OIL AND GAS PRODUCING INDUSTRY IN LOUISIANA
A SHORT HISTORY WITH LONG TERM PROJECTIONS

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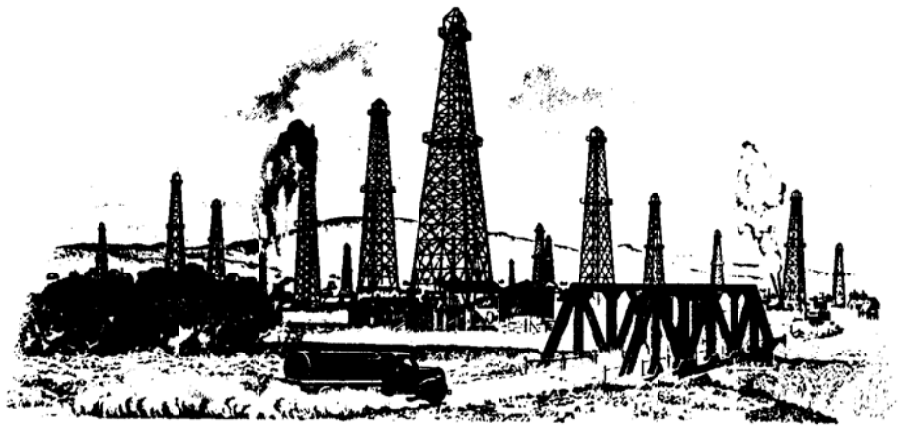

DEPARTMENT OF NATURAL RESOURCES
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Secretary of Natural Resources

Energy Division, Technology Assessment Section
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EXECUTIVE SUMMARY

This report is intended to serve as a reference document providing a brief historical perspective of the development of the oil and gas industry in Louisiana, its evolution to date, and a forecast of oil and gas production and depletion (excluding Louisiana Outer Continental Shelf) to the year 2000.

The oil and gas fields of Louisiana are among the most widely explored and developed hydrocarbon provinces in the entire world. Development of oil and gas resources on State controlled land and offshore water bottoms has matured to the extent that production is well into the decline stage. State controlled natural gas production peaked at 5.6 trillion cubic feet per year in 1970 and had declined to 1.9 trillion cubic feet per year by 1985. State controlled crude oil and condensate production also peaked in 1970 at 566 million barrels per year and, by 1985 had declined to 182 million barrels.

Louisiana OCS development (Outer Continental Shelf -OCS- resources in federal waters off Louisiana's coast beyond the State's three mile limit) is not as mature as that of State onshore and offshore, but federal OCS development off Louisiana's coast is the most extensively developed and matured OCS territory in the United States. This Louisiana OCS territory for example, has produced 93% of the 7 billion barrels of crude oil and condensate and 92% of the 84 trillion cubic feet of natural gas extracted from all federal OCS territory through 1985. Louisiana OCS gas production peaked at 4.2 trillion cubic feet per year in 1979 and declined to 3.2 trillion cubic feet in 1985. Louisiana OCS crude oil and condensate production peaked at 388 million barrels per year in 1972 fell to 256 millions barrels in 1981 and then rose irregularly to 320 millions barrels in 1985.

The long term forecast of State controlled onshore and offshore production and depletion conducted by the Technology Assessment Section of the Department of Natural Resources projects that if long term trends continue, then by the year 2000, the State's conventional natural gas

resources will be 81 to 90% depleted. Likewise, it is estimated that approximately 70 to 82% of the State's ultimately recoverable gas has already been produced. For crude oil and condensate, it is estimated that approximately 80 to 88% of the State's ultimately recoverable oil has already been produced, and by year 2000, the State's conventional petroleum resources will be 89 to 97% depleted.

Although DNR does not currently have the capability to model or forecast Louisiana OCS production, information from federal agencies indicates that Louisiana OCS crude oil and condensate production should continue increasing by about 73 million barrels per year until it peaks around 1987 at approximately 548 million barrels. Louisiana OCS gas production is not likely to reverse its current decline for several reasons; among the reasons are the lack of a pipeline transportation infrastructure to bring gas to shore from fields farther from shore or from existing gas gathering systems and the weak market price/demand that is insufficient to offset the higher capital cost of developing more distant or remote offshore gas fields.

This report provides detailed discussion and data on the preceding items as well as information on oil and gas industry related employment, proved reserves of oil and gas, drilling activities, and a brief history of the industry in Louisiana.

CHAPTER ONE

INTRODUCTION

Louisiana is a leading producer of oil and gas in the nation. In 1985, Louisiana (onshore and offshore within state waters) produced more oil than any other state except Texas, Alaska and California, and more natural gas than any other state except Texas. Additionally, Louisiana's federal offshore production is greater than any other federal regulated offshore area in the United States. Louisiana, however has entered a period of transition which will see the State's position of abundant, low cost energy supplies that it now enjoys change into a situation of energy scarcity in which the cost of energy will be higher here relative to other producer and non-producer regions of the country. The oil and gas industry's production of energy resources has literally fueled the State's economy. It is also of enormous importance to the state in terms of employment and tax revenue.

The objective of this report is to provide (a) a brief history of production in the state, (b) an analysis of trends in production, mineral reserves, drilling and employment and (c) a long term forecast of production and depletion with comments on future prospects in the Louisiana oil and gas industry. In chapter two the discussion will focus on oil and gas production in Louisiana; in chapter three the discussion will focus on the prospects of the oil and gas industry in Louisiana to the year 2000; in chapter four the discussion will be on employment in the oil and gas industry working in production, refineries, petrochemicals and other industry related to oil and gas within Louisiana; in chapter five we will look at the proved reserves in Louisiana (onshore, state offshore and federal offshore); and in chapter six we will look at the drilling activities in territory under Louisiana jurisdiction.

CHAPTER TWO

OIL AND GAS PRODUCTION

Louisiana is one of the top four states in the production of oil and ranks second in production of natural gas from state regulated lands and waters, but Louisiana is the leading producer of oil and natural gas in the Outer Continental Shelf (OCS), sometimes called Federal Offshore. The 1985 Louisiana production including Louisiana Outer Continental Shelf (Louisiana's OCS) was slightly under 5.1 trillion cubic feet of gas and close to 503 million barrels of crude oil and lease condensate. Thus, when OCS is included, Louisiana ranks third in oil production and second in gas production among the fifty states.

HISTORY OF RESOURCE DEVELOPMENT

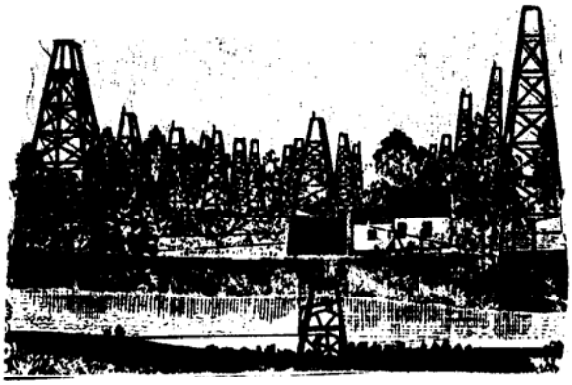


FIGURE 1

Louisiana's reservoir of crude oil was known to its native Indians for centuries before commercial oil was produced; they used the state's natural oil springs as a source of medicine. The first non-Indians that learned about this resource were the survivors of Hernando DeSoto's ill-fated expedition that landed on Louisiana's shore on July 25, 1542, because of bad weather. As they struggled to regroup their scattered band and to make their way to Mexico, they gathered their small ships at a creek where they located an oil spring and used the oil to make their ships more watertight. In 1812, Major Amos Stoddard in his book on Louisiana described an island that burned for at least three months to the west of the Atchafalaya River.

As early as 1833, gas bubbles were reported rising to the surface of Bayou Bouillon in St. Martin Parish, and in 1839 the American Journal of Science described several oil springs along the Calcasieu and Sabine rivers. One of the springs reportedly flowed with as much as three or four barrels of crude daily. Yet before the mid-1800's, local residents found little use of petroleum deposits except for medicinal purposes and for lubrication of wagon wheels. In 1859, demand for crude oil was established when refining techniques were developed to extract illuminating oil from it.

At the beginning of the Civil War, Louisiana's Governor Henry W. Allen requested studies of the state's mineral deposits and a report on the oil springs of the Calcasieu region headed by John B. Robertson and Charles N. Tripp. Mr. Tripp reported that if the petroleum deposit of the Calcasieu area alone were developed, it quickly would become the major source of oil for the entire Confederacy. The war ended before Mr. Robertson completed his investigation. Years later, Louisiana's Governor J. Madison Wells sent Mr. Robertson back to the Calcasieu area to finish the study. Mr. Robertson's report confirmed what Mr. Tripp had concluded several years earlier, suggesting that state owned land near Calcasieu be leased to oil men and the money used to retire Louisiana's war debt.

In 1866 the state's first petroleum firm was formed, Louisiana Petroleum and Coal Oil Company, in New Orleans. This firm drilled in the Calcasieu region but could not develop oil wells with paying quantities, so the holes were abandoned. There were some strikes in North Louisiana in 1866, but Northern businessmen were hesitant to invest in a former rebel state. This was the major reason that no development was done in this region from 1866 through 1896, although most oil men knew there was crude in Louisiana. In 1896, Anthony Lucas started drilling for oil at Belle Isle and, years later, at Anse La Butte near Lafayette; in both cases Mr. Lucas was forced to abandon his project because of shortage of capital. Discouraged by these results, Mr. Lucas went to Texas, where in January 1901, he discovered the huge Spindletop Field near Beaumont. This discovery sparked another round of oil fever in Louisiana, and oil men

invaded the areas where Mr. Lucas previously had found signs of petroleum.

By September, 1901, oil was found in a well drilled by W. Scott Heywood near Jennings. This finding triggered an oil boom that pushed Louisiana into the forefront of the nation's oil producing areas, and the Louisiana petroleum industry has since grown into the largest single producer of income in the state. The Jennings field's production reached its first peak in 1906 with an output of 9,025,000 barrels per year, after which its annual production declined rapidly. By 1913, the Jennings field's annual production was less than 1,000,000 barrels per year. In 1929 the Yount Lee Oil Co. located a deeper formation of oil near the 7,300 foot level. With this discovery the output of the Jennings field again began to climb, until 1939 when it reached its second peak at 8,118,000 barrels per year. Afterward, production began to decline, but at much slower rate than before.

FIGURE 2

By 1910, the first well ever drilled over water was completed at Caddo Lake near Shreveport. The first successful offshore well in the Gulf of Mexico was drilled in 1937 in the Creole field just 6,000 feet off the Cameron Parish coastline. Finally, in 1947 the first well completed in the Gulf out of sight of land was drilled approximately 44 miles south of Morgan City. Rapid discovery of other productive fields followed. By 1948, geophysicists had located 90 geologic structures in the Gulf within 31 miles of the coast, that contained oil and gas deposits.

On August 7, 1953, Congress enacted the Outer Continental Shelf Lands Act which vested the Secretary of the Interior with the authority to manage the submerged lands lying seaward of the state's coastal boundary. This legislation represented a Congressional ratification of President Truman's 1945 Proclamation and Executive Order claiming on behalf of the nation the natural resources of the Outer Continental Shelf (OCS). Since the coastal boundary was not clearly marked or defined in the OCS, Louisiana and Texas sued the federal government over the location of their jurisdictional boundaries. This dispute was settled by U.S. Supreme Court decisions and the Submerged Lands Act which established 3 mile boundaries and jurisdictions for coastal states, with the exception of Texas and Florida which have 3 league (9 miles) limits.

HISTORICAL PRODUCTION

Oil and gas production in the state developed first in North Louisiana, but production in South Louisiana

LOUISIANA CRUDE OIL AND CONDENSATE PRODUCTION
FROM ALL CATEGORIES

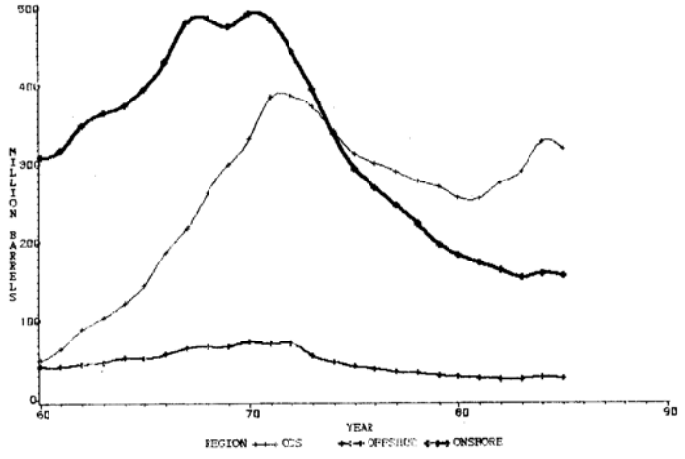


FIGURE 3

surpassed North Louisiana production of oil by 1935 and natural gas by 1951. Offshore production started in the mid-1930's. Its production surpassed state onshore oil production by 1972 and gas production by 1974 on an annual rate basis, as illustrated in Figures 3 and 4. By the end of 1985, accumulated production of over 11 billion barrels of crude oil, and over 107 trillion cubic feet of gas have been produced from onshore Louisiana. Accumulated offshore production by the end of 1985 is around 8 billion barrels of oil and 70 trillion cubic feet of gas. Of this production over 6 billion barrels or 83% of the offshore oil production and over 60 trillion cubic feet or 86% offshore gas production was produced in the federal OCS area. Since 1954, some 28 million acres have been leased in the Gulf OCS area, 63% of which is Louisiana OCS. The Louisiana OCS acreage has produced 93% of the 7 billion barrels of oil, and 92% of the 84 trillion cubic feet of natural extracted from all federal OCS land through 1985.

Oil and gas production began to decline in North Louisiana in 1966. By 1971, production also began to decline in South Louisiana. OCS production of oil and condensate peaked in 1972 and OCS natural gas production peaked in 1979. In all cases -- onshore oil and gas production and

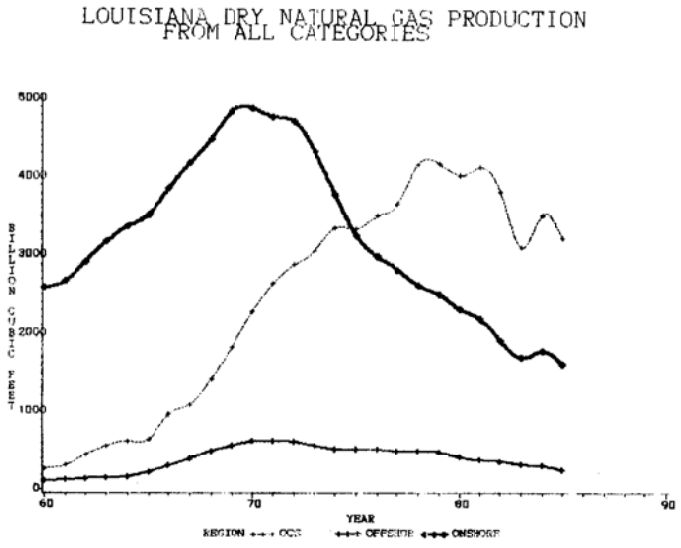


FIGURE 4

offshore oil and gas production -- the pattern of decline has been consistent through 1985 with one exception. That occurred in 1981 when offshore gas production increased slightly.

TABULAR AND GRAPHICAL DATA

Table 1 lists the calendar year production of dry gas and casinghead gas in the onshore area, the state offshore area, the Louisiana OCS area and the total of all three areas from 1954 through 1985. Table 2 lists the calendar year production of crude oil and condensate in the state offshore area, the Louisiana OCS area, the state onshore area and the total of all three areas. Table 3 lists the total U.S. and the total U.S. OCS oil and gas production from 1954 through 1985. Table 4 lists the calendar year production of gross wet natural gas from either gas or oil wells in the onshore area, in the state offshore area, in the Louisiana OCS area and their sum from 1975 through 1985. Table 5 lists the natural gas liquids production from gas wells located in areas under state jurisdiction from 1975 through 1985 and some OCS's production. Figures 3 and 4 show the Louisiana production by region: onshore, state offshore and Louisiana OCS. Figures 5 and 6 compare Louisiana production excluding Louisiana OCS to the total U.S. production for oil and for natural gas. Finally, Figures 7 and 8 compare Louisiana OCS production to U.S. OCS production for oil and for natural gas.

The Office of Conservation in the Louisiana Department of Natural Resources is responsible for the regulation of the drilling, production and gathering of production from nearly 40,800 producing oil and gas wells in onshore areas and in state waters; approximately 14,500 of these wells produce natural gas. Production of Louisiana oil and gas resources, including OCS, amounted to slightly under 5.1 trillion cubic feet in 1985 of which State regulated production amounted to 1.9 trillion cubic feet. Oil production from Louisiana wells in 1985 amounted to approximately 503 million barrels, of which the State regulated production amounted to 182 million barrels.

DRY NATURAL GAS PRODUCTION
LOUISIANA PRODUCTION EXCLUDING OCS VS TOTAL U.S.

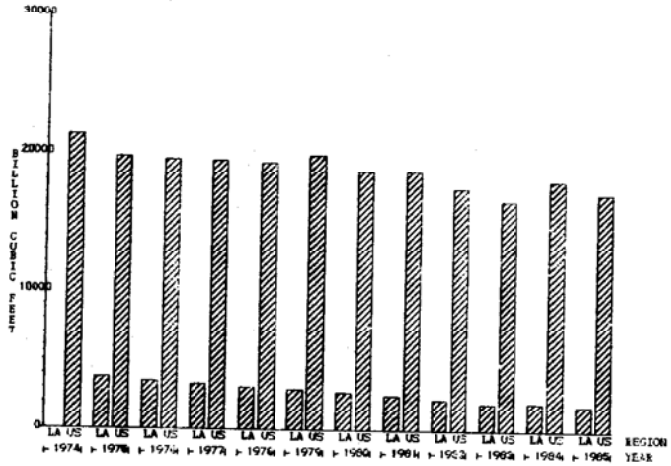


FIGURE 5

CRUDE OIL AND CONDENSATE PRODUCTION
LOUISIANA PRODUCTION EXCLUDING OCS VS TOTAL U.S.

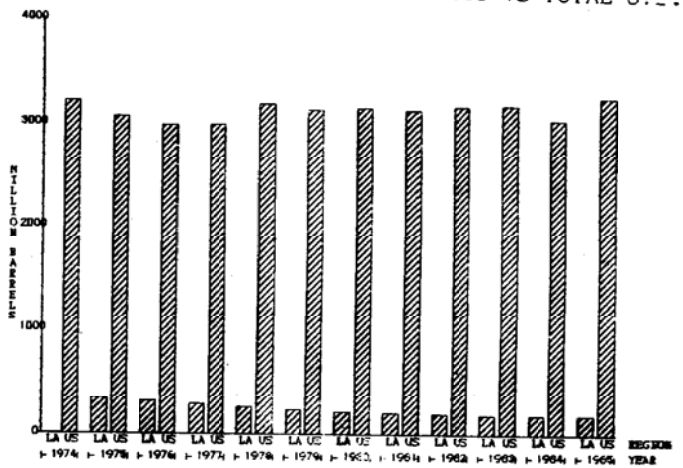


FIGURE 6

NATURAL GAS OCS PRODUCTION
LOUISIANA OCS VS TOTAL U.S. OCS

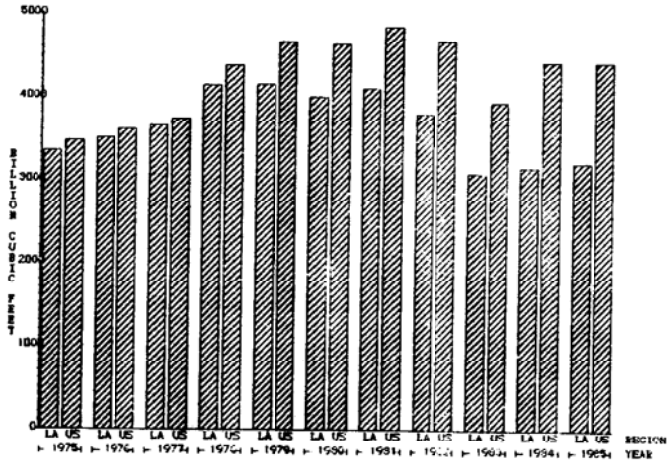


FIGURE 7

CRUDE AND CONDENSATE OCS PRODUCTION
LOUISIANA OCS VS TOTAL U.S. OCS

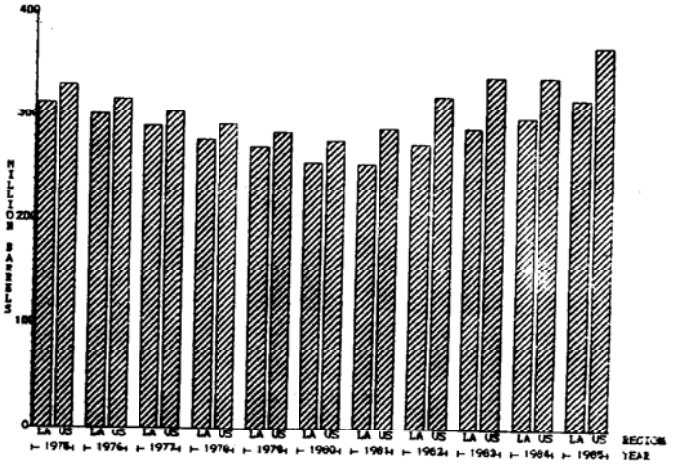


FIGURE 8

TABLE 1

LOUISIANA CASINGHEAD AND DRY GAS PRODUCTION
(Billion Cubic Feet/Year, at 14.73 psia & 60 degrees Fahrenheit.)

YEAR	FEDERAL O C S	STATE OFFSHORE	STATE ONSHORE	STATE TOTAL
1954	56.3	11.1	1,358.7	1,426.1
1955	81.3	21.4	1,609.3	1,712.0
1956	82.9	42.9	1,837.1	1,962.8
1957	82.6	63.1	2,030.6	2,176.3
1958	127.7	86.3	2,162.3	2,376.3
1959	207.2	100.8	2,441.1	2,749.1
1960	273.0	117.6	2,638.2	3,028.9
1961	318.3	122.2	2,725.6	3,166.1
1962	452.0	140.3	2,983.3	3,575.5
1963	564.4	152.6	3,239.4	3,956.4
1964	621.7	165.0	3,434.3	4,221.0
1965	645.6	230.0	3,585.0	4,460.7
1966	965.4	306.5	3,931.4	5,203.3
1967	1,087.3	403.1	4,253.7	5,744.0
1968	1,413.5	501.0	4,565.3	6,479.8
1969	1,822.5	566.5	4,934.6	7,323.7
1970	2,273.1	628.3	4,978.5	7,879.9
1971	2,634.0	632.0	4,865.9	8,131.9
1972	2,881.4	622.8	4,801.0	8,305.2
1973	3,055.6	567.9	4,400.1	8,023.7
1974	3,349.2	527.3	3,846.3	7,722.7
1975	3,332.2	519.7	3,311.5	7,163.4
1976	3,499.9	523.2	3,039.2	7,062.3
1977	3,647.5	495.8	2,872.2	7,015.5
1978	4,149.7	499.5	2,664.7	7,313.9
1979	4,158.5	487.5	2,542.1	7,188.1
1980	4,013.7	417.3	2,345.2	6,776.2
1981	4,106.5	381.9	2,218.7	6,707.1
1982	3,803.7	366.2	1,945.3	6,115.2
1983	3,087.4	324.0	1,720.3	5,131.7
1984	3,505.9	306.6	1,808.4	5,620.8
1985*	3,206.3	255.2	1,639.1	5,100.6

NOTE: For data sources see Data Sources.
Totals may not equal sum due to independent rounding.
* Preliminary data.

TABLE 2

LOUISIANA CRUDE OIL AND CONDENSATE PRODUCTION
(Million Barrels/Year)

YEAR	FEDERAL O C S	STATE OFFSHORE	STATE ONSHORE	STATE TOTAL
1954	3.3	12.8	233.8	249.9
1955	6.7	20.4	250.6	277.7
1956	11.0	31.1	263.3	305.4
1957	16.1	37.5	277.3	331.0
1958	24.8	33.9	259.2	317.9
1959	35.7	38.5	289.4	363.6
1960	49.7	41.0	310.1	400.7
1961	64.3	41.1	318.6	424.0
1962	89.7	44.1	350.4	484.2
1963	104.5	46.7	366.0	517.2
1964	122.5	52.3	375.9	550.7
1965	145.0	51.8	397.1	593.8
1966	187.8	56.8	431.4	676.1
1967	219.0	65.0	481.3	765.4
1968	263.8	66.6	487.7	818.1
1969	300.2	67.2	477.0	844.3
1970	333.4	72.7	493.8	899.8
1971	385.8	70.1	485.4	941.2
1972	387.6	71.2	445.7	904.5
1973	374.2	55.0	396.5	825.7
1974	342.4	46.7	339.0	728.1
1975	313.6	41.0	294.7	649.3
1976	301.9	38.4	270.5	610.7
1977	290.8	33.8	246.4	570.9
1978	278.1	32.4	223.7	534.1
1979	271.0	29.3	197.4	497.7
1980	256.7	27.6	183.8	468.1
1981	255.9	26.2	173.4	455.5
1982	275.5	24.8	163.9	464.3
1983	290.8	24.7	154.9	470.4
1984	328.3	27.2	160.0	515.4
1985*	320.0	25.6	157.3	502.8

NOTE: For data sources see Data Sources.
Totals may not equal sum due to independent rounding.
* Preliminary data.

TABLE 3

UNITED STATES PRODUCTION

YEAR	DRY NATURAL GAS ** (Billion Cubic Feet/Year) U.S. OCS ONLY	DRY NATURAL GAS ** (Billion Cubic Feet/Year) TOTAL U.S.	CRUDE AND CONDENSATE (Million Barrels/Year) U.S. OCS ONLY	CRUDE AND CONDENSATE (Million Barrels/Year) TOTAL U.S.
1954	56.3	9,375.3	3.3	2,315.0
1955	81.3	10,063.2	6.7	2,484.4
1956	82.9	10,848.7	11.0	2,617.3
1957	82.6	11,143.9	16.1	2,616.9
1958	127.7	11,030.3	24.8	2,449.0
1959	207.2	12,046.1	35.7	2,574.6
1960	273.0	12,771.0	49.7	2,574.9
1961	318.3	13,254.0	64.3	2,621.8
1962	452.0	13,876.6	89.7	2,676.2
1963	564.4	14,666.6	104.6	2,752.7
1964	621.7	15,462.1	122.5	2,786.8
1965	645.6	16,039.8	145.0	2,848.5
1966	1,007.4	17,206.6	188.7	3,027.8
1967	1,187.2	18,171.3	221.9	3,215.7
1968	1,524.2	19,322.4	269.0	3,329.0
1969	1,954.5	20,698.2	312.9	3,371.8
1970	2,418.7	21,920.6	360.6	3,517.5
1971	2,777.0	22,493.0	418.5	3,453.9
1972	3,038.6	22,531.7	411.9	3,455.4
1973	3,211.6	22,647.5	394.7	3,360.9
1974	3,514.7	21,600.5	360.6	3,202.6
1975	3,458.7	20,108.7	330.2	3,056.8
1976	3,595.9	19,952.4	316.9	2,976.2
1977	3,737.7	20,025.5	303.9	2,985.4
1978	4,355.7	19,974.0	292.3	3,178.2
1979	4,822.1	20,471.3	285.6	3,121.3
1980	4,902.4	20,179.7	277.4	3,146.5
1981	4,990.7	19,955.8	289.8	3,128.6
1982	4,771.9	18,519.7	321.2	3,156.7
1983	4,182.2	16,822.1	340.7	3,171.0
1984	4,706.8	18,299.6	380.3	3,249.7
1985*	N/A	17,167.0	369.6	3,246.9

NOTE: For data sources see Data Sources.
* Preliminary data.
** At 14.73 psia and 60 degrees Fahrenheit.

TABLE 4

LOUISIANA GROSS WET NATURAL GAS PRODUCTION, AFTER LEASE SEPARATION
(Billion Cubic Feet / Year, at 14.73 psia and 60 degrees Fahrenheit.)

YEAR	FEDERAL O C S	STATE OFFSHORE	STATE ONSHORE	TOTAL LOUISIANA
1975	N/A	N/A	N/A	7,242.4
1976	N/A	N/A	N/A	7,143.0
1977	N/A	N/A	N/A	7,350.9
1978	4,101.3	498.9	3,038.7	7,638.9
1979	4,262.6	487.5	2,608.7	7,358.8
1980	4,200.3	417.3	2,390.9	7,008.5
*1981	4,202.6	381.9	2,245.0	6,829.5
*1982	3,879.9	366.5	1,970.4	6,216.9
*1983	3,313.4	322.6	1,743.4	5,379.4
*1984	4,070.3	319.6	1,498.1	5,888.0

NOTE: Casinghead gas production included.
For data sources see Data Sources.
* Excludes most quatities of nonhydrocarbon gases removed on leases.
Totals may not equal sum due to independent rounding.

TABLE 5

LOUISIANA NATURAL GAS PLANT LIQUIDS PRODUCTION
(BARRELS/YEAR)

YEAR	O C S PRODUCTION	STATE PRODUCTION	TOTAL* LOUISIANA
1979	53,335,195	62,206,805	115,542,000
1980	48,495,469	57,738,531	106,234,000
1981	48,563,197	56,900,803	105,464,000
1982	52,758,638	43,518,362	96,277,000
1983	59,165,079	33,823,921	92,989,000
1984	55,456,481	38,250,519	93,707,000

NOTE: For data sources see Data Sources.

CHAPTER THREE

OIL AND GAS PROJECTION

Clearly, the continued availability of oil and gas resources in Louisiana will be critical to the producing industry itself, to state government revenue, to the petrochemical industry and to the state's energy consumers. Louisiana oil and gas production, however, is expected to decline dramatically by the year 2000. A Department of Natural Resources forecast conducted in a study by the Technology Assessment Section projects Louisiana crude oil production through year 2000 declining as shown in Figure 9, and natural gas production through year 2000 dropping off as shown in Figure 10.

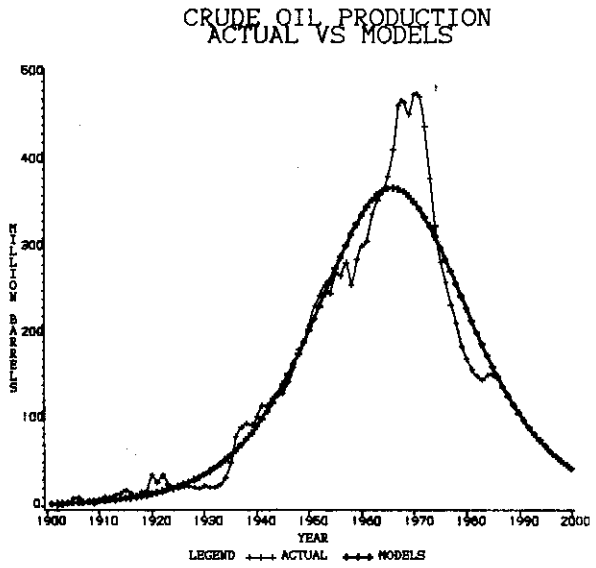


FIGURE 9

A primary conclusion of the study is that if long term trends continue, by the Year 2000, 97% of the State's ultimately recoverable oil, and 90% of the State's ultimately recoverable gas will have been depleted. A summary of these estimates and the model used to derive them follows.

LIFE-CYCLE MODEL

Proven experience in the petroleum industry and other natural resource industries has shown that it is reasonable to assume that there are three stages in the life cycle of a finite natural resource. The first stage consists of initially developing the technology to extract the resource and to use it; this is a period of slow growth. During the second stage, technologies and markets mature, supporting a period of rapid growth and sustained production. The finite nature of the resource does not become evident until the third stage, in which the total amount of the resource extracted over time slowly approaches its ultimate limit. Louisiana's entry into this third stage is suggested by the increased difficulty in finding oil and gas (e.g. quest for deep gas, shifts in exploration budgets from onshore to offshore areas), steady production declines over the last decade, and the inability to produce at established allowable levels.

Statistical analyses beginning with the first Louisiana production of oil in 1902 and gas in 1906 through the year 1985 clearly reveal a pattern over the course of this century which is in accordance with this life cycle model. The actual annual production of oil and gas in Louisiana through 1985 is shown in Figures 9 and 10, respectively, for comparison to the production curve generated by the model.

FORECAST TO THE YEAR 2000

Oil Forecast

If the existing pattern of production continues, the most likely estimate available from the application of the model is that 88% of the State's ultimately recoverable amount of crude oil has already been produced, and that the State will be 97% depleted by the year 2000. If the maximum statistically indicated value (most optimistic estimate) of ultimate recovery is used in place of the most

likely estimate, resulting estimates of depletion levels are slightly more favorable at values of 80% already depleted and 89% depleted by year 2000. This forecast is for crude oil only, lease condensate is not included in the projection.

Gas Forecast

The estimate for natural gas also shows a dramatic depletion over time. The most likely estimate is that 82% of the State's ultimately recoverable gas has already been produced, and that the State will be 90% depleted by the year 2000. Under the optimistic estimate, 70% of the State's gas has already been produced, and the State will be 81% depleted by the year 2000.

It is important to note that the estimates of ultimately recoverable oil and gas resources in Louisiana are not inputs to the model from industry or government sources. Rather, they are mathematically derived from the model itself. The model takes into account all currently utilized recovery methods as well as "natural" methods of increasing the flow of oil and gas from reservoirs. These improved methods are often referred to as "secondary recovery" or "tertiary recovery" methods. Today, more than 50% of all U.S. crude oil is produced with improved

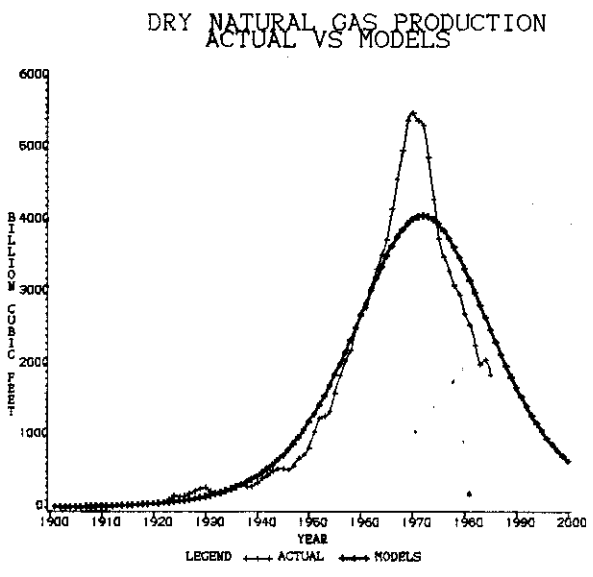


FIGURE 10

recovery methods. The model also includes a measure of expected technological improvement. However no model can account for dramatic scientific breakthroughs or intensified economic factors such as cartel controlled pricing.

CHANGES IN LONG TERM PRODUCTION TRENDS

These forecasts are based on the assumption that the Louisiana oil and gas production pattern that has developed over the last 80 years will continue without significant structural change. Certainly, the pattern of actual production shown in Figures 9 and 10 clearly indicates that the State is in the third and final stage of its production history. The model used for these forecasts predicts that, on the average, oil production will decrease by 6.3% per year through the year 2000; the corresponding decline rate for natural gas is 8.5% per year. Actual decline rates will vary in a cyclical manner around these base rates.

The possibility of a change in the long term trend in production of oil and gas in Louisiana does exist. The oil and gas industry has been heavily regulated resulting in numerous distortions. Incentives, for example, have been employed to encourage drilling for natural gas below 15,000 feet but not to 10,000 foot depths. Similarly, natural gas flowing in interstate commerce under section 104 of the Natural Gas Policy Act is held at artificially low prices and is not scheduled for price decontrol in the near future. The full effect of such distortions and disincentives is not known. Additionally, the ultimate effect of incentives, such as for deep gas and tertiary recovery efforts, is not yet fully understood.

CHAPTER FOUR

EMPLOYMENT

The oil and gas industry is very important to the state economy as a whole in terms of employment, and it is critical to some cities because employment in the industry is concentrated geographically. The importance of this industry is measured by its production volume, excise taxes, value of plants and equipment, sales volume, the size of the labor force, the stability of employment, and the wages paid. Reports published by Louisiana Department of Labor Office of Employment Security, 1985, indicate that the oil and gas producers alone employ 5% of the covered employment work force in the state and pay 8.5% of the wages in covered employment. Employment in the petroleum industry has advanced rapidly since 1901 when the state's first oil well was brought in, and even more rapidly since the first refinery was built in 1909. Over this period the increasing labor force employed in the industry reflected the expanding demands for the crude and refined products of the petroleum industry, not only in the Louisiana area but throughout the nation and many other parts of the world.

PRODUCTION

Employment information for periods prior to 1942 is difficult to obtain. But in 1942, Louisiana Division of Employment Security reported that 12,850 persons were employed in the petroleum production industry; from 1942 to 1982 employment in this field followed an upward trend with some periodic adjustments. The employment in the petroleum production

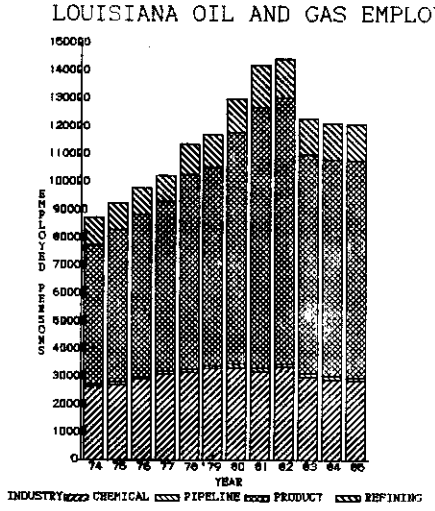


FIGURE 11

industry reached its peak in 1982, at that time the industry employed 94,700 workers in the state of Louisiana. In 1985 the employment figures indicate that there were 79,097 persons working in oil and gas production, which is a decline of about 15% from its peak (see Figures 11 and 12 and Table 6). The long term decline in the labor force reflects the general economic conditions in the nation rather than specific conditions confined to the Louisiana petroleum industry. It is also known that in addition to the 79,097 persons employed in 1985 in the producing phase of the petroleum industry, additional thousands are employed in related industries, such as selling oil field and refinery equipment, constructing plants and pipelines and transporting products by truck, train or barge. The oil and gas production and drilling industry is feeling the impact of the recent recession, the Middle East situation, the continued uncertainty of oil prices, the high cost of operations, and the large volume of oil products imports, lowered oil allowables and the over supply of natural gas.

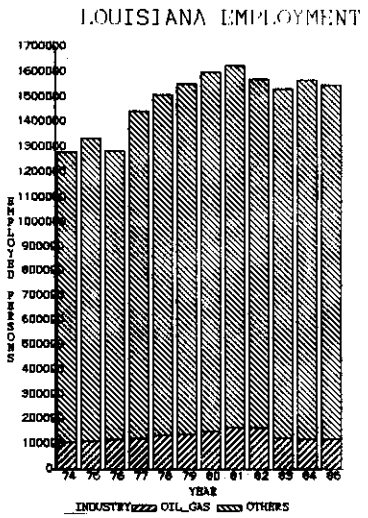


FIGURE 12

Producers and oil refineries in the U.S. are pressing for relief and controls on imports of foreign crude oil and refined products. These imports are blamed for the skidding to lower levels of the domestic production. This situation is affecting employment, income to employees, profits to stockholders and profits to operators of the oil and gas industry.

REFINING

Employment in Louisiana refineries has been identified with a slow steady growth, a feeling of stability and few uncertainties of labor disputes or other disruptions of

activity. Greater product diversification and technological improvements have had their share of responsibility in maintaining the healthy status of the industry, but have not always created greater employment. The forerunner of Louisiana's petroleum refining and petrochemical industry was the refinery located at Baton Rouge. Ground for this refinery was broken in the spring of 1909.

The earliest available record of employment in the refining industry recorded by Department of Labor Office of Employment Security was an average 7,400 in 1938. At the present there are 18 operating refineries in Louisiana; these refineries currently employ around 13,000 people, but this figure is 14% below the peak refining sector employment of 15,100 reached in 1981. (See Table 6.) Much of this decline can be attributed to the excess deliverability of refined petroleum products and the shutdown of a number of independent refineries in Louisiana during this period. Additionally, some major oil companies consolidated refinery operations in the face of declining demand and fierce competition with other domestic refiners as well as with refined product imports. The result has been to maximize throughput at their most efficient or newest plants within the U. S. and to shutdown all or a portion of the older,less efficient facilities.

CHEMICALS

Employment in Louisiana's industrial chemical operations is not specifically defined because vast amounts of petrochemicals are manufactured in petroleum refineries, and it is almost impossible to segregate the employees in these chemical units from those engaged in the refinery operations. Louisiana petrochemicals are frequently sold to wholesale outlets for resale; others are sold to manufacturers for further processing and very few are sold to the consumer directly from manufacturing operations in this state.

The chemical industry employment data collected (see Table 6) indicates employment only in plants that are separate and distinct from the refineries. Employment in this segment of the work force has risen steadily since 1942 reaching to its peak in 1982 when there were 33,862

persons employed. The recent employment decline in the petrochemical industry is attributed to environmental regulations such as the phasing out the usage of leaded gasoline, cheaper labor and raw material costs in foreign countries, increased automation of manufacturing plants, and reduced demand for products resulting from the national economic slump of the past few years.

PIPELINES

Employment in oil transportation by pipeline has its ups and downs. The highest employment year in this segment of the industry was in 1957 when it employed 1,500 persons. Ten years later, in 1967 there were about 900 persons left in this segment of the industry. The reason for the decline was the development of new methods of pipeline operations that were more automated and required less maintenance. Since 1978 employment has been on a recovery mode, fluctuating between 1,000 and 1,300 depending mostly on the repair needs on the pipelines that are 20 years or older and the volume of foreign oil that comes through the Superport.

OTHER RELATED INDUSTRY

Employment in industries related to the oil and gas industry but not included above includes those employed by the gas pipeline industry, gas utilities, pipeline construction, plant construction, retail gasoline stations, barge repairs, other forms of oil and gas transportation, and, one of the most rapidly growing businesses in the state, transportation and support services to offshore operations.

The number of people employed in the above industries is into six digit figures but the future prospects may not be too bright with the increase in oil imports, more mechanization and automation in repair shops, self service filling stations, and energy conservation.

TABLE 6

LOUISIANA EMPLOYMENT FIGURES

YEAR	OIL & GAS PRODUCTION	OIL REFINING	CHEMICAL INDUSTRY	OIL PIPELINE	TOTAL EMPLOYMENT
1960	40,300	13,400	16,400	1,250	1,099,800
1961	40,300	12,800	16,300	1,100	1,094,700
1962	40,400	12,000	16,100	950	1,099,800
1963	40,400	11,400	16,500	1,000	1,120,800
1964	43,100	10,400	17,100	950	1,160,700
1965	45,800	10,400	17,500	900	1,199,400
1966	47,200	9,200	20,200	900	1,248,100
1967	47,100	9,800	21,500	900	1,286,100
1968	47,200	10,500	22,300	900	1,300,100
1969	48,300	9,700	23,500	900	1,300,500
1970	47,300	9,600	23,700	900	1,203,000
1971	48,000	9,600	23,900	900	1,230,000
1972	49,200	9,500	24,300	900	1,241,000
1973	49,800	9,600	25,300	900	1,287,000
1974	49,900	9,900	26,800	900	1,280,000
1975	54,800	9,600	27,300	950	1,336,000
1976	58,200	9,700	29,300	900	1,285,500
1977	61,300	9,300	31,100	900	1,444,600
1978	70,100	10,800	31,800	1,000	1,509,100
1979	71,400	11,500	33,200	1,100	1,554,370
1980	83,300	12,100	33,500	1,200	1,599,600
1981	93,500	15,100	32,300	1,200	1,627,796
1982	95,522	14,098	33,862	1,033	1,571,017
1983	78,586	13,005	30,113	1,282	1,531,480
1984	77,865	13,053	29,063	1,247	1,568,064
1985*	79,097	12,595	28,538	1,141	1,543,381

NOTE: For data sources see Data Sources.
* Preliminary data

CHAPTER FIVE

RESERVES

The crude oil and natural gas reserves figures are a good indication of field production capabilities. Proved reserves, by definition, are the estimated quantities of petroleum products, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. The reserves figures help in the decision of pipeline construction or replacements, government policies, production rates and other activities. The latest proved reserves figures reported by the Energy Information Administration (EIA) indicate that there are 2.66 billion barrels of crude oil and about 42.34 trillion cubic feet of natural gas left in Louisiana (onshore, offshore state and Louisiana OCS). These figures are estimates from EIA. Experts from other organizations may disagree with these figures, but all experts agree that crude oil and natural gas exist in finite amounts, and no one really knows how much of either remains.

METHODS OF ESTIMATION

Since proved reserves cannot be measured directly, their quantities are inferred on the basis of the best geological, engineering and economic data available. The estimator must use considerable judgment in his analysis and interpretation of these data before giving a calculated guess of the amount of oil or natural gas deposited in the studied reservoir. Depending on the amount, kind, quality and reliability of information available, all methods used in the estimation of proved reserves can be classified in three groups:

a) Empirical Group

This group includes all those methods that use historical data in their estimation. These historical data are past production, decline rate, existence of undeveloped but potentially productive zones elsewhere within a producing

field, the possibilities for enhanced recovery and any constraints that may have inhibited past production. Methods in the empirical group are Time Decline Method, Material Balance Method (for crude oil reservoirs), Pressure Decline Method (which is a material balance method for natural gas reservoirs) and Reservoir Simulation Method. Of all these methods, the Reservoir Simulation method is the most accurate in predicting reservoir performance; but not all reservoirs can use this method for reserve estimating because the Reservoir Simulation method requires a lot of data, and sometimes this data is either not available or not reliable, requiring use of the other methods.

b) Theoretical Group

The theoretical group consists of methods that are not based on past production data, but rely on engineering, geological and geographical data obtained before production begins. This approach is useful for forecasting production from the yet-to-be drilled portions of a field. The best known method in this group is called the Volumetric Method.

c) Comparison Group

The comparison method is based on "rules-of-thumb" or analogy with another reservoir or reservoirs believed to be similar for which more data are available. This approach is employed when the other methods are not feasible.

RESERVE ESTIMATES FOR LOUISIANA

Estimates of remaining Louisiana petroleum reserves vary widely. Experts disagree about the size and productivity of individual reservoirs and about the reserves associated with already discovered fields. They are even further apart when assessing the undiscovered potential, but everyone recognizes that crude oil and natural gas are nonreplenishable resources that are progressively being exhausted.

Louisiana estimated crude oil proved reserves are listed in Table 7. Table 8 lists Louisiana estimated lease condensate proved reserves. Table 9 lists Louisiana natural gas liquids proved reserves; estimated lease condensate reserves figures are included in the natural gas liquids proved reserves. Table 10 lists Louisiana dry natural gas proved reserves. Tables 11 and 12 show estimates of crude oil proved reserves and wet natural gas proved reserves, after lease separation, respectively, for Louisiana, Texas and the U.S.. Figures 13 through 16 show the reserves figures for the past 10 years, and the extent of Louisiana and Texas reserves relative to the U.S. as a whole.

LOUISIANA OIL RESERVES

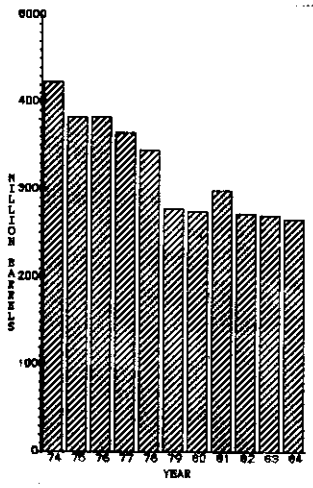


FIGURE 13

LOUISIANA DRY GAS RESERVES

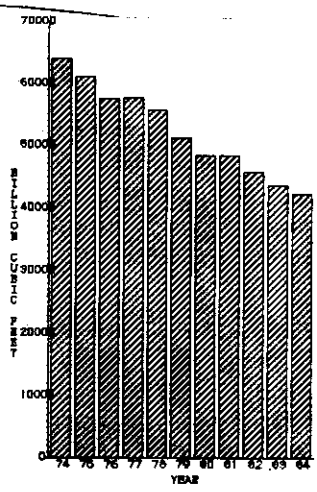


FIGURE 14

As shown in Table 7 the Louisiana 1984 proved reserves of crude oil dropped 1.6 percent, but these figures can be misleading since the reserves under Louisiana regulatory jurisdiction dropped almost 2.0 percent; whereas, Louisiana OCS reserves increased by one half percent, making the composite figure drop only 1.6 percent. Louisiana proved reserves of natural gas dropped 3.0 percent, shown in Table 10, but the drop in Louisiana jurisdiction natural gas reserves was about 9.0 percent, while the drop in the Louisiana OCS portion was only 0.2 percent. During the same time period, the Texas figures indicate an increase of 0.3 percent in crude oil reserves under Texas jurisdiction and a 9.7 percent decrease in Texas OCS with the composite figure indicating a 0.2

percent increase in Texas crude oil reserves. The Texas natural gas reserves showed a decrease of 0.3 percent for Texas state jurisdiction and a 12 percent increase for Texas OCS gas.

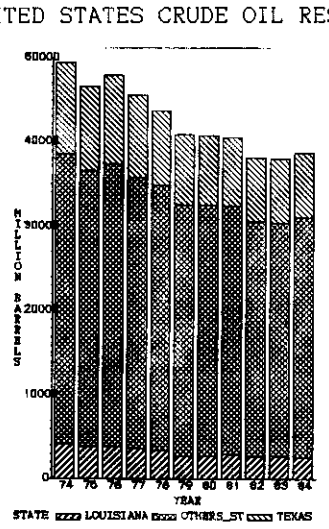


FIGURE 15

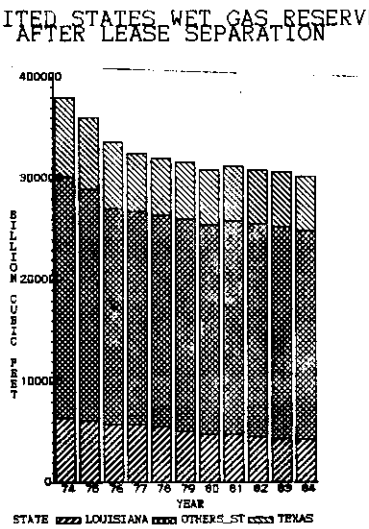


FIGURE 16

At the 1984 Louisiana production rate of 515 million barrels per year for crude oil, Louisiana's proved reserves as of the end of 1984, would last just over five years. At the 1984 Louisiana production rate of 5.6 trillion cubic feet for natural gas, Louisiana's proved reserves of gas would last only over eight years. Of course, new reserves are found each year through exploration activities to replace some of what has been produced during the same time period. In 1984 new reserves found amounted to 55 million barrels of crude oil (2% of proved reserves) and 4.5 trillion cubic feet of natural gas (10% of proved reserves). A major portion of the newly found reserves are located in the federal OCS region (22 million barrels of crude oil and 3.6 trillion cubic feet of natural gas). Also there are significant quantities of oil and gas remaining in the ground which are not included in the reserves figures because they are either not economically feasible or not technologically practical to produce in the twenty year time-frame discussed in this report, or the reservoir has not been located. Nevertheless, the decline in Louisiana reserves of oil and natural gas has been substantial.

TABLE 7

LOUISIANA ESTIMATED CRUDE OIL PROVED RESERVES
(Million Barrels)

YEAR	OFFSHORE and OCS	SOUTH ONSHORE	NORTH ONSHORE	STATE TOTAL
1977	1,974	1,382	244	3,600
1978	1,951	1,242	255	3,448
1979	1,882	682	216	2,780
1980	1,821	682	248	2,751
1981	2,026	642	317	2,985
1982	1,877	611	240	2,728
1983	1,915	569	223	2,707
1984	1,911	585	165	2,661

NOTE: For data sources see Data Sources.

TABLE 8

LOUISIANA ESTIMATED LEASE CONDENSATE
PROVED RESERVES
(Million Barrels)

YEAR	OFFSHORE and OCS	SOUTH ONSHORE	NORTH ONSHORE	STATE TOTAL
1979	309	263	42	614
1980	296	267	36	599
1981	280	253	36	569
1982	310	243	26	579
1983	300	238	24	562
1984	269	229	19	517

NOTE: Prior 1979 data are not available.
For data sources see Data Sources.

TABLE 9

LOUISIANA ESTIMATED PROVED RESERVES FOR NATURAL GAS LIQUIDS, INCLUDING LEASE CONDENSATE
(Million Barrels)

YEAR	OFFSHORE and OCS	SOUTH ONSHORE	NORTH ONSHORE	STATE TOTAL
1977*		1,292	59	1,350
1978	682	823	105	1,610
1979	652	676	96	1,424
1980	711	540	95	1,346
1981	684	544	99	1,327
1982	709	501	85	1,295
1983	731	527	74	1,332
1984	677	454	57	1,188

NOTE: For data sources see Data Sources.
* Louisiana offshore and OCS proved reserves are included in the south onshore figure.

TABLE 10

LOUISIANA ESTIMATED DRY NATURAL GAS PROVED RESERVES
(Billion Cubic Feet, at 14.73 psia and 60 degrees Fahrenheit.)

YEAR	OFFSHORE and OCS	SOUTH ONSHORE	NORTH ONSHORE	STATE TOTAL
1977	35,295	18,580	3,135	57,010
1978	34,767	17,755	3,203	55,725
1979	33,250	13,994	2,798	50,042
1980	31,233	13,026	3,076	47,325
1981	31,462	12,645	3,270	57,377
1982*	30,203	11,801	2,912	44,916
1983*	28,480	11,142	2,939	42,561
1984*	28,574	10,331	2,494	41,399

NOTE: For data sources see Data Sources.
* Includes State and Federal offshore Alabama.

TABLE 11

ESTIMATED CRUDE OIL PROVED RESERVES, EXCLUDING LEASE CONDENSATE PROVED RESERVES
(Million Barrels)

YEAR	LOUISIANA	TEXAS	TOTAL U.S.
1960	4,785.3	14,758.0	31,613.0
1961	4,931.2	14,850.0	31,758.0
1962	5,086.6	14,648.0	31,389.0
1963	5,088.6	14,573.0	30,969.0
1964	5,162.4	14,300.0	30,990.0
1965	5,245.8	14,303.0	31,352.0
1966	5,408.4	14,077.0	31,452.0
1967	5,455.9	14,494.0	31,376.0
1968	5,608.1	13,810.0	30,707.0
1969	5,689.1	13,063.0	29,631.0
1970	5,710.3	13,195.0	39,001.0
1971	5,399.0	13,023.0	38,062.0
1972	5,028.5	12,144.0	36,339.0
1973	4,576.8	11,757.0	35,299.0
1974	4,226.5	11,001.0	34,249.0
1975	3,827.2	10,080.0	32,682.0
1976	3,827.0	10,652.0	33,502.0
1977	3,651.0	9,715.0	32,146.0
1978	3,448.0	8,911.0	31,355.0
1979	2,780.0	8,284.0	29,810.0
1980	2,751.0	8,206.0	29,805.0
1981	2,985.0	8,093.0	29,426.0
1982	2,728.0	7,616.0	27,858.0
1983	2,707.0	7,539.0	27,735.0
1984	2,661.0	7,559.0	28,446.0

NOTE: For data sources see Data Sources.
OCS reserves are included in state figures.

TABLE 12

ESTIMATED GROSS WET GAS PROVED RESERVES,
AFTER LEASE SEPARATION
(Billion Cubic Feet, at 14.73 psia
and 60 degrees Fahrenheit.)

YEAR	LOUISIANA	TEXAS	U.S.
1960	63,042	118,840	262,326
1961	65,670	119,188	266,274
1962	71,544	118,855	272,279
1963	75,365	117,809	276,151
1964	79,076	118,855	281,251
1965	82,811	120,617	286,469
1966	83,684	123,609	289,333
1967	86,290	125,415	292,908
1968	88,015	119,001	287,350
1969	85,057	112,393	275,109
1970	82,957	106,353	290,746
1971	78,625	101,472	278,806
1972	74,971	95,042	266,085
1973	69,152	84,936	249,950
1974	64,052	78,541	237,132
1975	61,309	71,037	228,200
1976	57,502	64,651	213,278
1977	57,666	56,967	209,842
1978	55,725	55,583	208,033
1979	51,192	56,027	208,335
1980	48,385	53,170	206,259
1981	48,448	53,688	209,434
1982	45,899 *	53,131	209,254
1983	43,663 *	53,803	209,046
1984	42,348 *	53,650	205,984

NOTE: For data sources see Data Sources.
OCS reserves are included in state figures.
* Includes State and Federal offshore Alabama.

CHAPTER SIX

OIL AND GAS WELLS DRILLING

Louisiana has a very active state in the exploration and development of oil and gas fields. There were an average of 230 rigs active in Louisiana at any day during 1985, which was an average year for the industry. Louisiana ranks second in drilling activities in the U.S., surpassed only by Texas.

HISTORY OF DRILLING DEVELOPMENT

The earliest American well drilled using drilling tools was recorded in the early 1800's. In 1806, the Ruffner brothers pioneered the development of drilling bits and stems. The stems were built by splitting and coring a small tree, the two halves tied together and packed with rags, and the whole thing pounded into the ground. At the same time, drilling practices leading to successful well boring and completion were developed. Most of the wells drilled prior to 1859 used the Ruffners' techniques, except in a few cases where wells were drilled using steam powered rigs. The steam powered rigs were introduced in the middle of 1840. Even with the introduction of steam powered rigs, the spring pole with foot power was the primary means for developing the drilling motion. Using this method well drillers completed wells probably as deep as 800 to 1,000 feet.

During the early 1860's, the fluid circulating rotary, diamond coring drill was develop in France. It was introduced into the United States during the late 1860's. The machine employed a hydraulic cylinder feed and flush joint drill rods. This machine, in its various developments, was used extensively in later years and contributed much to coring and pressure control practices that are in common use today. Prior to 1860 wooden drill rods were in general use in percussiom tool drilling. After 1860 American operators changed to manila drilling cable and to steel cable in the early 1900's.

In the early 1880's the Baker brothers of South Dakota

From 1945-70: a) Drilling instrumentation was improved, so that by 1969 there were instruments that indicated the instant value of any given drilling factor, the characteristics of the formation being drilled, the functioning of the downhole tools, and other factors of interest of the driller. b) Land rigs were developed into completely portable mounted rigs for 5,000 foot wells or less. c) The hole sizes were reduced, thus lessening the weight in drill pipe and casing to be handled in the hole. d) The derrick was eliminated in the rotary drilling rig and hydraulic lift was used for handling drill pipe.

From 1970-present: a) Drilling platform design was improved several times. b) Basic design of drilling bits remained unchanged, but the raw material in making the drilling bits improved in hardening, and the life between failure increased several times. c) Power station and machinery design were improved. d) The needs of fast mobility and drilling over water, had induced the development of drilling rigs aboard of ships. e) Directional drilling techniques were improved, as well as cost saving measures in offshore drilling.

DRILLING IN LOUISIANA

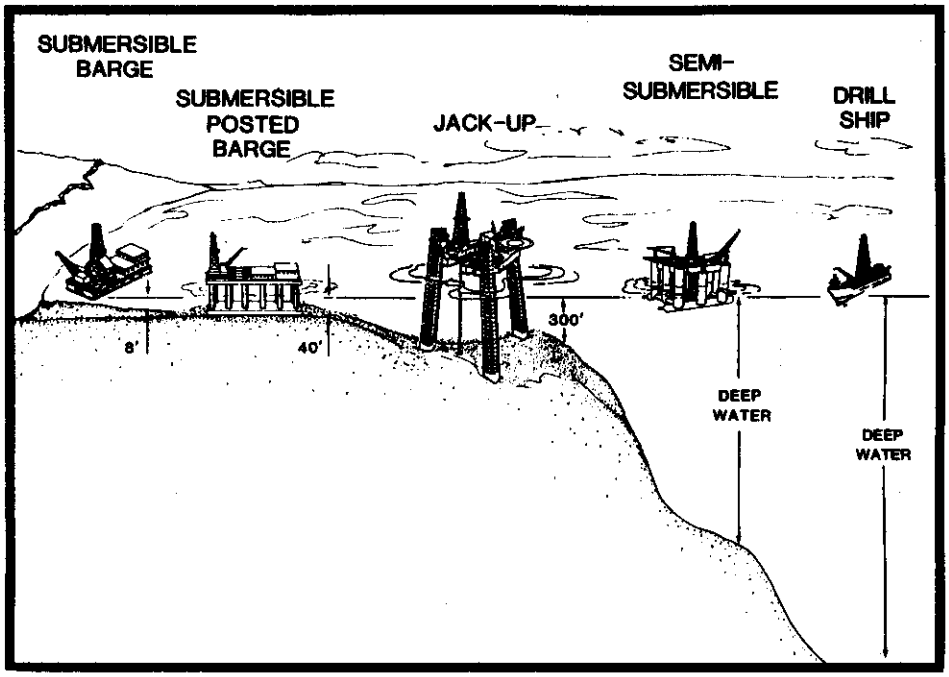
The highest number of drilling permits issued in the state of Louisiana since statistics have been kept was 7,631 permits issued in 1984, and the lowest was 2,688 permits issued in 1973. In 1985, there were 5,410 permits issued, from which 599 were for wildcats or exploratory wells. Exploratory well permits reached a peak in 1981 when 1,086 permits were issued.

Rig activity in the state was at its highest point in the 50's and 60's when there were 350-450 rigs active on any given day. In recent years the average has dropped to 200-300 active rigs per day with the exception of 1980-1983; in those years, the average active rigs per day count was above the 300 mark.

The big surge in drilling activities in those year was due the rapid increases in oil prices. Just recently, oil prices have plunged to the $10 to $14 range from a level of $26 to $29 at the beginning of this year. Drilling activities are expected to drop. In a comparison of the first quarter of 1986 to the same period in 1985 indicates

developed a fluid circulating rotary rig. This type of drilling rig was moved into many soft formation areas where cable tools had been tried without success. The cable drilling rigs could not reach the required depths in the soft caving formations. In 1909, the rolling cutter rock bit was designed, built, patented and successfully used by Howard R. Hughes. It was a very crude tool with replaceable rolling cutters that were highly expendable. The hughes and other rolling cutter bits were improved over the years until about 1930 when they were built in designs similar to those of today.

In 1930, the hydraulic rotary well drilling equipment was developed. From 1900-30 the cable tool drilling industry was also improved with the introduction of derrick hanging tools, better pipe handling tools, and new floor tool design. Starting in 1934, the steam rigs were replaced by internal combustion driven rigs or electric driven rigs. In 1938, air or gas was introduced as circulation fluid in rotary drilling. It had been used in cable tool drilling previously. In the early 1940's diamond set bits that drilled without leaving a core were developed. They are now one of the principal and most important cutting tools in hard formations. With the use of the new heavy equipment, new drilling practices, and more technical direction; the drilling industry improved 100% in rate of penetration.



TYPES OF MOBILE OFFSHORE DRILLING RIGS
FIGURE 17

a drop of 50% in permits issued and more than 30% in rig activity. The average active rig count for the first quarter of 1986 was 169, and this average number is the lowest since the 1940's.

Table 13 lists by year the daily average number of active rigs, the number of permits issued , the number of exploratory or wildcat permits issued, and the number of well completions by type.

TABLE 13

LOUISIANA STATE JURISDICTION DRILLING ACTIVITIES

YEAR	WELLS COMPLETED DRY	OIL	GAS	AVERAGE ACTIVE RIGS	WILDCAT PERMITS ISSUED	TOTAL PERMITS ISSUED
1970	1,144	1,359	700	247	447	3,982
1971	934	965	582	189	441	3,011
1972	940	849	787	183	453	2,940
1973	844	624	535	172	370	2,688
1974	936	723	665	207	610	3,194
1975	1,010	796	648	200	513	3,286
1976	972	797	935	205	515	3,428
1977	1,078	760	1,098	245	588	3,707
1978	1,238	771	1,067	277	695	4,352
1979	1,254	824	1,331	273	694	4,419
1980	1,555	1,218	1,623	364	893	6,237
1981	1,788	1,351	1,564	386	1,086	6,281
1982	1,702	1,455	1,331	337	727	5,172
1983	1,542	1,628	884	224	645	5,494
1984	1,861	2,420	879	258	702	7,631
1985*	1,660	2,500	910	231	621	5,535

NOTE: For data sources see Data Sources.
* Preliminary data.

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3 Hough, Leo W. and Arnold C. Chauviere, "Oil and Gas Development in Louisiana", American Institute of Minning and Metallurgical Engineers, 1952.

4 "Louisiana Energy Outlook", Louisiana Department of Natural Resources, Office of Secretary, Baton Rouge, 1984

5 "Oil and Jobs in Louisiana", Louisiana Department of Labor, Research and Statistics Division, Baton Rouge, 1960.

6 Ristroph, John, "Statewide Oil and Gas Forecasting Procedure", Louisiana Department of Natural Resources, Office of Secretary, Baton Rouge, 1984.

DATA SOURCES

DRILLING

Drilling permits, active rigs and completion data are from "Petroleum Activity Report", 1970-1985, Louisiana Department of Natural Resources, Office of Conservation.

EMPLOYMENT

Oil and gas related industries employment data are from "Employment and Total Wages Paid by Employers Subject to the Louisiana Employment Security Law", 1976-present, Quarterly report, Louisiana Department of Labor, Office of Employment Security; and early data are from "Louisiana Oil and Gas Facts", Mid-Continental Oil and Gas Association, 1983.

PRODUCTION

Louisiana onshore and offshore crude oil including lease condensate and dry gas production (see note) data under state jurisdiction are from "Petroleum Activity Report", 1970-1985, Louisiana Department of Natural Resources, Office of Conservation; and early data are from "Annual Oil and Gas Report", 1954-1969, Louisiana Department of Conservation.

Natural gas wet-gross productions data are from "Natural Gas Annual", U.S. Department of Energy, Energy Information Administration, DOE/EIA-0131.

Outer Continental Shelf dry gas productions prior to 1984 data are from "Federal Offshore Statistics", U.S. Department of Interior, Mineral Management Services, MMS 84-0071, September 1984; and later data are computed from state total production reported in "Natural Gas Monthly", U.S. Department of Energy, Energy Information Administration, DOE/EIA-0130.

Outer Continental Shelf crude oil productions including lease condensate data are from "Federal Offshore Statistics", prior 1982, U.S. Department of Interior, Mineral Management Services, MMS 84-0071, September 1984; and later data are from "Petroleum Supply Monthly", U.S. Department of

Energy, Energy Information Administration, DOE/EIA-0109.

U.S. natural gas production data are from "Natural Gas Monthly", 1980-1985, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0130; "Natural Gas Annual", 1975-1979, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0131; and "Basic Petroleum Data Book, Petroleum Industry Statistics", prior 1975, American Petroleum Institute, Volume VI, Number 1, January 1986.

U.S. crude oil production data are from "Petroleum Supply Monthly", 1984-1985, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0109; "Petroleum Supply Annual", 1978-1983, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0340; and "Basic Petroleum Data Book, Petroleum Industry Statistics", prior 1978, American Petroleum Institute, Volume VI, Number 1, January 1986.

RESERVES

Crude oil, lease condensate, natural gas and natural gas liquids reserves data are from "U.S. Crude Oil, Natural Gas and Natural Gas Liquids Reserves", 1974-present, U.S. Department of Energy, Energy Information Administration, DOE/EIA-0216; and early data are from "Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the United States and Canada as of December 31, 1978", prior 1974, American Petroleum Institute, Volume 33, June 1979.

NOTE:
The Louisiana Department of Natural Resources, Office of Conservation uses 15.025 psia. as base pressure in its reported gas volumes. Federal agencies reports their volumes of gas using a base pressure of 14.73 psia.. In this report the used base pressure is 14.73 psia and the used base temperature is 60 degrees Fahrenheit for all gas volumes. Volumes provided at 15.025 psia. were adjusted to the 14.73 psia. level by using the following factor:

-Volume (at 15.025) x 1.02 = Volume (at 14.73)

NATURAL GAS -- A mixture of hydrocarbon compounds and small quantities of various non-hydrocarbons existing in gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons usually contained in the mixture are methane, ethane, propane, butane and pentanes. Typical nonhydrocarbon gases which may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separated substances.

NATURAL GAS, "DRY" -- The actual or calculated volumes of natural gas which remain after: (1) the liquefiable hydrocarbon portion has been removed from the gas stream, and (2) any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

NATURAL GAS LIQUIDS -- Lease condensate plus natural gas plant liquids.

NATURAL GAS PLANT LIQUIDS -- Those hydrocarbons remaining in a natural gas stream after field separation and later separated and recovered at a natural gas processing plant or cycling plant through the processes of absorption, condensation, adsorption, fractionation or other methods. Generally such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane (e.g. ethane) are recovered as liquids, these components are included with natural gas liquids.

NATURAL GAS PROCESSING PLANT -- A facility designed to recover natural gas liquids from a stream of natural gas which may or may not have passed through lease separators and/or field separation facilities. Another function of natural gas processing plants is to control the quality of the processed natural gas stream.

NATURAL GAS, Wet After Lease Separation -- The volume of natural gas remaining after removal of lease condensate in lease and/or field separation facilities, if any, and after exclusion of nonhydrocarbon gases where they occur in sufficient quantities to render the gas unmarketable. Natural gas liquids may be recovered from volumes of

GLOSSARY

CASINGHEAD GAS -- All natural gas released from oil during the production of oil from underground reservoirs.

CONDENSATE -- (See LEASE CONDENSATE).

CRUDE OIL -- A mixture of hydrocarbons that existed in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.

DRY GAS -- (See NATURAL GAS, "DRY").

FIELD SEPARATION FACILITY -- A surface installation designed to recover lease condensate from a product natural gas stream usually originating from more than one lease.

GROSS WET -- (See NATURAL GAS, Wet After Lease Separation).

LEASE CONDENSATE -- A mixture consisting primarily of pentanes and heavier hydrocarbons which is recovered as a liquid from natural gas in lease or field separation facilities, exclusive of products recovered at natural gas processing plants or facilities.

LEASE SEPARATOR -- A facility installed at the surface for the purpose of (a) separating gases from produced crude oil and water at the temperature and pressure conditions of the separator, and/or (b) separating gases from that portion of the produced natural gas stream which liquefies at the temperature and pressure conditions of the separator.

LOUISIANA OFFSHORE -- It is a 3 mile strip of submerged lands located between the State coast line and the OCS region.

LOUISIANA ONSHORE -- Region defined by the State boundary and the coast line.

LOUISIANA OCS -- Submerged lands that comprise the Continental Margin adjacent to Louisiana and seaward of the Louisiana Offshore regions.

natural gas, wet after lease separation, at natural gas processing plants.

OUTER CONTINENTAL SHELF (OCS) -- All submerged lands that comprise the Continental Margin adjacent to the U.S. and seaward of the state offshore lands.

PROVED RESERVES OF CRUDE OIL -- Proved reserves of crude oil as of December 31 of the report year are the estimated quantities of all liquids defined as crude oil, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.
Volumes of crude oil in underground storage are not considered proved reserves.

PROVED RESERVES OF LEASE CONDENSATE -- Proved reserves of lease condensate as of December 31 of the report year are the volumes of lease condensate expected to be recovered in future years in conjunction with the production of proved reserves of natural gas as of December 31 of the report year.

PROVED RESERVES OF NATURAL GAS -- Proved reserves of natural gas as of December 31 of the report year are the estimated quantities which analysis of geologic and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoir under existing economic and operating conditions.
Volumes of natural gas in underground storage are not considered proved reserves.

PROVED RESERVES OF NATURAL GAS LIQUIDS -- Proved reserves of natural gas liquids as of December 31 of the report year are those volumes if natural gas liquids (including lease condensate) demonstrate with reasonable certainty to be separable in the future from proved natural gas reserves, under existing economic and operating conditions

RESERVOIR -- A porous and permeable underground formation containing an individual and separate natural accumulation of producible hydrocarbons (oil and/or gas) which is confined by impermeable rock or water barriers and is characterized by a single natural pressure system.
Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation

test (drill stem or wire line), or if economic producibility is supported by core analysis and/or electric or other log interpretations. The area of a gas or oil reservoir considered prove includes: (1) that portion delineated by drilling and defined by gas-oil and/or gas-water contacts, if any; and (2) the inmediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data. In the absence of information on fluid contacts, the lowest known structural occurrence of hydrocarbons is considered to be the lower proved limit of the reservoir.