



*An Enduring Partnership—
Oklahoma and the Petroleum Industry*



Oklahoma Geological Survey
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Norman, Oklahoma

1997

This booklet was prepared by the staff of the Oklahoma Geological Survey, and compiled by a committee consisting of: Charles J. Mankin, Kenneth S. Johnson, Tom L. Bingham, Tracy Peeters, Connie G. Smith, and Michelle J. Summers. Graphic support and cover design by James H. Anderson.

Photos on the cover and title page are of a 22 ft x 11 ft mural in the Oklahoma State Capitol rotunda. The painting, dedicated November 17, 1996, commemorates the 100th anniversary of the oil industry in Oklahoma. The artist is Jeff Dodd, of Enid. (Photo courtesy of the Oklahoma Arts Council.)

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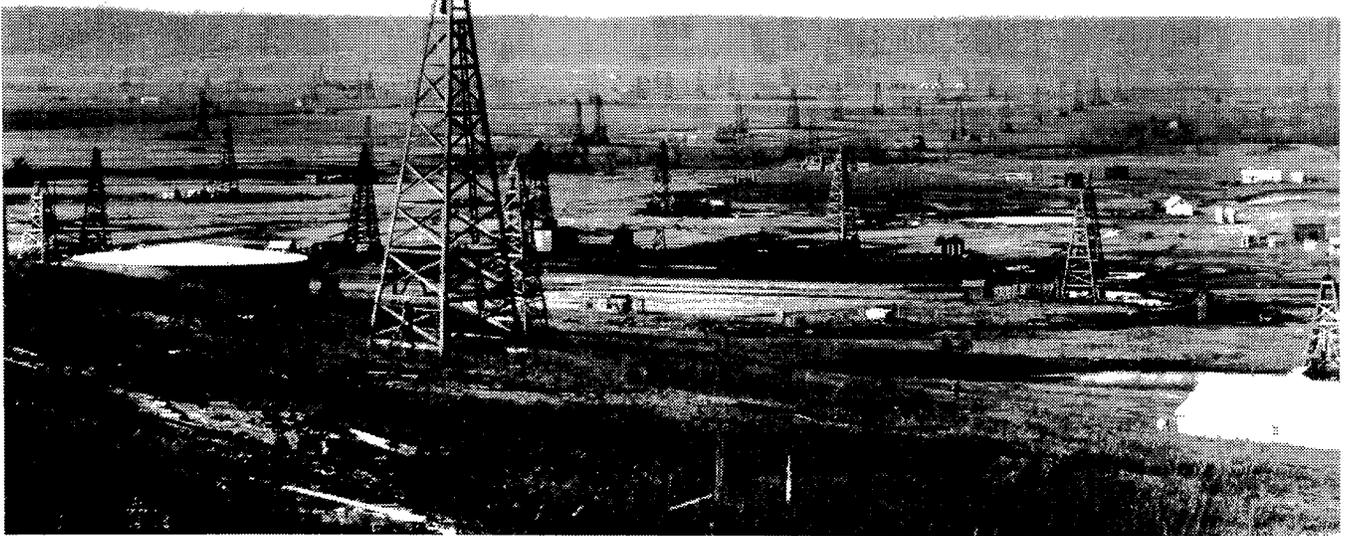
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We are pleased to provide this brief glimpse of Oklahoma's petroleum history and its people. Production of petroleum was well established by the time of Statehood in 1907, and that played an important role in shaping our State. Many of the important scientific and technical advances in exploration, production, and processing of petroleum had their origins in Oklahoma; a few are noted in this publication. Many of the major companies that today operate around the world were "born" here. The wealth generated from the extraction and utilization of petroleum in Oklahoma has been an important foundation for improvements in the quality of life for all our citizens. The generosity of these successful pioneers in the industry built many of our museums, cultural centers, libraries, and health-care facilities, and contributed much to our educational institutions. And, most of all, they provided a colorful and exciting chapter of our history. I am pleased to have been present for a part of the journey.

Charles J. Mankin, *Director*
Oklahoma Geological Survey



Glenn Pool field, southwest of Tulsa, during the early days of the oil boom. (Photo courtesy of the Western History Collections, University of Oklahoma Libraries.)

Petroleum— “Brought Oklahoma to the Dance”

It has been said by some that “petroleum brought Oklahoma to the dance”; meaning that an oil boom coming on the heels of Statehood provided the capital, the people, and the excitement literally to put the State on the map and affix an image of prosperity in the eyes of the world. When Oklahoma became a state in 1907, it immediately became the nation’s leading oil producer. Long before the oil industry was glamorized and fictionalized on television in the series “Dallas,” events in Oklahoma captured the imagination of a nation moving into a new century and a newly mobile lifestyle made possible by oil and the automobile.

Some of the richest men in America made, and sometimes lost, their fortunes in Oklahoma. J. Paul Getty, at one time the richest man in the nation, lived in Tulsa for a time and drilled his first producing well near Muskogee in 1916. Tom Slick, one of those who discovered the Cushing field, was called the “King of the Wildcatters.” Robert F. Garland drilled 40 dry holes in a row, then was refused a \$100 loan by a Tulsa bank. After finding success at Seminole, within a year he was worth \$10 million—and a member of that same bank’s board. Frank Phillips was a barber and banker in Iowa before coming to Oklahoma to help found Phillips Petroleum Company. Dean A. McGee, who was chief geologist for Phillips, co-founded and became chairman of the board of Kerr-McGee Corp. And the roll call continues: E. W. Marland, later an Oklahoma governor, founded Marland Oil Co., which merged with Continental Oil Co. (Conoco); William G. Skelly, founder of Skelly Oil Co.; Herbert R. Straight, of Cities Service; Erle P. Halliburton, founder of Halliburton Oil Well Cementing Co.; Harry F. Sinclair, of Sinclair Oil; Robert S. Kerr, one of the founders of Kerr-McGee Oil Co. and a powerful U.S. senator; Lew Wentz, of Wentz Oil, who generously donated work-study money for college students.

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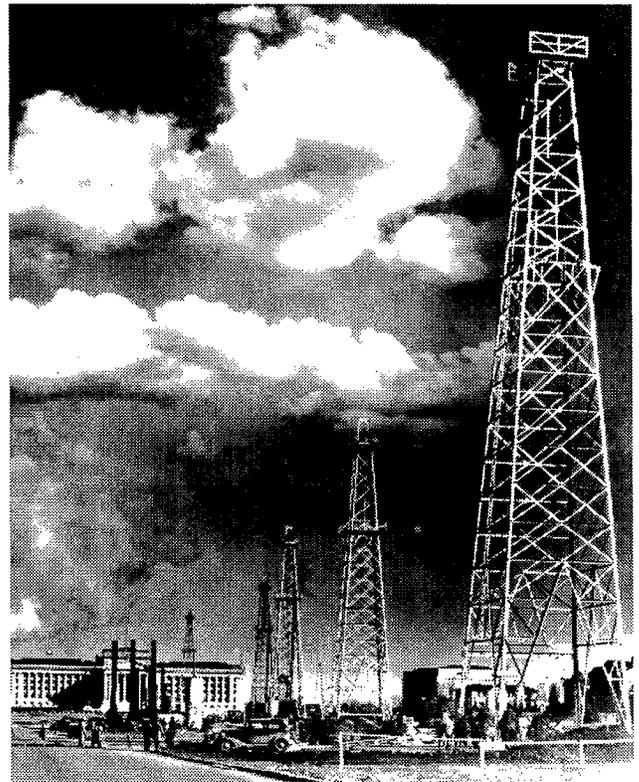
Still the list goes on and on: Samuel R. Noble, John E. Kirkpatrick, William K. Warren. And a myriad of other names follow these—all names that are associated with petroleum, big business, and success. And also, all names that are associated with charity, philanthropy, and the foundations of society in Oklahoma. Hospitals, music halls, orchestra performances, scholarships, museums, historic sites, education, civic groups, public buildings, medical research, and a myriad of other causes important to the quality of life in this still-young state all have received funding through those in the petroleum industry.

The actions of these pioneers and others in the field brought about an industry that to date sustains Oklahoma with revenue and jobs. In fact, the petroleum industry has been the greatest single source of revenue in Oklahoma every year since Statehood. The value of petroleum production reached a high of nearly \$11 billion in 1983, and it was about \$5.5 billion in 1996. Through the taxes paid, jobs created, and revenue flow generated by this industry, the State of Oklahoma and its citizens—past, present, and future—all have a stake in the petroleum business.

Oklahoma's Geologic History— The Root of Its Petroleum Wealth

Oklahoma's geologic environment proved highly favorable for the generation, migration, and trapping of oil and gas. Shallow seas covered the State at many times during the Paleozoic Era. Both source rocks and reservoir rocks are widespread throughout the State. Source rocks are sedimentary rocks rich in organic material that was transformed into petroleum through pressure, heat, and time. Most source rocks are black shales, and in Oklahoma this includes the Woodford Shale, formed during the Devonian Period, and other black shales of Mississippian and Pennsylvanian age. Reservoir rocks include any porous or permeable rocks that yield petroleum. In Oklahoma, reservoir rocks are present in each geologic system from the Cambrian through the Permian, and include platform carbonates as well as alluvial, deltaic, and marine sands. Major depositional basins, such as the Anadarko, Arkoma, Ardmore, Marietta, Hollis, and Ouachita, accumulated 10,000–40,000 feet of sediments, and thus the source rocks deposited in these basins were buried deep enough to allow generation of great quantities of oil and gas. Pennsylvanian-age folding, faulting, and uplift created the Wichita, Arbuckle, and Ouachita Mountain systems of southern Oklahoma, and the many geologic structures formed at this time created or enhanced most of the petroleum traps in the State.

Both source rocks and reservoir rocks are widespread throughout the State.



Oil wells south of the State Capitol building. The Oklahoma Capitol is the only state capitol with producing wells on its grounds. (Photo courtesy of Western History Collections, University of Oklahoma Libraries.)

Oklahoma's Petroleum Industry— The Proverbial Phoenix

Oklahoma achieved statehood in 1907 on the shoulders of the petroleum industry. Today, the industry is still a major component of our State's economy. Increases in value for oil and gas during the past year are important contributors to our improving economic status, and are significant factors in the projected surplus in tax revenues for the year.

The precipitous decline in value of almost \$5 billion for these commodities in 1986 (fig.1) sent our economy reeling for the past decade, a condition from which we are only now beginning to emerge. With prospects for a continuation of improved prices for both crude oil and natural gas, the industry is emerging as the proverbial phoenix from the "ashes." In fact, the value of oil and gas production increased by \$1.5 billion to \$5.5 billion in 1996. While it is too early to project the value for 1997 with confidence, the total again should exceed \$5 billion.

The basic thesis that the decline in Oklahoma's oil and gas production (figs. 2 & 3) is a condition that cannot be reversed is fundamentally flawed. These declines are the direct result of significant decreases in prices for both commodities without a corresponding decline in operating costs. Because the prices for oil and gas have not been sufficient to support a healthy industry, exploratory and even much development drilling has not occurred (fig. 4). Consequently, reserves have declined (figs. 5 & 6) leading to the inevitable decline in production.

Some will argue that exploratory and development drilling will not lead to sufficient new production to reverse the current declines because the 420,000 plus wells of record already drilled in the State have found almost all of the economic accumulations of oil and gas. While on the surface such an argument may seem to have merit, a number of important factors are ignored in such a superficial analysis. Among these are: that shallow wells

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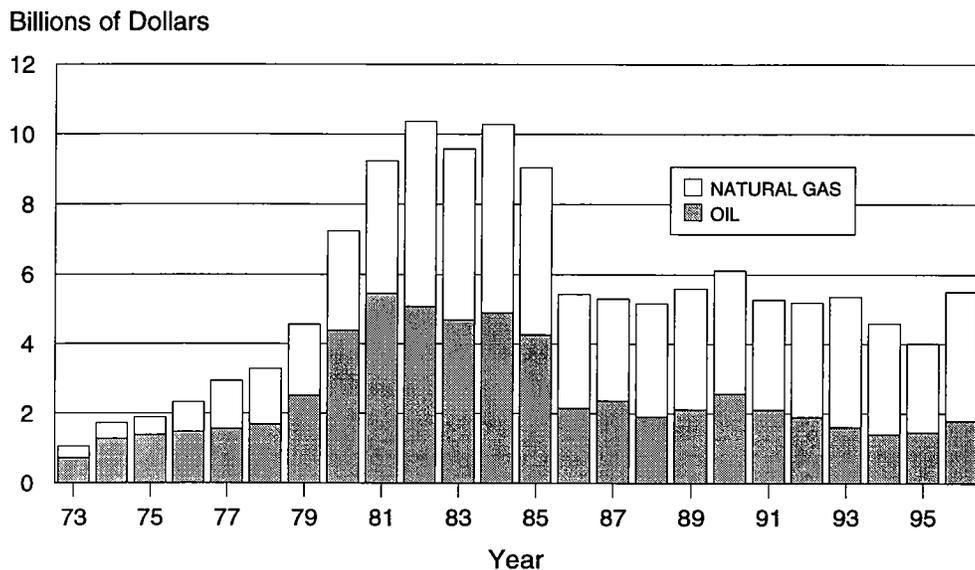


Figure 1. Value of oil and gas in Oklahoma from 1973 through 1996.

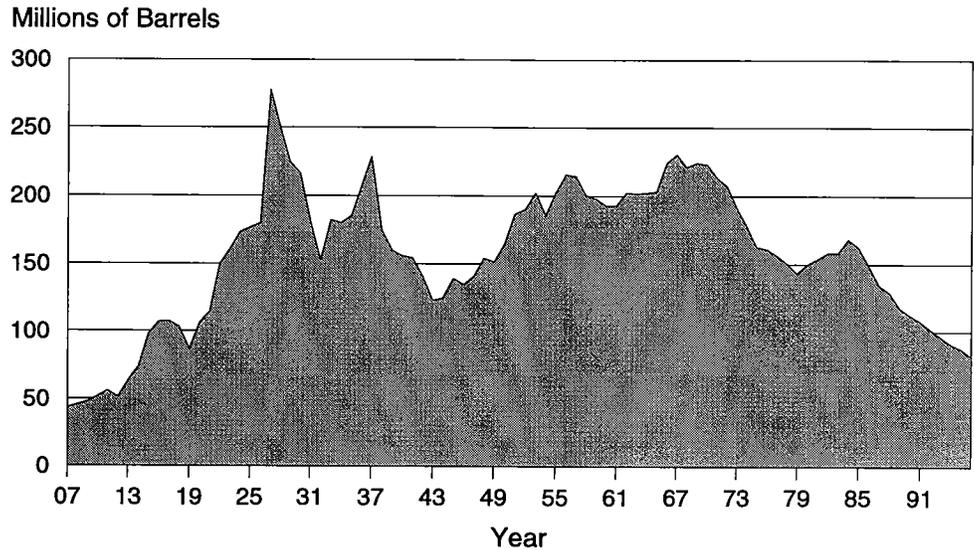


Figure 2. Production of oil in Oklahoma from 1907 through 1996.

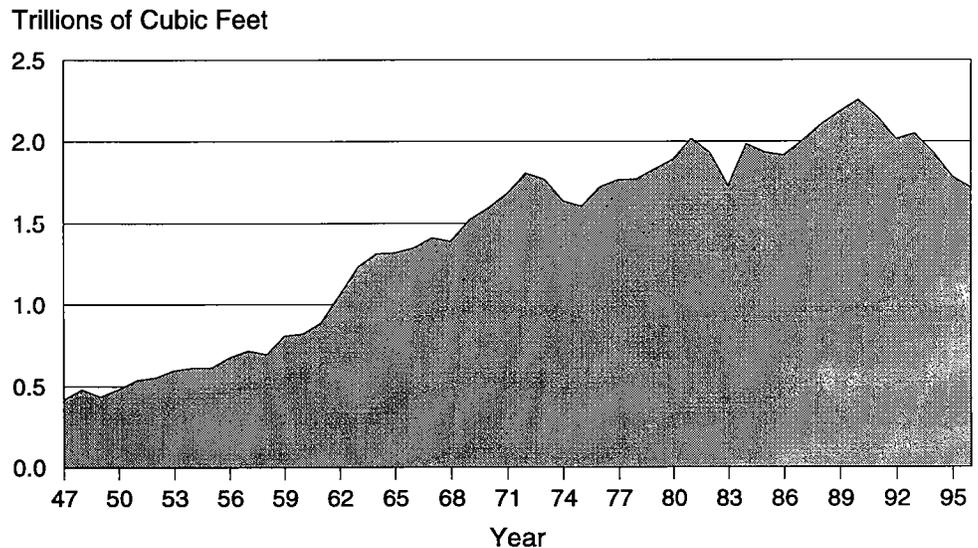


Figure 3. Production of natural gas in Oklahoma from 1947 through 1996.

When all wells drilled to depths of less than 4,000 ft are removed from the map, large areas of Oklahoma begin to resemble unexplored territory.

do not condemn production from deeper horizons; the economic conditions existing at the time when many “so-called” dry holes were drilled; new science and technology leading to improved recovery from existing fields; and new-field discoveries. A brief analysis of these factors will illustrate why Oklahoma’s petroleum industry will remain a viable economic force well into the next millennium.

A map of the State depicting the location of every oil and gas well of record does resemble indeed the proverbial pin cushion. However, when all wells drilled to depths of less than 4,000 ft are removed from that map, large areas of Oklahoma begin to resemble unexplored territory. With the capabilities of computer-assisted mapping and the use of digitized well-completion files, it now is possible to develop plots of wells using depth information or a large number of other criteria in hours as opposed to weeks by manual methods. This technology permits the explorationist to examine many areas of the State in a timely and cost-effective manner.

This technology also can be used to examine areas determined to be non-productive from the presence of “dry holes”, by examining dates when such wells were drilled. For example, if a well were drilled in the early 1930s when the price for crude oil might have been as low as 60 cents per barrel, a well producing as much as 40 barrels per day would have been considered uneconomic, and thus plugged and abandoned. Today, such a well would be an economic success. Attempting to examine the more than 420,000 completion reports manually would be an insurmountable task, but with computer-assisted technology, the task is daunting but could be done.

The development of new science and technology is assisting in identifying opportunities to improve production from existing fields at today’s prices. An examination of one group of crude-oil producing reservoirs in the State, called fluvial-dominated deltaic reservoirs, is a good example of such opportunities. A study to date of five stratigraphic groupings of these reservoirs shows that the average recovery of oil is about 15 percent of that contained in the reservoir, thus leaving more than three-fourths of the oil in the ground. Geologically, these reservoirs are highly compartmentalized like the many rooms in a home. When the drill bit penetrates one compartment, that well bore may recover most of the oil from that “room” but surrounding compartments will remain undrained. The ability to identify these conditions using 3-D seismic or engineering reservoir-testing methods, and using targeted in-fill drilling, horizontal drilling, and/or profile modification, can recover additional production from such existing fields at current crude-oil prices. This same study also is useful in identifying the potential for new fields by examining the patterns of sand distribution in the area.

Natural gas now provides two-thirds of the total revenue from petroleum production in Oklahoma. With the elimination of the myriad of regulations and constraints placed upon natural gas in the 1970s, and the growing demand for base-load supply, the prospects are bright for continued growth of this segment of the industry.

The only cautionary note for the future of natural gas in our State is the ability of small operators to compete successfully for competitive prices for their production. Onehalf of Oklahoma’s production is provided by small

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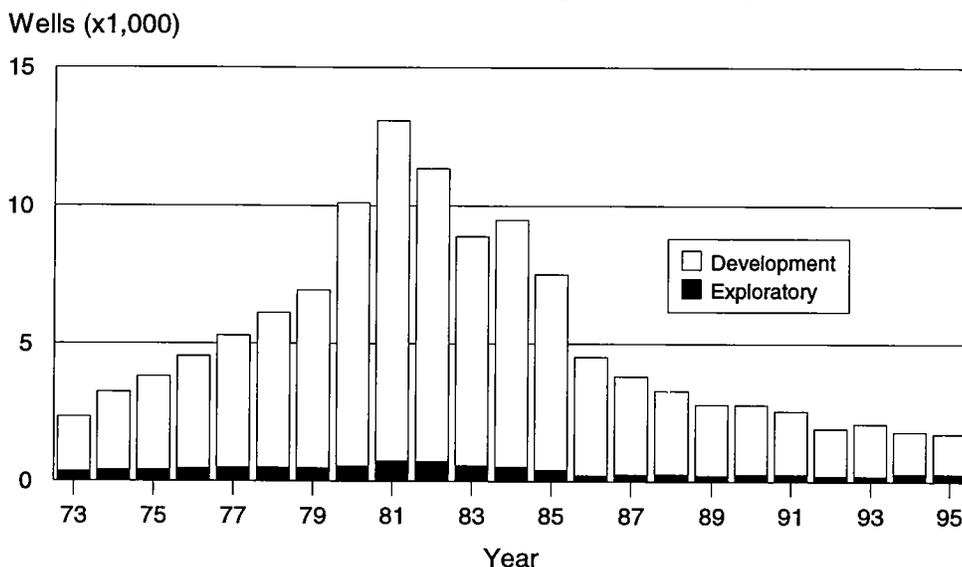


Figure 4. Number of exploratory and development wells drilled in Oklahoma from 1973 through 1995.

operators that commonly do not have effective marketing capability. Because almost two-thirds of our production is exported to other states, a producer must be able to market production in the interstate market in competition with major producers. A major goal of the State should be to expand the intrastate use of natural gas. Our two major competitors, Texas and Louisiana, are very successful in that endeavor. Texas consumes almost 80 percent of the natural gas produced in the state and in state waters, and Louisiana consumes more than 100 percent of their comparable production. By comparison, Oklahoma consumes less than 40 percent.

The demand for petroleum products on a worldwide basis is growing at a record rate. U.S. demand continues to grow as well. Given these conditions, the prospects for continued improvement in the economic conditions of the industry are bright. The current increase in price for oil and gas and the application of new science and technology will permit Oklahoma's petroleum industry to continue to be a significant economic force for well into, and perhaps through, most of the next century.

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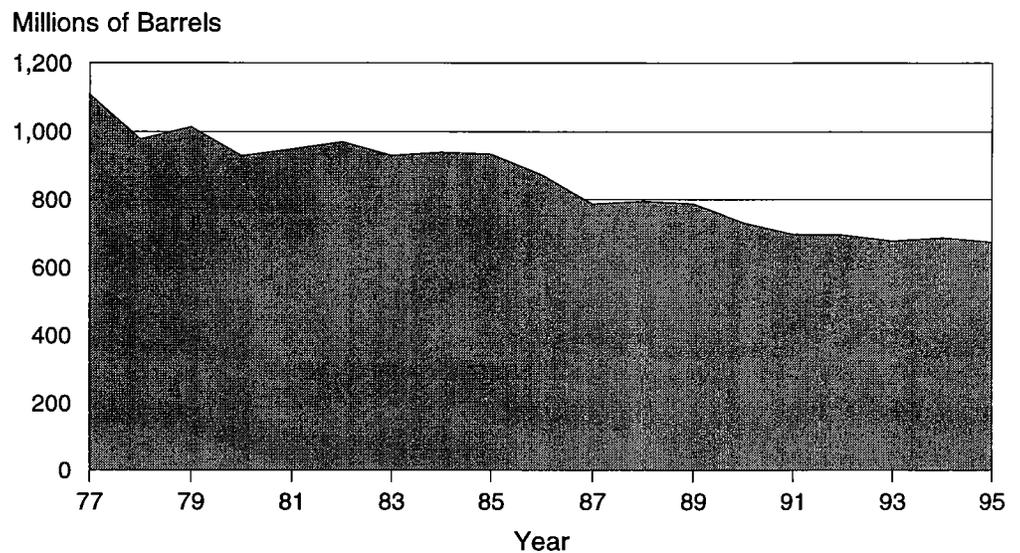


Figure 5. Reserves of crude oil in Oklahoma from 1977 through 1995.

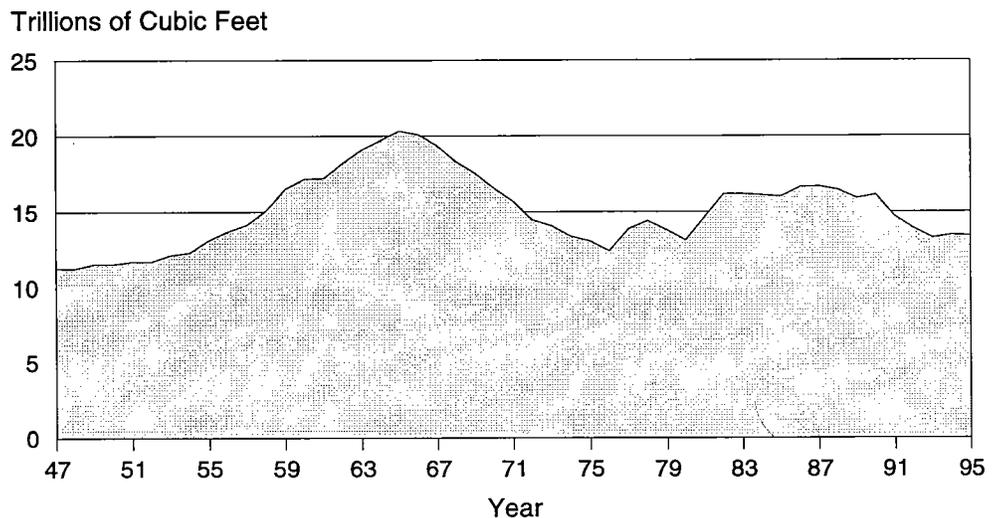


Figure 6. Reserves of natural gas in Oklahoma from 1947 through 1995.

The Oklahoma Geological Survey— Mandated in the State Constitution

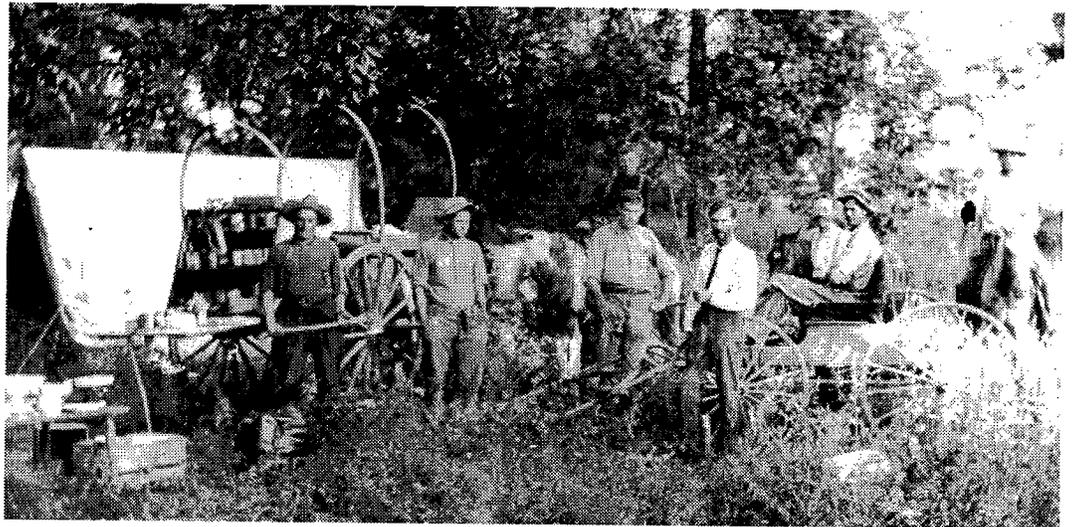
Even before Oklahoma became a state, geology was an important consideration for those living in Oklahoma Territory and Indian Territory. H. M. Chance wrote the first detailed geologic report, describing part of Indian Territory in 1890. Chance's maps were remarkably accurate, and the descriptions are recognizable in present-day terms. U.S. Geological Survey parties began work in what is now Oklahoma in 1890, with much of the work connected with coal on Choctaw Nation lands. J. P. Smith, who had been working for the Arkansas survey, and an assistant named Herbert C. Hoover, who later became president of the U.S., noted in 1892 the limestone west of Pawhuska. Smith published the name Pawhuska limestone and credited it to Hoover.

In 1898, David Ross Boyd, president of the University of Oklahoma, introduced a bill in the Territorial Legislature to establish "a Geological and Natural History Survey" of the Territory of Oklahoma. The effort proved successful and in 1900, by an act of the Fifth Session of the Legislative Assembly of Oklahoma, the Department of Geology and Natural History of the Territory of Oklahoma was authorized "for the purpose of beginning and continuing the geological and scientific survey of this territory and of discovering and developing its natural resources, and disseminating information in regard to its agriculture, mining, and manufacturing advantages."

Under the new law, A. H. Van Vleet, professor of biology at the Territorial university and thus *ex officio* territorial geologist, hired Charles Newton Gould to perform the "geological and scientific survey" that was mandated by the legislation. Gould already had been hired to teach geology and help develop a department for this science at the University of Oklahoma.

Although every state has a geological survey, or an organization by another name that serves that function, Oklahoma is the only state that mandates such an agency in its state constitution. The 1907 Constitution provided for the establishment of a "State Geological and Economic Survey," and enabling legislation signed by Governor Charles N. Haskell on May 29, 1908, made the Oklahoma Geological Survey a reality.

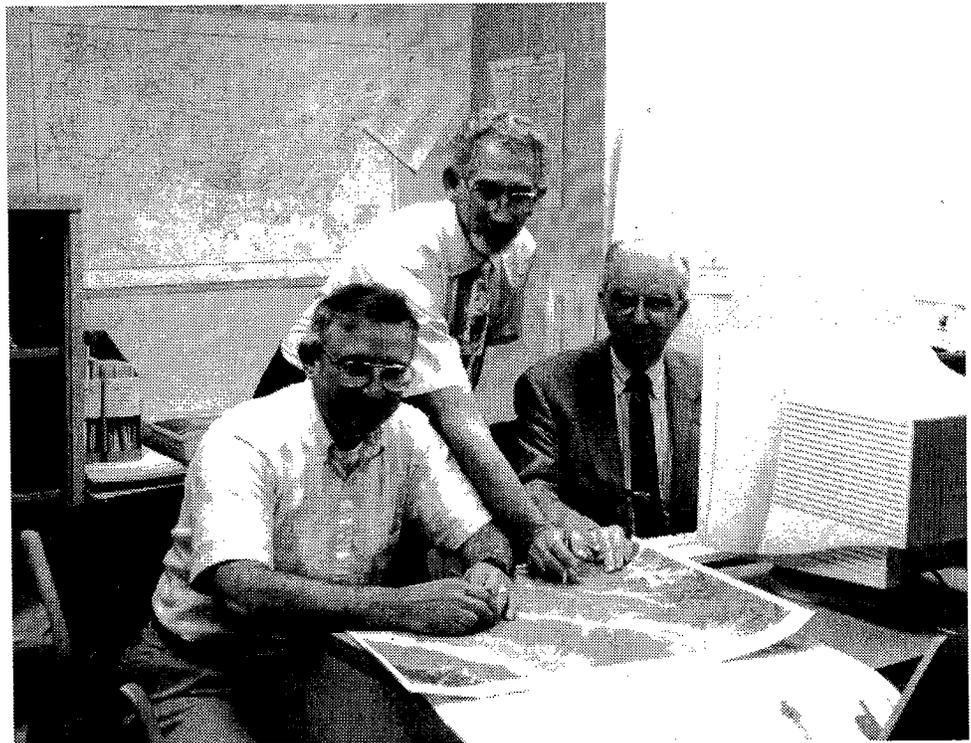
"... a study of the geological formations of the State with special reference to its mineral deposits"; preparation and publication of reports that would include "both general and detailed descriptions of the geological structure and mineral resources of the State."



Field-camp party from Territorial Survey. Charles N. Gould is fourth from right, in white shirt and tie.

The legislation clearly spells out the mission and purpose of the OGS, which is: “a study of the geological formations of the State with special reference to its mineral deposits”; preparation and publication of reports that would include “both general and detailed descriptions of the geological structure and mineral resources of the State”; and “consideration of such other scientific and economic questions as, in the judgment of the Commission shall be deemed of value to the people.”

It is in this tradition and by this mandate that the Oklahoma Geological Survey still serves Oklahoma. Although geologists still do field work and mapping much as was done in the early days, they now also work with computer specialists and others to collect and convey information in new ways. Geological material is available not only in books and on maps, but through databases, on floppy and compact disks, and over the Internet through the World Wide Web. Through these many media and personal contacts, the OGS serves the geological community and the petroleum industry, the schools, state and federal agencies, and, certainly not least, the public.



Kenneth V. Luza, OGS geologist, T. Wayne Furr, manager of cartography, and Dr. Charles J. Mankin, director, (left to right), compare older Geological Survey maps with new versions being prepared on computers.

Charles Newton Gould— The Father of Oklahoma Geology

After being hired in 1900 as Oklahoma Territory's first trained geologist, Charles Newton Gould and a number of field assistants managed to publish two volumes on geology—with accompanying botanical and zoological articles—on budgets of \$200 and \$300 per year. In September of 1900, Gould also began organizing the study of geology at the University of Oklahoma. Gould, who would go on to serve as the first director of both the Oklahoma Geological Survey and the School of Geology and Geophysics at the University of Oklahoma, became Dr. Gould upon receiving his Ph.D. from the University of Nebraska in 1906. It is for these and many other reasons that he is known as the “Father of Oklahoma Geology.”

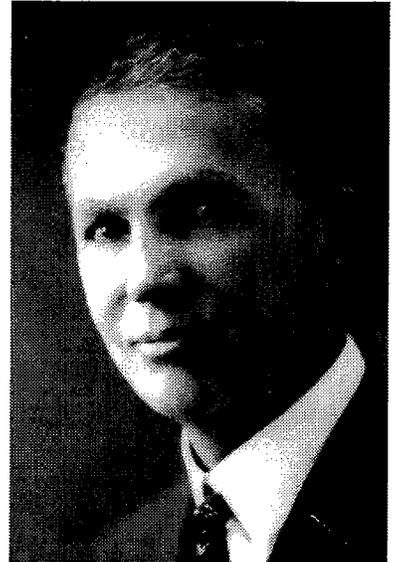
While still with the Territorial Survey, Gould also worked with the U.S. Geological Survey on the Tahlequah Quadrangle; investigated coal deposits in the Choctaw Nation; worked in the Wichita Mountains and Western Oklahoma; studied Permian red beds and published the findings; worked as a research hydrographer for the Reclamation Service of the USGS to investigate water resources of the Great Plains; and published “General Geology of Oklahoma” in the Second Biennial Report of the Department of Geology and Natural History at the University of Oklahoma. From 1900 through 1907, he published 19 papers on Oklahoma geology.

Later, when the Oklahoma Geological Survey was established in 1908, Gould was elected director, and offices were set up in rooms rented in private residences. Within one hour of his appointment, five geologists had been contacted by telephone to begin field work immediately. Nine parties were put into the field that first summer of the Survey's existence, and they investigated oil and gas fields, limestone, sandstone, clays, building stone, gypsum and salt, granite and gabbro, portland-cement rock, lead and zinc, tripoli, marble, coal, and asphalt, and engaged in basic mapping.

Gould kept up this frantic pace for the State until 1911, when he resigned to become a consulting geologist in the oil business. While working for the industry, he was instrumental in locating several significant deposits of oil and gas in Oklahoma, the Panhandle Gas Field in Texas, the South Bend Oil Field in Texas, and the Augusta-Eldorado District in southern Kansas.

In 1924 he became director of the OGS for the second time. From 1924 through 1931, he oversaw publication of 27 bulletins, 10 circulars, a geologic map of Oklahoma, and a number of other maps. Part of his legacy to Oklahoma is the massive, multi-volume, multi-author, county-by-county Bulletin 40, *Oil and Gas in Oklahoma*. It was well said by Elizabeth A. Ham, in *A History of the Oklahoma Geological Survey, 1908–1983*, that Bulletin 40 “could be updated, but it will never be equaled in scope.” Gould again left the Survey in 1931, when for a second time the Survey's appropriation was vetoed by a governor for political reasons.

There is a mountain in Glacier National Park named for Dr. Gould; on the South Oval of the University of Oklahoma Campus stands Gould Hall—the former home of the Oklahoma Geological Survey and OU's School of Geology and Geophysics.



Charles N. Gould

Native Americans Play Large Role in Oklahoma's Petroleum Industry

American Indians have played a significant role in the development of the State's petroleum industry, developing a close and rewarding relationship since the beginning.

After the Civil War, oil companies were formed and Indian lands were drilled, with some wells yielding minor production. However, for various reasons, no commercial well was drilled in what became Oklahoma until the Nellie Johnstone No. 1 came in on the bank of the Caney River near present-day Bartlesville, in the Osage Reservation, on April 15, 1897.

Many of the most significant petroleum finds in Oklahoma were made on Osage lands. The 1.5-million-acre Osage reservation extended from Bartlesville on the east to Ponca City on the west, from the Kansas border on the north to the wandering course of the Arkansas River all the way to Tulsa on the south. Bigger than either Delaware or Rhode Island, the area would become the State of Oklahoma's largest county, and, not incidentally, one of the country's most prolific areas of oil production. The Osage Indians owned all of the mineral rights in Osage County, and those rights in just two decades would yield more wealth than all of the Old West's gold rushes combined.

After World War I, a surge in the demand for oil and petroleum products led to a boom in the Osage fields, assisted by the discovery well that opened the fabulous, billion-dollar Burbank oil field in 1920. The man responsible was E. W. Marland, who brought in a 150-barrel flowing well on the Bertha Hickman farm. The rush was on, and in came both the new companies and the old, established ones represented by their subsidiaries: Phillips, Skelly, Gypsy, Prairie Oil and Gas, Sinclair, the Carter Oil Company, Cosden Oil and Gas, Texaco, and E. W. Marland.

The production companies bid up to \$1 million each for lease rights to 160-acre lots at public



Frank Phillips in 1931 with Chief Bacon Rind, second from left, and other Osage Native Americans at Phillips' Woolaroc lodge in the Osage. Frank is wearing an Osage chief's dress, having been honored by the Osage tribe with the name "Eagle Chief." Frank and his brother, L. E., founded Phillips Petroleum Co. in 1917 after bringing in a gusher on an Osage reservation lease. (Photo courtesy of Phillips Petroleum Company.)



The Osage Indians owned all of the mineral rights in Osage County, and those rights in just two decades would yield more wealth than all of the Old West's gold rushes combined.

For years, auctions of leases on the Osage reservation involving huge sums were held under a massive elm tree on the front lawn of the Osage Council House in Pawhuska. This is a scene of an auction in the early 1920s. (Photo courtesy of Phillips Petroleum Company.)

auctions in Pawhuska, under a tree that was known as the “Million Dollar Elm.”

What the oil companies paid were bonuses for the right to drill. This bonus money, when added to the tribe’s royalty on oil and gas production, boosted the Osage payments in the 1920s, causing the tribe to be hailed nationally and internationally as “the richest group of people in the world.”

In the Creek Nation, the first major oil field in Oklahoma, the fabulous Glenn Pool, was ushered in November 22, 1905, on the Ida Glenn farm about 10 miles southwest of Tulsa. Thomas Gilcrease was part Creek Indian, which enabled him to receive acreage that became part of the Glenn Pool. Some of the fortune he made was used to assemble the world’s greatest collection of western art, which is now housed in a museum he deeded to the City of Tulsa—the Gilcrease Museum.

There have been, of course, many other Oklahoma oil industry leaders with an American Indian heritage. More important, there have been many thousands of Oklahoma Native Americans who in various ways have rewarding relationships with the oil industry today.

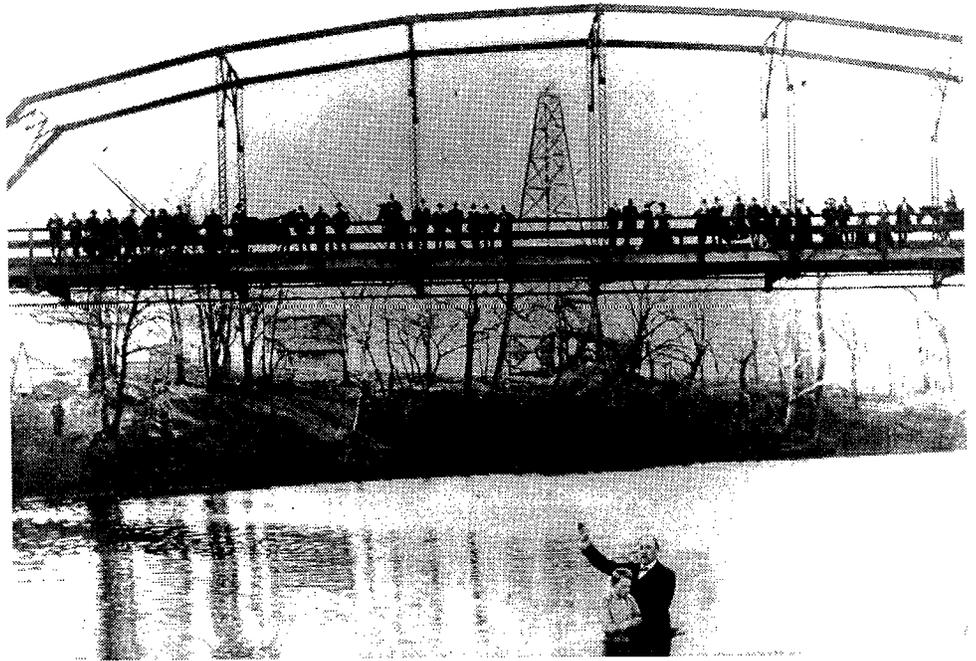
Professional Organizations Trace Roots To Oklahoma

A number of professional organizations and societies in the petroleum industry were founded in Oklahoma. Both the state and the industry have benefitted from this strong background of professionalism and teamwork.

American Association of Petroleum Geologists

The AAPG is the world's largest geological society, currently having about 31,000 members in 115 countries.

The American Association of Petroleum Geologists (AAPG) was organized in Tulsa in 1917; its original name was the Southwest Association of Petroleum Geologists (SAPG). The name was changed to AAPG one year later in 1918. A number of great oil and gas discoveries were made in Oklahoma prior to and during the early 1900s, including Bartlesville–Dewey (in 1897), Avant (1904), Glenn (1905), Cushing (1912), Healdton (1913), Velma (1917), Cement (1917), and Burbank (1920), among others. Some of these fields, and others, were discovered by using and interpreting geologic data, and the acceptance of geology as a guide to prospecting was definitely confirmed in the oil industry by the year 1913. With this recognition of the importance of geology in petroleum exploration, it was appropriate for the newly formed SAPG to broaden its interest to a national scope and become AAPG.

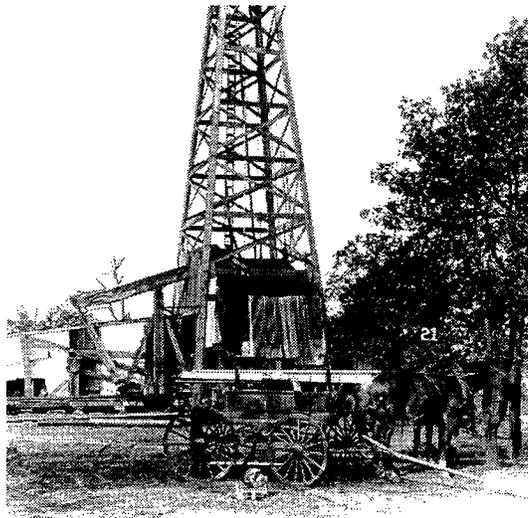


A baptism takes place in the Caney River, with the Nellie Johnstone No. 1 well in the background. Onlookers, one on horseback and one with a horse and buggy, watch from the bridge and the bank. (Photo courtesy of Bartlesville History Museum.)

The AAPG is the world's largest geological society, currently having about 31,000 members in 115 countries. Membership reached a high of nearly 45,000 in 1986. The purpose of AAPG is to encourage scientific research among its members and to advance the science of geology, especially as it relates to finding and developing petroleum, natural gas, and other mineral resources.

Society of Exploration Geophysicists

The Society of Exploration Geophysicists (SEG) was founded in 1930, and maintains its business office in Tulsa, Oklahoma. It began as a division of AAPG, but became an independent organization in 1935. The purpose of SEG is (1) to promote the science of geophysics, especially as it relates to exploration and research, (2) to foster the common scientific interests of geophysicists, and (3) to maintain a high professional standing among its members. The maximum membership of SEG was about 19,000, in the mid 1980s, and at present the membership numbers about 14,000.



Nitro wagon beside a wooden derrick, Cushing, Oklahoma. (Photo courtesy of Western History Collections, University of Oklahoma Libraries.)

Society for Sedimentary Geology

The society, founded in Tulsa in 1926 as a technical division within AAPG, initially was called the “Association of Exploration Paleontologists” and later became the “Society of Economic Paleontologists and Mineralogists” (SEPM). In 1987, SEPM became a separately incorporated society, and initiated a name change to “SEPM (Society for Sedimentary Geology)” reflecting the growing number of sedimentologists among its members. The mission of SEPM is to encourage excellence in sedimentary geoscience and to disseminate that information through research conferences, publications, continuing education, and participation in technical meetings. Membership, about one-third employed in the petroleum industry, reached a high of more than 8,000 during 1985–86, and now has stabilized at about 5,300.

Both the State and the industry have benefitted from this strong background of professionalism and teamwork.

University of Oklahoma

School of Geology and Geophysics

The School of Geology was founded at the University of Oklahoma in 1900 by Dr. Charles N. Gould, the “Father of Oklahoma Geology,” and subsequently became the School of Geology and Geophysics in the late 1960s. During the early part of this century, Gould and other faculty members pioneered the application of geological and geophysical techniques in the search for petroleum, and, as a result of their efforts, the School gained early recognition in the field of petroleum geology; in fact, the department has been recognized as the world’s first school of petroleum geology. Among the professors known for pioneering work in petroleum-related fields were: Victor E. Monnett, who directed the School between 1924 and 1954, and built it to the preeminent school of petroleum geology; Frank A. Melton, who pioneered work in geologic interpretation of aerial photographs and the use of remote sensing in exploring for petroleum; Reggie W. Harris, who first taught a course in examination and identification of sample cuttings from boreholes; and Leonard R. Wilson, who developed an outstanding program using palynology in the study of oil-well cuttings and cores. The School has a long tradition of excellence in the earth sciences, and among its 4,400 graduates are many distinguished members of industry, academia, and government organizations. The mission of the School is to be the preeminent school for the study of geology and geophysics, applicable to the energy field, and to emphasize multidisciplinary teaching and research responsive to the needs of society.

The department has been recognized as the world’s first school of petroleum geology.

Along with the major emphasis on petroleum, the School has strong programs in many areas of basic geology and environmental geology. The School’s programs focus primarily on sedimentary systems and geochemistry, structural geology and rock mechanics, exploration and environmental geophysics, and rock and mineral chemistry. These are the programs appropriate to the needs of geology in the future, and they build on the strengths of the School’s past. Consequently, the School strives to provide the intellectual environment where students can develop into successful modern geoscientists able to understand, manage, predict, and in some cases control the dynamic processes of planet Earth.

Along with the major emphasis on petroleum, the School has strong programs in many areas of basic geology and environmental geology.

University of Oklahoma

School of P&GE

The School of Petroleum Engineering was founded at the University of Oklahoma in 1927, and subsequently became the School of Petroleum and Geological Engineering (P&GE) in the 1960s. During the early part of this century, faculty members pioneered the development of drilling, production, and reservoir-engineering techniques in the exploitation of petroleum. As a result of their efforts, the School gained early recognition in natural-gas en-

gineering, enhanced oil recovery, water flooding, and property evaluation. Its Oklahoma location helped make OU a significant provider of technical manpower for all phases of the industry.

The School of Petroleum & Geological Engineering is rated among the top three petroleum-engineering programs. It has been that way for several years, and P&GE graduates are highly sought. They have experienced a 100 percent job-placement rate for 4 years. Among almost 4,000 P&GE alumni, more are top executives in Fortune 500 companies than any other alumni group. As a leading petroleum-research institution, the School has attracted an eminent faculty. Five OU P&GE professors have received the Society of Petroleum Engineering's Distinguished Achievement Award.

Strong traditions and small size, compared to usual academic programs, give the University of Oklahoma's School of Petroleum and Geological Engineering its distinctive character. The principles and values of superior education are powerful. Teaching, research, and service are inseparable commitments of our academic mission. Intellectual currents form and flow in abundant variety, helping foster the spirit of educational innovation that has distinguished OU's P&GE School since 1927.

P&GE graduates have experienced a 100 percent job-placement rate for four years.

The Petroleum Industry Continues Its Contribution to Education

The association between the petroleum industry and education in Oklahoma has been longstanding—since the inception of OU's curriculum in geology before statehood. Although the industry contributes to common education through funding for special projects, speakers for schools, and other activities, some of its most prominent work has been with higher education. Below are mentioned only a few of the highlights of this partnership with the state's two largest universities—the University of Oklahoma and Oklahoma State University. These two institutions are used only as examples; and even then, the list of philanthropic activities only scratches the surface.

The University of Oklahoma

It would be difficult to separate the history of the University of Oklahoma and that of the oil and gas industry in the State. Support from companies, foundations, and individuals with their roots in energy-related businesses has touched virtually all areas—from academics to athletics, to the arts at OU.

The \$50 million Sarkeys Energy Center, which houses the Oklahoma Geological Survey and School of Geology and Geophysics, among other units, stands as a symbol of the strong support of companies and individuals in the oil and gas business. Completed with a major gift from the Sarkeys Foundation of Norman, the Energy Center has more than 200 teaching and research laboratories, including: the Halliburton Rock Mechanics Lab; O. Glen Simpson Production Lab, made possible with contributions from Atlantic Richfield Foundation; the Geosciences Computing Network, established with a grant from Shell Companies Foundation; the Texaco Reservoir

It would be difficult to separate the history of the University of Oklahoma and that of the oil and gas industry in the State.

Characterization Lab; Shell Crustal Imaging Lab; and Amoco Multi-Media Teaching Lab. Other areas honor Conoco, Phillips Petroleum Co., Mobil, Dresser, Kerr-McGee, and Occidental Oil and Gas. The Energy Center also houses the Laurence S. Youngblood Energy Library, one of the top five petroleum geology libraries in the country.

A few other examples of how private gifts from oil- and gas-related corporations, foundations, and individuals have had an impact on OU include:

The nationally recognized History of Science Collection, begun with a gift of rare books from early-day geology graduate E. L. DeGolyer;

The new \$37.5 million Sam Noble Oklahoma Museum of Natural History, a 190,000 square-foot facility initiated with a historic gift from the Noble Foundation of Ardmore;

The prestigious Neustadt International Prize for Literature, endowed by the Neustadt family of Ardmore and ranked second only to the Nobel Prize among literary awards.

Also made possible through donations from oil companies and individuals in the business were the expansion of Bizzell Memorial Library; construction of the Catlett Music Center; the Lloyd Noble Center; Goddard Health Center; the Merrick Computing Center; Westheimer Airpark; the Samuel Roberts Noble Electron Microscopy Lab; many of OU's 135 endowed faculty positions; the Minority Engineering Program; several student computer centers and laboratories; and an array of faculty awards, fellowships, scholarships, and student-enrichment programs, including most recently the Phillips Minority Scholars Program.

Oklahoma State University

Oklahoma State University has long enjoyed the support of the oil and gas industry. A few highlights from recent years include:

The College of Engineering, Architecture and Technology is completing a major new research facility, the Advanced Technology Research Center (ATRC). Upon completion in the fall, this \$34 million project will bring 72 new research labs on line. Among the Oklahoma companies supporting this project are: Kerr-McGee, Phillips Petroleum, Conoco, and Halliburton Energy Services.

Two of the latest student enrichment programs to be established at OSU are the Phillips Petroleum Engineering Scholars Program and the Mapco Business Scholar Leaders Program. The Phillips program incorporates scholarship aid, mentoring, personal leadership development, and international travel opportunities, attracting some of the region's top scholars to study at OSU.

The oil and gas industry has supported nearly every aspect of campus life at OSU, including athletics, the Edmon Low Library, minority enrichment programs, public radio, the visual and performing arts, and student organizations. Two of the most prominent buildings on campus stand as testimony of this support: the Bartlett Center for the Studio Arts, named for Tulsa oil man Pete Bartlett; and the Noble Research Center, honoring Sam Noble. The T. Boone Pickens School of Geology and the OSU Chemistry Department also have seen major support from the oil and gas industry.

The oil and gas industry has supported nearly every aspect of campus life at OSU.

Petroleum and Oklahoma's Heritage— Legacies from an Industry

The petroleum industry in Oklahoma was created by men and women of enormous energy, talent, creativity, and courage. These same traits that gave rise to a vital and thriving new sector of the economy also were put to use in philanthropic activities that continue today to be almost a mandate to those involved in this business. Their time, talents, and money have helped Oklahoma build universities, museums, orchestras, civic centers, and other facilities too numerous to list, and educate students through various grant and scholarship programs such as the justly famous “Lew Wentz work study” aid. The following paragraphs give some examples of the broad range of projects supported by contributions from the industry. Because the list is long, and the names too numerous for any but a large tome, this account is only representative, and the names mentioned are but few.

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Philbrook

One of Oklahoma's most outstanding art centers is contained in one of the many homes of Waite Phillips—brother of Frank and L. E. Phillips, founders of Phillips Petroleum Company. When Waite sold his own oil company to a New York investment firm for \$25 million in 1925, he and his wife Genevieve began to travel in the U.S. and Europe, making plans for a series of grand new residences and bringing back art and decorative items to adorn their new palaces. They expressed their love for architecture and design in the building and furnishing of Philbrook, then on the outskirts of Tulsa, Philmonte in New Mexico, and the Philcade and Philtower office buildings in downtown Tulsa. The Phillipses lived at Philbrook from 1928 to 1938, donating it as an art museum in 1936, saying “all things should be put to their best possible use.”



Philbrook Museum and grounds. (Photo courtesy of Philbrook.)

Since its opening in October 1939, Philbrook has been known for its American Indian collections, and the Standard Oil Company of New Jersey Collection of paintings.

Today, the petroleum industry continues to support Philbrook through the contributions of individuals and companies. As an example, CITGO Petroleum Corp., in partnership with the Oklahoma Arts Council, is sponsoring an exhibit called "Norte del Sur: Venezuelan Art Today." Phillips Petroleum Co., Vintage Petroleum, and MAPCO Inc. are some of the key sponsors of Philbrook's "Year of Europe," an exciting series of three exhibitions scheduled for 1998.

The Phillips family continues to play a vital role in the life of Philbrook by ensuring that the house and grounds remain as beautiful today as they were in 1936 when the house was donated to the people of Tulsa.

Omniplex

Due largely to the financial support of John E. Kirkpatrick of Kirkpatrick Oil, Oklahoma City is home to one of the nation's best hands-on science museums for children. This facility is part of Omniplex, which also houses aviation and space artifacts; gardens and a greenhouse; art and historical galleries; Kirkpatrick Planetarium; the International Photography Museum; and Red Earth Indian Center.

This exciting facility that welcomes more than 340,000 visitors each year would not be possible without the support of Oklahoma's oil and gas industry. Along with Kirkpatrick, supporters include Kerr-McGee, Phillips Petroleum, Sun Oil, Oryx Energy, Crawley Petroleum, American Association of Petroleum Geologists, Oklahoma Natural Gas, State of Oklahoma Stripper Wells Overcharge Fund, and Vestige Energies, among a very long list of others.

In 1991, these organizations and others funded the EnergyQuest exhibit that uses more than 20 segments to teach visitors about the formation, discovery, recovery, and conservation of Oklahoma's energy resources. The Geovator is a simulator ride that takes visitors "back in time," shows how fossil fuels are formed, and then "returns" passengers to the present to see how these deposits are recovered and used as energy sources.

With new funding, this exhibit has been expanded to demonstrate the continuity among formations of the earth, fossils, rocks, minerals, and fossil fuels, and to show how petroleum is extracted from the earth. The new exhibits include a seismic logging truck, one-third-scale drilling rig, and an actual pumpjack.

Omniplex also is embarking on a new partnership with the Oklahoma Energy Resources Board (OERB), which will provide funding to update the Geovator exhibit with multimedia technology—giving visitors the opportu-



Students view science exhibit at Omniplex. (Photo courtesy of Omniplex.)

nity to choose from several informative programs on the oil and gas industry. OERB's support also allows the museum to include elements in the programming that allow viewers to interact with the exhibit by answering questions about the industry. Also, OERB will provide funding for selected school groups to visit Omniplex and attend educational programs on Oklahoma's energy resources. Together, these projects will help educate current and future generations on the rich heritage of Oklahoma's petroleum industry, and on its impact on the economy—now and into the 21st century.

Dean A. McGee Eye Institute

In 1965 a small group of prominent Oklahoma City citizens founded the Oklahoma Eye Foundation with the specific goal of establishing an institute dedicated to maintaining and restoring sight. Their efforts received a tremendous boost in 1971 when Dean A. McGee, president and CEO of Kerr-McGee Corp., developed a retinal detachment that was repaired by two doctors involved in the foundation. A man of great curiosity, McGee's ensuing interest in his surgery and ophthalmology brought him to an understanding of the need for subspecialists in Oklahoma. In addition to contributing to the effort himself, he helped assemble a team of community and business leaders to shepherd the development of the Institute.

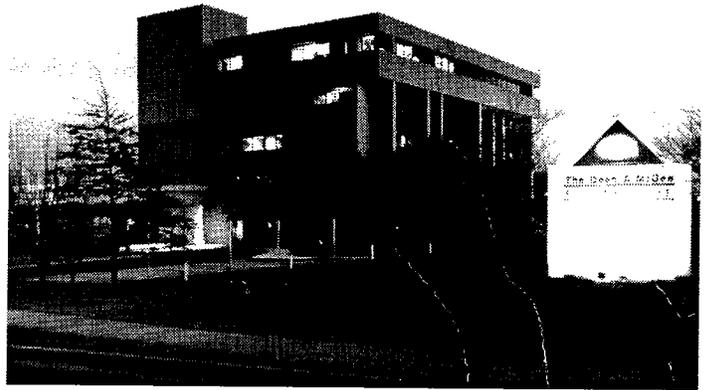
To build the new center, oil rigs, pumps, and tanks had to be relocated from the construction site, near the State Capitol.

The Institute, dedicated on December 5, 1975, is unique in that it is a separate charitable corporation with its own governing Board of Trustees. The University of Oklahoma Department of Ophthalmology is housed within the Institute, and the two groups operate with the department chair appointed as the Institute president.

Although one of the largest eye institutes in the country, it is less than a quarter-century old in a state yet to celebrate its centennial. Some of the Institute's founding trustees and physicians still guide its activities.

Woolaroc

Located 12 miles southwest of Bartlesville, Woolaroc began in the 1920s as the ranch retreat of oilman Frank Phillips, founder of Phillips Petroleum Co. The museum now consists of the following: the original lodge; an early history collection featuring the Woolaroc monoplane that won the 1927 Trans-Pacific Dole Flight; a Native American Heritage Center; and a wildlife preserve that houses deer, elk, longhorn cattle, and one of the largest privately owned buffalo herds. These attractions, along with Bison Lake, an 1840s traders camp, and various nature trails make this facility a perfect place for family outings.



Lights come on in the Dean A. McGee Eye Institute as night falls on Oklahoma. (Photo courtesy of the Dean A. McGee Eye Institute.)

The E. W. Marland Story— A Saga of the Boom Days

One of the great sagas of the petroleum industry and of Oklahoma, the story of Ernest Whitworth Marland—multimillionaire, oilman, philanthropist, and 10th governor of the State of Oklahoma—is one of the more dramatic, bizarre, and poignant in the State's history.



Ernest Whitworth Marland

Before coming to Oklahoma early in the 1900s, Marland had made and lost a million dollars in oil fields in West Virginia. His first Oklahoma strike came in June of 1911 with the discovery well of the Ponca pool on Ponca Indian land just north of the famous 101 Ranch. Marland also was instrumental in the Burbank field, which yielded more than 550 million barrels of oil. This was the third-largest producing field in Oklahoma history, and is the one that made the Osage the richest Indian tribe in the world. The discovery of Three Sands field made the already wealthy Marland a man of enormous financial resources. One deal made with Standard of New Jersey for 20,000 barrels of oil a day garnered \$60,000 every 24 hours for Marland—a staggering sum in the 1920s. During that decade, his personal fortune was more than \$100 million, and he produced 10 percent of all the oil in the world.

Marland built one grand 22-room mansion and golf course in Ponca City before starting on the house of his dreams—which was constructed from 1925 to 1928 at an estimated cost of \$5.5 million. The 55-room, 12-bathroom, three-kitchen, 43,561-square-foot “Palace on the Prairie” would cost an estimated \$48.5 million in today's dollars—if the materials and European craftsmen were available. The building was patterned after the Davanzatti Palace in Florence, Italy, with 24-karat gold leaf costing \$80,000 in the 1920s, or \$1,435,000 today, in gilt on the ceiling of the ballroom. From this golden ceiling hung a pair of 14th-century Waterford Crystal chandeliers. The chandeliers were shipped from Europe at a cost of \$30,000 for the pair—which would be some \$220,000 today. When 24 people dined at the Marland's \$3,000 table, each sat in a chair costing \$555—except for Marland himself, who occupied a \$675 chair at the head of the table.

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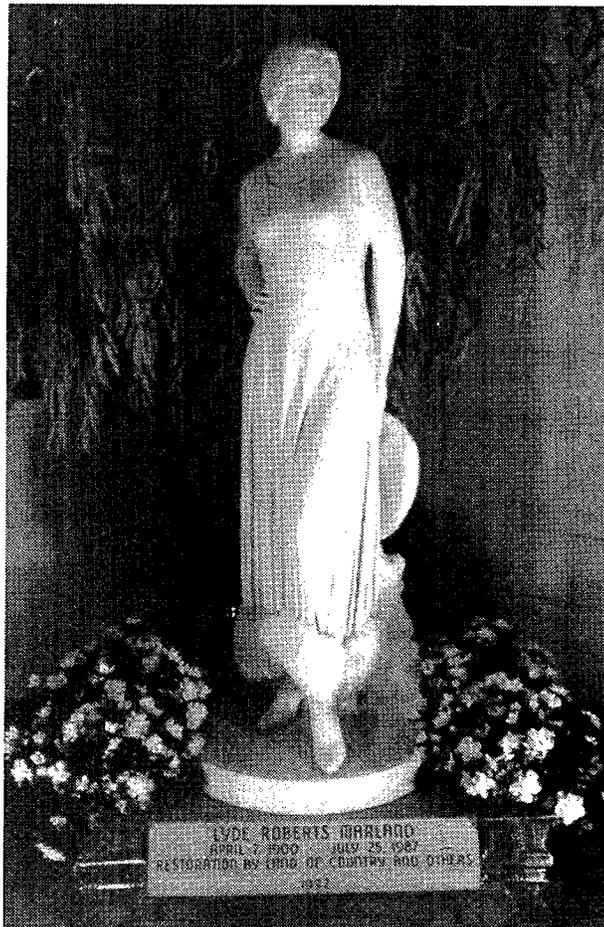
During construction of the mansion, Marland's first wife, Mary Virginia, died in 1926. He married again in 1928, shocking the nation when he took as his second wife his adopted daughter, Lydie, after having her adoption annulled in Flourtown, Pennsylvania. He was 54 at the time; she was 28. Lydie and her brother George, the children of Mary Virginia's sister, first visited Ponca City in 1912, when she was 12 and George 14. E. W. and Mary Virginia adopted the two in 1916, offering them the best of schools and an education “back east.”

Marland and Lydie lived in the house only for about two years before E. W. lost his oil company on Wall Street in 1928 and resigned as president of Marland Oil Co. He and Lydie moved into the artists' studio and guest house, where they stayed until 1932 when he was elected to the U.S. Congress. The Marlands then moved to Washington until 1934, when he became the 10th governor of Oklahoma. With his fortune gone and his health fading, Marland sold the mansion to the Discalced Carmelite Fathers of

Mexico for \$66,000 in 1941, keeping only the chauffeur's quarters and stables for himself and Lydie. Four months later, with Lydie at his side, he died.

Lydie lived in the chauffeur's quarters until 1953, when she left Ponca City. She did not return until 1975, when she heard the estate was for sale again. Summoning her courage to confront painful memories and face up to the hard and far-flung life she had led, she returned, again taking up residence in the chauffeur's quarters. In August of that year she placed a personal letter in the newspaper encouraging the citizens of Ponca City to purchase the estate, which they did for \$1,435,000—paid for by a two-year sales tax. Continental Oil Co., which grew from Marland Oil Co. and is now Conoco, Inc., paid \$717,500 of the amount. Lydie remained in the quarters, living a reclusive and eccentric life until her death on July 25, 1987, at the age of 87. She was buried next to her husband in the Marland crypt at the Ponca City Odd Fellows Mausoleum.

The mansion now functions as a museum owned by the city of Ponca City, and includes a hotel and conference center.



Lydie Miller Roberts Marland

Statue of Lydie Roberts Marland. This piece, along with other artwork and furnishings, can be seen at the Marland Mansion Estate Hotel and Conference Center in Ponca City. A small booklet with a fascinating account of Lydie's tragic life is available from the Center.