Petroleum's Deep Freeze

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hed by the Industrial and Public Relations Department for Stockholders and Employes:
n King, Director of Public Relations;
Prudden, Editor, THE TEXACO STAR; **Keith de Folo**, Staff Writer.

and elevator bails of a rotary rig loom above the f a crew that is drilling a wildcat well in spite of the bstacles of a Canadian Winter.

THE COVER: The post of the derrickman is lonely and lofty. High on the "mast" he racks the joints of pipe when they are pulled out of the drill hole. In case of a fire or blowout, he must make a fast getaway. At this wildcat rig in northeastern British Columbia, a derrickman is descending on the "Geronimo" (named after the paratrooper's battle cry) in a test demonstration of the sling-cable that whisks a man to safety.

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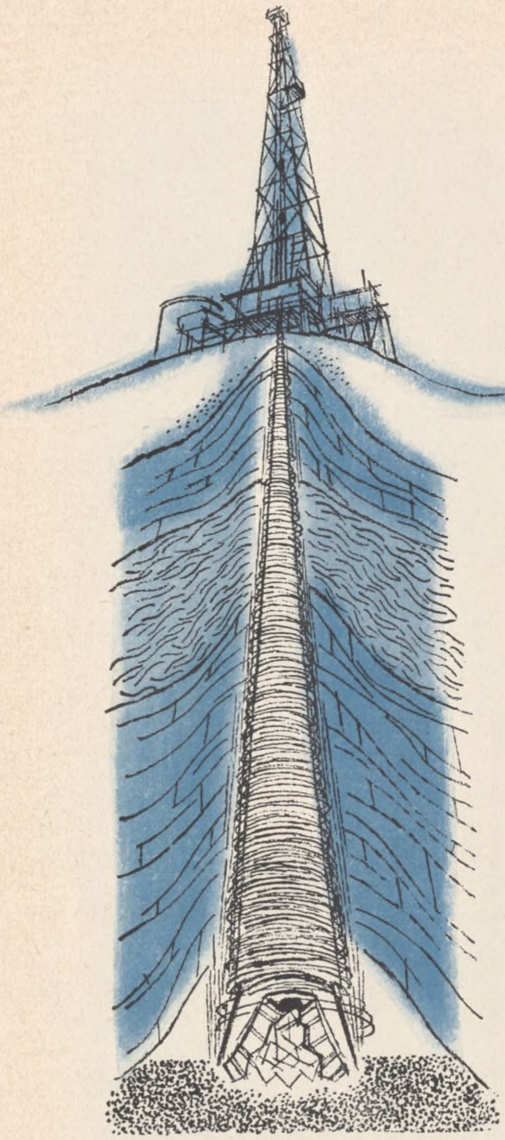
Collateral IN



It took daring and vision to change a long-standing method of financing oil operations

WHEN George Nathan Aldredge, chairman of the executive committee of the First National Bank in Dallas, Texas, and a Texaco Director, tells you about the banking business, he often begins by saying, in his soft, Texas drawl, "Let me tell you a little story."

One story takes you back to the early Thirties. It concerns a man who invested $100 (all the capital he possessed) in an option on a piece of land in the booming East Texas oil field. The land—a small parcel—was situated halfway between the discovery well and acreage rumored to be slated next for drilling. By selling his original option for a fancy figure and then shrewdly buying and selling other options as the field was extended, and by acquiring leases and drilling wells himself, this operator became one of the wealthiest men in Dallas—a distinction of no little significance.

Says Mr. Aldredge: "We played an important part in financing his ventures—and in counseling him. A few years after he started operating in the East Texas field, this man came to me and told me a major oil company had offered him $6,000,000 for his holdings. 'What should I do?' he asked me. 'Taxes on such a capital gain would be terrific.' I thought the matter over and then asked him how much money he owed. The answer was, '$1,600,000.' Then I said, 'I'll tell you what to do. Take enough cash to pay off your loans and take the remainder in an equivalent number of barrels of oil as it is produced.' He did as I suggested, and this is a real fairy story because the price of crude went up long before the last of the 4,400,000 barrels of oil was produced."

Another story George Aldredge tells has a different ending. Against the advice of Mr. Aldredge, a Texas oil operator refused an offer of $5,000,000 for some land. He figured he would drill on it himself and make even more money. The man did drill some holes—23, to be exact—and went broke in the process. The reason: every hole was dry.

N THE GROUND

His 48 years of experience in the banking business in Dallas, where he was born and raised, have given George N. Aldredge a vast knowledge of financial affairs.

In one particular phase of banking—financing oil transactions—he was a pioneer.

IT TAKES a lot of capital to be an oil operator. The average cost of drilling a well is about $50,000; it may take $1,000,000 or more to drill some holes. Of the First National's more than $240,000,000 in loans outstanding at the end of 1953, oil loans accounted for nearly $100,000,000. Since 1932, when the First National Bank in Dallas revolutionized oil financing by announcing it would make loans on oil in the ground, the bank's oil loans in all categories have totaled more than $2,000,000,000.

Although loans to drilling contractors, lease brokers and traders, oil field equipment supply houses, and so on, are included in this enormous sum, 80 per cent of the loans have been to oil producers. Of these producers, 95 per cent have been so-called "independents"—the operators who concentrate on producing crude oil exclusively, in contrast to the "majors," whose integrated operations cover all phases of the oil business from producing through making and marketing finished products. The First National, of course, also figures in the financing of major oil companies. The oil loans the First National makes range from $100,000 up to $3,000,000—and they'll tell you at the bank that the loss on the $2,000,000,000 lent to date has been "infinitesimal."

The First National's record of successful oil loans is evidence of the sound judgment of bank executives such as George Aldredge. His wise counsel also has aided the deliberations of Texaco's Board of Directors for the past 20 years.

One of the essential ingredients in a lending transaction is collateral—the tangible security which the borrower

Granting an oil loan calls for a balanced blending of two functions: appraisal and executive decision. Loans are based on engineers' calculations of the "present worth" of a producing property.

Oil loan applications are reviewed by the Officers' Loan Committee of the First National Bank in Dallas, Texas. Texaco Director George N. Aldredge, who is chairman of the bank's executive committee, is seated in foreground. The loan committee meets every business day.

gives the lender to secure a loan. Traditionally, collateral has been some form of readily accessible asset that could be converted without difficulty into cash. Thus, collateral can be a farm, a herd of cattle, Government bonds, a stand of timber–the list is almost endless.

Up to 1932, traditional forms of collateral had always been required of oil operators seeking bank loans. Consequently, it took a great deal of courage to change this long-standing approach to financing oil operations. The directors of the First National Bank in Dallas had an abundance of courage–as well as foresight–when a combination of circumstances occurring at that time in the oil industry opened the way to a new and revolutionary concept of collateral: oil in the ground.

The catalyst that produced this credit revolution was the discovery of an ocean of oil buried in the earth under East Texas. The discovery of this gargantuan oil reservoir in 1930 immediately, and profoundly, affected the petroleum industry. In this area, which major companies had almost without exception rated negatively, one of the world's greatest reserves of crude oil was tapped. Chaotic production resulted as hundreds of small, independent operators scrambled for land, drilled wells, and flooded the market with such quantities of oil that the price of crude sank to as little as 10 cents a barrel.

Shocked by the spectacle of uncontrolled production of crude oil in East Texas, oilmen saw the need for practices that would stabilize the market for crude and assure the nation of a continued plentiful supply of petroleum. They inaugurated scientific methods for determining the extent of the reserves of oil in a field. They supported measures which, by encouraging the conservation of oil and gas by the prevention of physical waste, tremendously increased the producing life and ultimate recovery of oil fields.

East Texas opened the way to the development of oil reserves to an extent previously unrealized. In the orderly development of oil fields which followed the stemming of the torrent of crude in East Texas, the First National Bank in Dallas was a pioneer in meeting the expanded credit needs of oil operators who now were subject to statutory provisions for proration (limiting the quantity of oil produced by each operator to a fractional part of his total productive capacity) and other conservation measures.

Financially, proration had the effect of stretching out an operator's income from his wells in a manner that, while it could be predicted with a fair degree

Like commodities in a warehouse, oil in the earth is measurable collateral

f accuracy, frequently gave an operator insufficient cash for expansion. This situation created the need for a greatly increased volume of bank credit, on extended terms, for development and other purposes.

GEORGE ALDREDGE and his associates at the First National were the first to recognize that if commodities lying in a warehouse could be financed through bank loans, the same logic could be applied to oil lying in the earth. With scientific procedures, the extent of the reserves could be calculated. Proration saw to it that withdrawals were regulated with strictness and adjusted to economic conditions. Stability could be expected in the market for crude oil.

Taking these factors into account, it was apparent to the directors of the First National Bank in Dallas that there were, literally, billions of dollars of measurable collateral in the form of oil in the ground. Theirs was a truly progressive concept and one destined to change completely the future course of financing oil operations.

George Aldredge, then a vice president of the First National, was selected by the bank's president, Nathan Adams, to set up machinery for making oil loans. With his experience in handling commercial loans and other phases of banking (among his personal duties at the time he became active in petroleum financing was responsibility for 23 cottonseed oil mills that were banking with the First National), Mr. Aldredge was an excellent choice for this important assignment. His first action was typical of the sound approach to granting oil loans that the First National has followed ever since. He employed a geologist and an evaluation engineer, men with knowledge of oil in the ground. They became the nucleus of an Oil Department. From the beginning, the First National's oil loans have represented a balanced blending of two functions: 1) appraisal and 2) executive decision.

One of the steps in making an oil loan brings an oil operator *(left)* into conference with Eugene McElvaney *(center)*, First National senior vice president.

First, appraisal of a loan application is made by the Oil Department's engineering staff. Then the responsible loan officer reviews the appraisal and follows through to a decision on the application. Generally, the loan value is established at about 50 per cent of the applicant's portion of the "present worth" of the producing property.

Oil loans made by the First National Bank in Dallas aid operators in all producing regions of the United States. The bulk of the bank's oil loans, however, is at work in Texas.

FROM the outset, the oil-loan business of the First National grew rapidly. It soon became apparent that supervising the bank's expanding volume of oil loans was more than a one-man job. An up-and-coming member of the First National's staff, Eugene McElvaney, was brought into the Oil Department. To him Mr. Aldredge turned over the prime responsibility for supervising oil loans. Mr. McElvaney (who is now a senior vice president and a director of the First National as well as a recognized authority on oil financing) has headed the Oil Department ever since. Mr. Aldredge says: "Eugene McElvaney actually makes the important oil loans of this bank. Of course, these loans come to the executive committee and the loan committee for approval, but Mr. McElvaney is the man who handles the details."

George Aldredge helps shape all major oil-loan policies today. "We don't make loans on wildcat wells," says Mr. Aldredge, "and we don't make a loan on just one well. If a man has two or more wells he can put up the land as collateral and the bank will lend him money for further development. If he has a lot of wells, we'll lend him money for considerable development; however, if he has only a few wells, we'll lend him only enough for one well." Adds Mr. Aldredge: "Oil loans are the best loans we have in our bank today."

Quick to point out that oil loans are highly specialized and cannot be compared with other types of loans, Mr. Aldredge tells this "little story":

"I once was asked to appear before a committee of insurance commissioners

An early morning meeting takes George Aldredge and Ben H. Wooten *(left)*, president of the First National Bank in Dallas, Texas, across the block-long main lobby.

of several states. These men were sitting as a special committee representing the insurance commissioners of all the states relative to a very large oil loan negotiated by an insurance company in one of the states. The commissioners wanted to reduce all oil loans to a single formula, like a formula that can be used in making loans on real estate. I said to them, 'This just won't work, and I'll tell you why. Let me draw you a diagram,' " which he proceeds to do as he tells the story. " 'Here are two oil fields five miles apart. Each field has different characteristics. A formula for one field is not a good formula for the other field, because the characteristics of the producing formations in each field are not alike. That's why we work out a formula for each loan application based on the characteristics of each particular field.' I proved my point to the satisfaction of the insurance commissioners."

Every oil-loan application at the First National Bank in Dallas is evaluated on its merits. This is the best safeguard for the bank as well as for the borrower.

THE distinguished career Mr. Aldredge has had in banking began in 1906 in the National Exchange Bank in Dallas. He recounts an incident that helped him to decide to become a banker: "I made some money for my mother working the family plantation and began investing it in Dallas real estate because I figured Dallas was going to grow. One day, the president of the Dallas Trust and Savings Bank called me in and asked me if I was making any money for my mother with my investments. I said I was, and then and there the president invited me to be the trust officer of the bank. He said the kind of work I would be doing at the bank as trust officer would be exactly the same as I was doing on behalf of my mother." Mr. Aldredge adds, "Later on, I did accept this invitation to be trust officer."

In 1920, Mr. Aldredge became vice president of the Dallas Trust and Savings Bank. Three years later, he was elected vice president of the City National Bank, one of the predecessors of the First National Bank in Dallas. He was instrumental in arranging the merger (1930) of the City National Bank and American Exchange National Bank, the two largest banks in Dallas at the time, into the First National. He was elected vice president of the First National in 1932, and became chairman of the executive committee of the bank in 1948.

When Mr. Aldredge was with the City National Bank, he met a construction contractor who highly praised Texaco products. Such a strong endorsement, from a business associate whose judgment he greatly respected, led George Aldredge to buy some stock in The Texas Company. His holdings attained substantial stature during the Twenties and early Thirties. During these years, his reputation as a banker of keen judgment and as an advocate of the highest standards for national systems of exchange and values also gained in stature. In 1934, Charles B. Ames, then Chairman of the Board of The Texas Company, invited Mr. Aldredge to become a member of Texaco's Board of Directors. He was elected to the Board that year and has been re-elected a Director of the Company each year since then.

The First National Bank in Dallas holds, in a fiduciary capacity, a large number of shares of the Capital Stock of The Texas Company.

OIL operators are not only borrowers of money from the First National Bank in Dallas. "Oil money" accounts for about one third of the more than $600,000,000 deposited in the First National. Major oil companies, including The Texas Company, as well as the "independents," drilling contractors, supply houses, and so on, are depositors.

The bank's "oil money" helps to create the capital which the First National provides oil operators—and other businessmen—in the form of loans.

The continuous cycle of financial transactions, generated by deposits and loans, creates jobs and wealth. Through the process of taking in money and putting it to work, banks sustain our economic vitality. Their importance is no better illustrated than in the field of oil loans. As banker George Aldredge puts it, "We are in business to help others who are in business."

With collateral in the ground, oil operators get a lot of help from the First National Bank in Dallas. **END**

Rescuing Crassostrea Virginica

by Al Reese

When oystermen sued for $30 million, oil countered with a remarkable $2 million research program that may bring new prosperity to the Louisiana industry

THE DRIVER of the dump truck didn't know he was pointing to a treasure cache of great worth to the oil industry. Nevertheless, he made a grand production of aiming a dark finger at the twin white turrets of the Texas A. & M. Research Foundation Laboratory, standing half on the sands of Grand Isle, half in the shallows of Bayou Rigaud.

"There, cher'," he said through a grin that flashed like a whitecap. "That two-small house she's it."

Crammed in that "two-small house" were some lofty new ideas and a mass of documented fact which may silence the Louisiana oyster industry's 21-year outcry against oil and bring an early settlement to more than 100 damage suits seeking in excess of $30 million.

The settlement: New prosperity for the oyster, new friends for oil.

This would close one of the oddest chapters in American jurisprudence and provide a magnificent stroke for oil's public relations.

When the first claim was made in 1933 that the Louisiana oyster industry was being destroyed by its giant neighbor, oil began developing a three-fold program:

1. To ascertain whether oil operations are harmful to the oyster.
2. If not, to point out the oyster's real enemies.
3. To show how to combat effectively those enemies.

The first two goals were reached four years ago—at least to the satisfaction of oil. The third may be near.

At first glance, oil's expensive efforts beyond proof of its own blamelessness may appear quixotic or charitable. But the facts are more characteristic of an industry that exists to make money. To operate amicably – and profitably – oil needs friends. Thus, it was deemed wise to develop information beneficial to an industry closely cherished by the people of Louisiana.

This is not to say that the magnitude of the litigation to come was apparent from the beginning, or that oil's program was hatched in an afternoon's conference.

Oyster's initial outcry was so feeble, so isolated, that it would have seemed incredible that the echoes would endure for a quarter of a century.

How it began. It was July 4, 1933, when a Humble Oil & Refining Company well blew wild and spilled 3,000 barrels of crude over Lake Washington. Though there were many oyster beds in the vicinity, only one owner made a claim. This, without scientific investigation, was compromised for $1,500.

At about the same time there appeared on the docket of a Louisiana district court a suit in which it was charged that The Texas Company was destroying oysters in the Timbalier-Terrebonne Bay region. This suit was so valuably vague that it set a pattern for all those to come. Because no such spectacular incident as the Humble well was involved, the suit used the catch-all charge—pollution. In subsequent years the word was repeated in charges broad enough to cover almost every industry operation, from geophysical work through drilling, producing, pipelining, and refining—though there is no nearby refining activity.

Doucet vs. The Texas Company languished on the docket until 1942, by which time it was only one of 19 suits involving several companies. It was tried as a test case and the district court held for Texaco. The oystermen appealed and in 1944 the State Supreme Court reversed the decision. The other cases were settled out of court and the oystermen claimed to have received more than $211,000.

Now the gate was open. In 1947 came more suits against Texas, Humble, Gulf Refining Company, Phillips Petroleum Company, Tide Water Associated Oil Company, and The California Company.

First to get moving was Gulf, at present the defendant in more than 60 suits involving claims in excess of $20 million. In December, 1946, Gulf asked Albert Collier, marine biologist, to ascertain whether oil activity was harming oysters; and if not, to find what was causing the mortality. Thus began a four-year effort at Pensacola, under the direction of Sammy M. Ray, a biologist, and at Grand Bay, under the supervision of Joe Bell, a chemist.

Shortly afterwards, The Texas Company contracted with the Texas A. & M. Research Foundation "to conduct to conclusion a thorough, scientific, and impartial research . . ." This project was under the direction of Dr. Sewell H. Hopkins of the A. & M. Department of Biology, with the field work supervised by Dr. J. G. Mackin, professor of marine biology at A. & M.

About a year later, the other companies involved in suits joined with Shell Oil Company—which was not being sued—to ally themselves with Texaco in this effort, which was to continue for three years. Ninety men were at one time involved in the study, and more than half this number worked full time for the entire three years.

Condensation of an article from World Oil

Experts assembled. Dr. Mackin's work centered on a laboratory built by Texaco at Grand Isle and equipped by the other companies.

Experiments were conducted at Texas Christian University under the direction of Dr. W. G. Hewatt, head of the Department of Biology; at Louisiana State University under Dr. Harry Bennett, professor of zoology; at Texas A. & M. under Dr. Fred Jensen, head of the Department of Chemistry, and Dr. S. O. Brown of the Department of Biology.

Dr. E. J. Lund and Dr. Gordon Gunter carried on research at Port Aransas. G. Robert Lunz worked at Bear's Bluff near Charleston, South Carolina.

In addition to these full-time scientists, consultants included Dr. Peter Korringa, head of shellfish research for Holland; Dr. Claude E. ZoBell of the Scripps Institute of Oceanography at LaJolla, California; Dr. Thurlow Nelson of Rutgers University; and Dr. Ray Elsey of the British Columbia Packers.

Meanwhile, on behalf of the State of Louisiana, James N. McConnell, chief of the Division of Oysters and Water Bottoms, enlisted the efforts of Dr. H. Malcolm Owen, now chairman of the Department of Biology at the University of the South, Sewanee, Tennessee.

Additional research was carried on at Port Sulphur and Biloxi for Freeport Sulphur Company. This was headed by Dr. A. E. Hopkins, now director of the Gulf Coast Research Laboratory at Ocean Springs, Mississippi.

Never before had so many brilliant minds probed with such concerted ferocity into the private life of such an unassuming little beast. For three years prior to 1950—and to a lesser extent until now—the oyster was desiccated, emasculated, flagellated, and lubricated.

The first task was to determine whether oil activity was harmful to the oyster. One by one, they laid the charges under the microscope.

Can oysters survive in water covered by a blanket of crude?

To follow the experiments on this problem requires only an elementary knowledge of the beast of the bayous. *Crassostrea virginica,* the commercial oyster of the Atlantic and Gulf Coasts, performs one of the most prodigious feats in nature by merely staying alive from the egg stage until it is a month old. In her year-round spawning, which is heaviest during the warm months, a female oyster will release a few million eggs into the water to be fertilized by the male's spermatozoa. Only a couple will normally survive.

After fertilization, the egg divides repeatedly, forming a ball of tiny cells. A little later, the oyster-to-be develops vibrating hairs, known as cilia, which keep it suspended as it is drifted about by wind and current.

Presently this embryo acquires a pair of tiny shells, from between which extends a minuscule foot. Now the roving oyster is a "spat" in search of a home. Upon encountering a piling, a bottle, the shell of a larger oyster, or almost any other firm object, out goes the foot to gum the surface with a substance which quickly turns to calcium carbonate, and the oyster sits itself down for life.

To eat, the beastie opens its shell and pumps water through it by rhythmically beating its thousands of cilia. The water passes over the palpi, which strain the microscopic organisms upon which the animal feeds, discarding that which is undesirable. If an abundance of obnoxious substance comes along, the oyster will simply close its "box." If the condition persists, the little beast will continue to clam up and live off its fat for a time.

The oyster's ability to taste though it has no tongue, as such, is tied up with its talent to see though it has no eyes, and to hear though it has no ears. A shadow passing over an oyster's aquarium or a gentle rap on the glass has exactly the same effect as when it tastes something unpleasant. Snap goes the box.

These sensory perceptions are concentrated in the mantle, a film of skin which is a rudimentary nervous system. The mantle dead-ends into the adductor muscle which opens and closes the box.

Recording movement. It was upon the oyster's sensitiveness to environment that one of the comprehensive experiments with crude was predicated. Collier employed a kymograph, a machine to record movement of the shell. Six oysters were placed in separate tanks and each attached to a device which recorded their every movement on a roll of paper. The result is a three-year study of the oysters' likes and dislikes. If the paper used in this experiment were laid end to end, it would be 6,000 yards long.

The scientists also constructed boxes which were open at the top, covered with wire mesh across the bottom, and which floated with the sides extending several inches above the waterline. Oysters were placed on the wire bottom, the boxes anchored above the animals' natural bedding grounds, and a blanket of crude was poured into the boxes. The oysters survived and apparently were content, for they brought forth little oysters to share their lot.

In another experiment the scientists jetted water through oil for six months into an aquarium containing oysters. The emulsion had no discernible effects.

Does bleed (production) water harm oysters?

Oysters placed in a large tank and exposed to a constant flow of bleed water were not harmed.

Oysters placed within 80 feet of a production water outlet showed no ill effects.

Oysters were frequently found growing on piling flanked on either side by production water outlets.

At the request of The Texas Company, the Texas A. & M. Research Foundation in collaboration with the U. S. Coast and Geodetic Survey measured the water in Barataria Bay. The assumption was then made that all the bleed water entering the bay would remain there a year. (Actually, the water is changed every few days by the tides.) The ratio of bleed water to total water was then ascertained and the quantity of bleed water multiplied by 1,000. This ratio was duplicated in the laboratory and the oysters were placed in a tank of such water.

They survived.

Does drilling mud kill oysters?

The bottom of an aquarium was covered with drilling mud and oysters placed on it. They showed no ill effects.

What about geophysical activity?

Recent answers to this question have corroborated the findings of exhaustive experiments conducted before the controversy reached its height. In 1944, Gowanloch and McDougall found that 800 pounds of dynamite failed to kill oysters suspended in cages 50 feet from the charge. The team felt that additional work was needed and the following year reported on experiments "in which great care was used to check the validity of the conclusions . . ." In this work they discovered that oysters were not damaged by 400 pounds of dynamite exploded 25 feet under the surface of an oyster bed.

These findings were substantiated time and again in recent experiments which also inquired of the after-effects of geophysical shots. In one test, 50-pound dynamite charges (maximum legal limit) and 20-pound charges (typical operating charge) were set off 20 feet from the oysters, with no apparent harm. Some of the oysters were then moved to another bedding ground. After four months, the per-cent survival of the oysters remaining at the experimental site was greater than that of those moved away.

What about dredging in the marshes?

With this question McConnell, the pokesman for 4,000 to 5,000 members f the Louisiana Oyster Dealers and rowers Association, sent the scientists urrying into geological history. When e argues that cuts through the marshes r drilling barges or pipe lines have diected the flow of fresh water from the yster reefs or have smothered the beds ith silt, there can be no counter-argument decisive as setting off a charge of dynaite under an oyster or dunking the beast crude.

Oyster reefs are indeed silting over and e marginal areas are certainly growing ore saline, say scientists, but it is imposle to ignore evidence that the primary uses are:

The sea is rising.

This is attributed to the melting of the lar ice caps and the sinking of the dele country, possibly because of the sediint load of the Mississippi River and the mpaction of the land.

There is a profusion of literature on is subject, some dating back to 1849. e authority noted in 1930 that many ce-prosperous old plantations had been duced to marsh. Another said in 1936 at surveyed markers on the lower Louisia delta sank about eight feet in a cenry. Another offered data in 1941 indicatg that the coast at Galveston sank at the e of 0.19 inch a year between 1909 and 39.

The thriving mudshell industry offers re evidence. The dredges have dug rough 25 feet of mud to bring up pure ster shell. During the war years a severce tax on this shell by the Texas Game d Fish Commission at the rate of 5 ts per cubic yard amounted to more n $1 million per annum.

Man-made levees have changed the ire drainage system of the lower Mississi Valley, preventing fresh water from ching the historical bedding grounds the oysters.

One of the most striking facets of this ky subject is the growth of the Atchafa- River. The Atchafalaya was of such e consequence that it was called a ou back in 1717, when the initial settlent of New Orleans was held up by ds. But since that time the Mississippi been imprisoned virtually its entire gth by levees which at some points are feet high; and engineers now believe Atchafalaya will some day be larger than the Mississippi unless means are taken to contain it.

To emphasize how recently this change has taken place, Dr. Gordon Gunter recalls talking to an old Creole gentleman who drove cattle across the Atchafalaya at a ford during low water stages approximately 85 years ago.

Enter the villain. The conditions bringing increased salinity have created an area favorable for parasites and predators.

The possibility of parasitic damage did not occur to investigators who as early as 1904 noted an increase in predators when salinity was high in areas where oyster reefs were dying.* But modern scientists attach great significance to the fact that high salinity encourages the ravages of *Dermocystidium marinum.*

Dermocystidium (pronounced Der'-mo-cys-tid'-i-um), discovered in 1950, is a fungus which literally devours the oyster alive, destroying in progressive stages the blood vessels, digestive system, heart, and adductor muscle. In form a spherical cell, it may be remotely related to several fungus infections which attack man.**

After exhaustive tests which led to the conclusion that Dermocystidium costs the Louisiana oyster industry about $2 million a year—or roughly 40 per cent of the total value of the 1953 crop—the scientists closed the second phase of their investigations. Experimentation as to whether oil activity causes oyster mortality had shown negative. The disease source had been proven.

A new research setup was organized with Dr. Mackin directing the Grand Isle work with the aid of Ed Schrader, a chemist; Fred Cauthron, photographer and general manager of the laboratory, who also has bachelor's degrees in chemistry and biology; and James L. Boswell, biologist. Dr. S. H. Hopkins is consultant to the group.

The studies were augmented by Sammy M. Ray, who had participated in the Gulf Refining project until that company completed its independent efforts and joined the other companies in 1950. In that year Ray enrolled as a graduate student at Rice Institute to carry out investigations in the life cycle of Dermocystidium under the direction of Dr. A. C. Chandler. It was Ray who found the now-famed thioglycollate culture technique by which it is possible for even an untrained eye to recognize the disease without aid of a microscope. The technique is to cover the cultured oyster meat with iodine. If it turns blue, it is heavily infected.

Present goals. Recent efforts at Grand Isle have resulted in evidence that the disease is more prevalent in areas of high oyster mortality than in areas of low mortality.

Oystermen would like to transplant their spat from the east (seed grounds) to the west side of the lower delta in any month from September to April and allow them to develop until the second or third Winter.† However, high mortality during hot weather in very saline areas has forced them to transplant in September, October, and November, and to harvest before the next Summer. This results in a marked decrease in the production of prime, or counter, oysters.

A plan devised by Dr. Mackin would take advantage of well-substantiated data that (1) Dermocystidium is most active in the Summer months;‡ and (2) that oysters less than a year old are not nearly so susceptible to the disease. He is prepared to suggest to the oystermen that they transplant at the end of the Summer, leave the oysters on the reefs through the next Summer, when they are all but immune to the disease, and the next Winter, and harvest them about March of the year after that. He would also transplant the oysters when they are only hours old, rather than several months or a year old, as now.

In actual field experiments, working in areas of high endemic disease, Dr. Mackin has harvested oysters 3½ to 4 inches long by this technique.

Experiments are also being made in shifting oysters to comparatively fresh water in the Summer to avoid high incidence of Dermocystidium, and shifting them to areas of greater salinity in the Winter, when the disease incidence is low. This is based on data which show that oysters fatten better in areas of high salinity —unless the disease interferes.

The rewards. More information beneficial to the oyster will be divulged as the work continues. As of now, after several years of effort and at a cost of $2 million, oil has:

Made *Crassostrea virginica* one of the best-documented beasts on earth;

Held its friends and made new ones; and

Opened the way to great prosperity for the Louisiana oyster industry. **END**

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*Predatory enemies of the oyster, in order of their importance, are the drilling snail (conch), stone crab, blue crab, *Stylochus* (a worm), and drumfish.

**Notably blastomycosis, cryptococcosis. Dermocystidium, however, cannot be transmitted to man, nor indeed have the biologists been able to transmit it to the clam, oyster's close kin.

†The efficiency of this method is doubted by some on the grounds that a crop of very large oysters every two or three years would not bring as much as several crops of smaller oysters.

‡Also true of the oyster's other enemies.

In land above the 48th parallel
"Tex-Ex" pursues its search
despite Winter's ice, wind, and snow

Marking the discovery well at the Bonnie Glen field near Edmonton is this "Christmas tree" that juts unexpectedly out of a mantle of snow.

Petroleum's DEEP FREEZE

NEITHER blinding blizzards nor 40-below-zero cold can stop the widening search for oil in Canada. Marching with the front rank of hunters is Texaco Exploration Company, a wholly owned subsidiary of The Texas Company.

As the hunt goes, so goes "Tex-Ex"—into the eastern foothills of the Rockies in British Columbia—across the farm lands of Alberta, Saskatchewan, and Manitoba—over the rolling, glaciated terrain of the Peace River country in northern Alberta.

From oil companies all over North America, teams of geologists and geophysicists move across the vast expanses of Canada's western provinces. They look for underground formations that show a promise of oil.

Focal point of Texaco's exploration in Canada is Alberta and northeastern British Columbia. A good portion of the crude oil that "Tex-Ex" finds here is processed into Texaco gasolines and other products at Edmonton Works, which is owned by McColl-Frontenac Oil Company Limited *(see Page 15)*.

Texaco's seismic survey crews in the timbered wilderness of British Columbia do much exploring in sub-zero weather—the kind that will "frost your lungs" if you breathe too hard. (Admonition: "Walk—don't run.")

In the "bush country" at 40-below-zero temperatures, the explorers can travel quite rapidly by truck over frozen muskeg. During Spring or Summer, however, a bulldozer or truck bearing seismic equipment would be trapped in the marshy muskeg—a rooty mass of grass, fern, and water.

The terrible cold is by far the worst obstacle that must be conquered by the men and machines who search for oil.

is constantly swept off pipe. If a sudden warm ok wind melted the snow, pes would freeze into a mass of ice when the wind d its direction.

When it is below zero, a maintenance man's job in an oil field is performed with great difficulty.

At sub-zero temperatures, a man doesn't forget how cold it is. No matter what he does, he must always combat the weather

At 40 below, the cold "burns" against the faces of the Texaco men. Said one surveyor: "When you breathe, you feel as if you were inhaling ice cream."

No matter how many layers of loose clothing a man wears, the faintest wind will jab the cold right into him. The crewmen constantly check each other for the first sign of freezing—a little white spot on a cheek, nose, or ear. When a spot appears, the man is hustled into the heated cab of a truck.

The weather was summed up recently by one "roughneck" on a Texaco drilling crew at Nig Creek in British Columbia: "You got to get used to the cold." He added with a wry grin, "Of course, no one ever does."

A "cat skinner" bulldozes a snowy trail through a forest of evergreens to make a track for the shot-hole drilling team that drills the holes for a seismic test. Or a derrickman, balancing aloft on his tiny platform, racks the joints of drill pipe whenever the bit is hoisted out of a well-hole for a change.

Whatever job the men of Texaco Exploration do in a Canadian Winter, the goal is the same: to find oil for Canada in the years ahead. **END**

At a bleak outpost of Texaco Exploration Company, the bunkhouses and plywood-and-aluminum trailers (on sled runners) of a seismic crew make a snowy huddle.

At Wizard Lake near Edmonton an oil rig reaches skyward as Texaco Exploration Company drills in a land where the danger of "frosting a lung" is constantly present.

At Nig Creek, in northeastern British Columbia, the driller on a wildcat crew "runs the show." The brake lever is one of the numerous controls that demand his careful attention.

Two producing men tramp across the crisp, powdered snow to inspect a pump at one of Texaco's fields in the oil area south of Edmonton, Alberta.

Wintry WORKS

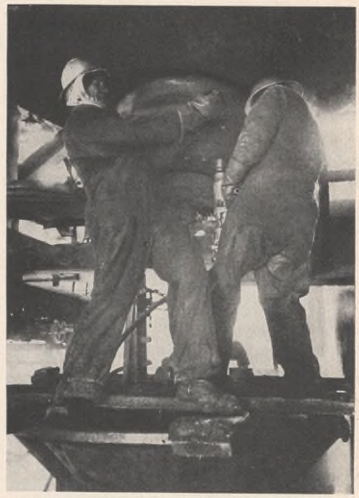
Exhaling long spirals of steam, Ed-monton Works refines crude oil at full capacity during weather that quickly frosts everything in sight.

Even at 30 below for six weeks at a stretch, this Canadian refinery never slows down its pace

RISING out of the heart of Canada's oil and wheat fields is the modern, fast-expanding city of Edmonton (pop. 113,111), the capital of Alberta. One of three oil refineries in this petroleum center is Edmonton Works. McColl-Frontenac Oil Company Limited, a subsidiary of The Texas Company, operates this refinery which, two years ago, began producing gasolines, Diesel fuel, heating oils, and other products. To meet growing demand for Texaco products, the capacity of Edmonton Works is currently being boosted to 11,000 barrels a day, double its original designed capacity. The Edmonton refinery processes crude oil that flows by pipe line from Texaco's Alberta oil fields at Wizard Lake and Bonnie Glen.

When Winter's first cold wave rolls in, Edmonton Works is already "wrapped" to withstand the freeze. Half-inch steam "tracing" lines are tied to lines carrying products in many stages of refining; other product lines are buried five feet under the frozen earth. Storage tanks for holding heavy oils are lined inside with steam coils to prevent congealing. Outdoor valves are insulated, and instruments are boxed to ward off the cold.

At Edmonton Works—Summer or Winter—products are turned out for Western Canada, where consumption of oil has risen 60 per cent in the past four years. **END**



Struggling against the bitter cold, two heavily clothed men at the McColl-Frontenac refinery tackle a maintenance job. Winter is a tough adversary for refiners as well as producers.

Day and night, strings of railroad tank cars are filled with products that are processed at the Edmonton refinery. Here, a bundled employe follows the flow of Texaco gasoline as it starts the long, cold journey to McColl-Frontenac service stations.

Storage tanks at Edmonton Works glisten under the Winter rays of a sun that is never strong enough to compete with air that holds people, nature, and machinery in an icy grip.

ORGANIZATION CHANGES

reflect Texaco's growth in many directions, especially research and technical...

M. HALPERN
Senior Vice President

J. S. WORDEN, *Vice President*
Refining Department

F. H. HOLMES, *Vice President*
Research and Technical Department

IN recognition of the continued growth of The Texas Company and to provide for increased emphasis on its research and technical activities, a number of changes were announced by J. S. Leach, Chairman of the Board of Directors, on July 27, 1954. A new Research and Technical Department was established. Michael Halpern was elected Senior Vice President and will be responsible for executive coordination of the activities of the Refining Department, the Research and Technical Department, Texaco Development Corporation, and all work in petrochemicals.

In other Board actions, J. S. Worden was elected Vice President in charge of the Refining Department, succeeding Mr. Halpern, and F. H. Holmes was elected to the new position of Vice President in charge of the Research and Technical Department.

In a statement that followed the action by the Board, President Augustus C. Long stated:

"This move by The Texas Company is designed to provide even greater stress on the values and benefits to be derived from petroleum technology.... We propose to intensify the research activities of The Texas Company to guarantee both to the public and to ourselves the greatest possible benefits from the most effective utilization of our vast petroleum resources."

The Research and Technical Department will carry on a broad research program, ranging from basic work in physics, chemistry, and engineering to the continuous development of new products and processes. It will also provide a variety of technical services to the Sales and Refining Departments.

Mr. Long made this prediction:

"Although great advances have been made in development of improved petroleum products and establishment of a new industry in petrochemicals, there is even greater promise in the future."

In connection with these new appointments, Dr. Wayne E. Kuhn was named General Manager of the Research and Technical Department and Theodore A. Mangelsdorf was named General Manager of the Refining Department, succeeding Mr. Worden.

MICHAEL HALPERN, the Senior Vice President, rose to the top of the Refining Department before taking on his new responsibilities. At one point in his Texaco career, in the middle Thirties, he was the Company's first director of research.

New York born, "Mike" Halpern's first job after college was as an engineer helping to build a subway in Manhattan. In 1916, he started with The Texas Company by engineering construction of the docks and warehouses at the Bayonne (New Jersey) Terminal.

Early in his Texaco years, husky, forceful Michael Halpern showed his qualities of leadership. Says an associate: "Because he was confident of his ability, people had confidence in him."

Mike Halpern has always moved steadily ahead in the 38 years he has been a Texaco employe—from supervisory positions at terminals and refineries to Manager of Manufacturing in the Refining Department, to General Manager, and (in 1940) to Vice President in charge of Refining. Six years later he was elected a Director.

A lover of grand opera, he also gets

a kick out of viewing an occasional boxing match on television. Manhattanite Halpern is one of the most vocal admirers of the New York Yankees.

Right now, Senior Vice President Halpern is devoting more time than ever before to plans which concern the new petroleum products and processes in Texaco's future.

JOHN SARTWELL WORDEN, Texaco's new Vice President in charge of Refining, is lean, tanned, and six feet, one inch tall. With his rangy build, Worden looks more like a Texan than a native of Olean, New York.

Son of a bank vice president, John headed for Oklahoma in 1920 after graduating from Princeton. The following year he was hired as a gauger at the Texaco refinery in Tulsa. John Worden spent the next 19 years "living the oil business in the field."

When he was made Assistant Manager-Operations of the Refining Department in 1940, he had behind him experience in superintendencies at the Amarillo, Houston, Lawrenceville, and Port Arthur refineries, and he had been vice president and general manager of the Indian Refining Company. Promotion to Manager of Operations came in 1942, and to General Manager of Refining in 1950.

The new General Manager of Refining, Theodore Mangelsdorf, remembers Worden's zeal and energy as superintendent at Lawrenceville Works. "I was a young engineer then. Each morning, I saw Mr. Worden touring the refinery —checking every operation. That really impressed me!"

FREDERIC H. HOLMES, who heads the new Research and Technical Department as Vice President, works closely with Michael Halpern and John Worden on Texaco's many research and technical projects.

Sturdily built, blue-eyed Holmes was graduated from Yale in 1927. He was determined to carve out a career in the oil business. He had the necessary drive and perseverence to go a long way before reaching 50 years of age.

One of Fred Holmes' earliest jobs with Texaco was as a tester in the laboratory of Port Arthur Works, in 1928. Later assignments included supervisory positions with Texaco refineries both in the United States and abroad. In 1950, at the age of 45, Fred Holmes was brought into Refining Department headquarters in New York as Assistant Manager of Operations.

Promoted to Assistant General Manager of the Refining Department last year, Holmes worked closely with the Technical and Research Division of the Refining Department, which formed the nucleus of the new Research and Technical Department.

His integrity impresses all who have worked with him. Says one colleague: "Fred is scrupulously fair about everything he does." At refineries where he served, he earned a reputation for working to achieve good labor relations.

Naturally quiet, Holmes doesn't waste words. "When he does talk," remarked a friend, "Fred goes right to the point."

T. E. BUCHANAN, *Vice President*
Marine Department

NEW EXECUTIVE POST *in Marine Department*

THOMAS ELIE BUCHANAN, former General Manager of the Marine Department, was elected by the Board of Directors on July 27 to the new post of Vice President in charge of Texaco's marine activities. "Buck" Buchanan, a cheerful man with a soft, Louisiana accent, heads the Texaco operation of a tanker fleet totaling more than 1,000,000 dead-weight tons.

Buck comes naturally by his love for water and boats. As a boy in the "Cajun" country of Louisiana, he paddled down the bayous in his home-made pirogue. On his office walls hang scenes of bayous overhung with Spanish moss.

In 1917, at the age of 18, Buck became a stenographer at Texaco's Port Arthur, Texas, refinery. But the "boats" lured him away a few years later, and he joined a group of marine concerns. Buck rose to be a top marine executive in his late 20's.

Buchanan returned to The Texas Company as Assistant to the Chairman of the Board in 1938. The following year, he was named General Manager of the Marine Department.

Today, Buck Buchanan tries to go down to the sea as often as possible, particularly whenever a new Texaco tanker heads for a shakedown cruise.

James V. C. Malcolmson, formerly Assistant General Manager, has succeeded Mr. Buchanan as General Manager of the Marine Department. **END**

The Princess of Pilottown

Because of a Texaco Samaritan, a furry orphan is the liveliest citizen who has ever lived in this tiny settlement on the edge of the Mississippi

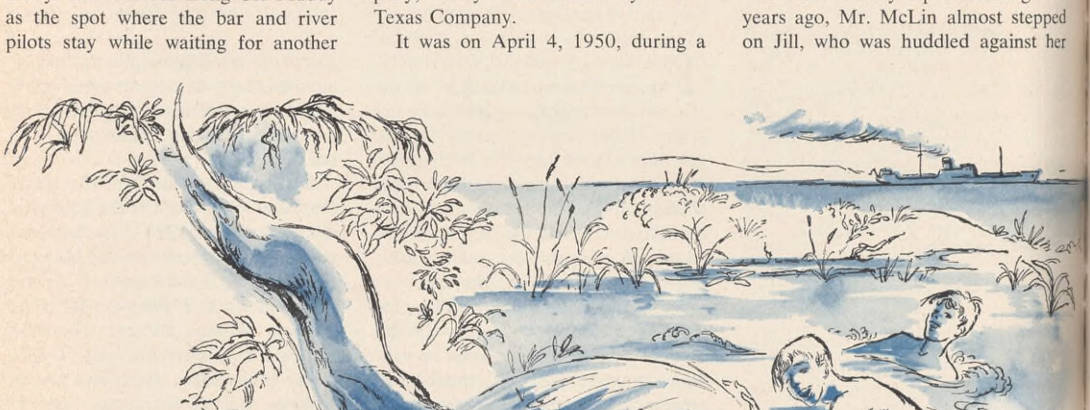
WAY DOWN upon the Mississippi Delta – about 100 miles below New Orleans – is a Texaco outpost that is nearly as far away from civilization as a jungle village. Pilottown, Louisiana (pop. 300), a hamlet on the river marshes, is reached only by boat or airplane.

At Pilottown, the houses of Texaco employes (half the population) almost creep into the river. This settlement has always been famous along Old Muddy as the spot where the bar and river pilots stay while waiting for another boat to guide past the shoals and through the currents of the Mississippi.

Today, Pilottown is famous for something else. Jill, a squirming brown-and-white marsh otter, is responsible for giving Pilottown a bigger place in the southern sun. Bright-eyed and playful, Jill is the liveliest event ever to hit this sleepy town. Certainly, Jill is one of the most distinctive pets ever owned by an employe of The Texas Pipe Line Company, wholly owned subsidiary of The Texas Company.

It was on April 4, 1950, during a big flood, that Jill first came into the life of Robert D. McLin, who supervises the Texaco tanks and pump station at Pilottown. "Mac" and his crew of four handle the flow of crude oil via pipe lines from nearby Texaco fields to barges, which regularly "load up" at this tiny Mississippi River port. These barges are then towed to Texaco's Port Arthur Works and to New Orleans, where the crude is sold to other refiners.

On that stormy April morning four years ago, Mr. McLin almost stepped on Jill, who was huddled against her



mother near the pump station. Like her two brothers, Jill was only a few days old and too young to swim. To protect the helpless babies from the rising flood waters, the Texaco Samaritan carried them into the warm station. Not so willing to be carted off to drier quarters, the mother otter dived into the Mississippi and swam away forever.

Jill's two brothers, not as sturdy as she, died when very young. But Jill thrived on the bottle of warm milk Mac gave her, drinking a pint every day. "In a few weeks," recalls Mr. McLin, "Jill was fat and sassy."

One day, while experimenting with her diet, Mac fed Jill a spoonful of a canned dog food. As enthusiastically as a kid laps up ice cream, Jill devoured the entire contents of the can and grunted for more. Today, Jill eats dog food almost exclusively, topping off her daily ration with an occasional dessert of boiled perch or catfish.

JILL'S gay antics have greatly brightened the lives of Mr. and Mrs. McLin and the citizens of Pilottown. Having no movie theater or citified amusements, the river village can be a trifle dull. ("In Pilottown, you entertain yourself or you go without it," philosophizes Mr. McLin.)

Fortunately for the townspeople, Jill's talent for getting into humorous scrapes is unlimited. She loves to creep up to one of the town cats, then wiggle all over while grunting excitedly. This is Jill's way of inviting the cat to play. These strange actions, however, only frighten tabby, who lets out a yowl and streaks away.

While Jill is genuinely fond of cats, she never misses a chance to make a dog's life miserable. Should a Pilottown canine be so foolish as to come within sniffing distance of Jill, he might leave with his "sniffer" permanently damaged. Only a long, sharp whistle from Mac will stop Jill's pursuit of a dog.

THERE are those cyclonic days when Jill rampages through the town, her bushy tail waving like the plumes of England's Royal Horse Guards. Suddenly, a housewife's scream will break Pilottown's serenity as Jill pops out of a clothes closet. Or the capricious otter will climb into an open, unheated oven and playfully lunge out

at anyone who tries to shut the door. One night, Jill disrupted one of the "town meetings," which are held in Pilottown's general store, by suddenly appearing on the platform in the middle of an important discussion.

After these escapades, Jill's patient master scolds her, threatening to deprive her of the next daily stroll along the town's one and only street—a narrow boardwalk. (This unique "boulevard" runs straight for half a mile past the store, post office, the little white school house, the pilots' inn, and Pilottown's modest homes.) Jill's only reply to a scolding is to nuzzle affectionately in Mac's ear and whimper plaintively—like a puppy dog that has been spanked.

"It is the children who really spoil Jill," sighs Mr. McLin. They play tag with her, and sometimes they even go swimming with Jill in a shallow pool near the Mississippi. Pilottown's youngsters love to cuddle Jill in their arms and rub their faces into the otter's deep, soft fur. Grunting appreciatively, Jill closes her eyes in a mood of ecstasy.

THERE is no doubt that Jill leads a soft life. According to zoological experts, she can look forward to another six or seven years of luxury as the little "princess of Pilottown."

Not for some time will Jill allow things to become dreary for the local citizenry—pilots, fishermen, and Texaco pipeliners and producing men who bring the oil out of the ground in the fields around the Delta.

If things do get a little dull on a still Winter's night, perhaps, Mr. McLin can forget to close Jill's cage. Then Pilottowners will have something to talk about in the morning. **END**

He is "TEXACO'S A

WALTER G. ELICKER, *Secretary*

IT is not unusual around Texaco's New York offices to hear a tough question passed on this way: "Ask Elicker, he knows." Many employes, in all ranks and departments, go to Walter Garfield Elicker, Secretary of The Texas Company, for the right answer.

Walter Elicker's 36 years of service with Texaco have given him a vast knowledge of the Company's people and policies, which helps him find the correct answers. Observed one associate: "Accuracy is Walter Elicker's guide."

As a boy, Walter Elicker earned an early reputation for accuracy and precociousness in his home town of Rossville, Pennsylvania (pop. 100). By the time he was 12, Walter was ready for high school.

Because there was no high school in Rossville, Walter was tutored for a year. Between lessons, young Walter often drove the horse-drawn hearse for his father, who was the undertaker in the Pennsylvania Dutch community. At 13, he entered Pennsylvania State Teachers College to train himself to be a school teacher. The youngest and shortest kid in school, "Chippy" (so dubbed because of his size) Elicker was also one of the smartest. At 16, he was graduated with honors.

For the next 10 years Walter Elicker instructed and disciplined students in Pennsylvania and New Jersey. When 21 years old, he was the principal of a grade school in Roselle Park, New Jersey. He was called "the most popular kid in school." An ex-student, now a doctor, cites the reason: "Mr. Elicker played baseball with us. He was a regular guy."

In 1918, at the age of 27 and with the security of his family in mind, Walter Elicker shifted from education to business. He joined The Texas Company as a clerk in the Marine Department in New York City. Having studied accounting in his spare time, Elicker was soon put in charge of the cost-accounting section. Ten years later, he was transferred to Texaco's Executive Offices. The following year, in 1929, he was appointed Assistant Secretary of the Company. Walter Elicker was elected Secretary of The Texas Company in 1945.

ONE of Secretary Elicker's jobs is to prepare the agenda for the meeting of the Executive Committee, which convenes every Thursday on the 26th floor of the Chrysler Building. (During the intervals between the meetings of the Board of Directors, the Executive Committee possesses and exercises, when required, all the powers of the Board in the mangagement and direction of the business and affairs of The Texas Company.)

During the Executive Committee's deliberations, Elicker provides facts and figures when they are needed. A Director may ask for Texaco's earnings report for 1935, or the amount of money spent in producing operations in January, 1947, or the refinery runs in any month of the current year.

If the Secretary hasn't the requested information at hand, his staff immediately locates the answer. (It is no wonder that a Texaco Director once said, "Walter Elicker is better than an encyclopedia.")

Every action of the Executive Committee must be ratified by the Board of Directors. Secretary Elicker presents a summary of these acts at the monthly meeting of the Directors. The Board's agenda might include the consideration of a dividend, whether to build another refinery, or a decision relating to the Iranian oil settlement. At the Board meetings Elicker must also be prepared to answer questions about the Company, past and present.

To each meeting of the Executive Committee and the Board of Directors, Secretary Elicker takes a "confidential financial report," which is compiled every week by his staff. Says Elicker: "This report gives everyone a bird's-eye view of exactly what Texaco makes and spends day by day."

Walter Elicker also "reports" to Tex-

NSWER MAN"

aco stockholders; that is, he is responsible for seeing that all stockholder queries and letters are answered.

Among the Secretary's other duties are the giving and serving of all notices for the Company, and keeping the minutes of meetings of the stockholders and the Board of Directors.

Walter Elicker has been instrumental in helping to transform Texaco's Annual Report from a "mere fact-and-figure booklet" to an attractive, well illustrated, and comprehensive presentation of financial and operational information. "The Annual Report is the most important piece of literature The Texas Company puts out," says Elicker. "We are always trying to find ways to improve its usefulness to our stockholders."

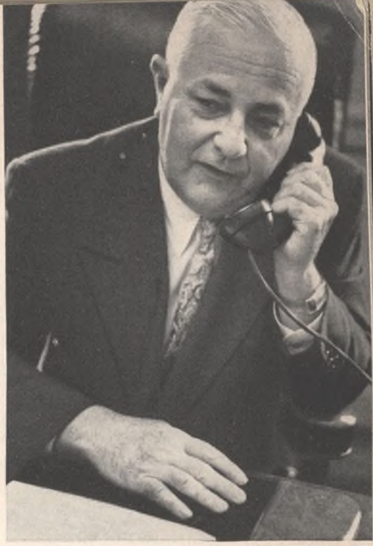
Texaco's Secretary also answers queries from representatives of investment houses and insurance companies which hold large blocks of Texaco stock. These financial analysts check with Elicker on all phases of the Company's operation, both domestic and foreign, including crude reserves, production of crude oil and gas, refining operations, transportation facilities, sales, budgets, cash position, earnings, and dividends. The analysts are always anxious to discuss the immediate and long term outlook for the Company.

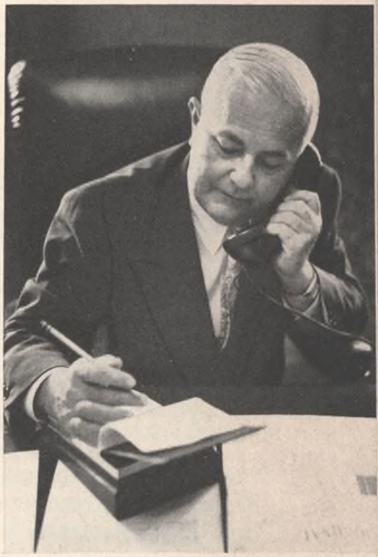
"I give them the facts," says Elicker. He adds, with a twinkle in his eye: "They seem to like the facts that I give them about The Texas Company."

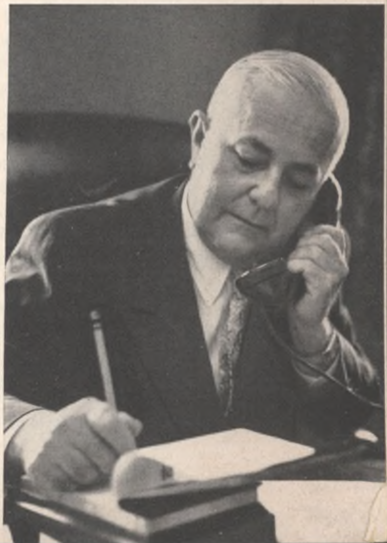
SECRETARY Elicker serves on many important committees, but he is especially enthusiastic about the Committee on Employes' Benefits Plans. He likes to help other people. "If something is troubling an employe," he says, "it will show up in his work. With a little effort, most problems can be solved." Elicker often gives counsel on problems of sickness, finances, and other personal matters.

Walter Elicker lives in a Dutch Colonial home in suburban Westfield, New Jersey (pop. 21,335). The Secretary's favorite relaxation is a game of bridge. For 15 years, Elicker and three bridge-playing cronies have rarely missed the "Monday night game." One kibitzer's reaction: "They play like their lives depend on it."

When you meet Walter Elicker, you are immediately impressed by his friendliness and by his firm knowledge of the corporate complexities of Texaco. These are his greatest assets. They are the reasons why Texaco's Secretary is known as the "answer man." **END**







"Answer Man" Elicker gets a call from an insurance company in New England. He makes a luncheon appointment with one of the vice presidents, who says he has a "lot of questions to ask about Texaco." ▶

Since the advent of the automobile, urban centers have "exploded" in all directions, and people are dependent upon their cars throughout their daily lives.

fuel research, the refiner, and YOU

by DR. WAYNE E. KUHN, *General Manager*
Research and Technical Department, The Texas Company

WHAT are the engine problems the refiner faces today? And what are his methods for overcoming them?

In every decision the refiner makes, he must observe the silent confidence of a figurative man at his elbow, the car owner. The second largest investment most men make, after a home, is the family car. And every car owner expects the gasoline he buys to give him all the power he paid for at the automobile showroom.

Some of the engine problems were indicated in the first of these two articles *(see* THE TEXACO STAR, *Summer, 1954).* Their solution reveals a healthy difference of opinion in the research laboratories of an industry long known for its singularly competitive spirit.

It is useful to keep in mind this fundamental: an automobile engine is a device for converting the heat-energy of gasoline into mechanical power. The engine man must make compromises with perfection, compromises dictated by the market in which his product must compete. Perhaps a perfect engine could be made to burn the perfect fuel—but one must reckon that in the background there would lurk a "perfect," and outlandish, cost.

Lacking perfection, then, here in summary are the major fuel-engine problems of the moment:

Higher Compression Ratios

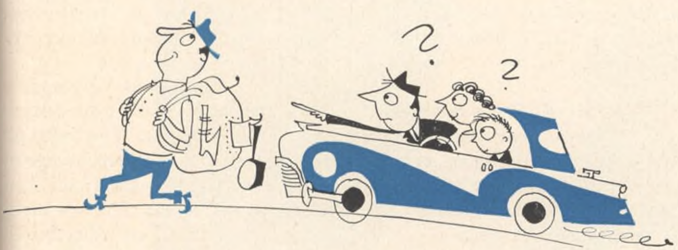
Each year, compression ratios mount, and the trend will continue.

The higher compression ratios bring about higher temperatures and higher pressures in the combustion chamber.

For the car owner this is good news—up to a point—for he gets these noticeable results: 1) more power, 2) more efficiency.

In short, his engine is converting more of his fuel into useful power.

Your car's engine was designed to perform best under conditions which are the opposite of stop-and-go driving. Here, in the second and concluding article on the fuel men's problems, is the story of petroleum's remarkable progress in making gasolines that give you peak performance—regardless of driving conditions



It's easier to drive than to walk, but a car's short "walk" can be 15 times more wearing on the engine than a long drive.

However, there's a hitch. Assuming his engine is of conventional design, he now needs a fuel with a higher octane number in order to accommodate the greater compression.

Further, he must face the fact that the whole forward step of engine progress each year is placing a far greater burden on *both* his fuel and his lubricant. He must choose wisely the most nearly perfect fuel and motor oil team.

Higher-Quality Fuel

As temperatures and pressures increase year by year in his engine's combustion chamber, the motorist faces another problem. Today, it is imperative that he select a fuel which will permit, at all times, a completely efficient seal between valve and valve seat, and between piston ring and cylinder wall.

Otherwise, his large investment in a fine engine is for nothing. Some of the power he paid for will leak out the exhaust system. Worst, the extremely high combustion temperatures, if allowed to leak past an ill-seated exhaust valve, will act like an acetylene torch and burn the valve. Result: high repair bills.

Obviously, the motorist doesn't know all these things. We have expressed them in terms of the motorist merely to emphasize again his complete dependence on fuel research and the refiner.

Combustion Deposits and Uncontrolled Ignition

The preceding problem brings up a new one: combustion deposits, a greater problem today than last year (and—unless the trend is changed—one that we can expect to be greater next year). The refiner is aware that you cannot burn fuel in a combustion chamber without having some by-products of that combustion. As compression ratios increase, the problem of deposition becomes more critical.

Some of the problems relating to the need for the higher octane number fuels are familiar: "knock" is an old-timer, "ping" is fairly familiar. But the 1954 engine houses some other phenomena as it rolls along the highway. Hot spots, glow spots, after-running, and preignition are some of the newly recognized problems the refiner and engine designer must grapple with.

Knock was explained in the last issue of THE STAR. Briefly, knock occurs when a part of the unburned fuel-air mixture spontaneously explodes. You can hear this uncontrolled detonation. Sometimes such detonation takes place in cylinders which are completely free of deposits.

However, the other "new" problems *are* the product of deposition. They add up to a class of problem we might call *uncontrolled ignition.*

One can study deposits in several ways: by their volume; by their thermal character; by their catalytic character. This whole field of study is now coming under wide and intense investigation. The phenomena causing uncontrolled ignition are far from completely understood. However, much practical progress has been made.

It is enough here to note these facts:

The volume of deposition, from the fuel expert's point of view, is not too great a problem (except, of course, in that the material is present at all).

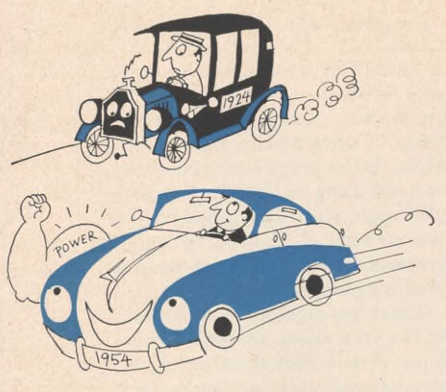
The thermal character of deposits can result in the material "glowing" from one combustion cycle to the next, thereby igniting the fuel-air mixture before the spark plug can do the job at the proper time.

Finally, it appears that some deposition materials act as catalysts and speed up some phases of combustion.

To a large extent, detonation ("knock") can be controlled by increasing the octane number of the fuel in use. However, such a method is not helpful in offsetting that uncontrolled ignition which is caused by deposits.

THE GOAL of both the engine man and the fuel man is to provide the motorist with as much power as possible from an engine of a given size. In view of the fuel problems posed by today's engines, this question arises:

How much progress has been made?



The increased power of automobile engines manufactured today is realized through the use of fuels that provide top performance.

A simple fact can be cited which reflects a remarkable story: space for space, the 1954 engine is delivering four to five times as much power as engines manufactured 30 years ago.

Any discussion of engine-fuel problems would be incomplete without taking note of the modern driver. Social historians have remarked that the automobile (and the truck and bus) "exploded" the American city out into the countryside years ago. The growth of suburban dwellings became possible to the degree that the motor vehicle provided ready access to the city.

Today, another cultural phenomenon has arisen: the integrated suburban shopping center which serves the needs of one or more "package communities." Now, many people do all their shopping with the family car; it is the common denominator of changing dwelling habits. It takes the family breadwinner to the train every morning, the children to school, the family to the doctor, to church, to the movies. Walking would appear to be a lost art.

What effect does this have on automobile performance? First, remember that this fine power plant is designed to deliver efficiently more power and more speed. Second, consider that today two-thirds of all car "trips" are under eight miles. Call it stop-and-go driving, or neighborhood driving, or creep-and-crawl. The result is what matters, and the result is one of the ironies that seem constantly to confront engine-fuel progress: *the 1954 engine is generally driven under conditions exactly the opposite from those for which it was designed to perform best.*

Short trips rarely warm up an engine properly (this is much worse, of course, in cold weather). Water, unburned gasoline, carbon, sludge—all cause trouble, and all may be present in engines which are not properly warmed up when driven. The major trouble is wear. However, the most modern motor oil—Advanced Custom-Made Havoline—in the modern engine minimizes these problems which have grown out of design progress.

Studies have shown that neighborhood driving once was 15 times more wearing than highway driving.

There was a time when a second-hand car, which had been owned by an elderly school teacher who always drove short distances at low speeds, was considered a good bargain. Today, we know such a car was a bad bet.

FUEL RESEARCH has been enlivened by the different avenues of approach selected to overcome current engine-fuel problems. One widely advertised route is the use of commercially available chemical additives.

"Additive" has become the new glamour word in gasoline marketing. A slight confusion has arisen which pits high octane against additives. People sometimes assume that one or the other is the exclusive answer to all fuel problems. This is not true. Increased octane number is a fundamental requirement in a modern fuel. After the octane number has been raised to a level permitting efficient operation of an engine, *with respect to those conditions critically dependent on octane number per se,* there still remain certain other problems to be solved.

The answer, then, is higher octane number *and* something else, not *or* something else. As mentioned earlier, gasoline is a very complex material. Therefore, the refiner in his continual effort to supply the motorist with improved quality fuel, must be ever conscious of *all* the problems relating to gasoline. He must not improve one characteristic at the expense of another by the use of an additive. The cure should not cause a new disease as bad or worse than the old!

That is the risk inherent in some inorganic chemical additive approaches. Conclusive tests indicated that a new approach must be sought which would avoid the destructive side reactions of the commercially available inorganic additive compounds.

The Texas Company took a daring route, which utilized all the resources of research and engineering ingenuity at its disposal. The decision was to market a new fuel then under development and to launch with it a revolutionary motor fuel component. This fuel would incorporate a series of improvements which, at that time, were proving out in severe laboratory and road tests.

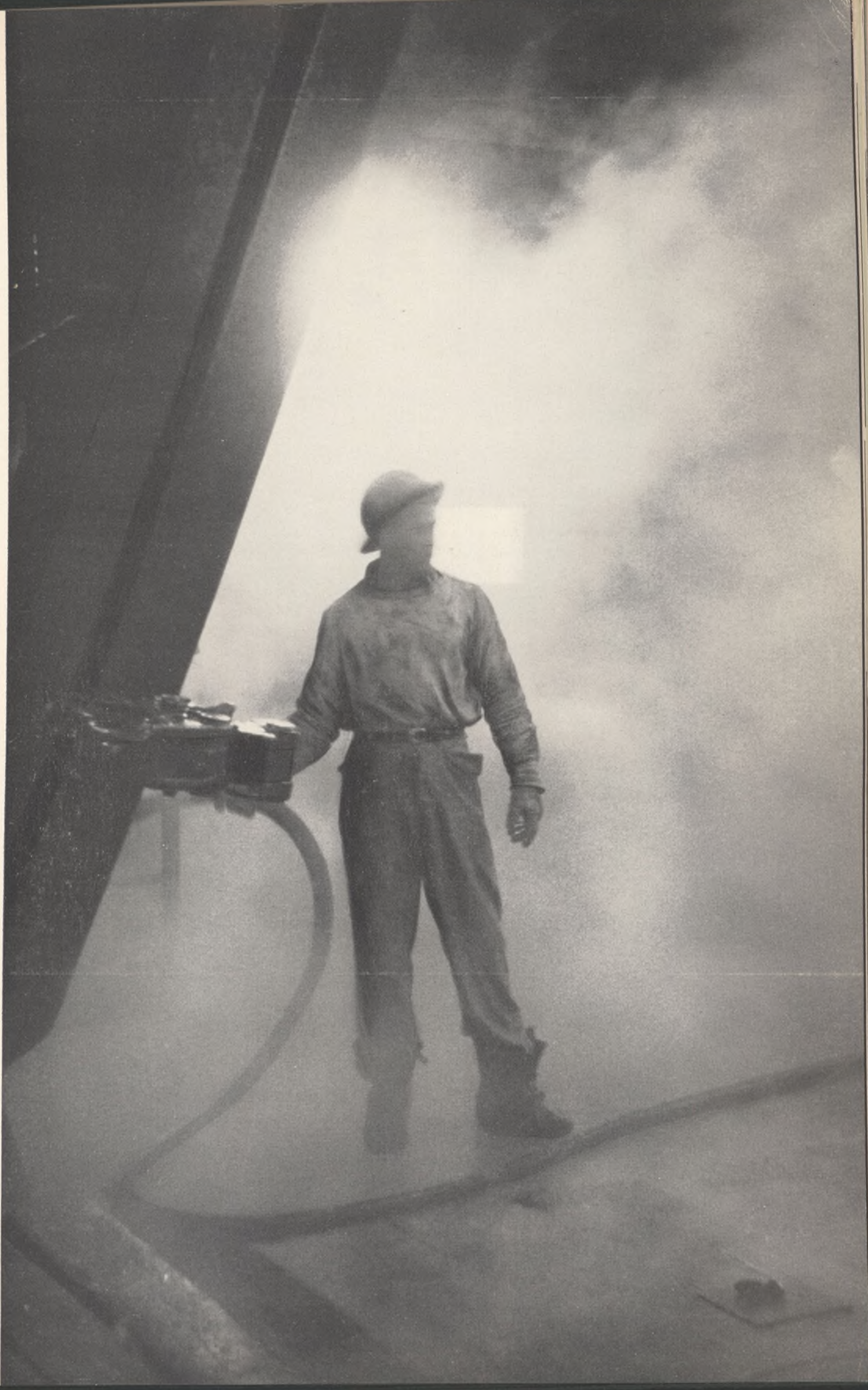
The base stock of Texaco's premium-grade gasoline, Sky Chief, was reformulated. Thus, each component was upgraded. This resulted in a higher-octane fuel *before the blending in of tetraethyl-lead.* The result was an excellent fuel with the highest octane number Sky Chief Gasoline had ever had.

The final step was the development of a completely new hydrocarbon-derived fuel component. This called for the construction of a new processing unit at Texaco's largest refinery, the Port Arthur (Texas) Works. The new material, called "Petrox," embodies knowledge acquired by Texaco during many years of research in a highly specialized field of materials and processes.

Of prime importance to the Company in the management decision which sent the new fuel to market is the fact that Petrox is a petroleum-derived organic compound which is completely assimilable in the hundreds of complex hydrocarbons which make up gasoline. In a 2,000,000-mile laboratory and highway test program the new Sky Chief Gasoline containing the exclusive material, Petrox, revealed a consistent level of improvement. This improvement appeared in all areas of fuel problems when the new gasoline was tested against other available premium fuels. And most important, the improvements produced absolutely no harmful side effects such as increased deposition problems.

In taking a daring route, The Texas Company ended up with the cherished prize of a successful innovator—an exclusive product improvement which no competitor can offer the public. END

At 30 below zero, clearing ice and mud from a derrick floor at Nig Creek, in British Columbia, requires a steam hose, creates this misty scene.



Northern Lights

WHEN the night of Winter envelops Edmonton Works, the cold, crisp air causes the refinery's lights to glisten with a special radiance. Located in Edmonton, the capital city of Alberta, this is one of two refineries operated by McColl-Frontenac Oil Company Limited, subsidiary of The Texas Company. Edmonton Works as well as the McColl-Frontenac refinery at Montreal, Quebec, manufacture Texaco products for Canadian consumers. The Edmonton refinery supplies the three Prairie Provinces of Manitoba, Saskatchewan, and Alberta, as well as eastern British Columbia, with petroleum products that power factories, heat homes, and fuel a vast variety of motor vehicles.