UNIFINING

(see report on page 9)

OCTOBER 1954

On Tour

WITH UNION OIL COMPANY OF CALIFORNIA

On Tour

Volume 16, Number 10
OCTOBER 1954

In This Issue

THE COVER

Three members of our Research Department—from left, Colleen Douglas, Dr. H. C. Huffman and Irene Thompson—are trying to tell us with beaker samples how dark, sulfur-bearing oil can be changed by Union Oil's new catalyst into the finest water-white petroleum products. For details, turn to Page 9 and "Unifining."

"ON TOUR", pronounced "on tower," is an oil field expression meaning "on duty." Our magazine by that title is published monthly by Union Oil Company of California for the purposes (1) of keeping Union Oil people informed regarding their Company's operations and progress, and (2) of recognizing and encouraging the fine accomplishments of employee groups and individuals. We invite communications from our employee readers, whose thoughts, interests and opinions are carefully weighed in determining editorial policy. Address correspondence to ON TOUR, Union Oil Building, 617 West Seventh Street, Los Angeles 17, Calif.

T. D. Collett, Editor
R. C. Hagen, Assistant Editor

Oil Man's River

Above New Orleans, the mighty river serves as a transportation artery accomodating, among other shipping, many barges carrying oil to and from mid-Continent refineries.

FROM two words—*missi sipi*, meaning great river—of the Algonquin Indian tongue came the name of America's mighty Mississippi. Aptly named by these earliest known adventurers on its waters, the stream now is recognized worldwide for its greatness. Including its main tributary, the Missouri, it flows a total distance of 4,200 miles from the Rocky Mountains to the Gulf of Mexico. So measured, it is the longest river in the world, exceeding even the Nile. With 40 navigable tributaries, it drains over one-third of the entire United States, discharging more than 758 billion cubic yards of water annually at its mouths. And its total load of sediment carried into the Gulf annually is estimated to be about 400 million tons.

White men first saw the river in 1541 when Hernando de Soto explored westward to its lower course. But the Spaniards seemed in no hurry to exploit their discovery. No Europeans are believed to have visited the stream during the next 132 years, or until 1673 when the French explorers Louis Joilet and Father Marquette came down from Lake Michigan to view its upper course. Nine years later, La Salle carried French exploration southward to the river's mouth. Thereafter, the Mississippi surged into international greatness, becoming a major strategic prize in the European struggle for New World domination.

When in 1802 the Spaniards in control at New Orleans closed the river to all navigation by Americans, a crisis threatened. Settlers on the banks as far northward as Ohio had been floating their products downstream on flatboats, transferring them at New Orleans to ocean vessels for shipment to Atlantic Coast and European ports. The blocking of this outlet, in violation of a treaty between Spain and the United States, stirred indignation. But swift transfers of territory from Spain to France, and from the latter to the United States through provisions of the Louisiana Purchase, ended the impasse'.

The Mississippi was quickly reopened to commerce. Downstream came a great tide of settlers and an ever increasing tonnage of freight. Soon after Fulton demonstrated the possibilities of steam on the Hudson, the first steamboat appeared on the Mississippi. For 30 colorful years these boats made history up and down the river, catering to a vigorous tide of industry and migration. Although interrupted briefly by the Civil War, the river's transportation usefulness has continued unabated. It is still the "great river"—great in size, great in romance, great in economic importance.

Boring through sediments deposited by the undulating Mississippi River, this Union Oil well in our new East Lake Palourde Field has tapped productive oil formations.

Beneath The River Is Oil

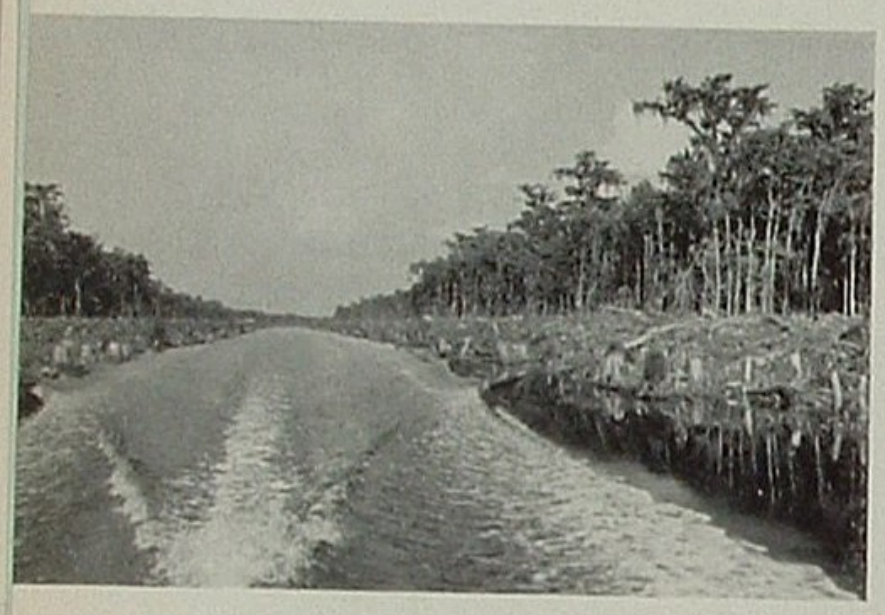
Long prior to the steamboats, the French, the Spanish and the Algonquins, the Mississippi had labored for thousands of years building up an enormous delta. Geologists tell us that as far back as the Miocene age the river was depositing alternating layer upon layer of porous sand and non-porous shale at its mouth. When an outlet became chocked with sediments, the river turned right or left on a new course, thus building up the wide delta now comprising the entire coastal margin of Louisiana. As evidence of the stream's age and ceaseless labor, oil men point to the great thickness of these sedimentary

deposits, some of them extending deeper than 25,000 feet.

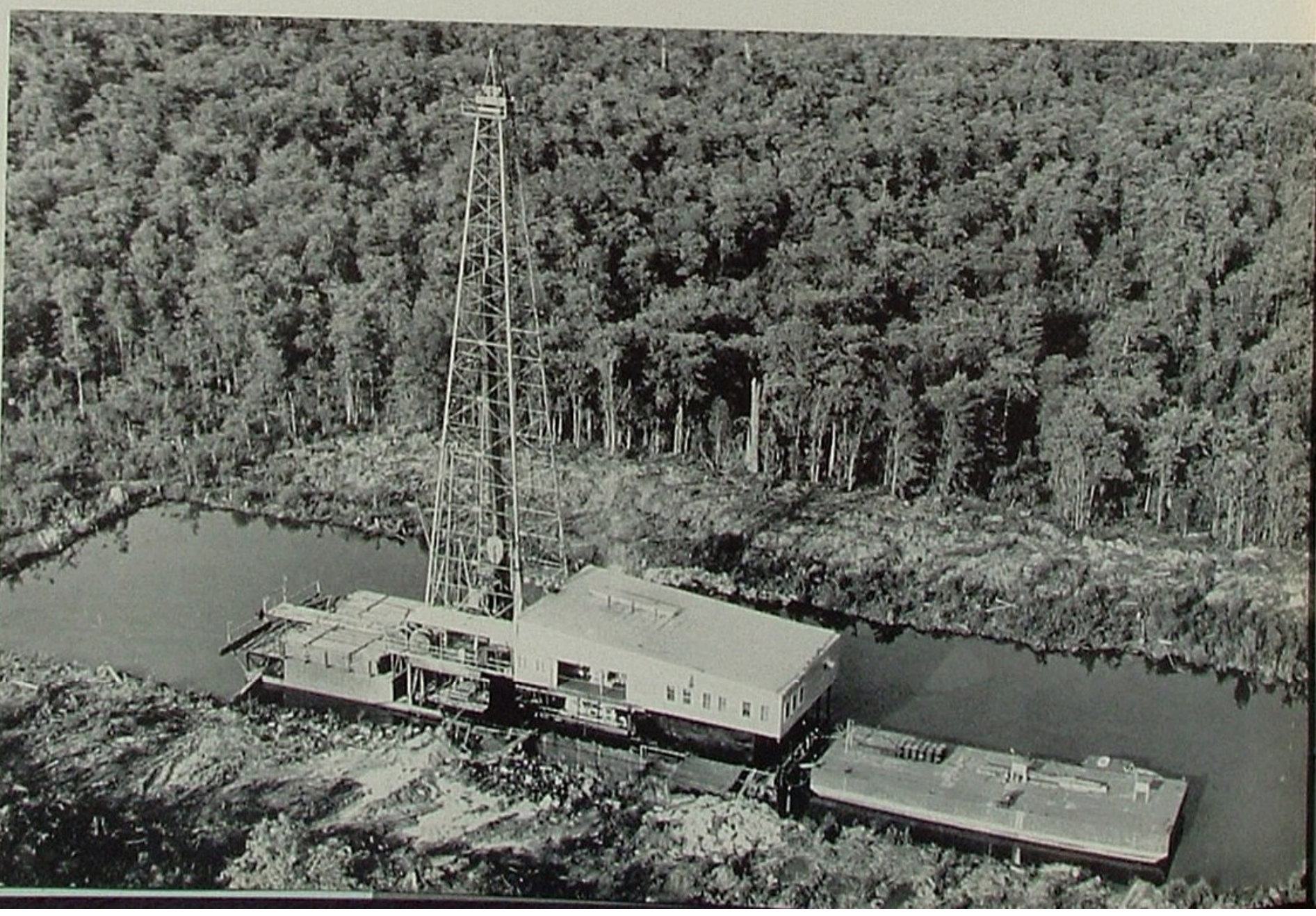
Beneath the upper sediments existed a thick layer of salt which, when compressed by the accumulating overburden of river sands, changed from solid to plastic or semi-liquid form. Acting somewhat like compressed air inside a defective tire, the pliant salt mass found weak places in the downward pressing layers of sediment and pushed upward to form massive bulges, called salt plugs. The salt actually punctured the sand and shale layers in some cases while pushing others up into massive dome-shaped formations. But seldom do you find surface evidence of these salt plugs and domes in Louisiana. More recent labors of the Mississippi have concealed the mighty upheavals under other layers of river deposits, camouflaging the entire creation beneath a level covering of fertile land, shallow seas, lakes, bayous, swamps and marshes.

Sometime and somehow during the Louisiana delta's formation, oil put in its appearance, probably originating in the dense vegetation and prolific marine organisms that once lived and died along this coastal fringe. The oil migrated through porous rock layers between the non-porous shales, finally coming to a halt where the porous sand pinched out or where it arched over or abutted against flanks of the penetrating salt plugs. There a vast wealth of oil collected and remained, while above it the Mississippi continued to swing east and west on its endless mission of burial and concealment.

It remained for oil men of the present generation to unlock the Mississippi's deep treasure vaults. Their keys were such instruments as the modern seismograph which, through the ingenious timing of shock waves, tells surface observers the relative position of subterranean rock layers. Instrument crews found evidence of many possible oil entrapments deep under the delta's farms, streams, lakes, bays, bayous, swamps and marshes. But



A mile or more of canal, left, had to be dredged from Lake Palourde through dense cypress swamp in order to prepare a location for the development well, below. Crude from this new Union Oil field is stored in barge-supported tanks, right, pending shipment to refineries.



it remained for drilling crews to find the oil. Devising amphibious drilling techniques to cope with this wringing-wet belt of partially submerged land, they opened the river's depositories. And they found petroleum—both rich in abundance and rich in quality.

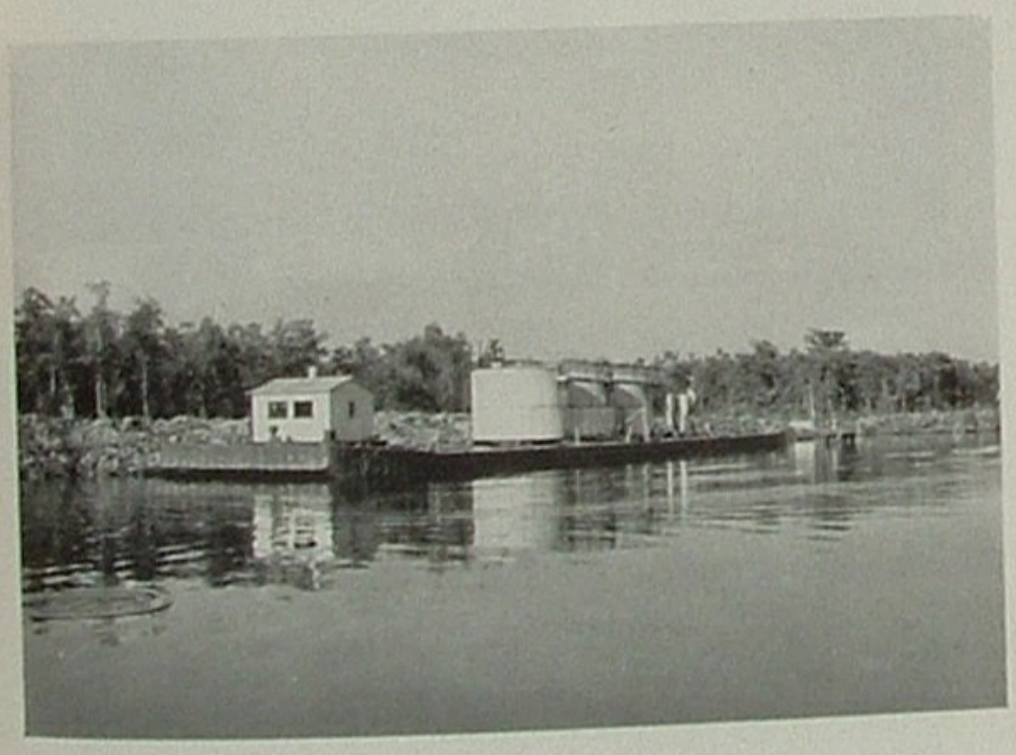
Today, oil refineries account for many miles of the Mississippi's shore line. Oil barges represent a high percentage of the river's traffic, some of them entering the "great river" after moving hundreds of miles via lakes, bayous and man-dredged canals. From the air, the Louisiana delta—once thought to be a worthless, dismal swamp—is now a scene of surprising action. Boats ply its waters constantly. Amphibious airplanes cross and criss-cross it in every direction. Drilling platforms, barges, *christmas trees* of completed wells, tank batteries, gas plants and even lodging houses appear in areas intended by Nature for ducks and alligators. Following the best tradition of the oil industry in America, men dismiss the difficult terrain with an undampened "Oil is where you find it!"

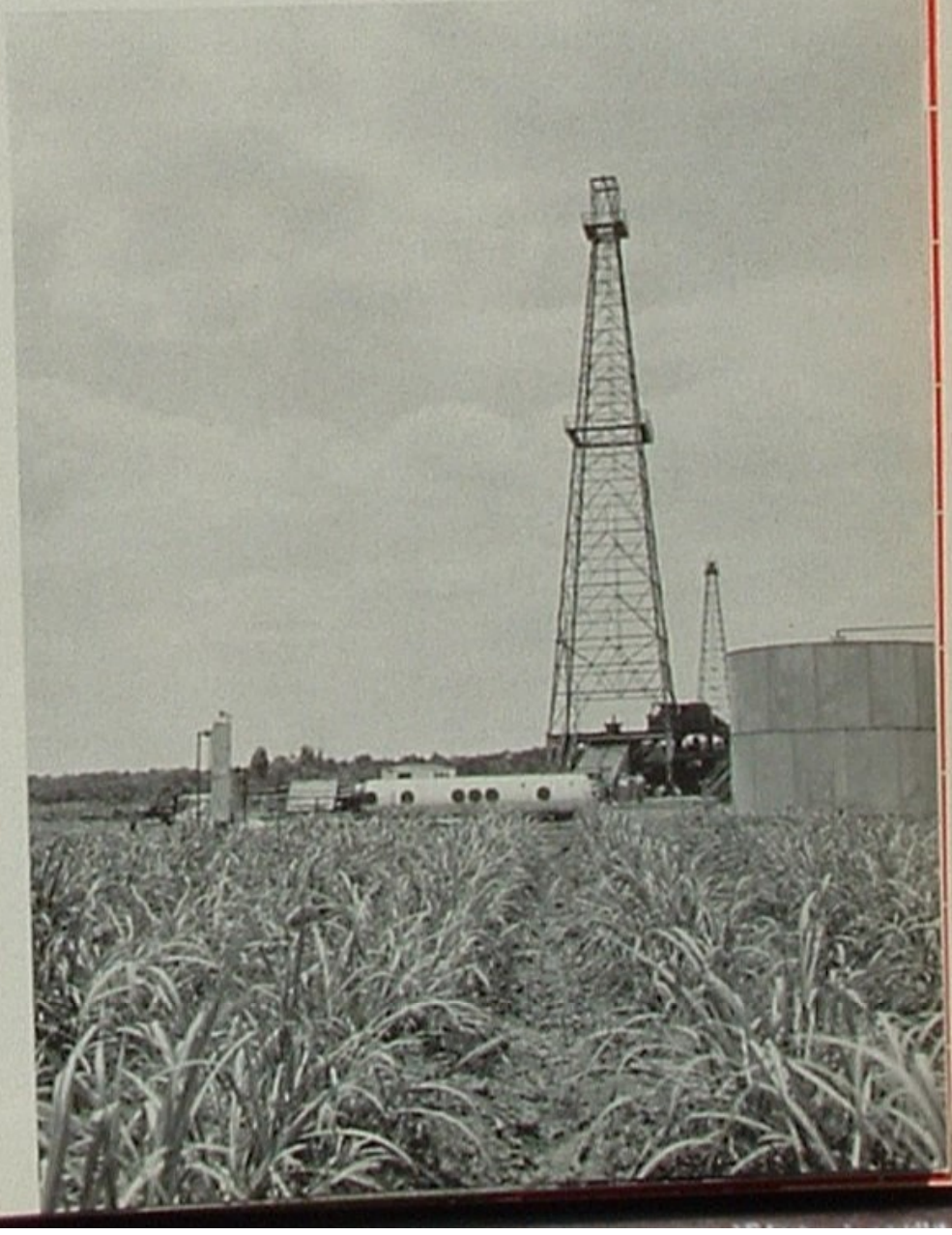
Happily, Union Oil people are taking a most active part in this search for oil structures and oil fields throughout the Louisiana delta. They have met with very encouraging success during the past 15 years, having discovered a dozen or so good oil fields, acquired a number of other prospective lease blocks, and added substantially to the assets of Union Oil while gaining in personal experience and skills.

One of the Gulf Division's most recent discoveries took place literally on a bank of the Mississippi River. It is the College Point—St. James Field, 50 miles upstream from New Orleans. Our discovery well, Union Oil Company No. 1 Karstein, looks down upon the Old River Road immortalized in the pre-Civil War literature of the Old South. Nearby are some of the South's most famous river plantations—including Oak Alley, whose well preserved mansion was built in 1832 by a Louisiana governor—and Evergreen Plantation, now being restored by Miss Matilda Gray, fee owner of our Vinton Field and loyal friend of the Company. Here, among the original settlements of the state, thousands of visitors come annually to sense the lingering atmosphere and romance of a bygone day.

Although our first well in this field indicated a potential oil production rate of 259 barrels per day and, under the state allowable, is now producing 149 barrels daily, the importance of the find has yet to be determined through development drilling. Union Oil controls about 2,200 acres in the vicinity.

Another Gulf Division discovery, made April 3rd of this year, took place in quite a different type of delta terrain. It is our East Lake Palourde Field, 90 miles southwest of New Orleans. This is an uninhabited region of principally cypress swamp traversed by many bayous. In order to make location for our first wells, it was necessary to cut through a growth of cypress trees, some more than five feet in diameter, and then dredge a mile or so of canal through the stumps and snake-infested





Union's Karstein No. 1 well, right, found oil within a stone's throw of the Mississippi's present channel at a depth of nearly 11,000 feet. This cane field location adjoins Louisiana's famous Old River Road above New Orleans, which connects the South's finest plantations.

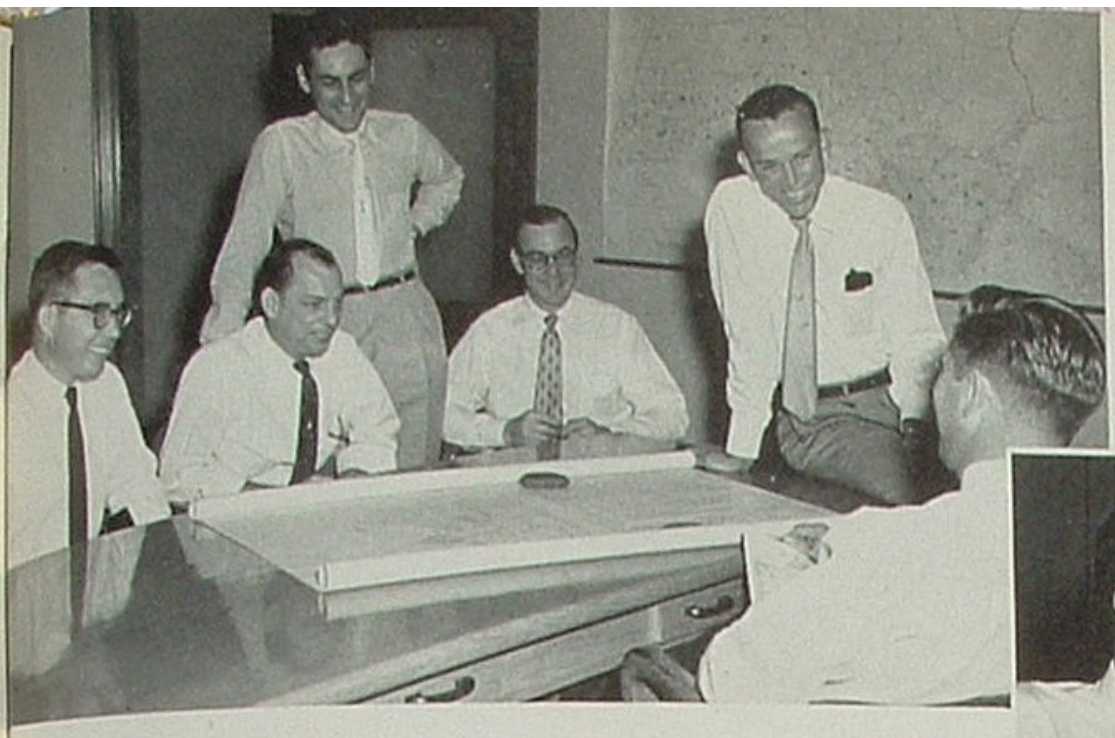
Oak Alley Plantation, left, derives its name from the beautiful trees, below, whose entwining branches form a shaded alley leading down toward the Mississippi's levee. The mansion, now owned by a Stewart family of the South, antedates the Civil War by some 30 years. Within a mile of this plantation, we have found oil.

swamp. It was the type of arduous and costly exploration that separates the men from the boys; and certainly the odds were in favor of a dry hole. But Union Oil Company No. 1 Williams drilled to 14,491 feet and completed a 250-barrels-per-day oil well. Since April, two development wells have been drilled, one completed as an oil well and the other as a gas producer. Two drilling rigs are currently at work boring into other portions of some 6,000 acres the Company has leased here. The 35.9° gravity oil is purchased by Pan Am Southern Corporation, who move it by barge through the Intercoastal Canal and connecting waterways to refineries located on the Mississippi River.

Lake Palourde was discovered by an explorer of French descent in 1839, who named it for the giant mollusk found there. Union Oil's amphibious planes land almost daily on the lake, from where launches relay men and equipment to the drilling sites. From boat or plane, the beauty of the swamp compares favorably with that of Florida's famous Cypress Gardens.

At New Orleans is a district office of the Gulf Division whose staff (pictured herewith) of a dozen or so geologists, landmen and clerical assistants deserves much of the credit for these recent discoveries. Their continuing success in tapping the Mississippi's deeply buried oil treasure is the hope of Union Oil people everywhere.

The terrain 90 miles southwest of New Orleans is less hospitable. However, Union Oilers, including Co-Pilot Al Delz and Pilot Dan Mitchell, right, fly to it almost daily, using Lake Palourde as a landing place.



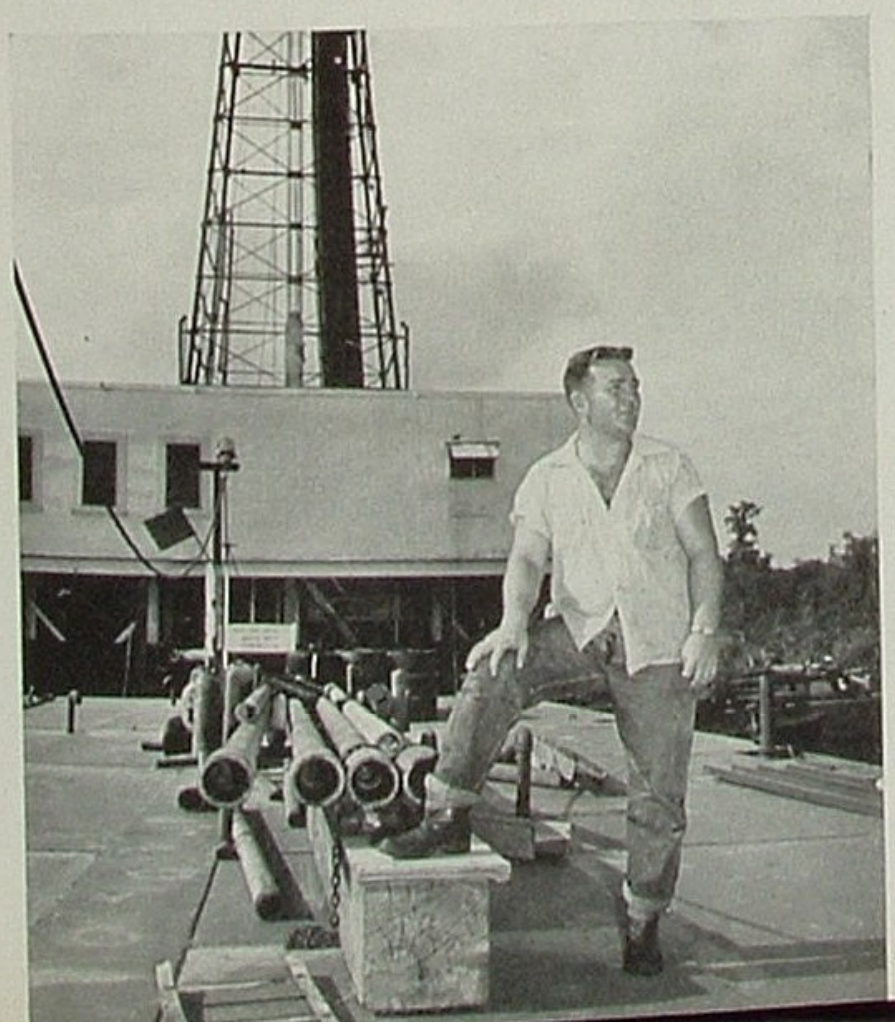
Above from left are Charles M. Schwartz, Wiley B. Harle, George B. Pichel, Karl F. Hagemeier and Sam C. Terry, geologists who work with Ray Burke. Below with Wayne Hightower are Draftsman Terrance J. O'Connor and Landman Carl J. Schwarz.

Our Gulf Division's district office in New Orleans is headed by, from left, District Landman Wayne Hightower and District Geologist Ray A. Burke. They and their associates are doing excellent work in finding and acquiring control of good oil prospects.

"On tour" at East Lake Palourde is Field Operator Buford Veazey, husky Union Oiler whose life-long familiarity with the swamp qualifies him for the muddy prospecting job.

Providing the feminine touch in our New Orleans office are, from left, Clerk Martha Herbert, Drafstman Gloria Lloyd, Secretary Thelma Scutt and Clerk Joyce Jones.

Below, Production Foreman Clyde Aycock and Assistant Foreman Dozeta Miller observe as Victor Webre and Harold LeBlanc assemble a bottom-hole pressure bomb at Karstein.



To Flyers and Oilmen

The Sky's No Limit

By Jacqueline Cochran

I've had the opportunity to see first-hand the imagination of our oilmen at work in two entirely different fields—aviation and cosmetics.

I've spent well over 10,000 hours of my lifetime at the controls of a plane. I've seen oilmen advance the age of flight with one amazing new aviation fuel after another. As wartime head of the Women's Air Force Service Pilots (WASPs) I saw how our 100 octane gasoline—which the Germans didn't have—helped our pilots win control of Europe's skies. Today I marvel at the special jet fuels that make it possible for us to break the sound barrier.

I've test-flown many of these new fuels. In fact, I've never flown a race or tried for a record that was not a test for a new fuel, engine or instrument. I've found that competition is an ideal proving ground. This is because it forces you to push beyond recognized limits. The same competition is the driving force in the oil business. A company can best get ahead of rivals by developing new products or improving old ones.

That's why I was not surprised when oilmen began to play an important role in my cosmetics and luggage businesses. Through constant research oilmen have now developed over 500,000 compounds derived from oil. We use more and more of them every day. Even our squeeze bottles are now made from an oil-based product while my compacts, bottle caps and brush handles are oil-based plastic. And it's pure mineral oils which give lipstick its lustre—make it taste good enough to eat—keep it smooth.

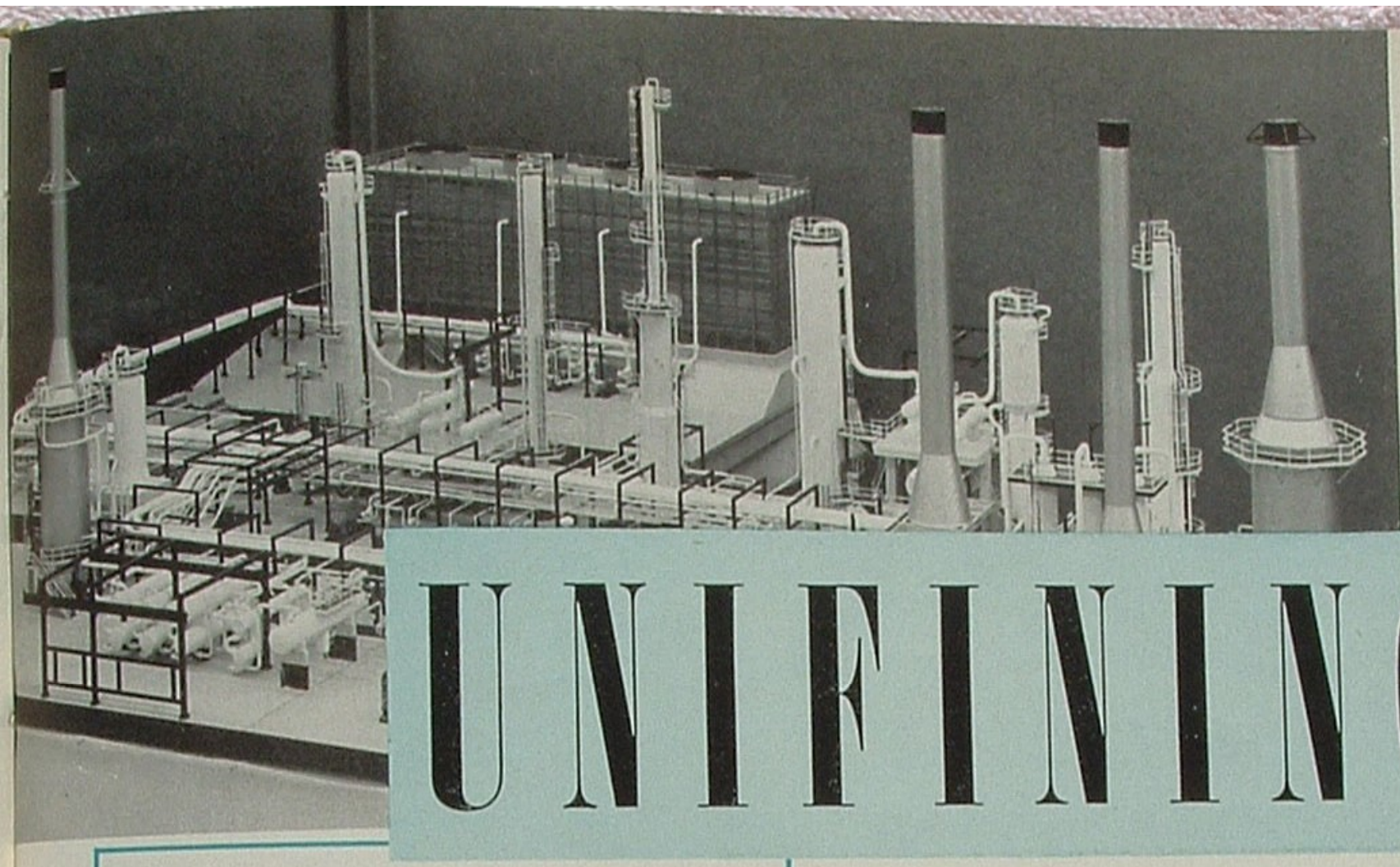
The foaming agents in my shampoos and bubble bath are oil-derived, too. And so is the "sun screen"—the chemical in suntan lotion that keeps burning rays out—let's tanning rays in. I could go on forever, telling you about extra-sturdy luggage materials, vinyl travel kits and many other "oil-burn" products that are important in our lives.

It really seems to me that as long as the free competition for business never ceases, there's just no limit to the oilmen's inventiveness. I can't wait to see what they'll come up with tomorrow.

* * * * *

Jacqueline Cochrane has won fame in two fields—aviation and industry. The first woman to break through the sound barrier, Miss Cochran was recently awarded the Gold Medal of the Federation Aeronautique Internationale and received the 1954 Harmon International Aviation trophy as the world's outstanding aviatrix. For her work as wartime head of the Women's Air Force Service Pilots (WASPs) Miss Cochran was decorated with the Distinguished Service Medal—becoming the only civilian woman to receive this honor. She is well-known in the cosmetics industry as president of Jacqueline Cochrane Inc. and Parfums Charbert Inc. She is also U.S. distributor of Nina Ricci Parfums, Paris, and a popular line of luggage bears her name. "The Stars at Noon," Miss Cochran's autobiography, has recently been published.

This is one of a series of reports by outstanding Americans who were invited to examine the job done by the U. S. oil industry. This page is presented for your information by The American Petroleum Institute, 50 West 50th Street, New York 20, N. Y.



UNIFINING

A Process Developed by Union Oil People Leads the Industry Toward New Heights Of Petroleum Upgrading and Quality

Shown above is a model of the combination Unifining and Platforming unit now being built at Oleum Refinery. The origin and description of Unifining, a Union Oil developed process, is revealed in the following report to employees.

IN the late 1930's, Union Oil Company foresaw the need for developing new refining techniques. The crude oil from several of our large underground reserves, being relatively high in sulfur and nitrogen content, was limited in usefulness mainly to the manufacture of fuel oils. But West Coast markets showed a declining need for fuel oils while, at the same time, the demand for quality diesel and gasoline engine fuels was increasing yearly. It was decided therefore to conduct a research program aimed toward the development of better refining methods, a particular objective being the removal of sulfur and other unwelcome compounds from these refining stocks.

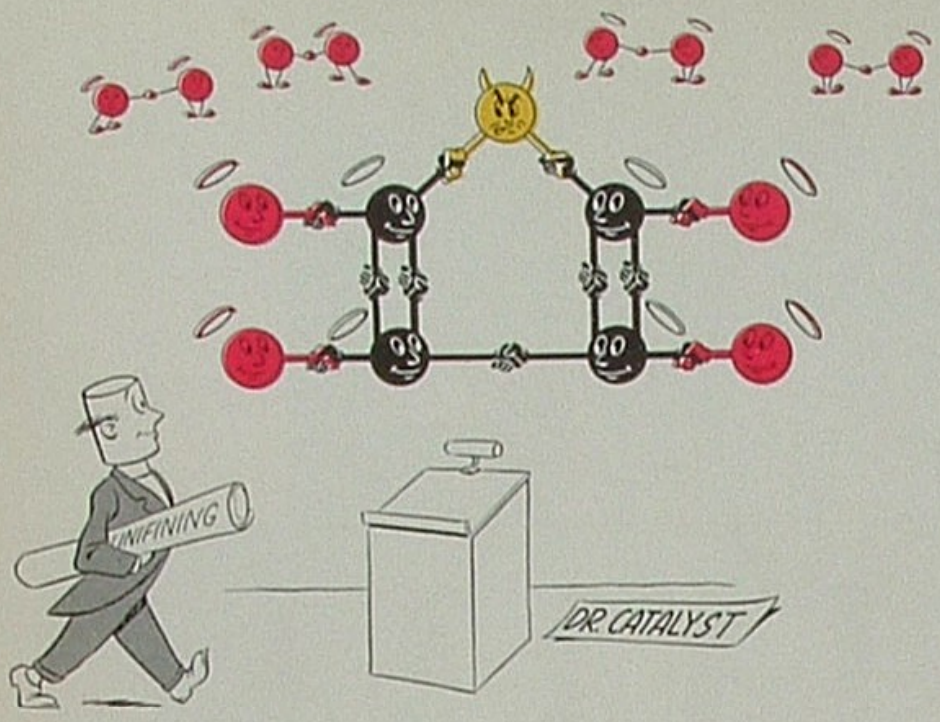
Petroleum having a high content of sulfur is known as *sour crude*—a troublesome raw material because of its limited usefulness and high refining costs. Gas oils distilled from sour crudes are also high in sulfur content; when they are used as a catalytic cracking stock, the cracking catalyst is *poisoned*. Therefore, high-sulfur gas oil distillates have been considered either totally unfit for catalytic cracking or have greatly increased the cost of oil processing. If present in gasoline, sulfur adversely affects *octane* rating, resulting in lower fuel efficiency or quality. Sulfur in engine fuels adversely affects engine cleanliness and increases maintenance costs. Sulfur corrodes metals, including refining equipment. Finally, when removed from refinery stocks, this substance has to be disposed of through costly means to prevent contamination of the atmosphere.

After more than 15 years of expensive research, the Company has evolved a refining method that successfully solves the sour crude problem. Being of Union Oil origin, it is appropriately called UNIFINING.

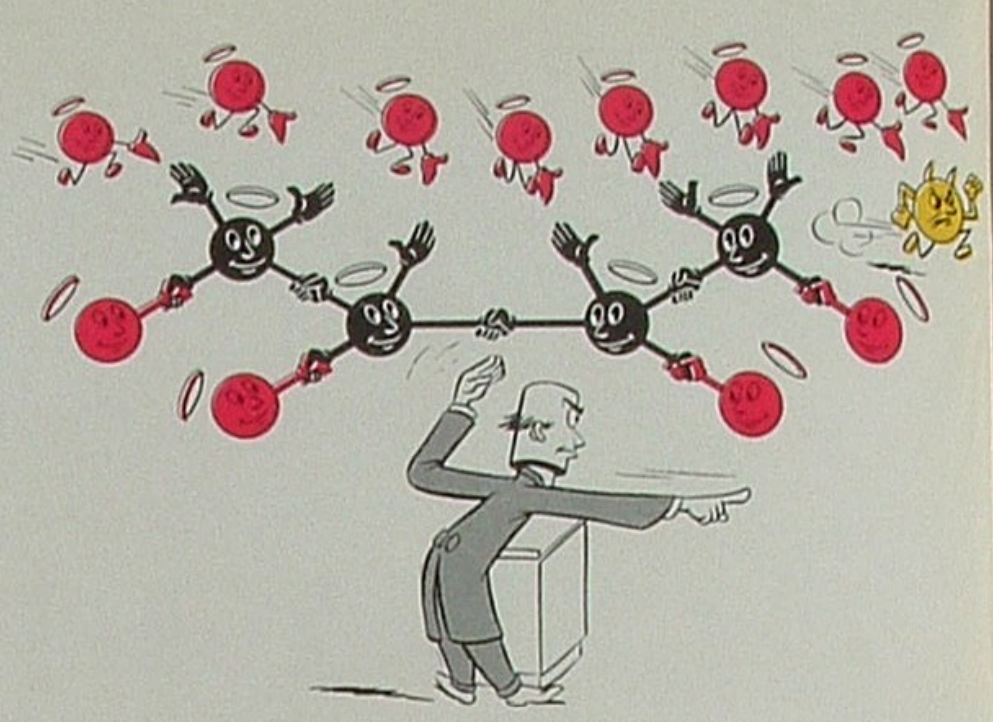
THE UNIFINING PROCESS

Unifining does a great deal more than merely remove sulfur. It also is effective in removing the harmful nitrogen, oxygen and metallic compounds often found in oil stocks. And it can change unstable hydrocarbon compounds into products having great stability.

When sulfur and other impurities are present in oil, they generally are found in chemical combination. In other words, an atom or more of sulfur will be found linked or *bonded* firmly in a molecule that should desirably contain only hydrogen and carbon. Furthermore, hydrocarbon molecules whose four-handed carbon atoms (see illustrations) take double handholds on each other instead of grasping more atoms of hydrogen are usually



Act 1



Act 2

characterized as *unsaturated;* in such molecules, two hands of the double bond are apt to release their grasp on each other and attach to other substances within reach.

The object of Unifining, therefore, is to cause a breaking of the molecular chain or ring at precisely the point where impurities are linked on. Then by having a sufficient quantity of hydrogen present when the breaking occurs, the process enables this desirable element to fill the molecular vacancies, creating an impurity-free hydrocarbon. In addition, reactive double bonds of unsaturated molecules are filled up or saturated with hydrogen to yield more stable molecules.

The heart of the Unifining process is a catalyst composed of cobalt molybdate particles on an alumina base. Pellets of this cataylst—when brought into contact with impurity-laden oil and hydrogen—not only cause a removal of the unstable double bonds and a breaking away of the impurities, but do so without becoming poisoned, contaminated or otherwise harmed. Thus, it is possible to use the catalyst over and over again for a very long period of time.

Our Refining Research Group including, from left, T. V. Inwood, N. L. Kay, G. W. Hendricks, Dr. H. C. Huffman, V. E. Stiles, R. L. Richardson and Dr. E. C. Attane, handled the chemical research underlying Unifining.

Let's visualize for a moment how the Unifining chemical action takes place:

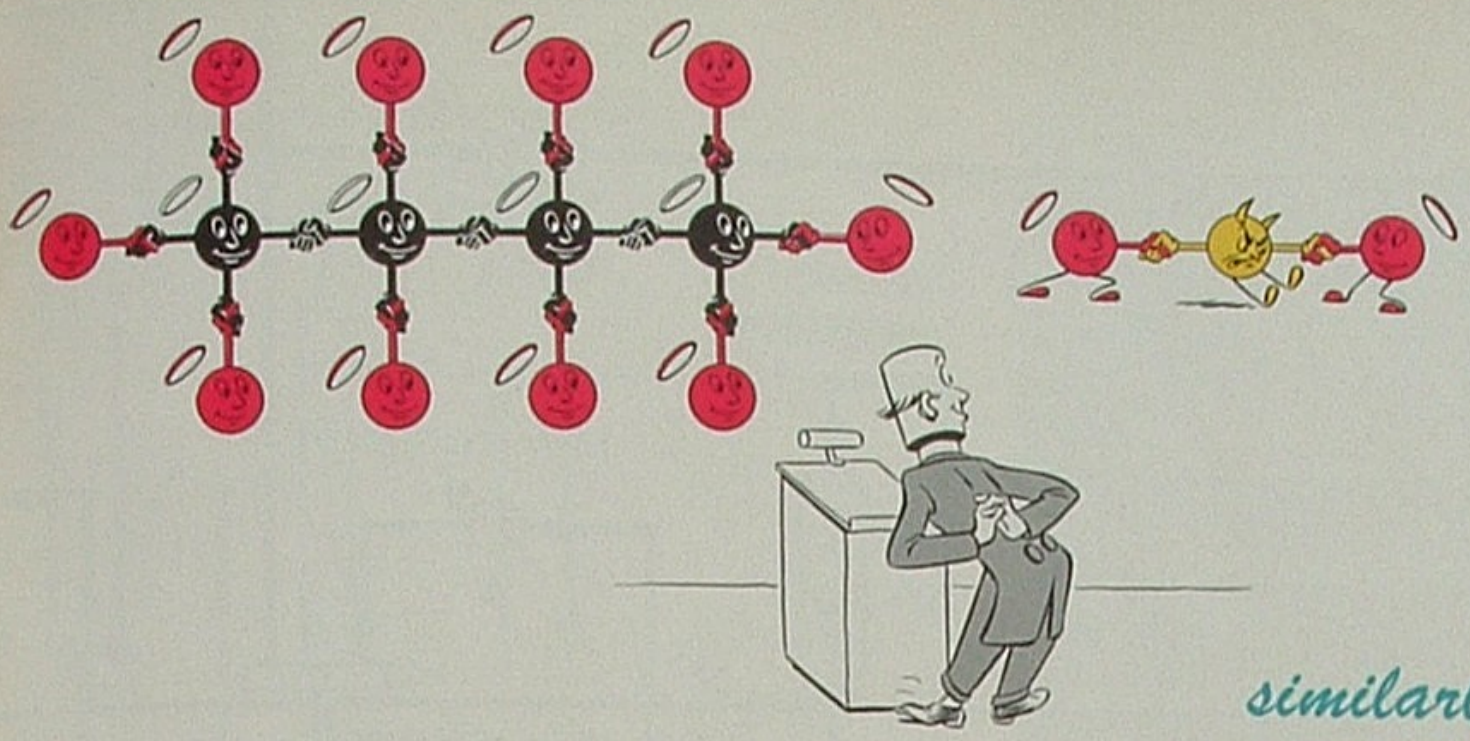
THE CHEMISTRY OF UNIFINING

In caricaturing a chemical reaction, above, our artist has taken considerable license. The halos, horns and handclasps are, of course, symbolic, and any resemblance of the atoms to persons is perhaps farfetched. However, we have the assurance of Union Oil scientists that the reaction sequence is technically correct.

In Act 1, we see a molecule of thiopene (C_4H_4S) occupying the center stage. This somewhat imperfect petroleum character was chosen because it demonstrates an interesting example of double bonding and also contains an atom of unwanted sulfur. In the background you will notice eight atoms of hydrogen who watchfully are holding hands in pairs. Coming on stage is the hero of our chemical drama, Dr. Catalyst, with a discourse on "Unifining" held firmly under his right arm.

In Act 2, the plot begins to unfold. Dr. Catalyst has delivered a very short but extremely effective lecture on the evils of bad companions and idle hands. Responding to the Doctor's good advice, the thiophene molecule releases its bad companion and waves a not uncheerful goodbye as the unwelcome sulfur atom announces, "I'm gettin' outa here." Meanwhile, the willing hydrogen atoms rush forward to take advantage of several new handsclasping job opportunities within view.

Our chemical drama has a happy ending. Act 3 shows



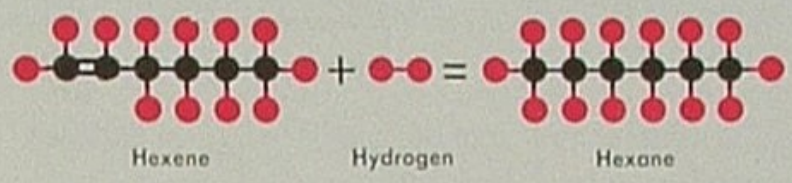
Act 3

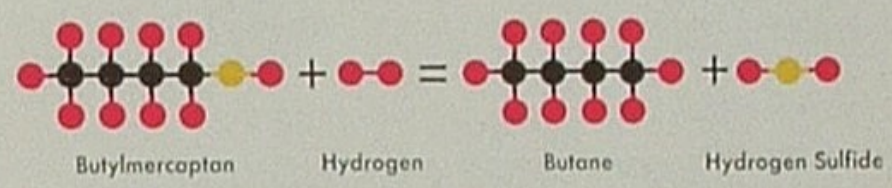
the changed thiophene and extra hydrogen atoms now bonded into a stable, chain-like molecule of butane (C_4H_{10}), a petroleum figure of much greater worth and acceptance than thiophene. Two of the extra hydrogen atoms, volunteering as bouncers, have combined with sulfur to form hydrogen sulfide (H_2S), and are escorting the villain off stage. Dr. Catalyst, unsoiled by the reaction, smilingly surveys his accomplishments before turning to repeat the "Unifining" lectures to a continuing legion of ill-bred molecules.

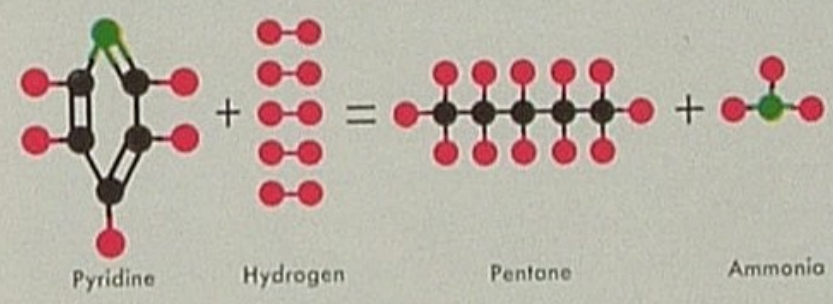
Similarly, the artist reveals, at right, how five other imperfect molecules found in petroleum crudes and distillates are changed by Unifining's breaking and hydrogenation methods into hydrocarbons having great purity and stability. Unstable hexene (C_6H_{12}) with hydrogen added to its unsaturated carbon atoms becomes stable hexane (C_6H_{14}). Butylmercaptan ($C_4H_{10}S$) is made to substitute hydrogen for its sulfur atom, then becomes butane (C_4H_{10}) with a hydrogen sulfide (H_2S) by-product. Pyridine (C_5H_5N), containing a nitrogen impurity, is transformed to pentane (C_5H_{12}) and a molecule of ammonia (NH_3). Phenol (C_6H_6O), with oxygen in its make-up, is changed to benzene (C_6H_6) and water H_2O). And diethylsulfide ($C_4H_{10}S$), containing sulfur in the center of its chain, is Unifined into two molecules of ethane (C_2H_6) and one molecule of hydrogen sulfide (H_2S).

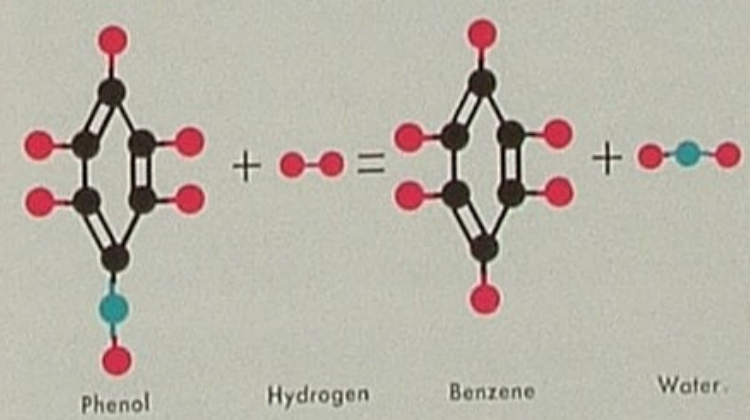
These represent only a very slight percentage of the reactions Unifining causes to take place. There are literally thousands of impure or unstable hydrocarbons, ranging from light gases to heavy fuel oil, that respond to this remarkable process. Yet so precisely and selectively does the catalyst do its work of bond-breaking and saturating that there is no loss of commodity

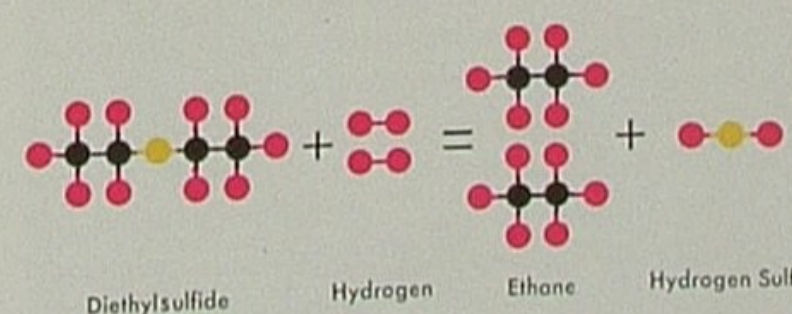
similarly:

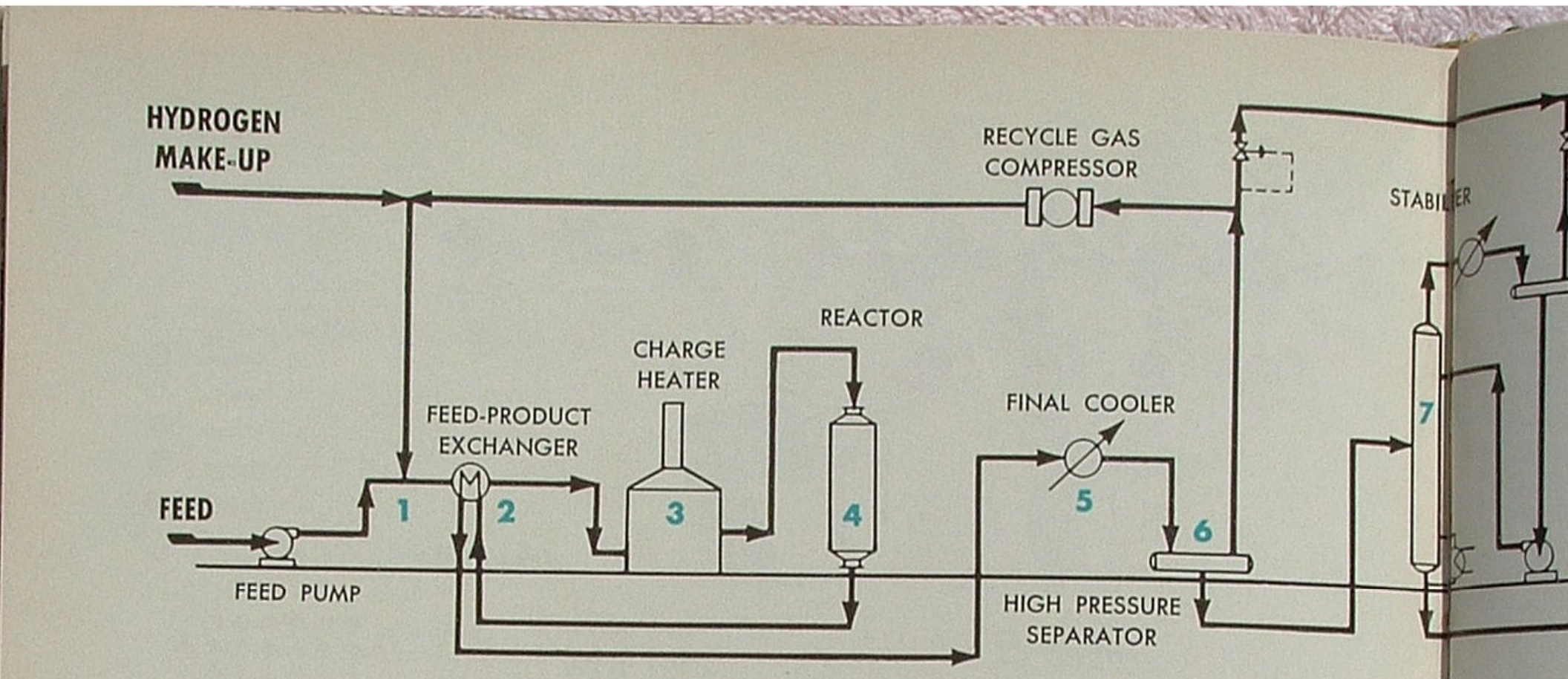












during Unifining and actually an increase in volume. A thousand barrels of high-sulfur gas oil, for example, can be Unifined to produce as much as one thousand and twenty barrels of *sweet* gas oil, ideally suitable for many customer requirements or for subsequent catalytic cracking into high-octane, low-sulfur gasoline.

HOW UNIFINING WORKS

One of the important advantages of Unifining is its simplicity, hence low cost. The facilities required are neither massive nor complicated and can be erected for a fraction of the amount oil companies have invested in other types of catalytic processing units. Because energy generated by the chemical reactions is salvaged through a heat exchanger to provide most of the balancing heat requirements, fuel costs are very low. Due to the exceptional durability of the catalyst, including its ability to maintain full activity after many regenerations (coke burn-off periods), the cost of the catalytic agent is only one or two pennies per barrel of oil processed.

The simplified flow diagram presented herewith offers a good conception of how one of the units might function, the feed stock in this example being a high-sulfur coker distillate.

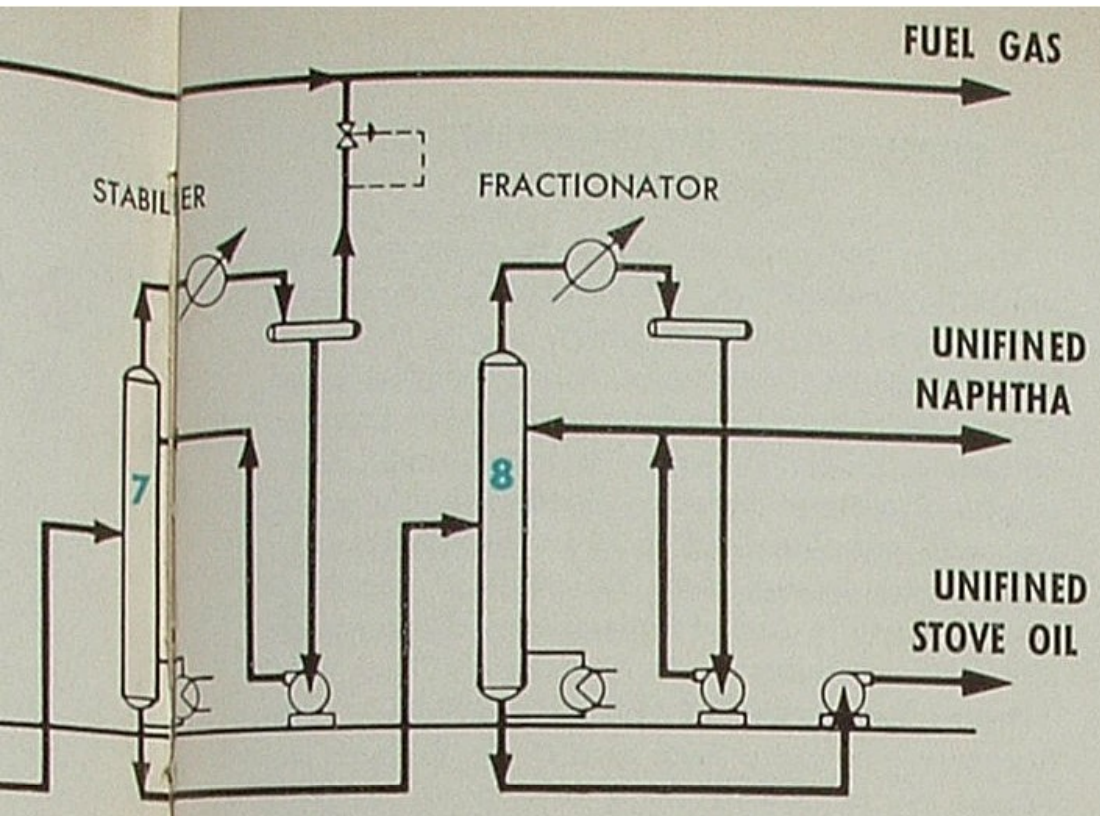
Sufficient hydrogen is mixed with the feed at (1), after which both are heated to a temperature of not greater than 800 degrees F. in the *heat exchanger* (2) and *charge heater* (3). Normally enough heat is generated through chemical reaction and transmitted from outgoing product to incoming feed through the *exchanger* that only a small heater is needed. In the *reactor* (4), where the feed passes downward through a fixed bed of catalyst, the entire reaction takes place. Petroleum molecules are deftly broken, where sulfur is attached, and hydrogen fills the vacancies. All reaction products return to the *exchanger* (2) to impart their heat to incoming feed, then proceed to a *cooler* (5) and to a high pressure *separator* (6), where the hydrogen-rich gas is removed for use as a recycle gas or, if in excess of recycle requirements, as a fuel gas. Liquid from the high-pressure separator flows to a *stabilizer* (7) for the removal of dissolved light gases, some of which return to the stabilizer as a reflux. Finally, entering a *fractionator* (8), the oil is distilled into two fractions, Unifined naphtha and Unifined stove oil.

WHO DEVELOPED UNIFINING?

Like most other scientific accomplishments of today, Unifining is a tribute to the ideas and ingenuity and plain hard work contributed by many people. In fact, so many Union Oil people have aided in the achievement that ON TOUR cannot acknowledge all. Here and in the accompanying pictures we present many who have participated.

Some of the earliest research work leading to Unifining was done by Dr. W. E. Bradley, now Manager of Research Division, and our present Assistant Patent Counsel M. W. Lee, and Dr. A. B. Byrns, now Director of Research for Permanente Metals Company.

Their studies were continued and expanded by Dr. H. C. Huffman, now Supervisor of Refining Research, and his Catalytic Refining Research Group led by G. W. Hendricks. This group has contributed a major share of the research findings underlying Unifining. These include the fundamentals of the chemical reactions involved, the development of an ideal catalyst, and potential uses of the process. The group has also completed a large amount of semipilot experimental work to furnish data for use in design of commercial Unifining units.



Process Development, headed by Dr. Clyde Berg, utilized the information made available from Refining Research to advantage. The Experimental Development Group, led by F. C. Wood, and the Development Processing Group, under R. P. Vaell, designed, built and operated pilot-scale Unifining units in order to obtain additional processing data and aid in evaluating the commercial possibilities of the process. Through its studies, Process Development contributed to the basic understanding of Unifining reactions and devised correlations useful in commercial design.

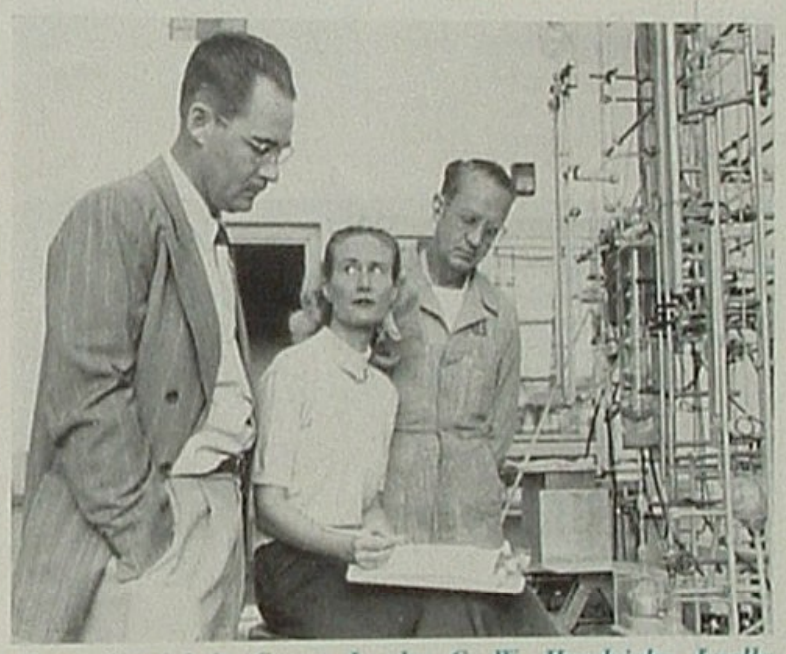
Using the information from both Refining Research and Process Development, the Process Engineering Group, headed by Chief Process Engineer A. E. Kelley and assisted by Supervising Process Engineer H. F. Poll, translated the embryonic process into designs for refinery-size Unifining plants. In doing this, Process Engineering, in addition to resolving numerous design problems, pointed out research areas requiring more detailed study and suggested several innovations which help to make Unifining more attractive to refiners.

During the development period, the Patent Division under Patent Counsel R. J. Garofalo, kept abreast of the industry patent situation and successfully prosecuted patent applications which assured for the company its patent rights.

Many other groups contributed to the development, including the inspectors and chemists who performed myriads of analyses to guide the research work and the craftsmen who built the experimental apparatus.

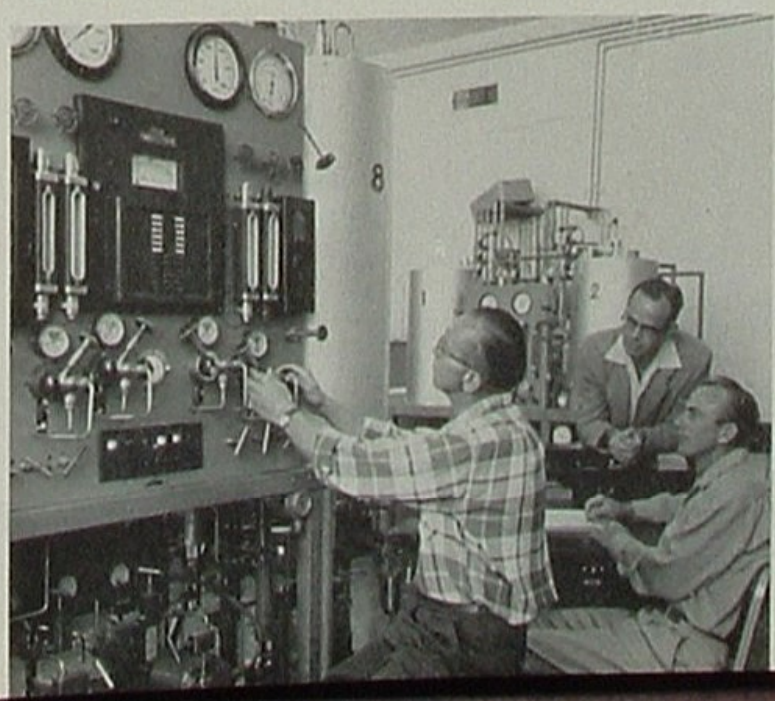
Without doubt, the development of the Unifining Process exemplifies the type of team effort and integrated thought required to solve successfully the complex problems which challenge our Research and Process Department.

The Process Development Group including, from left, R. L. Switzer, W. L. Barnet, J. G. Claypool, F. C. Wood, Dr. Clyde Berg, R. P. Vaell, Dr. R. C. Oliver, C. P. Reeg and N. D. Kock, carried Unifining through pilot plant phases.



Above from left, Group Leader G. W. Hendricks, Luella Rodabaugh and M. P. Harrington are conducting one of the myriad tests required to develop Unifining's catalyst.

Below, using bench-scale equipment, A. H. Lange, Dr. E. C. Attane and T. V. Inwood perform some of the research refining operations preceding construction of large units.



Directed by Chief Process Engineer A. E. Kelley, right, the Process Engineering Group, above, including H. F. Poll, Royes Salmon, Dr. Bernard Wendrow and R. F. Deering, translated pilot-scale units into large commercial plants.

The Patent Department including, above, Assistant Patent Counsel M. W. Lee and Patent Counsel R. J. Garofalo, steered the project clear of patent infringements and promptly secured for Union Oil Company its patent rights.

The Commercial Development Division, managed by Fred L. Hartley, left, promotes the use of Unifining by Union Oil as well as other refiners whom we license.

COMMERCIAL DEVELOPMENT OF UNIFINING

Machines and processes are of no value to people unless they are utilized. The commercial development of Unifining is progressing rapidly.

First, a supply of catalyst had to be available to Union Oil and the industry. The Harshaw Chemical Company of Cleveland, Ohio, is licensed to manufacture Union's cobalt-molybdate on alumina pelleted catalyst in accordance with procedures and specifications established by the Research group. Many thousands of pounds of catalyst, carefully checked for quality by this group, are already in continuous use in operating Unifining units.

Second, applications of Unifining to Union's problems have been under study by both the Research and Process and the Manufacturing Departments for many years. By 1949 a definite program to upgrade Santa Maria crude had been formulated but was postponed because of the Korean war. As part of this program, now known as the MP-30 expansion, a 15,750 barrel per day Unifining unit is under construction at the Oleum refinery. This unit, illustrated by the model, will convert unstable naphtha containing 1.8 per cent sulfur into an almost sulfur free product suitable for use as feed to a new catalytic reforming unit and, in addition, will produce stove oil blending stock. The reformer will convert the purified naphtha into 95 octane gasoline or higher, producing as a by-product hydrogen for the Unifining unit.

On September 17, at the Cut Bank Refinery in Montana, a 450 barrel per day Unifining unit was put into operation to convert high mercaptan content mal-odorous feed stock into sweet stove oil having excellent color characteristics and practically no sulfur. The source of hydrogen for the unit is Cut Bank's new catalytic reforming unit, which transforms low octane naphtha into high octane gasoline, and releases by-product hydrogen.

Interdepartmental cooperation is evident in applying Unifining to the company's manufacturing operations. In addition to the Research and Process team, other groups are involved. Long range product demands are forecast by the Economics and Financial Research staff to determine Company planning objectives. Economic evaluation by Manufacturing Economics under Myrl Reaugh determines the profitability of a proposed Unifining operation required to meet objectives. The Manufacturing Engineering and Construction group under Robert H. Bungay supervises and coordinates engineering activities and administers contracts for the construction of the new Unifining unit. Many other departments and specialist groups make their contribution, including purchasing and auditing. Finally, the refining operating people apply their experience to run and maintain the new facili-

ties at peak efficiency. It then falls on our marketing organization to distribute and sell the new and improved products to complete the Unifining development as a sound business venture.

Third, Unifining can be used by other petroleum refiners. Therefore, Union—along with Universal Oil Products Company of Chicago, our associates in this endeavor—is licensing the process to the industry at a reasonable royalty rate. Union's Commercial Development Division, managed by Fred L. Hartley, is directly concerned with the application of Unifining to Union's operations and to the petroleum refining industry through license agreements.

MANY UNITS BEING BUILT

The first commercial Unifining unit was built for one of our licensees, the United Refining Company of Warren, Pennsylvania. This installation, starting on stream February 19 of this year, is processing 750 barrels per day of various fractions, including kerosene and other mid-barrel oils, to produce highly stable, essentially sulfur-free premium products.

A 3,000-barrel-per-day unit has been operating successfully at 3,700 barrels per day since August 17 for the Eastern States Petroleum Company, Inc. of Houston, Texas. This operation desulfurizes and upgrades thermal gas oils into stable, good color heating oils.

A 2,500-barrel-per-day Unifining unit has been licensed to an overseas company for the production of specialty products. The Aurora Gasoline Company of Detroit, Michigan, is currently constructing a unit for Unifining 7,700 barrels per day of high sulfur gas oil.

Many other units are under license and numerous inquiries are under development. The same Research and Process team, which developed the process, provides laboratory data for the construction of a Unifining unit to meet customer requirements and prepares the license contract.

The future of Unifining is indeed bright because results to date are outstanding. It enables the refiner to increase the per barrel yield of valuable light products such as gasoline and raises petroleum products to new heights of quality. Specifically, here are some of the results to be obtained by Unifining:

Production of stable, impurity-free motor gasolines and jet aircraft fuels.

Elimination of acid treatment, and the production of superior solvents, kerosenes, stove and diesel engine fuels.

Upgrading of low quality distillate stocks for subsequent high yield catalytic cracking.

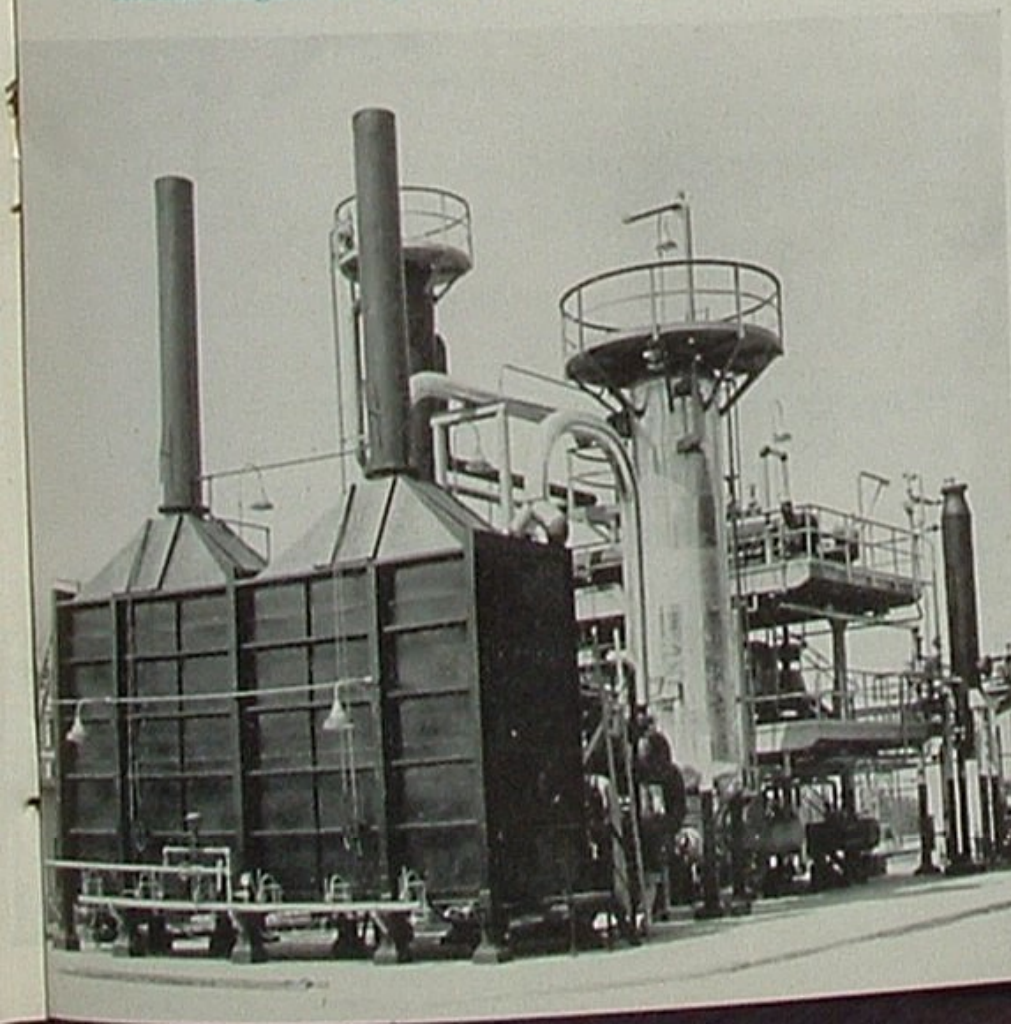
Purification of chemical fractions.

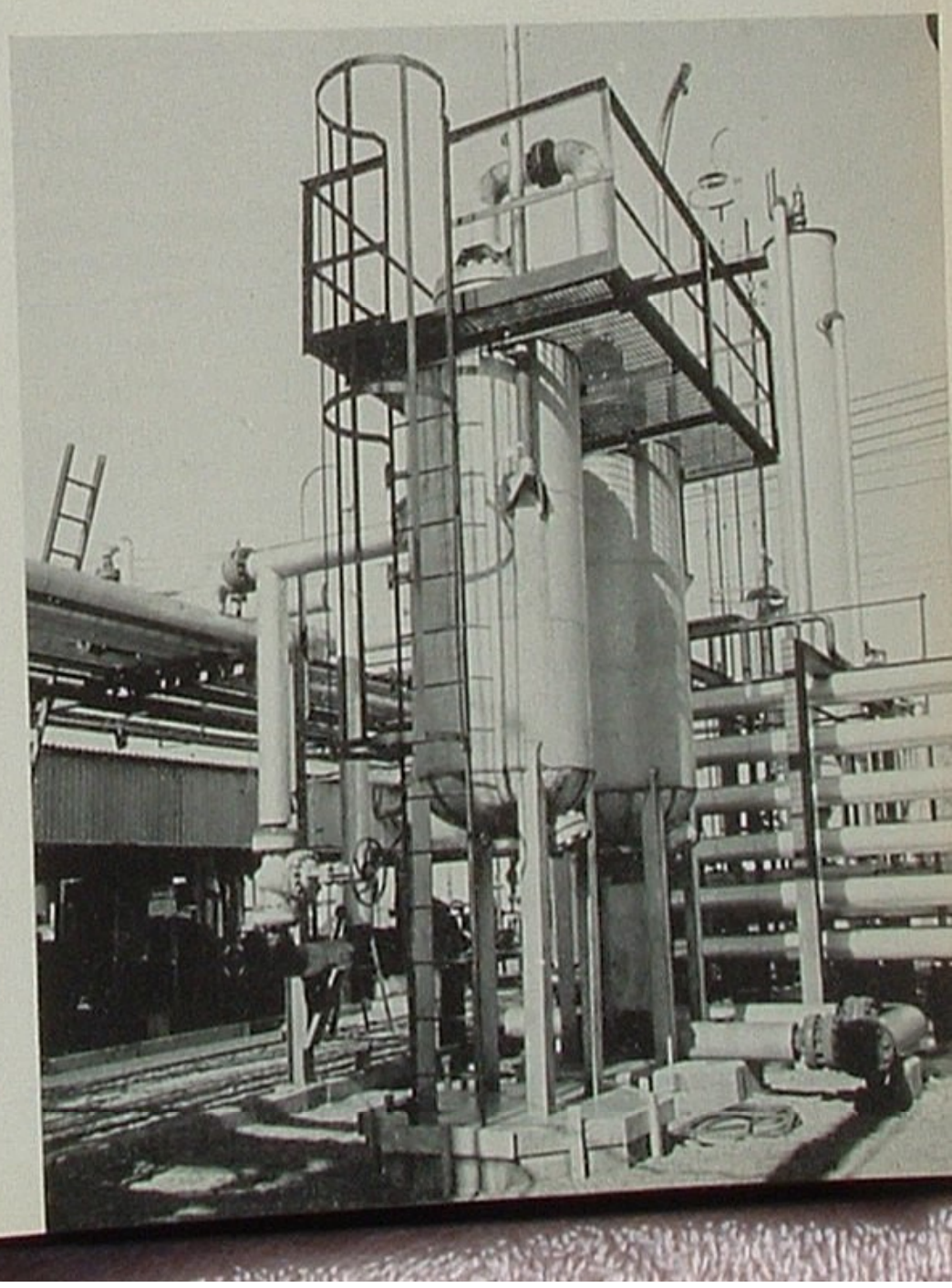
Reduction of sulfur compounds going into the atmosphere by elimination of sulfur from fuels which are consumed and exhausted to the air over a wide area.

Lastly, and looking into the future, the retorted shale oil producible from the Company's immense holdings of oil shale in Colorado could not be considered useable

Continued on Page 23

In addition to Unifining plants being constructed at our Cut Bank and Oleum refineries, many others are being built or planned. The first unit, at right, is in operation at Warren, Pennsylvania. The second, below, went on stream August 17 of this year at Houston, Texas.





INDUSTRIAL SUMMARY

• INDUSTRIAL RELATIONS

National industrial and governmental demands for technically trained personnel have for several years exceeded the supply of qualified technical graduates. Intensified recruitment has assisted in attracting to Union Oil employment the necessary high caliber engineering and scientific personnel needed by the various departments. Our 1954 recruitments have been as follows:

Geological	3
Field	10
Pipe Line	1
Manufacturing	14
Research and Process	9
Marketing	6
Other	5
Total	48

from W. C. Stevenson

• FIELD

The Company, in all of its operating divisions in the United States and Canada, produced crude oil in August of this year at a rate of 148,194 barrels per day. In the corresponding month a year ago, the rate was 150,545 barrels per day, or 2,351 barrels per day higher than current production.

This comparison appears rather startling when it is realized that in the year ended August 31, 1954 the Company completed 174 producing oil wells having in the aggregate an initial production rate of approximately 48,000 barrels of oil per day. Why, in the face of this, has our production declined?

The main reason is drastic curtailment of production in Texas and Louisiana, enforced by State regulatory bodies. This, in turn, has been caused in part by excessive crude oil imports, forcing domestic producers to reduce their production.

The Company has made several important discoveries in the Gulf Division during the past year, yet the division's production has declined to 15,600 barrels per day, a reduction of 2,700 barrels per day. Were it not for the additional reductions in allowables which have been ordered since August, 1953, this division would now be producing about 21,000 barrels per day. Much the same story is true of the West Texas Division in which 22 new wells have been completed by the Company for an aggregate initial production of 5,500 barrels per day. But, due to heavy curtailment, daily production has declined by 500 barrels.

In California, where conservation is on a voluntary basis, the Company has been able to increase its production of crude slightly. Company-operated production in this state is running around 124,000 barrels per day, up 1,000 barrels from a year ago. Thus, we have more than offset the natural decline (equal to about 1% a month). To do this, 124 new wells have been drilled with a total initial production rate of 38,000 barrels per day.

It must be remembered that well "initials" are often a misleading index. They usually represent maximum producible rates, whereas maximum efficient rates, which are lower and are based on engineering recommendations, are generally followed in oil field operations.

This picture illustrates the tremendous volume of expenditures and work necessary to offset the combined effects of state regulatory edicts and the normal production decline, if high rates of production are to be maintained.

from Sam Grinsfelder

• TRANSPORTATION & DISTRIBUTION

An improvement in the average gravity and fluidity of crude oil shipped from our producing properties in the Coalinga Nose and other oil fields in that vicinity has made possible the elimination of one more old landmark in our Northern Division Pipe Line system. Dudley Pump Station, constructed in 1909 for the heating and pumping of heavy

crude oil enroute from San Joaquin Valley to Port San Luis, has been abandoned and all facilities have been removed from the property.

To cope with the increasing traffic congestion on freeways, highways and city streets, we are continuing our program toward the development of larger and more powerful tank vehicles. By constructing equipment of maximum permissible capacity, we are reducing the number of vehicles required to accomplish our delivery job, thus making a contribution to reduced highway congestion.

from E. L. Hiatt

• MARKETING

The Pacific Oil Company in Taipei, Taiwan (Formosa) has been signed as our exclusive distributor for asphalt and wax in Taiwan.

Moving of the Company's credit card accounting office in San Francisco from Market Street to new quarters in the Central Territory office building was completed during September. The transfer had to be accomplished piecemeal and at times when the work load permitted in order not to interrupt the department's normal accounting functions. Demolition of the old hotel adjacent to our San Francisco office is also being completed. The removal, besides providing space for building and garage expansion, will greatly improve the appearance and visibility of our facilities atop Rincon Hill.

Effective October 5th, Union bunker fuel became available for sale to all classes of trade at Coos Bay, Oregon. We are the only company with such facilities at Coos Bay.

The Yellowstone Pipeline, bringing refined products from Montana into Spokane, Washington, was formally opened October 2. Union Oil Company holds a 14% interest in the line.

from Roy Linden

• PURCHASING

The "Steel Products Barometer," published by the National Association of Purchasing Agents, shows practically all normal fabricated steel items available in reasonable quantities "off the shelf." Steel items from mills are shown as available in basic manufacturing time.

This chart, on a national basis, is supported by experience on the West Coast. Stocks at steel warehouses are ample for normal operations. Tubular goods, which until recently were shipped by the mills on a quarterly basis, are now available for shipment during specified months within the quarter. The next step is expected to be the re-establishment of mill stocks of oil country tubular goods on the West Coast, which is now under consideration.

Coupled with this constantly improving availability, however, there have been many price increases. Tinplate, cans, stud bolts, lead, zinc, mercury, sucker rods, chlorine and hose are among the various items we are obliged to buy at higher prices.

from C. S. Perkins

• MANUFACTURING

The new Catalytic Reforming Unit at Cut Bank Refinery in Montana is now in operation. This additional manufacturing tool will process 600 barrels per day of low-knock-rating, straight-run gasolines to produce high-knock-rating gasoline stocks for blending 7600 and 76 gasolines. The unit operates at a temperautre of 975 degrees F. and a pressure of 700 pounds per square inch.

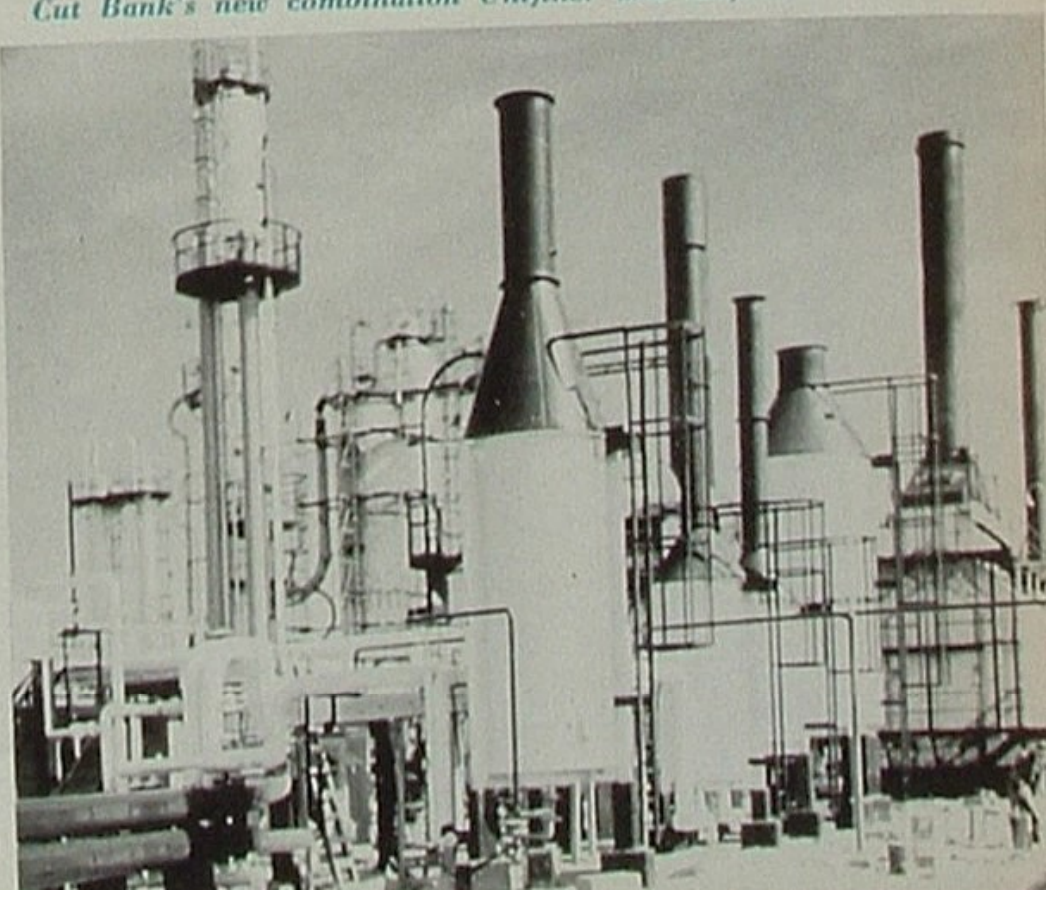
In addition, Cut Bank Refinery started operating the new Unifiner Unit. The Unifining process, as explained elsewhere in this issue of ON TOUR, is used to remove sulfur and other undesired compounds from petroleum products by use of a catalyst containing cobalt and molybdenum. The unit operates at a temperature of 625 degrees F. and a pressure of 510 pounds per square inch.

Activity is increasing at our new Santa Maria Refinery. The foundation work on the process units is completed, and the erection of steel work is in progress. There are about 500 contractor's employees now at Santa Maria Refinery.

Oleum Refinery has increased its capacity for manufacturing lubricating greases by installing two 15,000-pound capacity high-temperature grease kettles and a mixing device called a Stratco contactor. Lubricating grease manufacturing capacity is increased 50 per cent by the addition of this equipment.

from K. E. Kingman

Cut Bank's new combination Unifiner and Catformer.



OFFSHORE DRILLING

WILL IT HARM OR BENEFIT CALIFORNIA?

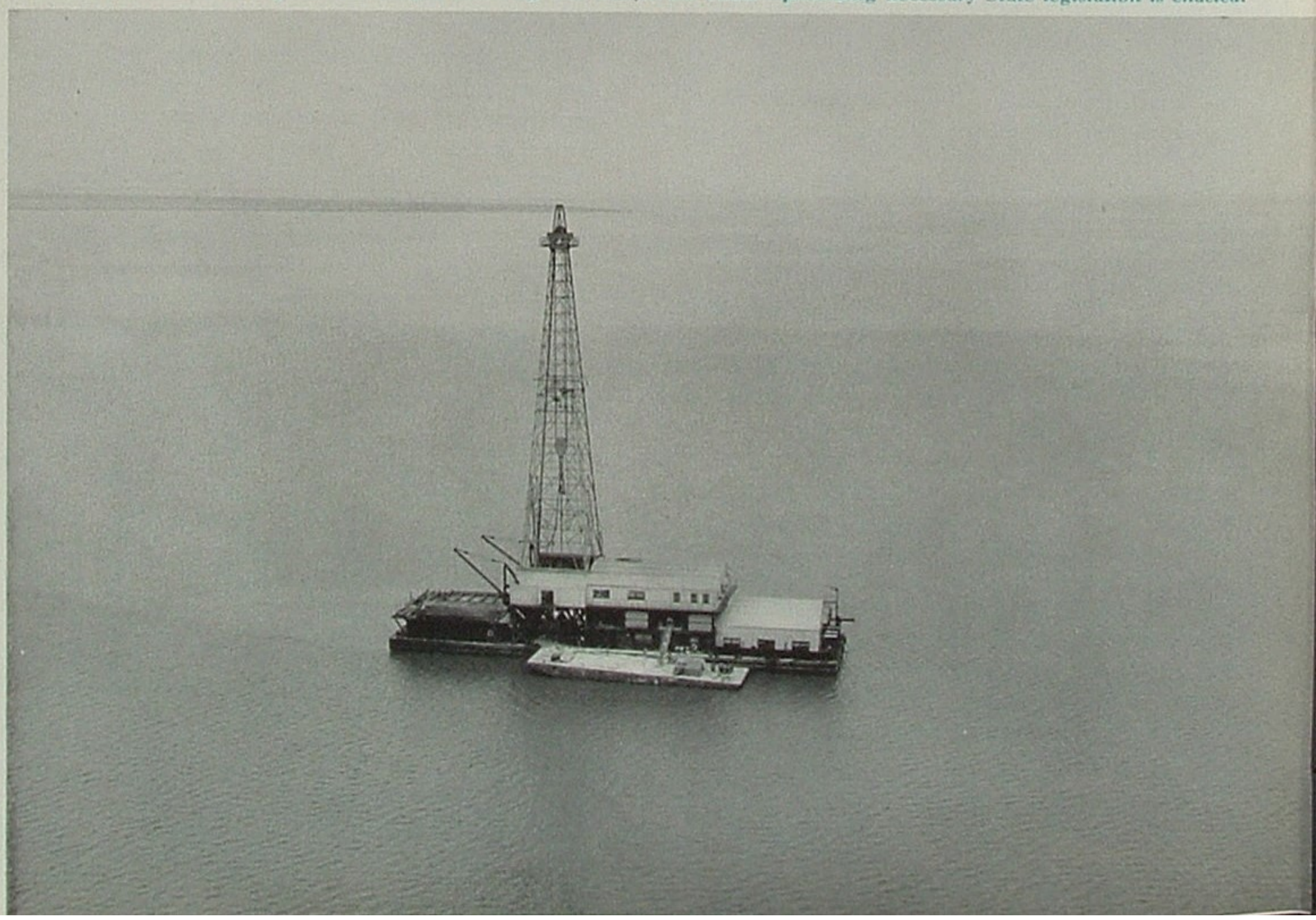
THERE is no longer any question as to the rightful ownership of a three-mile submerged land strip bordering the coastline of California. During 1953, the Congress of the United States confirmed California's claim to the marginal strip of ocean bottom, and in 1954 the Supreme Court of the United States issued a sustaining decision.

However, the substantiation of California's claim has not opened this submerged land to oil exploration—although potential oil deposits certainly were a major consideration in the Federal-State contest for ownership. Under present State law, the State Lands Commission has only very limited authority to issue oil and gas leases embracing submerged lands. Until further legislation is passed, this potential source of vitally needed oil and gas cannot be touched by the petroleum industry.

Since undiscovered oil is an asset to no one, it is important to every citizen of California that the 1955 session of the State Legislature enact appropriate legislation to permit the leasing of these lands to responsible individuals and firms for exploration and development.

There is no foregone conclusion that the State Legislature will start such action and conclude it favorably—unless public interest is aroused. The petroleum industry therefore is calling upon all oil workers for stimulative help. We need not be propagandists of the special-interest variety. But, armed with a few facts about the oil situation in California, we can be a helpful influence with friends, neighbors and legislators in getting this important legislation started.

Offshore drilling methods somewhat advanced over those, below, being employed in shallow waters bordering the Gulf of Mexico will be used to explore submerged lands off the California Coast—providing necessary State legislation is enacted.



In a booklet recently prepared by the Western Oil & Gas Association, spokesmen for the western oil industry, offshore drilling problems were discussed in detail. The following highlights from that report are offered to provide Union Oil people with a factual understanding of the problem's importance to California and the nation:

Does California Need More Oil?

Yes. The need is urgent. California, second largest oil producing state in the union, now needs, for domestic use and traditional markets, more oil than it produces. In fact, the state is now importing oil. Crude petroleum provides more than 90% of the energy needed by California. Unless additional sources of oil are discovered, the State will become increasingly dependent on imports, hence increasingly vulnerable to oil shortages in case of war.

What Causes The Oil Shortage In California?

Although California's crude oil reserves and production have continued to increase year to year, they have been unable to keep pace with the Pacific Coast's unprecedented growth of population and the greatly expanding oil demands of agriculture and industry. California's population has increased from 8 million to over 11½ million during the past 10 years, and will rise to an estimated 15½ million by 1964. During the same period, the State's motor vehicle registrations have jumped from 2,842,000 to 5,550,000, with 8,170,000 registrations being forecast for 1964.

Are Submerged Lands The Only Remaining Potential Sources Of Oil?

No. Besides from foreign sources, California can expect to receive oil from many new zones and fields within the State. But recent experience is demonstrating a scarcity of good fields and an increase in the cost of finding them. One of our greatest exploration hopes lies along the three-mile-wide strip of submerged land.

Will The Submerged Lands Yield Oil?

No one knows. Nor will it be possible to tell until exploratory wells have been drilled. However, the oil industry is willing to take that gamble just as is being done on submerged prospects elsewhere. Most probably offshore drilling in California will be much more costly than it is in the Gulf of Mexico areas, due to the deeper and rougher water here. But engineers believe they can drill the wells if given an opportunity.

Will Ocean Drilling Be Harmful?

No. Representatives of the State Fish and Game Commission have already testified that even seismic blasting along the three-mile strip can be done carefully enough not to endanger marine life. Kelp beds are not destroyed or damaged. The modern drilling methods being considered would neither contaminate ocean waters nor offend the seascape. Through *whipstocking* or directional drilling, a number of wells could be drilled from a single offshore platform. Portable equipment now used to drill and service wells is dismantled swiftly for transfer to other locations, so there would be no forest of derricks to spoil the view.

Who Would Benefit From Offshore Oil?

Practically everybody.

Consumers who long have depended upon California as a source of supply would continue to receive an ample supply of petroleum products at reasonable prices and low transportation costs—both during peace and war.

From a relatively small acreage of tide and submerged lands, the State has sofar received $89 million in oil and gas royalties. These public revenues are expected to decline from an annual income of over $10 million at present to about $350,000 within 20 years—unless more of these State-owned lands are opened to oil exploration. Obviously, such a decline would necessitate increased revenues from other sources—especially taxes. On the other hand, new oil discoveries offshore would bring to the State probably hundreds of millions of dollars in royalties.

Under existing California law, 70% of the State's oil royalties goes to the State Beaches and Parks Commission and 30% to the General Fund. The first $150,000 of this income is transferred yearly to the Veterans and Dependents Education Fund. Much of the remainder is earmarked for the improvement and beautification of the State's recereational parks and beaches. Thus, in effect, offshore drilling should enhance California's attractiveness.

To the oil industry and its hundreds of thousands of skilled people, offshore drilling should mean continued growth and improvement of facilities, freedom from great dependency on foreign sources of crude supply, and the continuing need for our services in one of California's foremost industries.

Union Oilers

HIS BIG MOMENT David, son of Union Oiler Norris Christopherson, Los Angeles Marketing, is a victim of hemophilia, a blood condition that can easily result in severe hemorrhaging. Even to have a tooth pulled required his hospitalization recently and made him the subject of a Los Angeles newspaper story. The story also mentioned David's enthusiastic interest in sports and quoted him as being a rooter for the Hollywood Stars. Well, the Stars really are great guys. Represented above by, from left, Frank Kelleher, Jack Phillips and Tom Saffell, the club presented him with an autographed ball. And now David's entire family, left, are unwavering Star fans.

from Elaine Lawson

PORTLAND'S BEST "B" League softball team of 1954 are our Union Oilers from Willbridge Terminal. Below, Manager Dave Phillips receives the championship trophy from President Earl Stevens of the Portland Softball Association. The team members are (standing) Gene Pederson, Marv Nemec, Marv Johnson, Oscar Hubbard, Gus Cloepfil, Ernie Wilson, (seated) Doug MacFarland, Dave Phillips, Billy Blackstone, Pete Suguro and Bill Chetwood. Outclassing their "D" League competition earlier in the season, these boys moved up to the "Bees," won the league championship and four playoff games.

from Gudrun Larsen

REVERENT SCOUT Jerry, son of Daryl Jeffery, Los Angeles Refinery, believes in keeping busy even at church. He sang in the junior choir, played trumpet in the youth orchestra, prepared maps locating colleges and seminaries of the Lutheran Church, daily studied the Bible and church history, wrote a 500-word essay on the life of Martin Luther, and volunteered for duty every Saturday morning for any church job that needed doing. At right he receives the Pro Deo et Patria Boy Scout award from Rev. Orval A. Awerkamp who regards him as an outstanding boy.

from Jim McDonald

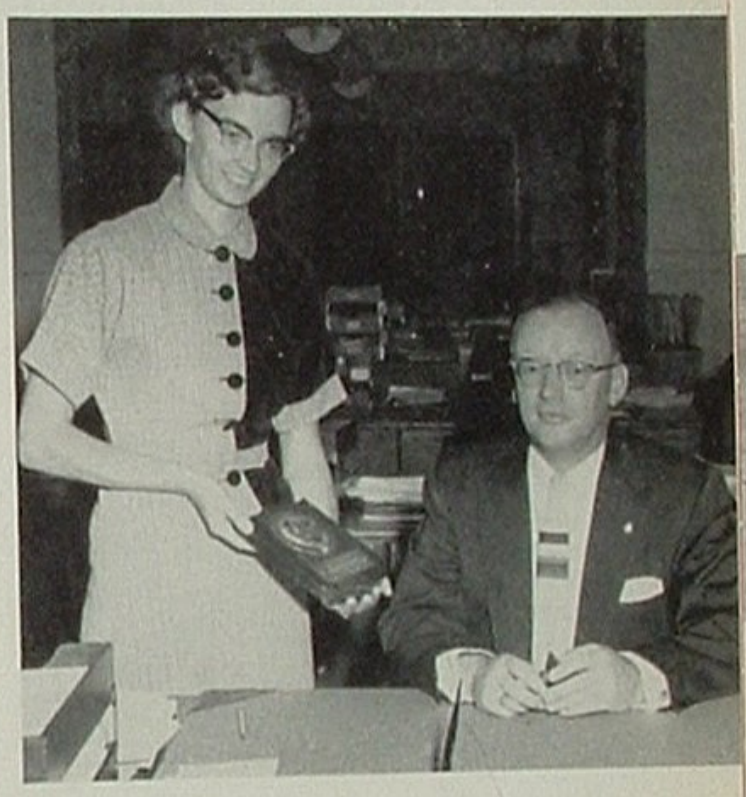
THE KID SISTER of Wayne Jessen, Northwest Territory Tax Department, is Ruthie Jessen, 17-year-old high school girl with ambitions to become a golf pro. Wayne, quite a golfer himself before other interests intervened, takes his hat off to Ruthie. During the past few months she won top honors in six major Washington tournaments; is Washington State champion, Pacific Northwest Amateur champion, and was medalist in the National Junior Amateur. At left Wayne appraises some of her trophies.

from Gudrun Larsen

DEAN MORSMAN, maintenance man at our Willbridge Terminal, handles volunteer fire-fighting for Multnomah County as a sideline. During the past seven years of his 20 in Company service, he has responded to fire and accidents alarms at all hours of the night. A fine public service!

C. A. JEFFERY, leaseman for retail properties in Southwest Territory, and his daughter Geraldine admire a United Airlines plaque he recently received for having completed 100,000 miles of airline travel—most of it done on Christian Endeavor weekend hops.

from Jack McFarland



OLEUM HOSTS RODEO More than 90 Rodeo community leaders, including the Chamber of Commerce and some 50 teachers in the district, were invited to use Oleum Refinery's cafeteria, September 22, for the monthly C. of C. meeting. A business meeting, buffet dinner and documentary movie presentation were combined to make the occasion a most interesting one. Occupying front row movie seats are, from left, Union Oiler Dave Zenk, Trustee Harry Weaverling and President John DePaoli of the Chamber, Union Oiler Vernon Frederickson, District Superintendent of Schools Emil J. Spiering, and Secretary Arthur Dern of the Chamber.

from Clyde Morton

EXOTIC DANCERS were featured at a recent monthly meeting of the Central Territory Girls' Club in San Francisco. Union Oil girls who delighted their working associates with unusual dance routines were, from left, Helen Chamousis and Stella Kapanis who performed the Greek Synto dance; Nadine Branco who did amusing pantomines to recordings; and Esther Vasquez, exponent of the Spanish Chapanecos dance.

from Ethel Cline

SONGSTRESS Dana Henry, who uses each day to productive advantage in Northwest Territory's Sales Services Department, often becomes a nightingale come quittin' time. She is a member of the Seattle Star Singers and has sung in many productions. One of her most recent singing roles was that of the princess in "The Student Prince," presented in August by Greater Seattle in the Aqua Theater.

from Gudrun Larsen

APPRECIATED "Ask Lucille" is the usual reply at Willbridge Terminal when up-to-the-minute information is needed. Lucille Haner seems to take an unselfish interest in everybody and everything of a Union Oil nature at Portland. As a result, her desk has become a sort of communications exchange. Portland votes her every desire of her life except an early retirement.

from Gudrun Larsen

ON TOUR

Retirements

A grateful Company and host of well-wishing employees are bidding farewell to the following Union Oilers who have concluded long careers of Company service and are retiring:

WILLIAM M. SHELTON
Treasurer Department
Employed 11/17/15—Retired 10/1/54

FRED F. FRAMPTON
Pipeline Department
Employed 4/10/16—Retired 10/1/54

FRANK G. STROSCHEIM
Field Department
Employed 4/10/16—Retired 10/1/54

HARRY D. PRICE
Northwest Territory
Employed 10/16/29—Retired 10/1/54

BERT BUSI
Pipeline Department
Employed 3/26/30—Retired 10/1/54

FLORENCE M. BARTH
Central Territory
Employed 9/24/34—Retired 10/1/54

LOUISE HILBERT
Southwest Territory
Empolyed 5/1/39—Retired 10/1/54

SERVICE BIRTHDAY AWARDS

OCTOBER 1954

MANUFACTURING

Kaveney, Emmet P., Wilmington 35
Zanussi, Edward J., Oleum 35
Coleman, Russell P., Wilmington 25
Doty, Leo W., Oleum 25
Kenny, Louis, Oleum 25
Mendes, Manuel C., Oleum 25
Nicholson, Howard C., Oleum 25
Bradley, Charles D., Home Office 20
Pearce, Lawrence R., Oleum 15
Vigre, Elmer T., Oleum 15
Bond, Grady B., Wilmington 10
Hilton, Willis H., Oleum 10
Lundeen, Glenn A., Wilmington 10
Pearce, Fred G., Wilmington 10
Underwood, Ivan G., Wilmington 10
Wagle, Harley D., Wilmington 10

EXPLORATION & PRODUCTION

Austin, Clifford R., Ventura 35
Whitton, Dewey G., Bakersfield 30
Knowles, Fred B., Dominguez 25
Hicks, Florence A., Home Office 20
Kaufman, Keith V., Orcutt 20
Bevill, Leldon L., Texas 10
Carson, Kelley C., Louisiana 10
Drummond, Hanford, Canada 10
Johnson, Myrle S., Louisiana 10
Johnson, William H., Whittier 10
Minch, Bernard A., Bakersfield 10

MARKETING

Colville, David, Bakersfield 25
Hargrove, L. Oliver, Los Angeles 25
Lathrop, Albert L., Rosecrans 25
Price, Harry D., Seattle 25
Ritzer, Harry J., Los Angeles 25
Kearney, Edward P., San Francisco 20
Maruya, Raymond K., Honolulu 15
Roussel, Mabel L., Los Angeles 15
Wilson, Francis Joe, Bakersfield 15
Olson, Leonard N., Los Angeles 10
Palmer, Dawn, Los Angeles 10
Vidal, Eloy, Central America 10
Wenkel, Charles J., Rosecrans 10
Clark, Roger M., Medford 10

PIPELINE

Shea, Mike D., San Luis Obispo 25
Hill, Harry B., Santa Fe Springs 20

COMPTROLLERS

Wachtel, Leland D., Home Office 25
Warner, Velma A., Home Office 10
White, Richard M., Home Office 10

RESEARCH & PROCESS

Wright, Wm. A. S., Brea 25
Hamilton, Barbara J., Brea 10

INDUSTRIAL RELATIONS

Brown, John G., Home Office 20

AUTOMOTIVE

Drum, Frank L., Santa Fe Springs 10

In Memoriam

On August 30, 1954
THOMAS E. DOSS
Superintendent of Building
Retired 5/31/42

On September 4, 1954
RODERICK F. ABEL
Los Angeles Refinery

On September 7, 1954
CATHERINE H. DIMOND
Southwest Territory
Retired 6/1/52

On September 8, 1954
PARKER D. VAN NEMAN
Northern Division Pipe Line

On September 8, 1954
CLARENCE E. RANSOM
Southwest Territory
Retired 4/1/49

On September 19, 1954
LOTTIE VEEN
Central Territory

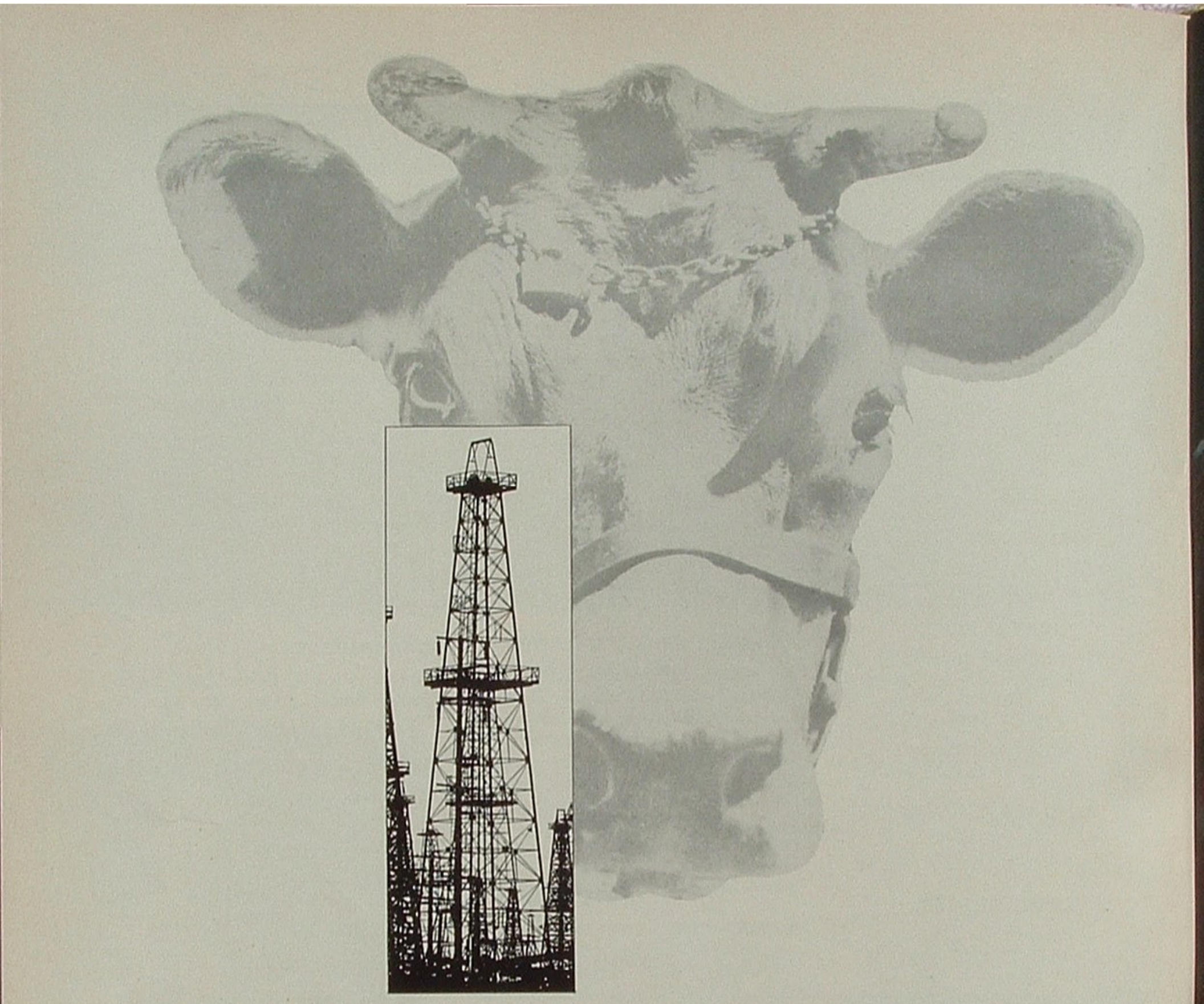
On September 9, 1954
JOHN M. GEARY
Marketing Department
Retired 7/1/37

UNIFINING

Continued from Page 15

in engine fuels until a new process was available to reduce the shale oil's sulfur and nitrogen content. Laboratory tests show conclusively that Unifining can do this job successfully.

Unifining is a tribute to teamwork, perseverance, hard work and financial risk. It brings credit to the people concerned, to the Company, and to the free-competitive environment in which we live.



How is an oil well like a cow?

In many ways the similarity between an oil well and a cow has a lot to do with the future security of your children.

Both well and cow give us vital products—petroleum and milk. But unless we withdraw those products at an efficient rate we can ruin our source of supply.

For it's as economically unsound to take a year's supply of oil from a well in a month, as it would be to try to obtain a year's production of milk from a cow in a day!

It's equally bad economically to *underproduce* a well or a cow. Yet, today, the American petroleum industry is underproducing—to accommodate the oil coming into this country from far-off places.

Obviously, if our own industry is to maintain its capacity to produce it has to be able to sell its products. Whatever interferes with this jeopardizes its ability to continue to satisfy America's need for oil.

Nor does it have the financial resources to drill wells and then shut them in until needed. You have to *do* business to *stay* in business.

What's worse, oil from distant shores creates a dangerous dependency. In a national emergency it could disappear overnight. And we can't slow our production down too much and expect it to be adequate when we want it.

In our opinion, there is only one safe way to keep this nation's rate of petroleum production up to any challenge it may have to meet. That's to encourage our domestic oil industry to constantly find and develop new fields in the Western hemisphere, *where we can get at them if we need them.*

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Your comments are invited. Write: The President, Union Oil Company, Union Oil Building, Los Angeles 17, California