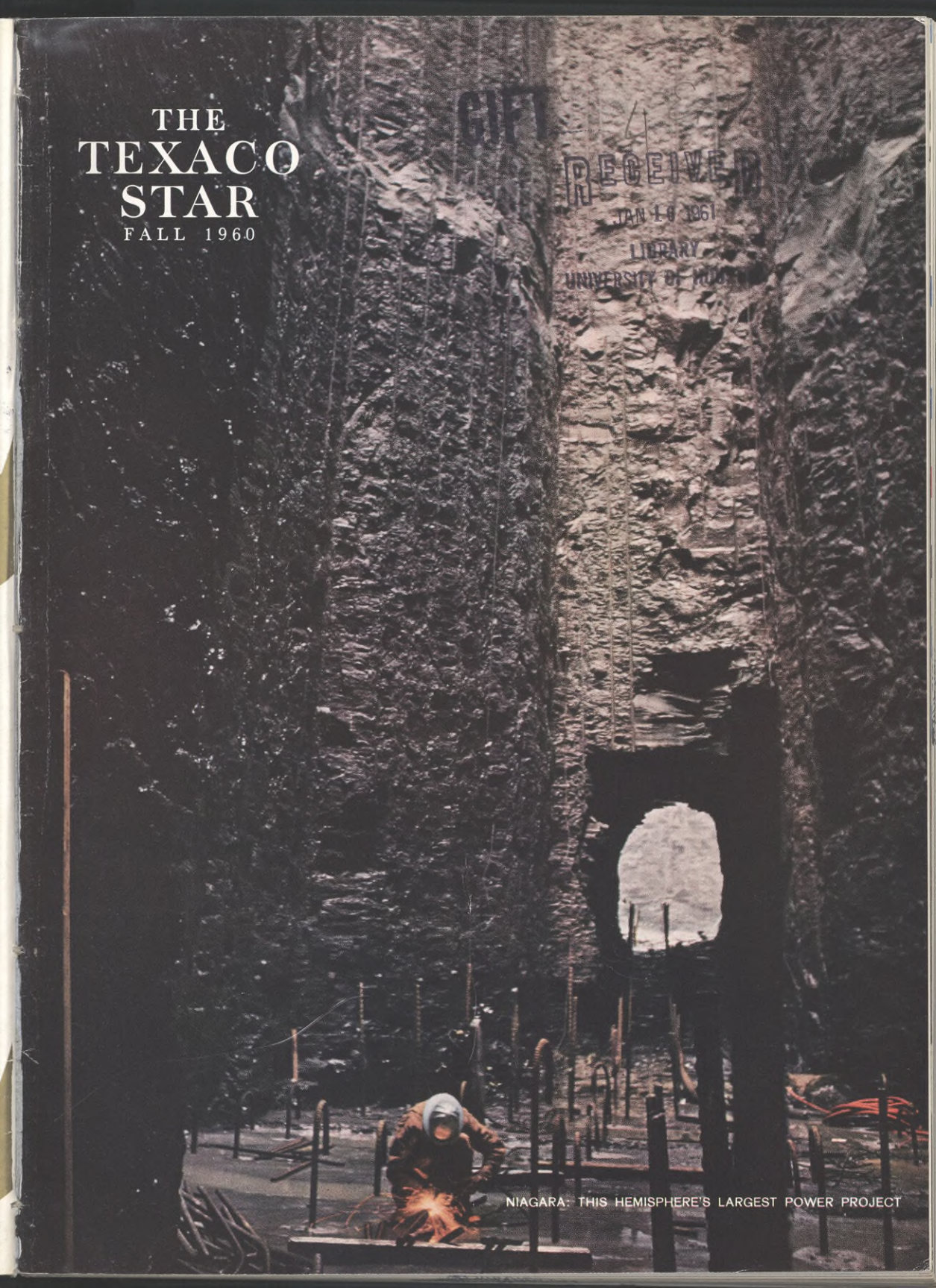
THE TEXACO STAR

FALL 1960



NIAGARA: THIS HEMISPHERE'S LARGEST POWER PROJECT

MOUNTAIN ON THE MOVE

About 42 million cubic yards of earth and rock were moved to make room for the $720 million Niagara River Power Project, under construction at the site of the famous falls. Scheduled for completion in 1963, the project will supply critically needed hydroelectric power for the Niagara area and nearby communities in upper New York State.

Texaco services the equipment and supplies the fuels and lubricants used on four of the project's six major construction jobs—about 80 per cent of the program's total fuel and lubricant requirements.

From the beginning, Texaco field representatives have been consulting with contractors and keeping an eye out for any emergencies. In this photograph a Company representative inspects the Texaco-lubricated bearings on one section of the two-mile conveyor belt system that moves small fragments from the huge rock crushers to a stone stockpile pyramiding near the concrete-mixing plants. Most of the rock hauled out of the excavations will go back in a concrete mix to help build the project's generating plants and water conduits.

The story of the vast Niagara Project (it's the biggest single digging job ever attempted in the United States) and Texaco's part in it begins on Page 9 of this issue.

THE TEXACO STAR

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THE TEXACO STAR
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Where do we grow from here?

After more than 100 years, any business can be assumed to be fully grown, and many settle into a comfortable complacency long before that. But the 101-year-old oil business continues to grow as though it were still in its teens.

Texaco, for example, is almost 60 (the Company was founded in 1902); yet it keeps making strides with a youthfulness that might easily tire a lot of younger organizations.

In the last decade, its production of crude oil has increased from slightly more than 200 million barrels in 1950 to more than 445 million barrels last year. Refinery crude oil runs have grown from 197 million barrels in 1950 to nearly 445 million last year. Sales of its products more than doubled during the same period—and last year totaled more than 480 million barrels. Since World War II, the Company's operations have expanded tremendously; and today Texaco is active in more than 100 nations on every continent.

The Company, and the industry, today perform a more vital function in our economy than at any time in history, and this is reflected in the vast and growing consumption of petroleum products throughout the free world. Free world demand now stands at 18.8 million barrels a day, or almost four times the level of 1938. In the last five years this demand has risen by 4.4 million barrels a day, and in the next five it is expected to increase another 5.6 million barrels a day. By then, the petroleum requirements of the free foreign world will exceed those of the United States—which this year is expected to run at about 9.7 million barrels daily. As demand grows, Texaco seems certain to continue its progress.

That progress has not come easily, any more than the rest of the industry's has. Texaco has gone through both shortage and oversupply of crude oil, has weathered periods of price softness—and, during the depression of the 1930's, operated at a loss for three years (even so, it continued to pay regular dividends, and today shows a record of unfailing dividend payments since the very first dividend was declared in 1903—in addition to frequent extra dividends).

The fact that Texaco *is* so widespread and that it does business with so many peoples and governments has created problems along with progress. What affects the people of one country will ultimately, to some degree, affect all other people in all other countries. When revolution sweeps Cuba or fighting breaks out in the Congo, it affects the Company's operations domestically, just as Federal regulations on United States oil imports bear on the lives of men and women living in Venezuela and Saudi Arabia. Over the years Texaco has weathered many storms, both in the United States and abroad: it has gone through two world wars, Korea, the Suez crisis (and the subsequent oil lift to Europe); it has been harassed by the Justice Department and investigated by Congress. Yet it has come out of every one of these difficulties healthily, with a record brighter than before.

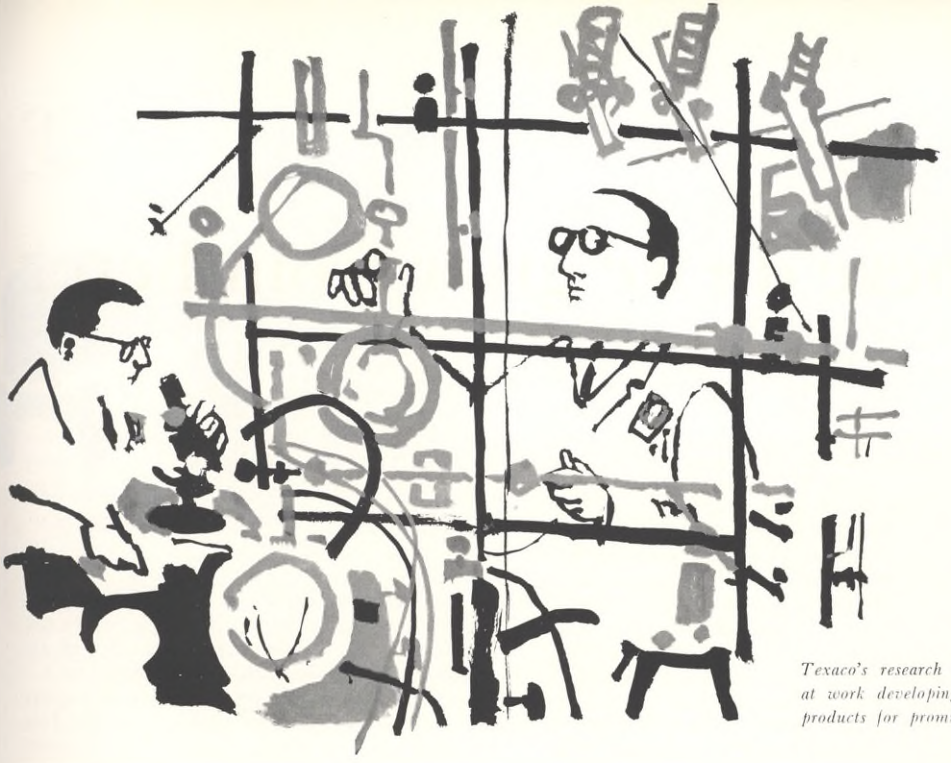
With the world in a turmoil, it is not surprising that the international petroleum industry is experiencing its own strains and dislocations. It must deal not only with the problems of communism and nationalism, but with its own internal problems as well. Right now the most serious of these is an abundance of crude supplies, resulting in high inventories, depressed prices, and low returns on investment. But even with these current problems, the industry's prospects are as bright as its record. Contemporary difficulties do not seem likely to stand in the way, for very long, of a growth that promises to continue at a lively rate.

One reason short-term problems do not permanently affect growth is that oil is a basic necessity. It is an energy source, and energy is needed wherever progress is sought.

Another basic reason for oil's continuing growth lies in the inherent versatility of petroleum. New markets are constantly being explored. In the past 20 years, for instance, the industry has developed an important market in heavy transportation by proving that the diesel railroad locomotive is more efficient and economical than the old coal-burner, and by showing that heavy fuel oil is superior to coal for use in power plants and other industrial installations. Another major breakthrough has been in the development of liquefied petroleum gas (LPG) in areas where homes are not close to gas transmission lines.

Since World War II petroleum has become tremendously important as the root material for an ever-growing list of products born in the present age of petrochemistry.

Texaco is aware that it is important not only to create new uses for petroleum, but to expand present uses. In that connection, it has been keeping a close watch on the current trend toward the compact automobiles which have become so popular in the last couple of years. One obvious reason for their growing popularity is that they use less gasoline, which has become taxed more and more. Although Texaco is seriously concerned about current gasoline taxation (see "Hidden Diversion" beginning on Page 14) it is not entirely pessimistic about the small car's influence, because it has found many people now feel they can afford two cars—often a compact and a standard model—with the result that they are driving more miles than ever. The American Petroleum Institute, of which Texaco is a member, recently formed a committee to promote more pleasure driving, which could



Texaco's research teams are constantly at work developing new and improved products for promising marketing areas.

very effectively bring about a renewed desire on the part of the public to get out on the road and explore the country.

In the years ahead, gasoline will continue to be the single most important fuel in transportation. One hears a great deal about nuclear, solar, and other non-conventional forms of energy, but these will have little effect on the use of petroleum for at least 20 years. Nuclear energy will remain a negligible factor at least until the 1970's, and probably longer. Even if nuclear technology were further advanced, the abundance of low-cost petroleum would continue to make nuclear power expensive. Solar energy appears to be in the same category. So the industry continues to seek out new markets and expanded uses in the transportation field —from compact cars to cargo airplanes.

Developing new markets for petroleum is one of the jobs of Texaco's research teams, working with the Company's marketing force; and some of the potentialities they envision for future uses of petroleum are intriguing. Particularly in the fields of metals, agriculture, and construction, there seems to be plenty of room to grow. Here are a few examples:

- In metals, there is the growing use of oil for the preparation of metallurgical coke. Currently about half a ton of petroleum coke is consumed in the form of electrodes for each ton of aluminum produced. The aluminum industry has predicted that the demand for the product should rise so much, by 1980, that the use of petroleum electrodes will increase from last year's million tons to five million.
- Oil as a replacement for coal coke in blast furnace operations is another very real possibility. The steel industry's consumption of coal is roughly equivalent to the energy that would come out of 1.3 million barrels of oil each day, and considering the ease of handling petroleum compared with the relatively cumbersome handling of coal, there is a good chance that oil could become the principal coking material in the steel industry.
- The construction industry today is a $42 billion market, and 150 million of those dollars are spent on plastics which go into $500 million worth of construction products. Petroleum-derived plastics as a substitute for wood and metals could very well create a big new market for oil. As a matter of fact, a four-fold increase in the use of plastics in construction has been predicted by 1965.
- Building blocks made from local soil, stabilized with asphalt and using fire- and fungus-resistant additives, are a possibility not only for domestic markets but more notably for use overseas in underprivileged countries where means of helping people raise their living standards is bound to result in enlarged outlets for petroleum products.
- Another important possibility in the construction field lies in the increased use of asphalt for road building. Already a major market, this could become enormous in the '60's, with local, state, and national highway programs amounting to billions of dollars planned.

Agriculture is this country's largest single business, and possible new uses for petroleum by farms include such things as:

- The application of a thin asphalt coating as a mulch to control plant growth or to prevent soil erosion. Many soils, particularly in America's corn belt, would benefit from

a mulch which would help control moisture and aid in conditioning the earth.

• The increased use of petroleum fractions as carriers for insecticides, fungicides, and pesticides. There is a continuing need for improved materials used in pest and weed control.

• Vastly increased use of petroleum-derived fertilizers. Experts in agriculture agree that fertilizer consumption is far below the amount that would give the American farmer the largest possible profit. (The farm market already is huge: this country's farmers now spend about $2 billion annually on petroleum products, exclusive of fertilizers.)

Metals, construction, and agriculture appear to be the major markets in which petroleum consumption is likely to grow; but there *are* others.

It is possible that a synthetic paper will be produced from a petroleum base, for one thing. It is even possible that synthetic fats and carbohydrates will be developed from oil. This last would not be a simple thing to accomplish, but it is being studied seriously and would be of inestimable value to the world's underdeveloped nations. The uses for synthetic rubber show interesting potential for expansion: United States rubber consumption should increase from 1.8 million long tons this year to 2.3 million in 1970, and total free world demand is expected to grow from 3.7 to 5.3 million long tons during the same period.

To be able to grow, a company must be *ready* to grow, and while research and marketing studies help anticipate where growth seems likely to come from, other functions within Texaco are preparing for growth by keeping the Company competitive.

A concerted search for new reserves of oil goes on throughout the world. Recently, for example, Texaco began exploration in Algeria, Libya, Turkey, and Nigeria—in the hope of further diversifying the Company's producing interests. In producing fields, important amounts of money have been saved by doing away with traditional steel casing in certain types of wells. Techniques for completing two or more wells from a single platform, thereby saving the cost of erecting a new platform for every attempt to find oil, are being perfected. In the Company's pipe line operations it is adopting microwave remote controls and remote gauge readings, eliminating the need for stand-by technicians. Last year the Laurel Pipe Line, in which Texaco has a 25 per cent stock interest, was completed between the Philadelphia area and Cleveland to reduce costs in supplying the Company's products to the important Pennsylvania and Ohio markets.

Since the end of World War II, Texaco's operations have expanded into more than 100 nations where energy is needed for progress.

New and more efficient refining facilities constantly are being installed, both to produce better products and to produce them more economically. And in marketing, innovations like the Texaco Speed Charge Credit Card Service not only encourage buying but significantly reduce paperwork that can be terrifically inefficient and expensive. All these moves are designed to keep the Company competitive, and all of them are aimed at keeping its prospects for future growth at least as encouraging as the rest of the industry's.

In assessing the many factors which have contributed to the industrial development of this country over the past 50 years, it is clear that petroleum has played a role of overriding significance. The rise of the United States to its present position of industrial dominance has occurred in almost perfect parallel with the corresponding growth and refinement of the petroleum industry. In fact, the oil industry has provided not only much of the impetus, but also much of the direction, of our over-all industrial progress during the past half-century.

Commenting on oil's role, both in this country and abroad, Chairman of the Board Augustus C. Long recently said: "It will never be an easy assignment to serve as one of the prime providers of energy to the world. No one is likely to find quiet and repose in an industry that has taken on itself the task of making the earth a better place to live for all men everywhere. There is no calling I know of that is more challenging and demanding. And in all my experience in this industry, I have never met an oilman who would have it any other way." •

Petroleum still remains transportation's most important fuel, in spite of recent news about nuclear and solar energy developments.

THE HEDGE OF THORNS

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The issue of how the United States oil companies engaged in foreign operations can counter the deliberate disruption by the Russians of international oil markets, and still not run the risk of violating the antitrust laws of this nation, is becoming critical. The following editorial, which appeared in the November 3, 1960, edition of The Journal of Commerce, *outlines the problem facing Texaco and other U. S. oil companies in their foreign operations. It is being reprinted here for the benefit of all Texaco stockholders and employes.*

FOR THE SAME REASON that the burnt child is reputed to fear fire, U. S. oil companies operating in the international field view with some misgivings the situation with which they are confronted by the Russians overseas and by antitrust laws at home.

On one hand, it is perfectly obvious to them that the Soviet Union is now a major factor in oil markets, that it is exerting strong pressures on prices, and that it is ready at the drop of a hat to create any mischief in this field that it can. In the circumstances, nothing much short of concerted action on the part of United States and probably other Western oil firms, can provide an effective counter to the monolithic power wielded by Moscow.

On the other hand, they also have reason to wonder whether, in the event they do decide on common action abroad—even when their concerted action is urgently requested by an institution as high in the Federal hierarchy as the Department of State—they won't be smitten by the Department of Justice for "collusion" on their return home.

So it was in the early 1950's when a dangerous situation in Iran prompted Federal authorities to send the major U. S. international oil companies out to save the day by organizing a consortium to market the oil Premier Mossadegh had seized from the Anglo-Iranian Oil Company.

The job was done with consummate skill, but this did not prevent the Justice Department from rolling up its heaviest artillery and firing on all of them in the so-called "Middle East Case" until—almost in the last hours of his Administration—President Truman called it to a halt.

So it was again during the Suez Crisis in 1956. The oil firms' labors were again undertaken at Government request, and were devoted to supplying Europe with its essential needs for so long as the Suez Canal remained closed. This detonated another barrage of antitrust action, the Justice Department's position being that the collusive action taken by the companies abroad had created a carry-over into the domestic market. First known as the Alexandria Case, this later became better known as the Tulsa Case. The oil companies appeared to have won it when the Federal judge presiding threw the proceeding out of court with a severe admonition to the Justice Department.

But had the oil companies really won the victory they appeared to have won? Does the Defense Production Act provide sufficient "elasticity" to insure that any necessary measures they take in concert overseas won't stir punitive action back home?

Robert A. Bicks, acting chief of the Justice Department's Antitrust Division, indicated doubts on this score in speaking to the New York Society of Security Analysts last week. Though he did not mention the Tulsa Case directly, he made some point of his belief that the elasticity of the proviso in the Defense Production Act excluding from antitrust action certain commodities marketed overseas by U. S. firms "is as yet untested."

To be sure, Mr. Bicks acknowledged that Russian political manipulation of oil prices was getting to be a headache, and that U. S. oil firms (perhaps by implications all American firms operating overseas) could work out collective marketing arrangements with other companies who find themselves harassed by the Russians.

There are two qualifications to this, though. The first is that the organizational structure for the joint group must be created outside the U. S. A. There is little quarrel with that. The second is that no action taken by the companies in concert abroad must "restrain" U. S. commerce. In principle there is little quarrel with that, either. But in practice it is the proverbial hedge of thorns.

In the past the Antitrust Division has nourished an almost fanatical interpretation of what constitutes a "restraint" on U. S. commerce, even to the point of bringing proceedings against foreign companies and seeking (usually with no success whatever) to subpoena their overseas records. It has failed more often than it has succeeded, as it failed in the Tulsa Case. But it has by no means given up.

To us it has always seemed a little odd that the expensive, time-consuming proceedings arising out of such developments as, say, the Suez Crisis couldn't have been stopped before they ever got off the ground.

Our premise is based on the assumption that the Secretary of State and the Attorney General sit in the same Cabinet and must sometimes speak to one another, if only about the weather. We assume that when the Secretary of State wants an oil consortium formed for purposes of U. S. foreign policy, he could clear it with the Attorney General in the presence of the President and agree how far the consortium could go and at what point it should be restrained.

Alas, things don't seem to work out that way. And since they don't, we think there is nothing for it but for the next Congress (which will have a lot of other things to do) to pick up the antitrust statutes, compare them with recent interpretations, and then try to reconcile both with a number of significant changes which have occurred in the world since the turn of the century. •

THE PERFECT ROCKET FUEL: WILL TEXACO FIND IT?

THE FAMILIAR BROMIDE about not being able to have one's cake and eat it too was already an over-used phrase when it first appeared in John Heywood's *Proverbes,* a collection of colloquial sayings published around the middle of the 16th Century.

But the recent announcement that Texaco had been awarded the largest contract ever granted by the Air Force for the development of high-energy liquid propellants seemed to turn Heywood's 400-year-old admonition into an Atomic Age ambition. The basic aim of the $1.3 million Air Force contract is the development of propellants that have all the advantages and performance capabilities of a liquid, combined with some of the handling simplicity and compactness of solid fuels.

Announcement of the research contract was made early in September by Brigadier General John W. Carpenter III, Commander of the Air Force Flight Test Center at Edwards Air Force Base in California. "The building and maintenance of an effective defense system," he said, "require that we have advanced propellants ready for firing at a moment's notice which can be stored at every missile base without loss or deterioration."

This requirement, General Carpenter added, poses a serious challenge for the continued success of our military's liquid propellant programs. Many missile experts are still far from happy with conditions that the use of high-energy liquid fuels impose at missile sites.

Under the terms of the new contract, Texaco's principal responsibility will be to study every known type of liquid propellant for its potential value as a rocket or missile fuel. The Company's research scientists and engineers—particularly those at the Texaco Beacon (New York) Research Laboratories—also will attempt to develop new fuels that will avoid many of the problems now associated with the handling and storage of high-energy liquids.

Although detailed specifications for the new propellants are classified, what can be told is challenging and speaks well of Texaco's research reputation. According to L. C. Kemp, Jr., Vice President in charge of the Research and Technical Department, Texaco will be looking for fuels that are not only storable, but which pack a maximum of energy into a minimum of weight and space. This combination of characteristics is a tough requirement for any propellant.

Some fuels are extremely "dense," in the sense that a small volume contains a tremendous amount of available energy, making them very useful in volume-limited craft. Other fuels —such as the liquid hydrogen which will propel the *Saturn's* upper stages into space—are very high in "energy-per-pound" but lack density and may be unstorable or difficult to handle.

So the search for the elusive "ideal" propellant goes on. The bulk of Texaco's research activity will be carried out at the Beacon Research Laboratories, one of the largest privately financed fuel research installations in the petroleum industry. Here, fuel test cells do just about everything but fly. Extremely sensitive instruments can simulate flight conditions at speeds exceeding 1,000 miles an hour and altitudes up to 100,000 feet, if necessary.

The laboratories at Beacon have been tripled in size in recent years to handle fuel combustion tests on today's high-pressure-ratio engines — engines that power the supersonic F-100 fighters and propel jetliners.

Project Director of the Beacon research force assigned to the Air Force contract will be Dr. George Arnold. "We are initiating a very comprehensive program in propellant research," Dr. Arnold says, "that will involve a study of every possible high-energy fuel source. We also plan to move into the relatively unexplored areas of the more 'exotic' liquid fuels, oxidizers, and monopropellants."

Monopropellants are primarily liquid fuels that combine the fuel and oxidizer in one propellant and which can be fired in relatively simple mechanisms. In some cases, the monopropellant decomposes, creating a hot exhaust that provides the fuel for an additional stage of combustion. This system along with new and unusual fuel-oxidizer combinations will be studied.

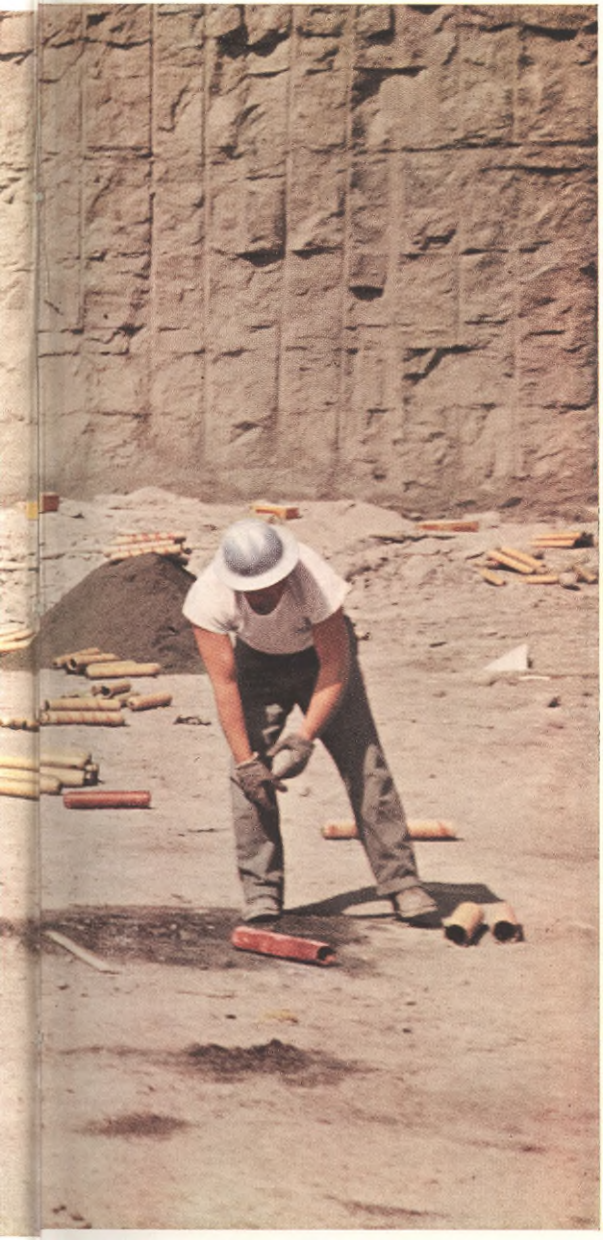
Many of these "exotic" propellants and monopropellants have been under study for some time at the Company's subsidiary, Texaco Experiment Incorporated (TEI), in Richmond, Virginia. According to Mr. Kemp, about a third of the work done under the Air Force contract will be carried out by TEI.

Since most of TEI's work so far has been done under Defense Department contracts, the Company already is well-tuned to military procedures and requirements. In turn, Texaco's close association with aircraft and propulsion systems manufacturers has helped provide TEI with the opportunity to engage in the extensive development and production necessary to carry many of its projects beyond the early research stages.

Although the Air Force contract marks Texaco's entry into direct military contracting, the development of aircraft fuels is not new to Texaco. In the early 1920's the Company began evolving a lot of today's high-performance military engine fuel needs. As a result, Texaco is in a position to meet almost any commercial jet fuel problems likely to arise within the foreseeable future as well.

The Air Force is counting on this backlog of accomplishment. Texaco's strong research arm now has a powerful one-two punch to meet and solve some of the problems, both basic and peripheral, that fill the field of rocket fuels and missile propellants. •

After tractor-mounted drilling rigs dig holes for dynamite charges to blast out beds for the giant conduits, crew inserts charges, tamps them dow wit



with a long rod. Conduits will carry water to a reservoir four miles away.

MORE POWER FROM A NEW NIAGARA

By 1963, Niagara Project will supply critically needed hydroelectric power to industrial and home consumers

Bowling pins protect holes until charging.

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A mountaineer on a man-made mountain, this workman scales a sheer wall of the 150-foot-deep conduit trench. Dangling by a lifeline, he hoses down the sides to wash away loose dirt and rock before the huge water tunnel's concrete walls can be poured.

To make room for the project meant moving enough earth to bury the Empire State Building

WHEN A ROCKSLIDE destroyed most of the big Schoellkopf generating plant at the bottom of the Niagara gorge four years ago, it created a serious power shortage in an industrial area that depends heavily on an abundance of power—an area of tremendous potential since the opening of the St. Lawrence Seaway.

To build that supply back to full strength, New York's Power Authority began, in 1958, to construct the privately financed Niagara River Power Project. When it is finished in 1963, the huge $720-million construction effort will be the largest hydroelectric development of its kind in the Western Hemisphere. The ambitious Niagara Project will produce enough electricity to light nearly 22 million light bulbs at the same time.

The theory behind the Niagara Project is basically simple —to get maximum hydroelectric energy from the water's natural drop, or "head," between Lake Erie and Lake Ontario. Actually, the head between the two lakes is 326 feet, but at Niagara Falls it is only about 165 feet; the remainder of the drop is through rapids above and below the falls. So intake conduits are being built to draw off water *above* the rapids and funnel it back into the river *below* the lower rapids. Thus the project will utilize almost the entire natural head, or drop, between the two lakes.

Canada and the United States, by treaty in 1950, agreed on a given amount of water that must flow over the falls during the tourist season in the daytime. But much less water is required at night and off-season. The Niagara Project will make good use of this provision; at night, the greater amount of water drawn off by the conduits will be stored in a huge 2,460-acre reservoir now being built behind the new generating plant.

Since the reservoir is about 100 feet higher than the water conduits, a generating plant is also being installed within the reservoir's dam. Here, electric motor-pumps will raise the excess water up into the reservoir at night. During the day, when the reservoir is tapped, these motors are reversed to become turbine-generators.

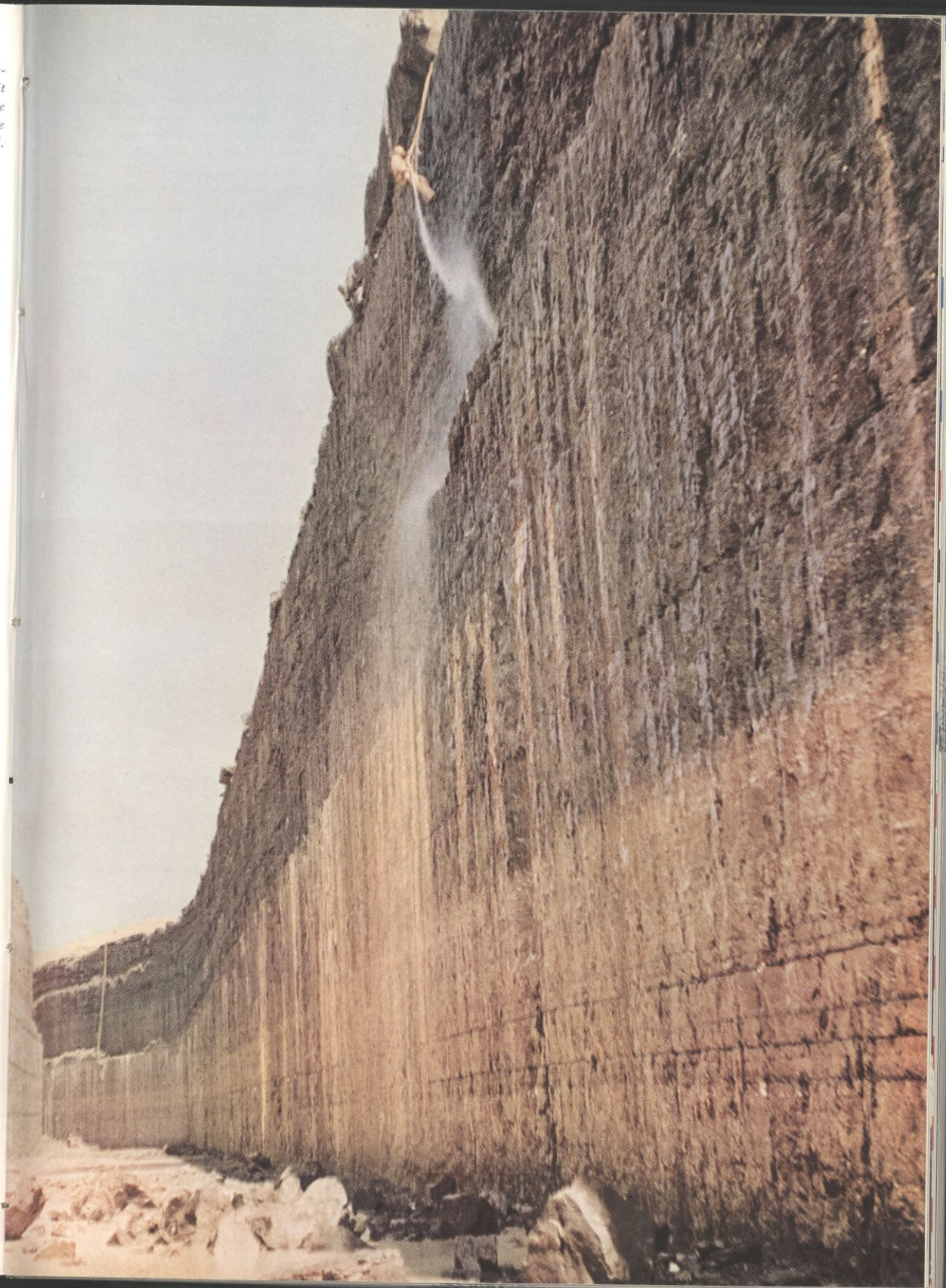
As a result, the same water will generate electricity twice; once as it falls through 12 penstocks, or water pipes, in the reservoir dam, and again as the water plunges down the 13 penstocks in the main generating plant at the river's edge.

From the beginning, Texaco has been importantly involved in the vast undertaking. The Company supplies and services all the contractors' fuel and lubricant needs on four of the project's six major jobs: the water intakes, the twin water conduit tunnels, the Niagara Generating Plant, and the 500-foot-wide open canal connecting the generating plant and the reservoir a mile away.

Water from the reservoir will flow, first, through the Tuscarora Pump-Generating Plant—also under construction —before reaching the canal. Each of the plant's 12 pump-turbines will be Texaco-lubricated.

But before one turbine can turn, four massive construc-

Pyramids of crushed rock rise below jutting snouts of conveyor belts. Side-dump trucks will carry stone to nearby concrete-mixing plants.



tion projects must be completed; whole urban areas moved; transmission lines and railroad yards relocated; and a six-and-a-half-mile dike built to hold the reservoir's 20-billion-gallon storage capacity. By the time the job is done, more than 42 million cubic yards of earth will have been moved.

Contractors working on the giant power project face a variety of earth- and rock-moving problems. In some places, rock must be removed from under water; in others, near residential areas, blasting has to be done with kid-glove consideration for families living nearby.

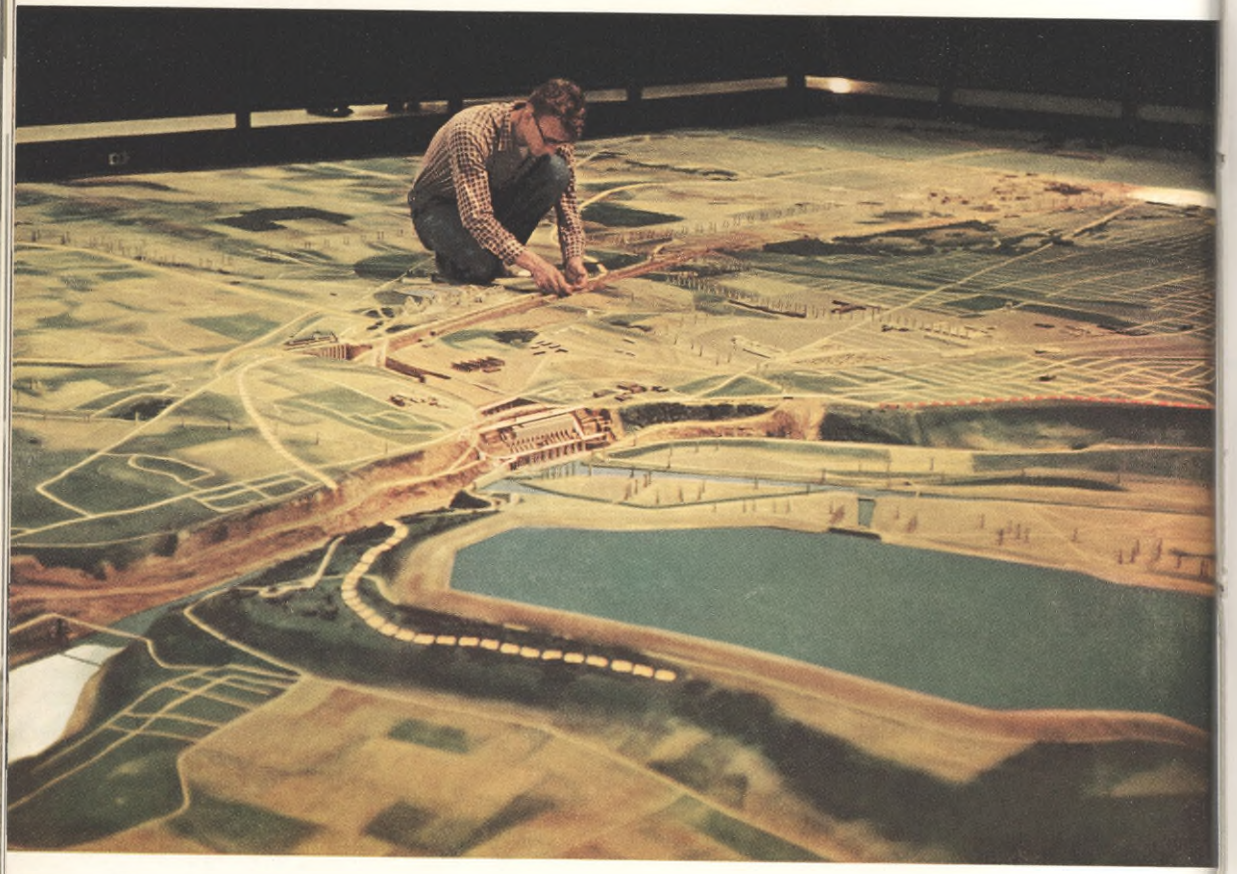
The pair of four-mile-long trenches holding the concrete water conduits (buried 40 feet underground, much like New York City's subways, these tunnels are 46 feet wide by 66 feet deep with walls up to seven feet thick) were carved out of solid rock. Downriver, at the generating plant site, one contractor had to push the base of the plant 300 feet back into a cliff because the river bed drops too sharply to allow for the usual cofferdam-constructed foundation.

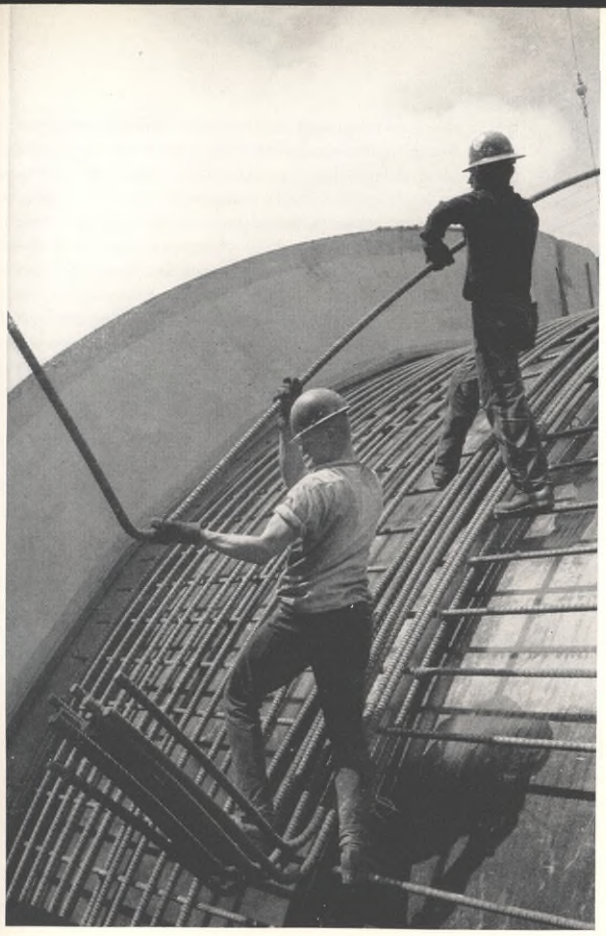
Excavation costs range all the way from 30 cents to $45 a cubic yard. Because proper machinery and equipment lubrication can mean the difference between profit and loss to the contractors, a team of Texaco lubrication engineers are on stand-by call 24 hours a day. The economy, efficiency, and dependability of Texaco products is one reason why the Company is supplying about 80 per cent of the fuels and lubricants for the project. Under the Texaco Simplified Lubrication Plan, just eight lubricants are doing the job.

And the job is a mammoth one. At the generating plant site alone, dump trucks made over 800,000 round-trips to haul away excavated earth and rock (most of it was used to build the reservoir dike). In the conduit trenches, too, tractor shovels, working like giant dustpans, log 50 miles a day scooping up bucketfuls of broken rock.

Choking dust coats engine parts and long hours of heavy duty keep equipment under constant strain. Texaco's simplification of lubricant requirements is helping contractor customers keep purchasing costs and inventory expenses low, and lessens the danger of misapplication, which could result in costly downtime.

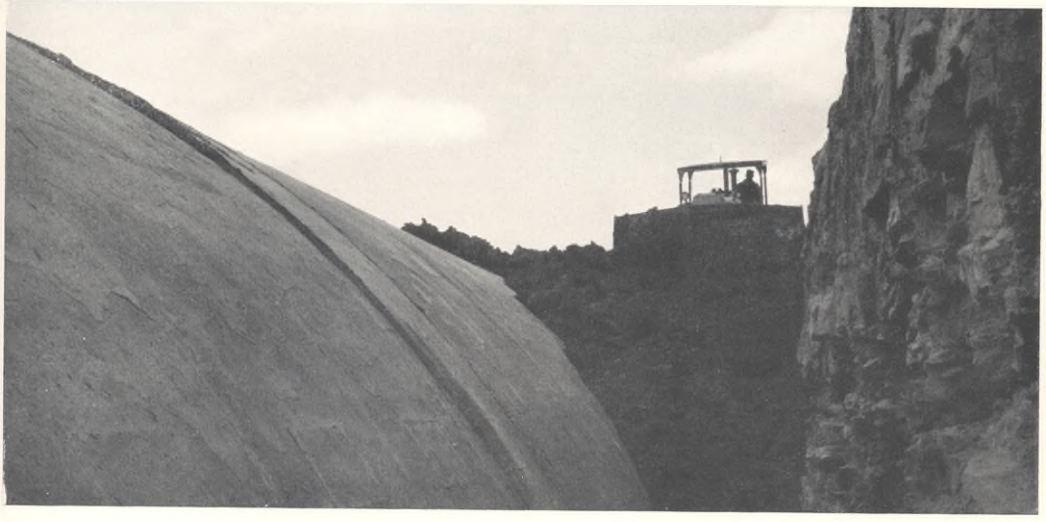
For years, the Company has been a major supplier of petroleum products for construction projects throughout the country. Texaco's contributions to the Niagara Project, the biggest single digging job ever undertaken in the United States, strengthen this position even more. •





Texaco supplies contractor firms on four out of the six major construction projects

Scale model of the Niagara Project area, opposite page, *with Canada in foreground, shows huge 13-turbine generating plant on the river's bank. The man has his hand in one of the twin conduit trenches leading to the reservoir site, about a yard to his right. Workmen,* left, *insert reinforcement bars for conduit's roof over oil-coated concrete forms. After concrete has been poured and dried, telescopic form will move forward for the next section. Bulldozer,* below, *pushes dirt back over completed sections of the conduit; buries tunnel under 40 feet of earth.*



HIDDEN DIVERSION IN THE HIGHWAY SYSTEM

IN 1956, WHEN PRESIDENT EISENHOWER signed the Federal-Aid Highway Act that created the nation's ambitious interstate and defense highway system, the estimated cost of the entire 40,000-mile network of highways was $27.6 billion. By 1972, its expressways would knit together all the states, many large cities, and hundreds of smaller towns with ribbons of gently graded, no-stop-sign roads that would be four, six, and even eight lanes wide.

Most important of all, the system would pay for itself out of the Federal taxes on tires, tubes, trucks and buses, and the 1956 Federal tax boost from two to three cents a gallon on gasoline, diesel fuel, and special motor fuels.

Over the past four years, an added 1,000 miles to the basic program and what the Bureau of Public Roads calls "unexpected additional costs" have raised the price tag to just under $40 billion. A new official figure is due this January, and many engineers and builders believe that *$50 billion* is too conservative an estimate.

With less than one-fourth of the now 41,000-mile superhighway system actually built, this sharp increase in the estimated cost of completion emphasizes the need for a careful reappraisal of the scope and concept of the program to get the maximum return from the taxpayer's dollar. The petroleum industry, naturally, favors construction and maintenance of the roads the motoring public needs; but it also is deeply concerned with seeing that highway construction and maintenance are soundly financed.

Increasingly, highway costs are becoming a greater burden on Federal and state tax revenues. Private and governmental agencies should use every practicable means to plan highway programs so that they include only essential projects and hold costs to a minimum, within the framework of sound economic planning and solid engineering practices.

As matters stand now, it is the highway *user*—the individual motorist—who will bear almost the entire cost of the interstate highway system. This is inconsistent with one of

the program's main objectives—defense—which benefits the entire nation. It was the "military necessity" argument that sold the highway network to economy-minded Congressmen in 1956.

Good highways aid national defense, open up new areas for development, raise real estate values, lower transportation costs, expedite essential services. People who do not own automobiles benefit, indirectly, from a good highway system. It is unfair and unsound to expect highway users to pay the entire cost. Anything that benefits the nation should be supported by all the people, and not by taxes imposed on the users of one single product—in this case, gasoline.

Last year, the Federal taxes on motor fuels climbed to four cents a gallon when American motorists were hit with a "temporary" one-cent increase, costing them an additional $500 million a year in taxes. *The Federal motor fuel taxes alone are now supplying about 85 per cent of the entire cost of the superhighway system.*

Yet, slightly less than two-thirds of last year's $3.5 billion total Federal automotive excise tax collections from motorists went into the highway fund. Over one-third (about $1.4 billion) was sidetracked into the U.S. Treasury's general fund, where it is not used for highways. More than 40 cents out of every dollar collected by the Federal Government in special taxes on the motorist has never seen the right of way.

The Congress recently was asked to legislate an additional half-cent-a-gallon tax hike, and a three-year extension on 1959's one-cent "temporary" boost, scheduled to expire June 30, 1961. The proposed half-cent rise would add another $250 million a year to the already unfair burden on motorists. There is a good deal of evidence that if all the money diverted into the general fund were put to work building highways, there would be no need for more taxes.

The petroleum industry has always been in favor of the road programs vital to the nation's economic growth and development—and willing to underwrite its share of the cost of these highways. What the industry opposes, however, is the diversion of gasoline tax receipts to non-highway purposes; hundreds of millions of dollars collected from automotive taxes each year are diverted to government expenditures which have nothing to do with highway construction and repair.

More and more, state lawmakers are realizing the importance of earmarking these funds for highway purposes. The fact that 27 states now have constitutional amendments prohibiting diversion is indicative of this increasing recognition.

Careful spending of the money that *does* go into highway construction is also vitally important as the nation's network of roads is extended and improved. Many areas of the country reportedly will not allow petroleum asphalt to bid competitively with more costly cement as a paving surface on sections of the new highways. For example, a stretch of highway in one state, using cement, cost about a quarter of a million dollars *per mile;* in an adjoining state, an asphalt-paved section of the same highway cost roughly half as much.

Such situations prompted Representative Silvio O. Conte of Massachusetts to remind Congress that, because states are not required to solicit competitive bidding, "it is altogether possible that millions and millions, if not billions, of unnecessary dollars will be spent on the interstate highway system."

The use of asphalt paving, he pointed out, saved $15 million in the construction of the Massachusetts Turnpike, and another $5 million on the New Jersey Turnpike. And at hearings before the House Ways and Means Committee, committee members were told that the use of asphalt could slice perhaps $3 billion off the cost of the highway network.

Obviously, the time has come for realistic reappraisal of the financing behind the entire superhighway system. The solution cannot continue to be increased gasoline taxes, a solution that may soon reach a point of diminishing returns. Last year's "temporary" Federal gasoline tax boost is due to expire next June. But this temporary tax could become per-

manent if legislation favored by some members of the Congress is enacted.

Take a look at the history of gasoline taxes. In 1932 the first Federal tax on gasoline was enacted as a temporary emergency measure; it's still in effect. For 24 years—until the interstate highway program was adopted in 1956—this two-cent tax was a source of revenue for the U.S. Treasury's general fund.

Then, in 1956, motorists were led to believe that a 50 per cent increase in the Federal tax from two to three cents a gallon, in combination with other automotive tax levies, would provide enough money to finance the superhighway system. But the three-cent levy had been in effect less than two years when the Federal highway fund began to need bolstering. The present temporary fourth cent was proposed as a solution.

This increase brought combined Federal and state gasoline taxes to a national average of about 10 cents a gallon, or nearly 50 per cent of the retail price of regular-grade gasoline, exclusive of taxes. In 20 states combined taxes now amount to more than half the retail price of the fuel itself, and equal the refinery price of gasoline in some areas.

When the temporary fourth cent hike was originally introduced, some members of Congress realized the obvious severity of this tax load on an essential commodity, and opposed its enactment. But the temporary tax increase was passed as a compromise agreement, calling for the application of other automotive excise taxes—now going into the U.S. Treasury's general fund—to the highway fund as soon as the increase expires next year. Without this stipulation, the bill probably would never have gone through Congress.

Unless the money now diverted to non-highway uses is made available to the highway fund, the result can only be a higher price for gasoline at the pump. The public does not generally realize that, since neither oil companies nor their dealers can absorb tax increases, economics of the oil industry demand that these tax raises be passed on to the motorist.

Yet more than half the automobiles in the country are owned by families with incomes of $5,000 or less a year. These car-owning families, in addition to their regular taxes, are finding themselves saddled with increased gasoline taxes and other burdensome special highway taxes.

As a result, high gasoline taxes are encouraging the use of compact, more-miles-to-the-gallon "economy" cars. In this way, motorists can get up to twice the gasoline mileage, and save half the tax. Some experts are predicting that in five years 50 per cent of all new cars sold will be small cars.

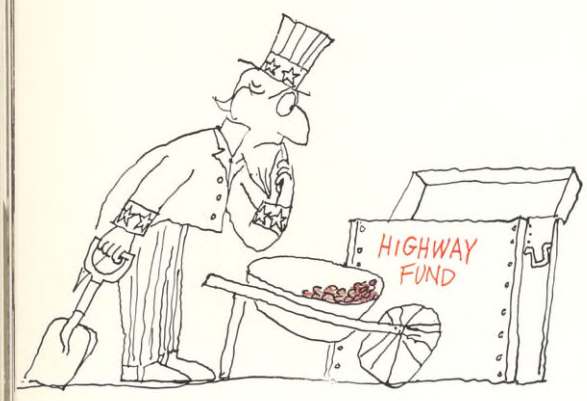
The effect of ever-increasing gasoline taxation might very likely lower gasoline consumption on a nationwide scale and thus prove to be self-defeating in financing the highways that the country needs.

If increased gasoline taxes—resulting in less driving or a move toward smaller cars—caused each car owner to cut his gasoline purchases by only two gallons a month, the drop in consumption across the country would come to about 1.8 billion gallons annually.

A downward shift like this in gasoline consumption would mean a cut in Federal and state revenues as well. Economists predict that, by 1964, gasoline tax revenues will be over half a billion dollars *below* previous estimates for that year. That possible 1.8 billion gallon reduction in gasoline consumption already cited illustrates a point: annually, it would reduce the amount of taxes collected by $180 million, of which $72 million would be cut from the Federal share.

As a result of present excessive gasoline tax rates, revenues from gasoline taxes are steadily approaching a point of diminishing returns, while the need for funds for highway construction and maintenance mount.

The trend is clear. Whether this trend can be reversed calls for Congress to keep its promise and at least let the present "temporary" Federal gasoline tax increase expire on June 30, 1961. •



THEY STILL YELL "TIMBER"

BUT TODAY MACHINES REPLACE LUMBERMEN'S MUSCLE, REFLECT THE VAST CHANGES THAT ARE MAKING MECHANIZATION AND CONSERVATION THE LOGGING INDUSTRY'S NEW "CODE OF THE WEST"

TEXT BEGINS ON FOLLOWING PAGE ▸

The Columbia River was dug special by Paul Bunyan to get his timber to the ocean when he was logging the Inland Empire out in Washington State. When Paul got his raft of logs finished and was ready to take them out, he hitched up a plow behind Babe the Blue Ox. . . . Then Paul and Babe just plowed out that river and filled it up with water. . . . And that's how the Columbia River got there.—From *Paul Bunyan,* edited by James Stevens.

PAUL AND BABE did a good job: the Columbia River is still there, and the Pacific Northwest today is one of the country's most important lumbering areas. But lumberman Bunyan would be astonished at the changes in logging methods that have taken place since his time.

Gone are the rank logging camps where grizzled men worked through a cutting season on a steady diet of pork and beans. Today these camps are bright, comfortable housing units with central heating, hot water, laundries, radio and television, and medical care. Diaper-laden clotheslines clearly indicate the lumber industry's new emphasis on recruiting family men, part of a long-range movement to attract and hold a stable labor force.

Still another significant change in the logging industry has been its recognition, over the last several decades, of the need for conservation. As new machines find new ways to cut, transport, process, and deliver more and more lumber, scientific forest conservation methods make sure that the country's supply of timber is not dangerously depleted.

Unlike the early sawmills, today's pulp mills cannot be transferred to new sites where trees are plentiful. As a result, timberland has become too valuable to permit the wasteful cut-out-and-get-out practices of the old days. Loggers now work on the "sustained yield" theory, which emphasizes that new timber growth should equal or exceed whatever is cut down. (Lumbering companies also have begun programs that offer help to farmers and other owners of small acreages who are willing to put idle land to work growing trees.)

Laden with newly felled logs, Roseburg truck starts 75-mile trip to mill. Once, teams of oxen handled this log-hauling chore.

Logging, the nation's sixth largest industry, has come under increased pressures over the past few years from a large and varied number of highly competitive products—particularly from the steel and aluminum industries. But lumber is still one of the country's most important basic construction materials, and last year's total production reached an estimated 36 billion board feet. This year over $55 billion will be spent just for lumber used in new housing construction. Plywood sales are expected to increase about 13 per cent.

The forest products industries are relying more and more on mechanization. And for years Texaco has been supplying leading lumber firms all over the country with the fuels, oils, and greases they need. One Texaco customer is the Roseburg Lumber Company, whose plywood and timber operations in timber-rich Oregon are shown in the photographs on these pages.

A big spread, even by Bunyanesque standards, Roseburg uses huge amounts of Texaco gasoline, oil, and greases yearly. A Texaco sales engineer in the area makes weekly calls to see that Roseburg's equipment is running smoothly, and to consult on any lubrication problems that may have cropped up. Severe Winter weather can create plenty of these; and even during the milder seasons, the rugged conditions under which the logger's machinery is used makes the Texaco man's counsel welcome.

Situated in the heart of the northwestern lumber country, the Roseburg mill—one of the largest independently owned lumber companies on the West Coast—is one of many permanent installations that have sprung up to transform forests into dozens of wood products. With nearly 15 million acres of valuable timberland, Oregon is one of the nation's leading suppliers of pine and fir; the timber cut averages over nine million board feet a year, and usually represents the highest production in the nation.

Along with increasing mechanization has been the growing importance of petroleum—as powerful, portable machines steadily replace the lumberman's muscle and strong back. The old two-man saws and double-bladed axes have been superseded by lightweight, versatile power saws driven by gasoline motors. Mammoth cranes, with huge teeth that can lift six-ton loads at a time, and heavy-duty trucks have taken over the log-hauling chores once performed by teams of oxen pulling wagons.

That dazzling virtuoso of the forest, the high-rigger, also is disappearing. Instead of climbing 100 feet up a bare "spar tree" to attach rigging for moving fallen trees into place for hauling, he and his crew now erect—in just a few hours—portable steel towers to do the job.

As loggers move into remote timber areas, stepped-up road-building activity becomes highly important. To build these roads, rumbling bulldozers and tractors like the ones

At mill's storage pond, where trucks dump their heavy loads, agile pondmen sort logs according to girth and length, steer them to the pond's edge

Chain saws slash into the storage-pond water and cut the logs into sizes that the mill's machines can handle.

used by the Roseburg crews are now standard equipment for any sizable logging operation.

Once descriptive of the worst in roads, the term "logging road" now refers to roads often as well-built as public highways. They have to be carefully engineered to support trucks carrying 70,000-pound loads of logs, many of them 60 feet long and three to four feet in diameter.

But hauling the timber out of the forests is just the beginning, of course.

At the Roseburg mill, now about 75 miles from the company's timbering activities, log trucks dump their loads into storage ponds where the pilots of sturdy boats, assisted by agile pondmen, steer them to the pond's edge. There, six-foot chain saws slash into the water and cut the fir, spruce, and pine logs into various sizes. Passing along on a conveyer, the logs go through a debarking machine where a ring of whirring blades removes the bark in about the way a pencil sharpener works. A sharp-eyed inspector looks over each log to determine whether it should go to the plywood mill or to the sawmill.

The logs (usually Douglas fir) chosen for the plywood mill are called "peelers," because they are literally shaved into long, thin sheets of wood. These are fed through a series of conveyers, driers, and presses until they emerge as finished plywood to be trimmed, scored to look like finished wood paneling, and packaged for shipment.

The sawmill logs, varying in length and size according to a tree's height and circumference, are squared down into huge timbers by band saws. Gang saws then slice each timber into foot-wide boards before conveyors carry them off to be sorted, trimmed, and put into drying kilns. After the boards have thoroughly dried, they are steel-banded into large bundles and shipped by freight cars to construction sites across the country.

There is little left in the logging business that has not been mechanized. But the elaborate machines that are making modern logging more efficient are also making it a whole lot more expensive.

Many businesses, such as the Roseburg Company, have millions of dollars invested in their heavy equipment: they depend heavily on developments like Texaco's Simplified Lubrication program to keep their machinery operating at top efficiency with the lowest possible maintenance costs. Almost all major sawmill lubrication can be handled with no more than six Texaco products, and Texaco's plan is designed to meet these particular requirements with the right product for each machine.

Expanding mechanization, though, has not yet brought about all the changes possible in logging methods; there are many more still planned. Some pulpwood companies, for example, are beginning to use portable chipping machines that cut logs into chips at the logging site instead of at the pulp mill. Chips are easier to transport than logs.

A more dramatic possibility—one that might make even Paul Bunyan look to his laurels—is the use of helicopters to bring timber out of inaccessible areas. A heavy-duty helicopter to handle such work is not available now, but lumbermen expect it will be very soon. When it is, loggers will have a real "sky-hook" to help out in the rough spots; the helicopter will represent another step in the expanding mechanization of one of America's oldest and most important industries. ●

STOCKHOLDER REPORTS EARN SPECIAL AWARDS

Texaco's 1959 Annual Report and its report of the 1960 Annual Meeting of Stockholders were recent recipients of "Best of Industry" awards in the 20th Annual Report Survey and Competition conducted by *Financial World*, the investment and business weekly.

Out of 5,000 entries, the Company's Annual Report was selected as a winning annual report among the large (assets over $100 million) petroleum companies that were judged.

In a supplementary competition, awards for the best post-meeting reports to stockholders are made in six classifications: chemicals and drugs, manufacturing, merchandising and services, transportation, petroleum products, and public utilities. Texaco's report booklet was judged the best in the petroleum category and awarded a Bronze Oscar.

Presentation of the awards was made by Richard J. Anderson, Editor and Publisher of *Financial World*, at the 16th Annual Awards Banquet, held on October 24 in New York City, before an audience of about 1,000 American and Canadian business and financial leaders. Texaco's Secretary, Wallace E. Avery, accepted the awards on behalf of the Company.

TEXACO TANKERS WIN SHIP SAFETY HONORS

Fifteen Texaco tankers were among 27 American-flag merchant ships recently awarded Ship Safety Certificates of Honor by the Marine Section of the National Safety Council and the American Merchant Marine Institute in New York City.

Representatives of the seven steamship and oil companies which own the 27 winning ships—with a collective record for accident-free operation of nearly 84 years—received their awards from Rear Admiral Edwin J. Roland, USCG, Commander, Third Coast Guard District and Eastern Area, acting for the Safety Council and the Institute. Texaco's certificates were accepted by J. V. C. Malcolmson, General Manager of the Company's Marine Department.

The Certificate of Honor award was created this year by the joint Ship Safety Achievement Awards Committee of the Safety Council's Marine Section and the AMMI. Any merchant vessel of United States registry becomes eligible at the end of two years' operation without a lost-time accident.

FIVE COLLEGES GIVEN EDUCATIONAL GRANTS

Under Texaco's 1960 Aid-to-Education Program, five American universities have been awarded unrestricted grants of $10,000 each for the 1960-61 academic year. They are: Cornell University, New York; Northwestern University, Illinois; Tulane University, Louisiana; Stanford University, California; and Rice Institute, Texas.

By providing assistance to these universities, which are major national centers for research and for the advancement of academic knowledge in almost any field, it is expected that many colleges and universities will receive indirect benefits from the research and academic achievements of these larger schools. Also, many smaller colleges rely on advanced degree graduates from the country's larger universities to help fill their teaching staffs.

In addition to the grants, Texaco also provided these five schools with additional funds under the scholarship and fellowship provisions of the Company's program.

This year, more than 230 institutions of higher education are participating in the program. By the end of the current academic year, about $700,000 will have been provided in aid to colleges and universities throughout the country.

NEW CUMENE PLANT ONE OF LARGEST

One of the world's largest cumene plants has been put on stream at Texaco's Eagle Point Plant in Westville, New Jersey.

Cumene, once used as a high-octane blending stock for aviation gasoline, is now an important raw material used widely by the chemical and plastics industry.

During World War II, cumene was manufactured to help meet the military need for large quantities of enriched aviation fuel. Since then, it has become one of the principal raw materials for producing the synthetic phenol and phenolic resins that help make up many common household plastics, textiles, detergents, pharmaceuticals, and plywood adhesives.

Texaco's new plant, which has an annual capacity of approximately 70 million pounds of cumene, will help the chemical industry meet the increasing demand for synthetic phenol. The plant has been specifically designed to produce an exceptionally pure cumene which facilitates the manufacture of quality phenol and phenolic plastics.

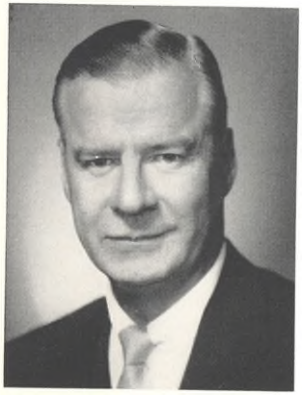
It is estimated that the United States will be producing some 725 million pounds of phenol by 1964 (the 1958 figure: 518 million pounds), most of it synthetic. "Natural" phenol is made primarily by the distillation of coal tar, but about three-quarters of all phenol now is made synthetically from petrochemicals, or petroleum-derived chemicals.

Texaco will make its cumene from propylene and benzene, both petroleum-based raw materials.

(CONTINUED)

MARION J. EPLEY, JR.

KERRYN KING



BEN HALSELL

EXECUTIVE CHANGES ANNOUNCED

Six executive changes were announced recently by Board Chairman Augustus C. Long.

Marion J. Epley, Jr., formerly Vice President and Assistant to the Chairman of the Board, was named Senior Vice President in charge of worldwide sales; Kerryn King, formerly Vice President in charge of the Employe and Public Relations Department, was named Vice President and Assistant to the Chairman; and Ben Halsell, formerly Director of Advertising and Sales Promotion, was elected Vice President in charge of the Employe and Public Relations Department—all effective September 1.

Charles H. Dodson, formerly General Manager of the Domestic Sales Department, was elected Vice President in charge of the Company's Midwest Operations with headquarters in Chicago, effective September 15. Mr. Long said Mr. Dodson's new position was created in recognition of the Company's expanded growth and market position throughout the Midwest and Great Lakes area.

Effective November 1, William P. Gee, formerly Vice President in charge of the Petrochemical Department, was named Vice President and Assistant to the Senior Vice President. Succeeding Mr. Gee as Vice President in charge of the Company's Petrochemical Department is M. F. Granville, formerly General Manager of the department.

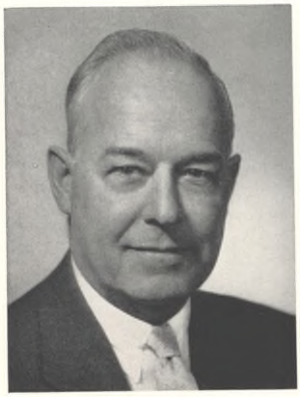
Mr. Epley, who succeeds the late Harris T. Dodge, joined Texaco as an attorney in the Legal Department at New Orleans in 1947. The following year he was appointed the Company's Chief Attorney in Louisiana and, in 1951, was promoted to General Attorney in New Orleans. He was transferred to New York the following year and served as General Attorney. He became Assistant to the Board Chairman early in 1958 and, later that year, was elected Vice President.

Mr. King, who succeeds Mr. Epley, came to Texaco as Director of Public Relations in 1953. Four years later he was made Assistant General Manager of the Employe and Public Relations Department, later became General Manager. In 1958, he was elected Vice President in charge of the department.

Mr. Halsell joined Texaco in 1926 at the Company's refinery in Port Arthur, Texas. He was transferred to the Domestic Sales Department the following year as a salesman, and subsequently held various managerial capacities. These included Manager of the Boston and Chicago Sales Divisions; Assistant Manager of the Northern Sales Region; and Merchandising Manager. He was made Director of Advertising and Sales Promotion in 1958.

Mr. Dodson joined Texaco in 1927 as an engineer in the Refining Department and was transferred to the Domestic Sales Department in 1930. After serving in various capacities in the 11-state Southern Region, he was named Manager of the Denver Sales Division in 1942; Manager of the Chicago Sales Division in 1950; Assistant to the Executive Vice President in mid-1953; and Manager of Dealer Sales later that year. In 1954, Mr. Dodson was promoted to Assistant General Sales Manager, and he was named General Sales Manager in 1959. He was appointed General Manager of the Domestic Sales Department this September.

CHARLES H. DODSON



WILLIAM P. GEE

MAURICE F. GRANVILLE

John I. Mingay, formerly Assistant General Manager of the Marine Department, succeeds Mr. Dodson as General Manager of Domestic Sales.

Mr. Gee came to Texaco in 1927 as a research chemist. In 1947 he was elected Vice President of Texaco Development Corporation, a wholly owned subsidiary. He was appointed Assistant to the President of Texaco in 1951 and, three years later, was named President of Texas-U.S. Chemical Company. Mr. Gee returned to Texaco in 1959 as Vice President in charge of the Company's Petrochemical Department.

Mr. Granville joined Texaco in 1939 and served at various Company installations as a chemical engineer. He was made Assistant Superintendent of the Eagle Point Plant in 1951. Four years later he was transferred to the Company's Port Arthur Plant as Superintendent of the Chemicals Division. In 1958 Mr. Granville was promoted and transferred to New York as General Manager of the Petrochemical Department.

John K. McKinley, formerly Manager of Commercial Development Processes at the Texaco Beacon Laboratories, succeeds Mr. Granville as General Manager of the department.

HUNTLEY-BRINKLEY CONTRACT RENEWED

Texaco and the National Broadcasting Company jointly announced the renewal, recently, of Texaco's sponsorship of NBC's *The Texaco Huntley-Brinkley Report* through 1961. The 15-minute news program will continue to be carried nationwide on more than 150 television stations, Monday through Friday from 6:45 to 7 p.m. (EST).

The NBC presentation has already received many of the nation's highest awards during the past year as an outstanding television news program. And, in October, the one-million-member American Legion Auxiliary selected the show as the best current events program on radio or television.

Using the facilities of NBC's worldwide news-gathering organization, the program offers a comprehensive coverage of daily events reported by Chet Huntley from New York City, and David Brinkley from Washington, D. C. The show, which has been sponsored by Texaco since the Summer of 1959, reaches the largest news audience in the country—more than 12 million TV viewers nightly.

To keep this many viewers tuned in 260 nights a year, Texaco's advertising agency, Cunningham & Walsh, must constantly look for new commercial material and fresh ways of presenting it.

As part of the agency's campaign, several writers and a film crew went on a shooting safari in West Africa last Spring — busy shooting film, rather than big game.

During their month-long trek, they visited four countries: Ghana, Senegal, Liberia, and Morocco. The crews had to make special arrangements not only with tribal religious leaders and French consulate officials, but also with the Sultan of Morocco and the President of Ghana directly.

The teams came back with enough film footage to make up 11 new commercials for the Huntley-Brinkley program, including scenes of the President's Rolls Royce being serviced at a Ghanaian Texaco service station.

On the Magdalena River, deep in the jungle of Central Colombia, a Mississippi riverboat is home, office, and laboratory for a team of Texaco geologists and engineers, and for a contractor's drilling crews. The stern-wheeler tows a barge carrying a portable drilling rig. Looking for petroleum reserves along the river bank, the crews drilled 21 exploratory wells, opposite page, *and studied samples of formations from the wells,* right, *to see whether petroleum traps might exist in that area.*

Riverboat ride for oil

WHEN OILMEN LOOK for petroleum in remote areas of the world—such as the jungle of Central Colombia—unusual operational procedures often become commonplace. That's how this story happens to involve a Mississippi River stern-wheeler and bandits.

Last year, engineers and geologists from the Company's Velásquez field (Texaco's largest in Colombia) began a systemized, scientific search for new petroleum reserves along the nearby Magdalena River, Colombia's main water route from the Caribbean area.

Work proceeded under the theory that, since oil had been found in the sands under the Velásquez field, it might also be found in the Magdalena River area where, geologic study showed, a trap might exist. So, an intensified stratigraphic drilling program began.

A stratigraphic well is not a producer; it's not meant to be. This type of well is drilled for subsurface information and gives the operator an opportunity to core and log the formation at substantially less cost than a "wildcat" well. The holes are of small diameter, and are drilled with highly portable equipment.

Texaco used a Mississippi River stern-wheeler, built in West Virginia in 1928, towed across the Gulf of Mexico and the Caribbean Sea, and used to transport fuels in Colombia for nearly 30 years. Leased for the stratigraphic survey, the riverboat *Barranca Bermeja* was rigged for jungle duty at the Company's camp in Puerto Niño. Here, sleeping and dining facilities for full drilling crews, supervisory personnel, and the boat's crew were installed; also radio equipment and a generator for electricity. A portable drilling rig was transported on a barge towed behind the stern-wheeler.

The geologists' theory that oil might be found along the Magdalena subsequently proved to be valid: today, the banks and mid-stream islands of the twisting jungle river are dotted for about a 50-mile stretch with 21 stratigraphic test wells. Substantial heavy oil reserves have been discovered and studies are now being carried on to develop an economical means of production.

The 21 wells were all drilled as small holes and seven-inch surface pipe was used to cut drilling costs. Electric logs were run; side wall samples taken for further evaluation; and the wells sealed with cement caps. Then the boat would move on to the next site.

The entire Magdalena River area is bandit territory, with an uncomfortable number of marauders who sometimes are farmers by day and *bandidos* by night. For the crews' protection, the Colombian government assigned a squad of soldiers to the river boat.

During the year's operation, no mishaps were encountered and the search for new petroleum deposits went on. Whether new explorations will be begun has not yet been determined, but Texaco has completed preliminary investigations within an area where considerable petroleum reserves lie. New reserves are always needed, and, when the time comes, the Magdalena wells may form the nucleus of a promising producing field. •

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GOOD ADVICE TO FOLLOW

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P. S. "Sound your horn — the road is yours" is typical Texaco courtesy, the kind you enjoy at all Texaco stations across the country.