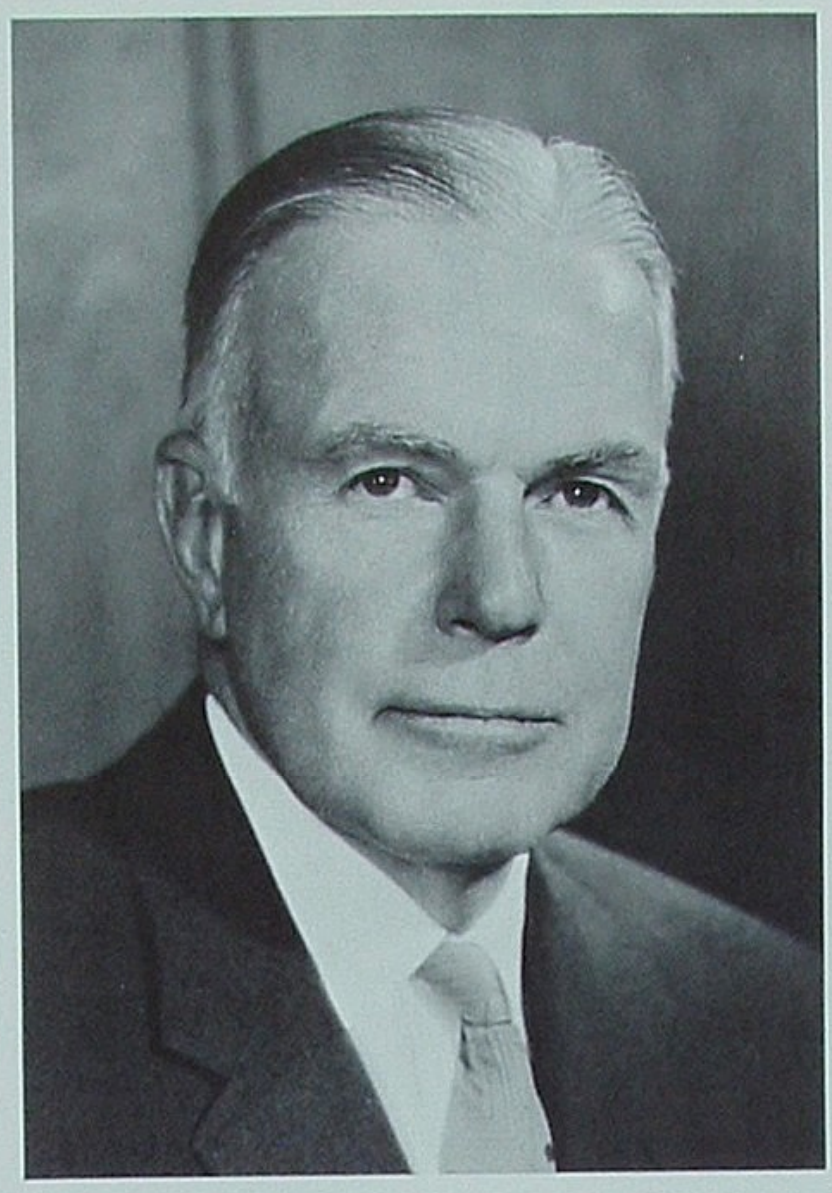
SEVENTY SIX

APRIL 1965



A. C. STEWART RETIRES

FOR 74 CONSECUTIVE years there has been a Stewart among the executive management of Union Oil Company: Lyman, one of the company's founders; W. L., a president; his son, the late W. L. Stewart Jr., a chairman of the board; and the younger son, Arthur, a senior vice president.

On February 1, after a forty-year association with the company—twenty-five of these as an officer—Arthur C. (Art) Stewart retired. He will remain as a director of Union Oil Company and as president of the Union Oil Company of California Foundation.

Stewart, a native son who grew up in Los Angeles in the days when Southern California was more noted for its orange groves than for its freeways, has had an important part in guiding Union Oil through a period of explosive growth.

As an indication of the rapidity with which change has come to the company, Stewart is just entering his sixties. Within a 20-year span as the company's vice president for marketing—from 1940 to 1960—Union Oil's sales increased from a pre-war $75 million to close to the half-billion mark.

Stewart literally started at the bottom as a wiper on the tanker *Montebello* during his student days at Stanford University. He also worked as a marine station attendant on the fishing docks at San Pedro, California.

After graduation from Stanford (and a year at the Harvard Business School) he took his first full-time job with Union Oil; he had 12 years line-sales and managerial experience before he was elected a vice president, a director and a member of the executive committee in 1940.

Throughout most of his career with Union Oil, Stewart has been—and still is—active in civic work. He has served as president of the Southern California All-Year Club, as a director of the Los Angeles chapter of the American Red Cross and of the Chamber of Commerce, and as an executive of the Community Chest. At present he is president of the Santa Anita Foundation.

Stewart's interest in Stanford University activities has also continued throughout the years. He has been a trustee of the University since 1954. A few years ago when Stanford launched its $100 million PACE (Plan for Action in a Challenging Era) fund-raising campaign, he headed the major gifts committee in the Southwest.

In 1960, Stewart relinquished his marketing responsibilities to take over the direction of other fields of activity, notably industrial relations and administration of the company's large property holdings.

Fortunately, his retirement as an officer of the company does not mean his executive ability and store of valuable experience will be lost to Union Oil. Because he retains his directorship, Arthur Stewart's voice will continue to be heard in the company's councils.

This sign is a symbol of
Union Oil Company of California.
The trademark, 76, also symbolizes the
American freedoms won in 1776
that make possible this nation's industrial
development and abundance. SEVENTY-SIX magazine
mirrors industrial freedom through the thoughts,
skills, accomplishments and appreciations of
Union Oil people. We invite your
participation in an exchange of ideas and
information. Address: Editor, Seventy-Six,
Union Oil Center, Los Angeles, California 90017

SEVENTY SIX

UNION OIL COMPANY OF CALIFORNIA

Our Cover: Pictured this month are two of the many Union Oilers involved in research on the Unicracker. They are Rowland C. Hansford (L) and William S. Bradford of Union Research Center.

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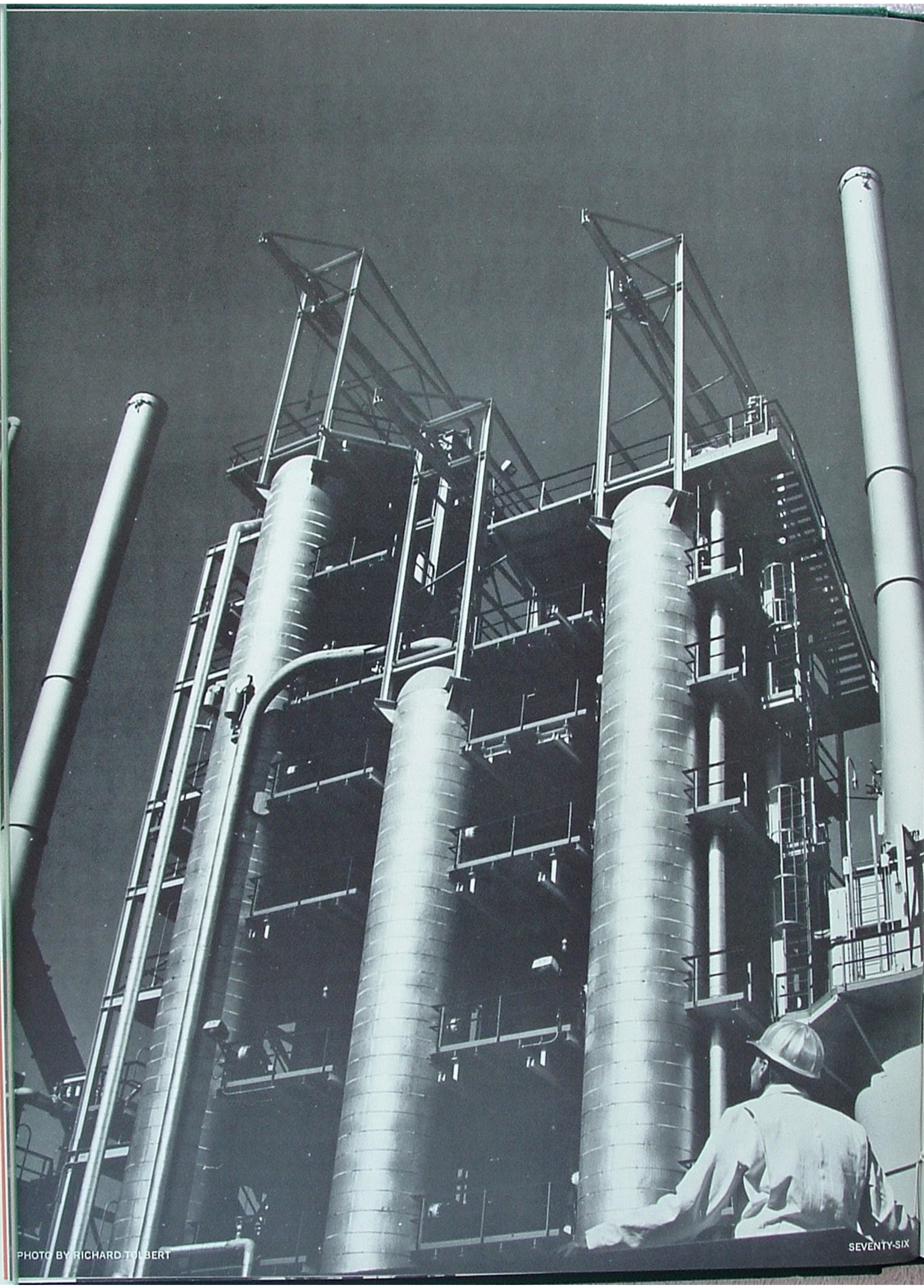


PHOTO BY RICHARD TOLBERT

WORLD'S FIRST UNICRACKER

Inventors,
Builders,
Operators

ONE DAY more than a decade ago, a group of men from our Refining, Research and Economics Departments sat down in the home office for a Refining Department technical review meeting.

As a result of this meeting, Union Oil Company began pouring what would eventually total more than $25 million into research, development and construction. More than two dozen scientists would spend the better part of the next decade probing such rarefied horizons of science as catalysis and in doing so employ such exotic tools as nuclear-magnetic resonance techniques. In the end, they would come up with a process that promises to significantly improve our company's profits.

The purpose of the meeting was to bring together those men who were knowledgeable in the latest trends in marketing and those who were proficient in the newest refining processes; jointly they were to explore the market of the future and point toward the processes that could deliver the products of tomorrow. The group was in for a surprise.

MANAGEMENT: *Defining the problem.*

At the meeting, the head of the economics group came up with a provocative topic. He predicted the market of the Sixties would be topsy-turvy. Not only would the market demand for gasoline and jet fuel skyrocket, but also the normally stable demand for fuel oil would shrink. Because oil refineries cost millions to build and are expected to last for many years, this projection brought an immediate reaction of concern.

The upshot was this: A refinery process was needed to convert fuel oil into gasoline, jet turbine and diesel fuels. Most important of all, the process should be profitable.

At our Research Center, where scientists began pondering the problem, the hydrocracking process was among those suggested. Hydrocracking is a process in which petroleum molecules are cracked in the presence of hydrogen and catalyst while being subjected to heat and pressure. As far back as the Twenties, hydrocracking had been known. Yet it hadn't caught on in the United States, largely because the technology of the Twenties called for vessel pressures up to 10,000 pounds per square inch, and it wasn't practical to build large vessels for these pressures.

"Our job," said Dr. W. E. Bradley, who is now vice president for research, "was to find a way—a catalyst—to make the hydrocracking process work at less than 2,000 pounds pressure."

PROCESS RESEARCH: *Finding the catalyst.*

The catalyst would be the heart of the hydrocracking process, so a great deal of thought and care went into finding the right catalyst. Then a process would be designed around the catalyst, so to speak. Together the catalyst and process had to meet many requirements:

The process had to be more efficient than either thermal or cat cracking. The catalyst had to be strong enough physically and active enough chemically to operate for many months. Desirably, the catalyst should function effectively in the presence of sulfur and nitrogen compounds, which normally are present in petroleum stocks. The process would have to give the refinery a gasoline yield without leaving fuel oil as a by-product. Finally, and always the critical factor, the process would have to be profitable.

Catalysts are peculiar substances. Scientists don't fully understand *why* catalysts do their unique job, although they know *what* they do: Catalysts promote a change or reaction in one specific type of compound—such as petroleum hydrocarbons—without the catalysts themselves apparently being affected. Another peculiarity of refining catalysts is their need for purity. Their manufacture often must be controlled with the same care and precision that goes into the production of pharmaceutical drugs. Some elements of hydrocracking catalysts must be measured in parts per million, meaning these catalysts for all practical purposes are chemically pure.

Details of what our scientists found in their researches are well-kept secrets, but this much can be told: The process they came up with meets all the objectives. Out of their studies came theories leading to a dual-function catalyst that strikes a balance between hydrogenation and cracking activity, a catalyst with high conversion and maximum selectivity in the

continued

manufacture of desirable, high quality products.

Once promising catalysts were developed, it was necessary to test them, so the Process Research group set up a bench-scale refinery operation—actually a one-gallon-a-day hydrocracker. Research and economic studies of the bench-scale hydrocracking operation indicated the process would be commercially feasible, so the process was christened Unicracking.

PATENT ATTORNEYS: *Clearing the path.*

Research Center's Patent group began clearing away any legal obstacles to the company's use of the process, as well as building up a strong patent position on our own inventions. Complicated agreements were negotiated with a catalyst supplier for development and supply of commercial quantities of catalyst. Equally complicated arrangements were negotiated with Esso Research & Engineering Company, which was in the midst of a research program directed along lines similar to our own, and it appeared we probably would get involved in a number of patent interferences. Accordingly, an arrangement was concluded whereby we would grant licenses to each other under our patent rights, and each of us could grant licenses under our own or the other's patent rights to third parties to operate the process under a new name, the Unicracking-JHC process.

PROCESS DEVELOPMENT: *Scaling the unit up.*

A bench-scale Unicracker in a laboratory is a far cry from a 16,000-barrel-a-day refinery unit; the ratio is something like 670,000 to 1. An intermediate step was called for before scaling up the Unicracker to refinery-size proportions.

Our development engineers built a 10-barrel a day pilot plant—a semi-commercial size Unicracker—inside a three-story building at Research Center. The pilot plant was run for many months, providing reams of engineering data needed for the design of a commercial-size unit. Some of these data, for instance, led to the physical design of the reactors and their complicated internals. In addition, the pilot plant provided a firmer basis for economic evaluation of the process on a commercial scale.

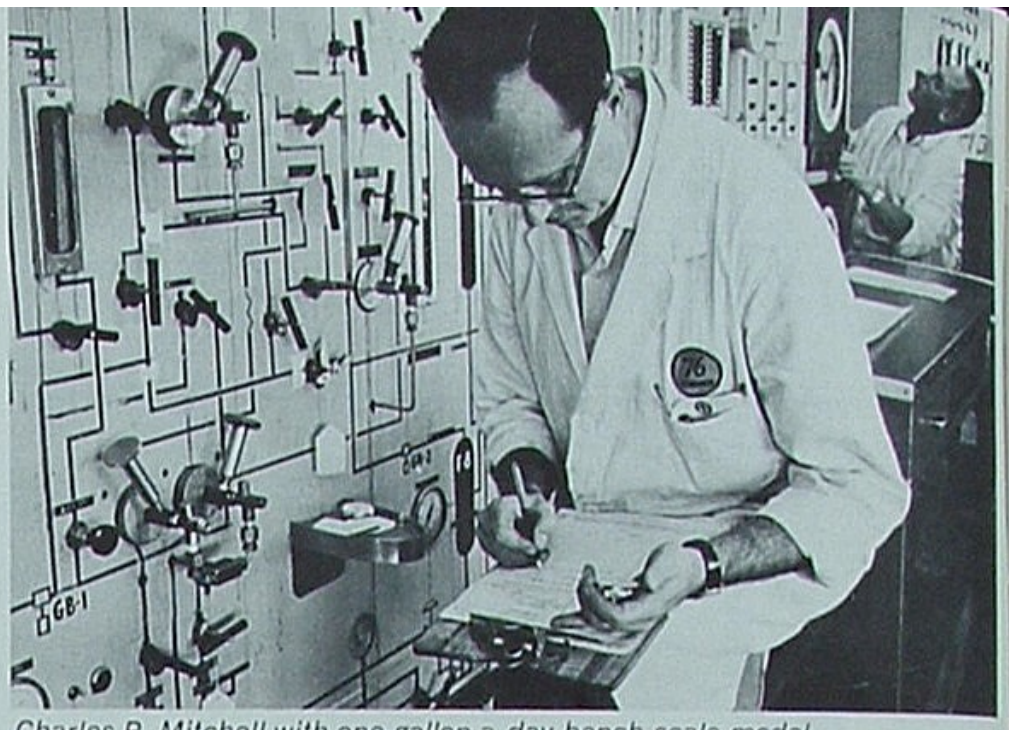
PROCESS ENGINEERING: *How big is a Unicracker?*

The Process Engineering group used data from the pilot plant studies to turn out a preliminary design basis for a commercial unit. These men sought answers to such engineering questions as: "What should the reactor size be?" "How much hydrogen will be needed?" "What should the feed rate be?" and "How much catalyst will be required?" These answers were later summed up in a 27-page booklet called a "Design Basis."

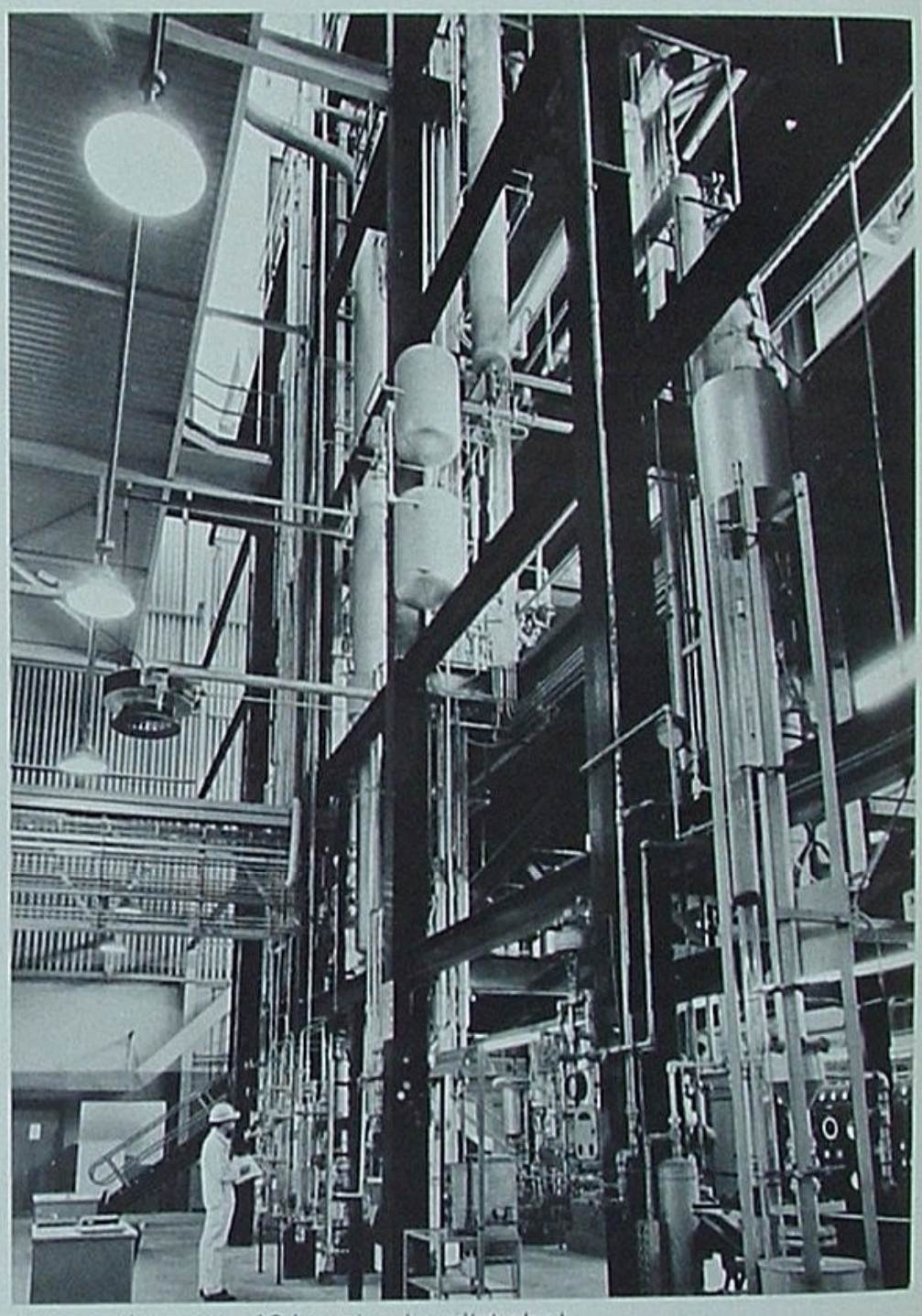
ANALYTICAL CHEMISTRY: *Tests that didn't exist.*

The Analytical Chemistry group was involved in the Unicracker project from the start, for this group does the testing and analysis for all other departmental experiments. When they were called on to make tests of chemical reactions for the Unicracker project, they learned a whole series of new tests had to be developed.

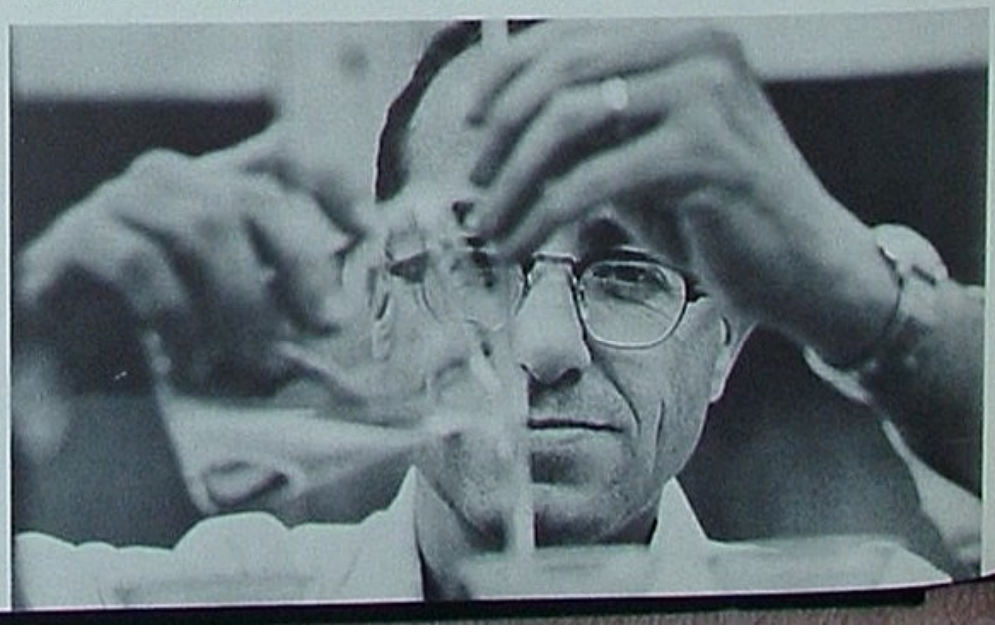
One problem in petroleum chemistry, for instance, involves



Charles R. Mitchell with one-gallon a day bench scale model.



Intermediate step: 10-barrel a day pilot plant.



Robert L. Dube, member of Analytical Group that provided testing, analysis.

determining the precise composition of petroleum stocks—both the feedstock that goes into a refinery unit and the product that comes out. Unless you know precisely what went into the unit, and precisely what came out, you can't tell what happened during the reaction. To determine the composition of petroleum samples, the Analytical group had to refine and improve existing testing methods.

Among the testing methods used by the Analytical group were gas and liquid chromatography, mass spectrometry, infra-red spectroscopy and nuclear-magnetic resonance techniques.

PRODUCT RESEARCH: *They discover a winner.*

When the Product Research group began evaluating the quality of the Unicracker's output, they discovered some pleasant surprises. For instance, in gasolines made from conventional cat cracking processes, the light ends—stocks that boil from 90 to 180 degrees (F)—usually have a relatively low knock rating, near 90 octane. This means costly additional treatment is required to bring the final gasoline blends up to the desired octane levels.

"In the Unicracker, things don't work that way," Dr. Bradley said. "In the Unicracker, the light ends measure in the neighborhood of 100 octane."

R & M PLANNING: *When and where to build.*

With such an obvious winner on hand, the Planning Department of the Refining and Marketing Division asked, "Where should a Unicracker be built?" Other questions they had to resolve included: "What feedstocks should be used." and "What would the payout be?" When these questions were answered, it was possible to say, "We can build a Unicracker at X-site for Y-dollars and it will pay out in Z-years."

MANAGEMENT: *The green light.*

Given a recommendation, backed up with yields, gasoline demands and engineering estimates, executive management and the board of directors in November, 1962, approved plans to build a Unicracker at Los Angeles Refinery. This was the big step.

ENGINEERING & CONSTRUCTION: *What does a Unicracker look like?*

The working tool that Research Center transmitted to Engineering & Construction at Union Oil Center was the same 27-page, specification-packed booklet, the "Design Basis." It outlined precise data and a schematic diagram of the Unicracking process, but it didn't show what a finished Unicracker would look like. (Of significance here is the difference between the Unicracking process—a schematic diagram—and the Unicracker itself—a huge piece of apparatus. The difference may be likened to the schematic diagram of a television set—which shows how the wiring is hooked up—and the finished television set as it is mounted in a maple chassis.)

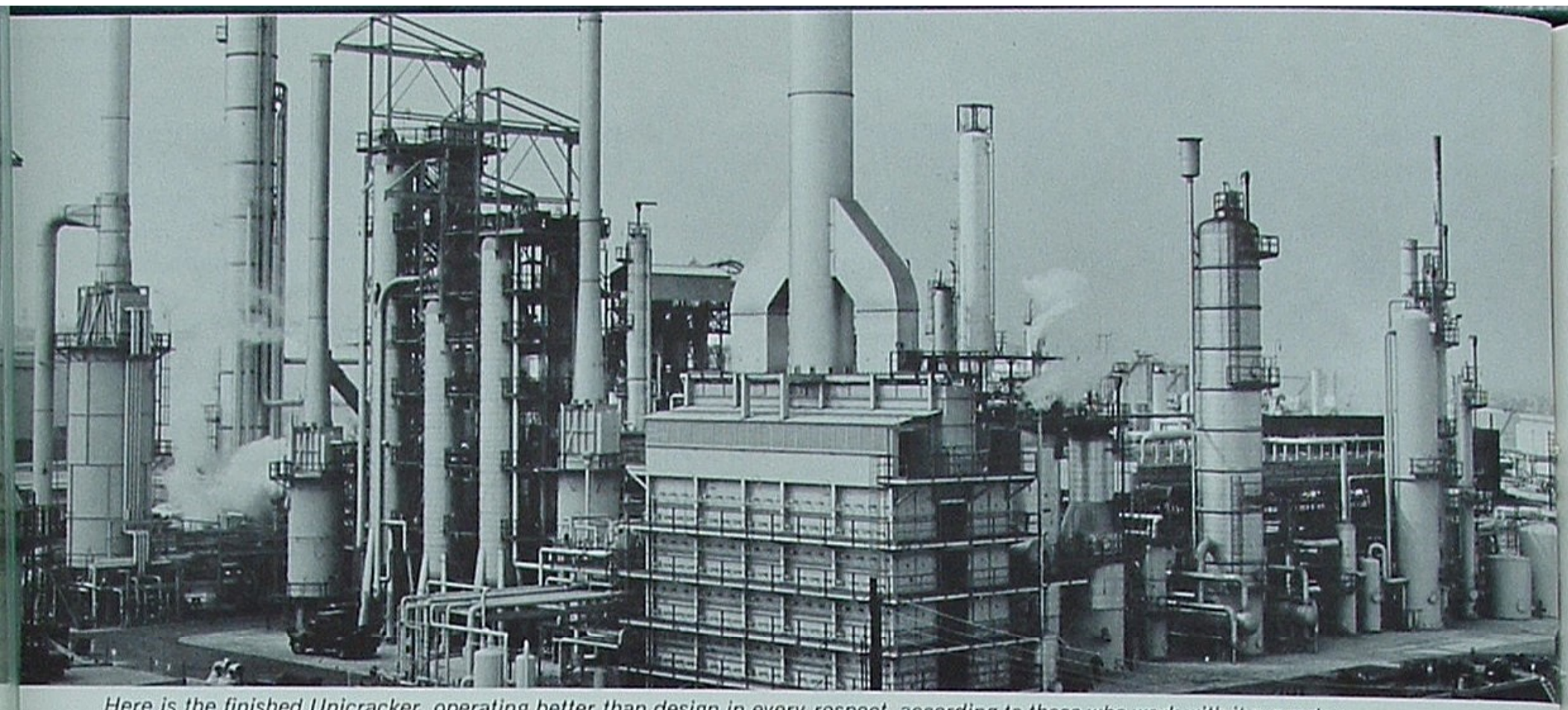
From the "Design Basis," Engineering & Construction embarked on an engineering venture that took nearly a year and resulted in the publication of some 25 thick volumes of process calculations, specifications and mechanical designs. Recorded in this more-than-a-million-word effort were such detailed items as the wording on face plates that would be installed over the dials and gauges in the Unicracker control room. Every piece of equipment was accounted for and spelled out in detail.

Actually, Engineering & Construction had gotten into the Unicracker project much earlier. When Process Engineering at Research Center was working on problems of reactor size and hydrogen feed, Engineering & Construction men were on hand to make sure the technology was available. In one instance, the size of the reactors was significant. Fabrication of one of the 350-ton reactor vessels required a year, and special railway cars had to be used to accommodate the load. A study also had to be made of rail routes to make certain that bridges and tunnels could accommodate the long and heavy reactors on their journey from Pennsylvania to California.

By the middle of 1963 contracts had been let, and work was well underway on a 3.5-acre site at Los Angeles Refinery. The C. F. Braun Company was named prime contractor to build the Unicracker and hydrogen plant; before Braun was finished about 500 of their employees were involved. The

continued

ENGINEERING: *The slim "Design Basis" had to be translated into a library full of engineering data before the Unicracker could be built. Pictured here (L-R) are C. D. Bradley, C. E. Gardner and R. A. McKean.*



Here is the finished Unicracker, operating better than design in every respect, according to those who work with it every day.

Fluor Corporation was named contractor for the offsite preparations and utility systems, major tasks themselves in a project of this scope.

In a Pennsylvania steel mill, the reactors were rolled, welded, endlessly tested and prepared for railway shipment across the nation. Pumps, valves, piping, fittings, turbines, electric motors, wiring and thousands of other items began arriving at Los Angeles Refinery from manufacturing plants across the country.

By the summer of 1964 the Unicracker had taken shape. There were three principal sections: a hydrogen plant, the Unicracker reaction sections and a conventional refinery fractionation (separation) section where the Unicracker's output could be separated into individual products or refinery stocks.

LOS ANGELES REFINERY: *Preparing for start-up.*

At the refinery, things were humming. The Technical Services group, Maintenance group and Unicracker Operations group were busy at a hundred tasks.

Refinery operators and shift engineers had to undergo a stiff training course. Classroom theory and plant tours were intermixed until all the men were ready.

In another phase, hundreds of pipeline connections had to be realigned and reconnected: Hookups for more than 30 tanks in the refinery were reorganized and realigned.

New operating procedures were a special task themselves. The operators and staff had to write detailed startup, operating and emergency procedures. Part of this involved what might happen, for instance, if electric power failed. What would operators do if a pump suddenly quit—as can happen to any piece of mechanical equipment? To find the answers, LAR engineers visited Research Center, and there the pilot plant was again fired up and subjected to torture tests. From this shakedown came information leading to detailed operating procedures for any eventuality.

THE FINAL COUNTDOWN: *Pre-startup shakedown.*

By late in the summer of 1964 activity was at a climax. Pumps, vessels, compressors and a thousand other sub-assemblies were being checked, tested and cleaned out to make sure everything would work properly. The Maintenance Division was especially busy keeping a watchful eye on the condition of all parts. Time was of essence during this period; some men worked 24 hours a day, for startup must procede on schedule.

CATALYST LOADING: *Essence of the Unicracker.*

Catalyst, being the heart of the process, was treated as carefully as if it were a set of crown jewels. The Technical Services Division at Los Angeles Refinery spent nearly a year designing the catalyst loading facilities and formulating loading procedures. To make sure everything would work when the time came, they built a mockup model to practice on.

UNICRACKER ON STREAM: *A dream fulfilled.*

Finally, one day in November, the hydrogen plant was started up, reactors were brought up to operating temperatures, and the Refinery Operating group began introducing the feedstock—a heavy gas-oil that soon would come out as high-grade gasoline. As a safety measure, the startup was begun slowly, carefully, making sure that every bolt and flange had been properly tightened.

Startup was completed late in November, 1964, and today the Unicracker is operating smoothly. In fact, most people say it is running even better than might be expected. Said John Hopkins, manager of the refinery, "The Unicracker gives every indication of being one of the most stable and efficient process units in the refinery."

A PORTFOLIO: *The inventors, builders, operators.*

On the next seven pages you will find a portfolio of pictures of many of the people who have been involved in research, development, engineering, construction, startup, operation and maintenance of the Unicracker. They, and dozens of others who couldn't be shown for lack of space, are responsible for making the world's first Unicracker the *finest*. ⑦⑥

OUR HYDROCRACKING PATENTS

Research and development leading to the Unicracking-JHC process and other hydrocracking processes has already resulted in 25 patents being granted to 18 Union Oil researchers. Here is the list:

PATENT NO.	SUBJECT MATTER	INVENTORS
2,873,246	Silica-titania hydrocracking catalysts	R. C. Hansford D. A. Young
2,885,349	Chromium sulfide hydrocracking catalysts	R. C. Hansford
2,911,356	Hydrocracking nitrogen-containing feeds	R. A. Hanson
2,983,670	Hydrocracking with X-molecular sieve catalysts	Dr. F. Seubold*
3,008,895	Hydrofining-hydrocracking-reforming combination	R. C. Hansford A. E. Kelley
3,053,754	Aluminum phosphate-BF_3 hydrocracking catalysts	R. C. Hansford
3,053,755	Hydrocracking with silica-zirconia-titania catalysts	R. C. Hansford D. A. Young
3,088,908	Aluminum phosphate-SiF_4 hydrocracking catalysts	R. C. Hansford
3,099,617	Hydrocracking catalyst pretreatment	Dr. A. J. Tulleners
3,119,763	Hydrocracking catalyst pretreatment	Dr. R. H. Hass Dr. A. J. Tulleners
3,120,483	Silica-zirconia hydrocracking catalysts	R. C. Hansford D. A. Young
3,132,086	Hydrocracking process with pre-hydrogenation	A. E. Kelley W. I. Barnet
3,132,087	Two-stage hydrocracking process	A. E. Kelley F. C. Wood W. I. Barnet
3,132,089	Hydrocracking process with pre-hydrogenation	Dr. R. H. Hass C. P. Reeg
3,132,090	Hydrocracking process with control of sulfur concentration	Dr. P. F. Helfrey N. L. Kay B. Peralta C. P. Reeg
3,132,091	Hydrocracking catalyst regeneration	D. A. Young
3,147,206	Hydrogen-donor hydrocracking process	Dr. A. J. Tulleners
3,147,207	Slurry-catalyst hydrocracking process	Dr. T. F. Doumani
3,147,210	Countercurrent hydrocracking process	Dr. R. H. Hass C. P. Reeg F. C. Riddick
3,147,227	Aluminum phosphate catalyst preparation	R. C. Hansford
3,159,564	Hydrofining-hydrocracking combination	A. E. Kelley R. P. Vaell T. V. Inwood
3,159,567	Hydrocracking of paraffins	D. A. Young
3,159,568	Integral hydrofining-hydrocracking process	F. C. Price* Dr. A. J. Tulleners C. P. Reeg
3,159,569	Promoted silica-zirconia-titania hydrocracking catalysts	R. C. Hansford
3,159,588	Silica-zirconia-titania hydrocracking catalysts	R. C. Hansford

* No longer with Union Oil Company


W. J. Barnet


T. F. Doumani


R. C. Hansford


R. A. Hanson


R. H. Hass


P. F. Helfrey


T. V. Inwood


N. L. Kay


A. E. Kelley


B. Peralta


C. P. Reeg


F. C. Riddick


A. J. Tulleners


R. P. Vaell


F. C. Wood


D. A. Young

PATENTS PENDING

In addition to the 18 who have patents granted, 10 other Union Oilers have patents pending for the hydrocracking process. They are Dr. J. H. Ballard, Dr. W. E. Bradley, Dr. N. C. Ch'in, J. H. Duir, J. E. Hines, V. E. Stiles, Dr. D. M. Waldorf, C. G. Wight, H. F. Wilkinson, and B. J. Young.

RESEARCH CENTER

This portfolio of pictures depicts some of the many dedicated Union Oilers who participated in the Unicracker project from its inception more than a decade ago. On the preceding page are some of the inventors. There follow six pages of pictures of people at Research, in Engineering & Construction and at Los Angeles Refinery.

Managers


W. J. Baral


W. E. Bradley


H. C. Huffman


A. E. Kelley


M. W. Lee


R. P. Vaell

Process Research


S. K. Alley


E. C. Attane


N. Ch'in


R. C. Hansford


M. P. Harrington


R. H. Hass


P. F. Helfrey


G. W. Hendricks


T. V. Inwood


N. L. Kay


C. P. Reeg


R. L. Richardson


F. C. Riddick


V. E. Stiles


A. J. Tulleners


C. G. Wight


D. A. Young

Process Development


J. H. Ballard


W. I. Barnet


G. D. Cheadle


R. O. Dhondt


O. C. Eubank


L. S. Henderson


J. E. Hines


N. D. Koch


B. Kouzel


B. Peralta


M. M. Ralston


D. M. Waldorf


C. C. Walters


F. C. Wood

Process Engineering


R. F. Deering


J. H. Duir


D. A. Gaudio


J. L. Lafferty


H. C. Meiners


H. E. Rea


C. J. Welsh


H. F. Wilkinson


B. J. Young

Analytical


D. O. Alford


B. E. Buell


L. W. Burdett


J. H. Galey


E. Goldish


H. E. Howard


G. R. Lake


U. Niwa


L. R. Snyder


J. W. Ward

ENGINEERING & CONSTRUCTION

Managers


R. H. Bungay


C. E. Gardner


C. R. Mickelson


P. W. Morgal


E. M. Parkin


J. R. Pownall

Supervisors


J. J. Heller


R. A. McKean

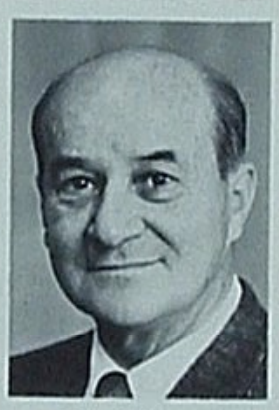

F. G. Pierce

Engineers


C. D. Bradley

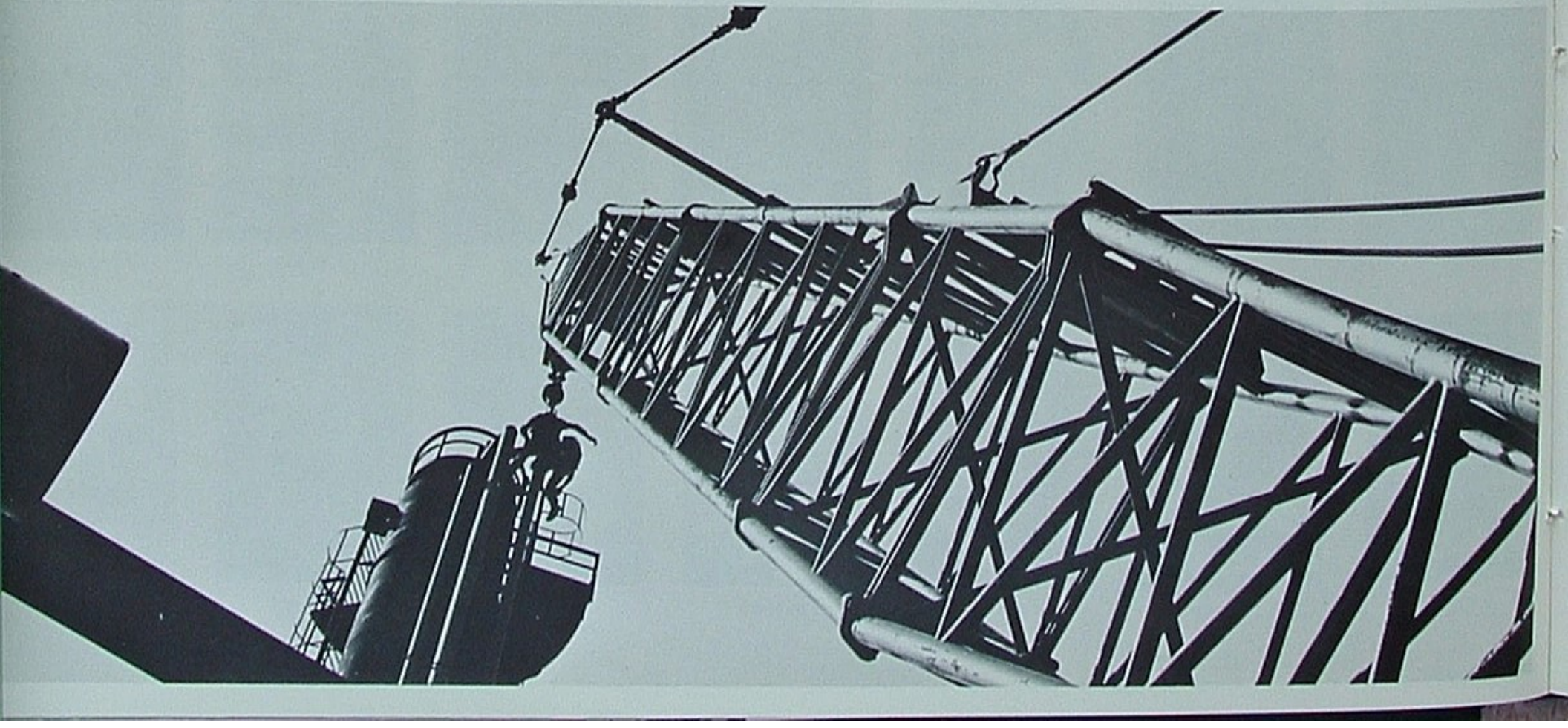

W. H. Holmes


W. C. Lieffers


M. L. Michaud


R. R. Runge


W. J. Tomsic



LOS ANGELES REFINERY

Administration


R. Brown


P. J. Fryar


T. H. Gaines


C. J. Goyette


J. M. Hopkins


M. H. Mangold


J. R. Mortensen


G. H. Orr


W. H. Page


W. N. Stark


A. A. Totten


F. Van Acker


F. R. Watts

Maintenance


W. G. Allenbaugh


O. A. Buckalew


R. L. Buckalew

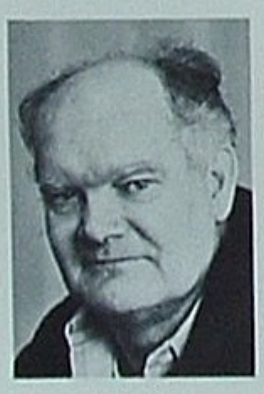

R. E. Cakebread


S. C. Cerveny


W. Eichholtz


S. P. Goyette


H. J. Gregg


D. F. Hill


J. R. Hubbard


J. N. Kovaly


L. Ledbetter


J. Mackey


F. C. Monroe

LOS ANGELES REFINERY *continued*

Maintenance


A. M. Palmer


T. A. Peterson


L. M. Ritchie


R. C. Sangster


S. F. Sawyer


F. J. Schleibaum


E. W. Schroeder


T. B. Shepherd

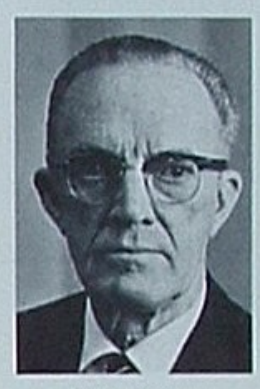

H. A. Sisk


W. H. Welch


W. C. Woron


H. C. Wrigley

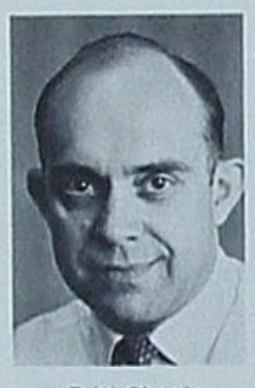
Technical Services Division


M. W. Adcock


E. W. Alverson


H. M. Brandt


D. M. Chaffee

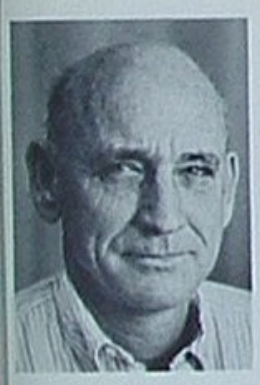

R. W. Chapin

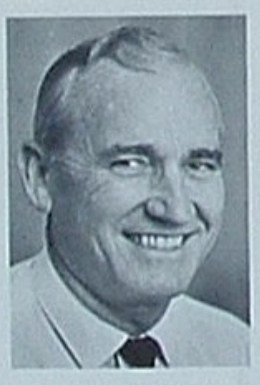

J. E. Coler


E. C. Evans


W. P. Field


N. T. Foster


A. J. Gilchrist


W. J. Harbert


L. R. Keller


L. S. Knudsen


E. F. Langevin


G. E. Moller

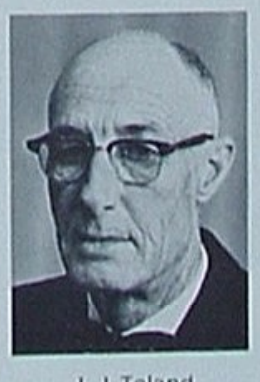

W. Pollard


J. D. Roberts


M. B. Southwick


W. E. Stennett


M. Strader


L. I. Toland

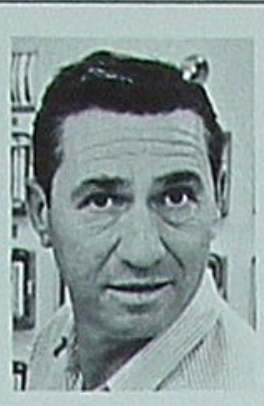

H. D. Tupper


P. J. Williams

Unicracker Operations


T. T. Aarup


R. M. Barnes


R. W. Barnes


A. D. Baty


G. S. Baumgartner

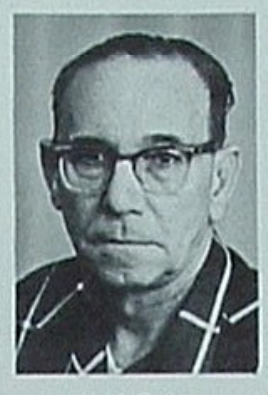

R. A. Campbell


E. W. Commander


D. Eichman


D. Ferrante


D. N. Geiger


W. H. Golay


D. L. Hanley


F. K. Hull


H. H. Jones


W. J. Lewis


J. E. Linebarger


R. W. Lofstrom


C. Macho


D. Marshall


L. R. Mote


C. O. Munson


O. F. Noss


M. G. Olson


E. B. Pedersen


C. W. Rogers


C. F. Smith


H. R. Smith


C. Sullivan


R. W. Tolle


J. L. Weaver

BUSINESS HIGHLIGHTS

THEY MOVE THE EARTH

Construction of Interstate Freeway 5, which parallels U. S. 99 from Seattle to Los Angeles, is responsible for new highway earthmoving statistics in western Washington, particularly in the Seattle area.

Records have consistently been broken in yardage of dirt removed, contract dollar awards and, of course, consumption of petroleum products. As an example, three sections now under construction require the removal of more than eight million cubic yards of dirt. Union Oil is serving five of six contracts that were let to build Interstate Freeway 5 through Seattle.

VANDENBERG FREEWAY

Ten miles of four-lane freeway are under construction between Orcutt and Harriston Junction in Santa Barbara County, California. When finished in 18 months, this will be the third segment to be completed of a Santa Maria-Vandenberg AFB freeway route.

The $4,250,000 contract was awarded by the state of California to a joint venture group consisting of Miles & Sons of Merced, California, and the M. M. Sundt Construction Company of Tucson, Arizona. Union Oil will serve the petroleum requirements of these contractors on this project.

PROFIT IN SCRAP

Last year the Surplus Material Sales section of our Purchasing Department turned scrap and surplus materials into dollars. Some 5,400 tons of unwanted materials were sold for a profit of $405,000.

Finding the right scrap dealer or contractor helps. When we closed our Orcutt Refinery, a contractor paid us $2,850 for 700 tons of junk tanks, boilers and other hardware left there; he also leveled and cleaned up the site. The next lowest bidder wanted us to *pay him* $8,900.

The wheels of progress make outmoded equipment surplus. The electrification of our Santa Maria and Brea wells, for instance, resulted in 148 gas engines becoming surplus. They were sold for $5,182. At Los Angeles Refinery, an obsolete 120,000-barrel riveted steel storage tank, weighing 470½ tons, was sold by the ton—bringing in $10,900.

When disaster strikes, it is sometimes necessary to make the best of it. At Whittier, Alaska, where our terminal was destroyed by earthquake and fire, Surplus Material Sales negotiated a contract with a Portland, Oregon, scrap dealer to clean up the mess. Owing to the location and condition of the salvage, we have to pay the contractor a fee in addition to the allowance of $12,500 he has made for the value of the scrap.

DEEP WATER DRILLING BARGE

Currently being completed in Louisiana is *Ocean Master I*, the world's largest ocean-going, jackup-type oil drilling barge. It is rated for drilling in 312 feet of water, and is under contract to Union Oil and Mobil Oil companies.

Jackup drilling barges are used to drill in unproved territory; should oil production be encountered, a permanent steel platform will be built. One advantage of a portable barge is that it

can be moved away if the hole is dry. Jackup drilling barges are towed to the drill site by a seagoing tug; then huge sea legs are extended downward, hoisting the barge high and dry over the water during drilling. When finished, the hull is lowered to the water level, the sea legs are lifted, and the barge can be towed to a new site.

In the August-September 1963 issue of SEVENTY-SIX, we reported on what was then the world's largest jackup barge, the *George F. Ferris,* which is rated for 200 feet of water and has been drilling in the offshore California area.

Ocean Master I, with its 312-foot rating, exceeds the *Ferris's* capacity by 112 feet. *Ocean Master's* sea legs are 460 feet long; the barge costs $6 million, draws 23 feet of water while floating, is 211 feet long, 208 feet wide, and is powered by six 1,000 h.p. diesel engines. *Ocean Master I* is the first of four 300-foot capacity rigs being built this year; it was constructed by LeTourneau for Loffland Brothers and will drill for our Gulf Division this summer.

METERS MEAN MONEY

In the refining industry, meters mean money, for in their care is trusted the measurement of our product, and it is this product that brings our money.

In all meter calculations, extreme care is taken. The requirements for meter installation are rigid. Yet, even with this constant effort, the best accuracy to be expected in the majority of installations with orifice-type meters is plus or minus two per cent.

Today this latitude is often too great. Today's refinery processes are too complex; it is necessary to have a greater knowledge of the composition and quality of our products. To achieve the necessary accuracy, refinery men are turning to the turbine flow meter.

This meter utilizes a turbine rotor installed inside a pipeline; as the fluid flows, the rotor blades turn, producing an electrical signal which is transmitted to a digital read-out device.

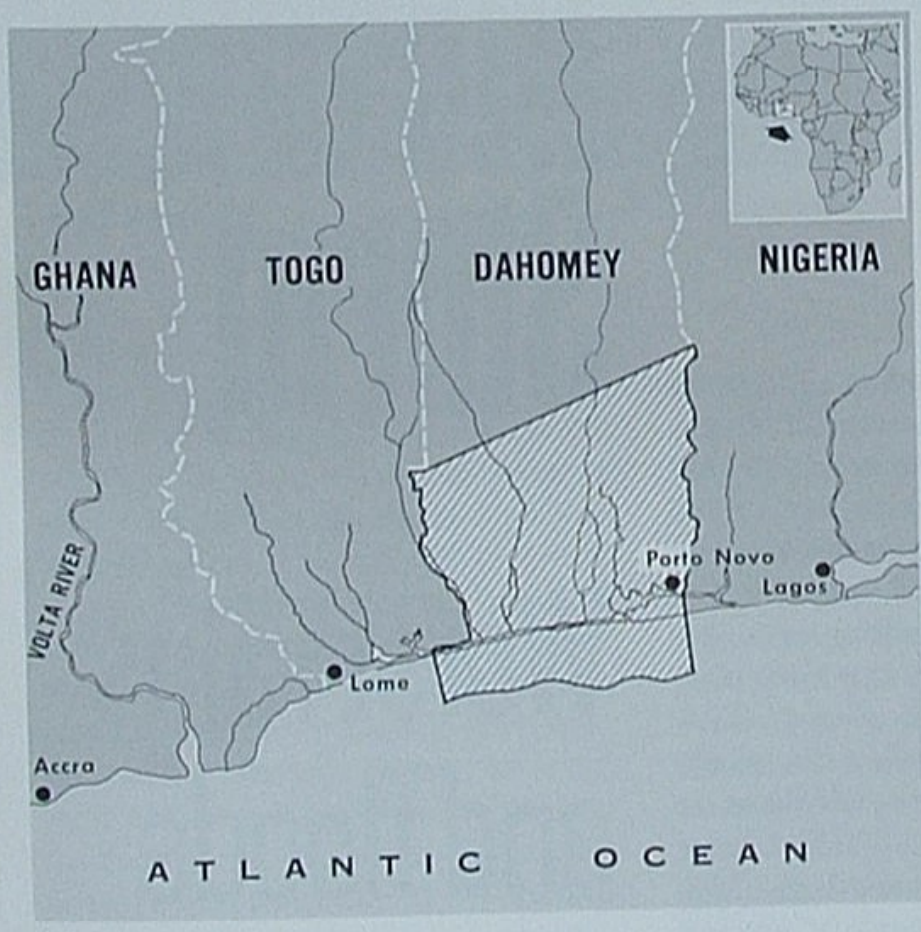
Whereas the orifice-type meter has an accuracy of plus or minus two per cent, the turbine flow meter can bring accuracies to within plus or minus one-half of one per cent. Moreover, the turbine meter provides a convenient means of data reduction and the possibility, if desired, of computer control.

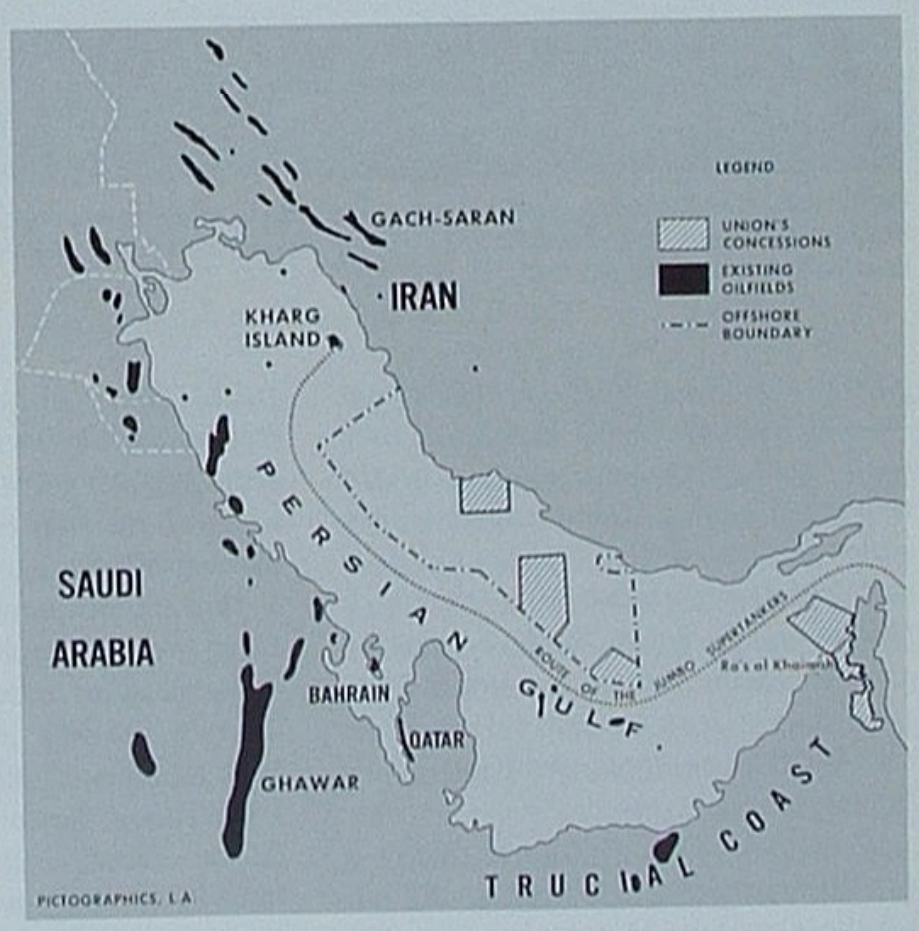
Inasmuch as there is no branch piping with the in-line turbine meter—as there is with the orifice-type meter—the possibility of hazards from leaks is reduced. These advantages mean the outlook for turbine meters is good. Such devices are becoming increasingly necessary to help the company maintain a competitive position in an ever-more competitive market.

INGENUITY PAYS OFF

Cost consciousness pays off. One recent accomplishment in the Marketing Department is of interest. A new regulation issued by the Los Angeles County Air Pollution Control District requires installation of submerged fill pipes on all underground storage tanks at service stations. The purpose is to stop gasoline vapors from being vented to the atmosphere.

To comply with the new regulation, all gasoline tanks at service stations would have to be filled through input pipes that extend below the liquid level of the storage tank. Normally, to make this change, existing fill caps would have been removed and new ones provided. Marketing Engineering, however, in cooperation with the operations group of the California South Coastal Division, devised a way to fit into the existing fill pipe a sleeve that extends below the liquid level. The method of fitting this sleeve was done in such a manner that it did not disturb the ordinary fill caps.





Map on left depicts Union's 3.7 million acre concession in Dahomey, West Africa. A seismic crew has been mobilized to study the offshore area. Operations are expanding in the Middle East too. Map on right shows 2 million acres—in three blocks—granted by Iran to Union, Atlantic, Sun and Murphy. To the east, on the Trucial Coast, is Union's 1.1 million acre Ras al Khaima concession. Seismic work conducted on Trucial Coast last year is being evaluated. Note also Kharg Island, where our jumbo supertankers load.

UPI PHOTO

NORTHERN CALIFORNIA: *The Eel River laid waste to an 85-mile long area from Garberville to Ferndale; Union Oilers used ingenuity to deliver products over washed out bridges.*

The Great Pacific Northwest Storm

Worst rains and floods this century

CONTRACTOR S. H. DUFF hopped out of the cab of his low-boy truck; there in the pre-dawn rain he wiped the green sleeve of his timber-cruiser jacket across a tired, whiskered face that hadn't seen a razor in 36 hours. On two hours notice, he had loaded a crawler-tractor onto the low-boy in Portland and driven to Starvation Falls Creek, 75 miles up the swollen Columbia River.

Starvation Falls Creek, normally a placid stream that bubbles merrily out of the Cascade Mountains into the Columbia River, was a rampaging torrent, carrying boulders as large as a desk. Dead trees, timbers, rocks and rubble were piling up at the Union Pacific railway bridge—one of dozens the contracting firm of Steelman & Duff of Portland was committed to defend along the Columbia and Umatilla Rivers.

A waiting tractor operator, who had taken shelter from the pelting rain under a Douglas fir tree, walked up to his boss.

Duff, pointing down to the railway bridge, shouted, "Get this cat down there and clear out the rubble before the water carries out the road bed." The operator fired up the big tractor and began dozing his way down to the pile of logs and trash that had dammed up behind the bridge. Within the hour, he had the passage clear.

OREGON FLOODS: *The countryside was a confused pattern of wet and dry areas; a few inches in elevation saved many homes.*

The scene was one of hundreds in the Pacific Northwest during December and January when warm rains came to melt a record accumulation of snow in the mountains, touching off the worst floods of the century. A series of storms had rained vengefully on Oregon, Washington, Idaho, Northern California and Nevada, transforming dry river beds into raging streams. Under the seemingly endless pelting of rain, the snow foamed into angry, trash-laden flash floods that inundated hundreds of towns and drove thousands from their homes.

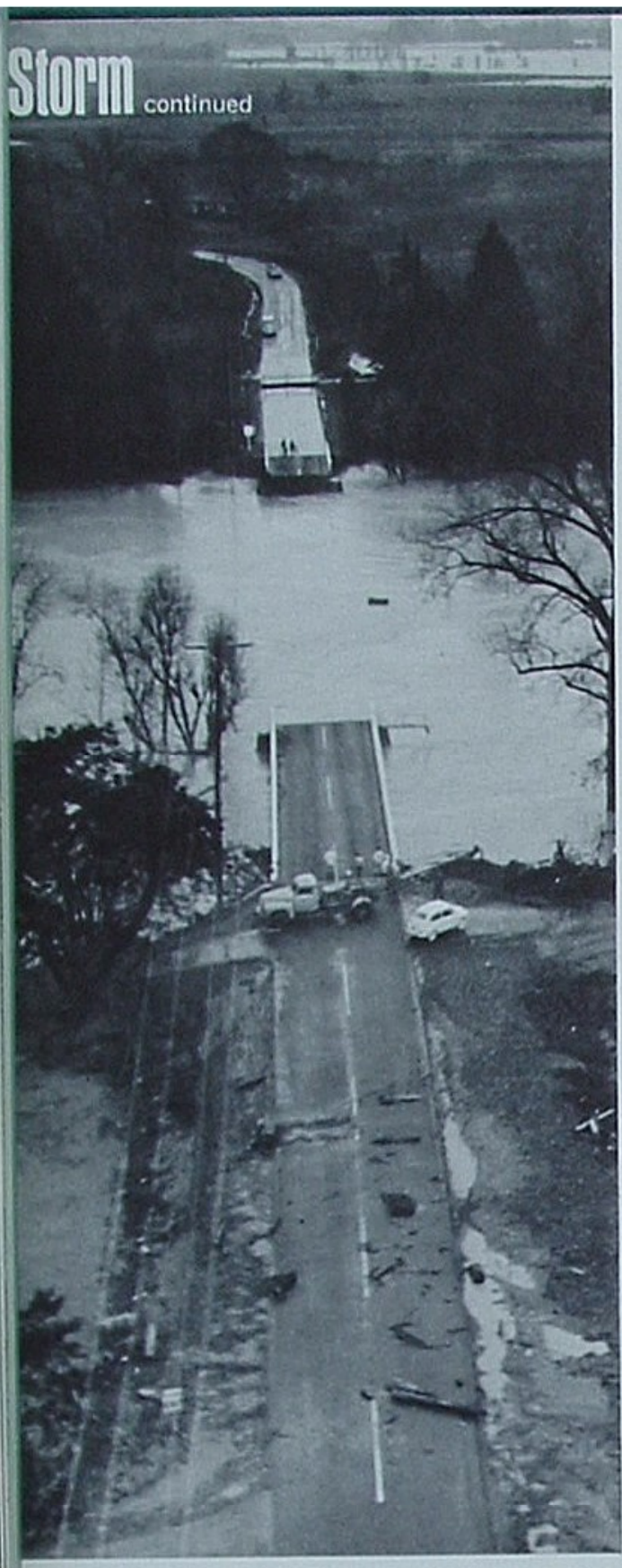
Union Oil dealer Larry Hamm of Keizer, Oregon, a suburb north of Salem, described the chaos along the Willamette River:

"The countryside was a confused pattern of wet and dry areas. Many people couldn't believe the Willamette would overflow. A few inches in elevation made the difference between grief and relief. One boy built a backyard playhouse on stilts. After the flood the boy's playhouse was standing, but his parents' home was washed off its foundations."

In Northern California, the damage was likened to the aftermath of an air raid. Consignee Larry Renner of Garberville, situated on the Eel River which smashed a dozen communities in its rampage, said, "Damage in Weott, Pepperwood and Myers Flat was beyond description." For 85 miles along U.S. 101 —the Redwood Highway—the Eel River was a foaming torrent, carrying an estimated million cubic feet of water seaward every second. All towns along the Eel River valley were evacuated; at Rio Dell sirens blew all one night summoning the able-bodied.

During the flood, Pepperwood was a log jam in a sea of muddy water. Today the town no longer exists; one sees only broken lumber, an occasional battered car. Mud and silt up to five feet deep bury the rest of the tragedy. Klamath and Requa, near the mouth of the Klamath River, were similarly laid to waste.

continued



BRIDGES OUT: *Hundreds of bridges were washed out, giving truck drivers their share of flood-inspired adventures.*

The rampaging floodwaters brought strange sights and eerie quirks. At Phillipsville, the force of the Eel River drove a fir tree under the paved surface of U.S. 101 like a broom handle shoved under a carpet. The wheel of a U.S. Army rescue helicopter that went down with the loss of five lives in Dyerville, California, was found at Coos Bay, Oregon. A black Angus steer swept to sea by Redwood Creek near Orick, California, was found—alive—in a log jam in Crescent City harbor.

Bill Heath, consignee at Grants Pass, Oregon, saw a 1964 Mercury floating upside down along the Rogue River. As Heath crossed the Rocky Point bridge, the auto suddenly turned nose up and struck the bridge with all four wheels, then sank. At Myrtle Creek, Oregon, consignee Don Clark of Riddle told of Steelhead salmon swimming over Interstate Freeway 5.

Every day there were grave emergencies. In one case, The Dalles (Oregon) General Hospital called manager of operations Frank Lord in Portland to report dangerously low stocks of fuel oil. The temperatures were below freezing, and there was no supply other than in Portland.

Lord called on Portland Motor Transport, a trucking firm that delivers for Union Oil on long runs. They, in turn, called on Sam Tindall for the job. This was a fortunate choice since Tindall, who has been jockeying big rigs all his adult life, knows the Oregon mountains like the back of his hand. Also, he doesn't give up easily.

Tindall loaded his White Freightliner with the legal transport limit, 6,700 gallons, and proceeded east to Troutdale, where he was halted by snow. Undaunted, he returned to Portland, crossed the Columbia River to the Washington side and maneuvered to Washougal, north of Troutdale, where snowbanks again blocked his way.

While backtracking to Portland a second time, Tindall thought of the patients at The Dalles Hospital, and vowed he would get through. At Portland, he wheeled southeast on Highway 26. When snow slides stood in his way, he crashed full-speed right through.

At Mt. Hood, Tindall found the road north to the Columbia River firmly packed with snow. The road east to Maupin was likewise closed, so he continued on U.S. 26 to Madras—in Eastern Oregon—whereupon he turned north and paralleled the Deschutes River to The Dalles.

Dispatcher Clayton Copeland of Portland Motor Transport said, "Sam crossed three mountain summits on that trip. He used every one of his 15 speeds forward and wished for more. He forded streams, plowed through snow banks and wheeled around icy curves. Ordinarily the trip is 83 miles but Sam covered 284 miles on that run."

Throughout the storms, Union Oil dealers performed yeoman service. In Albany, Oregon, dealer Jerrell Adair turned his station over to his brother, Bruce, and set out in an outboard to rescue neighbors. "Adair went 68 hours without sleep," said Kirk Cloepfil, retail sales supervisor in Eugene.

In Keizer, near Salem, dealer Larry Hamm set up a food station and operated a central clearing house for police and rescue workers. Hamm, a member of the Keizer Volunteer Fire Department, said, "Many of the 4,200 evacuees were removed to the Oregon State Fairgrounds. Some took only their clothes; others stripped their houses bare, removing even the wall-to-wall carpeting. Still others carried Christmas trees and gifts, determined to celebrate Christmas even if it wasn't a joyful one."

Like many others Hamm kept his station open even though the business district was closed to all traffic. "At least people could come in to get warm and use the phone," Hamm said.

Other Union Oilers dug down into their pockets to aid storm victims. In Stevenson, Washington, at the north side of the Bonneville Dam, consignee Keith Neyland drove out the Evergreeen Highway to help a truck driver who was stranded without gasoline. Neyland fueled the truck, loaned the driver $20 for food and lodging, then broke snow with his truck to lead a convoy of 40 cars and trucks to safety.

Amateur radio operators helped keep communications links open. When the telephone line to Wasco, in Eastern Oregon, was severed, a local ham operator made a radio patch with the telephone system to provide emergency communications. Consignee Bob Myers, worried about fuel shortages, called Portland on this emergency link to discuss possible rationing.

When electric power failed, Union dealers used ingenuity to restore power to their pumps. In Happy Camp, California, dealer Ron Boren bought a welding outfit and used the auxiliary power unit to operate his station for two weeks. Boren's needs were pressing, for he was a supply point for Civil Defense and military rescue workers.

Flood waters forced closure of several stations and bulk plants. At Reedsport, Oregon, where the Umpqua River feeds into the Pacific, dealer Cliff Washington watched helplessly as three feet of water flooded his station, forcing him to close for eight days. In Lebanon, Oregon, an irrigation dam burst and flood waters poured into a canal that runs behind dealer Prentis R. Spier's station, washing him out for four days. In Clatskanie, between Portland and

UPI PHOTO

RIVER'S RAMPAGES: *In Keizer, near Salem, Oregon, the Willamette River overflowed. Union Oilers helped rescue efforts.*

LOG JAM: *Pepperwood, California, was described as a log jam in a sea of muddy water. Consignee Larry Renner said damage was "beyond description." Today the town no longer exists; only broken lumber remains to mark the site.*

Astoria, water overflowed U.S. Highway 30, forcing dealer Wayne Pugh to close his station temporarily.

Consignee Chet Naslund of Norway, Oregon, was closed for three days when waters from the south fork of the Coquille River blocked access to his bulk plant. He was fortunate, however. A competitor's bulk plant lost three bulk tanks to the river. Further north, the Coos Bay terminal, newly resupplied by ocean barge, had to close for a week because of high water.

Only one station bearing the Sign of the 76 was destroyed—it was owned by Lester Terry of Grants Pass, Oregon, and was situated on the banks of the Rogue River. Terry's station and auto court were inundated by 18 feet of water, and when last seen the station was floating down to sea.

Northwest of Roseburg, Oregon, the Umpqua River flooded Charles Updegraff's general store and contaminated his gasoline tanks with muddy water. Also ruined were foodstuffs, feed grains, seeds and other store supplies. The Updegraffs themselves were stranded for 24 hours in three feet of water, until rescued by a helicopter.

Nor was this their only blow. Earlier they had remodeled a house along the Umpqua River and sold it, receiving a small down payment. The river swallowed the property—house, lot and all. The discouraged buyer let the place revert; it was nearly a total loss to the Updegraffs.

Hundreds of bridges were washed out, giving tank truck drivers their share of adventures. Driver Brad Flowers of the Eugene Terminal, on a delivery up the McKenzie River, was trapped upstream when a bridge collapsed. John Lessel, commercial salesman at Eugene who was in the area at the time, gives this account:

"It was raining – six inches in three hours – so fast you could see the McKenzie rising. Logs, lumber, houses, chicken coops and trash came charging down the river faster than you could drive."

Shortly after Flowers crossed the bridge, an acre of wreckage came plummeting down the river, upending one part of the bridge. "Every route to Eugene was cut off," said Lessel. "The upper McKenzie was isolated."

Luckily, Flowers managed to get back –across a makeshift catwalk—but they couldn't get the truck back for a week.

Maintaining distribution to hard-pressed consignees and dealers was heartbreaking. Frank Lord, manager of operations in Portland said, "We threw away the book; normal supply procedures had to be junked. When we got Coos Bay resupplied, floodwaters cut it off. Klamath Falls, normally supplied with heating oils via rail from Chico, California, had to be supplied out of Eugene. We couldn't get tankers into the Columbia River because a ship's wake might spill over the flood banks and breach the levees."

In California, damage to bridges along the Eel River posed a special supply problem. Old highways, newly built freeways and bridges had been swept away in the maelstrom of the Eel River. To supply Redwood Highway communitees, driver Gerald Goyan of Eureka and consignee Larry Renner of Garberville worked out a special relay system. Goyan would drive south from Eureka along a 15-mile long, mud-rutted logging road to Rio Dell, where the Rio Dell-

FLOODED OUT: *Several dealers, consignees and terminals were flooded. Here is one: Wayne Pugh's station in Clatskanie, Oregon.*

PIGGYBACK: *Consignee Jack Crescenzi of Chemult, Oregon, made deliveries aboard a Southern Pacific flatcar.*

UPI PHOTO

RIO DELL, CALIF: *To deliver six truckloads of petroleum products across this washed out bridge, Gerald Goyan and Larry Renner used a special relay system, pumping from one truck to the other across the span.*

Scotia bridge had washed out.

Meanwhile, Renner would drive 42 miles north to Scotia. There, rescue workers had strung a catwalk across the bridge. Goyan would drag a hose from his truck across the catwalk to where Renner's truck was backed up. Then they would pump gasoline across the span to Renner's truck.

The drive back to Garberville was no picnic, either. Much of the new freeway was washed out or damaged and several bridges had taken so much punishment from log jams they could be crossed by only one vehicle at a time —and that at 5 m.p.h.

Before the Scotia Bridge was repaired, Goyan and Renner transferred six truckloads of gasoline, oil and grease using their relay system. During this period, Renner had the only petroleum products available to the devastated Eel River valley.

Other Union Oilers were ingenious too. In Chemult, Oregon, north of Crater Lake, consignee Jack Crescenzi was called on to deliver a truckload of fuel oil to the Southern Pacific Railroad at Crescent Lake where the storm had wiped out a million dollars of railway track. Crescenzi, aware that the highway was washed out, loaded his truck aboard a flatcar of a Southern Pacific work train and rode high and dry to the repair scene.

Likewise, when a washout prevented Estacada consignee Jack Woodward from delivering heating oil to Three Lynx, a consignee in Eastern Oregon, Al Troutman of Maupin, filled the breach. Mrs. Troutman describes the episode:

"The Pacific Power & Light station and a local Forest Service ranger station were running out of heating oil," she said. In Oregon, where heating oil is a necessity of life, the timely arrival of a heating oil truck was cause for concern by some 150 persons there.

Driver Marvin Wall, Troutman and his wife climbed into their tank truck at Maupin, drove over snow-clogged forest service and logging roads to the Cascade Summit between Mt. Hood and Mt. Wilson. Beyond was Three Lynx, virtually isolated.

"We took along a two-way radio to keep in touch," Mrs. Troutman said. "The Highway Department sent a rotary snow plow to clear the way."

Keeping bulk plants in operation involved physical danger for many Union Oilers. In West Stayton, Oregon, southeast of Salem, consignees Buz Bryant and M. F. Cox served everyone on a 24-hour basis. In addition to their West Stayton plant, Cox & Bryant operate the Greystone bulk plant 50 miles up the North Santiam River where they serve the communities of Detroit and Idanha. Giant washouts had ripped away miles of mountain highway on all sides of Detroit and Idanha, isolating the two towns for eight days. Their only petroleum was in the Greystone plant.

Every day for more than a week, Bryant drove his pickup truck 35 miles up the slushy North Santiam highway to a washout near the Detroit dam reservoir. There he boarded an outboard motor boat and churned up the flooding and rubble-strewn reservoir to Detroit. At night, when it was too dangerous to navigate the reservoir, Bryant hiked over a mountain to his vehicle.

Flood victims weren't content to sit idly by while the floodwaters ravaged their homes and communities. They actively battled the storms and overflowing rivers—in many places they won. Even while the rains pelted down, men turned to and shored up river banks.

Levees and dam construction were a big help. Residents of Yuba City and Marysville, California, mindful of the Christmas 1955 Feather River flood, kept a watchful eye on the water's level. According to Jack Kent, then commercial sales manager in Sacramento, the still-uncompleted Oroville Dam helped. (For Oroville Dam, see SEVENTY-SIX, May 1964.) The dam, now 500 of its ultimate 735 feet high, held back 50,000 cubic feet a second of Feather River floodwaters.

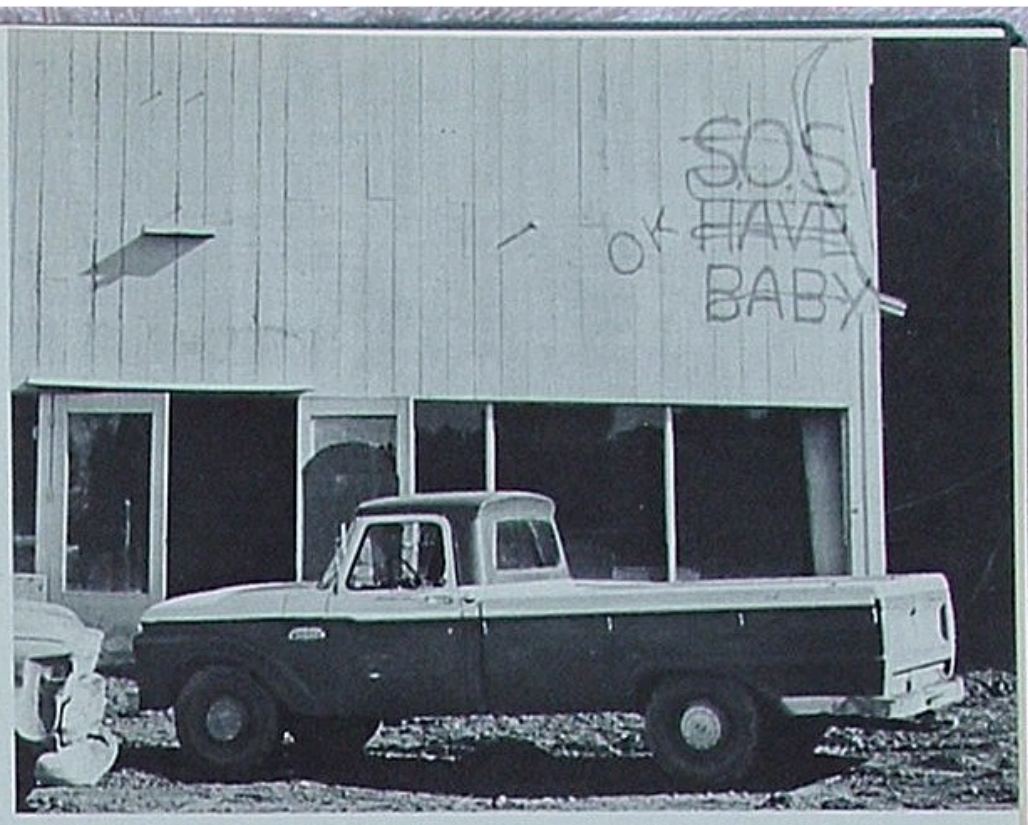
"As a result," Kent said, "a lake built up behind the dam. If it hadn't been for that construction, we might have been far more seriously flooded." Consignee Pat Patterson of Marysville agreed. "We pinned our hopes on the levees built since 1955," Patterson said. "They held, partly due to construction on the dam." Even so, Patterson pointed out, 20 square miles of rich Yuba County farmland were inundated by floodwaters.

In battling the floods, petroleum-powered mechanical equipment proved its worth. In Orick, California, dealer Glen Fisk credited the local highway department with saving his community.

"Both Klamath and Requa were

UPI PHOTO

JOHN DAY BRIDGE: *Accumulation of logs and debris carried away center span of John Day River bridge where it empties into Columbia River. Old bridge and U.P. rail span stood.*



DRAMATIC MESSAGE: *Plight of Harold Lord family in Klamath, California, was dramatized by spray paint message on wall. Everyone was rescued, as "O.K." indicates.*

wiped out," he said, "because a quarter of a mile of logs and rubble piled up behind the bridge. When the pressure got too great, the bridge collapsed, flooding the towns.

"Here in Orick, the local highway department superintendent kept the bridge over Redwood Creek clear of rubble. When logs started piling up, he got a 'dozer to free them. Thanks to him, Orick was saved."

Elsewhere, too, mechanical arms came to the aid of flood victims. East of Portland, the contracting firm of Steelman & Duff helped save the Union Pacific right-of-way along the Columbia and Umatilla rivers. Said S. H. Duff, the man who trucked a 'dozer out to Starvation Falls Creek, "As long as we could keep the water flowing under bridges, we knew the damage would be reduced."

To save the railroad's right-of-way and maintain a line of communication with Portland, Steelman & Duff called on a large assortment of petroleum-powered 'dozers, helicopters, drag lines, dump trucks, track loaders, cars and pickups.

Duff, a thoughtful man, contrasted the events of December, 1964, with what might have happened if this flood came thirty years ago.

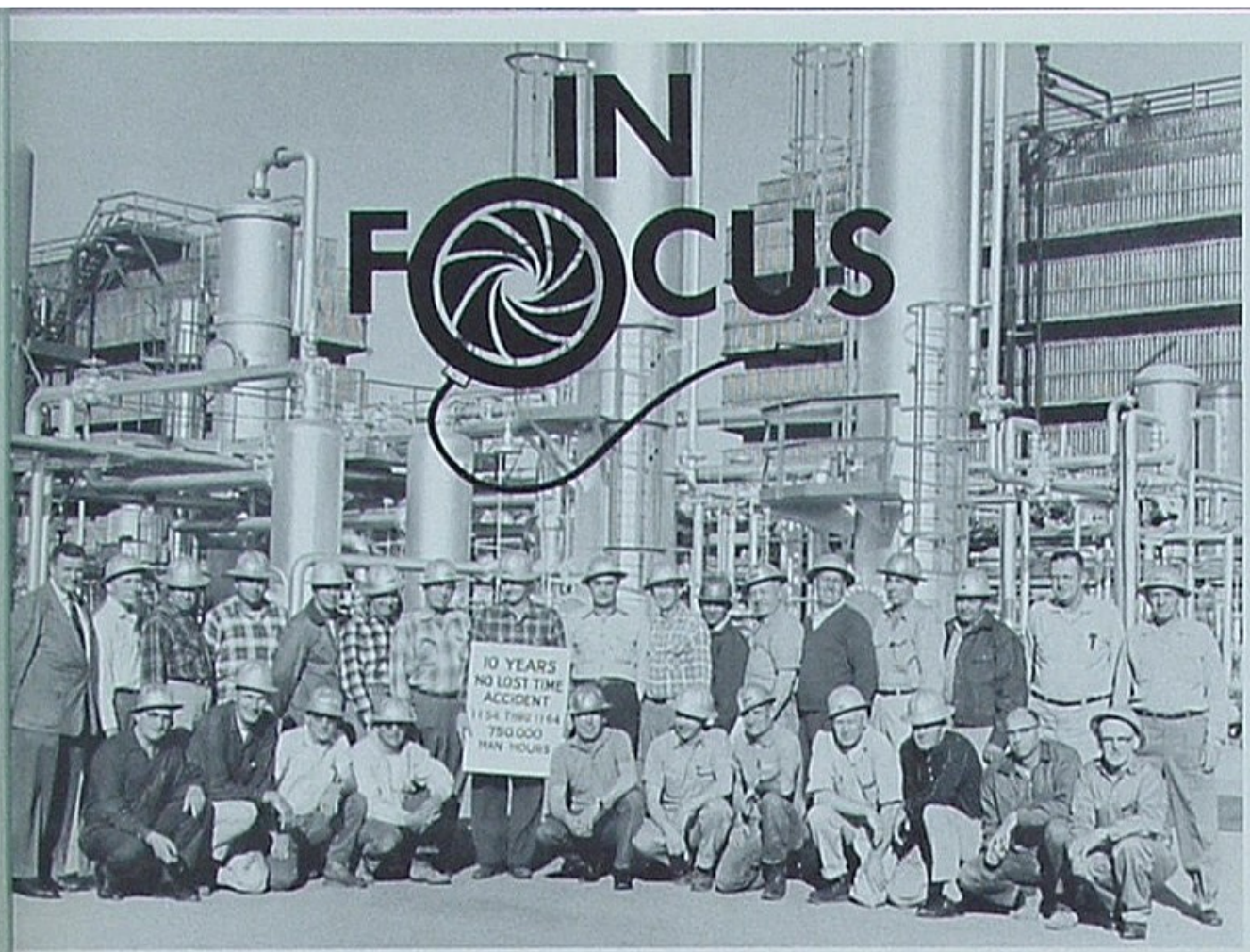
"Had this flood occurred in 1934 instead of 1964," he said, "the damage would have run into the billions. Hundreds of people would have died, perhaps thousands. It would have been slaughter.

"Today," he continued, "we can get in there and fight the flood. We have dams to reduce the flow of water. We have communications to warn people of dangers. We have means of evacuation, even helicopters for air rescue. And we have the big, hydraulic equipment to move in fast and keep the log jams clear.

"Thirty years ago," he concluded, "people were relatively helpless. In those days, there were far too few dams. There were no freeways for rapid, mass evacuation. There were no helicopters for air rescues. There were no microwave telephone systems and portable, transistor two-way radios. As important as anything in keeping the floodwaters down, thirty years ago there were no hydraulically operated dump trucks, cats, loaders and tractors. We have a lot to thank for those thirty years of progress." 76

FLOOD LOSS: *Near Roseburg, Oregon, the Charles Updegraff family was rescued by helicopter from their general store and "76" station (white building), but lost food, furnishings and house.*

IN FOCUS



SAFETY SCORE: 10 YEARS, 0 ACCIDENTS

Employees at the Santa Maria Valley Natural Gas and Gasoline Plant have completed 10 years without a lost-time accident. Reaching a safety mark of 750,000 man hours on January 1, 1965, they made a New Year's resolution to lengthen the achievement—already a record for the Exploration and Production Division. The creators as well as beneficiaries of this fine accomplishment are, from left (standing), John Adams, H. G. Randolph, Marion Evans, Roy Kreps, William Gardner, Edward Cutler, John Terry, Carl Morgan, John Cramer, Henry Stave, Wilfred Souza, William Galentine, Clarence Halter, David Smith, Oliver Deleissegues, Lawrence Powell, R. L. Lauenstein, foreman; (kneeling) Jerome Moore, William Stanford, Corman Glenn, Donald Bates, Duane Foster, Alvin Cox, Phillip Seaton, Charles Green, Wade Sanders, Robert Bunkelmann and Samuel Patterson.

SAFE AT CUT BANK TOO!

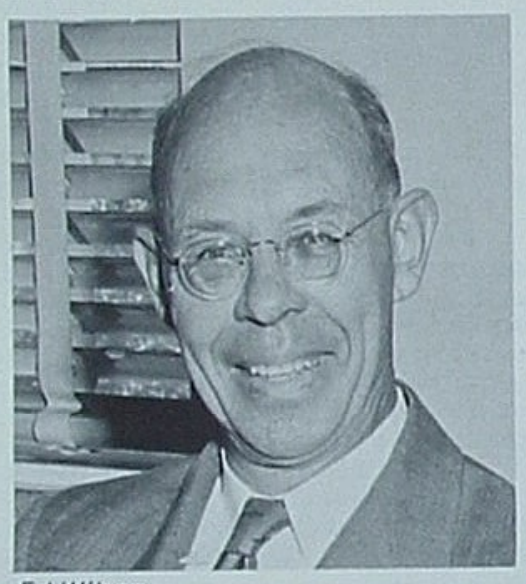
A similarly fine defense against lost-time injuries has been achieved at Cut Bank Refinery in Montana, the only Union Oil refinery to avoid a disabling injury in 1964. As the picture indicates, they have passed the two-year mark and are continuing strong in 1965. Our hale and hearty Montanans include, from left, Clifford Brandvold, Don Martin, S. A. Monroe, Roy Schaeffer, Harry Kays, Dick Guse, Leo Zarn, Carl Rehmer, Don Boe, Jim Smith, Don Goldrick, Darrel Christenot and Vern Owen.

WINNER OF SALES MARATHON

S. E. Onorato, at left in photo, operates 38 large parking garages in California and Honolulu. Throughout 1964 he promoted a petroleum products sales contest among his garage managers and their employees. Winner of the year-long competition was Haring Leong, manager of San Francisco's Portsmouth Square Garage, where "76" products are sold exclusively. On hand to witness presentation of the winner's trophy were, continuing from left, Union Oilers David E. Houck and Don Macaulay of our marketing division.

Douglas Wilde

Eugene Motte



Ed Wilson

AUTHOR LAUDS UNION OILERS

Ten years ago, Douglas Wilde and Eugene Motte were young chemical engineers in the Process Engineering Department at Oleum Refinery. Working with them in the same department was Ed Wilson, a senior engineer long recognized for outstanding technical accomplishments as well as his ability to train and develop young engineers. Today Dr. Wilde is an associate professor at Stanford University and the author of a recently published book, "Optimum Seeking Methods." Appropriately, the author pays dedicatory tribute in his writings to both of his early Union Oil associates, Gene Motte, now senior engineer, and Ed Wilson, now retired.

TURNING BACK *The* PAGES

THE ACCOMPANYING PICTURE, first published in the May, 1925, issue of Union Oil BULLETIN, deserves comment today chiefly because one of the persons identified was the late Sir Winston Churchill. (He is seen seated in the middle row, second from right.) Sir Winston was then—in 1902—a young correspondent for British newspapers and was returning aboard ship with a group of military leaders from the Boer War in South Africa. He rose from this beginning to become the most respected leader of his generation—admired by friend and enemy alike.

Far more prominent when the picture was taken was Major Frederick R. Burnham (back row, third from left), the man whose life of adventure and war the BULLETIN described. Burnham was an Indian fighter of the old Southwest at the age of 14—a cowboy, miner and deputy sheriff while still a teenager—a British hero of the Matabele War in Africa—a gold prospector in the Klondike—chief scout for the British Army during the Boer War and recipient of the Distinguished Service Cross from England's King Edward VII—next an explorer and gold miner in the heart of Africa—and finally head of the Burnham Exploration Company, which, jointly with Union Oil Company, discovered the Dominguez oil field.

The Burnham Trophy for which Union Oil bowling teams still compete annually was conceived by this man.

He prized the old shipboard picture highly and could identify all except four of the men. Obviously he and Sir Winston knew each other well. But Burnham's words of admiration were for another great leader of the day—Cecil Rhodes, the man who first stirred Africa out of its dark sleep.

Of Rhodes, Burnham said: "He stood out over other men like a towering peak. I've met kings, queens, generals, financial giants—all had their weaknesses. Rhodes was the exception. He thought in continents where the rest of us think in acres. Time, too, meant nothing to him; he planned ten, twenty, fifty, a hundred years ahead. When he needed coal for the oncoming railway in Africa, he didn't plan the expedition or go into details. He said, 'Burnham, you must find it.' My men combed hundreds of miles of wilderness and jungle for months, but we found coal."

SERVICE EMBLEM AWARDS

CORPORATE

March 1965

15 YEARS

WILLIAM R. HIZAR . . . . . Union Oil Center

10 YEARS

ALLEN L. SMALL . . . . . Union Oil Center
MARY JANE WALSH . . . . . Research Center

April 1965

40 YEARS

CHESTER M. GJERDE . . . . . San Francisco

25 YEARS

PAUL M. FOREMAN . . . . . Union Oil Center

20 YEARS

VERA DAVIS . . . . . Reseach Center

15 YEARS

HELEN NOLAN . . . . . Research Center

10 YEARS

BORIS A. KONEFF . . . . . Union Oil Center

EXPLORATION & PRODUCTION

March 1965

40 YEARS

JOHN W. McINTOSH . . . . . Dominguez, Calif.

30 YEARS

JOHN G. CRAMER . . . . . Santa Maria, Calif.
MARTIN J. NELSON . . . . . Cut Bank, Mont.
W. LAYTON STANTON . . . . . Union Oil Center
JAMES H. WATSON . . . . . Santa Paula, Calif.

20 YEARS

DWIGHT C. BROUSSARD . . . . . White Lake, La.
STANLEY M. TAYLOR . . . . . Brea, Calif.

15 YEARS

THEODORE S. JONES . . . . . Midland, Tex.
GUY A. LANDRUM, JR. . . . . Midland, Tex.
WALLACE J. MAYNARD . . . . . Bakersfield, Calif.
GRACE L. WISHERD . . . . . Bakersfield, Calif.

10 YEARS

WALTER R. BELL . . . . . Cut Bank, Mont.
PRESLEY CHOATE . . . . . Vermilion, La.
WALTER H. GARZA . . . . . Houston ,Tex.
MAVIS W. JONES . . . . . Midland, Tex.
DOWNS McCLOSKEY, JR. . . . . Union Oil Center
TOM W. REDIN . . . . . Santa Fe Springs, Calif.
HENRY B. REED . . . . . Coalinga, Calif.

April 1965

30 YEARS

OTTO BRANDLE . . . . . Richfield, Calif.
ADRIAN W. SHELDON . . . . . Orcutt, Calif.

25 YEARS

JEROME J. MOORE . . . . . Santa Maria, Calif.
WILLIAM A. NABERS . . . . . Polvadero, Calif.
CHARLES E. SMITH . . . . . Union Oil Center

20 YEARS

JUAN P. PEDRETTI . . . . . Santa Fe Springs, Calif.
GLENN M. WORSHAM . . . . . Guadelupe, Calif.

15 YEARS

WALLACE LEE CONNER . . . . . E. White Lake, La.
WILLIAM P. DAVIS . . . . . Lompoc, Calif.
LLOYD L. HENDERSON . . . . . Santa Maria, Calif.
MARIE E. HENTZ . . . . . Union Oil Center
BILL W. HODGES . . . . . Santa Maria, Calif.
HAROLD L. LeBLANC . . . . . Abbeville, La.
HERMAN E. MEGISON . . . . . Abbeville, La.

10 YEARS

HENRY ARNAUD . . . . . Houma, La.
SHIRLEY L. CHAFFIN . . . . Santa Fe Springs, Calif.
W. R. FILLIPPONE . . . . . Casper, Wyo.
BILL FOGLE . . . . . Damon Mound, Tex.
DONALD L. HERIFORD . . . . . Coalinga, Calif.
ROBERT L. JEFFERIES . . . . . Tulsa, Okla.
EDWARD J. LANDAY . . . . . San Joaquin, Calif.
ALFRED T. MANNON JR. . . . . Midland, Tex.

REFINING & MARKETING

March 1965

40 YEARS

WILLIAM W. WORKMAN . . . . . Union Oil Center

35 YEARS

MALCOM K. CARTER . . . . . Union Oil Center
GEORGE C. CRABTREE . . . . . Los Angeles Refinery
RAYMOND D. LARIMER . . . . . Modesto, Calif.
FRANK A. THOMAS . . . . . Oleum Refinery

30 YEARS

KINGMAN B. BAILEY . . . . . Edmonds, Wash.
WILLIAM T. BURGETT . . . . . Union Oil Center
ERNEST C. CHEATHAM . . . . . Union Oil Center
HENRY DUBETZ . . . . . Oleum Refinery
JOHN C. HILLENBRAND . . . . . Oleum Refinery
CLYDE H. MORTON . . . . . Oleum Refinery
FRANCIS K. NORRIS . . . . . Oleum Refinery
PATRICK H. O'GRADY . . . . . Oleum Refinery

25 YEARS

WILLIAM A. COIE . . . . . Honolulu
ARTHUR G. CROCKER . . . . . Colton, Calif.
ROBERT L. GREEN . . . . . Oleum Refinery

20 YEARS

JOHN ANDERSON . . . . . Seattle
ATHUR CONKLIN . . . . . Oleum Refinery
HARRY B. McELHINNY . . . . . Los Angeles Refinery
WALTER R. NIHART . . . . . Los Angeles Refinery
GEORGE A. SOETEN . . . . . Long Beach, Calif.

15 YEARS

GEORGE C. ALEXANDER . . Santa Fe Springs, Calif.
VANCE E. CLOEPFIL . . . . . Portland
GUY OREN DYKE, JR. . . . . Oleum Refinery
MAGNUS W. FLAWS . . . . . Richmond, Calif.
GEORGE F. HOGAN . . . . . Oleum Refinery
T. E. LUKE . . . . . Union Oil Center
RUSSELL L. SEWELL . . . . . Cut Bank Refinery

10 YEARS

RICHARD H. ACKERMAN . . . . . San Francisco
RICHARD C. ADAMS . . . . . Seattle
CHARLES E. ANTHONY . . . . . Santa Maria Refinery
CHARLES E. BLEDSOE . . . . . Santa Maria Refinery
JAMES W. DeVILLIER . . . . . Los Angeles Refinery
PETER C. GASSMANN . . . . . Los Angeles Refinery
GALINA G. GREBER . . . . . San Francisco
DONALD L. HAMILTON . . . . Los Angeles Refinery
RONALD E. HAMILTON . . . . . Santa Maria Refinery
NORMAN F. JENSEN . . . . . Santa Maria Refinery
WILLIAM J. JOHNSON . . . . . San Diego, Calif.
PAUL KLEMENOK, JR. . . . . Petaluma, Calif.
WALDEN E. McCRARY . . . . . Los Angeles Refinery
ORVILLE L. ONKEN . . . . . Los Angeles Refinery
RICHARD N. OWINGS . . . . . Richmond, Calif.
JOHNNIE D. RANDALL . . . . . Los Angeles Refinery
EDWARD L. SHARP . . . . . Sacramento, Calif.
DONALD E. SILVA . . . . . Santa Maria Refinery
FRANK R. STEVENS . . . . . Portland
GEORGE M. WELLS . . . . . Bend, Oreg.

April 1965

35 YEARS

F. W. McMULLEN, JR. . . . . Union Oil Center

30 YEARS

J. L. BURRUS, JR. . . . . Union Oil Center
LAURENCE W. COOTS . . . . . Los Angeles
HAROLD H. DALTON . . . . . Los Angeles
A. C. FIGUEIREDO . . . . . Avila, Calif.
CARL F. NYBERG . . . . . Tacoma, Wash.

25 YEARS

FRED T. AULT . . . . . Oleum Refinery

20 YEARS

RICHARD J. COWLING . . . . . Portland
WALLACE B. CRANK . . . . . Union Oil Center
HUGH C. DERBY . . . . . Los Angeles Refinery
WM. H. FITZGERALD . . . . . Seattle
ALEX P. KUNKEL . . . . . Los Angeles
DOUGLAS MacKENZIE . . . . . Los Angeles Refinery
GEORGE C. MAJORS . . . . . Los Angeles Refinery
AUSTIN R. McCREERY . . . . . Union Oil Center
ROBERT E. OSBORNE . . . . . Union Oil Center
JASPER R. PARKER . . . . . Los Angeles Refinery
EDWIN G. SCHAAP . . . . . Los Angeles Refinery
EARL E. WYLIE . . . . . Sacramento, Calif.

15 YEARS

VIOLA I. EKIN . . . . . Union Oil Center
MARCIA HEMMINGS . . . . . San Francisco
MARVIN D. JOHNSON . . . . . Portland
JAMES F. LUZADDER . . . . . Tucson, Ariz.
ARTHUR G. TAVARY . . . . . Cut Bank Refinery

10 YEARS

WILBUR F. BARBER . . . . . Bakersfield, Calif.
DONALD B. FINK . . . . . Phoenix
ED FRANCES LYONS . . . . . Oakland, Calif.
JOSEPH J. MILLER . . . . . Union Oil Center
BILLY FERRELL MIMS . . . . . Portland
KENNETH M. OLIVER . . . . . Medford, Oreg.
ROBERT A. SCHROEDL . . . . . Seattle
ROBERT C. SKINNER . . . . . Edmonds, Wash.
MERWIN E. THOMPSON . . . . . Edmonds, Wash.

DEALERS

March 1965

30 YEARS

MYRON TANNAHILL . . . . . Los Angeles
F. A. WESTMAN . . . . . Astoria, Oreg.

25 YEARS

A. A. WOOTTON . . . . . Los Angeles

20 YEARS

COFFLAND MOTOR SERVICE
Sedro Woolley, Wash.
DON COOKEY . . . . . Tucson, Ariz.
HELMICKS, INC. . . . . Irwindale, Calif.
JOHN T. WARD . . . . . Long Beach, Calif.

15 YEARS

WALTER F. PROCTOR . . . . . Beverly Hills, Calif.

10 YEARS

FERN T. AUMAN . . . . . Monte Rio, Calif.
BODEY'S SERVICE . . . . . Hoquiam, Wash.
WILLIAM BURROUGHS . . . . . Canoga Park, Calif.
JOHN GILBERT . . . . . Sequim, Wash.
EARL GREGORY . . . . . Orsi, Calif.
HAROLD KRAMER . . . . . Ewan, Wash.
KAINO KUVAJA . . . . . Ft. Bragg, Calif.
FRANCIS LEE . . . . . Marysville, Calif.
J. D. MILLER . . . . . Ft. Bragg, Calif.
C. D. PARKER . . . . . Camano Island, Wash.
JOEL R. PETERS . . . . . Lakeview, Oregon
TOM SHARP . . . . . Corona Del Mar, Calif.
E. B. WALTHER . . . . . Everett, Wash.
R. E. WILLIS . . . . . Chowchilla, Calif.

5 YEARS

D. V. ARNOLD . . . . . Superior, Ariz.
E. M. ASHMAN . . . . . Filmore, Utah
CIVIC PLAZA GARAGE . . . . . San Francisco
C. N. COREY . . . . . Clear Lake Oaks, Calif.
JOSEPH ELLISON . . . . . San Francisco
ROBERT HOOPER . . . . . Sherwood, Oregon
L. KIRBY . . . . . Chelan, Wash.
DONALD KING . . . . . Inglewood, Calif.
EARL LENZI . . . . . Newport, Wash.
FRANK LEWIS . . . . . Lynwood, Calif.
W. F. LAYTON . . . . . Chula Vista, Calif.
BILL MARSHALL . . . . . Bell Gardens, Calif.
DAVID McGEE . . . . . Gardena, Calif.
D. MORTON & J. MORTON, dba
BALLS FERRY FISHING
RESORT . . . . . Cottonwood, Calif.
AUBREY NASH, JR. . . . . Grants Pass, Oregon
E. FRED NYSTROM . . . . . Sacramento, Calif.
BEN T. ONO dba
BEN ONO'S UNION SERVICE Waipahu, Hawaii
FRED PARRISH . . . . . Heppner, Oregon
D. W. PARSONS . . . . . Grants Pass, Oregon
PAUL PEZZELLA . . . . . Seattle
PAUL S. PROKOP . . . . . Sunnyvale, Calif.
R. G. REXROAD dba
MID'S COUNTRY STORE . . . . . Chico, Calif.
HOWARD RICE . . . . . Creswell, Oregon
ALBERT SILVA . . . . . Los Angeles
WOODRUFF SPROUL . . . . . No. Las Vegas, Nev.
PATRICK VERDI . . . . . Seattle
KAZUTO YAMADA dba
COASTLINE 76 . . . . . Honokaa, Hawaii

April 1965

30 YEARS

RAY CALANDRI . . . . . Alameda, Calif.
MRS. DAVID RAY . . . . . Ralston, Wash.
E. H. ROBERTS . . . . . Los Angeles
WILLIAM M. STEELE . . . . . Los Angeles

25 YEARS

DALLAS RICHEY . . . . . Oakland, Calif.

20 YEARS

HARRY BAKKEN . . . . . Idleyld Park, Oregon
CURTIS P. BONNER . . . . . Van Zandt, Wash.
HERMAN M. MINOR . . . . . San Jacinto, Calif.

15 YEARS

ROBERT E. ACORN . . . . . Petaluma, Calif.
WILLIAM JONES . . . . . Salem, Oregon
HAROLD P. KINNAMAN . . . . . Centralia, Calif.
JACK K. MIZUTA . . . . . Seattle
JAMES POWELL . . . . . Sherman Oaks, Calif.
H. A. POWERS . . . . . Chico, Calif.
GEORGE QUIDORT . . . . . El Cajon, Calif.
J. W. SMITH . . . . . Traver, Calif.
FRANS STRAND . . . . . Rochester, Wash.

10 YEARS

ELMER AINSWORTH . . . . . Pomeroy, Wash.
HARRY CLAYTON . . . . . College Place, Wash.
JAMES M. DALBY . . . . . San Diego, Calif.
RALPH W. GEORGE . . . . . San Leandro, Calif.
STANLEY KARAS . . . . . Las Vegas, Nev.
FRED NOBLE . . . . . Fullerton, Calif.
B. L. SPAFFORD . . . . . Castro Valley, Calif.
MRS. OLE STRAND . . . . . Marysville, Wash.
CLIFFORD WASHINGTON . . . . . Reedsport, Oregon

5 YEARS

S. E. ALLEN . . . . . Missoula, Mont.
LEO ANDERSON . . . . . Redlands, Calif.
OSCAR BERGSING . . . . . Livingston, Mont.
MELVIN BIBBEE . . . . . Ellensburg, Wash.
JOSEPH DONOHO . . . . . Costa Mesa, Calif.
JOSEPH EHLI . . . . . Salem, Oregon
CHARLES L. ETTINGER . . . . . Pacifica, Calif.
GERALD GILLIG . . . . . Los Angeles
AL HELLMAN . . . . . San Mateo, Calif.
D. Z. HAINES . . . . . Berkeley, Calif.
JIM KOURY . . . . . Palos Verdes, Calif.
R. S. KUBALL . . . . . Oakland, Calif.
RICHARD MARSHALL . . . . . San Pedro, Calif.
GENE MATSUDA . . . . . Los Angeles
JOHN F. MOORE . . . . . Santa Cruz, Calif.
JOHN PARKER . . . . . Los Angeles
W. W. PENNICK . . . . . Montesano, Wash.
KENNETH SAPPINGTON . . . . . Great Falls, Mont.
HALE SECAKUKU . . . . . Second Mesa, Ariz.
HERBERT F. SIMONSEN . . . . . Montebello, Calif.
WALTER K. YOSHIDA . . . . . Haleiwa, Hawaii
HARRY ZUNDELL . . . . . No. Hollywood, Calif.

CONSIGNEES & DISTRIBUTORS

March 1965

40 YEARS

J. C. RIGGS . . . . . Dinuba, Calif.

35 YEARS

J. F. HOLLY . . . . . Avondale, Ariz.

25 YEARS

G. A. TOOLEY . . . . . Pasco, Wash.
BERNICE FAILING . . . . . Baker, Calif.

20 YEARS

A. J. MARKHAM . . . . . Toppenish, Wash.

10 YEARS

SOUTHWEST VIRGINIA TIRE CO. . . Richlands, Va.
LAKESIDE REFINING CO. . . . . Kalamazoo, Mich.
JOLIET CARBURETOR CO. . . . . Joliet, Ill.
BOWER AUTOMOTIVE CO. . . . . Bloomington, Ill.

5 YEARS

MILLER AUTOMOTIVE CO.
White River Junction, Vt.
CHARLES C. MORRIS, INC. . . . . Pottsville, Pa.

April 1965

35 YEARS

J. WANNER . . . . . Newberg, Oreg.

30 YEARS

F. H. MEYERS . . . . . Bend, Oregon
F. G. MARTIN . . . . . Bingen, Wash.

15 YEARS

C. E. "JACK" MEEK . . . . . Odessa, Wash.

10 YEARS

ERNEST F. COBUN . . . . . Mt. Shasta, Calif.
B. W. HENDRIX . . . . . Ely, Nev.
MIKE BRAYKO . . . . . Glasgow, Mont.
OSCAR GREENE . . . . . Isabella, Calif.
BALDWIN PETROLEUM CO. . . . . Knoxville, Tenn.

5 YEARS

BINGHAM TRANSFER CO. . . . . Safford, Ariz.
FLOYD E. HOWELL . . . . . Everett, Wash.
CLARENCE WESTRING . . . . . Springville, Utah

RETIREMENTS

February 1965

LEO E. BALDWIN
Oleum Refinery . . . . . March 20, 1934
NEWTON R. CHRISTOPE
Los Angeles Refinery . . . . . May 28, 1945
DANIEL B. DUNCAN
Los Angeles Refinery . . . . . August 8, 1945
RUTH ESTHER MILLER
Santa Fe Springs, Calif. . . . . May 29, 1929
HAROLD I. PHILLIPS
Los Angeles Refinery . . . . . March 19, 1926
ARTHUR C. STEWART
Los Angeles . . . . . June 19, 1928
STANLEY E. WHITING
Oleum Refinery . . . . . October 25, 1945
L. E. WOODLEY
Los Angeles Terminal . . . . September 23, 1934

March 1965

MIKE M. BIEL
Brea, Calif. . . . . September 21, 1944
JOHN W. BOYD . . . .
Los Angeles Refinery . . . . . September 10, 1945
ANNA E. CAMERON
Union Oil Center . . . . . May 6, 1937
ALLEN E. GROGAN
Westway Petroleum . . . . . December 10, 1938
WILLIAM A. KARBERG
Research Center . . . . . August 5, 1937
HAROLD A. TOBEY
Union Oil Center . . . . . January 30, 1922
GOVE R. WILDER
Los Angeles Terminal . . . . . February 25, 1925

IN MEMORIAM

Employees

KENNETH D. ALBERTSON
Santa Maria, Calif. . . . . January 4, 1965
OREN G. GILBERT
Salt Lake City . . . . . February 3, 1965
DARYL F. JEFFREY
Long Beach, Calif. . . . . January 28, 1965

Retirees

ELMER O. BRADSHAW
Rodeo, Calif. . . . . January 14, 1965
ALFONZO CARDOZA
Rodeo, Calif. . . . . February 4, 1965
MELVIN H. EDWARDS
West Covina, Calif. . . . . February 2, 1965
PETER N. GERZ
Crockett, Calif. . . . . January 22, 1965
ALLAN S. GREENWOOD
Long Beach, Calif. . . . . January 10, 1965
GEORGE C. GWIN
Los Angeles . . . . . January 29, 1965
ETHAN A. LOUDERBACK
Ventura, Calif. . . . . January 18, 1965
JAMES C. MARONEY
Reseda, Calif. . . . . December 5, 1964
HARRY M. SELLERS
Brea, Calif. . . . . November 30, 1964
EDWARD M. WILCOX
Victoria, B.C., Canada . . . . . January 4, 1965

UNION OIL COMPANY OF CALIFORNIA
P. O. Box 7600
Los Angeles, California 90054

HOW WE WORK

Here's how to spend money to make money. This radio facsimile machine, installed on one of our drilling platforms 75 miles in the Gulf of Mexico and operated by drilling foreman Roland Perrin, paid for itself many times over on one of its first jobs. The drilling foreman wanted a geologist in New Orleans to look at the electric drilling logs to see whether or not to begin installing casing on a well. About that time a rainstorm came up, halting helicopter flights for three days. Had this radio facsimile machine not been able to transmit a perfect copy of the drilling log to New Orleans in 15 minutes, the $14,000 a day drilling rig would have had to shut down for three days. To date, our Communications Department has arranged for licensing of 96 radio, telemetering and facsimile transmitters in the Gulf area. Each is a time and money saver.