★ UNION OIL BULLETIN ★

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Triton Vanquishes Carbon Knock

To MOTORISTS in general, and to Union Oil Company employees in particular, the greatest piece of news since the development of Triton itself is contained in a paper, presented by David R. Merrill, manager of research, C. C. Moore, Jr., and Ulric B. Bray at the mid-year meeting of the American Petroleum Institute in Tulsa, Oklahoma, May 16 last. The paper describes a comprehensive series of road tests, covering over 100,000 miles, recently conducted by the Research Department to determine the relationship between the composition of lubricating oils and their service characteristics.

These tests have revealed in Triton a quality that it was not known to possess at the time it was placed on the market, i.e., that it eliminates the knocking which is induced by excessive carbon in the combustion chamber and that it actually reduces carbon deposits formed by less stable oils. This, as is pointed out in the paper, permits the use of higher compression ratios with accompanying improved performance, without the expense of frequent carbon removal or the eventual use of premium grade fuel. It also explains the reports of thousands of motorists to the effect that after they had used Triton for a month or two their motors ran smoother than ever before, that the "pinging" was gone, and that they were getting better gasoline mileage and an all around improved performance.

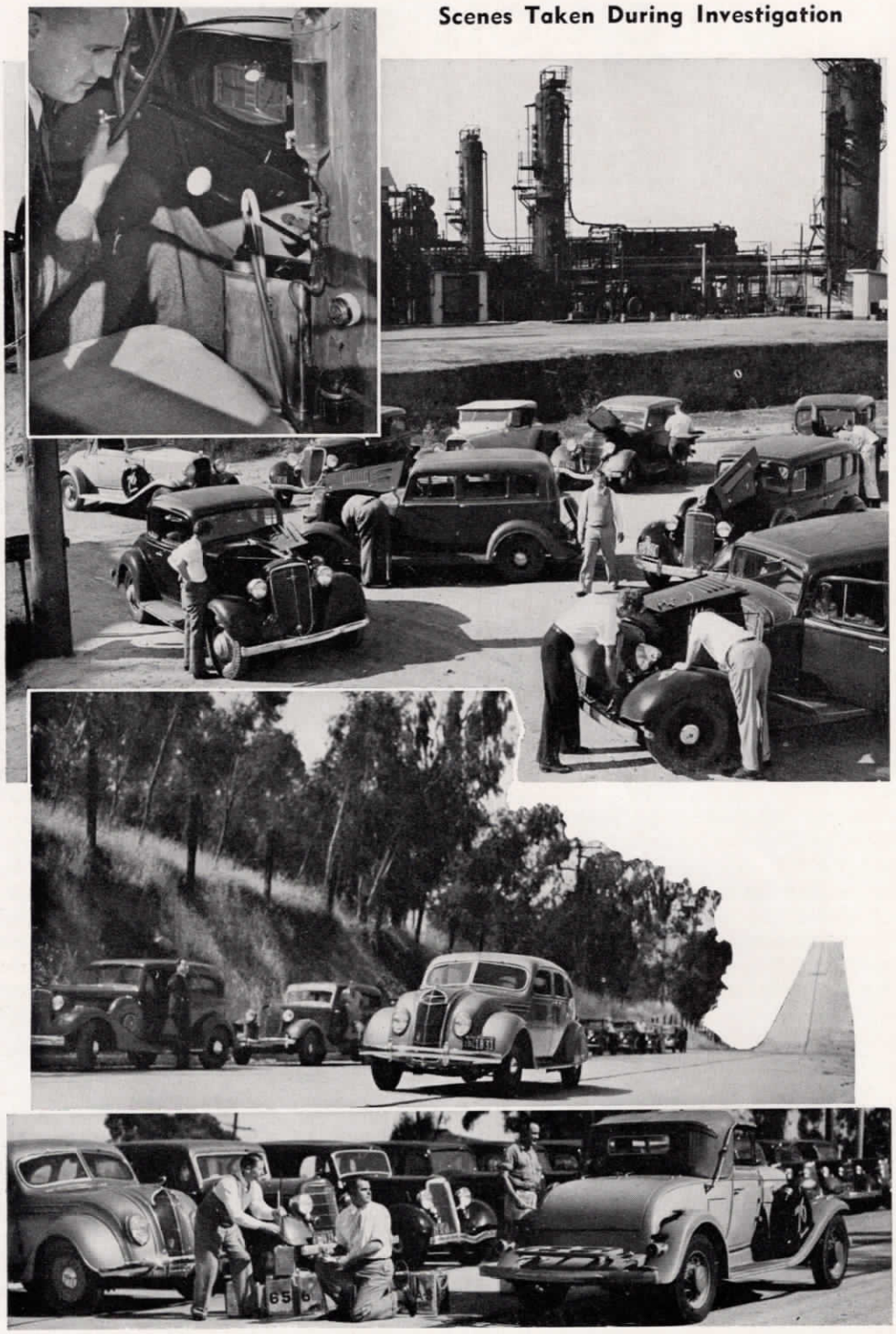
In view of the fact that in the past attention has been focused on the use of premium fuels to overcome motor knocks, the discovery that the need for premium gasolines can be eliminated in many cases by using pro-

D. R. Merrill
Manager of
Research

C. C. Moore, Jr.
Research
Supervisor

Ulric B. Bray
Research
Supervisor

Scenes Taken During Investigation



Top left: Portable octane requirement tester. Top right: Checking mechanical condition of motors prior to tests. Center: Car undergoing knock rating test on 10% grade. Bottom: Preparing standard knock rating fuel.

Preparing gasolines of various octane ratings for use in the tests. Here Dr. Bray is carefully adding ethyl fluid to the standard gasoline, while Mr. Reynolds makes note of the quantities used, and an assistant insures safety on the job.

pane solvent refined lubricating oil becomes one of the major research accomplishments of the year.

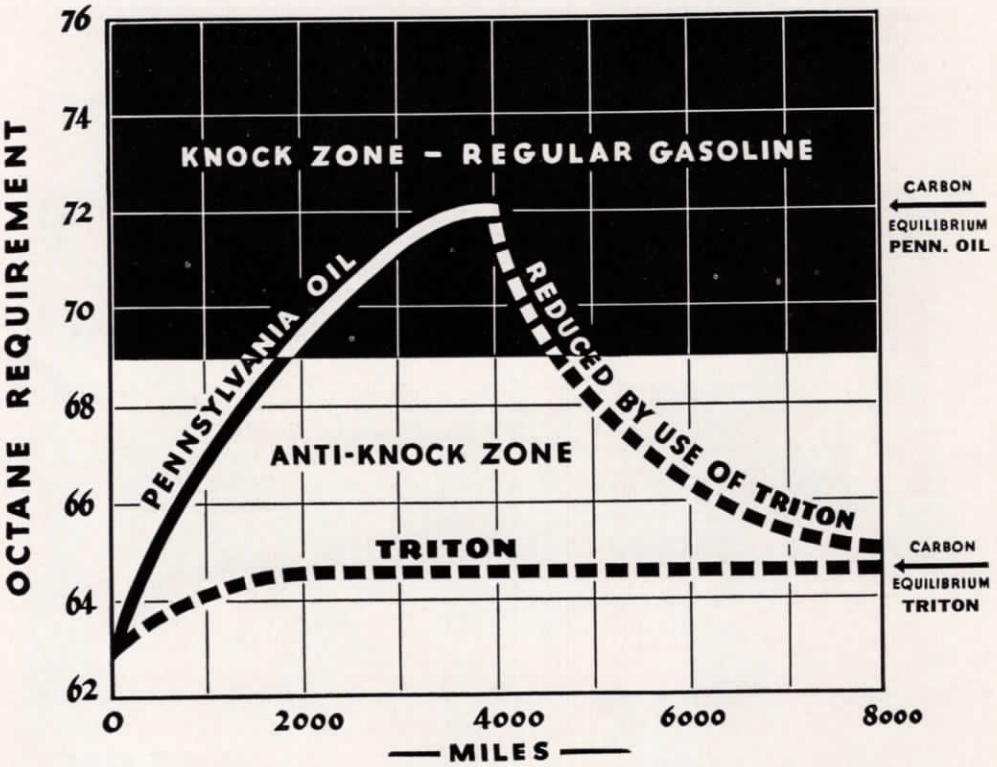
It has long been known that the development of carbon knock in the engine is the direct effect of carbon deposition in the compression chamber and on the piston head, but the testing methods formerly used, involving the actual weighing of the deposit, were tedious and inconvenient, and prohibited any accurate determination of the rate of accumulation. In the research department's investigation, the relative deposition of carbon was established by measuring the octane requirements of each motor after regular intervals of operation, a much more simple and convenient method of comparison.

Twelve cars of various popular types were used for the tests. Eight of these were first subjected to a general overhaul, the valves being ground, the ignition timing checked, and the carburetion systems properly adjusted. Each of the cars was then operated under normal routine conditions for alternate intervals with two oils—Union Oil Company's propane solvent refined Triton, and a representative brand of high grade Pennsylvania oil. The distance run on the respective oils was from 4,000 to 6,000 miles, and at regular mileage intervals a test was made to determine the octane number of the fuel required to suppress detonation.

In order to make sure that the results of the tests would not be influenced by any change in the mechanical condition of the motors, they were checked just prior to each test, and were adjusted to standard conditions of ignition timing, carburetion, etc. All octane numbers were determined on the same 10% grade, with full throttle opening in each case. The test fuels consisted of a standard gasoline adjusted to a graduated series of octane numbers by the addition of requisite quantities of ethyl fluid.

In this manner it was found that, when Pennsylvania oil was used for lubrication, the octane number requirement of the motor increased one point in every 400 miles of driving, and continued to do so until a state of equilibrium had been reached, at which no further substantial increase was noted. This limit was established when a total increase averaging nine octane numbers had occurred. When Triton was used, the average increase in octane requirement was equivalent to only one number in each 1,000 miles. The carbon equilibrium condition was reached when the octane requirement had risen approximately two points.

The results of this first phase of the investigation indicate that the deposition of car-

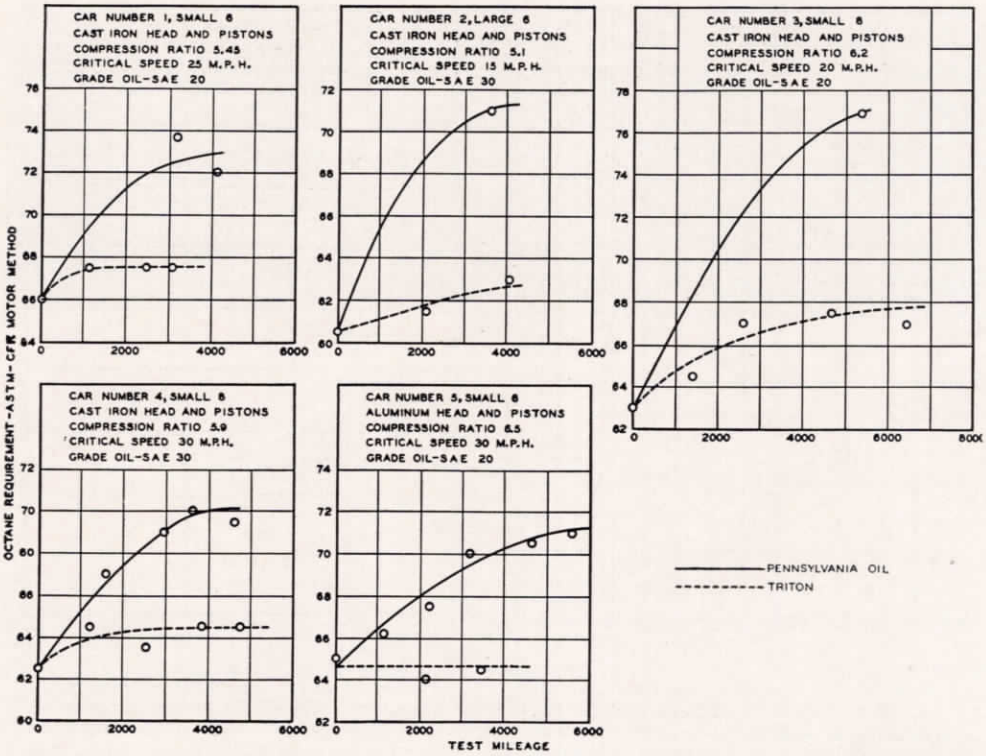


Graph demonstrating the effectiveness of Triton in removing excess carbon. The first half of the upper curve shows how quickly Pennsylvania oil deposited enough carbon to cause knocking with regular gasoline, and the second (dotted) half shows how a change to Triton just as quickly brought the motors down, out of the knocking range. The upper carbon equilibrium point represents the maximum octane requirement of the motors when Pennsylvania oil was used, and the lower one represents the maximum for Triton. The lower dotted line shows the effect of the continuous use of Triton in an initially clean motor.

bon in the motor takes place at a much more rapid rate when eastern oil is used, than it does when the engine is lubricated with Triton, and that the ultimate carbon deposition of the eastern oil is much greater than that from Triton. The difference in equilibria further demonstrates that the motorist using eastern oil must, at the end of 4,000 miles driving, either suffer the inconvenience and expense of having the carbon removed, or change to a fuel one, and sometimes two, commercial grades higher than that which he is using, if he is to escape the discomfort and deleterious effect of carbon knock. The Triton motorist, on the other hand, will find it unnecessary to change the grade of gasoline he is using, or have the carbon removed. He may continue in the use of an initially satisfactory fuel with the assurance that detonation will not occur, and that his motor performance will be consistent.

In the second part of the experiment, four cars were first run approximately 8,000 miles each with Pennsylvania oil, at the end of which distance the crankcases were drained and Triton was substituted without cleaning the motors, as had been done in the first series of tests. The cars were then run under the same routine conditions, and under the same system of mechanical control, as had characterized the other runs. Tests were made at regular mileage intervals in the same manner, as formerly, to determine the anti-knock requirements of the motors.

This procedure developed what is undoubtedly the most astonishing discovery of the whole investigation. It was found that, when the motors were converted from less

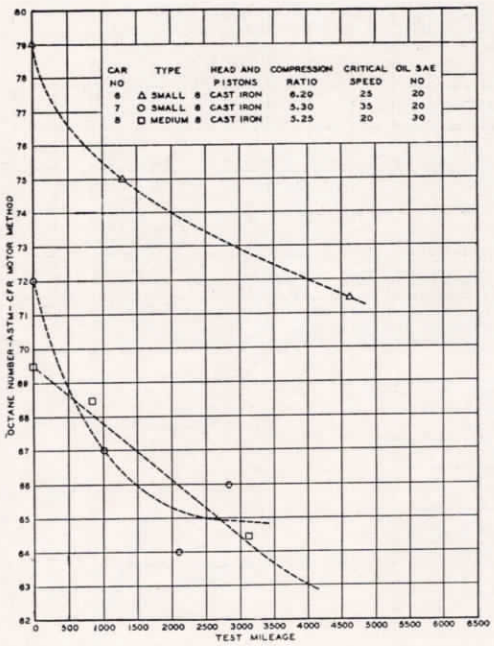


Group of curves illustrating the knocking tendency at progressive intervals of 5 motors lubricated with Pennsylvania oil, and the same motors lubricated with Triton. The chart shows that Pennsylvania oil increased the octane requirement of the motors approximately one point in every 300 to 400 miles, and developed a maximum increase of 7 to 14 octane numbers, while Triton only increased the requirement one point in every 1,000 miles, and developed a maximum increase of 0 to 4+ octane numbers. The cars represented are as follows: No. 1, Chevrolet, 1934; No. 2, Buick, 1929; No. 3, Pontiac, 1934; No. 4, Oldsmobile, 1932; No. 5, Plymouth, 1934.

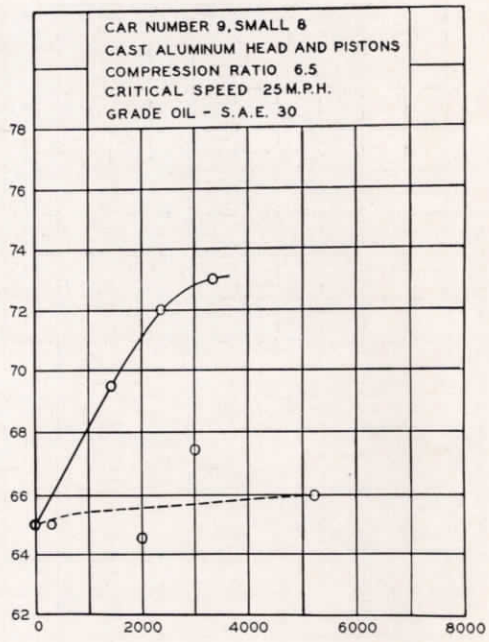
stable oils to Triton, a gradual but substantial drop in octane requirement took place, which, in approximately 4,000 miles of driving, reached an average of about seven octane numbers. From this, only one logical deduction can be drawn: Triton definitely reduces carbon. The elimination in an average of 4,000 miles of driving is sufficient to reduce the prior accumulation of carbon to something approaching the normal deposition of Triton in a clean engine.

The reduction of carbon through the use of Triton is explained as being due to the fact that the carbon in the combustion chamber burns off or sloughs away faster than it is formed by Triton. This process of carbon dissipation continues until the normal carbon equilibrium point for Triton, in that type of engine, is very closely approached. This accounts for the fact that motors which knock when not using Triton stop knocking after two or three thousand miles of driving with the latter. As shown in accompanying charts, the anti-knock requirement of a motor switched from a Pennsylvania oil to Triton starts a decline from the moment the change is made. In some cases the reduction in octane requirement is sufficient within 500 to 1,000 miles to eliminate carbon knock.

As a result of these tests, no longer can there be any question that the propane solvent process is successful in eliminating ordinarily included materials that have a greater tendency to decompose under operating conditions, and that the finished product, Triton, has, in the highest degree, those attributes that are essential in the ideal lubricating oil.



How a change to Triton reduced the knocking tendency of three motors, previously run 8,000 miles each on Pennsylvania oil, is illustrated on this chart. The curves show that the use of Triton lowered the requirement of the three cars an average of 7 octane numbers in 4,000 miles of driving. Reading from top to bottom, the cars represented are: a 1934 Pontiac, a 1933 Oldsmobile, and a 1933 Buick.



These two curves show the knocking tendency of a 1934 Ford motor at progressive driving intervals when lubricated with Pennsylvania oil (continuous line), and when lubricated with Triton (dotted line). Note that the requirement of the motor jumped 8 octane numbers in less than 4,000 miles of driving when Pennsylvania oil was used, and that Triton only accounted for an increase in requirement of one octane number in 5,000 miles.

Triton Dealers Exceed 10,000

THE number of dealers handling the Union Oil Company's propane solvent processed Triton motor oil is continuing to show a phenomenal growth throughout the Pacific Coast territory—California, Oregon, Washington, Arizona, Nevada, Idaho, and western Canada.

At present, there are more than 10,000 marketing outlets, including service stations, garages and new-car dealers, selling Triton to hundreds of thousands of motorists and firms in the field of commercial transportation. This number exceeds, by about three thousand, the number of outlets handling Union Oil Company products previous to the marketing of Triton, and reflects, somewhat, the growing demand for this motor oil of proved superiority.

Union's Vidor wells Nos. 6, 8 and 7 in foreground in new Playa del Rey section.

Straightest Well Drilled in Record Time

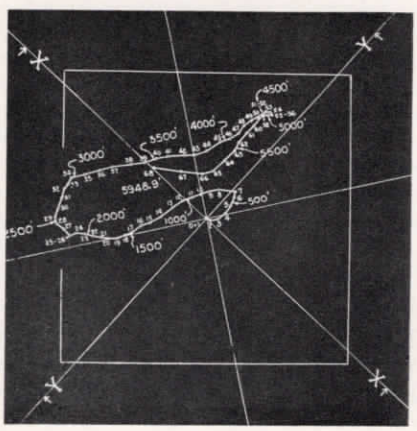
DRILLING of the Union Oil Company's Vidor No. 8 well in the southeastern extension of the Playa del Rey oil field, California, was marked by the establishment of what is believed to be a two-fold record in drilling time and directional control of the bit.

The time required to drill the well, which was completed in March, this year, at a depth of 6,156 feet, was but 27 crew days, or only about half the time taken by any other operator to complete a well in the same area. Later, when the well was surveyed by the Alexander Anderson survey engineers, it was found to be the straightest well that had ever come under their observation. As illustrated on this page, the well was drilled so straight that, at no time during the drilling process, did the bit stray beyond the boundaries of the derrick floor—an unusual occurrence, even in much shallower wells.

Aside from Vidor No. 8, two other wells on the same lease—Nos. 6 and 7—were drilled in excellent time. Together, the three wells were completed in a sequence of operations which were carried out with planned precision. In 102⅔ crew days (109 days actual elapsed time), these three completions were a matter of record. In that time, 18,525 feet were drilled for an average of 195 feet of hole a day, and the aggregate daily potential production of the wells, when tested, built up to approximately 13,500 barrels for a per well average of about 4,500 barrels. Of this group, Vidor No. 7, when tested, proved to be the second largest potential producer ever completed in any section of the Playa del Rey field by establishing a daily potential rate of 8,425 barrels. The average gravity of production in this section of the field is 22-23 degrees.

In each successive well drilled, the time required for completion was considerably reduced. Individual drilling times were: No. 6, 41 crew days; No. 7, 31⅓ crew days; and No. 8, 27 crew days. Even the time of 41 crew days spent in completing Vidor No. 6 was considerably less than that taken by any other operator in that area.

The methodical and systematic manner in



Outline of Vidor No. 8 derrick floor, showing path of bit to completion depth.

Back row: A. Johnson, J. C. Vance, G. B. Darling, R. Pearcy, driller, and L. E. Denliger. Front row: A. W. Sisemore, L. Vandiver, H. L. Dowdy, driller, V. H. Earley, and F. B. Stussey

Above, left to right: W. C. Newcomb, O. H. Pettigrew, E. C. Jennison, E. C. Staunton, driller, and S. Scarborough. Left: Fred Stratton, H. W. Hancock, W. P. Gerlich, L. A. Welch, driller, and R. Downs.

Drilling Crews on the Vidor Projects.

which these operations were conducted is an interesting story in itself. Everyone connected with the work cooperated to such an extent that an exceptionally high degree of efficiency was accomplished. Each one of the various units, having to do with drilling, production, petroleum engineering, transportation, construction, etc., performed a very carefully timed part of the work. In this way, the average lost time ratio was considerably reduced.

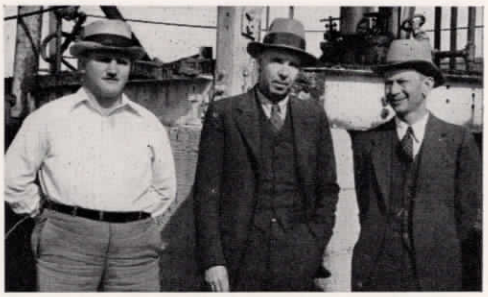
The short intervals of time occurring between the completion of one section and the beginning of the next, in the same well, were always utilized to forward the progress of the succeeding well. This procedure permitted the maximum degree of accomplishment in a minimum of time.

After locating Vidor No. 6, the construction crew erected the derrick and set the machinery, and the drilling crew commenced work. After drilling the first 750 feet, surface casing was set, but, chafing at the fishtail bit, the crew was obliged to wait about four days for the cement to set. This, incidentally, constituted the only extensive delay experienced in the whole procedure. With the cement set, drilling continued unimpeded to the 5,930-foot level, and the water string was cemented. Meanwhile, through the combined efforts of the transportation and construction departments, Vidor No. 7 was ready for the drilling crew, so, while the cement at No. 6 was setting, the crew drilled the first 750 feet of Vidor No. 7, set casing and cemented.

While this cement was setting, the crew returned to No. 6 and finished the hole.

This done, Vidor No. 7 was drilled down to 6,015 feet, and, while cement was setting at that level, Vidor No. 8, which had been made ready in the meantime, was started. Thus, the three wells were completed in record time.

Subsurface formations underlying the Playa del Rey field are relatively easy to penetrate, yet the comparisons drawn here, so far as the time element is concerned, are based on facts regarding other wells in the same area. Consequently, the comparisons are without distortion. As for accuracy in directional control of the bit, it would be difficult to find many wells anywhere as straight, or straighter than Vidor No. 8.



Left to right: W. J. Larson, production foreman, Dominguez and Playa del Rey; Frank Boyd, drilling superintendent, and Wm. Eggleston, district engineer.

A. V. Andrews Dies

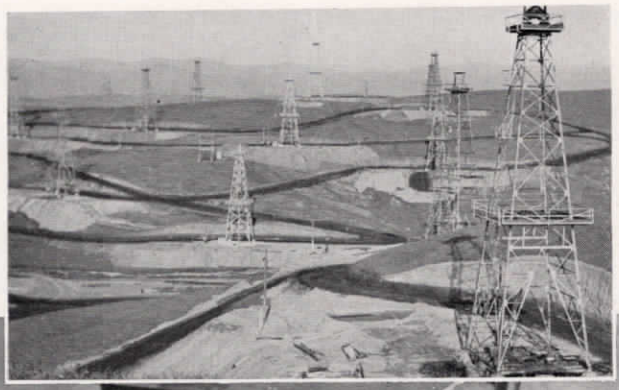
AS A RESULT of serious injuries received in an automobile accident near Barstow, California, A. V. Andrews, one of the senior partners of Andrews and Andrews, law firm of which the Union Oil Company has been a client for more than 30 years, died on April 13, last, seventy-one years of age.

A. V. Andrews

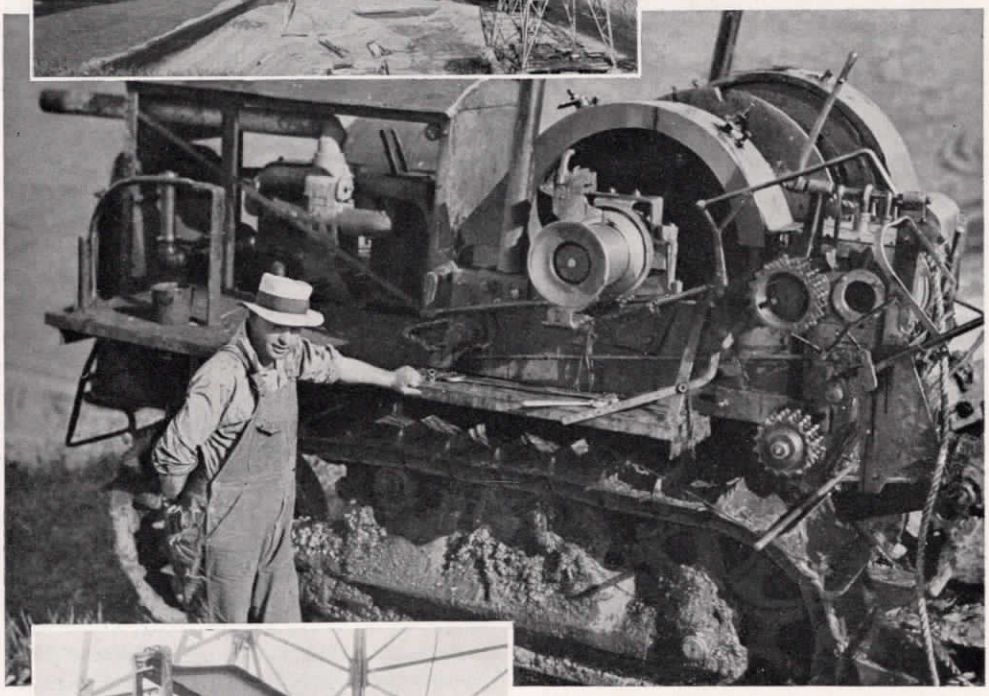
Mr. Andrews came to California some twenty years ago to join his brother, Lewis W. Andrews, in the practice of law, and became a member of what is now the firm of Andrews and Andrews. His unusual talents of legal and business character received instant recognition at the California Bar, and in the petroleum industry. During subsequent years, he played principal roles in countless major litigations on behalf of the Union Oil Company, as well as others in the industry. In addition, he contributed considerable time and effort to state and national legislation, in an endeavor to prevent waste and depletion of petroleum in California.

Mr. Andrews virtually lived his profession, and his love for it was an inspiration to all with whom he associated. "A. V."—as he was generally and affectionately known—was a prodigious worker, and became noted for many great mental attainments, yet he always was modest and somewhat self-effacing.

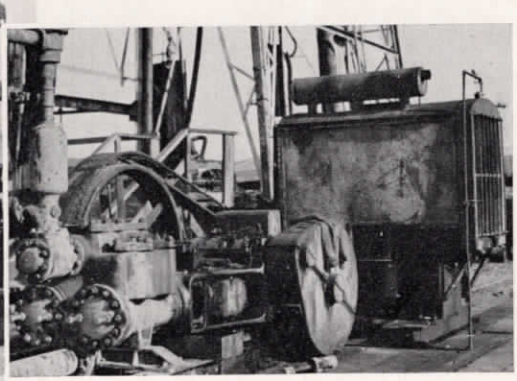
The untimely death of Mr. Andrews deprived the Union Oil Company of a most capable adviser and was a decided loss to his friends and business associates. As a personality, undoubtedly he will be remembered beyond even his greatest achievements.



Left: General view of Union's Mt. Poso property. Below: Portable drilling equipment mounted on a Caterpillar "60" tractor. The tractor's motor supplies the power for drilling the wells.



Left: Type of pumping equipment, powered by electric motor, used at Mt. Poso and, below, pump for circulating mud.



Mount Poso Presents Interesting Development

AN INTERESTING development is taking place on the Union Oil Company's S and M lease in the Mount Poso oil field, discovered in 1926 and situated about 18 miles north of Bakersfield, California.

Although the field has no gas pressure, there is considerable oil to be raised to the surface, the latest estimate placing the daily potential production at more than 66,000 barrels. Due to the soft subsurface materials in that area, it is possible to complete a well in from five to seven days. The average well depth is from 1,400 feet to 1,800 feet, and the per well potential production is from 700 barrels to 1,400 barrels a day of about 18 degrees gravity oil. Production is derived principally from the upper Vedder zone and, to a minor extent thus far, from the lower Vedder zone of the Miocene age.

The Union Oil Company has 480 acres of fee land in the field, of which some 210 acres (of a total approximating 1,360 acres in the field) are listed as proven property. In order to develop this acreage in as economical a manner as possible, the company's field department has perfected a system of drilling operations which is something of an innovation from the normal course of development activities. Because of the soft formation and shallow depth, it has been found that a small portable drilling outfit mounted on a Caterpillar "60" tractor, and powered by the tractor's motor, is fully capable of drilling to completion the deepest of these wells. A power pump, driven by a 150 horsepower gas engine supplies the mud circulation.

Operating under its own power, the tractor with the equipment is run into a specially built U-shaped space in the floor of the derrick, set up with the other equipment incidental to rotary drilling, and operations are begun. After completion of a well, the equipment, which needs little dismantling, is moved to the next location. While drilling is carried on, a concrete base is poured for the well pumping equipment, for these wells are placed on a pump immediately they are completed. The pump is powered by a 15 horsepower, 60-cycle, 220/440-volt electric motor.

Derricks for these wells are but 87 feet high. This height contrasts with the regulation derrick of 126 feet, and the derrick used for deep drilling which usually is at least 136 feet in the air. The smaller derrick is used at Mount Poso, not only because the load is seldom great at any time to completion depth, but because the extra time spent in pulling only two lengths of drill pipe, instead of the usual four in a regulation height derrick, is more than compensated by the less expensive derrick. Then, too, the completion depth of the average well in the field and the soft materials do not require that the bit be pulled very often.

Obviously, the completion of wells in Mount Poso is quite inexpensive, as compared with wells in most other fields. The time required is short, the type of equipment is inexpensive, and there is no duplication of equipment necessary to the individual well other than the derrick and the pumping equipment. Operating costs, likewise, are kept at a minimum by the type of pumping equipment used, which is built to outlast the expected life of the average well. Incidentally, the casing used in these wells is mostly salvaged from abandoned wells in other fields.

Another factor in cutting drilling costs at Mount Poso is the building of derricks by the construction department well in advance of the drilling crew. Several wells are located at once, roads are built to the derrick floors, the derricks are constructed, and everything is put in readiness for the drilling crew long before it is time to move on to another location.

The company's production from these wells is piped to Kernco station, adjacent to the Maltha refinery, thence through pipe lines via ten other pumping stations to Port San Luis, where the oil is shipped either to the company's Oleum or Los Angeles refinery.

California Potential Production Highest in History

AT THE present time, California has more known producible oil underground than ever before in the history of the state's petroleum industry, which dates back approximately 70 years.

According to State Oil Umpire J. R. Pemberton, the daily potential oil production of California for the month of June has been estimated at 1,702,797 barrels. This is greater than the comparable figure at the end of 1934 by 221,367 barrels, and shows an increase over the state's daily potential production for June, 1934, of 353,810 barrels.

Following is a comparison of daily potential production and allocated daily production, as well as the number of producing and shut in wells, by districts:

District	*Potential Production	*Allocated Production	**Number Wells
San Joaquin Valley	917,340	209,550	9,221
Coastal	188,037	59,320	1,649
L. A. Basin....	597,420	244,860	5,417
Total for State..	1,702,797	513,730	16,287

Note: *Barrels per day.
**Producing or shut in.

A comparison of the daily potential production of some of the larger fields for the month of June, 1935, versus 1934 is given:

Field	*June, 1935	*June, 1934
San Joaquin Valley:		
North Belridge	46,715	32,665
Kettleman N. D.....	486,610	422,407
Mount Poso	66,170	31,901
Mountain View	111,835	20,078
Coastal:		
Elwood	48,310	43,240
Ventura Ave.	78,192	71,411
L. A. Basin:		
Dominguez	67,975	58,041
Huntington Beach (New)	78,661	92,794
Long Beach	123,668	109,494
Playa del Rey.....	86,083	12,701
Santa Fe Springs.....	76,525	70,155

Note: *Daily potential production.

The increase in the state's potential production is due to the continued development of fields—largely necessary to satisfy lease requirements—during a period of curtailed production, and to discoveries which have either extended certain fields, or have found new deeper producing zones.

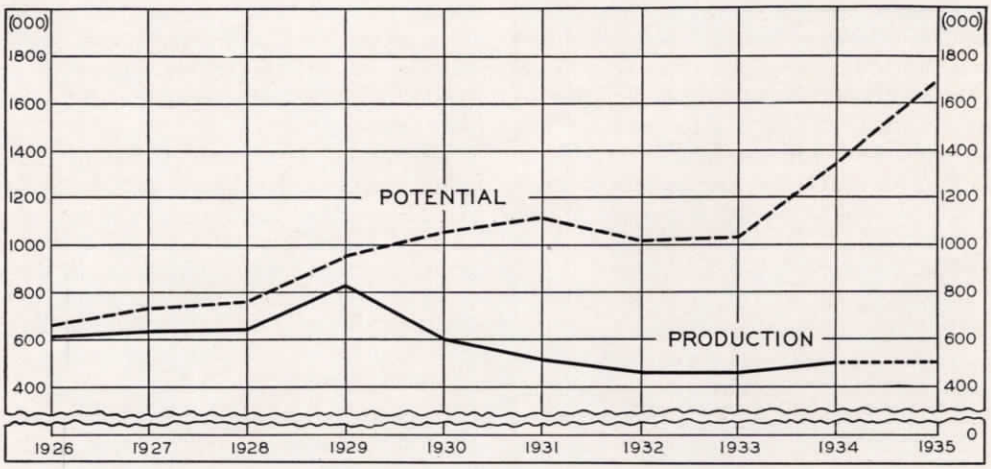


Chart shows the estimated daily potential production of crude oil in California in June of each year from 1926 through 1935, and the actual production for the same time, excepting that, for June, 1935 (lower dotted line), the allotted daily production for the period is indicated.

El Cid Campeador

America's 1935 Exposition

WITH more than one hundred buildings housing several hundred thousand exhibits depicting man's achievements in science, industry, commerce and art, the $20,000,000 California Pacific International Exposition opened in Balboa Park, San Diego, on May 29, to remain open for the nation to view until Armistice Day—November 11.

Occupying 300 acres in Balboa Park, famous as one of the five most beautiful parks in the world, the Exposition is laid out in the form of the letter "S" extending from northeast to southwest. The amusement zone forms the top of the "S," the permanent buildings of the Panama California Exposition in 1915 being the middle section, while the new section of special exhibitors is found to the southwest.

The Exposition is one of the most interesting ever developed, for, not only does it present the modern phases of our civilized world, but it also shows through what innumerable stages our civilization has passed during the last four centuries.

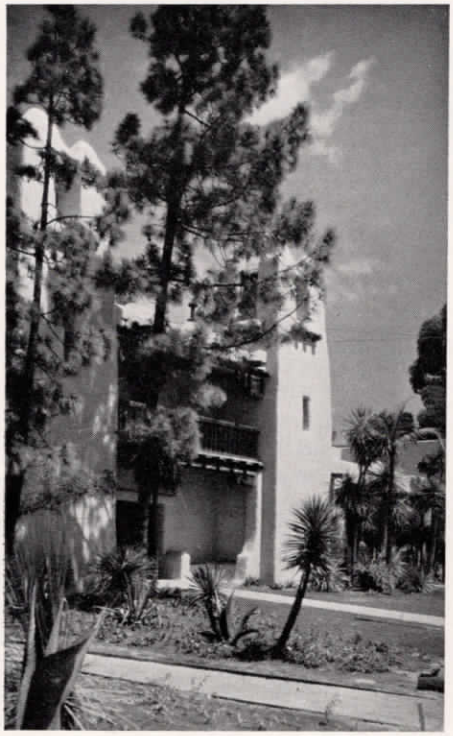
In each of the three sections of the Exposition, a distinctive type of architecture predominates. The permanent buildings remaining from the 1915 Exposition are of Spanish Renaissance and Spanish Colonial design; the new buildings of the Spanish Village and of the new section to the south are a combination of two of the oldest and most typical American schools of architecture, the ancient Mayan and Indian Pueblo. On these latter buildings, little or no ornamentation is used, the architects depending almost wholly upon native, living, blooming flowers and vines. Some special exhibitors have built more modern buildings of steel and glass.

Aside from the palaces of science, foods and beverages, natural history, fine arts, photography, water and transportation, better housing, education, the houses of charm and hospitality, and the motion picture industry's Hall of Fame, the United States Government, the State of California, and individual exhibitors have contributed greatly to the success of the Exposition by erecting buildings of their own. The federal exhibit displays the working of more than twenty government departments, the California State Building houses exhibits of the state's several counties as well as its own display, and the Ford Palace is devoted to showing the actual manufacture of automobile parts.

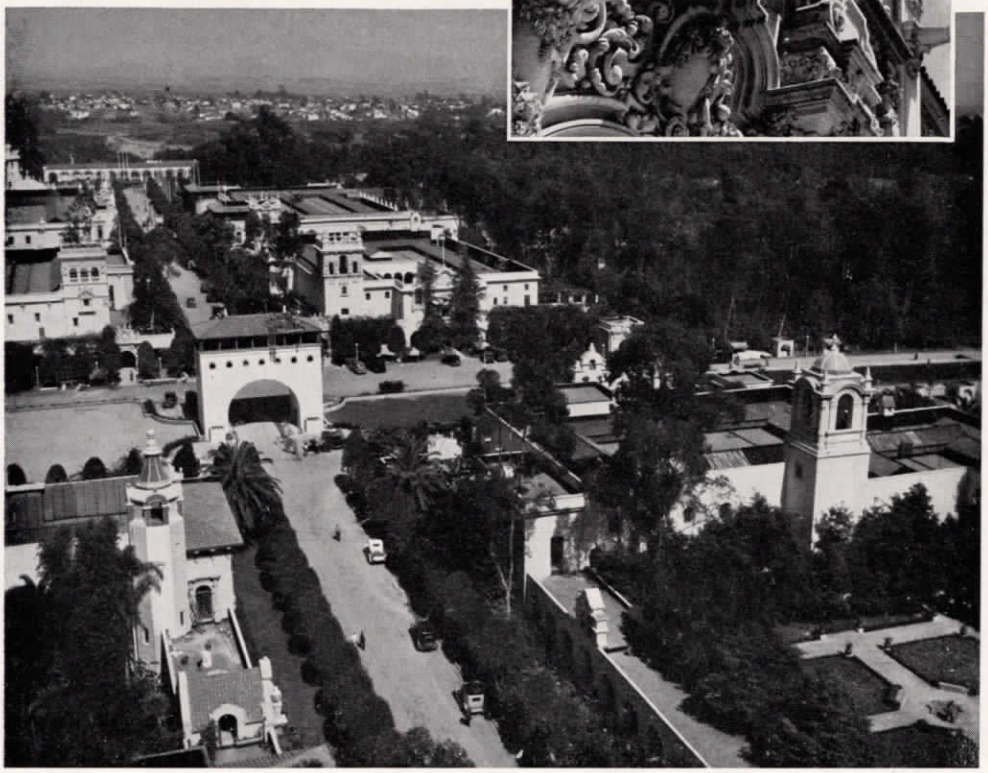
In the evening, the Exposition presents some of the world's finest musical organizations and one of the most striking night scenes yet conceived. Daily concerts are presented at the Spreckels Outdoor Organ, and evening symphonies are presented in the Music Bowl, adjacent to the Ford Exhibit. Contrasting with the brightly illuminated Amusement Zone, the grounds are made softly brilliant through the use of color screens on concealed floodlights cast against buildings and through trees and shrubbery. In June, and again in August, the United States Navy will add hundreds of searchlights to the scene.

San Diego, the center of more than five hundred points of historic and sightseeing interest, and vicinity offer accommodations for 75,000 visitors daily. Already, several hundred thousand spectators have visited the Exposition.

As a special exhibitor at America's Exposition, Union Oil Company has utilized an animated "flow sheet" to indicate the progress made in the manufacture of the many fin-



Left: Palace of Education. Right: Section of Spanish Village. Center: Facade of Palace of Foods. Below: View of permanent section of Exposition.



ished products now being refined from crude petroleum, thereby placing emphasis upon the fact that the production and refining of crude petroleum is the greatest single industry in California. The company's exhibit is located in the Varied Arts and Industries Building.

Supplementing the animated schematic presentation of refining methods is a "Triton Answerograph," a question and answer board upon which the interested person may himself ask a question pertaining to Union's new motor lubricant simply by pulling a small key and have the answer flash on a multi-colored background. A further feature is the "Effect of Motor Oil on Carbon Knock" panel, a giant size graph upon which, by means of unique lighting and sound arrangements, the merits of Triton as regards deposition and removal of carbon are illustrated.

At the end of the animated flow sheet, which covers a space 30 feet long, is a canning machine where coin banks, made up in the form of a miniature Triton container, are sealed and racked for handing to patrons of the Exposition.

The animated flow sheet is divided into six sections, each section covering a particular phase of the refining process. The entire panel is controlled by means of an automatic system of electrical contacts and relays so that animation, achieved through the use of special Neon tubing and other lighting effects, progresses as cut after cut is made of the original crude stock. To amplify and simplify understanding of the various steps being shown on the flow sheet, an audible explanation—also robot controlled—accompanies the action. The process carries manufacturing procedure through to finished lubricating oil. Beneath each section of the flow sheet is shown, in volumetric proportion, the various products which come off at that particular stage and, also, the by-products which are made.

New Triton Demonstration Truck

Above: Interior of trailer. Right: R. Cubicciotti, D. Cameron and P. H. Enochs with equipment which demonstrates Triton throughout the West.

New Highway Maps Distributed

Pacific Coast highway maps, available wherever Union products are sold.

A NEW series of Pacific Coast highway maps has been published by the Union Oil Company, which are available at all company service stations and resellers of Union products.

The series embraces three folders, one of California and Nevada, one of Washington and Oregon, and the third of Arizona. Each is printed in color, and all non-essential material has been eliminated to allow space for amplifying highway information and points of interest. Thus, the maps are complete in that all necessary road data for tourists and vacationists are included.

An additional innovation in the folders is the complete log of Pacific Coast radio stations. This is the first time such information has been included in a highway map, and was incorporated to enable the ever-increasing number of motorists with radio equipped cars to tune in as they ride, regardless of location.

Also, in each state folder an accurate map of the area west of the Rocky Mountains, extending from the Gulf of California in Mexico to Glacier National Park in British Columbia, is included.

Several inset maps show main thoroughfares and cross-town boulevards of principal West Coast cities. State maps are cross-indexed to facilitate the location of cities, and indices include city populations.

The maps, when folded, are nine and one-half inches long and four and one-quarter inches wide, and fit easily into the side-pocket of any car. When unfolded, they are twenty-five inches by sixteen inches—an easily handled size inside the car.

Adit "Y" junction with main tunnel in the Whipple Mountain tunnel under construction by Walsh Construction Company. Completed tunnel will be 10 miles long.

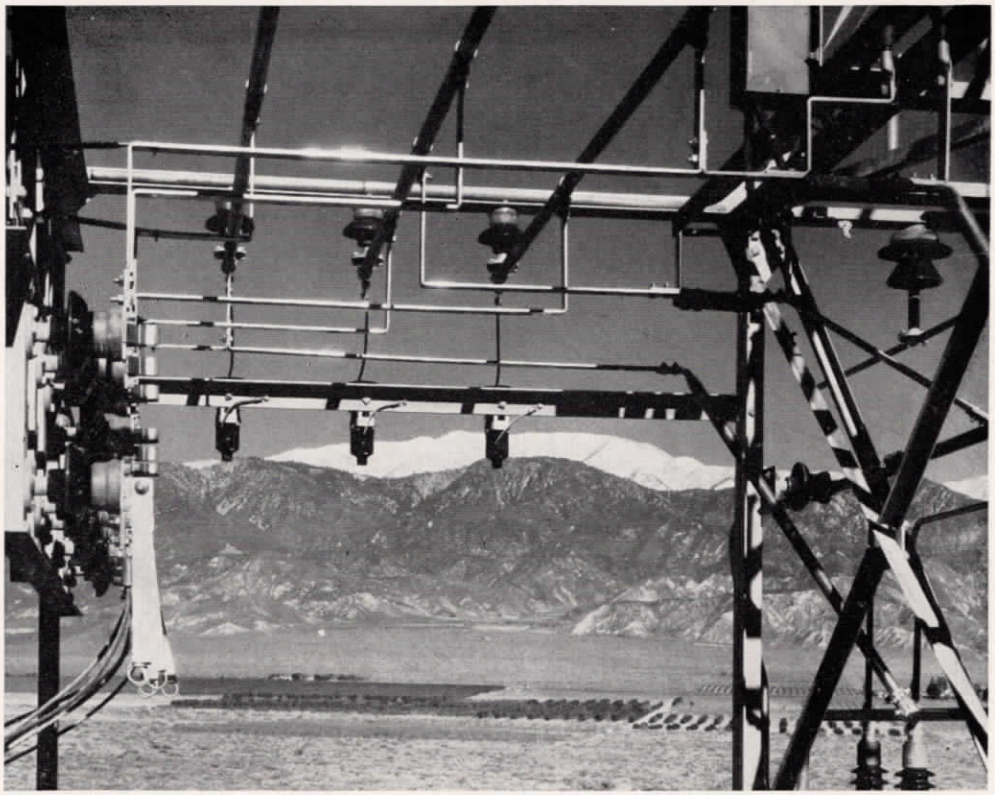
Progress Along the Aqueduct

WORK on the $220,000,000 Metropolitan Water District aqueduct which, when completed some five years hence, will embrace 241 miles of tunnels, conduit and canals to guide part of the waters of the Colorado River from Parker Dam to Southern California, is progressing according to schedule.

Begun in March, 1933, construction of the aqueduct in the past two years has been confined largely to the excavation of the several tunnels, made necessary by the mountainous nature of the region being traversed. Up to the present, over 70 miles of the total 91 miles of tunnels have been excavated. This includes the boring of the East Coachella tunnel, north of Indio, which not only is the longest tunnel in the entire project, but the largest single tunnel job in the history of engineering.

It took ten years to complete plans for the aqueduct, and it will take a quarter of a billion dollars to build it, but the water which it will transport to Southern California cities will provide safety to life—a necessary requisite for a continued growth of population. Years ago, when the Los Angeles aqueduct was built to transport water from Owens Valley, it was not believed Southern California would become so greatly populated. This supply, with that derived locally, has become insufficient in relation to the probable future growth of communities served. In fact, the underground water supply in Southern California has been seriously depleted in the semi-drought of the last few years. However, the new aqueduct is expected to overcome fully this situation.

Many have conjectured on the quality of the Colorado River water for every-day usage. Exhaustive tests by the Public Health Service and individual organizations have shown the water to be comparable to that now used. Surveys by dental associations and

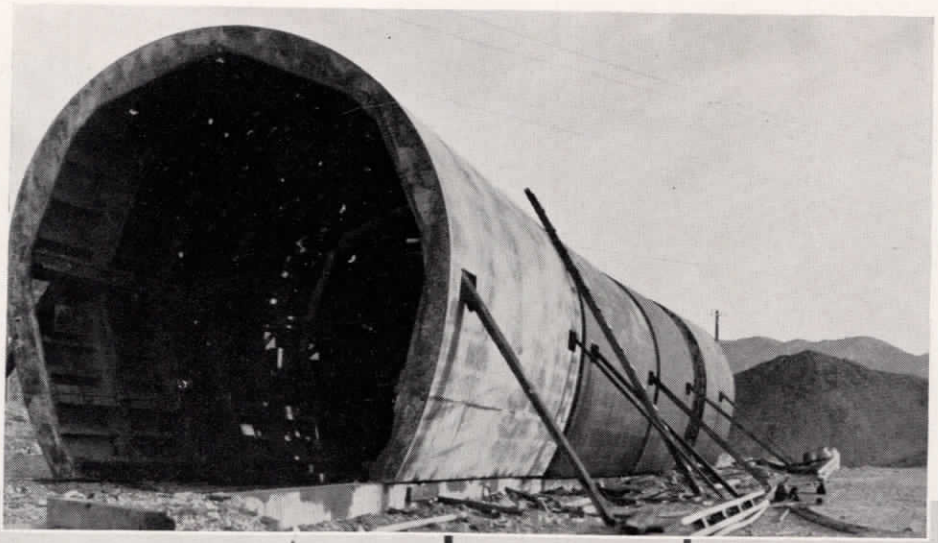


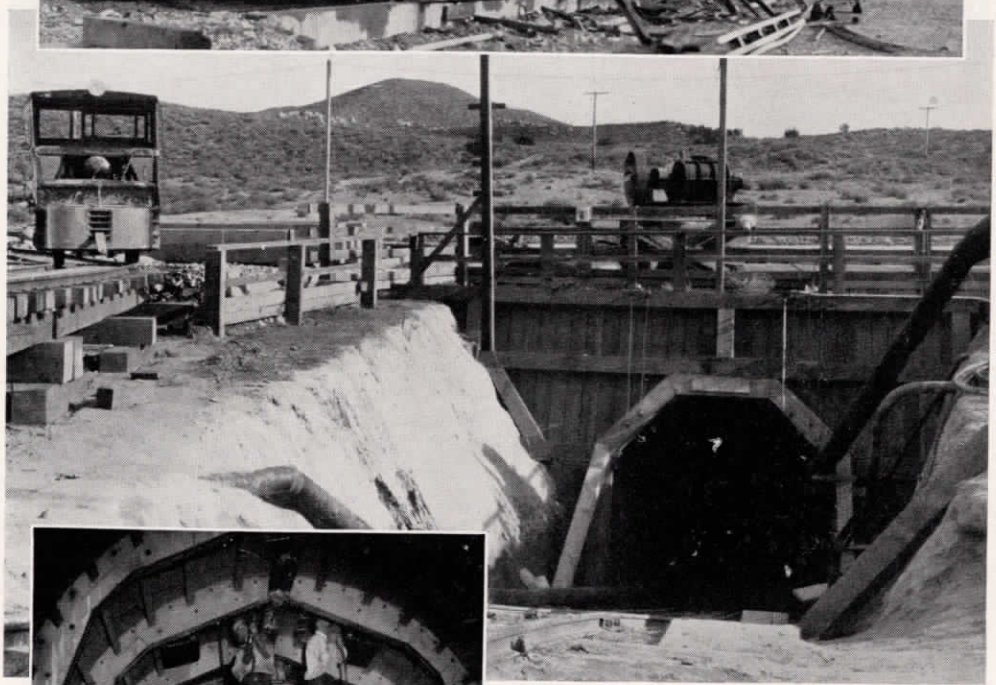
Transformer bank on Metropolitan Water District power line at Cabazon shaft. Mt. San Gorgonio in background.

medical societies among people who have thrived on Colorado River water for the past thirty years have failed to discover any harm done to tissues, bones or teeth. And salt deposits are so small that but an infinitesimal part of one per cent of the water is affected.

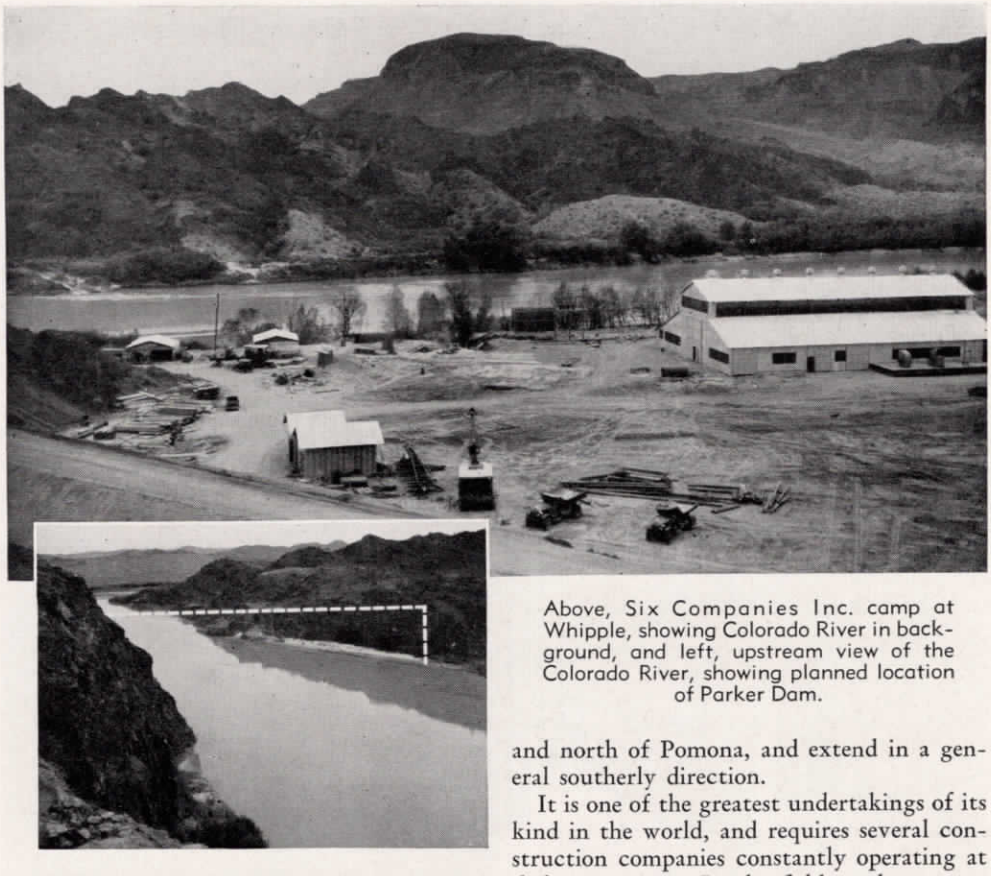
Aside from the tunnels, the aqueduct will consist of 56 miles of conduit, 66 miles of lined canals, and 28 miles of siphon. Starting 160 miles below Boulder Dam, at the site planned for Parker Dam, the construction of which has been contracted by Six Companies Inc., the water from the Colorado River will be raised 290 feet by pump, drained into the Gene Wash reservoir, then will be lifted 301 feet by pump to an elevation of 1,036 feet above sea-level. There it will begin a gradual descent of 136 feet in the next 67 miles of its journey, passing, first, through the Copper Basin reservoir, and, then, through Whipple Mountain tunnel and several miles of conduit into a long section of lined canal extending to the eastern base of Iron Mountain, broken only by the Freda siphon and a relatively short section of conduit. At Iron Mountain, seventy miles along the aqueduct from the Colorado River, the water will be lifted 147 feet, traverse a tunnel through the mountain, and emerge on the west side to a section of canal. Coxcomb tunnel will be reached next, then Pinto Wash siphon, and, then, the eastern base of Eagle Mountain where the water will have an elevation of 966 feet 110 miles from Parker Dam. It will be immediately lifted 436 feet, will pass through Eagle Mountain tunnels, and will drain into the Hayfield reservoir, approximately half way to the main terminus.

At that point, the water will be lifted 440 feet to the highest elevation of the entire journey, 1,807 feet—1,357 feet above the Colorado River at the dam. From there, until reaching the Cajalco reservoir, tunnels and conduit comprise the aqueduct, with the





Top, telescoping steel forms used in pouring walls of tunnels. Center, adit to Val Verde tunnel, under construction by Dravo Contracting Company. This is last construction camp on tunnel which will empty water into Cajalco reservoir. Below, concreting walls in Mecca Pass tunnel by Morrison and Knudsen.



Above, Six Companies Inc. camp at Whipple, showing Colorado River in background, and left, upstream view of the Colorado River, showing planned location of Parker Dam.

water passing through the Hayfield, Cottonwood, Mecca Pass, East Coachella, West Coachella, Whitewater, San Jacinto, Bernasconi and Valverde tunnels. At Cajalco reservoir, terminus of the main aqueduct, the water will be 1,405 feet above sea-level.

From there, the water will be distributed to Anaheim, Beverly Hills, Burbank, Compton, Fullerton, Glendale, Long Beach, Los Angeles, Pasadena, San Marino, Santa Ana, Santa Monica, and Torrance by a series of distribution lines. The upper distribution line will proceed north from the reservoir beyond Ontario, northwest above Glendora, and, from the Glendora tunnel westward through the Monrovia tunnel and conduit to Burbank, and southwest through the Beverly Hills to Santa Monica. Other distribution lines will tap the upper line at Pasadena and north of Pomona, and extend in a general southerly direction.

It is one of the greatest undertakings of its kind in the world, and requires several construction companies constantly operating at different points. In the field at the present time are the Walsh Construction Company, Winston Brothers Company, Utah Construction Company, Broderick and Gordon, L. E. Dixon & Bent Brothers, Inc., Hunkin-Conkey Construction Company, Shofner & Gordon, J. F. Shea Company, Inc., Morrison-Knudsen Company, West Construction Company, Hamilton & Gleason Company, Dravo Construction Company, Aqueduct Construction Company, Barrett & Hilp & Macco Corp., Jahn & Bressi Construction Company, C. W. Wood & M. J. Bevanda, Three Companies Inc., Thompson-Starrett Company, Inc., and the Griffith Company. On the upper distribution line, work has been started by the West Construction Company and L. E. Dixon, Bent Bros. & Johnson on the Monrovia and Pasadena tunnels, respectively.

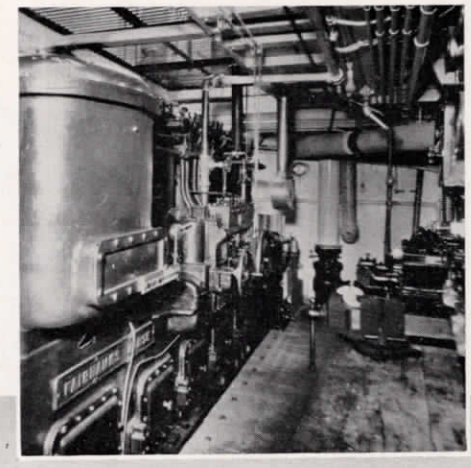
Above are shown relative quantities of carbon deposited by Triton (left) and a high grade eastern oil (right) in 7 days' operation of auxiliary Diesel engine on the tuna clipper "Reliance". When Triton was used, the deposition of carbon was only about 5% of former accumulations, and there was no indication of the sludging that had characterized the use of other oils.

The Good Ship "Reliance"

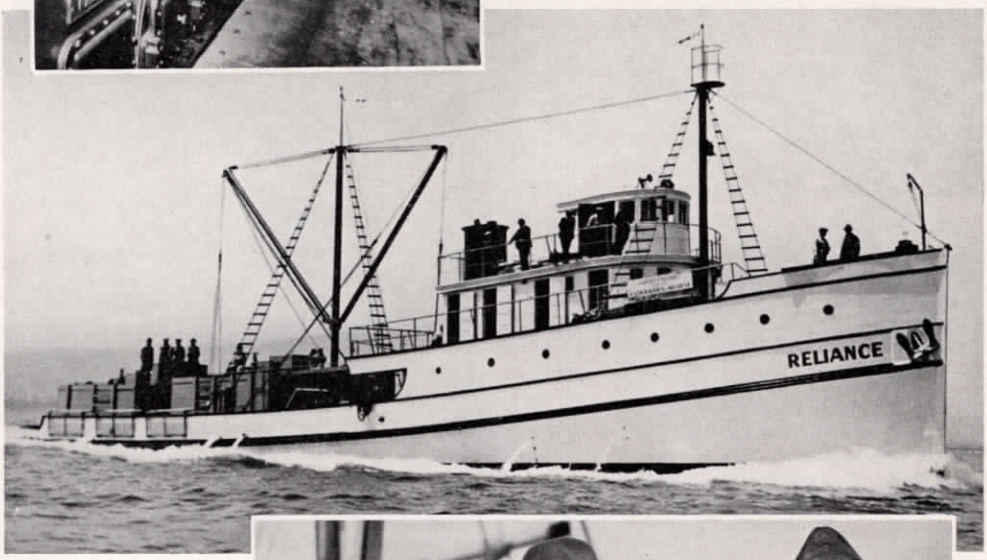
PERIODICALLY there emerges from Fish Harbor at Terminal Island, Los Angeles harbor, the tuna clipper, "Reliance," which has no predetermined ports of call. The little ship goes wherever the tuna may be found—Galapagos Islands, Panama, Socorro or elsewhere. No unnecessary dunnage is carried, her engines are always maintained in the best of condition, and she is fitted with every detail necessary for a voyage of uncertain duration. This includes a large refrigeration plant for the tuna catch, and a large bait tank in which is kept live bait living in sea water.

Recently, the "Reliance," owned by the Reliance Fishing Corporation and operated for the Southern California Fishing Company, started out on one of these voyages. Chief engineer and part owner Earl Howard, a man who has devoted some 20 years to marine engineering problems and who was for many years test engineer for the Fairbanks Morse Company, was on board. On this voyage he was particularly interested in two Fairbanks Morse 4-cycle, 60 horsepower, auxiliary Diesel engines, one on the port and the other on the starboard side of the vessel, which he was subjecting to test.

During a voyage, these engines are run alternately, without a break in operation, for the purpose of pumping fresh sea water into the bait tank and for operating the refrigeration plant. They are subjected to extremely hard usage, and alternately run for a period of 7 days, after which they are broken down, the oil is changed, carbon



Left: Fairbanks Morse, 4 cylinder 60 HP auxiliary Diesel engine on tuna clipper "Reliance." Center: The "Reliance" starts out from Terminal Island on another fishing trip of unknown duration.

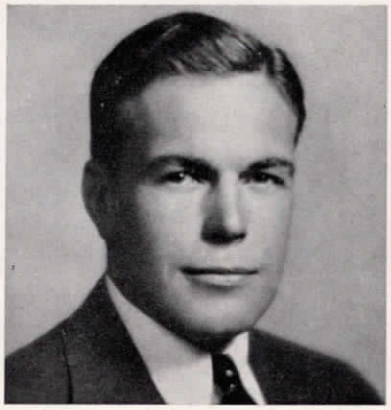


Right: Earl Howard, chief engineer and part owner of the "Reliance"; C. W. Drake, marine sales manager, and George Stakelin, shop foreman, of Fairbanks Morse Company.

deposits are scraped out of the exhaust ports and manifold, and generally adjusted for the next run. For some time, Mr. Howard had been keeping an accurate record of the performance of each of these motors, and it had been found that the port side engine required more overhauling than the starboard unit.

Prior to this voyage, the Union Oil Company marine representative, Wm. Martin, had introduced Mr. Howard to Triton motor oil, and at once he saw the possibilities of this oil solving his lubrication problems. In order to prove the merits of Triton, sixty-five 5-quart cans were taken aboard for the test, some of the contents from which were placed in the crankcase of the port side unit.

A. C. Stewart Advanced



A. C. Stewart

ON May 1, last, A. C. Stewart was named assistant to the director of sales, advancing from the position of southern division sales manager.

Mr. Stewart has served in several different capacities in the sales department since 1928. His first major sales post was that of manager of specialty sales, when that department was formed in 1931. In January, 1934, he was promoted to the position of southern division sales manager. Mr. Stewart's present position gives him direct contact with Union Oil Company sales throughout the entire Pacific Coast territory.

(Continued from Page 22)

At the same time, the starboard engine was serviced with a high grade eastern lubricating oil.

In the 84 days of this voyage in quest of tuna, these engines were operated in the usual manner and, at the end of the first 7 days' continuous performance, the port engine was taken down for examination and overhaul. A remarkable change was immediately noted in the condition of the interior of the motor. By actual measurement, the quantity of carbon deposited on the exhaust ports and manifold was only about five per cent of former accumulations, and the pistons and piston rings revealed such a comparatively slight degree of wear that Mr. Howard became somewhat skeptical of his own tests. Finally, the time came for the starboard engine to be torn down after a like period of operation. Examination of the interior of this engine definitely convinced Mr. Howard that the condition of the port side unit, after having used Triton, was a true comparative although considerably improved condition, for the starboard engine showed the same condition as had previously been found. This meant that the latter unit had accumulated approximately 20 times the carbon found on the port side unit.

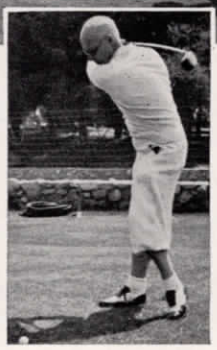
Just to make certain of the difference between the two oils, Mr. Howard subjected the port side unit, lubricated with Triton, to a continuous run of 14 days of 24 hours a day. In spite of the extended period of operation, it was found upon the subsequent breakdown of the engine that the deposition of carbon was still only approximately 10 per cent of the accumulation in the other engine serviced with a high grade eastern oil and run continuously for only a normal 7-day period. Also, the condition of the cylinders and rings of the port side unit still were vastly superior to those of the other unit, despite the difference in operating time. It was also found, in this last test, that the remaining Triton oil in the base of the engine at the conclusion of the operating period was in unusually good condition. There was no evidence of the change in consistency that had characterized the base oil in former runs or of the oil used in the other engine, and there was no thickening or other indication of sludging.

Mr. Howard was so satisfied with the results of these tests that the Reliance Fishing Corporation now uses Triton motor oil exclusively for this type of engine.

Left: A. C. Stewart, and W. A. Newhoff.

Above: M. W. McAfee, Don Belding (Lord and Thomas), A. C. Galbraith, and E. W. Hutton. Left: J. B. Arthur, W. A. Newhoff, and J. B. Williams.

Below: C. S. Myer, S. D. Herkner, J. S. Clifton, and A. P. Bennett.



Sales Conference Ends on Golf Course

MANAGERS of the company's four sales divisions—Southern, Central, Northern, and Canadian—met with head office sales executives May 20 to 25, in a six-day conference presided over by J. B. Williams, assistant manager refined oil sales.

Discussion of sales policies and problems was halted toward the close of the week to permit the sales managers and department heads to settle a golfing controversy that had extended over from the 1934 annual meeting. Thirty-one participated in the links' conference, held at the Oakmont Country Club, and remained for the dinner that evening. W. F. Lewis, Southern Division operating manager, was the official host.

Men who direct the company sales assembled at Los Angeles for annual "division managers" conference. Standing, left to right: Eugene Power, manager Properties and Facilities; E. W. Hutton, manager Lubricants and Specialty Products; F. W. Pemberton, manager Northern Division; W. F. Lewis, operating manager Southern Division; C. S. Myer, operating manager Central Division; M. W. McAfee, manager Southern Division; W. A. Newhoff, manager Central Division; V. H. Kelly, Director of Sales; T. A. Power, operating manager Canadian Division; J. B. Williams, assistant manager Refined Oil Sales, who presided at the conference; A. C. Stewart, assistant to Director of Sales; A. P. Bennett, sales manager Canadian Division; J. M. Geary, manager Refined Oil Sales; R. Linden, sales manager Southern Division; R. J. Kenmuir, manager Canadian Division; J. S. Clifton, operating manager Northern Division; S. D. Herkner, sales manager Central Division; W. E. Davenport, sales manager Northern Division; and R. C. Worsley, district manager Panama.

I. J. Hancock Promoted

EFFECTIVE May 1, last, I. J. Hancock was promoted to the position of auditor of general accounts, advancing from chief clerk, general accounts division. At the same time W. H. Steele, who had been auditor of general accounts since March, 1931, was transferred to the position of auditor of marketing station accounts. H. H. Hannah, previously auditor of marketing station accounts, was named special auditor, E. C. Rogers became chief clerk, general accounts division, and C. M. Gjerde assumed Mr. Rogers' previous position of chief clerk, station accounts division.

These changes are in line with the long-established policy of the Comptroller's Office to permit the several auditors and heads of divisions to acquire comprehensive accounting experience of the various operations of the Union Oil Company.

I. J. Hancock

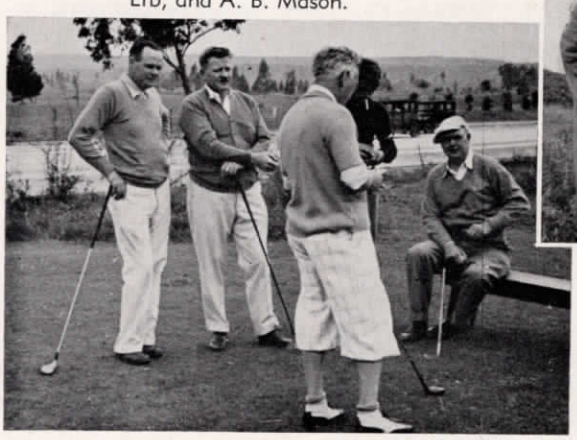
Mr. Hancock first became associated with the company on December 31, 1915, in the capacity of junior clerk in the Comptroller's Office. During 1917 and 1918, he served with the 91st Division of the A. E. F. in France and Belgium, returning to the company after being honorably discharged in 1919. In August, 1920, he was assigned to the marketing station auditing staff, where he served for the next four years.

In May, 1924, Mr. Hancock was transferred to the disbursements division and, during the next year, was advanced to the position of chief clerk, station accounts division. After three years, he was transferred to the position of chief clerk, production and transportation accounts division, in which capacity he served until August, 1931, when he was named chief clerk, general accounts division.

Some of those who played in the Annual Tournament. Left to right: J. T. Howell, R. C. Farrand, C. Nelson, and A. W. Anderson. Right: E. H. Badger, and E. Dalaney.

Left: Dalaney, L. Jones, Jr., W. J. Chase, A. B. Mason, E. C. Rogers, and C. M. Gjerde. Below: D. Lovejoy, J. Niles, N. Myers, and B. Hansen.

Above: W. K. Hopkins, and Dr. L. Murphy. Right: C. R. Erb, and A. B. Mason.



W. F. Lewis, J. B. Williams, A. C. Galbraith, and M. W. McAfee. Right: H. B. Dean.

1935 Union Oil Golf Tournament Held

Jack Muzzal and President's Cup

RECENTLY, the most successful annual golf tournament yet held by the Union Oil Company, was played by 139 employees from all parts of Southern California who migrated to the Fox Hills and Baldwin Hills golf courses and engaged in the ancient and honorable art of divot lofting. Of this group, 92 competed for the President's Cup and, when the last score was recorded, it was found that Jack Muzzal, of the Field Department, Richfield district, had repeated his championship form of the previous two years to win permanent possession of the cup.

In winning this year, Muzzal played his best golf of the past three years by turning in a 77 for each of the two 18 holes played. His score of 154 for 36 holes was 3 strokes better than his 1933 and 1934 performance. Upon being presented with the President's Cup, which was given by the late W. L. Stewart nine years ago and which bears the name of many well known Union Oil employees, Muzzal expressed the desire that the cup be retained as a perpetual trophy for future competition.

This year Earl ("Happy") Fields, Construction Department, Santa Fe Springs, won the Vice-President's Cup for the runner-up, with scores of 76 and 82, and beat his old rival, William ("Bill") MacPherson, who had nosed him out in the two preceding years. "Happy," in recognition of his victory, was presented with a replica of the trophy donated by R. D. Matthews.

Earl Fields, 1935 runner-up

The handicaps were well contested and provided lots of fireworks. Results of the five flights in the 36 hole championship contest were as follows:

1st Flight: Bill Nelson, So. Div. S.S.
2nd Flight: R. W. Martin, Executive
3rd Flight: J. W. Sinclair, Automotive
4th Flight: Tut Roll, So. Div. SS.
5th Flight: John Gordon, So. Div. Sales

The 18 hole tournament ("Old Man's Event") was divided into two flights—N. Myers (Los Angeles Refinery) and G. C. Ferguson (Geological) tied for the first, and Henry Dean (Personnel) won the second. Each flight winner was presented with a trophy donated by a department manager. Six "special" awards were presented this year. Frank Bescos received the Bogey prize; Lloyd Kinney, the prize for attaining the biggest score; L. C. Metcalf, the slicer's trophy; Carl Madson, the chiseler's prize; Dr. Ware, the "jitter salve"; and C. K. Howard, the prize for turning in the highest net score.

Following the contests, the golfers gathered in the club house and sat down to an excellent dinner, during which the winners of the various events were presented with trophies, and a new and distinguished master of ceremonies was discovered in the person of "Ron" Gibbs.

Those who served on the committees were: R. D. Gibbs, Chairman, J. J. Gaffney, R. H. Hornidge, J. T. Howell, W. K. Hopkins, Jess McClocklin, S. F. S., Dud Showler, L.A. Refinery, and J. P. Rockfellow, Secretary.

Right: W. W. Orcutt congratulating G. L. Armstrong (center) on completing 35 years' service with the company, with F. F. Hill looking on. Together, these men are the only living members of the Thirty-Five Year Club. Below is view of banquet given in honor of Mr. Armstrong, with a replica of Bardsdale field, which Mr. Armstrong operates, forming a centerpiece.

Thirty-five Years' Service Completed

ON THE crest of a wooded hill, overlooking the beautiful Santa Clara Valley from a point a few miles south of Fillmore, is the modest home of Gilford L. Armstrong, who completed thirty-five years' service with the Union Oil Company on June 1. Considering length of service with the company since it was incorporated in 1890, this places Mr. Armstrong in the select thirty-five-year-service circle to which but four members have ever belonged. The late W. L. Stewart, Sr., president at the time of his death, was the first member. W. W. Orcutt, vice-president in charge of exploration and production, and F. F. Hill, director of production, are the other members.

"Dad" Armstrong, as he is known, although he is quite young at the age of 63, has operated the company's Bardsdale oil field properties throughout his entire service. It is there that Mrs. Armstrong and he live, partially surrounded by the small wooden derricks, some of which are forty-five years old.

Before coming to California, Mr. Armstrong was associated with oil interests in Ohio, and, more than forty-one years ago, was married in Abilene, Kansas. After several years at the Bardsdale field, he took a leave of absence for a few months. Aside from this brief period, Mr. and Mrs. Armstrong have been at Bardsdale since 1900. They have one son, who is married and established in Fillmore.

Service Emblem Awards

25 Years

J. B. Hughes

C. H. Stamm

M. S. Sutphen

F. M. Smith

G. H. Sutphen

V. DeLarm

DURING April and May, this year, J. B. Hughes, C. H. Stamm, M. S. Sutphen, F. M. Smith, G. H. Sutphen, and Vernon DeLarm completed 25 years' service with the Union Oil Company. In the same period L. A. Welch, P. H. Nancett, R. H. Hornidge, J. G. Uhren, J. P. Varner, L. C. Weeks, E. L. Laughlin, V. E. Washbon, J. G. Schachtman, H. B. Isacson and G. L. Shaw completed 20 years' service.

On April 15, 1910, J. B. Hughes began with the Union Oil Company as a pumper in the Hartnell district. In 1917, he was transferred to Orcutt as lease foreman, a year later was made head well puller, but was reassigned the position of lease foreman at Orcutt in 1921. Since 1930, Mr. Hughes has been head well puller in the same district. During the last quarter century, Mr. Hughes has witnessed much of the development of the Santa Maria field.

C. H. Stamm, who has been identified with the petroleum industry since 1896, entered the employ of the company prior to his present service record, which began April 1, 1910, as a member of the Seattle sales department. After re-entering the employ of the company, he was made foreman of the asphalt shed and

shipping department at the Oleum refinery. In 1911, he became refinery foreman and, after about seven years in that capacity, was promoted to superintendent of the refined oil division, which position he now retains.

On May 1, 1910, M. S. Sutphen became a warehouseman on the Stearns lease of the Union Oil Company. After about a year, he was transferred to the field department as a rotary helper. Since then, he has remained in that department, working in the Orange division until the consolidation of districts in 1929. For the past 18 years, Mr. Sutphen has been a driller, which is his present capacity.

F. M. Smith first entered the employ of the company on May 10, 1910, as telegrapher at Junction Station, California. Shortly afterward, he was transferred to the San Luis Obispo office as dispatcher. In the years following, Mr. Smith filled several capacities from time to time, such as gauger, fireman, engineer, and then senior engineer at the Avila tank farm. At present he is night foreman on Wharf No. 2 at Port San Luis.

Beginning with the company on May 18, 1910, as a pumper on the Stearns lease, near Brea, G. H. Sutphen remained in his original capacity for about seven years. He then was transferred to the Hole lease as pumper and operator of the National Products plant, which subsequently was acquired by the Union Oil Company. After approximately ten years, when this plant was shut down, he was reassigned to production work on the Stearns lease. At present, Mr. Sutphen is located on the G. & L. lease.

Vernon DeLarm entered the employ of the company on May 20, 1910, as a stillman at the Port Hartford refinery. This was at the old plant, and, in connection with this work, Mr. DeLarm recalls the fact that in those days he and his fellow workers were forced to produce the lighter gasoline fractions during the night shifts, in order to take advantage of the cooling effect of the night air. When this plant was moved to its present location at the company's Avila refinery, Mr. DeLarm became one of the original stillmen there. He is continuing with the company in the same capacity.

Three months after beginning as a roustabout on the G. & L. lease, on April 5, 1915, L. A. Welch was advanced to rotary helper. He continued this work until 1917, when he was transferred to the Hole lease as tool dresser. In the following year, he was transferred to the Bastanchury ranch where, later, he became a driller. In 1922, he was transferred to Montebello to drill several wells, after which he returned to the Orange District. He remained there until the company's Myer lease at Santa Fe Springs was opened, then was transferred to that field. Mr. Welch still is a driller in the Southern Division, at present being stationed on the Vidor lease, Playa del Rey field, where he has made a remarkable record in this capacity.

On May 18, 1915, P. H. Nancett began what has become twenty years of continuous service with the company. During these years, he has been a greasemaker at the Oleum refinery, and now is considered one of the best in his work. Mr. Nancett has been connected with the oil industry, from time to time, since 1897, when, in that year, he was employed by the company at the Oleum refinery—his first land job after a career on the high seas. He worked in various capacities at that refinery until 1904, when he decided to try farming. Shortly afterward, however, he returned with the company, remaining for several years before again severing his connection. Finally, in 1915, he decided to seek re-employment with the Union Oil Company. Incidentally, during his seafaring days, Mr. Nancett survived three shipwrecks.

R. H. Hornidge first was employed as a clerk in station accounts division of the comptroller's office, on April 27, 1915. In October, 1916, he was transferred to general accounts, and, in June, 1918, became a traveling auditor. In March, 1921, he returned to head office as statistician, in 1925 he was appointed auditor of general accounts, and, in the following year, was made auditor of refining and marketing accounts. In January, 1930, he assumed his present position as auditor of production and transportation accounts. Mr. Hornidge is a vice-president of the Petroleum Accountants Society of Los Angeles.

Entering the marine department of the Union Oil Company on April 30, 1915, J. G. Uhren advanced to the point where he was named master of the company's tanker, "La Placentia," in 1929. Since then, he has assumed command of other company ships at various times, the "De Roche" in 1930, the "Utacarbon" early in 1933, and the "De Roche" again the latter part of that year. At present Captain Uhren remains master of the "De Roche."

L. A. Welch

P. H. Nancett

R. H. Hornidge

J. P. Varner

L. C. Weeks

20 Years

E. Laughlin

J. G. Schachtman

V. E. Washbon

H. B. Isacson

G. L. Shaw

Prior to his present service record, J.P. Varner was a roustabout in 1908 on the Stearns lease, later dressing tools until 1914, when he resigned. On April 30, 1915, he returned with the company as rotary helper, working in the drilling department for a few months and then transferring to the production department of the Hole lease. He remained on that lease for the next six years, then returned to the drilling department as a tool dresser, later advancing to his present capacity of driller, located in the Southern Division.

L. C. Weeks was first employed May 1, 1915, at the Oleum Refinery. On March 16, 1919, he was transferred to the L. A. lubricating oil sales department, where he has served ever since. Mr. Weeks was superintendent from April 1, 1919, until he was made chief stock clerk in October, 1933, which position he holds at the present time.

Entering the employ of the company at Lodi, California, on May 6, 1915, as warehouseman, E. L. Laughlin was soon made a package truck driver and then tank truck salesman, in which position he is now retained. Mr. Laughlin has had a good share in training a number of boys who have gone out to service stations.

On May 12, 1915, J. G. Schachtman became associated with the company at Oakland as assistant to the sales manager. During the years 1920-1924, he acted as district accoun-

tant. Since that time, Mr. Schachtman has been in sales promotion work and the leasing of service stations. At present he is assisting in the sales promotion of black oils.

Starting work on May 11, 1915, as a well puller on the Stearns lease, V. E. Washbon was advanced after the first year to head well puller. After the next three years, he was transferred to the drilling department, dressing tools on a standard rig and working derrick on rotary well. In 1921, Mr. Washbon was appointed production foreman on the Stearns lease, which position he continues to retain. As a tool dresser, he recalls when the company's Chapman No. 1 well blew in, got out of control and scattered oil all over the surrounding territory.

For the first few months of his employ with the company, which began on May 28, 1915, H. B. Isacson worked as a laborer at the Oleum Refinery, after which he became a boiler scaler in the boiler room. Within six months he was made boiler fireman, and, in 1917, was named an engineer in the power plant, the position he now holds. In point of service, Mr. Isacson has been engineer in the power plant at Oleum the longest of anyone, and, despite the many years he has devoted to such work, he has never had a lost time accident.

G. L. Shaw entered the employ of the Union Oil Company on May 31, 1915. His first work was that of well puller and roustabout at Orcutt. After a little more than a year, he became a pumper in the same district, and has been working in this capacity ever since.

Fifteen Years—April

Ashworth, F. L., Field, Southern Division.
Bailey, W. E., Sales, Southern Division.
Beattie, Margaret R., Sales, Head Office.
Butler, H. E., U. S. S., Southern Region.
Cardoza, Henry, Mfg., Oleum Refinery
Dunham, R. A., Mfg., Research.
Eberhardt, Pearl R., Field, Southern Division.
Eikelberry, A. R., Field, Southern Division.
Hansen, Mathias, Transp., Prod. Pipe Line.
Holden, J. N., Mfg., Oleum Refinery.
Salvatori, Joseph, Auto., L. A. Garage.
Schrodder, Marian M., Sales, Northern Div.
Sellers, K. L., Field, Southern Division.
Skinner, Wm. R., Field, Northern Division.
Staunton, C. E., Field, Southern Division.
Ward, E. S., Sales, Central Division.

Ten Years—April

Borlace, Geo. E., Mfg., L. A. Refinery.
Delacorte, Mathew, Auto., L. A. Garage.
Farr, Wm. H., Field, Southern Division.
Flanagan, D. M., Sales Southern Division.
Ghys, P. M., Auto., L. A. Garage.
Gjerde, C. M., Compt., Head Office.
Hilton, Otto, Mfg., L. A. Refinery.
Hooper, F. W., Mfg., L. A. Refinery.
Jube, Wm., Compt., Head Office.
Layton, J. W., Gas, Southern Division.
Lening, W. R., Mfg., Oleum Refinery.
Morrison, H. R., Pur., Head Office, Seattle.
Skinner, Wm. W., Sales, Southern Division.
Spowart, Alfred, Mfg., Oleum Refinery.
Summers, H. J., Sales, Central Division.
Taylor, T. E., Mfg., Oleum Refinery.
Tom, Sui Lun, Sales, Honolulu.
Van Treese, L. H., Mfg., L. A. Refinery.
Vermillion, F. R., Transp., So. Div., LAPL.
Villa, J. O., Mfg., Oleum Refinery.
Wentworth, F. P., Mfg., Oleum Refinery.

Fifteen Years—May

Balmes, H. J., Field, Southern Division.
Bateman, J. N., Sales, Northern Division.
Cooper, W. F., Sales, Northern Division.
Freeman, F. H., Transp., Producers Pipe Line.
Hamilton, Wm. H., Field, Southern Division.
Hinkle, N. G., Mfg., L. A. Refinery.
Oneto, F. J., Sales, Central Division.
Quinn, G. L., Field, Southern Division.
Souza, Manuel, Mfg., Oleum Refinery.
Tatum, Ray A., Traffic, Head Office.
Vincent, Geo. M., Mfg., Oleum Refinery.

Ten Years—May

Benson, Dewey, Sales, Northern Division.
Bice, Geo. S., Sales, Central Division.
Chandler, L. M., Compt., Head Office.
Fausset, E. C., Mfg., Oleum Refinery.
Geist, Henry, Sales, Northern Division
Grantstaff, H. E., Mfg., L. A. Refinery.
Griffith, B. R., Confd., Southern Division.
Hamilton, R. N., Const., Central Sales.
Lewis, C. A., Mfg., Oleum Refinery.
Lucid, David, Mfg., Oleum Refinery.
Medina, E. J., Mfg., Oleum Refinery.
Motzer, J. B., Auto., L. A. Garage.
Osborough, A. E., Sales, Vancouver.
Publicover, W. S., Mfg., Vancouver Ref.
Purgavie, Alex., Sales, Vancouver.
Shields, Robt. C. P., Sales, Gen. Oil Co., Ltd.
Smalley, C. J., Sales, Southern Division.
Stevenson, Wm. C., Mfg., H. O., Oleum Ref.
Sutphen, R. H., Field, Southern Division.
Takenishi, S. S., Sales, Honolulu.
Tilston, A. N., Sales, Southern Division.
Tudor, E. O., Transp., Producers Pipe Line.

REFINED AND CRUDE

By Richard Sneddon

A scientist has distinguished himself by discovering that singing increases the temperature of the blood. Shucks, we knew it all the time. There are certain kinds of singing that actually make our blood boil.

And a classic is a book you intend to read if you can ever get around to it.

After reporting to the police that her house had been wrecked by vandals, the wife of a well-known oil man discovered that her husband had merely been looking for a clean shirt during her absence.

Then there was the poor fellow who spent so much money trying to perfect a burglar alarm that he was eventually obliged to sell his watch dog and do his own barking.

Now we are informed that the newspaper is a great help to the radio. Yes, if you bunch it up, and stuff it in the loud speaker.

And bridge shin is a new disease, resulting from the too frequent repetition of the words, "What did you say were trumps?"

"This is an epoch-making machine," said the demonstrator, and the skeptical customer responded, "Zat so? Well, let me see it make one."

And now that the summer is actually here, it's sure swell to know that once more you can step into your car and go anywhere your wife pleases, so long as the kids are agreeable.

According to a well-known zoologist there are only eight gorillas in the United States. Oh, yeah!

Another authority tells us that the best way to tell plants from weeds is simply to pull them out, and if they grow up again they're weeds.

You've heard, of course, about the bird who sent his car to the auto laundry, and had it returned with the starter button missing.

It is said that gasoline costs eighty cents a gallon in Africa. No wonder the natives go around without any clothes on.

But why in the name of goodness has nobody yet been punished for the invention of the paper towel?

Bacteriologists tell us that the flaps of envelopes are just covered with microbes, but personally we don't see how a microbe could live on such a small quantity of mucilage.

And the reason the Scotchman never knew what kind of cigarettes he smoked, was simply that he was too polite to ask.

Once upon a time, so the story goes, there was a guy who told his boss exactly what he told his wife he was going to tell his boss.

In reality men don't want to quarrel with their wives, but heck, a fellow has to spend some time at home.

There is apparently no limit to the uses of petroleum products. It has just been discovered, for instance, that a coating of asphalt will considerably lengthen the life of a cake of soap.

That Union Spot remover will completely remove the spots left by spot removers.

And that Triton is the ideal lubricating oil for the canny motorist.

Since the fog has finally cleared away, the girls are doing everything under the sun to get a coat of tan.

But after all, when you rise up and the chair rises with you, that's really summer.

Said the young man in the book store, "Have you got a book called, 'Efficiency in the Oil Business'?" Replied the clerk, "Fiction counter on the other side, sir."

Archæologists have found a road in the Mojave desert that they claim was started 5,000 years ago. It was probably a government job.

In conclusion, you'll never know how careful you can really be, 'til you begin wearing white shoes.

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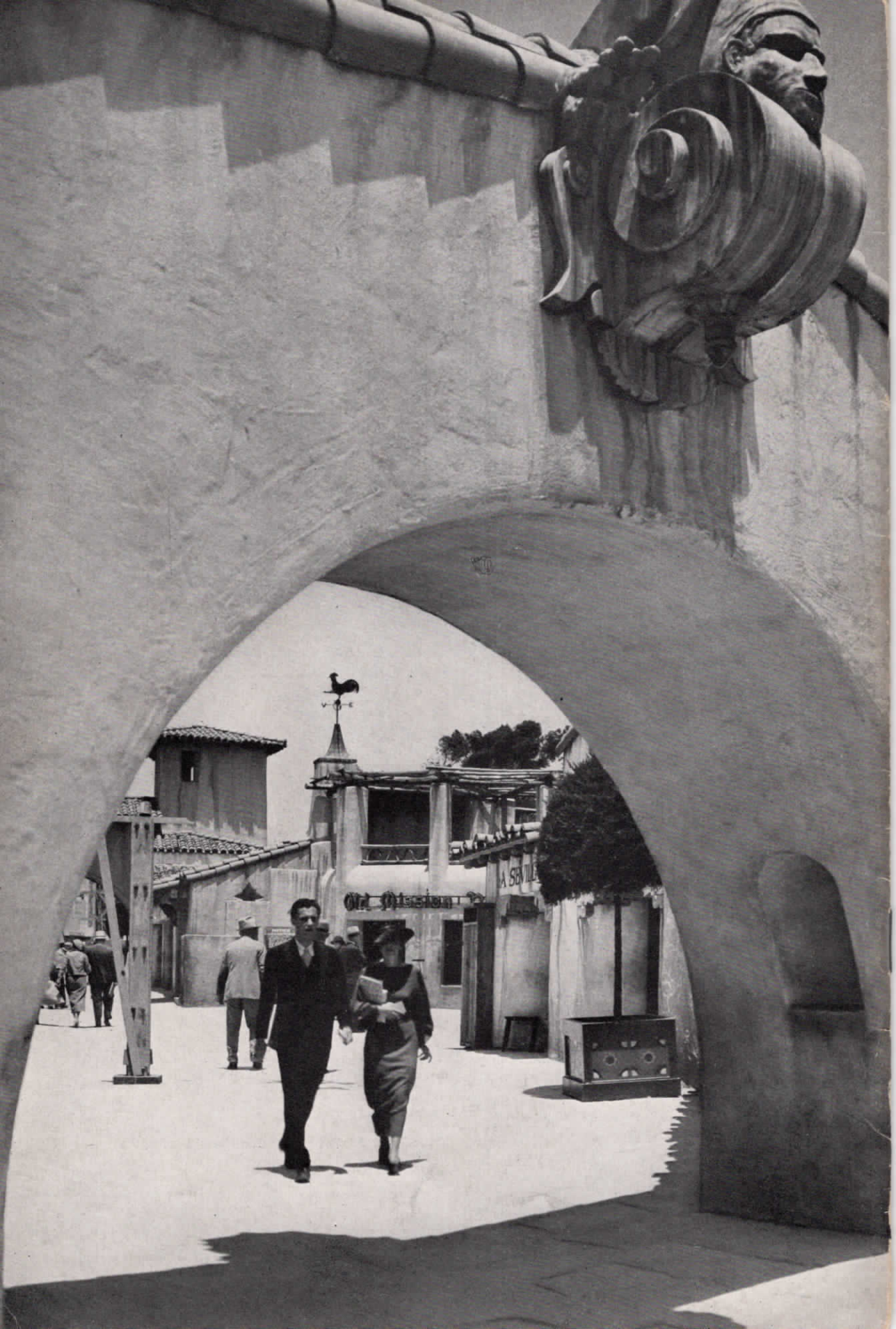
Old Mission