpson would lend encouragement to their drive. The secretary of the company, H.S. Johnson, later asked Simpson whether he could not give a statement encouraging the project which could be enclosed to the stockholders. But, Johnson added, "I fully realize your position and will not feel hurt if you cannot do this."³³

The Des Lacs Company made special offers to raise money. One such offer stated that two shares could now be purchased for the price of one.³⁴ Nonetheless, its financial troubles persisted. The lack of

³¹ Ibid.

³² Howard Simpson to the Des Lacs Company, March 16, 1917.

³³ H.S. Johnson to Howard Simpson, December 17, 1920.

³⁴ Cited from a Des Lacs bulletin.

ready cash was shown in a letter of July 29, 1921, in which Johnson stated to the State Geologist: "I am starting out on the road again and will send you your expenses on last year's trip just as soon as I raise the money."³⁵ Some time later Johnson reported that the company was nearly forced to close down, but they secured a mortgage on the outfit and casings from some local parties. This group Johnson added, was becoming somewhat impatient.³⁶ The situation became desperate, and on July 10, 1923, a stockholders meeting was held. Simpson was asked to see if he could get the Department of Interior to send out an experienced oil man to investigate and see if the venture should be finished or abandoned. The company apparently had tried earlier to have Washington send a man but with no success.³⁷ The Department had said that it could not spare a man but instead offered to send some information.³⁸

Drilling was halted at 3,924 feet while the company waited to buy new casings. The work was suspended to cut expenses and the drilling expert stayed on as a watchman for a small salary.³⁹ For all practical purposes the Blum enterprise was now abandoned. Simpson summed up the failure of the company when he said: "They have had so many

³⁵H. S. Johnson to Howard Simpson, July 29, 1921.

³⁶Ibid., July 7, 1923.

³⁷Ibid., June 25, 1923.

³⁸C. E. Beecher to Howard Simpson, June 11, 1923. Beecher was the acting petroleum technologist of the U.S. Department of Interior, Washington D.C.

³⁹Des Lacs Bulletin.

different drillers on this well and endless difficulties from caving, cutting of pipes, . . . and other causes"40

Like the Blum organization, many other North Dakotans were fooled by different "oil signs" and members of the geological survey had to travel many miles to disprove them and to save them money in deep-well prospecting. Typical of these incidents was that of a farmer from Valley City who informed Simpson: "I have discovered what I thing [sic] is a good field for oil I would like to have you come down and look the field over. Kindly let me know what your charges are and when you could come down and go over the field."⁴¹ Simpson answered a similar inquiry by saying: "There are no known or are there likely to be found, surface indications of oil in N. Dak. Surface indications come as a result of cracks or faults which extend into oil-bearing beds. These faults are lacking in this state. Oil in commercial quantities would be deep seated. The only surface indications therefore are of the geological nature and relate to the attitude and structure of rocks. I do not believe that it would be possible for one not familiar with geology that he could read the signs."⁴²

Simpson realized the importance of taking the risk to sink wells. In a 1923 report to the governor he wrote: "It is true in prospecting for oil in any new field even after most careful geologi-

⁴⁰ Howard Simpson to W.T. Thom, U.S. Geological Survey, Washington D.C., March 13, 1923.

⁴¹ J.H. Sampson to Howard Simpson, April 1923.

⁴² Howard Simpson to A.O. Haugerud, Van Hook, North Dakota, September 13, 1921.

cal survey has reduced the risk to a minimum there is more or less uncertainty as to the results. But unless men had been willing to take the chances of drilling the fields would not have been discovered and developed."⁴³

Men were apparently willing to take these chances. In 1922 a well was sunk in Adams County and a number of other attempts were made in various places in the 1920's. Located mostly by hunches and guesswork, most of these were shallow wells and were unsuccessful.⁴⁴ One of the attempts was made near the village of Robinson, twenty-five miles north of Steele in Kidder County. Robinson was founded in 1912 by the Northern Pacific Railway which had dug a well for water there along one of its branch lines.⁴⁵

Robinson was destined to be the scene of one of the most fabulous stories in the history of North Dakota oil exploration. On August 24, 1925, a man stopped at the well in Robinson to fill his radiator with water. He pumped out a mixture of oil and water. Into this he dropped a stick and applied a match. The stick burst into flame and the man roused the town, shouting that they had a well which pumped gasoline. The townspeople were gripped with excitement, and, not wishing to pass up a good deal, brought their cream cans and pails to the well to fill them. Others drove up their cars and filled their tanks.

It was claimed that thousands of gallons were pumped out of

⁴³ Report from Howard Simpson to the legislature and the governor in the spring of 1923.

⁴⁴ Williston Plains Reporter, June 1961.

⁴⁵ Fargo Forum, June 24, 1951.

the well.⁴⁶ Many people believed that a high-gravity oil was seeping into the water well, while others felt that someone was adding gasoline to the well so that local residents could be exploited. Gasoline storage tanks for miles around were checked for leaks. None was found. A sample was sent to the state geologist, A.G. Leonard, who analyzed it and found it to be refined gasoline. He thought it might have come from three tankers of gas wrecked in the area some time before. Leonard's report did not dampen oil fever, and businessmen began to buy up leases.⁴⁷

The incident might have passed had it not been for the appearance of A.C. Townley, the discredited founder of the Nonpartisan League. Townley had been in Kansas but then he heard what was happening in Robinson, he dropped everything and rushed home. He called his old Nonpartisan League friends together and had them bring carloads of people from all over the state to the wellsite. He raised money, leased land, put up a fence, and set up an oil camp. Secret meetings were held behind the fenced enclosure, and to the men assembled there Townley told a dramatic story. He claimed to have found a doodlebug oil man in Texas whose successes at finding oil were nothing short of phenomenal.⁴⁸

⁴⁶ The state has records of taxes on gasoline from the well. These records show taxes collected on 140 gallons in November 1950 and 123 gallons sold in December 1950. Fargo Forum, June 24, 1951.

⁴⁷ Ibid.

⁴⁸ The doodlebug was a common sight around oil fields in those days before geologists had earned their present-day reputation in the search for oil. The doodlebug had a variety of ways to find oil. One of them was a tin can on a chain which was claimed to locate oil bearing formations. The twisting of the can on the chain signified the presence of oil.

Townley told his listeners he had heard of this man a number of years ago and went to Texas to investigate the claims. Townley said that he and his brother, Claude, took the doodlebug and his instrument in a closed auto, put him in the rear seat, and hung black curtains around the windows so he could not see out. One of the brothers drove the car, while the other sat in the back with the doodlebug and his instrument. They would then drive up beside a producing oil well, and the man would immediately tell them exactly how much the well was producing. Next, they would go to another well, or to a dry hole, and in each case the instrument would give a true account of oil, or the lack of oil. Townley dramatically ended his speech by telling the crowd that he and Claude had brought the doodlebug to Robinson, where the scientific instrument had selected the present camp as the place to drill for oil. To the few skeptics Townley said: "There may be a big reservoir in the Robinson hills." Sure enough, only a short distance from the Robinson well, the doodlebug indicated oil. For some strange reason the instrument did not indicate oil in adjacent leases, but did indicate oil only on Townley's leases. Townley ignored remarks as to why this should have happened.⁴⁹

Townley told his doodlebug story over and over to different audiences, and at the end of each speech would appeal for money. This he did in a take-it-or-leave-it manner. "Loan me your money but kiss it goodby," he told them. "There may be oil here, I am convinced there is, but there may not. If we strike oil it will make us all rich. There

⁴⁹Fargo Forum, June 24, 1951

will be plenty of money to pay off mortgages and all other debts and then some." Townley further stated that the money was to be used in both North Dakota and Kansas or elsewhere.⁵⁰

For the money turned in, Townley gave his own personal note at 9 per cent interest. Estimates of the amount taken in ranged from \$500,000 to \$1,000,000. No accounting was ever made of this money by Townley or his brother.⁵¹

Geologist Leonard warned it was a gamble pure and simple. The State Security Commission investigated and could not find a favorable report from any geologist on the possibility of oil in the area. But Townley went ahead, and on May 15, 1926, claimed to have found oil. He displayed a bottle of crude oil which he said was dipped from the hole with a tomato can tied on a string. He said the oil had come from the 1,700-foot level. Crowds of six to seven thousand attended the Townley rallies to hear about the oil discovery. At one rally a string of drill tools was lowered into the well and emerged dripping with oil and mud. Townley said the actual discovery had been made earlier but was kept secret because he wanted more leases. Townley told the crowd he would be able to bring in a paying well, but he could not say when. He said the price of oil was low at the present time. He did not answer questions about oil development in Kansas or elsewhere as he said he would.⁵²

The Townley Well was never brought in and today is listed in the records of Dr. Wilson M. Laird, State Geologist, as a dry hole at

⁵⁰Ibid.

⁵¹Ibid.

⁵²Ibid.

"1800?" feet. After a few notations of geological data is this sentence: "Too much reliance should not be placed on this data."⁵³

While the Townley Well was being drilled, there was further oil activity in the western part of the state. It was there in 1926, partially because of the Collier Report, that a number of Williams County businessmen formed the Big Viking Oil Company. After surface geological studies, Big Viking picked the Nels-Kamp farm nine miles south of Ray as the site to drill for oil. This was the first well drilled on the Nesson Anticline, and the drilling site had the approval of State Geologist A.G. Leonard.⁵⁴

In the fall of 1927 a wooden derrick was set up, and drilling began shortly thereafter. By April of next year, the company claimed a show of oil at nine hundred feet. By February 1929 they reached 3,300 feet, but their funds were exhausted and the drilling stopped. Promotional meetings were held and the three hundred stockholders were asked to contribute further. By this time the company had spent \$60,000.⁵⁵

On July 14, there were rumors of oil at the idle well. A.C. Townley, speaking in the area, encouraged the farmers to contribute. He also offered the loan of equipment from his Robinson well.⁵⁶

⁵³Ibid.

⁵⁴Williston Plains Reporter, June 1961.

⁵⁵Fargo Forum, April 12, 1953.

⁵⁶Ibid.

The rumors had the expected affect and drilling resumed. In September the engine broke down; one was borrowed from the Townley Well. But funds again were soon exhausted, and recruits went out to raise money. Goals were set at \$250 per person. One contributor said, "Here's my \$250, but I'll drink all the oil you'll get in N. Dak."⁵⁷

After the money was raised, the driller went back to work. By October of the next year they were down to 4,382 feet and the following June saw them at 4,450 feet. By September they were down only 4,460 feet with still no oil and no money. The company faced court action, and in 1933 made still another drive for money. The well was drilled to 4,590 feet that year; in May 1934 it reached its final depth of 4,680 feet. In 1935 the venture was abandoned.⁵⁸

Although Big Viking's efforts were a failure, it can be given credit for sparking the eventual discovery of oil in North Dakota. Big Viking was looking for oil at 3,000 to 4,000 feet while the Nesson Anticline oil is being produced today a few miles to the north at 8,500 feet.⁵⁹ The faith of the people of Ray, Tioga, Williston, and other communities and farms in the Nesson Anticline was not in vain.

Another rather unusual part of the history of oil exploration in this state was that played by the Hanson Syndicate. The Hanson Syndicate was active in the search for oil until recent years. The founder of

⁵⁷ Ibid.

⁵⁸ Ibid.

⁵⁹ Williston Plains Reporter, June 1961

this syndicate was Herman Hanson who had come out in 1880 to farm in McLean County. In addition to his farming activities, Hanson also operated a lignite mine; in 1913 he sent some lignite to scientists in Dusseldorf, Germany. The scientists supposedly answered, "Why bother with it, you are living in an oil field, so why not get oil."⁶⁰ Hanson took their advice and started a campaign to sell his neighbors on the possibilities of oil.⁶¹ The landowners transferred 90,000 acres to the Hanson Syndicate. Farmers received no bonus or rentals and promised to pool the one-eighth royalty if oil was found. The company received a charter and in 1928 capitalized at \$300,000. Next stock was sold, and a cable-tool rig purchased and set on location south of Turtle Lake. The location was picked by George W. Perry (inventor of the Perry Mineral Indicator), Dr. P.H. Lund (noted petroleum geologist), and C.L. Hatch who boasted of having brought in twenty-three producing wells out of twenty-four in Montana.⁶²

There were glowing reports regarding the location by Perry who said that his instrument "at once indicated petroleum deposits of exceptional volume and extent. I have never surveyed such remarkable petro-

⁶⁰Fargo Forum, June 13, 1954.

⁶¹A prospectus for the company stated: "Tickle old mother earth with a hoe and she will laugh with a harvest. Big money is made in oil through development. Oil is the blood of the earth flowing through fortune's field only to enrich the courageous. It sometimes rewards even the nonthinking business slacker, but it never lifts the burden from the back of a business coward. Its plus mark of success generally go to those who combine some degree of thought with action." Ibid.

⁶²Ibid.

leum deposits as the instrument shows this entire area of land to contain and I predict that development will quickly prove these lands the greatest oil field that the world has ever known."⁶³ The well was begun and was down to 1,840 feet when the depression came. New appeals for money were unsuccessful and the derrick remained until 1953 when it was blown down by a windstorm. During this time the company was inactive, and it was not until 1951, when oil was discovered in the Williston Basin, that interest was revived in the syndicate. The next year the Hansons met William T. Edwards, a Californian, who said that he could find oil through radiation.⁶⁴ He demonstrated his instrument to the Hansons while driving around Tioga. "In every case the instrument showed the outline of the field, detecting the good producing areas and the dry holes on the edges. It was uncanny," says Nelse Hanson who accompanied Edwards.⁶⁵

With the assistance of Edwards, the syndicate drilled three wells in 1952, one in McLean County and two in Stutsman County.⁶⁶ All were dry holes.⁶⁷ The first dry hole in Stutsman County was

⁶³ Ibid.

⁶⁴ Edwards said he found oil in California, Texas, and Utah and claimed only a two per cent error margin. Cited in Ibid.

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ After twenty-six years and five dry holes, people still invested in the syndicate. Oil men marveled at the short time it took the syndicate to raise \$25,000 to drill Dickey County's first oil well. Ibid., June 20, 1954.

explained by Vaughn A. Hanson to Wilson Laird, state geologist. According to Hanson, the trouble was caused by deposits of a rare mineral, Cerium, which had the same radiation as oil and thereby confused Edwards' instrument. But according to Hanson, Edwards had found a way to compensate for the radiation from Cerium and was so certain of finding oil that he was willing to stake his reputation on the next well. Hanson voiced his confidence in Edwards' methods: "We have seen so much successful work of Edwards that we stand ready to believe he has about mastered the radiation laws."⁶⁸

The second Stutsman well was drilled as a 40-acre offset to the dry hole, a procedure so unusual that a veteran driller on the rig quit in disgust. When this well also turned out to be a dry hole, Edwards explained that a second rare mineral, Cesium, had thrown his instrument off. But he had found a method⁶⁹ of cancelling out both the Cerium and Cesium, and after this was done, he reported his instrument had shown a reaction in Dickey County three times as great as recorded in Tioga.⁷⁰

Geologists were skeptical about the methods Edwards was using. Said one: "I don't believe in Edwards' radiation instrument but he has just as much chance of finding oil on the east side [of the Williston Basin] as anyone and the Hansons are getting wells drilled. That's

⁶⁸Vaughn A. Hanson to Wilson Laird, September 18, 1953., In the geology department files.

⁶⁹He did not say how he cancelled out the trace minerals nor would he permit anyone to see his instrument, but he said it was portable and could be carried around in one hand. Fargo Forum, June 20, 1954.

⁷⁰Ibid.

what it's going to take, a lot of wells . . . and it could just as easily be the Hansons as anyone else, radiation or no radiation."⁷¹ Other geologists called Edwards just another doodlebug man, but the Hansons' faith in him was unshaken. "We are sold on the deal," said Hanson, "and believe that when we get the now unknown radiations eliminated, we will have the answers to where the oil is located. At least we will stick with him until we are convinced he is off the beam."⁷²

After Edwards' report of oil prospects in Dickey County, the syndicate picked a well-site a quarter mile west of the city of Ellendale. The city council had granted leases of portions of the airfield and even the city dump. The well yielded gas but no oil and was abandoned at 1,532 feet.⁷³ The outcome for many residents was not a happy one, especially when a second well a half-mile southwest of Ellendale also failed. There was some criticism of how the money was raised. Said one Ellendale resident who had put in \$500: "There was too much calculation on how much money an oil well would bring and not enough warning about dry holes."⁷⁴

The Hansons, however, continued drilling until quite recently. Their eleventh well was plugged on August 30, 1959.⁷⁵ The Hansons had

⁷¹ Ibid.

⁷² Vaughn A. Hanson to Wilson Laird, October 8, 1953.

⁷³ Fargo Forum, June 13, 1954.

⁷⁴ Ibid., June 20, 1954.

⁷⁵ Statistics from the geology department files.

found no oil in the eastern part of the state; the search for oil in the western part was to be more successful.

The year after Big Viking spudded in its well, there was further oil play in the western part of the state. In 1928, the Transcontinental Oil Company, later absorbed by Standard Oil of California, sent Thomas W. Leach to study the Souris River Loop in the area north of Minot. It was reported that gas was readily found in artesian wells at a depth of about two hundred feet, and it was believed that the area was favorable for oil. Leach, however, was not convinced, and a later test to the 3,800-foot level by the A.R. Jones Oil and Operating Company in Renville County, had to be abandoned as a dry hole, proving Leach's convictions.⁷⁶

Leach was more interested in the Nesson Anticline. He believed that the structure was much larger than the geological survey had reported. He bought acreage around the Big Viking Well for the company and in 1934 reassembled a block of leases including those formerly held by Big Viking. Leach and A.M. Fruh of Minot interested the California Company, which was then the Rocky Mountain arm of Standard Oil of California, in the possibility of oil in the Nesson Anticline. The company decided to take over his block of leases.⁷⁷ The block totalled some two hundred thousand acres, and after considerable seismographing, the California Nels Kamp No. 1 Well was spudded in

⁷⁶Williston Plains Reporter, June 1961.

⁷⁷Ibid.

one-quarter-of-a-mile from the abandoned Big Viking Well. The drilling was begun in September 1937.⁷⁸

The well caused intense excitement in Williams County. Residents were certain oil would be found where Big Viking had failed. A public ceremony headed by Governor William Langer honored the California Company.⁷⁹

The Nels Kamp was the first really scientific well in North Dakota. The California Company had the necessary finances, a good technical staff, considerable seismographic information, and the best drilling equipment available. The rig used was supposed to be the second largest made at that time, a big 143-foot derrick.⁸⁰

Drilling operations, started that fall, were halted over the winter and begun again in the spring. Rumors of oil spread and became more intense as the depth reached seven thousand feet.⁸¹ The Williston Herald of June 15, 1938, stated: "Of the many rumors on the oil strike one that appears most reliable states that the drill shaft has gone through oil twice and that the crew is having difficulty now in holding back the flow."

Big Viking, which had transferred its leases to the California Company, was getting its affairs in shape ". . . so that if and when production is hit on the Nesson well it can start paying dividends

⁷⁸Voelker, Mineral Rights and Oil Development, p. 9.

⁷⁹Fargo Forum, April 5, 1953.

⁸⁰Williston Plains Reporter, June 1961.

⁸¹Fargo Forum, April 5, 1953.

and royalties it will receive out of the first well." Big Viking was sure it would recover all the money lost on the first venture. The oil activity affected others too, and buying and selling of leases went on at a fever pitch. Promoters of a refinery appeared before the Williston Chamber of Commerce.⁸² At the well there were so many spectators that a fence had to be erected. The people felt this was to keep them from the oil discovery.⁸³

On August 4 the well reached 10,000 feet, and by August 14, it was down 10,281 feet. At this point the drill stuck. The crews worked for fifteen days trying to free the pipe. At first 15,000 gallons of hydrochloric acid was poured in to dissolve the limestone. Next 220 barrels of fuel oil were poured in while the pipe was worked intermittently. On August 21 an additional 3,000 gallons of acid were used, but all to no avail. So on August 29, the crew recovered as much pipe as possible by shooting off explosives at 7,511 feet. Final abandonment was completed on September 16. All that remained was the water well which the company had provided at the request of Kamp. Some estimated that this drilling venture cost the California Company \$1 million.⁸⁴

Speculation on the reason for the stuck pipe varied. Some felt the casing was not set deep enough and others felt that it was the result of using the wrong mud. The mudmen of today know more

⁸²Williston Herald, June 15, 1938.

⁸³Fargo Forum, April 5, 1953.

⁸⁴Ibid.

about the qualities of their special material and could probably have saved the drill stem. Today Amerada holds much of the land that California Company had under lease when the Nels Kamp well was drilled. The geological and technical drilling information may have helped Amerada's efforts in finding oil. Mud was mixed to what engineers thought the California mud should have been.⁸⁵

And so North Dakota very nearly became an oil producer thirteen years before it actually did. It is interesting to speculate just what effect oil discovery would have had on the hard-pressed North Dakota farmer of the thirties. Had it not been for the unfortunate turn of events, it is quite possible that the California Kamp well could have yielded oil in commercial quantities. Unlike the earlier well which did not penetrate deep enough to test the Madison formation (the principle producing horizon) the Kamp well may have passed through oil-bearing sands. It was the deepest well in the Rocky mountain region at that time, having gone to a depth of 10,281 feet. It had missed the Beaver Lodge Pool by three-and-a-half miles, the Hofflund Field by four miles, and the Cappa Field by two miles.⁸⁶

With the abandonment of the Kamp well, enthusiasm for wildcatting was dampened for a time. Leach retained active interest in the region, however, and in the spring of 1940 turned over four blocks comprising two hundred thousand acres to the Carter Oil Company. From that time on, there was considerable oil play in the area as nearly every major

⁸⁵ Williston Plains Reporter, June 1961.

⁸⁶ Voelker, Mineral Rights and Oil Development, p. 9.

oil firm sent men in to check the activity and in many instances to take leases. During this period, Carter Oil moved its district office in the Rocky Mountain area from Billings to Bismarck and drilled a stratographic test on its lease in Morton County to 4,930 feet. This well was abandoned when a pipe twisted off. Magnolia Petroleum Company (Socony Vacuum) also opened a district office and was said to have had about 750,000 acres under lease.⁸⁷

But these two oil companies did not control all the oil play in the state. Within two years a dozen or so companies were again assembling lease blocks for explorations. Among them were Stanolind, Pure, Ohio, Sinclair, Standard Oil of California, Continental, Texas, Phillips, and others. Prices for leasing at that time were \$1.00 bonus per acre for signing a lease, with rentals at \$0.10 to \$0.25 per acre. Only in exceptional cases were companies anxious to plug holes in their blocks with a higher price than \$0.25.⁸⁸

With all the money and effort being put into North Dakota in 1940, it would have seemed that leaders in the oil industry had hopes for the following year. However, according to the October 9, 1941, issue of Oil and Gas Journal, most of the activity in 1941 was the leasing of hundreds of thousands of acres of additional land spreading into South Dakota. Amerada Petroleum was one of the heavy operators in this oil activity. The only major effort seemed to have been the

⁸⁷Williston Plains Reporter, June 1961. Depth figures for the Carter Well are from geology department statistics.

⁸⁸Ibid.

drilling of a ten-thousand-foot test well in Montana by Carter Oil across from Marmarth, North Dakota. The well did not prove to be a commercial producer.⁸⁹

Not until 1942 did Carter drill its long-awaited deep test well on its lease block in North Dakota. This was the No. 1 Semling in Oliver County which reached a depth of 8,850 feet before being plugged. The well, like the California Kamp Well, yielded up valuable geological information about formations below the four-thousand-foot level.⁹⁰

Three other dry holes were drilled in this period. They were in Morton County in 1940, in Oliver County in 1942, and in Emmons County in 1943.⁹¹ But the big drilling campaign that was subsequently expected was brought to an end by World War II. The government was allocating precious steel to insure discovery of new oil, but the remoteness of North Dakota from any market and the lack of oil transportation facilities forced the oil industry to concentrate its efforts in the established oil states where the discovery of a new oil pool would result in its availability almost at once. The North Dakota leases were therefore dropped until after the war when the area again became promising territory for oil speculation. The speculation culminated on April 4, 1951, when North Dakota spectacularly joined the ranks of the oil-producing states.

⁸⁹ Ibid.

⁹⁰ Ibid.

⁹¹ Voelker, Mineral Rights and Oil Development, p. 9.

CHAPTER II

THE IVERSON DISCOVERY WELL

With the end of World War II, oil men again turned to North Dakota. Lease blocks were assembled, and before 1951 eight more dry holes were drilled in widely separated areas. These were in Richland County in 1948, in Ward, Burleigh, and Ramsey counties in 1949, and in Mercer, McLean, Emmons, and Kidder in 1950.¹

One of the companies which had been assembling lease blocks covering a considerable area was the Amerada Petroleum Corporation.² Amerada's activities had gotten under way shortly after a big oil strike near Leduc, Alberta, in February 1947, by Imperial Oil Limited. This eventually led to one of the greatest leasing activities in history.³ By 1949 Amerada, together with Hunt Oil, and a few other companies, held 120,000 acres. In addition to its leasing activities,

¹Voelker, Mineral Rights and Oil Development, p. 9.

²Amerada (the name is a compound of "America" and "Canada") was a relatively small and virtually unknown company at the time of discovery. In income it ranked only 28th with other oil firms. Amerada was, however, distinguished because of its uncanny ability to find more oil, more cheaply, than anyone else. Amerada had been able to do this largely because of its efforts in developing scientific methods to find oil. Using these scientific methods, Amerada took nearly all its leases where oil had never been found. By 1952 Amerada held 1.5 million acres in the Basin and 2 million in Alberta in addition to being the largest single producer in New Mexico. Contributing in no small part to Amerada's success was its president, Alfred Jacobson. A Danish-American who got his start as a hardware salesman in Mexico, Jacobson was worth an estimated \$8 million by 1952. Time, March 24, 1952, pp. 89-90.

³Williston Herald, April 9, 1951.

Amerada had been doing seismographic work on the Nesson Anticline. This activity was later to lead to the drilling of North Dakota's first producer, the Clarence Iverson No. 1.⁴

By 1951 Amerada alone was said to hold a quarter of a million acres in Williams and McKenzie counties although not in a solid block. Other extensive holders were Union and Pure Oil.⁵

After exploration and leasing, Amerada chose the Clarence Iverson⁶ farm nine miles south of Tioga as the site of its first wildcat well.⁷ Construction of the 136-foot steel tower at the well-site began in the latter part of August 1950,⁸ and a crew of fifteen men worked in three shifts around the clock to complete the derrick. The Lofflund Brothers Drilling Company of Tulsa, reportedly one of the biggest drilling companies in the world, contracted the drilling.⁹ After completion of the

⁴Campbell, Williston Report, p. 102.

⁵Fargo Forum, October 7, 1951.

⁶Iverson had leased 640 acres of land to Amerada in 1949 for \$0.10 an acre. He was to receive royalties ranging from 6½ to 12½ per cent of the oil produced. The 12½ per cent was to come from 360 acres and the 6½ from 280 acres. Of the latter, Iverson had purchased 155 acres from the Bank of North Dakota and 125 acres from a school. Both school and bank retained half the mineral rights. Iverson sold some mineral rights but held on to most of them. He said that some of his neighbors had gotten \$15 to \$25,000 by waiting until after the oil boom to lease land. Iverson said that after discovery he was deluged by salesmen, correspondents, and car dealers. He also stated that he had dozens of letters a day from people who claimed to be his relatives.

Ibid.

⁷Ibid., October 7, 1951.

⁸Williston Herald, August 28, 1950.

⁹Ibid., August 24, 1950.

derrick, Lofflund Brothers spudded in the Iverson well in September. Officials announced that the first fifty feet would be twenty inches in diameter with a sixteen-inch casing. From there to the 1,500-foot mark the casing used would be ten-and-three-quarter inches, while below 1,500 feet it would be a nine-and-seven-eights-inch hole with seven-inch casing. It was further stated that Amerada planned to drill to the 12,000-foot mark.¹⁰

The well was a novelty and a curiosity to the people in the area. The skeptics scoffed, saying Amerada would find no oil in North Dakota. And indeed, the company was having its difficulties. The search was a blind one as the well was at the time the only test well in the area, and there were no others to correlate with to compare various strata. The drilling was slow with only forty to fifty feet per twenty-four hour day.¹¹ Supply too was a problem, with the nearest supply company being more than 500 miles away at Casper, Wyoming.¹² Next there was the weather as Texans and Oklahomans¹³ got their first taste of North Dakota winter. Clogged roads hampered operations, and drilling had to be shut down at times. Snowfall was heavy, especially in the early part of 1951.

¹⁰ Ibid.

¹¹ Ibid., January 2, 1951.

¹² Williston Plains Reporter, June 14, 1961.

¹³ One of the stories frequently told of reaction to the severe weather concerned a driller who left his rig in minus forty degree weather. When asked where he was going he replied, "I'm going to get my jacket." "Where did you leave your jacket?" he was asked. "In the Gulf Coast, gol dang it," was the reply. Cited in Williston Basin Oil Review, December, 1952, p. 9.

By December 30, the well was down to 10,803 feet and yet no oil.¹⁴ Early in 1951 the company just about decided to plug the well because of failure and abandon its leases when a little oil was recovered in a routine test.¹⁵ This occurred on January 3, 1951, and was the first bonafide oil discovery in North Dakota. The oil had come from the 10,500 to 10,518-foot level and although it only measured about a pint, it lent encouragement to the drilling project. The optimism spread throughout the Upper Midwest and drilling continued on a round-the-clock basis.¹⁶

There were several reasons for this optimism. First of all, the formations of porous limestone present were more favorable to the production of oil. Also, the pint of oil was recovered through a water cushion being used at the bottom of the pipe to keep the pipe from being crushed. The fact that it was recovered through this water cushion was encouraging since it meant that there was some substance, possibly oil, which was putting pressure on the water cushion. Then too, in a second test, nine hundred feet of water and 850 feet of mud were gas cut. This was significant because gas and oil are almost always associated.¹⁷

The pint of oil, described by Amerada geologists as of pretty good quality but containing some sulpher, had come from the Devonian

¹⁴Williston Herald, January 2, 1951.

¹⁵Voelker, Mineral Rights and Oil Development, p. 10.

¹⁶Williston Herald, January 4, 1951.

¹⁷Newspaper article of indeterminable source in the files of the geology department.

formation which produced oil in Texas and Canada. This formation occurs over a large portion of the state, especially in areas outside the Red River Valley. When the test for oil was made, Amerada had gone through 881 feet of this formation. State Geologist Wilson Laird estimated the thickness of this formation at one thousand feet.¹⁸

In mid-January Laird visited the Iverson site and inspected specimens from the core and drill stem tests. This visit, according to Amerada geologists, was "routine inspection."¹⁹

Interest in Tioga was further heightened by the report of oil discovery in February at Virden, Manitoba, fifty-nine miles from the border.²⁰ This discovery, on the east flank of the basin, was made by the California Standard Company.²¹ Its production came from the Madison formation which underlies most of North Dakota with the exception of the extreme eastern portion.²² Because of this fact, the find was of significance for the search for oil in this state.

Rumors of additional oil showings at the Iverson well in March 1951 were denied by Amerada officials. But oil men in Grand Forks confirmed the reports, stating that preliminary tests at Tioga an undetermined quantity of forty-five gravity oil was recovered and that

¹⁸Ibid.

¹⁹Minot Daily News, January 16, 1951.

²⁰Williston Basin Oil Review, June 1952, p. 10.

²¹The well was a marginal commercial producer and by October had produced only 850 barrels. Cited in Ibid.

²²Grand Forks Herald, March 23, 1951.

the oil would be tested in a few days. Testing was reported to be at four or five horizons, and mud and natural gas were being found in fair quantities. What actually happened at the well, which was then down to 11,743 feet, was cloaked in secrecy.²³

Amerada officials remained conservative. "There's no oil that we know of," said a geologist for Amerada, speaking at Tulsa.²⁴ He further stated that on the basis of reports covering operations it appeared that the gas production was not in commercial quantities. He said a little oil had been recovered in drilling and swabbing.²⁵ operations and about a gallon of oil had been gained. Not much additional information was made available, and that which was given out was very guarded. The assistant superintendent of Amerada said at Tioga that his company did not intend to make a full disclosure of their findings at levels where they had tested or at future levels until they had learned all that was possible from the well.²⁶

Meanwhile testing operations continued as spring began to break. Approximately four thousand gallons of acid were poured into the well to soften formations and this resulted in an increased show of gas.²⁷ People near the well told of a big explosion which was

²³ Ibid.

²⁴ Newspaper article of indeterminable source in the files of the geology department.

²⁵ Swabbing involves drying the hole so perforations can be observed.

²⁶ Newspaper article of indeterminable source in the files of the geology department.

²⁷ Williston Herald, April 2, 1951.

heard three-quarters-of-a-mile away. This explosion supposedly came after a valve opened following acidization. One newsman said he saw a piece of drill stem ninety-five feet long blown three hundred feet following an explosion. Other reports said that considerable quantities of oil sprayed around, and that large amounts of natural gas had been found. Employees were quiet but it was said that a fifty-gallon drum full of oil was seen near the well and that the mud pool was covered with a heavy oil film. Also green and black residue were scattered all around.²⁸

Laird stated that reports which reached him said the well was spraying forty-seven gravity oil and was good for ten million cubic feet of gas daily. Amerada officials would only say that the tests were encouraging.²⁹

About 9:30 p.m. on April 4, 1951, the gas flare was lit at the Iverson well. A new industry was born in North Dakota.³⁰ The next day the Williston Herald headlined, "Oil Flowing From Tioga Well Today." The paper also said that after acidization ten to twelve barrels of fifty-five gravity oil flowed per hour. Since a 500-barrel flow per day is considered a commercial producer at this depth and the Iverson well was flowing at only about 250 barrels per day, Amerada said it was too early yet to classify this well as a producer.³¹ Commenting on the discovery, one official said: "Up to Wednesday noon we didn't think we had anything but a headache in that hole. . . . We shipped in a

²⁸ Newspaper article of indeterminable source in the files of the geology department.

²⁹ Williston Herald, April 2, 1951.

³⁰ Williston Plains Reporter, June 14, 1961.

³¹ Williston Herald, April 5, 1951.

piece of equipment called a trap which separates oil from gas. This was turned on 1:00 p.m. Wednesday and much to our surprise, we had oil."³²

News of the discovery spread like wildfire and electrified the petroleum industry. The Williston office of Northwestern Bell Telephone Company reported that there were 17,000 local calls compared with an ordinary daily average of 14,000. Also outgoing long distance calls numbered 500 with an undetermined number of incoming calls. Many people who owned property in the area called in for confirmation of the oil strike.³³

The following Sunday an estimated 3,500 visitors drove out to the oil well; it was necessary to post guards at the derrick approach. On the roads cars, many with out-of-state license plates, stood bumper to bumper.³⁴

Meanwhile representatives of nearly every major oil company were converging on Williston. Five oil companies had representatives in town by April 6. No doubt there were other representatives in town who had not yet identified themselves. It was reported that if the Iverson was a producer, more wells would be started in two weeks. Amerada had already announced plans to open an office in Williston.³⁵

³² Ibid., April 6, 1951.

³³ Ibid.

³⁴ Ibid., April 9, 1951.

³⁵ Ibid., April 6, 1951.

At the well difficulties had temporarily halted the flow of oil. Production Superintendent R.G. Fuller said that a split had developed in the tubing inside the well casing, and workers were trying to seal off gas pressure from the oil in the two-mile-deep hole. It was this pressure which had brought up the 307 barrels of oil in the original test run of 17 hours. After the damaged pipe was pulled and repaired further test production could be carried out. Several days later, when this operation was completed, Amerada officials indicated that the well would be sunk deeper.³⁶

Talk of oil continued and rumors ran rampant around Williston. Every time a gasoline truck went through, there was talk of the first load of crude heading for Tulsa. But A.R. Dennison, vice president of Amerada, said that plans were to load a tank car and ship it to the Northwestern Refining Company of St. Paul, a company which specialized in high-grade lubricating oils.³⁷

On April 19, several new 2,000-gallon tanks at the well started filling with crude.³⁸ The Iverson crude was pumped from the well to a separator where gas and oil were separated. The gas was piped to a flare pipe³⁹ and was burned off.⁴⁰ The oil went by way of trucks to the town of Temple where it was loaded into 10,000-gallon railroad cars.⁴¹

³⁶ Bismarck Tribune, April 10, 1951.

³⁷ Williston Herald, April 9, 1951.

³⁸ Ibid., April 19, 1951.

³⁹ The gas was flared off because it could create a hazard if allowed to escape.

⁴⁰ Fargo Forum, October 5, 1951.

⁴¹ Williston Herald, April 19, 1951.

The oil was handled at Temple, a town of twenty-eight persons on the Great Northern mainline, because it was easier and safer.

By April 25 the well was flowing at 451 barrels in a 16-hour period with casing pressure of 3,900,000 cubic feet of gas per day. Trucks were busy hauling, and more tankers were on location or on the way. The flow of oil had been stopped on several occasions for testing purposes and also due to lack of storage facilities.⁴²

Crude from the Iverson well needed special handling because of its high wax content. The oil registered 39 API⁴³ and had a high pour point of 80 degrees Fahrenheit. This meant that the oil would congeal at temperatures below 80 degrees. This posed special problems in transportation, especially when cold weather set in. Consequently the well was running only 12 hours a day by September and producing 210 barrels in those 12 hours.⁴⁴ Amerada was considering the installation of heaters to keep the oil flowing from well to tank. Insulated trucks would then carry the crude to Temple where it would be loaded on tank cars with steam heated coils in them. Transporting crude in this manner is difficult and expensive, although it was being done in other areas, notably in Wyoming.⁴⁵

⁴² Ibid., April 28, 1951.

⁴³ Gasoline content is indicated by specific gravity. To gauge specific gravity, the American Petroleum Institute uses the API system which is the opposite of the specific gravity rating. The higher the specific gravity, the lower the degrees of API. Oil which is 40 degrees API gravity or over is considered premium.

⁴⁴ Grand Forks Herald, September 8, 1951.

⁴⁵ Fargo Forum, September 7, 1951.

When the oil reached the St. Paul refinery, it was mixed with other crudes to break down the wax content. The salt and sulfur, also being high, had to be removed. These are corrosive elements and were harmful to the gasoline, kerosene, diesel fuel, and other types of fuel oils which were being made from the North Dakota crude. While the gasoline content of this crude was small, only 23 per cent, this nonetheless refined to a good quality gasoline.⁴⁶

The Iverson well had at first produced 53 gravity oil, which has a high gasoline content, but was plugged back and recompleted in a shallower zone. By December the recompletion was finished, and after the producing equipment was put on the well, it produced 630 barrels of 42.5 gravity oil per 24 hours.⁴⁷

When the information from the log of the well, which is required by law to be kept secret for six months, was made public, it was found that the Iverson well had five pay zones. Four of these were in the deeper Devonian formation and one in the shallower Madison formation.⁴⁸ The well had shown its first recovery of oil from perforations at the 11,630 to 11,660-foot level. It was from this area that the first 307 barrels had been brought up in 17 hours ending April 5 at 5:00 p.m. Total production from this perforation was only 3,092 barrels. Amerada then deepened the well to 11,955 feet but shortly thereafter plugged

⁴⁶ Ibid.

⁴⁷ Grand Forks Herald, December 13, 1951.

⁴⁸ Ibid., January 23, 1952.

back to the 10,490 to 10,530-foot level. Total production from this area was 17,408 barrels. In December the well was again plugged back and recompleted in the Mission Canyon formation of the Madison group from which production has continued.⁴⁹ Amerada had decided to recomplete in this area when three other wells in the neighborhood started producing from this formation.⁵⁰

Although the state then had no limit for well-production, the Iverson well was producing only 200 barrels daily. The reason for this was that oil men desired to keep the reservoir gas pressure up and also to prevent too much water from being brought up.⁵¹ There was no longer any doubt as to the well's capabilities, however, and the rapid discovery of new wells pointed out the state's oil potential. The close of 1951 and the beginning of the new year saw the state gripped with oil fever. The extent of pools had to be found and new ones discovered. So rapidly were these brought in that it was not too many years before North Dakota would rank tenth among oil producers in the United States.

⁴⁹ Laird and Folsom, Nesson Anticline.

⁵⁰ Contributions to Geology, p. 104.

⁵¹ Grand Forks Herald, December 29, 1951.

CHAPTER III

THE FIRST TEN YEARS OF DEVELOPMENT

The cry of oil in early 1951 unleashed a tremendous amount of activity in the Williston Basin. As this was the first major discovery in a new geologic basin since before World War II, it resulted in fantastic leasing. About 30 million acres were leased in forty-five days, and the figure soon reached 44.8 million out of the state's total acreage of approximately 45 million acres. Over two hundred representatives of oil companies descended on Williston to take an active part in the oil play.¹ The companies which were especially active were Cities Service, Deep Rock, Atlantic Refining, Phillips, Pure, Lion, Magnolia, Stanolind, Union, and Superior.²

Within the next few years after discovery, North Dakota would see an accelerated development program in connection with its new oil industry. In over a dozen different counties, hundreds of wells were brought in. A great many oil fields were found, and to handle the large amounts of crude, pipelines and refineries were built in the state.

As was anticipated, new wells were begun in the area immediately after the Iverson discovery. Five months later, on September 7, North

¹Williston Plains Reporter, June 14, 1961.

²Grand Forks Herald, Sept. 15, 1951

Dakota got its second producer when Amerada announced that oil flowed from its Bakken No. 1 which was twelve miles north of the discovery well.³ Amerada had drilled the Bakken to 13,709 feet but eventually completed it as a producer in the Mission Canyon formation at a depth of from 8,312 to 8,350 feet the following spring.⁴ While the Iverson well was credited with being the discoverer of the Beaver Lodge Field, the Bakken was the discovery well of the Tioga Field.⁵

In October Amerada brought in the third North Dakota producer with its Palmer Dilland No. 1 six-and-a-half miles south of Tioga.⁶ The Dilland hit oil at the 8,396-to-8,444-foot level, and geologists described its flow as "really good." Like the Bakken, the Dilland was tested further in deeper formations.⁷

After the second discovery, Amerada had sent in six top-flight officials, mostly geologists, thus emphasizing the oil potential of North Dakota.⁸ Meanwhile, Hunt Oil, which had 1.5 million acres under lease in the Williston Basin, announced that it would drill three wells in North Dakota, two in McHenry County and one in Bottineau County.⁹

³ Ibid., Sept. 8, 1951.

⁴ Laird and Folsom, Nesson Anticline.

⁵ The first actual production from Beaver Lodge was obtained from the Palmer Dilland No. 1. Laird and Folsom, Nesson Anticline.

⁶ The Dilland well, one-and-one-half miles from the Iverson well and ten-and-one-half miles from the Bakken well was watched very closely while being drilled. Should it become a Madison producer, as was the Bakken, it might mean that a pay zone had been missed by the Iverson well which was plagued by cold weather when passing through that zone. This proved to be so and the Iverson well was subsequently recompleted in the Mission Canyon. Fargo Forum, Oct. 5, 1951.

⁷ Grand Forks Herald, Oct. 11, 1951.

⁸ Fargo Forum, Sept. 11, 1951.

⁹ Ibid., Sept. 13, 1951.

Drilling either started or continued at various sites in the state. On November 2 the fourth producer was brought in at the Math Iverson site ¹⁰ nine miles south of Tioga. This well was brought in by the M.B. Rudman American Viking Corporation. Like the Dilland well, this well produced from the Madison group, and because it was only one-and-one-fourth miles from the discovery well, it was generally anticipated by geologists that it would find oil. ¹¹ Although it was not yet definite that these wells were all in the same field, the discovery lent weight to the fact that it was an important oil area.

The work so far was still mostly exploratory, and the development of the fields was yet to begin. Amerada was drilling wells east and west of the Dilland to measure the width of the oil-producing area around Tioga. ¹² Also some flank drilling was started to ascertain whether oil could be found in the shallower parts of the basin. ¹³ If this was true, the costs of bringing up the oil would be reduced.

Exploration activity continued into the winter with some nineteen seismic crews working, mostly in the north and west. In addition to this work, drilling also continued. In early December Amerada spudded in the Halvorson No. 1 twenty-two miles southeast of Watford City in McKenzie County. ¹⁴ Later that month Amerada announced the first

¹⁰ It was later learned that this well had seven pay zones: one Madison, five upper Devonian, and one lower Devonian. Grand Forks Herald, Feb. 9, 1952.

¹¹ Grand Forks Herald, Nov. 3, 1951.

¹² Ibid., Nov. 6, 1951.

¹³ Ibid., Oct. 19, 1951.

¹⁴ Ibid., Dec. 2, 1951.

offset¹⁵ well in the state, an offset to the Iverson well.¹⁶

The seismic activities of the winter months led to concentrated attempts on the northwest corner of the state in early 1952. Oil officials thought that there would be at least thirty test wells drilled, with considerable activity shared by private operators.¹⁷ It was anticipated that a good share of these attempts would be made to the east of the discovery area. By middle January, thirteen wells were under various states of drilling, with four others ready to start.¹⁸

The rapid discovery of oil stimulated related activities. In early February, Standard Oil of Indiana (Stanolind) announced plans for a 15,000-barrel refinery to be located at Mandan.¹⁹ In Williston forty-two oil supply firms and service companies had moved representatives in and were constructing buildings to supply the oil industry from that city.²⁰ To all these, reports from the oil areas continued to be promising. Amerada had started its tenth well, the Clifford Nylander No.1, on the eastern edge of the Beaver Lodge Field. On Sunday, February 24, Amerada's Halvorson No. 1 brought in the first oil from McKenzie county. The show of oil from this well was significant in that oil had now been found on the southern half of the Nesson Anticline over twenty-five miles from Williams County producing wells. Also on this same day

¹⁵ An offset is a well drilled on land next to a producer when that tract of land is owned by someone other than the owner of the producer.

¹⁶ Ibid., Dec. 15, 1951.

¹⁷ Ibid., Jan. 5, 1952.

¹⁸ Ibid., Jan. 20, 1952.

¹⁹ Stanolind increased the capacity of its refinery to 30,000 barrels before it began processing crude. Williston Basin Oil Review, Sept. 1952, p. 3.

²⁰ Williston Plains Reporter, June 14, 1961.

Amerada brought in its first offset,²¹ the Marvin Iverson No. 1.²²

By the first anniversary of oil discovery in the state much had been accomplished. As of April 4, 1952, 23,597 barrels of oil had been shipped from Tioga. Production from the five completed wells now reached 1,000 barrels per day.²³ Amerada announced it was spending \$30,000 per day in the state, and after one year had spent \$8 million.²⁴ Looking back over the first year's activities, the Williston Basin Oil Review noted that discovery, in a sense, had come easily. In Wood County, Texas, the magazine stated, 180 dry holes were drilled before oil was discovered. In North Dakota only fifteen holes were drilled to granite over twenty-five years before Amerada hit oil. The magazine went on to say that as of March 1952, where oil was concerned, nowhere was the outlook rosier than in the Williston Basin states.²⁵

The oil companies sought to find oil in other places, both on the Anticline and elsewhere. During the winter of 1951-1952, seismic operations were carried on by fifty-five crews plus operations by five gravity crews centered in Williams, McKenzie, McLean, McHenry, and Ward counties.²⁷ Despite considerable spring activity it was obvious,

²¹This well had a producing section of 116 feet. Grand Forks Herald, Feb. 29, 1952.

²²Williston Basin Oil Review, March 1952, p. 3.

²³Ibid., May 1952, p. 30. ²⁴Ibid., p. 11.

²⁵Ibid., March 1952, p. 7.

²⁶Williston Plains Reporter, June 14, 1961.

²⁷Grand Forks Herald, March 1, 1952.

however, that the oil companies were waiting for the summer of 1952 to really launch an intensive oil search. Amerada was said to have had ten rigs in the Beaver Lodge area ready for summer activity.²⁸ Even though the drilling program had been relatively modest in 1951,²⁹ an estimated \$100 million had already been spent on oil in the state.³⁰

By May the state had twelve commercial wells including six completions in four days. These were in the Beaver Lodge area, with the exception of the Bakken, which was in the Tioga Field, and the Risser well, which was in the Croff Field in McKenzie County.³¹

After sixteen consecutive producing wells, Amerada hit the first dry hole on June 21, 1952, on the eastern edge of the Beaver Lodge Field. By the end of June there were twenty-five producers in the state.³² By August there were thirty wells completed in the Beaver Lodge Madison formation alone with only two dry holes. Some field wells had been completed in record time of twenty-nine days. This quick drilling was facilitated by the fact that production came from approximately 8,500 feet.³³

²⁸ Ibid., Nov. 21, 1951.

²⁹ N. Dak. had ten wildcats in 1951. Voelker, Mineral Rights and Oil Development, p. 10.

³⁰ Williston Plains Reporter, June 14, 1961.

³¹ Williston Basin Oil Review, June 1952, p. 3.

³² Williston Plains Reporter, June 14, 1961.

³³ Williston Basin Oil Review, Aug. 1952, p. 4.

To handle the crude from the increasing number of wells, Service Pipeline Company announced on June 26 that it would build a pipeline to Mandan. This was to coincide with the completion by Standard of its refinery in that city.³⁴

Feverish exploratory activity continued. In August the Grand Forks Herald announced that forty-seven seismograph crews were operating in the state with the emphasis on western North Dakota. Maintaining these crews and the drilling operations was costing \$1 million a month.³⁵

In September Amerada brought in the fourth North Dakota oil field, also on the Nesson Anticline, with its No. 1 "D" in McKenzie County. In addition Amerada was extensively studying the western edge of the Beaver Lodge Pool.³⁶ Figures for October showed production was coming from forty-two wells of which two were producing on pump. Seven of these wells belonged to Hunt; Rudman owned two; while Amerada had thirty-three producers and five dry holes. Current activity showed twelve rigs running and nineteen locations announced.³⁷

To maintain its active campaign to find oil, Amerada announced that its expenditures on North Dakota oil were averaging \$1,250,000

³⁴ Williston Plains Reporter, June 14, 1961.

³⁵ Grand Forks Herald, Aug. 2, 1952.

³⁶ Williston Basin Oil Review, Sept, 1952, p. 3.

³⁷ Williston Plains Reporter, June 14, 1961.

per month by mid October. C.E. Boone, vice president of Amerada, stated that this was about three times more than the worth of the oil being produced. Boone further stated that 70 per cent of North Dakota, or 31.5 million acres out of 45 million acres, were under leases.³⁸ Another oil official, S.F. Bowlby, vice president of Shell, said that the oil industry was spending \$100 million a year in the area and that oil production (in December) was only 10,000 barrels daily.³⁹

By fall of 1952 the state had reached nineteenth place among the twenty-seven oil producing states. At this time Stanolind was purchasing all North Dakota crude and was sending it to the Phillips refinery at Spokane.⁴⁰ A survey of monthly production figures is shown in Table 1.

TABLE 1

Monthly Oil Production, 1951-1952^a

1951	April	. . . . .	2,351	barrels
	May	. . . . .	none	
	June	. . . . .	none	
	July	. . . . .	1,426	
	August	. . . . .	6,502	
	September	. . . . .	4,493	
	October	. . . . .	3,126	
	November	. . . . .	2,403	
	December	. . . . .	4,383	
1952	January	. . . . .	7,166	
	February	. . . . .	11,197	
	March	. . . . .	17,269	

³⁸ Williston Plains Reporter, June 14, 1961.

³⁹ Williston Basin Oil Review, Dec. 1952, p. 9.

⁴⁰ Ibid., Sept. 1952, p. 8.

April	. . . . .	33,694
May	. . . . .	38,777
June	. . . . .	78,370
July	. . . . .	106,315
August	. . . . .	199,842
September	. . . . .	175,695
October	. . . . .	186,069
November	. . . . .	320,285

^aProduction figures from April 1951 to July 1952 in Williston Basin Oil Review, Sept. 1952, p. 8. Production figures from Aug. 1952 through Nov. 1952 in Williston Basin Oil Review, Jan. 1953, p. 15.

Oil production from January 1952 through November 1952, showed a total of 1,249,094 barrels of crude. Broken down into respective pool production the figures show the following: Beaver Lodge 948,253; Tioga 283,051; Charlson 6,609; Hofflund 2,139; and Croff 9,042.⁴¹

In 1952 the state had issued 195 drilling permits.⁴² Year-end totals showed eighty-nine producers completed in 1952 to bring the state's total to ninety. This meant roughly a successful oil well in North Dakota every four days during the year.⁴³ North Dakota now had six pools. They were the Beaver Lodge, the Tioga, Croff, Charlson, Hofflund, and the Bottineau still being tested at the end of the year.

Oil men saw no let-up in the fast pace of drilling activity during 1953.⁴⁴ Records showed that no less than forty-two major oil companies had leased land, and many of them expected to get into the hunt for oil before very long. At present, however, only four companies

⁴¹Ibid., Jan. 1953, p. 3.

⁴²Ibid., p. 6.

⁴³Grand Forks Herald, Dec. 31, 1952.

⁴⁴Williston Basin Oil Review, Jan. 1953, p. 3.

were actively engaged in the search for oil. They were Amerada, Hunt, Deep Rock Oil Company⁴⁵ and M.B. Rudman-Concord Development (formerly American Viking).⁴⁶

As expected, 1953 was one of continued spectacular successes in North Dakota. A wave of optimism was brought about by the Herman May No. 1 in Billings County, south of the Nesson Anticline. This well flowed twenty-three barrels of oil on June 22 and offered encouragement in an area where only two significant tests had been drilled.⁴⁷

An event of 1953 which was of tremendous importance to the state's oil industry was the meeting of the state legislature. This was the first legislative session since the discovery of oil, and on the agenda were such important items as taxation, well-spacing, administrative authority, and conservation. During this session the state enacted thirty laws to govern the state's expanding oil industry.⁴⁸ Included in this group and possibly the most important were the adoption of the new oil-and-gas conservation code which replaced the 1941 code and the setting of the oil tax at 4½ per cent and the depletion allowance at 27½ per cent.⁴⁹

Because legislative action was vital to their interest, organi-

⁴⁵ Deep Rock was the only one of the four which did not yet have a producer. It was, however, engaged in drilling and in November reported good shows of oil in Slope County at a site near New England. Although not commercially productive, this well was important in that it was the first wildcat in an area 100 miles wide and 80 miles deep. Ibid., Nov. 1952, p. 14.

⁴⁶ Grand Forks Herald, Dec. 18, 1952.

⁴⁷ Williston Basin Oil Review, July 1953, p. 5.

⁴⁸ Grand Forks Herald, March 29, 1953.

⁴⁹ Williston Plains Reporter, June 14, 1961.

zations were forming throughout the state. Notable among such groups being formed were the North Dakota Oil and Gas Association, Williams County Land Owners and Royalty Owners Association, Tioga Land Owners Association, North Dakota Independent Producers and Royalty Owners Association, and McKenzie County Mineral Owners Association.⁵⁰

The success that oil companies were having in the state stimulated activity of associated industries. On March 9 Signal Oil and Gas announced its plans to build, with Amerada, a \$17-million gas plant at Tioga. Operation of this plant was expected to begin in 1953 with a daily process capacity of 40 million cubic feet of gas and eventually an ultimate production of 55 million.⁵¹ Announcements soon followed regarding construction of oil refineries in Williston (1,500 barrels), in Minot (2,500 barrels), and in Dickinson (2,000) barrels.⁵² These plants were to be largely financed and operated by local residents.

By April 1, 1953, two years after discovery, there were thirty-four active rigs and thirty-two seismograph crews operating in the state. By this time there were over 140 producers and 83 dry holes.⁵³

With the coming of summer, Service Pipeline began construction of North Dakota's first crude-oil pipeline.⁵⁴ This was to connect Tioga with Mandan, 154 miles away, and was to be completed at a date roughly

⁵⁰ Campbell, Williston Report, p. 49.

⁵¹ Williston Basin Oil Review, April 1953, p. 13.

⁵² Ibid., May 1953, p. 9.

⁵³ Williston Plains Reporter, June 14, 1961.

⁵⁴ Service Pipeline had operated a gathering system in the Beaver Lodge area since January 1952. This was connected to 153 wells and was gathering 14,000 barrels daily. Williston Basin Oil Review, July 1953, p. 40.

corresponding with the completion of the refinery at Mandan. The pipeline would have an initial capacity of 30,000 barrels per day which could later be increased to 100,000 barrels.⁵⁵ In November the refinery went on stream and by mid-December the first crude oil via the new Tioga pipeline reached Mandan. This new operation resulted in a jump in the price of crude from \$2.50 to \$2.90 per barrel.⁵⁶ Also completed in December, was the petroleum-products pipeline built by Standard to run 205 miles from Mandan to Moorhead, Minnesota. This line was to carry gasoline, kerosene, heater oil, power fuel, and diesel fuel.⁵⁷

These developments did much to improve the marketing picture for the North Dakota oil industry. They were, however, inadequate as more and more wells were brought in. A look at the increase in number of wells in the state shows no subsequent increase in production of oil. In March 1953, the state had 130 producing wells.⁵⁸ This number rose to 267 wells in December, yet the number of barrels of oil remained about the same.⁵⁹ The state's daily allowable was 200 barrels per well, but the actual daily production was considerably less.⁶⁰

55

Ibid.

56

Williston Plains Reporter, June 14, 1961.

57

Williston Basin Oil Review, Sept. 1953, p. 29.

58

Ibid., May 1953, p. 25.

59

Ibid., Feb. 1954, p. 14.

60

Ibid., Oct. 1953, p. 15.

For North Dakota, the marketing situation was, and would continue to be, a drawback in an otherwise encouraging picture.

In 1953 oil counties received their first benefits from the new tax legislation. On December 13, residents of Williams County saw \$53,189 of the \$79,000 of tax revenue taken in returned to their county.⁶¹ Although not all counties benefited by the tax on oil, most of them had received some share of the \$400 million spent on the search for oil in the last three years.⁶²

In comparing 1952 with 1953, we see that the oil picture in the state was very good. In 1952 there were 140 wells drilled and 89 producers brought in. In 1953 the number of wells sunk had risen to 264 and the number of producers rose to 178.⁶³ Also in 1953 there were 13 wildcats that found oil compared with 4 in 1952 and 2 in 1951.⁶⁴ Monthly production figures for 1953 which totaled 5,264,416 barrels are shown in Table 2.

TABLE 2
Monthly Oil Production, 1953^a

January	445,029 barrels
February	496,850
March	445,714
April	435,376

⁶¹Williston Plains Reporter, June 14, 1961.

⁶²Grand Forks Herald, Dec. 16, 1953.

⁶³Williston Basin Oil Review, Feb. 1954, p. 22.

⁶⁴Ibid., Jan. 1954, p. 6.

May	. . . . .	449,094
June	. . . . .	424,505
July	. . . . .	435,543
August	. . . . .	443,888
September	. . . . .	392,923
October	. . . . .	409,733
November	. . . . .	440,620
December	. . . . .	445,141

^aWilliston Basin Oil Review, April 1956, p. 19.

As was expected, the remarkable development of 1953 continued into 1954. There were many more discoveries, considerable increases in development and drilling, and late in the year a great increase in production. Although many people had anticipated oil discoveries on the eastern of North Dakota, this was not to be. Many wells were drilled, however, on the shallow rim of the eastern side of the basin in central North Dakota during the year. This is an area where oil is found only by drilling, and where there is very little indication through seismic exploration.

In the early part of the year the North Dakota Public Service Commission held hearings regarding a proposal by the North Dakota Gas Transmission Company to build a gas pipeline from Tioga to Eastern North Dakota.⁶⁵ This pipeline would serve cities in that area, and the gas would be sold by Amerada at its Signal Oil and Gas Plant. The request, however, was eventually turned down by the Commission.⁶⁶

⁶⁵ Ibid., March 1954, p. 22.

⁶⁶ The coming of gas into eastern North Dakota would have brought about a conflict of interest between gas and lignite companies. Lignite concerns representing the six hundred or so people in its employ were present at the Commission hearings and strongly voiced their opinions. This group apparently feared the effect of gas on the sale of electricity generated by lignite plants. Ibid.

As 1954 wore on, it was apparent that the state's oil industry was becoming more stable. Both the immediate and the long-range future of the industry was considered bright. Oil-producing counties were enjoying increasingly larger tax rebates. State Treasurer Ray Thompson announced that after one year's operation, the oil tax brought in a total of \$145,644 as the state's share. The seven participating counties had received as their share a total of \$270,709.⁶⁷

Year-end totals for 1954 showed that 300 wells and dry holes had been completed. There were 121 wildcats as compared with 79 the previous year. In 1954, 176 oil wells were brought in compared with 264 in 1953 and 140 in 1952.⁶⁸ The state now had eighteen pools. They were the Beaver Lodge in Williams and Mountrail counties; Tioga in Williams, Mountrail, and Burke counties; Belfield in Stark and Billings counties; Hofflund, McGregor, and Cappa in Williams; Croff, Sanish, and Northeast Landa in Bottineau; East Tioga and White Earth in Mountrail; and the Fryburg (Madison formation) and Fryburg (Heath formation) in Billings County.⁶⁹

Monthly production figures for 1954, which totaled 6,134,460 barrels of crude, are shown in Table 3.

⁶⁷ Grand Forks Herald, Sept. 22, 1954.

⁶⁸ Williston Basin Oil Review, Feb. 1955, p. 14.

⁶⁹ Ibid., Jan. 1955, pp. 10, 11, 24, 26, 27, 30, 31, 39, 40.

TABLE 3

Monthly Oil Production, 1954^a

January	. . . . .	452,029 barrels
February	. . . . .	416,445
March	. . . . .	460,863
April	. . . . .	421,586
May	. . . . .	565,075
June	. . . . .	416,717
July	. . . . .	457,193
August	. . . . .	449,842
September	. . . . .	443,559
October	. . . . .	604,206
November	. . . . .	660,197
December	. . . . .	786,748

^aWilliston Basin Oil Review, April 1956, p. 19.

Cumulative production since discovery showed the state had produced 13,927,170 barrels of crude as of February 1, 1955, nearly half of it in the last fourteen months. This production had come from the following counties: Billings with 193,847; McKenzie with 563,272; Williams with 10,552,756; Mountrail with 2,487,714; Burke with 53,123; Bottineau with 76,081; and Stark with 377.⁷⁰

The success the state was enjoying regarding its search for oil is shown by the fact that in 1954 North Dakota drilling found an average of over 49 barrels of crude for each foot of hole completed. This compares with the Rocky Mountain average of 27½ barrels and the national average of 15.⁷¹

Early in 1955 Amerada announced that it intended to spend an additional \$20 million in the state during the year. One rather prodigious undertaking by Amerada was to drill for oil in areas that were covered by the Garrison Reservoir. The company had asked the United

⁷⁰Ibid., April 1955, p. 10.

⁷¹Ibid., Jan. 1956, p. 15.

States government and the Army Engineers for permission to build a mound of earth in the reservoir to facilitate "offshore" drilling.⁷²

The Garrison Reservoir was thought to cover possible oil-producing areas because it separated the Hofflund Field in Williams County from the Charlson Field in McKenzie County.⁷³

During 1955 the state legislature met, and there were attempts to raise the oil tax by 2 per cent. There were also proposals to place the oil tax in a general fund rather than to distribute portions back to the oil-producing counties. Neither of these proposals passed.⁷⁴

Although in general the oil picture in the state was excellent, marketing was still a chronic problem in 1955. The situation, however, was expected to improve somewhat with the announcement by Stanolind that it would again expand its refinery⁷⁵ at Mandan.⁷⁶

⁷²There are three methods applicable for developing flooded areas. They are by using barges, earthen mounds, or by directional drilling. Barges or platforms were rejected because of danger of damage from ice. Completion of a mound to bring the well-head above the high-water level such as was used here cost \$65,000. Directional drilling, therefore, was deemed to be the most satisfactory method, and in June 1954, Amerada had spudded in its first directional well on the north bank of the reservoir. This well deviated to the southeast for 1,893 feet and was completed in just over sixty days at a cost of about \$215,000. One year later a second directional well was spudded in on the south bluff. Laird and Folsom, Nesson Anticline.

⁷³Williston Plains Reporter, June 14, 1961. ⁷⁴Ibid.

⁷⁵The refineries at Williston and Dickinson, however, were not so fortunate. Both companies eventually entered bankruptcy because of lack of operating capital and increased crude prices. Westland Oil of Minot later purchased the Williston plant and expanded it. The Dickinson refinery has been mentioned more recently as about to be reopened to produce jet fuel.

⁷⁶Ibid.

Meanwhile, the search for oil continued at a rapid pace, and on May 3, 1955, the 500th producer was brought in. Roughly 200 of these were in the Beaver Lodge Field where the initial discovery had been made. The increased production of oil also brought a tremendous production of natural gas. To provide increased facilities for using more of the gas, rather than flaring it off, the North Dakota Public Service Commission reacted favorably to a plan advanced by Montana Dakota Utilities Company, in mid-summer. The firm would build 110 miles of pipeline and send Tioga gas to its Baker fields for storage.⁷⁷ During winter-peak loads, the gas would be reversed and sent to areas where the need existed.⁷⁸

In August the Texas Company discovered the twenty-fourth oil field in the state with a well in McKenzie County. One month later, the state issued the 1000th drilling permit to Amerada.⁷⁹ Oil production reached a million barrels a month during the summer.⁸⁰

As 1955 progressed, oil men were watching with particular interest the area between Tioga and North Westhope in Bottineau County. A discovery of major importance would help to keep a higher rate of activity for the whole state. For many years people had been

⁷⁷ Near the Baker, Montana, oilfields are located large underground reservoirs which were used for storing the gas.

⁷⁸ Williston Plains Reporter, June 14, 1961.

⁷⁹ The initial discovery well had come in under permit number 41. The earlier permits included early failures and gas wells.

⁸⁰ Ibid.

watching northern North Dakota, especially after the opening of a field in Saskatchewan in 1953.⁸¹ Standard of Ohio's strike in Renville County, therefore, was well received. It not only brought new interest to this area, but also was important because it indicated more shallow production in North Dakota.⁸²

During the year there was a general upswing in Bottineau and McKenzie counties.⁸³ There was especially much optimism over Bottineau County because this oil did not compete with other North Dakota oil, but rather was being shipped to Lake Superior Refining in Wisconsin. Some of it was carried to Manitoba in trucks and from there was sent by pipeline.⁸⁴

The year-end figures for 1955 showed that drilling activity had slowed somewhat from the previous years. Wildcatting especially suffered, having slumped to half. The number of dry holes outside of Tioga and Beaver Lodge rose in 1955. There were, nonetheless, 251 wells drilled during the year. This brought the total to 967 wells drilled of which 610 were producers.⁸⁵ During the year, oil companies had spent \$43 million in the state.⁸⁶ The new fields found in the state in 1955 were the following: Blue Buttes and Blue Buttes Exten-

⁸¹Williston Basin Oil Review, Sept. 1955, p. 6.

⁸²Ibid., Jan. 1956, p. 15.

⁸³Ibid., Sept. 1955, p. 6.

⁸⁴Ibid., July 1955, p. 6.

⁸⁵Ibid., Jan. 1956, p. 16.

⁸⁶Williston Plains Reporter, June 14, 1961.

sion (three-mile wildcat) in McKenzie; North Souris and Newbury in Bottineau; Bluell in Renville; and Coteau in Burke.⁸⁷

Monthly production figures for 1955 which totaled 11,178,792 barrels are listed in Table 4.⁸⁸

TABLE 4
Monthly Oil Production, 1955^a

January	. . . . .	995,612	barrels
February	. . . . .	860,267	
March	. . . . .	897,933	
April	. . . . .	702,228	
May	. . . . .	633,656	
June	. . . . .	854,306	
July	. . . . .	1,154,818	
August	. . . . .	1,041,048	
September	. . . . .	1,053,354	
October	. . . . .	705,312	
November	. . . . .	1,112,975	
December	. . . . .	1,167,283	

^a Williston Basin Oil Review, April 1956, p. 19.

After the slight slump in drilling of 1955 (Table 5), the state looked forward to increased activity in 1956. There was heavy activity planned for McKenzie County, the largest county in North Dakota with 2,810 square miles and 6,849 people. Oil production in this county had been increasing 300 per cent each year over the previous year. Speculation was on the bright future of this county which lies over the deepest part of the basin and as yet had no wildcat which had gone below

⁸⁷ Williston Basin Oil Review, Jan. 1956, p. 19.

⁸⁸ Production figures for a period in the spring and in the fall generally show a decrease because of the semiannual cleanup and repair at the Mandan refinery during which time operations are substantially reduced.

the Ordovician layer.⁸⁹ Both Amerada and Texaco had enjoyed considerable recent success in this county. In addition to activity planned for McKenzie County, there were approximately one hundred wildcats planned for central and eastern North Dakota. Oil shows in these areas were both encouraging and discouraging.⁹⁰

The overall picture showed that there were over six hundred wells which were producing at this time. Drilling statistics for the first four years of development are shown in Table 5.

TABLE 5
Drilling Statistics, 1952-1955^a

LOCATIONS	1952	1953	1954	1955	Total
Beaver Lodge oil	61	74	52	35	222
Tioga oil	25	78	67	36	206
Charlson oil	1	3	18	27	49
Others oil	2	22	39	70	133
Wildcats dry	35	79	121	61	296
Beaver Lodge dry	8	6	1	2	17
Tioga dry	8	2	2	3	15
Others dry	1	3	8	17	29
Totals	141	267	308	251	967

^aWilliston Basin Oil Review, Feb. 1956, p. 15.

In the beginning of 1956, there was substantial activity and 131 wells were drilled during the first six months.⁹¹ This activity contin-

⁸⁹Ibid., May 1956, pp. 9, 11.

⁹⁰Ibid., p. 5.

⁹¹Ibid., Aug. 1956, p. 8.

ued throughout the year, and the totals for 1956 showed 259 wells drilled, thus showing only a slight increase in the number of wells drilled as compared with 1955.⁹²

During the summer of 1956 occurred an interesting event in McKenzie County when a Texas Company well, the No. 3 Government Dorough "C", suddenly blew out. It appeared to have struck a nitrogen gas pocket at 7,500 feet. The blowout hurled a column of drill-mud approximately 300 feet into the air. The well blew wild and one official said, "It sounds like 100 freight trains out of control." It took four days to bring the well under control. Blowing gas, sand, and rocks cut the derrick to pieces.⁹³

A significant event of 1956 was the news of Amerada's striking oil in the Silurian formation in Sheridan County, Montana. This was greeted by some as the best news of the year for it would create interest in the deeper zones of the basin.⁹⁴ This development was not expected to be a rapid one, however, as the deep wells were costly to drill.

Monthly production figures which totalled 12,754,964 barrels in 1956 are listed in Table 6. In addition to the nearly 13 million barrels of oil produced in 1956, the state also produced 1.8 billion cubic feet of gas which had a value of \$1,250,000.⁹⁵

⁹² Ibid., Feb. 1957, p. 16.

⁹³ Williston Plains Reporter, June 14, 1961.

⁹⁴ Williston Basin Oil Review, Dec. 1956, p. 6.

⁹⁵ Ibid., April 1957, p. 7.

TABLE 6
Monthly Oil Production, 1956^a

January	1,334,657	barrels
February	1,085,122	
March	1,174,557	
April	856,376	
May	802,234	
June	1,016,967	
July	1,097,410	
August	1,121,463	
September	1,032,282	
October	817,971	
November	1,183,239	
December	1,232,677	

^aProduction figures for first six months in Williston Basin Oil Review, Oct. 1956, p. 11. Second six months in Ibid., April 1957, p. 7.

The following new pools were added in 1956: Haas and Kuroki in Bottineau; Columbus in Burke; Noonan in Divide; and the Antelope Field in McKenzie. In addition to these five fields, there were three probables in Billings, Bottineau, and Burke counties.⁹⁶

These widespread discoveries of 1956 were an important factor in boosting activity in 1957. Interest in the deeper formations had been reawakened by Amerada's discovery in Montana. Northern Pump Company had also found oil in Billings County in the Heath formation, which emphasized the fact that this formation might have greater importance than was generally assumed. The greatest amount of activity in 1957, however, seemed to be in the north.⁹⁷ After seventeen previous tries, Ward County got its first production during this period. In nearby Burke County, fifteen new wells were brought in on the Lignite

⁹⁶ Ibid., Jan. 1957, p. 15.

⁹⁷ Ibid., March 1957, p. 5.

Field by mid-December. This was remarkable because the field had only been discovered in July. Sharing the record for intensive drilling activity with Burke, which had fourteen drilling rigs operating by year's end, was McKenzie County, with twelve rigs. These represented roughly 55 per cent of the total rigs operating in the state during the year.⁹⁸

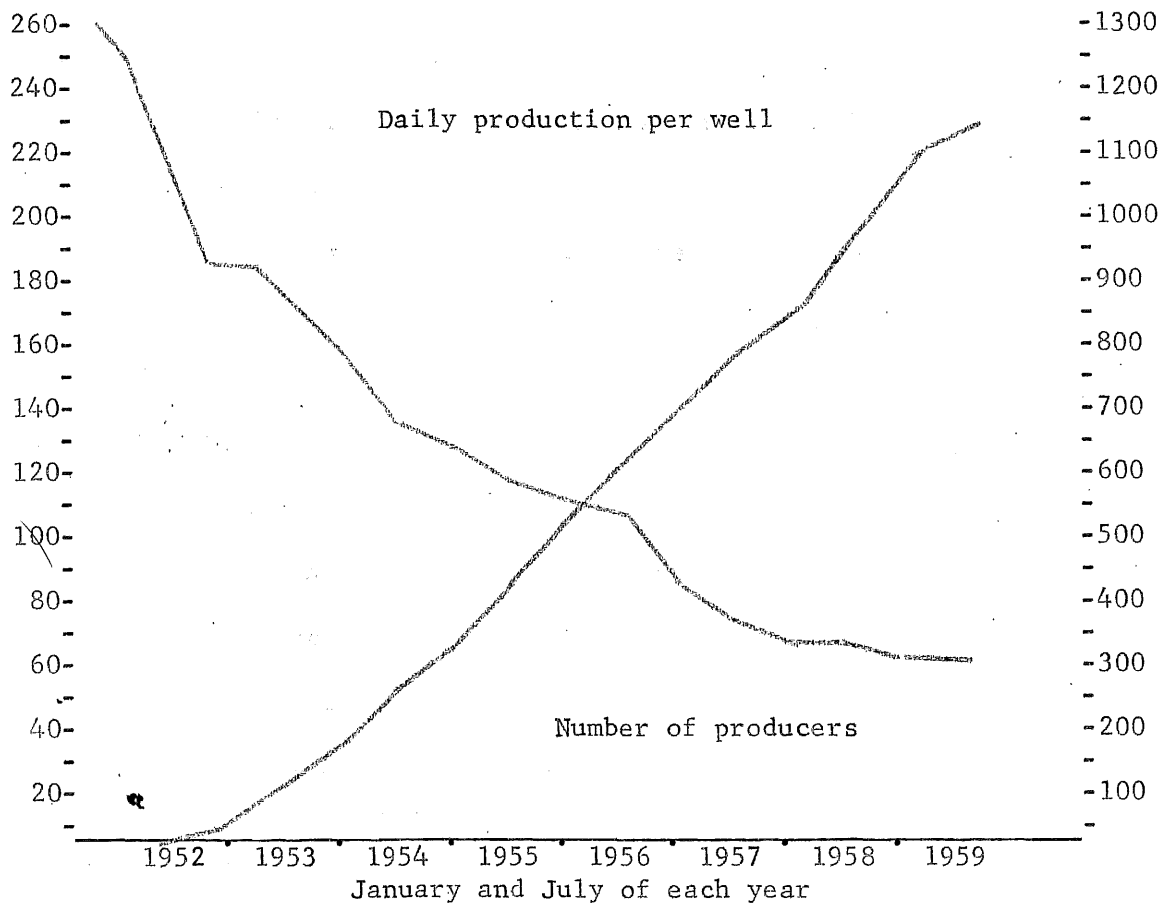
An added incentive to the oil industry was the fact that early in 1957 the crude oil price jumped to \$3.15 per barrel. This was partially due to the Suez crisis.⁹⁹ The troubled international situation did not, however, help the marketing picture in general. Despite the optimism created by activity and development during the year, the marketing picture became darkened, a fact which is readily pointed out by Table 7. Statistics for this table show that as the number of wells rose the daily barrel of oil production dropped. In October 1954, before the Mandan refinery opened, there were 407 wells producing about 15,000 barrels a day. When the refinery opened in November 1953 the total market doubled and several months later the refinery reached a peak load of 38,000 barrels daily. Since that time its intake had fluctuated between 38,000 and 41,000 barrels a day. However the state's wells had increased to 953, more than double the number when the refinery opened. This meant that the daily allowable per well had to be substantially reduced, and then was about nine barrels per 40-acre-unit-well per day. Counties to the north, which did not sell

⁹⁸Grand Forks Herald, Dec. 29, 1957.

⁹⁹Williston Plains Reporter, June 14, 1961.

TABLE 7

Daily Production of Oil as Related to
The Number of Producers^a



^aWilliston Basin Oil Review, April 1959, p. 27.

their oil at Mandan, were also facing serious problems. While the Nesson Anticline oil faced a shortage of marketing facilities, the counties of Divide, Bottineau, Ward, Renville, and northern Burke faced a price problem. Their oil was marketed in the Williston, Duluth, and Twin Cities areas. Oil being shipped to the latter two markets by rail had to compete with Canadian oil shipped via pipeline. Shipping by pipeline is a much cheaper method than shipping by rail, and in order to compete, North Dakota oil is faced with a price cut to make up for added transportation costs. An answer to this problem seemed to present itself when Great Northern Railway announced plans for a pipeline from the northern area to markets to the east.¹⁰⁰ However, to make this a paying proposition the firm needed 20,000 to 25,000 barrels of oil per day, an amount that the northern counties could not supply. Nor could Great Northern buy oil from the Nesson Anticline, which receives a higher price, and still compete with the Canadian oil prices at the eastern markets. These problems were not to be solved easily and persisted as years went by.¹⁰¹

¹⁰⁰ Another proposal, and one that was closest to becoming reality by 1961, was the construction of a pipeline by Matador Pipeline Company. It would gather oil in District Two and carry it to Cromer, Manitoba, where it would go via Interprovincial Pipeline to the Great Lakes markets. If any of the pipelines were constructed it would mean that the railroads would have to give up their oil rail traffic. To the Sioux Railroad this would mean a loss of \$1.5 million annually. W. E. Koenker, Improved Transportation for Oil from Marketing District Two. A report to the North Dakota Economic Development Commission (Grand Forks: Bureau of Business and Economic Research, College of Business and Public Administration, University of North Dakota). pp. 16, 22, 30.

¹⁰¹ Grand Forks Herald, Dec. 29, 1957.

Several important government actions taken in 1957 were directly related to the state's oil industry. The state legislature had met during the year and raised the tax on oil to 5 per cent.¹⁰² In May the North Dakota Industrial Commission authorized the first dual-completion in the history of the state.¹⁰³ This went to Pan American for its No. 1 George Lewis in McKenzie County which started producing from the Sanish-Mississippian formation.¹⁰⁴ Pan American had testified that nearly \$100,000 could be saved in this area by drilling one well to both formations rather than two. It was thought comparable savings could be realized in other areas by similar completions, and by the end of the year there were ten wells recorded as dual-completions.¹⁰⁵

Further action involving the commission concerned unitization.¹⁰⁶ The purpose of unitization is to get the maximum recovery from a field by restoring energy (either water or gas) necessary to get the oil out of the ground from productive formations. Consequently, a water-flooding program of major proportions was being planned by the operators of the Beaver Lodge and Tioga fields which would effect more than

¹⁰² Williston Plains Reporter, June 14, 1961.

¹⁰³ Dual completion involves the production of oil from two different formations through two separate strings of pipe but in one well.

¹⁰⁴ Williston Basin Oil Review, June 1957, p. 8.

¹⁰⁵ Grand Forks Herald, Dec. 29, 1957.

¹⁰⁶ Unitization involves the operation of a field as though only one operator and one royalty owner were involved. It results from an agreement between operators whereby they share costs and profits, and between the royalty owners by which they share royalty proceeds. Each participates in a unit according to a formula based on the amount and characteristics of his holdings.

half of the state's producing wells. This project, which was expected to be brought before the Industrial Commission sometime in 1958, would enable some twenty oil operators in the two fields to inject salt water into the producing formations through abandoned or specially drilled wells around the perimeters of the two fields. This water would push the oil into producing wells on the interior.¹⁰⁷ And since this movement would cross property lines, some voluntary agreement would be necessary to insure that each owner of oil or gas interests would receive his equitable share of the proceeds. By the end of 1957 a formula had been worked out, and a majority of the participants had already signed the agreement. Because unitization would benefit all parties¹⁰⁸ and was also a practice of conservation, State Geologist Wilson Laird gave the proposal wholehearted support.¹⁰⁹

After its discovery of oil in a deep-test well in Montana, Amerada continued drilling for oil in the lower formations. In 1957 Amerada set a new state depth record of 14,828 feet in a well which cost \$750,000. While this deep well was a dry hole, Amerada did bring in four others which were producers from the deeper formations.¹¹⁰ One of these, in the Beaver Lodge area, was termed the most fabulous

¹⁰⁷ The salt water comes from wells in the area maintained for this purpose.

¹⁰⁸ N. Dak. Chief Petroleum Engineer Clarence B. Folsom said that fractures in the Madison enabled about 30 per cent recovery. By pumping in water this could be raised to 70 per cent. Interview, July 10, 1961.

¹⁰⁹ Grand Forks Herald, Dec. 29, 1957.

¹¹⁰ Ibid.

well in the history of the Williston Basin. This well, drilled to 13,615 feet, produced commercially from the Ordovician, Silurian, Devonian, and Mississippian formations. The oil from the lower formations had a very high gravity rating.¹¹¹

These developments, plus the discoveries of new formations known to produce oil in widely scattered areas in the state, made 1957 particularly notable in the history of development.¹¹² The significant gains of 1957 are shown by Table 8.

TABLE 8
Drilling Statistics, 1956 and 1957^a

<u>LOCATIONS</u>	<u>1956</u>	<u>1957</u>
Antelope oil	9	19
Beaver Lodge oil	3	6
Blue Buttes oil	35	40
Cappa oil	31	13
Charlson oil	25	8
Lignite oil	0	13
Newburg oil	0	7
Tioga oil	28	16
Other oil	36	39
Wildcats dry	72	122
Beaver Lodge dry	2	1
Tioga dry	3	0
Others dry	15	16
Totals	259	300

^aTotals for 1956 from Williston Basin Oil Review, Feb. 1957, p. 16.
Totals for 1957 from Williston Basin Oil Review, Feb. 1958, p. 16.

¹¹¹Williston Basin Oil Review, June 1957, p. 8.

¹¹²Carter Oil had made a discovery in Bowman County which was expected to bring exploration to that area. Ibid., Jan. 1958, p. 16.

In 1957 there were a record number of wildcats which brought in twenty-three discoveries. Unfortunately the local marketing picture had not improved and these additional discoveries did nothing to help the situation.¹¹³ Monthly production figures which totalled 13,208,275 barrels from 47 pools are shown in Table 9.

TABLE 9
Monthly Oil Production, 1957^a

January	. . . . .	1,250,472 barrels
February	. . . . .	1,138,392
March	. . . . .	1,265,406
April	. . . . .	838,494
May	. . . . .	1,186,353
June	. . . . .	1,147,093
July	. . . . .	1,191,515
August	. . . . .	1,207,587
September	. . . . .	779,955
October	. . . . .	822,795
November	. . . . .	1,178,239
December	. . . . .	1,201,974

^aWilliston Basin Oil Review, April 1958, p. 7.

Cumulative production for the state since discovery was 40,524,517 barrels as of April 1, 1957. Table 10 shows the counties which had produced this oil.

TABLE 10
Cumulative Oil Production by Counties
to April 1, 1957^a

Bottineau	. . . . .	889,762 barrels
Billings	. . . . .	605,246
Burke	. . . . .	308,991

¹¹³Ibid., May 1958, p. 4.

Divide	13,324 barrels
McKenzie	4,153,573
Mountrail	7,564,281
Renville	13,973
Stark	6,905
Ward	0
Williams	26,968,462

^aWilliston Basin Oil Review, August, 1957, p. 38.

The year 1958 presented a relatively healthy picture. The drilling emphasis, as the year wore on, was in McKenzie, Bottineau, and Burke counties. Wildcatting was concentrated along the northern and western tier of the states. There were also reports that the national crude-market picture was becoming adjusted, and this added to the general healthy condition.¹¹⁴ By May there were about 1,100 producers in the state with 600 wildcats and development wells that were dry. In McKenzie and Williams counties the hope for deep production became more of a reality as successes in the Ordovician and Silurian together with successes in the Devonian and Cambrian formations were experienced. More than forty-five rigs were running in the state, and as the number of wells increased, the discoveries seemed to increase proportionately.¹¹⁵

In March 1958, the Industrial Commission ordered the unitization of the two major fields, Beaver Lodge and Tioga.¹¹⁶ It was thought that injection of water would provide an additional \$300 million in oil revenue. The Industrial Commission had taken the

¹¹⁴Ibid., July 1958, p. 5.

¹¹⁵Ibid., May 1958, p. 4.

¹¹⁶The areas included here were Tioga with 23,449 acres and Beaver Lodge with 16,987 acres. Ibid., Aug. 1958, p. 49.

program under advisement, and at this time ordered the program to be launched.¹¹⁷

As 1958 wore on, the national business recession slowed things up a bit, and the hope for a Great Northern pipeline from North Dakota to the Great Lakes was still unrealized. In addition to this the marketing-price situation in the northern counties had not improved either. Aside from these factors, the oil industry continued to expand during the year. As warm weather brought intensified wildcatting, the rate of discovery in the state continued to be good. The general activity seemed to be centered into three main areas. The first area was the extension of the Lignite Field where north-central operators had substantial success. This is related to the Bottineau-County fields which are shallow and productive. The second area was the southwestern part of the state where Scoria Field and Rocky Ridge Field showed considerable promise. The third area of the state was the northwestern part around the Nesson Anticline. Here there were not only continued developments of the Madison formation but also the deeper formations. The capabilities of these various layers, which were becoming targets for oil hunting, were becoming clearer as more and more of these zones started producing. One Bismarck geologist said: "Seventy-five per cent of the Paleozoic rocks in North Dakota either are productive

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Williston Plains Reporter, June 14, 1961.

now or will be found to be productive in the next five years of drilling.¹¹⁸

Outpost wells were successful in several fields in Divide County. The northern end of the Tioga Field in Burke County had now moved into Divide County and it appeared that there would be continuous production on the Nesson Anticline for seventy miles when it was all drilled. It was also anticipated that the exploratory trend to the southeast from this area would continue extending through Ward and McLean counties. This trend had started from southwestern Saskatchewan in 1955 and had continued as time went on.¹¹⁹

In the Fryburg Field in Billings County, production was found in the Heath and Madison formations. A Heath formation discovery was made to produce in the Dickinson (Madison) Field in Stark County.¹²⁰

The overall activity in 1958, as in other years, seemed to emphasize the tremendous amount of acreage available for exploration in the state. The vastness of this area is difficult for one to comprehend who is not familiar with the wide open spaces of North Dakota.

With the discovery of more wells and the increase of production, the state was also benefiting more from the gross production tax. By the fall of 1958 the tax revenue in the state was averaging \$2 million annually.¹²¹

¹¹⁸Williston Basin Oil Review, May 1958, p. 4. ¹¹⁹ Ibid.

¹²⁰ Ibid.

¹²¹ Williston Plains Reporter, June 14, 1961.

By the end of 1958 the state had 1,139 producing wells which had produced 64,340,131 barrels of crude since discovery. Exploration had been carried out with considerable success and had brought in twenty-two discoveries during the year, with a success ratio of 19 per cent.¹²² Cumulative production totals are shown in Table 11.

TABLE 11

Cumulative Oil Production by Counties
to End of 1958^a

Billings	1,160,629 barrels
Bottineau	2,341,535
Bowman	15,213
Burke	1,852,617
Divide	162,648
McKenzie	10,816,158
Mountrail	10,625,567
Renville	45,745
Stark	43,285
Ward	2,999
Williams	37,273,734
Total	64,340,131

^a Williston Basin Oil Review, May 1959, p. 24.

In the spring of 1959 the Williston Basin had the largest number of development wells either scheduled or drilling since discovery. This was a reflection of the activity that had been going on in the latter part of 1958. In North Dakota the rate of discovery continued to be good even after eight years of intensive development. In McKenzie and Williams counties deep drilling continued. Divide County was having increased activity, and southwestern North Dakota was in

¹²² Williston Basin Oil Review, Jan. 1959, p. 17.

for further drilling in 1959. There was more drilling going on during early 1959 than was usual for that time of year due to the fact that the snow had gone early. Also the trend for wider spacing, which had begun earlier, resulted in more wildcats being drilled over a greater area.¹²³

During the first six months of 1959 there were 247 wells drilled in the Williston Basin as compared with 206 drilled in the same period in 1958. This intensive activity was the beginning of a record year, and this active campaign was also reflected in the North Dakota part of the Basin.¹²⁴

In the fall of 1959 Amerada hit oil in Dunn County and added the twelfth county to the producing list. Toward the end of the year Shell found oil in the Rough Rider Field and brought in the seventy-seventh oil field in the state. Amerada's deep-drilling campaign continued and on December 24, set a new depth-drilling record for the state with a 15,013-foot well in McKenzie County.¹²⁵

A rather unusual development in 1959 was the discovery of oil in Lignite, a small village in Burke County, which became the only town to have an oil well within its city limits. I. J. Wilhite, a Bismarck oil operator,¹²⁶ had put together the drilling deal and

¹²³Ibid., May 1959, pp. 11, 22. ¹²⁴Ibid., Aug. 1959, p. 16.

¹²⁵Williston Plains Reporter, June 14, 1961.

¹²⁶Wilhite's project took two years as he had to contact owners of the 218 lots in the town when he leased 160 acres of which Lignite was a part. Many landowners were difficult to convince, and when oil was found, the residents could not agree what should be done with the royalties. The mayor and others were for civic improvements, such as a swimming pool. Meanwhile, the city fire department had been realizing a profit from the city water well used by the drilling companies.

shared the revenue from the well with Great Northern and the three hundred residents of the town.¹²⁷

Year-end totals showed that North Dakota had nineteen discoveries in 1959.¹²⁸ The state now had 77 oil fields and 1,440 producers. Gas and oil sales were valued at \$48.4 million.¹²⁹

During 1960 there was more evidence of importance strategic traps on the east side of the Basin. Few tests had been made in this area which lies south and east of a line from Minot to Devils Lake and Minot to Bismarck. A discovery east of this line would spur oil activity.¹³⁰

An important development of 1960 was the discovery of oil by Cardinal Petroleum in McHenry County making it the thirteenth producing county in North Dakota. Other developments of this year concerned the beginning of a heavy-crude pipeline to be constructed by Service Pipeline. The successes of the deeper formations, where the heavy crude was found, made such a project feasible. This gathering system would serve thirty-one separate Devonian leases in the Beaver Lodge area. The Devonian oil is thick and will not pour readily; consequently it needs special handling. This oil is moved

The city had made \$10,000 in two years after buying the well from the Great Northern Railroad for \$1.00. Williston Basin Oil Review, Sept. 1959, p. 23.

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Ibid.

128

Ibid., Jan. 1960, p. 7.

129

Williston Plains Reporter, June 14, 1961.

130

Williston Basin Oil Review, May 1961, p. 22.

through a heavy pipeline to a central point where it is blended with a lighter oil, and is then moved to market.¹³¹

By 1960 the state had been a center of the oil business for nine years. During this period, because of rapid development, North Dakota had moved from twenty-third to tenth place among oil-producing states.¹³² Yet in spite of spectacular past development, the oil industry still had before it tremendous opportunities in the future. Figures published in August 1960, listed the state's oil reserves at 1,343,000,000 barrels. Broken down into respective areas the figures showed the following: Beaver Lodge and Tioga Madison formation (primary and secondary) 291,557,000;¹³³ other Nesson fields from the madison formation 306,470,000; additions by current 1959-60 extensions 48,000,000; McKenzie County Devonian and Silurian formations 2,000,000; southwestern North Dakota 5,500,000; Bottineau and Renville counties 41,000,000; Burke County (Rival and Lignite fields) 17,000,000; Secondary recovery in the Madison formation for main fields on the Nesson Anticline including Tioga and Beaver Lodge 327,000,000 barrels.¹³⁴ Official reserves put North Dakota in eleventh place among oil producing states.¹³⁵ Compared to this is an unofficial estimate by some that the state had a reserve of 2.5 billion barrels which would put North Dakota next to Texas and California.¹³⁶

¹³¹Williston Plains Reporter, June 14, 1961.

¹³²Williston Basin Oil Review, April 1960, p. 24.

¹³³Primary reserves are those removed either by flowing or pumping, while secondary use gas or water injection.

¹³⁴Ibid., Aug. 1960, p. 6. ¹³⁵Geology department figures.

¹³⁶Williston Basin Oil Review, June 1961, p. 16.

The totals for 1960 showed that 259 wells had been drilled in the state and about 20 million barrels of oil produced during the year. With over 1,500 producers since discovery, the state's success ratio was close to 62 per cent.¹³⁷ In addition to the oil, the state produced 15 billion cubic feet of natural gas in 1960.¹³⁸ Ten new fields were opened during the year. These fields were located in the following counties: two each in Bottineau, McKenzie, and Renville; and one each in Billings, Bowman, Burke, and McHenry.¹³⁹

Cumulative production for the state to December 1, 1960 totaled 102,065,730. Counties producing this oil are listed in Table 12.

TABLE 12

Cumulative Oil Production by Counties
to December 1, 1960^a

Billings	1,960,116 barrels
Bottineau	6,323,229
Bowman	68,894
Burke	8,378,740
Divide	866,623
Dunn	30,995
McHenry	6,570
McKenzie	21,356,446
Mountrail	13,569,892
Renville	934,016
Stark	57,949
Williams	48,512,260

^aWilliston Basin Oil Review, March 1961, p. 5.

¹³⁷Williston Plains Reporter, June 14, 1961.

¹³⁸Williston Basin Oil Review, Feb. 1961, p. 18.

¹³⁹Ibid., p. 13.

By contrast with other years, the winter of 1960-1961 was one of the Basin's most inactive. The reasons were lack of adequate, expanding market, and the Great Northern Pipeline was still only a dream. Lack of another thirty-thousand-barrel refinery also held production down. Other reasons for the inactivity were the lack of additional discoveries and the business recession of 1960. There was more emphasis on exploration by independent organizations and by farmouts.¹⁴⁰ Additional Devonian exploration, which had been expected was slowed up because such wells were deep and expensive. Moreover there was need of adequate markets to handle the huge Devonian reserves.¹⁴¹ Several major oil companies had closed their Bismarck offices, and the state oil operations was increasingly managed from Casper and Denver.¹⁴²

Production of gas from the deeper reserves in the Beaver Lodge was expected later in 1961. Government action at the state and local levels, and marketing conditions were the key to initial production. Montana Dakota Utilities had applied for a certificate of necessity from the Public Service Commission to build a gas pipeline from Minot to Bismarck. It was hoped that the pipeline would be completed by fall. Government action was also the key to whether Silurian oil production would start from the Beaver Lodge Pool before

¹⁴⁰ If an oil firm does not wish to drill for oil in an area it has leased it may "farmout" the right to drill to another operator and retain some of the interest if oil is found.

¹⁴¹ Ibid., May 1961, p. 22.

¹⁴² Ibid.

the end of 1961. Amerada wanted wider spacing in the deeper formations because of the tremendous expense in drilling these wells. Spacing in the Beaver Lodge Field was on an 80-acre pattern. Regarding the deeper formations in the Beaver Lodge Field, Amerada wanted 160-acre spacing in the Devonian, which had 32 wells drilled; and 320-acre spacing in the Silurian, which had 22 wells drilled.¹⁴³

Production per month in early 1961 was running close to 2 million barrels. Production figures for January 1961, which totalled 1,989,214 barrels, are shown in Table 13.

TABLE 13.

Monthly Production Figures by Counties,
January 1961^a

Billings	37,115 barrels
Bottineau	283,062
Bowman	17,337
Burke	354,628
Divide	41,218
Dunn	6,832
McHenry	1,090
McKenzie	506,247
Mountrail	124,598
Renville	90,559
Williams	526,718

^aWilliston Basin Oil Review, May 1961, p. 13.

In early 1961 Hunt struck oil just south of the town of Grenora in Williams County. As this well promised oil in many remote areas of western Williams, Divide, and McKenzie counties, it was hoped that a vast new oil play would be brought into being.¹⁴⁴

¹⁴³Ibid., p. 4.

¹⁴⁴Williston Plains Reporter, June 14, 1961.

During the first half of the year there were three areas of intense speculation. These were the Nesson Anticline, the north and central part of the state, and the southwestern part of the state which observers felt has a greater potential than it has shown.¹⁴⁵

By April 1, 1961, the North Dakota oil industry was ten years old. The overall survey of the state's oil industry now showed eighty-nine pools in thirteen counties from these horizons or producing formations: Heath, Spearfish, Madison, Ordovician, Devonian, Silurian, and Precambrian. Official figures show 237,270 proven acres and 1,534 producing wells for an average of 107 barrels per acre-foot, and an average of 401,000 barrels per well. Unofficially, the state's reserve potential stood at over 2 billion barrels.¹⁴⁶

Cumulative production figures to April 1, 1961, had reached 110,160,633 barrels of crude. The counties producing this oil are shown on Table 14.

TABLE 14

Cumulative Oil Production by Counties
to April 1, 1961^a

Billings	2,129,462 barrels
Bottineau	7,395,763
Bowman	131,024
Burke	9,761,497
Divide	1,031,495
Dunn	66,714
McHenry	10,641
McKenzie	23,487,330

¹⁴⁵ Williston Basin Oil Review, June 1961, p. 10.

¹⁴⁶ Ibid., p. 44.

Mountrail	14,097,765 barrels
Renville	1,318,240
Williams	50,669,751

^aWilliston Basin Oil Review, Aug. 1961, p. 29.

In the long run, the benefits the state derives from the oil industry will depend on the amount finally discovered, the efficiency of recovery (maintaining pressures), and the improvement of the market picture. To help develop the industry the state needs sales talk. Many investors do not know of the state's reserves, its discovery allowables, and its new records for total production which are being set each succeeding year.¹⁴⁷ If the state can successfully present its promising oil potential, it is quite possible that the search for oil in North Dakota will still be going on by the turn of the century.¹⁴⁸

¹⁴⁷For the past seven years the state has said that the first four oil wells on a new field could run two hundred barrels per month for eighteen months if the reservoir was not injured. Ibid., p. 30.

¹⁴⁸Ibid., p. 9.

CHAPTER IV

ECONOMIC IMPACT

In the spring of 1961 the people of one of North Dakota's oil capitals, Williston, planned a big celebration commemorating the tenth anniversary of the discovery of oil in the state.¹ Williston had much to celebrate as, indeed, did the entire state. Since April 1951, 2,806 wells had been drilled in the state for a total drilling depth of 19,525,674 feet or 3,698 miles.² In these first ten years oil pools in thirteen counties had produced a total of 110,160,389 barrels of crude valued conservatively at more than \$280 million. Table 1 shows the value of oil production from 1951 to 1960.

TABLE 1

Value of Annual Oil Production^a

1951	\$53,000
1952	\$3,207,000
1953	\$10,552,000
1954	\$13,076,000
1955	\$35,228,000
1956	\$40,180,000

¹ There are three cities which claim the distinction of being North Dakota's Oil Capital. First there is Bismarck which has a number of oil companies located there. Williston is the supply-store capital and has many nationally known oil-field firms. But the true capital, production wise, is Tioga, which has several oil firms employing large numbers of people.

² The Williston Petroleum Picture, a supplement of the Williston Plains Reporter, June, 1961.

1957	\$41,614,000
1958	\$44,240,000
1959	\$44,679,825
1960	\$52,502,000

^aGeology department figures

In addition to the royalty money received, the state had also benefited from lease and bonus money, growth of related industries, building and construction, road improvements, and many other benefits which changed the economy and employment picture in the state.

The first benefits had come to North Dakota from the accelerated leasing program of 1948 to 1952. At the start the usual rental was small, only \$0.10 per mineral acre and little or no bonus. The trend, however, was upward until 1952 when the usual payment was \$1.00 per acre plus bonuses of from \$1.00 to \$100.00 per acre with an average of \$4.57. The prices for the sale of mineral rights ranged from \$1.00 per mineral acre to nearly \$2,000, depending on the location with respect to wildcat drilling, producers, speculative activity, and the landowner's knowledge of the current market for mineral rights.³ Before 1951 sales were generally \$10.00 per mineral acre outside the oil field area, while after discovery the prices ranged from a few dollars to \$200.00 with the majority selling for less than \$20.00⁴

The leasing picture was also changed by the 1951 strikes.

³There were several cases where owners refused even higher prices. Voelker, Mineral Rights and Oil Development, p. 42.

⁴Ibid., pp. 4-5.

Lease scouts flocked to the state to buy and lease all over the Basin. This competition pushed up the rates and the speculative fever held until 1952.⁵ Amid all this speculation farmers and landowners were greatly confused and many made bad deals. Some were actually victimized.⁶ In many cases brokers were able to resell for two to ten times what they had paid landowners.⁷

Other aspects added to the complexity of the situation. Some farmers had for many years bought and sold land without regard to mineral rights. Many had lost their land during the depression years and others had sold submarginal land to the government without regard to their mineral rights. In addition to making bad deals in leasing their land, farmers were not aware of the full meaning of various instruments pertaining to mineral rights which they were asked to sign. They did not realize that the owner of mineral rights, in this case the oil companies, had preference in any conflict, both economic and legal. For example, oil companies have the right to use as much of a tract as they had leased for drilling, producing, and marketing. They are limited only by stipulation in the lease and are responsible only for damage to growing crops and improvements. The acreage per well was usually from two

⁵Ibid., p. 7.

⁶In the winter of 1951 several landowners who were uninformed deeded half their mineral rights to two lease scouts for \$50.00 per mineral quarter. When these transactions were reported in a local newspaper, public indignation ran high. This incident dramatized the need for informing landowners about the legal and economic aspects of leasing. Such action was subsequently taken by local attorneys, radio stations, newspapers, and county agricultural extension agents. Ibid., p. 42.

⁷Ibid., p. 7.

to four acres and seldom was over ten acres.⁸ Usually the farmers did not quibble when a well went in because they saw the possibilities of royalties. But when a dry hole resulted, landowners were somewhat critical of the compensation they had been paid. In such cases the topsoil is disturbed and this results in the loss of crop production for several years. Even when oil was discovered, farmers found that they had to make adjustments, for within the oil fields the land loss is permanent.

While there was bitterness for some, to most landowners the oil activity meant wealth. As the years went by, nearly all farmers in the state were affected, for the oil play was present throughout most areas. By January 1954, 67 per cent of the land area of North Dakota⁹ was under oil or gas lease.¹⁰

During the peak activity of the years after discovery, the largest lease holdings in the United States' side of the Williston Basin were held by the following companies: Shell had six million acres; Standard of New Jersey had four million; Atlantic Refinings (in the U.S. and Canada) had three million; Phillips Petroleum had two million; Amerada had two million; Socony Vacuum had one-and-a-half million; and Union Oil of California had one-and-a-half million. Others holding over a million acres were Sinclair, Gulf Oil, Ohio

⁸Ibid., p. 52.

⁹Oklahoma, a state of similar size, had 39 per cent of its area under lease. Campbell, Williston Report, p. 103.

¹⁰Ibid.

Oil, Sohio Petroleum, and Tidewater Oil. All told there were substantial holdings by thirty major and twenty-five minor companies. In the Beaver Lodge Pool, where the initial production was found, Amerada held 29,120 acres under lease followed by Hunt Oil with 3,640 acres. Phillips, M.B. Rudman, California Company, and others also held leases in this area.¹¹

Amerada not only played a decisive role here but also in other areas of the state.¹² By mid-1956, of the 669 wells producing, 533 were drilled on leases held by Amerada. Eight out of every ten barrels produced before 1956 came from Amerada wells.¹³ Amerada produced 84 per cent of the state's 85 per cent oil output which came from Beaver Lodge and Tioga fields.¹⁴

In addition to the lease and bonus payments, oil companies spent millions on the actual search for oil in North Dakota. Wildcat drilling in this state is among the highest priced in the United States.¹⁵ Some of the reasons for this are the lack of oil-field supplies, the distances to the service companies, and the depth of the wells. Winter weather also made for extra expense to the drilling

¹¹ Williston Basin Oil Review, March 1952, p. 3.

¹² Many people felt that Amerada followed a conservative policy in developing the state's oil industry. This seems to be true and in the long run was to Amerada's advantage in the power struggle for favorable legislation.

¹³ The success which Amerada experienced had tremendous influences on its stock value. If a speculator had purchased one-hundred shares of stock for \$93.00 each, he would have received two hundred shares when Amerada's stock was split. If he had sold them for the \$179 closing price of February 16, 1952, he would have received \$35,800 for a profit of \$26,300 on his original investment of \$9,300. Ibid., p. 4.

¹⁴ Campbell, Williston Report, p. 104.

¹⁵ Contributions to Geology, p. 105.

companies. Lease roads had to be graded to locations before frost time. In the field, locations for wells to be drilled were also graded. Rigs had to be enclosed on four sides as were the mud pits and other structures. The rigs must be equipped with boilers to provide the steam which keeps the pipes from freezing. When the temperature drops below zero, every water pipe is protected by the steam pipe.¹⁶ The cost of running the boiler to provide the necessary steam alone costs \$100 daily. To handle the extra work, another man is added to the crew. In addition, a bunkhouse and sleeping quarters for ten men is supplied. If the snow is deep, a power wagon with four-wheel drive is provided.¹⁷ On the whole, drilling operations in the state are somewhat reduced due to winter weather.

Because of the importance of the roads in bringing in supplies, there was considerable construction in the oil-producing areas. Nearly two hundred miles of all weather roads were added between April 1951 and July 1954. These were county and township roads in addition to "well-access" roads. The latter were, of course, built by the oil companies.¹⁸ Maintenance was expensive, as the roads suffered damage due to the number and weight of the vehicles. The operational expenses alone had reached \$33 million annually by 1954.¹⁹

¹⁶Estimated annual cost of maintaining a well in this area is \$10,000, most of which comes as a result of the rigorous climate. Laird and Folsom, Nesson Anticline.

¹⁷Williston Basin Oil Review, Nov. 1953, pp. 40-41.

¹⁸Campbell, Williston Report, p. 12.

¹⁹Ibid., p. 106.

The state did not actually benefit greatly from this outlay of money, for the labor costs were small in comparison with the supplies and machinery. Of the amount spent for such goods, only that portion used for transport or distribution benefited the local economy. As time went on, however, and associated facilities were set up, the state benefited more and more. By 1958 the oil industries had spent more than \$600 million in the state. This even exceeded the amounts spent to construct the air bases at Minot and Grand Forks and the Garrison Dam.²⁰ The latter two, of course, created more jobs and spending within North Dakota.

The oil industry was not only injecting money into the agricultural economy but also bringing about growth in new industries and new possibilities for the state. The most important of the industries allied to the oil production were the refineries. At first the oil field development had been hampered by the lack of marketing facilities and inadequate pipelines. Rail rates were higher than pipeline movements, and this resulted in lower crude prices. Another problem was presented by the fact that the state had no heavily populated consuming areas nearby. It was too far to send the oil to the consuming areas on the East Coast, while the South and West already had their producing areas. Therefore the state had to find markets in neighboring states to the east. It was thought that the construction of pipelines and refineries in the state would solve these problems. But as more and more producers were brought in, these facilities proved inadequate with

²⁰Williston Basin Oil Review, Sept. 1959, p. 19.

a resulting reduction of production.

Most of the oil produced in North Dakota goes to four places: Mandan; Wrenshall, Minnesota; Superior, Wisconsin; and Williston, North Dakota. For marketing purposes the state is divided into districts. District One includes all the fields on the Nesson Anticline and the fields in southwestern North Dakota. Nearly all this oil is refined at Mandan. These wells are prorated because their production exceeds demand. District Two includes fields along the Canadian border. Its marketing area is chiefly to the east, in Minnesota and Wisconsin with some at Williston. The wells in this district are prorated only on Maximum Efficiency Recovery because their market exceeds their productive capacity. Oil here sells for less because of competition from Canada and other sources. The cost of sending it by rail is more than for the piped Canadian oil. In late 1959 a new market for oil was found at Glendive, Montana. The fields in southwestern North Dakota were placed in this district and as of January 1, 1960, this district was not prorated.²¹

The crude is produced according to anticipated monthly demand following hearings by the Industrial Commission determined by the various users of oil. These users come to the meeting and petition the Commission for the use of so many thousand barrels of oil per day. In this manner the operators know one month in advance how much oil they

²¹Clarence G. Carlson, Wallace E. Bakken, and Jack Kume, Subsurface Geology and Development of Petroleum in North Dakota, North Dakota Geological Survey, XXXIV (Grand Forks: University of North Dakota, 1960), pp. 140-41.

may produce from a specific well. In the interest of efficiency, the well is allowed to produce its monthly quota within a short time and therefore the wells are active only a few days each month.²²

Of the refineries operating in the state, by far the largest is located at Mandan. This refinery is rated at 40,000 barrels daily but can handle up to 48,000 barrels daily for short periods of time. It employs over 300 people with an annual payroll of about \$1.5 million. Its crude comes by the Service Pipeline from the Nesson Anticline and is turned into gasoline, distillate fuels, furnace oil, heater oil, diesel fuel, kerosene, and liquified petroleum gas (LPG). There are local markets for all these products and the surplus is sent via pipeline to Moorhead, Minnesota.²³ The importance of the Mandan refinery to the state's economy is pointed up by the fact that in 1955, when the refinery began taking on about a million barrels a month, it meant a payment of some \$3 million monthly or \$36 million annually for crude oil. This compares favorably with the value of the 1953 corn crop (\$33 million), and the value of the 1953 spring-wheat crop (\$187 million).²⁴

At Williston is located the refinery now under the operation of the Westland Oil Company of Minot, North Dakota.²⁵ The company

²² Ibid. ²³ Williston Basin Oil Review, Nov. 1957, p. 10.

²⁴ Ibid., Jan. 1955, p. 8.

²⁵ In the summer of 1959 Governor Davis announced that plans were made to erect a liquid petroleum gas and storage depot here. This would be available to all bulk distributors of propane, butane, and hydrocarbon in the U.S. and Canada. Storage capacity for requirements were expected to be around two million barrels over the next five to eight years. Ibid., July 1959, p. 3

markets the products by its own marketing organization. The Westland plant employs over 40 people with an annual payroll of around \$220,000. Its crude comes from northwestern Montana and Burke County by tank transport.²⁶ It has been operating at 2500 barrels per day and has added several other facilities including a plant to make jet fuel. A total of 50,000 barrels storage was built primarily for the jet fuel.²⁷

Another market is the Signal Oil and Gas plant located at Tioga. Completed in 1955, it purchases natural gas from fields which include Tioga, Beaver Lodge, Capa, Hofflund, Charlson, Antelope, and Blue Buttes. In 1960 the company was processing about 45 million cubic feet of gas per day.²⁸ Products produced by the plant include propane, butane, gasoline, crude sulfur, and residue gas. The company employs over 40 people with an annual payroll of \$210,000.²⁹

For a time the Dickinson refinery provided a market, but it was declared bankrupt in 1958 after five years of operation. One year later it was sold for \$126,000. At the time of voluntary bankruptcy the plant had assets of \$166,000, liabilities of \$750,000, and an appraised value of \$266,554. Future plans are to reopen this refinery to produce jet fuel.³⁰

The storage capacity was to be provided by using the cavities created from salt production near Williston. For each fifty thousand tons of salt, space would be created for one hundred forty thousand barrels of LP gas. This gas was formerly flared off. Ibid., Oct. 1960, p. 18.

²⁶Ibid., Nov. 1957, p. 10. ²⁷Ibid., Jan. 1961.

²⁸Ibid. ²⁹Ibid., Nov. 1957, p. 12

³⁰Ibid., Aug. 1960, p. 45.

Marketing facilities continued to expand. In 1961 O.L. Olsen and Company announced that it would build a refinery for Lyda Hunt-Herbert trust et al at McGregor. This plant would process natural gas from pools in Burke, Divide, and Williams Counties. Gas from these pools has been flared.³¹ Another development of 1961 was Montana Dakota Utilities' announcement of a planned pipeline connecting Minot and Bismarck. This pipeline would cost \$4.5 million and would make new deep gas reserves in the Tioga area available to the company's system. The line was intended to serve small communities and to assure western North Dakota of an ample transmission capacity.³²

Through the efforts of the state's refineries, North Dakota began exporting gasoline in 1960. Prior to that time it had consumed more than it had produced.³³

The effects of the expanding oil industry is also seen in employment. In 1951 the oil industry employed 177 people. This figure rose to 912 in 1952, 1,351 in 1953, 1,408 in 1954, 1,162 in 1955, 1,176 in 1956, 1,310 in 1957, 1,876 in 1958, 1,777 in 1959, and 1,271 in 1960.³⁴ Table 2 on the following page shows comparison employment figures for the first ten years of oil activity in North Dakota. The figures show a substantial increase as the industry expanded. Although total number employed remained only

³¹Ibid., June 1961, p. 25. ³²Ibid., Feb. 1961, p. 23.

³³Ibid., June 1961, p. 87.

³⁴U.S. Department of Labor statistics, Unemployment Compensation Division, Bismarck, North Dakota. These figures include only that employment covered by the N. Dak. Unemployment Compensation Law.

TABLE 2

Oil Employment as Compared to Employment in Other Areas^a

Annual Averages

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Oil Industry	177	912	1,351	1,408	1,162	1,176	1,310	1,876	1,777	1,271
Construction	8,530	8,400	8,580	10,500	8,440	9,600	10,350	10,330	11,410	9,900
Manufacturing	6,270	6,620	6,540	6,580	6,620	6,670	6,580	6,710	6,750	6,550
Transportation and Public Utilities	14,380	14,330	14,540	14,030	14,120	14,030	13,630	12,690	12,890	12,800
Trade	35,800	36,980	37,170	36,520	36,510	37,410	36,790	36,190	37,310	37,280
Finance, Insurance, and Real Estate	3,790	4,120	4,450	4,640	4,740	4,920	4,690	4,660	4,960	5,110
Service (Excludes Domestic)	12,770	13,140	13,390	13,930	14,550	15,540	16,240	17,170	18,510	18,970
Government	24,800	25,430	25,640	26,100	26,420	26,940	28,200	30,260	31,280	32,090
Total Nonagricultural Employment	107,330	110,930	112,690	114,520	113,420	117,100	118,490	120,400	125,420	124,570

^aU.S. Department of Labor Statistics, Unemployment Compensation Division, Bismarck, North Dakota

about 1 per cent of total non-agricultural employment, other economic effects were much more substantial.

The new industry had effects on transportation companies. The railroads, for example, profited from expanding production in that they were playing an important part in the transporting of crude oil.³⁵ Tank carloads of oil increased proportionately to the discovery of new wells in the state. Table 3 shows the effects of oil development on the four railroads which handled North Dakota crude. The total figures for other products shipped include only the freight carried by these four railroads and are not the total for all railroads in the state. With the construction of pipelines the rail freight on oil was reduced. However, as oil was discovered in new areas not serviced by pipelines, and as production of oil increased crude shipments by rail also increased. By 1960 North Dakota railways handled 22,834 carloads of crude originating in the state. This was nearly half the number of carloads of wheat shipped during the same period, and is a substantial amount of the total freight originating in North Dakota.

Obviously the greatest effects of the oil industry would be in the impact areas, the areas where the oil was discovered and being produced. These towns saw tremendous changes, some of which brought problems not easily solved. In the early years of discovery, leaseholders had swarmed over the region to assemble lease blocks and checkerboard potential hotspots. The landscape changed as drillers and geophysical

³⁵The railroads are also large landholders and therefore benefited from the actual leasing and oil production. It is estimated that the Northern Pacific is the third largest landholder in the basin. It owns outright or has mineral reservation on 3,200,000 acres. Ibid., April 1952, p. 8.

TABLE 3

Carloads of Some Leading Items of Revenue Freight Originating
on Oil Carrying Railroads in North Dakota, 1952-1954^a

1952

Items	Great Northern	Northern Pacific	Soo Line	Milwaukee	Carload Total
Crude Petroleum	5,361				5,361
Gasoline	4,708	4,799	1	1	9,509
Lignite Coal	11,586	17,058	11,537	3,222	43,403
Wheat	28,695	16,184	14,521	5,929	65,329
Barley	9,724	4,397	2,658	491	17,270
Cattle & Calves	2,353	3,591	961	683	7,588

1953

Crude Petroleum	19,815	2			19,817
Gasoline	4,261	3,981			8,242
Lignite Coal	11,307	15,295	10,593	3,258	40,453
Wheat	19,633	10,314	9,102	3,712	42,761
Barley	9,267	3,986	2,712	251	16,265
Cattle & Calves	2,432	2,590	840	557	6,419

1954

Crude Petroleum	12,687			18	12,705
Gasoline	3,838	3,790			7,628
Lignite Coal	13,223	15,309	10,752	3,096	42,380
Wheat	19,831	11,606	10,535	4,601	46,573
Barley	13,353	5,457	3,841	446	23,097
Cattle & Calves	3,725	3,685	965	902	9,277

^aNorth Dakota Public Service Commission, Railroad Statistics North Dakota Operations (Bismarck, 1952-1954).

TABLE 3

Carloads of Some Leading Items of Revenue Freight Originating
on Oil Carrying Railroads in North Dakota, 1955-1957^a

1955

Items	Great Northern	Northern Pacific	Soo Line	Milwaukee	Carload Total
Crude Petroleum	1,385			193	1,578
Gasoline	3,438	4,847			8,285
Lignite Coal	14,598	16,178	9,990	3,317	44,083
Wheat	22,283	14,670	11,792	4,363	53,108
Barley	15,834	6,391	6,075	722	29,022
Cattle & Calves	3,306	3,311	875	905	8,397

1956

Crude Petroleum	1,567			122	1,689
Gasoline	2,711	4,302	1		7,014
Lignite Coal	13,574	15,892	8,243	3,730	41,439
Wheat	26,681	13,159	12,028	3,386	55,254
Barley	19,305	8,298	7,162	812	35,571
Cattle & Calves	3,682	4,087	851	880	9,500

1957

Crude Petroleum	1,524	10	18	64	1,616
Gasoline	2,122	3,160	1		5,283
Lignite Coal	11,554	13,853	6,999	3,543	35,949
Wheat	29,517	16,433	14,569	3,939	67,558
Barley	15,775	6,394	5,290	574	28,033
Cattle & Calves	3,022	3,518	623	474	7,637

^aNorth Dakota Public Service Commission, Railroad Statistics North Dakota Operations (Bismarck, 1955-1957).

TABLE 3

Carloads of Some Leading Items of Revenue Freight Originating
on Oil Carrying Railroads in North Dakota, 1958-1960^a

1958

Items	Great Northern	Northern Pacific	Soo Line	Milwaukee	Carload Total
Crude Petroleum	5,510	205	300	46	6,061
Gasoline	1,460	3,140			4,600
Lignite Coal	9,520	12,287	6,240	3,417	31,464
Wheat	26,513	15,402	13,187	5,577	60,679
Barley	15,099	7,301	5,188	1,139	28,727
Cattle & Calves	1,777	2,477	265	393	4,912

1959

Crude Petroleum	12,273	28	1,106	17	13,424
Gasoline	1,198	3,395	7		4,600
Lignite Coal	10,571	14,602	6,159	3,251	34,583
Wheat	24,404	12,532	11,469	4,605	53,010
Barley	19,507	6,608	5,854	828	32,797
Cattle & Calves	970	1,996	152	317	3,435

1960

Crude Petroleum	15,052	36	7,746		22,834
Gasoline	1,010	3,652	35		4,697
Lignite Coal	10,013	15,425	5,791	2,850	34,079
Wheat	21,571	12,009	10,923	3,111	47,614
Barley	18,684	5,591	5,119	748	30,142
Cattle & Calves	592	1,000	77	230	1,899

^aNorth Dakota Public Service Commission, Railroad Statistics North Dakota Operations (Bismarck, 1958-1960).

crews sought the fields. At night the countryside sparkled with the gas flares. Steel derricks rose; pipelines were built; loading racks, storage tanks, and warehouses went up. The influx of workers and oil men created a tremendous shortage of housing. Local residents in some cases were resentful especially when the oil companies brought in trained laborers leaving local workers the lower-paying jobs. In the long run, however, the new industry resulted in diversification, more wealth, and a check on the decline of population.

Williston and the immediate surrounding area felt the greatest impact. From 1950 to 1954 the population of Williston gained by 32 per cent, Ray by 100 per cent, Tioga by 450 per cent, and Stanley by 11 per cent.³⁶ Of these immigrants, Williston got the white-collar workers, Ray the transients, and Tioga the permanent field workers.³⁷ Williston, which looked every day as if a convention were in town, had virtually no housing or hotel accommodations to handle the influx of people.³⁸ To increase accommodations, Williston and other towns prepared to offer developments. Because it had the largest influx of population (from 7,358 in 1950 to 12,000 in 1953) Williston felt the greatest impact.³⁹ To meet this rapid growth, many new projects were begun. A dozen draftsmen were busy in city hall, and in 1952, \$480,000 worth of water and sewer lines were put in, and a \$3 million water reservoir as well as

³⁶Campbell, Williston Report, p. 117.

³⁷Ibid., p. 133.

³⁸Grand Forks Herald, April 12, 1951.

³⁹Williston Basin Oil Review, April 1953, p. 21.

\$113,000 worth of street lighting developments were planned for the city. Fifty miles of streets were to be graded and graveled in the city, while the police force increased from three to twelve. To meet the housing demands over two hundred dwelling units were planned for the following spring.⁴⁰ Existing public agencies such as the library, post office, schools, and churches experienced unprecedented strains put on their facilities and staff. The flow of traffic increased greatly. In 1951 traffic between Tioga and Williston was 809 cars daily and this increased to 1,221 cars daily by 1952.⁴¹

Within five years Williston spent \$740,000 on school construction, \$675,000 on church buildings, \$790,000 for a hospital and clinic, and \$500,000 for a new courthouse. Many people complained of the additional taxation to pay for these projects.⁴² In 1952 the city commission held meetings with a federal representative regarding the application for federal aid under the Home Finance Agency and Public Law 139 which grants loans for expansion at a dense rate due to defense effort activity. The town would soon be in the red if some arrangement was not made to adjust municipal income and spending.⁴³

Business also felt the effects of the influx. By 1952 merchants estimated the increase of business from 10 to 20 per cent. Although the rain had come too late that year to help crops, the oil activity had a definite effect. The American State Bank showed gains in deposits of \$2,699,979 in 1952 as compared with the previous year.⁴⁴

⁴⁰Ibid., pp. 22-23.

⁴¹Ibid., p. 21

⁴²Campbell, Williston Report, p. 116.

⁴³Williston Basin Oil Review, Aug. 1952, pp. 16-17.

⁴⁴Ibid.

Other towns in the area had similar problems, although on a smaller scale. In Tioga over twelve housing units were provided by converting grain bins and chicken sheds. One resident commented, "Did you see those grain bins down the street? People are living in these. I don't see how anyone could rent them. They can't be very substantial. They're not very heavy. I sat here one morning and watched two of them being carried on one truck."⁴⁵ Other one-room sheds, made of low grade lumber and covered top and sides with tar paper roofing material, had lofts which served as supplementary sleeping spaces accessible by ladder. On the average, housing in Tioga was substantially poorer than in Williston. One man who had just arrived in Tioga said, regarding the hut he was living in: "... . how can they expect a man to live in something like that? I've come all the way from (a Southern state) because of my job and I've never had to live in anything like this before."⁴⁶

In addition to the large numbers of oil men, there were construction workers in Tioga working on the new gas plant, and although many workers lived in trailers, others were forced into the intolerable housing units. By 1954 two large housing projects had reduced the pressure and eliminated much of the market for substandard housing.⁴⁷

While the population of Tioga had gone from 456 to 900, the oil industry also had other effects on the town. Incoming freight in June 1951 was thirteen cars of agricultural implements. One year later, in June 1952, the incoming freight totaled 125 cars of pipe, rigs, and

⁴⁵ Campbell, Williston Report, p. 133.

⁴⁶ Ibid., pp. 133-35.

⁴⁷ Ibid., p. 117.

other oil equipment. The outgoing freight in April 1951 consisted of 8 cars of wheat while the outgoing freight in April 1952 was 124 tank cars of crude.⁴⁸

With the discovery of oil in McKenzie County, Watford City felt the impact of the oil industry. Here existing facilities were also put under strain. There was a heavy load on the schools and the housing facilities. To meet new demands a great deal of building was begun including the construction of a land office, bank, city hall, new water well, Rural Electrification Association building, school, hospital, and many dwelling units. About seventy blocks of street were paved in the community. Many companies opened offices in Watford City, and the frantic leasing kept five lawyers busy.⁴⁹

People in the impact areas hoped that tax revenues from oil would help relieve the local tax load. Before oil was discovered, there was little industry in the state to provide tax revenue. The non-agricultural sector of the state's economy was engaged exclusively in the distribution of goods and services to farm areas. It produced locally almost nothing consumed in the area before oil was discovered. Manufacturing was limited to printing and publishing and domestic food processing, while mining was limited to the production of lignite and clay materials.⁵⁰

After the discovery of oil the state legislature, at its first session, passed a 4½ per cent tax on oil and a 27½ per cent depletion

⁴⁸Williston Basin Oil Review, Aug. 1952, p. 20.

⁴⁹Ibid., May 1956,

⁵⁰Campbell, Williston Report, pp. 17-18.

Allowance. This tax,⁵¹ effective since July 1, 1953, was later raised to 5 per cent. Table 4 shows the amounts of revenue which have been collected.⁵²

TABLE 4

Annual Oil Tax Revenue^a

1954	\$ 306,680
1955	757,096
1956	1,439,691
1957	1,581,316
1958	1,894,577
1959	2,150,652
1960	2,501,802
1961	3,041,582

^aWilliston Basin Oil Review, June 1961, p. 25.

These tax figures show that approximately \$14 million had been collected from the oil tax. State income taxes for this period totaled \$33 million. Current fiscal collections for 1961 were running well ahead of the previous years with tax collections expected to show \$750,000 increase over 1959 and 1960.⁵³

The tax money taken in the state is divided in this manner. Of the first \$200,000, 75 per cent goes back to the oil producing counties. Of the next \$200,000, 50 per cent is given to the producing counties, and any revenue after that is divided on a 75 per cent to the state and 25 per cent to the county basis. One-fourth of one per cent of the tax

⁵¹North Dakota did have an ad valorem tax applicable to mineral rights, oil in storage, and drilling equipment, prior to 1953. However, this tax was hard to enforce. The legislature had tried on two occasions to put a flat acreage tax on mineral rights but the Supreme Court declared it unconstitutional. Williston Basin Oil Review, Oct. 1952, p. 24.

⁵²Ibid., June 1961, p. 25: N. Dak. State Treasurer's, Report, (1961), p. 5.

⁵³Ibid.

Bids are submitted as a bonus and are in addition to the rentals which are set at \$0.25 per acre.⁵⁸ The Land Department has 105 oil wells and holds 950,000 acres of land in addition to holding mineral interests in another million acres.⁵⁹ In 1960 the Land Department had 729,436.88 acres under lease which compares favorably with the peak year of 1953 when 884,613.28 acres were under lease.⁶⁰ Up to June 30, 1960, the Land Department had received \$5,144,377.25 in bonuses, \$1,903,725.38 in rentals, and \$1,896,758.84 in royalties from oil production on state land. The rentals and bonuses are disbursed quarterly to the schools and institutions as the money is received. The oil-and-gas royalties have been deposited in the permanent funds of those schools and institutions owning the production lands in amounts shown in Table 5.⁶¹

TABLE 5

Disbursement of Oil and Gas Royalties
To State Institutions^a

Common Schools	\$1,627,077.43
Agricultural College	156,114.28
University	12,958.41
School for the Blind	29,812.83

⁵⁸ Thirty-Fourth Biennial Report of the Commissioner of University and Schools, State of North Dakota, p. 21.

⁵⁹ E.W. Pedersen to Dominic Schaff, Aug. 17, 1961. Pedersen is Leasing Manager of the State Land Department in Bismarck, North Dakota.

⁶⁰ Ibid.

⁶¹ Thirty-Fourth Biennial Report of the Commissioner of University and Schools, State of North Dakota, p. 21.

State Training School	\$ 46,014.53
State Hospital	24,781.36
Total	1,896,758.84

^a Charles R. Emch to Dominic Schaff, Aug. 2, 1961. Emch is manager of Farm Loan Collections and Mineral Leasing Department, Bank of North Dakota at Bismarck.

The Bank of North Dakota, also a large landowner, at one time had 620,000 acres under lease but as of August 2, 1961, had only 118,929.10 acres under lease. On its land were seventy-nine producing wells with five additional wells having produced before being abandoned. Its producers are located in the following counties: one in Billings, eleven in Bottineau, seventeen in Burke, one in McHenry, thirteen in McKenzie, five in Mountrail, one in Renville, and thirty in Williams.⁶² By July 1, 1961, the Bank had received \$1,569,502.94 in oil lease bonuses, \$686,798.67 in oil lease rentals, and \$65,148.38 in oil royalties for a total of \$2,969,163.87.⁶³ Lease acreages, bonuses, royalties, and rental figures for these two organizations are illustrated on Table 6.

Oil legislation played a significant part in the development of the oil industry. North Dakota had some oil laws when discovery came in 1951. The most important of these laws were part of the Interstate Oil Compact Commission⁶⁴ "Model Act" of 1940 adopted by the state legislature of 1941. State Senator Clyde Duffy, in a speech at Banff, Alberta,

⁶² Charles R. Emch to Dominic Schaff, Aug. 2, 1961. Emch is manager of Farm Loan Collections and Mineral Leasing Department, Bank of North Dakota at Bismarck.

⁶³ Ibid.

⁶⁴ This commission is made up of governors and other officials from oil-producing states who meet once a year to share ideas.

TABLE 6
 Leases, Rentals, Bonuses, and Royalties for
 the North Dakota Land Department^a

Year	Acres under Lease	Rentals	Bonuses	Royalties
1936	\$ 4,860.00	\$ 1,215.00	\$	\$
1937	12,880.00	3,220.00		
1938	3,100.00	77.00		
1939	80.00	20.00		
1940	36,642.44	9,160.67		
1941	55,175.00	13,793.79		
1942	60,327.60	15,081.90		
1943	37,916.56	9,479.14		
1944	20,802.84	5,200.72		
1945	10,101.00	2,525.25		
1946	6,892.44	1,745.67		
1947	4,966.80	1,241.74		
1948	27,505.56	6,876.39		
1949	488,203.44	122,050.86		
1950	552,960.56	138,215.14		
1951	672,570.08	168,142.52	351,843.32	
1952	837,999.00	209,499.75	1,585,860.00	27,471.07
1953	884,613.28	221,153.32	338,739.25	96,646.16
1954	793,309.72	198,327.43	717,788.50	101,353.27
1955	694,028.32	173,507.08	180,203.55	272,221.80
1956	567,575.80	141,893.95	78,713.25	330,778.46
1957	561,422.68	140,355.67	940,393.25	336,017.73
1958	384,177.64	96,044.41	228,083.25	278,247.42
1959	406,155.48	104,704.81	221,425.33	297,899.29
1960	729,436.88	182,359.22	595,476.89	321,206.94

^aFigures compiled by North Dakota Land Office.

TABLE 6--Continued
Bonuses, Rentals, and Royalties for the
Bank of North Dakota^a

Year	Oil Lease Bonus	Oil Lease Rental	Oil Royalty
1951 and Prior	\$ 116,303.71	\$187,572.67	\$ 1,771.19
1952	549,633.44	113,620.37	15,641.06
1953	79,533.93	104,820.47	35,302.76
1954	22,774.38	62,816.94	32,238.95
1955	238,994.54	42,375.25	79,535.56
1956	35,067.72	36,901.16	84,081.96
1957	308,092.15	31,546.10	78,111.18
1958	29,408.99	31,369.63	76,922.13
1959	37,925.90	30,571.00	97,120.85
1960	117,073.64	31,518.72	146,988.24
1-1-61 to 7-1-61	34,694.54	13,686.36	65,148.38
Total	1,569,502.94	686,798.67	712,862.26

^aFigures compiled by Bank of North Dakota.

in 1952, described how this law happened to be passed. He said that State Geologist Wilson Laird introduced the bill and encouraged the legislators to see it through. Duffy went on to say that after some changes the bill came out of the committee with recommendations for passage. Both houses passed the bill without a dissenting vote. According to Duffy, all that was said was ". . .we had no oil legislation whatever and. . .this proposal might come in handy some time."⁶⁵

There was, however, some oil-and-gas legislation prior to 1941. One act passed in 1911 provided for the shutting off of gas wells if the gas was not used. In 1929 a law was adopted which required that anyone drilling for gas, oil, or other mineral products, must obtain a license from the state geologist and must file a log of his drilling at every five hundred feet. This log must be open to inspection for the purpose of informing stockholders, bondholders, or lessees of the land lying within a radius of six miles from the drilling operations. This measure was to restrain fraudulent claims which some people suspected had been made by various doodlebug wildcatters. In 1937 the legislature gave the state geologist the power to prescribe rules for drilling which should be those prescribed by the Bureau of Mines of the United States Department of the Interior.⁶⁶

The "Model Act" adopted in 1941 was brief, only twelve pages. It laid down the basic restrictions against waste but leaves a wide discretion in the regulatory commission with reference to the adoption of rules, spacing, limitation of production, and secondary recovery

⁶⁵Williston Basin Oil Review, Oct. 1952, p. 23.

⁶⁶Ibid.

methods. For political reasons rather than scientific, the regulatory powers were placed with the Industrial Commission⁶⁷ made up of the governor, attorney general, and the commissioner of agriculture and labor.⁶⁸

In 1953 the legislature adopted the 1950 "Model Act" of the Interstate Compact Commission, substituting it for the earlier one. An important provision of this law was that when a field is discovered, the State Industrial Commission meets within fifteen days of discovery and sets a temporary spacing pattern for the pool. Eighteen months later they meet again to determine permanent spacing.⁶⁹

Another important duty given to the Industrial Commission concerns prorating. Because production exceeds demand in the state, wells are prorated to insure equitable production to market demand, the forty-acre tract is the basic unit allowable. A pool with eighty-acre spacing gets double the allowable production. Another provision makes allowance for production depths and increased cost of deep drilling. Here the normal unit allowable is set for a well of five thousand feet and for wells deeper than this, the allowable increases with the depth. Gas-oil ratios are also considered in prorating. Wells having a gas-oil ratio in excess of 2,000 feet per barrel are penalized by the amount of the excess.⁷⁰

⁶⁷This commission can act only by unanimous consent as the veto of the governor can stop action proposed by the other two. The actual regulation of the oil industry is in the hands of the state geologist who is also head of the geology department of the University of North Dakota.

⁶⁸Ibid.

⁶⁹Contributions to Geology, p. 107.

⁷⁰Ibid.

The act also allowed oil companies to pool their interest in an oil field with each firm getting an equity and a share of production in the total field. Spacing one well in every forty acres in a proven oil field was then the regulation. Under the new law provision was made for combining parcels of less than forty acres into standard spacing units with each owner receiving an equity in his unit.⁷¹

Considerable discussion had developed over the subject of spacing, which is really conservation. The main idea of spacing is to produce as little gas as possible with the oil to keep the pressure up for longer periods of time. In setting spacing regulations the Industrial Commission had followed the principle of wide spacing for initial development and for establishing the limits of the pool quickly and obtaining data on the reservoir. A final spacing was to be determined when sufficient data has accumulated to form a basis for a sound determination.⁷²

After discovery Amerada had asked for eighty-acre spacing but the Industrial Commission ruled in favor of forty-acre spacing.⁷³ The small companies had argued that forty-acre spacing was better because they wanted faster returns on their investment as wells cost a lot of money to drill and they could not tie up their capital as long as the large companies.⁷⁴ The Industrial Commission was faced with the question of whether the state and the landowners would lose money by eighty-acre

⁷¹ Williston Basin Oil Review, April 1953, p. 9.

⁷² Laird and Folsom, Nesson Anticline.

⁷³ It had been changed from ten to forty the fall before. Grand Forks Herald, Nov. 27, 1951.

⁷⁴ Ibid., Nov. 27, 1951.

spacing. Also would more oil and gas be conserved by eighty-acre spacing? Would it help the state's maximum output? Many small operators felt that if eighty-acre spacing was agreed on, a precedent would be set. But those who favored eighty-acre spacing listed the following arguments: shortage of pipe, costs, outlines of the pools readily defined, money saved in drilling could be used elsewhere, and also that the commission could change from eighty-acre spacing to forty but not from forty-acre spacing to eighty.⁷⁵

At the hearing before the commission most of the landowners took the side of the small oil companies in favor of forty-acre spacing. Some had heard the oil men's saying: "The cheapest and best way to store oil is in the ground." Eighty-acre spacing, they felt, would delay development. One of the largest landowners in McHenry County gave his viewpoint. He and his wife, he stated, were past sixty and if there was any oil in the ground they would like to have it now to enjoy it. "If I have got a lot of money there I'd like to have it and divide it among my children as I want to," he said. "I do not like the idea of waiting ten or twenty years for development."⁷⁶ After concluding its hearing, the commission set the spacing of the first pool, the Beaver Lodge Pool, at forty-acres.⁷⁷ In 1954 the commission changed the spacing to eighty acres and this went into effect on October 1. The reasons given were to "equalize the amount of oil which may be produced from each well in the Madison Pool of the Beaver Lodge Field with the

⁷⁵Ibid., Jan. 16, 1952.

⁷⁶Ibid., Jan. 17, 1952.

⁷⁷Williston Basin Oil Review, April 1952, p. 12.

amount which can be produced from each well in the Madison Pool of the Tioga Field."⁷⁸ The Tioga Pool had had its initial spacing set at eighty acres.⁷⁹

In October 1958 the Industrial Commission was asked to act on spacing units for the deeper fields, specifically the Devonian and Silurian formations. These formations are generally found from three thousand to five thousand feet below the major producing horizon, the Madison. Different oil and gas-oil ratios exist in these respective formations and the cost of drilling these deep wells is very great.⁸⁰

Additional legislation was proposed by the North Dakota Legislative Research Committee in 1960. This was the first overhauling of the oil-and-gas laws since 1953. Among the recommendations was a bill that would force an operator of a well to prove that he was not draining adjacent lands. The owner of the adjacent land could go to court to force drilling or to get compensation. Another bill would give the Industrial Commission authority to order compulsory unitization of an oil field. It would also give the commission authority to add lands or take away lands from a unitization plan before approval. Further authority given the commission would enable it to set up marketing districts in the state.⁸¹

In the final analysis, the oil picture seems healthy and full of promise. Its ten years of development have been steady and orderly,

⁷⁸Ibid., Oct. 1954, p. 9.

⁷⁹Grand Forks Herald, Sept. 23, 1959

⁸⁰Williston Plains Reporter, June 14, 1961.

⁸¹Williston Basin Oil Review, Aug. 1960, p. 9.

and legislators have shown considerable insight in passing necessary legislation to meet the needs of the new industry. In the field of oil conservation, North Dakota is considered the leader among oil-producing states.⁸²

Aside from providing the state with a new industry, oil has been important to the state's economy. Royalties from oil, tax revenues, jobs, and growth of related industries are some of the benefits of oil. Also to be considered are the benefits from the leasing and rental programs which were intense and widespread, especially after discovery.

When oil was discovered in 1951, no hamlet in the Williston Basin was too small not to have felt the prosperity which followed.

While oil has made only a few men rich in North Dakota, it has generally bettered the standards of living for most others.

⁸²Geology department statistics.

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VITA

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After graduation he taught school for three years at Richey, Montana. In the summer of 1959 he began his graduate program at the University of North Dakota and will complete his M.A. in August 1962. At the present time he is teaching social studies at Merced, California.