UNITED STATES DEPARTMENT OF LABOR
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Earnings in Southwestern Petroleum Industry, April 1943

Prepared in the
DIVISION OF WAGE ANALYSIS
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Bulletin No. 762

[Reprinted from the MONTHLY LABOR REVIEW, January and February 1944]

UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON : 1944

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 10 cents

Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
Washington, D. C., February 23, 1944.

The SECRETARY OF LABOR:

I have the honor to transmit herewith a report on earnings in oil-well drilling and crude-petroleum production and refineries in the Southwest, April 1943. This report was prepared in the Bureau's Division of Wage Analysis, Region XII, Dallas, Tex. The first part of the report, which deals with oil-well drilling and crude-petroleum production, was prepared by Joe E. Brown; and the second part, which covers petroleum refineries, was prepared by C. Wilson Randle.

The Bureau is indebted to the many officials of cooperating companies through whose courtesy these data were made available. Preliminary editions (mimeographed) of these articles were issued earlier by the Bureau, and these materials were made use of in articles in the December 1943 and January 1944 issues of the Petroleum Engineer.

A. F. HINRICHS, *Acting Commissioner.*

Hon. FRANCES PERKINS,
Secretary of Labor.

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United States Bureau of Labor Statistics

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Oil-Well Drilling and Crude-Petroleum Production

Summary

A study of 21,805 males in selected occupations, employed in 401 companies engaged in petroleum production and the drilling of oil and gas wells, in Oklahoma, Texas, and Louisiana, reveals that 58 percent of these workers were in jobs which showed straight-time average hourly earnings of $1.00 or more. Approximately 8 percent were in occupations paying $1.25 or more per hour. As a group the employees studied averaged $1.02 per hour in April 1943.

Hourly earnings of workers in Texas averaged $1.03, in Louisiana $1.02, and in Oklahoma 99 cents. The highest average hourly wage ($1.06) was paid in the Texas Gulf Coast area and the lowest (95 cents) in North Texas. The wages paid by large companies were consistently higher than those paid by the small ones. Companies operating under bargaining agreements with unions—generally the larger companies—paid higher wages than those without such agreements.

Among the 18 individual key occupations studied, that of rotary driller showed the highest average wage, $1.52 per hour. Cable drillers averaged only $1.15, and ranked below class A machinists ($1.33), class A electricians ($1.31), class A carpenters ($1.19), and gang pushers ($1.17). Watchmen (63 cents) earned the lowest wages.

Scope and Method of Survey

This study of wages in the production and drilling branches of the petroleum industry was undertaken by the Bureau of Labor Statistics primarily to provide data for use by the War Labor Board in its administration of the national wage-stabilization program. In view of the fact that this is the most comprehensive study of wages ever made of the petroleum industry in the Southwest, its results should be of interest to management and labor also.

The companies included in the survey fall into three categories: (1) Those which engage in production only, maintaining no drilling department; (2) those which engage in production and maintain a drilling department which does all or part of the drilling; and (3) those which do drilling exclusively. Of the 401 companies studied, 71 were

engaged exclusively in drilling, whereas the remaining 330 either possessed drilling divisions in connection with production activities or were engaged solely in production. The Bureau's study covered both oil-well drilling and production but not rig building.[1]

The companies studied represent approximately 90 percent of those employing 9 or more workers which were in operation at the time this study was made. More than nine-tenths of the workers employed in the drilling and production branches of the oil industry in Texas, Oklahoma, and Louisiana were found in these companies.

As is characteristic of the oil industry, many of the companies studied were engaged in multiple operations.[2] The 401 companies included in the study were found to control a total of 730 separate operations in the Southwest, and many of them were operating in more than one of the areas referred to. Of the total operations, 501 were in Texas, 157 in Oklahoma, and 72 in Louisiana.

The wage data used in this report were taken directly from pay-roll records by trained agents of the Bureau, and relate to the pay-roll period ending nearest April 15, 1943. Care was taken to insure comparability of occupation from company to company through the use of standard job descriptions, each employee being classified according to the duties he performed rather than by his occupational title.

Average hourly earnings, exclusive of premium overtime payments and shift differentials, were obtained for 18 key occupations in the industry. Of the approximately 40,000 workers employed by the companies surveyed, 21,805 plant employees were studied. Several criteria were used in the selection of these occupations: (1) Definiteness and clarity of the occupational classification; (2) numerical importance; (3) critical importance to the war effort; (4) importance from the standpoint of collective bargaining; and (5) representativeness of range of rates. It is apparent that all these requirements are not equally satisfied by the occupations selected. Considered as a whole, however, they are believed to present an adequate picture of the wage structure of the industry.

Characteristics of the Industry

In 1942 the States of Texas, Oklahoma, and Louisiana produced 53.3 percent of the Nation's oil.[3] Texas produced approximately 35 percent, Oklahoma accounted for 10 percent, and Louisiana over 8 percent. Of the producing wells at the end of 1942, this Southwest region possessed nearly 40 percent—approximately 25 percent in Texas, 13 percent in Oklahoma, and nearly 2 percent in Louisiana. During this same year, these three States produced 739,572,000 barrels of crude oil. Of this amount, Texas produced approximately 65 percent, Oklahoma 19 percent, and Louisiana almost 16 percent. At the close of the year the boundaries of the three States contained 159,750 producing wells. Sixty-three percent of these wells were

[1] Recognition is given to the fact that rig building is broadly considered a part of drilling operations. Technically, however, it exists as a separate phase of the industry and has therefore been excluded from this study. A comprehensive study of wages prevailing in the refining industry of the Southwest appeared in the Monthly Labor Review for January 1944 (p. 124).

[2] An "operation" is considered to include all the drilling and/or production activities of a company which are within any one of the areas designated for purposes of this study. For example, there are six designated areas in Texas, and this would be the maximum number of operations which any one company would be considered to have in this State.

[3] Figures based on Bureau of Mines annual petroleum statement, No. P-241.

in Texas, 33 percent in Oklahoma, and approximately 4 percent in Louisiana. Production figures for areas within the State of Texas show that approximately 30 percent of the State's production comes from the Texas Gulf Coast, about 25 percent from East Texas, 17 percent from West Texas, 13 percent from Southwest Texas, 9 percent from North Texas, and 6 percent from the Panhandle. Of Louisiana's total production, the Louisiana Gulf Coast accounts for 75 percent and North Louisiana for the remainder.

Differentiation among the various drilling and production areas appears to be based upon variations in such factors as geological structure, depth of production, type of oil produced, gas pressures, refining quality of oil, and amount and type of production.

At the end of 1942, oil and gas operations were found in every county in Texas; 168 counties of the State, produced oil or gas, and leasing and drilling activities were to be found in the remaining 86 counties. There are over 750 separate oil fields in Texas. These fields are grouped, however, and the industry generally recognizes 6 distinct production and drilling areas (designated in table 2). Wells in Texas, especially in the Texas Gulf Coast and Southwest Texas areas, are generally deeper than those in Oklahoma. Slightly less than 40 percent of the wells in Texas flow while the remainder are on pump. Approximately 32 percent of the Texas wells are "strippers,"[4] the majority of these being in the North Texas area.

The Louisiana oil fields are generally in the northern and southern areas of the State, with few fields in the central region. There are two general concentrations of oil fields in North Louisiana—one in the western section near the Texas border and the other in the east central portion. The South Louisiana fields are scattered throughout the southern part of the State, and, as is characteristic of wells along the Gulf Coast, are of the deeper type, contain high gas pressures, and consequently require heavier rigs and more highly skilled labor than the wells farther north. Approximately 45 percent of the wells in Louisiana are of the stripper class, North Louisiana possessing most of these.

Although the industry recognizes no particular difference in areas of production and drilling in Oklahoma (and consequently none are made for purposes of this study), the northeastern part of the State is characterized by older and generally shallower deposits. Wells in the central part of the State, an area which embraces fields in the Seminole and Oklahoma City region, are deeper and probably more active from a drilling standpoint. No great differences in drilling problems appear to exist, however, throughout the State of Oklahoma. Production is characterized by a low per-well productivity, 95 percent of the wells producing less than 25 barrels per day. Approximately 88 percent of the wells in Oklahoma are of the "stripper" type.

DRILLING AND PRODUCTION

The policy regarding drilling varies from company to company. Some companies maintain drilling departments adequate to carry on all of their drilling operations while others make use of the services of contract drilling companies. It is common practice, even among those companies with their own drilling departments, to contract for a large

[4] The term "stripper" is applied to any well producing less than 5 barrels per day, which is taking from the reservoir sand the last oil which can be mechanically and physically pumped out. Many of these wells are operated on an extremely narrow margin of profit.

amount of drilling. In general, the tendency seems to be towards a greater utilization by all companies of contract drilling service.

Cable-tool and rotary drilling are the two methods in use. Cable-tool drilling, the older of the two, is used primarily for shallow drilling and is becoming less and less important as it is necessary to tap deeper oil deposits. This method involves dropping a sharp digging instrument, attached to the end of a cable, repeatedly into the hole being dug. It has been estimated that, as late as 1918, about 95 percent of the oil wells were drilled by this method.

Relatively little cable-tool drilling is found in Texas and Louisiana, but about 40 percent of the wells in Oklahoma are drilled by this method.

The rotary method of drilling involves the use of a revolving bit which bores into the earth. The development of this method of drilling, along with heavier and stronger materials such as casings, drill stems, and larger derricks and power units, has made possible the deeper wells of the present-day oil industry.

Most drilling rigs are operated by steam, although diesel and electric power are becoming more and more common. A rotary drilling rig consists of the derrick, including the crown block, cables, moving block, drill stem, and drilling machinery, the power unit (steam, diesel, or electric), mud pumps, pipe, and pipe racks, and a crew house. Near the derrick is a series of slush pits from which mud of varying thickness and weight is pumped for circulation through the well, the thickness and weight of the mud depending on the gas pressure existing or likely to be encountered in the well.

When drilling takes place in a proved field or territory, data on the sand stratum from which production is expected are usually obtained in advance. In such cases the distance from the earth's surface to the sand is known within rather close limits, and drilling goes forward rapidly, usually without benefit of "coring" operations (i. e., extraction of sand, for analysis) until the oil sand is approached. In a "wildcat" operation there is usually no accurate information available as to what sand strata, if any, lie beneath the surface, nor the depth to or between them. In such operations coring may be required throughout the entire depth of the hole, thereby slowing completion of the well. It is common practice in wildcat wells for drilling to be carried through one or more sands which normally would have been considered "pay" sand. This is done for purposes of securing information concerning the sands present in the area, their quality, and the depths to be drilled in order to reach them.

Whether or not drilling takes place in a proved field, if it is determined that production is possible and economically practical from any of the sands encountered, steps are taken to "bring in" the well. The "bringing in" of an oil well, primarily a responsibility of the driller, requires both skill and patience. The exact technique employed varies with the type of production which is expected, i. e., flowing, pump, or air or gas lift. In any event the casing must be set and tubing run. After these operations are completed, the well which is expected to flow is equipped with a "Christmas tree"—an elaborate arrangement of outlets, valves, and gauges essential to test the pressure of the well and control its flow. At this point the well is ready for swabbing or some other technique designed to start the flow of oil from the well.

The production of petroleum involves the bringing of the oil to the surface and its diversion to storage or appropriate transportation facilities. Also involved are such items as maintenance of wells, lease grounds, and other lease property.

The Labor Force

The labor force engaged in drilling and production activities in this region consists almost entirely of male workers. Even under pressure of the present labor shortage there is as yet no indication that this characteristic will be altered. Workers engaged in drilling activities are generally considered more mobile as a group than are production workers. The drilling crew usually follows the rig from area to area and, in general, remains intact. Wages paid to these workers are not ordinarily affected by labor conditions common to the locality in which the rig happens to be operating. Production employees, on the other hand, who do not move from place to place so frequently, often receive wages characteristic of the community in which they work. The effect of the labor situation in the individual community on wages paid to these employees is influenced considerably, however, by such factors as size and policy of the company involved and type of production.

The movement of labor in the drilling and production segments of the oil industry is, in general, confined to areas similar with respect to such factors as depth of the deposit and gas pressures. An example of this is found in the characteristic movement of workers among the oil-producing regions along the Gulf Coast and the relative lack of such movement between the coastal regions and the northern areas possessing shallower deposits and lower gas pressures.

OCCUPATIONAL COMPOSITION

The make-up of the crew usually required to operate a rig depends on the drilling method and power being used. A typical crew for a steam-driven rotary rig consists of a rotary driller, a fireman, two rotary floormen, a derrickman, and a tool pusher.[5] The driller is the key man in any drilling crew. On him rests responsibility not only for the safety of his crew, but also for the care of the expensive equipment of which the rig is composed. He must be continually alert for the particular formations in which he is drilling, in order not to overlook desirable oil sands. He must keep an accurate log of his drilling activities and be ready to meet emergencies created by high gas pressures, broken cables, and the finding of unusual geological formations. Both the skill involved and the inherent responsibility of this occupation are reflected in the wages received by drillers.

Throughout the oil industry rotary firemen, rotary floormen, and derrickmen are referred to as "roughnecks." An increasing number of smaller companies make no distinction in the duties of these three occupational classifications, paying the same rate for each. For purposes of this study these workers, when assigned a variety of duties, have been classified as "rotary driller helpers, not elsewhere classified." Average hourly earnings of such workers, since they reflect primarily the wage levels of small companies, have a tendency

[5] Roustabouts are commonly employed in the preparation of a drilling site and in setting up and removing equipment other than the derrick. However, they are not usually considered part of the drilling crew.

to be somewhat lower than the corresponding earnings of rotary firemen, rotary floormen, and derrickmen employed by larger companies. Some of the larger companies, also, have tended toward less specialization of such workers in recent years. The trend in this direction will no doubt be influenced by the degree to which diesel engines or electricity replace steam power, thus removing the need for a fireman and reducing the range of skills required to handle work of the floor, derrick, and power unit.

The tool pusher, whose principal duty consists of keeping a supply of sharp bits and other materials on hand, usually divides his time among a number of rigs operating in the same vicinity.

The duties of drilling-crew workers are usually strenuous and continually expose them to varying degrees of danger. Heavy blocks, cables, and tongs are in continuous movement overhead. The danger of blowouts, which sometimes result in fire, is always present. A derrickman must spend much of his time far up in the derrick. During recent years improved equipment and drilling techniques, accompanied by such safety devices as blowout preventers and weight indicators, have made the job somewhat less hazardous.

Once the well is producing, the job of the drilling crew is over. The rig is moved to other drilling sites and the care of the well becomes the responsibility of production workers, chief of which are pumpers and/or switchers and roustabouts.

Activities relating to the bringing of the oil to the surface and regulating its flow to storage or transportation facilities are carried on by pumpers and/or switchers; the pumpers normally tend wells which are pumped and the switchers tend those which flow under natural reservoir pressure. The pumpers and switchers together constitute the largest occupational group in oil drilling and production.

Roustabouts, who perform those duties of lease and well maintenance requiring relatively little skill, are often referred to as the "common labor" of the oil industry. The duties of roustabouts, however, are ordinarily more responsible than those of common laborers and involve work which is consistently heavy and frequently dangerous; the wages paid to roustabouts are generally considerably higher than those paid to ordinary common labor. It should be noted that the use of roustabout labor is not confined exclusively to production activities; roustabouts are frequently employed in pipe-lining and well servicing, and occasionally in drilling operations (particularly in the preparation of slush pits, laying of water and fuel lines, and moving equipment onto and off the drilling site).

The skill required and the responsibility involved in production, as well as in drilling activities, vary with the characteristics of the producing area involved. In fields where little or no gas pressure is present and wells are characterized by low productivity, relatively less skill and responsibility is required as compared with fields characterized by extremely high gas pressures, high productivity, and deep wells.

METHOD OF WAGE PAYMENT

Workers in the drilling and petroleum production industry are almost universally paid on a time basis. With negligible exceptions, overtime is paid for at the rate of time and a half, after 40 hours a week or 8 hours a day. A considerable amount of overtime was being worked at the time of the Bureau's study. Incentive systems of

pay are not generally found in the drilling and production phases of the oil industry. Oil-well drilling and production ordinarily proceed continuously, requiring 3 shifts for some occupations. Premium payments for late-shift work, however, are uncommon.

UNIONIZATION

Of the 401 companies surveyed for this study only 17, or 4.2 percent, were found to have bargaining agreements with unions. Of these 17 firms, 9 were affiliated with the Oil Workers' International Union (C. I. O.), and 2 with the International Union of Operating Engineers (A. F. of L.); 6 were independent unions. The 17 companies having union agreements, although constituting only 4.2 percent of the total companies covered, conducted more than 11 percent of the total operations in the Southwest and employed more than 30 percent of the employees, thus indicating that unionization is most prevalent among the larger companies. Thirteen percent of the operations in Oklahoma were conducted by companies with union agreements; the corresponding ratio for Texas was 10 percent, whereas in Louisiana only 1 percent of the operations were so classified.

Average Hourly Earnings, April 1943

The 21,805 employees covered by this survey earned an average of $1.02 in April 1943. Evidence available from other Bureau wage surveys in the Southwest indicates that earnings in this industry are relatively higher than those prevailing in most other industries in this area.

Regional variations in wages within the Southwest were not marked. A study of average earnings for each State, as shown in the accompanying tabulation, reveals a difference of 1 cent per hour in earnings of workers in Texas and Louisiana ($1.03 and $1.02, respectively). In Oklahoma, with its relatively shallow fields and high percentage of cable-tool drilling, as well as its characteristic low productivity per well and high degree of stripper activity, workers averaged 99 cents per hour.

More specific area comparisons indicate slightly greater wage differences. In North Louisiana workers averaged 99 cents per hour, while in the Louisiana Gulf Coast they earned an average of $1.05. This difference is probably the result of variations in such factors as depth of production and gas pressures, as well as degree of activity of the larger oil companies. The majority of Louisiana's stripper wells are in North Louisiana.

	Average hourly earnings [1]
Southwest	$1. 02
Texas	1. 03
Panhandle	1. 01
West Texas	1. 03
North Texas	. 95
East Central Texas	1. 04
Southwest Texas	1. 04
Gulf Coast	1. 06
Louisiana	1. 02
North Louisiana	. 99
Gulf Coast	1. 05
Oklahoma	. 99

[1] Exclusive of premiums for overtime and night-shift work. In preparing these area averages, constant occupational weights were used, based on the distribution of workers by occupations in the Southwest as a whole.

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The average wage paid to workers in Texas ranged from 95 cents per hour in North Texas to $1.06 per hour in the Texas Gulf Coast area. This range can be explained only in terms of a complex interplay of several influences. For example, rates in the Texas Gulf Coast and Southwest Texas areas reflect the presence of very deep drilling and production, extremely high gas pressures, and a high proportion of major companies. On the other hand, the average earnings received by workers in North Texas reflect the absence of the factors mentioned above and the influence of low per-well productivity, a high percentage of stripper wells, and high per-barrel production cost. The major oil companies have under lease large undeveloped acreages in this area, but their present activity is confined largely to exploratory operations; hence drilling and production are dominated by the smaller independent companies.

In East Central Texas, workers received an average of $1.04 per hour, in West Texas, $1.03, and in the Texas Panhandle, $1.01. It should be noted that both the area with the highest average wage and that with the lowest are in Texas.

OCCUPATIONAL DIFFERENCES

The average for individual occupations in the Southwest ranged from 63 cents per hour for watchmen to $1.52 for rotary drillers (table 1). Of the 18 occupations studied, only that of watchmen (including less than 1 percent of the total number of workers) showed average hourly earnings of less than 80 cents in the region as a whole. Five occupations, pumpers and switchers, rotary driller helpers not otherwise classified, rotary floormen, roustabouts, and truck drivers (under 2½ tons), accounted for 77 percent of the workers and had average earnings ranging from 80 cents to $1 per hour. Twenty-two percent of the workers were employed in the 12 remaining occupations which showed average hourly earnings of $1 and over.

Pumpers and switchers, the occupational classification in which the largest number of workers (36.4 percent) were employed, averaged 99 cents per hour, while roustabouts, accounting for the next largest group (24.2 percent) averaged 94 cents. Cable drillers averaged only $1.15 per hour, as compared with the $1.52 for rotary drillers. Derrickmen and rotary firemen each showed an average of $1.03 an hour, while the average for rotary floormen was 99 cents. Rotary driller helpers not otherwise classified, employed primarily in small operations, earned an average of 93 cents an hour.

The distribution of employees according to operation averages for the various occupations reveals that approximately 12 percent were in jobs averaging less than 80 cents per hour, about 30 percent were in those averaging from 80 cents to $1, and 58 percent were in jobs paying $1 and over. Approximately 8 percent were in occupations that averaged $1.25 or more.

Relatively few rotary drillers or class A machinists, it will be noted, received less than $1.40 per hour, while comparatively few watchmen received more than 80 cents. In view of the rather modest geographical differences in the general average wages previously given, the marked dispersion of wage rates in some occupations is, however, rather surprising. Extreme differences involving only a few workers, to be sure, may reflect the influence of unusual circumstances and

should not be regarded as highly significant. It is of interest to note, however, that substantial numbers of pumpers and switchers were found in both the lower and higher wage ranges. Nearly 1,200 roustabouts were paid less than 80 cents per hour, while more than 1,000 others received $1.10 or more. The wide range of wages found within the same occupational classification reflects, in addition to the area differences noted above, differences in size and policy of company, differences with respect to unionization, and other factors.

TABLE 1.—*Distribution of Male Oil-Well Drilling and Production Workers in Selected Occupations in the Southwest, by Operation Average Hourly Earnings,*[1] *April 1943*

Occupation	Number of operations	Total workers		Average hourly earnings	Number of workers in operations where hourly earnings averaged—				
		Number of workers	Percent		Under $0.80	$0.80 and under $0.85	$0.85 and under $0.90	$0.90 and under $0.95	$0.95 and under $1.00
All workers:									
Number	-------	21,805	-------	-------	2,590	471	1,029	1,878	3,325
Percent	-------	-------	100.0	-------	11.9	2.2	4.7	8.6	15.2
Carpenters, class A	16	25	.1	$1.19	-------	-------	-------	-------	1
Carpenters, class B	20	41	.2	1.03	5	-------	-------	2	4
Derrickmen	144	1,012	4.6	1.03	8	3	44	83	295
Drillers, cable	58	198	.9	1.15	-------	-------	3	3	-------
Drillers, rotary	225	1,353	6.2	1.52	-------	-------	-------	1	-------
Electricians, class A	17	25	.1	1.31	-------	-------	-------	-------	-------
Electricians, class B	9	15	.1	1.05	-------	-------	-------	1	7
Gang pushers	243	947	4.3	1.17	29	15	14	38	2
Machinists, class A	12	18	.1	1.33	-------	-------	-------	-------	-------
Maintenance men	77	167	.8	1.00	40	8	2	17	13
Pumpers and switchers	570	7,945	36.4	.99	988	232	312	450	1,069
Rotary driller helpers, not otherwise classified	88	1,539	7.1	.93	60	44	343	331	477
Rotary firemen	108	785	3.6	1.03	-------	3	22	72	224
Rotary floormen	134	1,836	8.4	.99	16	3	154	409	650
Roustabouts	440	5,271	24.2	.94	1,181	125	124	448	545
Truck drivers, under 2½ tons	98	284	1.3	.86	121	4	7	5	18
Truck drivers, 2½ tons and over	75	196	.9	1.02	17	30	1	14	20
Watchmen	70	148	.7	.63	125	4	3	4	-------

Occupation	Number of workers in operations where hourly earnings averaged—								
	$1.00 and under $1.05	$1.05 and under $1.10	$1.10 and under $1.15	$1.15 and under $1.20	$1.20 and under $1.25	$1.25 and under $1.30	$1.30 and under $1.35	$1.35 and under $1.40	$1.40 and over
All workers:									
Number	3,039	2,858	2,782	1,764	406	114	65	200	1,284
Percent	13.9	13.1	12.8	8.1	1.9	0.5	0.3	0.9	5.9
Carpenters, class A	1	3	-------	7	2	11	-------	-------	-------
Carpenters, class B	7	-------	20	3	-------	-------	-------	-------	-------
Derrickmen	275	11	56	68	149	20	-------	-------	-------
Drillers, cable	48	22	58	-------	14	20	10	8	12
Drillers, rotary	16	-------	3	13	3	18	30	83	1,186
Electricians, class A	1	-------	3	4	1	1	1	-------	14
Electricians, class B	-------	1	4	-------	-------	-------	1	-------	1
Gang pushers	46	43	113	300	144	27	15	108	53
Machinists, class A	3	-------	-------	-------	-------	-------	1	-------	14
Maintenance men	8	13	6	29	21	7	2	1	-------
Pumpers and switchers	639	2,228	1,173	799	45	4	3	-------	3
Rotary driller helpers, not otherwise classified	214	-------	58	12	-------	-------	-------	-------	-------
Rotary firemen	206	11	68	161	12	6	-------	-------	-------
Rotary floormen	98	27	185	294	-------	-------	-------	-------	-------
Roustabouts	1,445	382	1,016	5	-------	-------	-------	-------	-------
Truck drivers, under 2½ tons	20	90	1	16	2	-------	-------	-------	-------
Truck drivers, 2½ tons and over	11	16	18	53	13	-------	2	-------	1
Watchmen	1	11	-------	-------	-------	-------	-------	-------	-------

[1] Exclusive of premium payments for overtime and night-shift work.

Inter-area differences in occupational rates, although more pronounced than the differences in the regional averages, are, in most cases, moderate (table 2). Watchmen received the lowest wages in each of the 3 States represented and rotary drillers the highest rates. The greatest differences reflected, for the most part, variations in the earnings of relatively small numbers of workers.

TABLE 2.—*Average Hourly Earnings*[1] *of Male Oil-Well Drilling and Production Workers in Selected Occupations in the Southwest, by Area, April 1943*

Occupation	Texas								
	Entire State					Texas Panhandle		West Texas	
	Number of operations	Number of workers	General average	Lowest operation average	Highest operation average	Number of workers	General average	Number of workers	General average
Carpenters, class A	10	18	$1.21	$0.98	$1.27	(2)	(2)	(2)	(2)
Carpenters, class B	16	32	1.03	.75	1.15	(2)	(2)	(2)	(2)
Derrickmen	99	683	1.06	.65	1.27	34	$0.99	151	$1.05
Drillers, cable	39	144	1.17	1.00	1.77	70	1.22	24	1.07
Drillers, rotary	153	943	1.54	.90	1.87	36	1.48	220	1.50
Electricians, class A	13	20	1.30	1.10	1.42	(2)	(2)	(2)	(2)
Electricians, class B	8	14	1.06	.96	1.42	(2)	(2)		
Gang pushers	161	620	1.18	.56	1.58	49	1.15	88	1.17
Machinists, class A	8	14	1.32	1.00	1.42			(2)	(2)
Maintenance men	45	77	1.05	.49	1.30	(2)	(2)	15	1.04
Pumpers and switchers	405	5,151	1.00	.32	1.40	428	1.00	663	1.01
Rotary driller helpers, not otherwise classified	68	1,277	.93	.71	1.18	39	.95	372	.94
Rotary firemen	76	551	1.05	.85	1.27	27	.97	113	1.04
Rotary floormen	88	1,186	1.01	.68	1.18	42	.96	228	.99
Roustabouts	295	3,104	.95	.36	1.15	313	.95	384	.95
Truck drivers, under 2½ tons	66	183	.87	.40	1.16	14	.88	32	.80
Truck drivers, 2½ tons and over	53	122	1.04	.54	1.44	10	1.02	19	.95
Watchmen	52	123	.63	.30	1.08	(2)	(2)	9	.64

Occupation	Texas							
	North Texas		East Central Texas		Southwest Texas		Texas Gulf Coast	
	Number of workers	General average	Number of workers	General average	Number of workers	General average	Number of workers	General average
Carpenters, class A			4	$1.22	(2)	(2)	8	$1.26
Carpenters, class B	7	$1.08	3	1.11	4	$1.10	16	.97
Derrickmen	89	.94	65	1.08	76	1.09	268	1.09
Drillers, cable	43	1.16	7	1.09				
Drillers, rotary	165	1.44	86	1.58	86	1.61	350	1.58
Electricians, class A	(2)	(2)	(2)	(2)	(2)	(2)	11	1.26
Electricians, class B	(2)	(2)	(2)	(2)	(2)	(2)	9	.99
Gang pushers	90	1.13	126	1.20	82	1.25	185	1.18
Machinists, class A	(2)	(2)	(2)	(2)	(2)	(2)	6	1.21
Maintenance men	11	.99	25	1.08	4	1.13	20	1.04
Pumpers and switchers	810	.91	1,350	1.01	527	1.01	1,373	1.04
Rotary driller helpers, not otherwise classified	250	.90	74	.93	101	.88	441	.95
Rotary firemen	58	.95	52	1.08	65	1.10	236	1.07
Rotary floormen	173	.92	129	1.04	133	1.05	481	1.04
Roustabouts	528	.90	689	.96	358	.93	832	.99
Truck drivers, under 2½ tons	28	.78	44	.94	20	.94	45	.88
Truck drivers, 2½ tons and over	33	.99	13	1.14	4	1.24	43	1.06
Watchmen	13	.45	18	.59	9	.61	72	.68

[1] Exclusive of premium payments for overtime and night-shift work.
[2] Number of plants and/or workers too small to justify presentation of an average.

TABLE 2.—*Average Hourly Earnings of Male Oil-Well Drilling and Production Workers in Selected Occupations in the Southwest, by Area, April 1943*—Continued

Occupation	Louisiana						
	Entire State					North Louisiana	
	Number of operations	Number of workers	General average	Lowest operation average	Highest operation average	Number of workers	General average
Carpenters, class A	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Carpenters, class B	3	8	$1.02	$0.90	$1.11	(1)	(1)
Derrickmen	21	172	1.01	.85	1.24	28	$1.02
Drillers, cable	3	4	1.06	1.01	1.08	4	1.06
Drillers, rotary	30	195	1.52	1.00	1.82	39	1.50
Electricians, class A	(1)	(1)	(1)	(1)	(1)		
Electricians, class B	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Gang pushers	23	91	1.20	.60	1.62	43	1.14
Machinists, class A	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Maintenance men	11	44	.92	.76	1.37	30	.85
Pumpers and switchers	49	715	1.02	.38	1.24	357	.99
Rotary driller helpers, not otherwise classified	8	93	.98	.88	1.12	(1)	(1)
Rotary firemen	15	151	1.01	.92	1.18	16	.99
Rotary floormen	20	372	.98	.85	1.16	42	.94
Roustabouts	37	530	.92	.50	1.11	284	.89
Truck drivers, under 2½ tons	13	54	.82	.50	1.24	37	.70
Truck drivers, 2½ tons and over	5	7	1.14	1.05	1.16	(1)	(1)
Watchmen	9	14	.66	.40	1.08	4	.49

Occupation	Louisiana		Oklahoma				
	Louisiana Gulf Coast		Entire State				
	Number of workers	General average	Number of operations	Number of workers	General average	Lowest operation average	Highest operation average
Carpenters, class A	(1)	(1)	4	5	$1.10	$1.00	$1.18
Carpenters, class B	7	$1.04	(1)	(1)	(1)	(1)	(1)
Derrickmen	144	1.01	24	157	.95	.82	1.19
Drillers, cable			16	50	1.08	.89	1.33
Drillers, rotary	156	1.52	42	215	1.45	1.00	1.88
Electricians, class A	(1)	(1)	3	3	1.34	1.00	1.58
Electricians, class B							
Gang pushers	48	1.26	59	236	1.13	.61	1.87
Machinists, class A			3	3	1.40	1.40	1.40
Maintenance men	14	1.06	21	46	1.00	.68	1.30
Pumpers and switchers	358	1.04	116	2,079	.97	.45	1.14
Rotary driller helpers, not otherwise classified	81	1.00	12	169	.93	.64	1.12
Rotary firemen	135	1.01	17	83	.97	.82	1.14
Rotary floormen	330	.99	26	278	.94	.60	1.12
Roustabouts	246	.96	108	1,637	.92	.45	1.10
Truck drivers, under 2½ tons	17	1.07	19	47	.89	.43	1.08
Truck drivers, 2½ tons and over	6	1.14	17	67	.97	.75	1.16
Watchmen	10	.73	9	11	.65	.30	1.04

[1] Number of plants and/or workers too small to justify presentation of an average.

A more important factor which contributes to interplant variation in wage rates is difference in the size of companies involved (table 3). Quite commonly, the major oil companies, operating over a wide area, follow the policy of paying one rate for each occupational classification in all the areas in which the company operates. Because of the need for attracting and maintaining a labor force in all areas regardless of

local labor conditions, the wage rates paid by these companies are generally higher than those paid by smaller companies with more or less local operations. It follows that areas in which the major oil companies are particularly active tend to have a higher level of wages than those in which operations are largely confined to small independent companies.

Occupational averages were consistently higher in the medium-size companies than they were in small companies. Likewise, averages in the large companies were consistently higher than those in the medium-size group. Pumpers and switchers, for example, averaged 80 cents an hour in small companies, 94 cents in medium-size companies, and $1.07 in the large ones. Roustabouts averaged 73 cents in small companies, as compared with 86 cents in medium-size companies and $1.03 in the large-size group. Rotary drillers averaged $1.46, $1.48, and $1.61, respectively, while for gangpushers the corresponding averages were $1.06, $1.12, and $1.21.

TABLE 3.—*Average Hourly Earnings of Male Oil-Well Drilling and Production Workers in Selected Occupations in the Southwest, by Size of Company, April 1943* [1]

Occupation	Small companies (9–50 employees)		Medium companies (51–250 employees)		Large companies (251 or more employees)	
	Number of employees	Average hourly earnings	Number of employees	Average hourly earnings	Number of employees	Average hourly earnings
Carpenters, class A	4	$1.04	(2)	(2)	20	$1.23
Carpenters, class B	5	.75	4	$1.01	32	1.07
Derrickmen	205	.95	338	1.00	469	1.09
Drillers, cable	136	1.11	27	1.21	35	1.23
Drillers, rotary	338	1.43	475	1.48	540	1.61
Electricians, class A	2	1.06	6	1.18	17	1.40
Electricians, class B			(2)	(2)	14	1.03
Gang pushers	126	1.06	181	1.12	640	1.21
Machinists, class A	(2)	(2)			17	1.35
Maintenance men	33	.96	49	1.01	85	1.02
Pumpers and switchers	1,554	.80	1,333	.94	5,058	1.07
Rotary driller helpers, not otherwise classified	548	.91	666	.93	325	.98
Rotary firemen	151	.96	240	.98	394	1.09
Rotary floormen	344	.96	559	.93	933	1.05
Roustabouts	1,157	.73	899	.86	3,215	1.03
Truck drivers, under 2½ tons	57	.69	61	.70	166	.99
Truck drivers, 2½ tons and over	27	.88	48	.99	121	1.06
Watchmen	33	.50	58	.64	57	.72

[1] Exclusive of premium payments for overtime and night-shift work.
[2] Number of workers too small to justify presentation of an average.

Wage rates in companies having union agreements were consistently higher than those in companies without such agreements (table 4). Roustabouts averaged $1.06 per hour in union companies as compared with 86 cents in nonunion establishments. Rotary drillers averaged $1.80 in union companies and $1.47 in those with no union. The hourly average in union companies for pumpers and switchers was $1.08 while in nonunion firms it was 93 cents. As the union companies included in this study were generally the large organizations, the precise influence of these two factors individually is uncertain. A special comparison of the largest companies by presence or absence of unionization, however, reveals slightly higher rates among those having union agreements.

TABLE 4.—*Average Hourly Earnings of Male Oil-Well Drilling and Production Workers in Union and Nonunion Companies in the Southwest, April 1943* [1]

Occupation	Companies with union agreements		Companies without union agreements	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
Carpenters, class A	15	$1.22	10	$1.15
Carpenters, class B	22	1.10	19	.94
Derrickmen	136	1.22	826	.99
Drillers, cable	10	1.40	188	1.13
Drillers, rotary	203	1.80	1,150	1.47
Electricians, class A	15	1.42	10	1.15
Electricians, class B	6	1.16	9	.99
Gang pushers	449	1.20	498	1.14
Machinists, class A	15	1.39	3	1.02
Maintenance men	71	.98	96	1.02
Pumpers and switchers	3,222	1.08	4,723	.93
Rotary driller helpers, not otherwise classified	5	.71	1,534	.93
Rotary firemen	194	1.17	591	.99
Rotary floormen	408	1.14	1,428	.95
Roustabouts	2,127	1.06	3,144	.86
Truck drivers, under 2½ tons	133	.98	151	.76
Truck drivers, 2½ tons and over	52	1.10	144	.98
Watchmen	24	.84	124	.60

[1] Exclusive of premium payments for overtime and night-shift work.

Petroleum Refineries

Summary

A detailed study by the Bureau of Labor Statistics of 10,583 male workers in selected occupations—about 40 percent of the total labor force of 117 petroleum refineries in Texas, Oklahoma, and Louisiana—disclosed that nearly four-fifths were classified in jobs which showed straight-time average hourly earnings of $1.00 or more. As a group, these employees earned an average of $1.16 per hour in April 1943. Workers in Texas and Louisiana earned an average of $1.18 an hour as compared with $1.05 in Oklahoma. The highest hourly earnings ($1.24) were found in the Gulf Coast area of Texas, while the average for the inland Texas area ($1.00) was the lowest. These regional variations are, in large part, a reflection of differences in size of operation and technological processes, both of which appear to have pronounced effects on levels of earnings. Of the 34 specific occupational groups studied in detail, only 7 showed average hourly earnings below $1.00; less than a fifth of the workers covered were classified in these 7 groups. The averages for 9 occupational groups, which included more than a fourth of the workers studied, amounted to $1.25 or more per hour. The apparent upward trend of earnings in Southwestern petroleum refineries during the past 18 months is in part a reflection of the closing of disproportionate numbers of small and relatively lower-wage operations as a result of changes largely occasioned by the war.

Characteristics of the Industry

According to standard trade directories, at the close of 1942 there were in operation in the United States 412 petroleum refineries with a daily crude-petroleum capacity of 4,780,025 barrels. Texas, Oklahoma, and Louisiana accounted for 129 of these, with a daily capacity of 1,853,030 barrels—31 percent of the total number of refineries and 39 percent of the Nation's refinery capacity.

The expansion of the petroleum-refining industry was accompanied in peacetime by the processing of such tremendous quantities of crude oil that inadequate attention was given to the effective utilization of the full range of petroleum products. This resulted in the lack of development of certain petroleum derivatives, with a consequent neglect of their potentialities as sources of fuel and chemical products. The requirements of the war, however, made extraordinary demands on the refining industry. The need for tremendous quantities of aviation gasoline and special lubricants for the thousands of fighting planes, the importance of breaking the explosives bottleneck by pro-

ducing toluene from petroleum, the urgency of the new synthetic-rubber industry, and the need of the Army and Navy for emergency technical advice all provided a tremendous incentive for research and development in petroleum refining. New techniques have been developed, making available fuel types that would normally require years to produce. The art of oil refining has advanced so rapidly that there is little exaggeration in the statement that expensive equipment sometimes becomes obsolete almost before its construction is completed. Petroleum-refining technology has expanded the oil business into a highly developed type of chemical industry.

Modern refineries may be divided into two broad types, the distillation plant and the cracking plant. Distillation, the oldest process for separating petroleum into its constituents, consists of the simple physical separation of a liquid hydrocarbon into fractions with different boiling points. Distillation plants range from the simple skimming or topping plant to the establishment equipped for complete distillation. Cracking is of more recent origin and involves the actual chemical rearrangement or breaking down of heavy hydrocarbons into lighter hydrocarbons and carbon. All varieties of combinations of distillation and cracking plants exist in the petroleum industry today.

In the skimming or topping plant, the gasoline and/or kerosene fractions of the crude oil are removed by a simple distillation process utilizing heat but little or no pressure. After the gasoline and kerosene fractions are removed, the remaining heavy oil is usually marketed as fuel oil. In the complete distillation plant, not only are the gasoline and kerosene fractions removed, but various other fractions are distilled off and refined into lubricants, greases, and other special products. Coke and/or asphalt remain as a residual product in this type of refinery operation. The complete distillation plants are usually large-scale operations, while the skimming plants are ordinarily designed to supply local needs. It is estimated that approximately half of the gasoline used in peacetime was derived from distillation operations.

The cracking plant utilizes a process for converting the higher into lower molecular-weight hydrocarbons. This process can be accomplished by the application of heat and pressure (thermal cracking) or by the action of catalysts under conditions which give negligible thermal cracking (catalytic cracking). The catalyst not only accelerates but also directs the course of the cracking reaction to give better yields of higher quality products. It is to the improvement in "cracking" methods that much of the credit should go for the recent outstanding accomplishments of the petroleum-refining industry.

Thermal cracking produces approximately half of the 600,000,000 barrels of gasoline refined annually in the United States. On the basis of output, it may thus be considered as the most important form of processing by cracking. On the other hand, catalytic cracking is so important in the production of such war materials as aviation gasoline, butane-butylene hydrocarbons, aromatic hydrocarbons, and butadiene, that enormous impetus has been given this more recent form of cracking. At the end of 1942, according to reliable estimates,

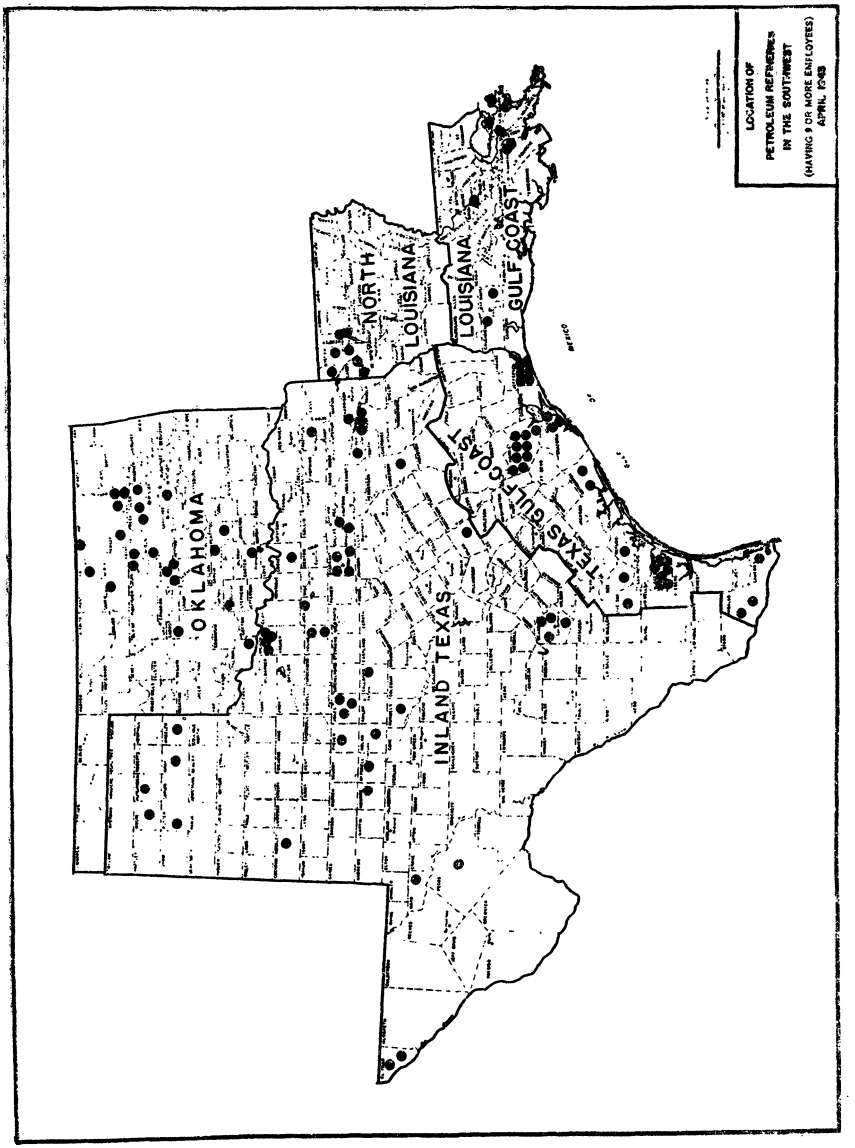
about 30,000,000 barrels of cracked gas were being produced annually by the catalytic process, and this type of operation was being subjected to rapid extension. Today, of the 412 refineries of the United States, 77 are equipped for catalytic cracking. Development of this type of processing is currently restricted to units of large capacity, chiefly because of the operating economies accruing to volume operations and the saving of steel and other critical materials.

According to trade journals, the number of operating refineries in the United States decreased by 39 during the year ended in March 1943. The Bureau of Labor Statistics found that, from March 1942 to September 1943, 25 refineries in Texas, Oklahoma, and Louisiana ceased operations. Sixteen of these were in Texas, 8 in Oklahoma, and 1 in Louisiana.

The closing of these plants resulted largely from war conditions, such as lack of transportation facilities, restrictions on the use of critical materials, inability to obtain labor, and, in some sections, the growing lack of crude oil. Contributing to this influence is the "big inch" pipeline, recently completed, which transports crude oil to the East Coast and thus reduces the refinery operations in the producing regions. Perhaps more important than these factors, however, is the trend toward larger refineries, as a result of the more efficient use of critical materials in the larger refineries equipped for cracking and the fact that the small skimming plants turn out only inferior gasoline and have a rather low recovery ratio of gasoline to crude oil processed. The Bureau of Labor Statistics found that 17 of the 25 refineries which have closed in Texas, Oklahoma, and Louisiana since March 1942 were small plants employing skimming operations only. The decreased crude supply and the demand for superior grades of petroleum products have thus been a potent combination in closing the smaller and less efficient refineries.

The location of petroleum refineries is determined primarily by the most favorable combination of two factors—proximity or low-cost access to a supply of crude petroleum and the location and nature of the consuming market. One would thus expect refineries to be situated near "feeder" pipelines, railroad centers, water-transportation facilities, producing fields, or large centers of population. Reference to the distribution of refinery operations in Texas, Oklahoma, and Louisiana confirms such an assumption. (See map, p. 17.) Concentrations of refineries occur near Corpus Christi, Houston, Beaumont—Port Arthur, Dallas—Fort Worth, San Antonio, Wichita Falls, Shreveport, and New Orleans. Other refineries in these States are rather widely dispersed over a considerable area, but in the main are small skimming or topping plants taking advantage of local production and catering almost exclusively to local demands.

Refining practice in various areas has been influenced by the demands of the market in which the products of the refinery are sold. For example, cracking is more important on the Gulf Coast, where there is a growing demand for high-octane gasoline, toluene, or butadiene for war uses, than in inland areas, where there is a greater demand for lower-octane gasoline for motor-car use or for fuel oil because of the high cost of coal. The type of crude oil produced within a region may also influence refinery operations. By way of



illustration, the refining techniques utilized in processing the "sweet" oils of the Texas Gulf Coast would necessarily have to be modified and supplemented by additional processes if the "sour" crude oils of West Texas were used as base stock.[6] Again, the presence of paraffin-base oils might require processing methods somewhat different from those utilized for asphalt-base oils. In brief, refining practices must be modified to meet the need of the type of crude petroleum currently being processed.

The various characteristics of petroleum refining set forth in the preceding paragraphs necessarily influence wage rates and occupational structures. In general, a more skilled type of labor is required for cracking processes than for skimming or topping operations. As a consequence, wage rates show a distinct tendency to be higher in areas where there is a predominance of plants equipped for cracking than in areas where simple distillation is relatively more important. As evidence of this tendency, wage rates are significantly higher along the Gulf Coast of Texas and Louisiana where cracking plants are concentrated than in the inland areas of these States where skimming and topping are more prevalent. Large establishments, for a variety of reasons, generally pay higher wages than do the smaller ones. Consequently, the predominance of large refinery units within an area tends to create higher wage levels than would prevail in sections where there are greater proportions of smaller units. The presence of large refinery units in the Louisiana Gulf Coast region has doubtless contributed to a wage level distinctly higher than in North Louisiana where the units are smaller. In this same connection, the significant number of small and relatively low-wage plants which have closed in recent months in the Southwest has probably contributed to the rise in the general level of refinery wages.

The occupational structures of petroleum refineries are also influenced by certain of the factors previously mentioned. Large plants with a more extended division of labor usually have a greater number of occupations than do the smaller establishments. More and different occupations are generally found in plants equipped for cracking than in plants employing only topping operations. Processing of paraffin-base crude oils may give rise to occupations not found in plants processing asphalt-base oils. West Texas refineries utilizing sour oils have different occupations from those found in Gulf Coast refineries which process sweet oils, as well as a greater number of jobs. Modern refineries with a large proportion of automatic equipment use fewer employees than older-type establishments. In addition, these employees tend to have more varied duties than those in older types of refineries where the equipment being utilized enforces strict division of labor. The same tendency is also apparent in the smaller refineries where several jobs may be done by one employee. Apparently in both the more modern refineries and in the smaller refineries there appears to be no strict adherence to a very fine division of labor.

Practices and characteristics of the petroleum-refining industry thus appear to be significant influences with regard to the level of wages, the occupational structure of the industry and, to a less extent, the method of labor utilization.

[6] Sour crude oils are usually defined as those which possess some compound of sulphur or some other ingredient which imparts corrosive characteristics to the crude petroleum stock. Sweet crude oils are those which do not possess corrosive qualities.

Scope and Method of Survey

This survey of wages paid in the petroleum-refining industry in the Southwest was undertaken by the Bureau of Labor Statistics as part of its program of securing basic wage information for use in the wage-stabilization program.[7] Included in the survey were 33,923 employees in 117 refineries in Texas, Oklahoma, and Louisiana. These establishments represent all of the petroleum refineries in these States which had 9 or more employees and were operating in April 1943, the time of the survey. Of the refineries studied, 78 employing 20,626 persons were in Texas, 23 employing 5,131 workers were in Oklahoma, and 16 employing 8,166 workers were in Louisiana. Detailed wage information was obtained for 34 selected plant occupations covering 10,583 workers, or approximately 40 percent of the total plant employment.

No attempt was made to cover all occupations in the industry. The intent was to cover such key occupations as would adequately represent the wage structure of the industry. The choice of occupations was guided by consideration of the following criteria: (1) Stability and definiteness of the occupation; (2) strategic importance from the standpoint of collective bargaining; (3) numerical importance; (4) critical importance from the standpoint of war effort; (5) representativeness of the range of earnings. Needless to say, the occupations selected do not satisfy all these requirements equally well. Considered as a whole, however, they are believed to provide an adequate picture of the wage structure.

The majority of refineries in the Southwest work a partial or skeleton night and "swing" shift. This tendency has become increasingly evident as the pressure of war demands has necessitated longer producing hours. Any differential amount that is paid for such shifts has been excluded from the data. Extra earnings from premium pay for overtime were also eliminated.[8] As a result, the average earnings presented in this report are straight-time hourly earnings, exclusive of premium overtime and shift-differential payments. It should also be emphasized that the averages shown are occupational averages and do not necessarily reflect the range of earnings of individual workers.

The wage data were taken from pay-roll and other plant records by experienced representatives of the Bureau of Labor Statistics, who used a standard set of occupational definitions in classifying the employees of each company studied.

For purposes of indicating differences in wage levels, the Gulf Coast areas of both Texas and Louisiana have been tabulated separately in this study. This is not intended to imply that geographical considerations are a primary cause of these differences. Such variations as exist in petroleum refining in the Southwest are apparently due to size of establishment and processing method rather than to geographical influences. Proximity to a source of crude oil and to cheap transportation facilities has resulted in the location along the Gulf Coast, of the larger refineries using intricate processing methods requiring a more skilled type of labor. The regional distinctions are therefore in

[7] Reports of earlier studies of this industry made by the Bureau in 1920 and 1934 may be found in the Monthly Labor Review for May 1921 (p. 50); August 1922 (p. 87); July 1935 (p. 13); and November 1935 (p. 1305).

[8] With negligible exceptions, time and a half after 40 hours a week or 8 hours a day was paid by Southwest petroleum refineries. Incentive systems are nonexistent in the petroleum-refining industry of the Southwest; consequently all wages shown are actually hourly wage rates.

reality differences resulting from size of establishment and type of process rather than from geography.

The Labor Force

The majority of occupations in petroleum refineries require a high degree of skill, which can ordinarily be acquired only after a considerable period of experience. As technological advance is made in the industry and processes become more complex, an even greater premium is placed upon experience and skill. Efforts have been made, therefore, to reduce labor turnover to an absolute minimum. Personnel policies, high wage rates, and the obviously essential character of the work have contributed to the success of this endeavor. It may be noted in this connection that the petroleum-refining industry of the Southwest does not employ many women. The survey disclosed that, in spite of a serious manpower shortage, less than 1 percent of the total number of plant employees found in selected occupations were women.[9] Further, all the female employees found were working as janitresses, routine testers, and stock clerks—jobs requiring comparatively little skill. However, women are being hired in increasing numbers,[10] mainly for work in the offices of the refineries. The Bureau of Labor Statistics found that approximately 74 percent of the refinery office forces were women.

The greatest employee concentration was found in the occupational classifications of stillmen's helpers No. 1; stillmen, other; and pumpmen. This was to be expected, since not only are these workers needed in appreciable numbers, but these occupations are common to practically all refineries. The smallest numbers of employees were found in the occupational classifications of compounders, chillermen, and wax operators. This was also to be expected. Compounder is a somewhat unusual occupational classification and is seldom found except in the largest refineries. Chillermen and wax operators are commonly found only where paraffin exists in the crude petroleum base stock; there is little paraffin to be found in southwestern crude oils.

The Southwest is generally regarded as being one of the less unionized sections of the United States. This generalization, however, does not appear strictly applicable to the petroleum-refining industry of this area. In the 117 companies scheduled, 28,491 employees (or 84 percent of the 33,923 workers employed) were working for companies having union agreements with their employees. Of the 28,491 employees in union companies, 15,026, or approximately 53 percent, were under agreements with unions affiliated with either the C. I. O. or the A. F. of L.,[11] whereas 13,465, or about 47 percent, were in companies having agreements with independent unions of various types.

As would be expected, the larger refineries of the Southwest were more highly unionized than the smaller establishments. Evidence of this may be seen in the fact that the 58 union plants surveyed contained 84 percent of the total refinery employment, whereas the 59 nonunion establishments employed only 16 percent of the total work-

[9] Because of the negligible number of women employees in plant occupations and because of their wide dispersion through so many plants, they have been excluded from the averages shown for plant occupations.
[10] See Monthly Labor Review, August 1943 (p. 197): Employment of Women in Petroleum Refineries.
[11] Affiliation was with the International Oil Workers Union, C. I. O., and the International Union of Operating Engineers, an A. F. of L. union.

ing force of refineries in the Southwest. Almost 91 percent of the refinery employees of Oklahoma were in companies having union agreements, whereas about 85 percent of Texas refinery employees and 78 percent of Louisiana employees were in union plants.

Average Hourly Earnings, April 1943

Indicative of the high level of wages prevailing in the petroleum-refining industry is the fact that, of the 10,583 workers studied, who constitute 40 percent of plant refinery employees in these operations, only about 14 percent received less than 95 cents an hour (table 5). On the other hand, approximately 55 percent received more than $1.15 an hour, and 22 percent received more than $1.25 an hour. Thirty percent of the plant employees surveyed were grouped in the wage range from $1.15 to $1.30 an hour and 50 percent in the range from $1.15 to $1.40 an hour. These rates, in comparison with other data accumulated from comprehensive Bureau of Labor Statistics wage surveys in the Southwest, indicate that the level of wages prevailing in the petroleum-refining industry is substantially higher than that in the majority of other industries in this area.

TABLE 5.—*Distribution of Male Employees in Selected Occupations in Petroleum Refineries in the Southwest, by Plant Average Hourly Earnings,*[1] *April 1943*

Occupation and class	Number of plants	Total workers		Average hourly earnings	Number of workers in plants where hourly earnings averaged—				
		Number of workers	Percent		Under $0.80	$0.80 and under $0.85	$0.85 and under $0.90	$0.90 and under $0.95	$0.95 and under $1.00
All workers:									
Number	-------	10,583	-------	-------	723	196	245	365	599
Percent	-------	-------	100.0	-------	6.8	1.9	2.3	3.4	5.7
Carpenters, class A	26	124	1.2	$1.32	-------	-------	-------	-------	2
Carpenters, class B	16	58	.5	1.15	-------	1	3	-------	-------
Centrifuge operators	11	75	.7	1.27	-------	-------	-------	-------	-------
Chillermen	11	50	.5	1.23	-------	-------	-------	5	-------
Compounders	17	57	.5	1.21	1	-------	1	-------	2
Electricians, class A	44	221	2.1	1.37	-------	-------	-------	1	2
Electricians, class B	28	102	1.0	1.18	1	-------	2	1	-------
Filtermen	15	93	.9	1.19	-------	4	-------	5	-------
Firemen, stills	50	536	5.1	1.13	23	-------	10	8	31
Guards	42	463	4.4	.93	76	4	39	22	114
Janitors	49	183	1.7	.78	76	38	1	66	2
Machinists, class A	50	460	4.3	1.36	-------	-------	-------	-------	2
Machinists, class B	36	251	2.4	1.18	2	-------	-------	6	-------
Packers, hand or machine	14	90	.8	.90	15	5	25	5	12
Pipefitters, class A	49	319	3.0	1.32	-------	-------	1	-------	6
Pipefitters, class B	38	307	2.9	1.15	12	4	4	13	5
Pressmen, paraffin	12	122	1.2	1.11	-------	16	-------	8	12
Pumpmen	80	858	8.1	1.22	39	19	22	21	11
Pumpmen helpers	29	471	4.5	1.15	22	4	1	3	19
Routine testers, laboratory	77	681	6.4	1.07	52	18	11	52	76
Stillmen, cracking	65	463	4.4	1.36	2	-------	-------	10	11
Stillmen, other	93	712	6.7	1.25	66	15	12	16	21
Stillmen's helpers No. 1	66	988	9.3	1.19	28	21	6	9	19
Stillmen's helpers No. 2	41	410	3.9	1.13	35	4	5	20	16
Stock clerks	46	125	1.2	.98	28	10	16	2	5
Treaters	77	393	3.7	1.24	15	7	12	10	3
Treaters' helpers	34	313	3.0	1.17	15	-------	2	30	7
Truck drivers:									
Under 2½ tons	48	227	2.1	.90	48	1	43	10	20
2½ tons and over	34	198	1.9	.92	47	6	3	7	8
Watchmen	38	481	4.5	.93	106	14	25	29	175
Wax operators	9	45	.4	1.17	-------	-------	-------	-------	-------
Welders, hand (gas and arc), class A	62	460	4.3	1.34	-------	-------	-------	2	-------
Welders, hand (gas and arc), class B	36	155	1.5	1.09	6	5	-------	4	11
Working foremen, processing departments	31	92	.9	1.26	8	-------	1	-------	7

[1] Exclusive of premium payments for overtime and night-shift work.

TABLE 5.—*Distribution of Male Employees in Selected Occupations in Petroleum Refineries in the Southwest, by Plant Average Hourly Earnings, April 1943.*—Con.

Occupation and class	Number of workers in plants where hourly earnings averaged—								
	$1.00 and under $1.05	$1.05 and under $1.10	$1.10 and under $1.15	$1.15 and under $1.20	$1.20 and under $1.25	$1.25 and under $1.30	$1.30 and under $1.35	$1.35 and under $1.40	$1.40 and over
All workers:									
Number	625	738	471	858	1,724	631	1,233	824	1,351
Percent	5.9	7.0	4.5	8.1	16.3	6.0	11.6	7.8	12.7
Carpenters, class A	-------	5	-------	16	1	14	7	37	42
Carpenters, class B	4	1	2	40	4	1	2	-------	-------
Centrifuge operators	4	13	-------	-------	4	4	32	-------	18
Chillermen	-------	8	-------	-------	17	-------	-------	15	5
Compounders	3	3	17	1	7	1	3	11	7
Electricians, class A	1	3	4	7	2	17	30	33	121
Electricians, class B	12	1	1	19	40	11	14	-------	-------
Filtermen	9	-------	11	4	17	15	21	7	-------
Firemen, stills	22	17	48	108	257	9	-------	3	-------
Guards	107	101	-------	-------	-------	-------	-------	-------	-------
Janitors	-------	-------	-------	-------	-------	-------	-------	-------	-------
Machinists, class A	4	1	2	16	11	25	64	178	157
Machinists, class B	11	4	6	73	149	-------	-------	-------	-------
Packers, hand or machine	3	25	-------	-------	-------	-------	-------	-------	-------
Pipefitters, class A	3	5	8	27	9	43	52	91	74
Pipefitters, class B	5	3	39	32	161	29	-------	-------	-------
Pressmen, paraffin	15	-------	5	4	34	-------	28	-------	-------
Pumpmen	50	35	32	23	22	39	378	120	47
Pumpmen helpers	11	14	41	230	76	50	-------	-------	-------
Routine testers, laboratory	20	116	47	4	279	-------	1	5	-------
Stillmen, cracking	15	11	23	18	22	4	64	29	254
Stillmen, other	19	8	30	26	75	40	15	54	315
Stillmen's helpers No. 1	27	122	36	67	183	263	183	-------	24
Stillmen's helpers No. 2	5	21	25	50	101	-------	120	8	-------
Stock clerks	11	13	6	5	2	2	23	-------	2
Treaters	44	10	7	42	19	24	10	95	95
Treaters' helpers	3	17	12	3	93	29	102	-------	-------
Truck drivers:									
Under 2½ tons	64	8	32	-------	-------	-------	-------	1	-------
2½ tons and over	74	30	23	-------	-------	-------	-------	-------	-------
Watchmen	43	89	-------	-------	-------	-------	-------	-------	-------
Wax operators	7	-------	9	1	20	-------	8	-------	-------
Welders, hand (gas and arc), class A	5	6	4	17	66	9	76	136	139
Welders, hand (gas and arc), class B	22	32	1	21	51	2	-------	-------	-------
Working foremen, processing departments	2	16	-------	4	2	-------	-------	1	51

OCCUPATIONAL DIFFERENCES

The averages for individual occupations ranged from 78 cents an hour for janitors to $1.37 for class A electricians. Of the 34 occupational groups studied, only 7 showed average earnings below $1.00 per hour; approximately 17 percent of the workers covered were classified in these groups. At the other end of the distribution were 9 occupational groups, which included more than a fourth (28 percent) of the workers, with averages of $1.25 or more per hour. A little more than half the workers in these higher-paid groups were doing maintenance work; included were class A carpenters, electricians, machinists, pipefitters, and hand welders.

Substantial interplant variations in wage rates are apparent in the ranges shown in table 6. These ranges reflect differences in location, size and type of operation, unionization, and other plant characteristics which are frequently associated with variations in wage levels. These factors are discussed in greater detail below. It should be noted that the lowest and highest averages shown in table 6 are plant averages and do not necessarily reflect the full range of the earnings of individual workers.

TABLE 6.—*Average Hourly Earnings*[1] *of Male Workers in Selected Occupations in Petroleum Refineries in the Southwest, April 1943*

Occupation and class	Number of plants	Number of workers	Hourly earnings		
			General average	Lowest plant average	Highest plant average
Carpenters, class A	26	124	$1.32	$0.95	$1.44
Carpenters, class B	16	58	1.15	.80	1.30
Centrifuge operators	11	75	1.27	1.03	1.42
Chillermen	11	50	1.23	.94	1.42
Compounders	17	57	1.21	.78	1.43
Electricians, class A	44	221	1.37	.94	1.50
Electricians, class B	28	102	1.18	.76	1.32
Filtermen	15	93	1.19	.80	1.36
Firemen, stills	50	536	1.13	.58	1.35
Guards	42	463	.93	.33	1.08
Janitors	49	183	.78	.30	.95
Machinists, class A	50	460	1.36	.95	1.50
Machinists, class B	36	251	1.18	.75	1.24
Packers, hand or machine	14	90	.90	.45	1.08
Pipefitters, class A	49	319	1.32	.89	1.50
Pipefitters, class B	38	307	1.15	.40	1.29
Pressmen, paraffin	12	122	1.11	.81	1.30
Pumpmen	80	858	1.22	.44	1.45
Pumpmen helpers	29	471	1.15	.45	1.28
Routine testers, laboratory	77	681	1.07	.40	1.37
Stillmen, cracking	65	463	1.36	.74	1.55
Stillmen, other	93	712	1.25	.46	1.60
Stillmen's helpers No. 1	66	988	1.19	.40	1.51
Stillmen's helpers No. 2	41	410	1.13	.35	1.38
Stock clerks	46	125	.98	.47	1.71
Treaters	77	393	1.24	.50	1.56
Treaters' helpers	34	313	1.17	.40	1.34
Truck drivers, under 2½ tons	48	227	.90	.36	1.39
Truck drivers, 2½ tons and over	34	198	.92	.35	1.14
Watchmen	38	481	.93	.34	1.08
Wax operators	9	45	1.17	1.00	1.30
Welders, hand (gas and arc), class A	62	460	1.34	.90	1.50
Welders, hand (gas and arc), class B	36	155	1.09	.49	1.26
Working foremen, processing departments	31	92	1.26	.67	1.73

[1] Exclusive of premium payments for overtime and night-shift work.

REGIONAL DIFFERENCES

The average straight-time earnings of plant employees in the 117 petroleum refineries included in the survey amounted to $1.16 in April 1943. Further analysis discloses significant regional variations in hourly earnings in the industry. On a State-wide basis, wage earners in Texas and Louisiana showed an average of $1.18 an hour for the occupations covered as compared with $1.05 an hour in Oklahoma. More detailed computations show that the highest average hourly earnings ($1.24) were paid in the Gulf Coast area of Texas, whereas the lowest average earnings ($1.00) were found in the inland Texas area. Refinery workers in the Louisiana Gulf Coast area received average wages of $1.22 an hour, those in northern Louisiana $1.06, and those in Oklahoma $1.05 an hour.

	Average hourly earnings[1]
Southwest	$1.16
Oklahoma	1.05
Louisiana	1.18
Northern Louisiana	1.06
Gulf Coast	1.22
Texas	1.18
Inland	1.00
Gulf Coast	1.24

[1] Regional and State averages computed by using constant employee weights, as shown in table 1. This method of weighting prevents distortion of area averages by differences in occupational structure. All data are exclusive of premiums for overtime and night-shift work.

In Texas, average earnings ranged from 79 cents an hour for janitors to $1.40 for cracking stillmen (table 7); in Oklahoma, earnings were lowest for watchmen at 78 cents an hour and highest for working foremen in the processing departments with $1.39 (table 8); the range of earnings in Louisiana was from 64 cents an hour for janitors to $1.70 an hour for working foremen (table 9). Thus both the lowest and highest occupational average hourly earnings were found in Louisiana.

In Texas, 6 occupational classifications showed averages below $1.00; in contrast with Oklahoma where average hourly earnings were less than $1.00 in 13 cases, and Louisiana where only 4 classifications received less than that amount. In Texas, 13 occupational groups received $1.25 or more an hour; in Louisiana 9, and in Oklahoma only 2, were in this class. In general, this is indicative of the wage levels of the respective areas.

To a considerable extent, these differences reflect industrial rather than geographical variations. Differences in size of plant and in technological processes are important in this connection.

TABLE 7.—*Average Hourly Earnings*[1] *of Male Workers in Selected Occupations in Texas Petroleum Refineries, April 1943*

Occupation and class	State				
	Number of plants	Number of workers	Hourly earnings		
			General average	Lowest plant average	Highest plant average
Carpenters, class A	16	56	$1.33	$0.95	$1.44
Carpenters, class B	10	15	1.14	.80	1.30
Centrifuge operators	4	32	1.28	1.07	1.32
Chillermen	5	20	1.33	1.22	1.37
Compounders	7	29	1.30	.78	1.42
Electricians, class A	25	146	1.38	.94	1.50
Electricians, class B	18	78	1.18	.86	1.25
Filtermen	6	43	1.25	.92	1.36
Firemen, stills	28	355	1.16	.58	1.35
Guards	25	372	.94	.33	1.08
Janitors	32	142	.79	.30	.93
Machinists, class A	28	336	1.36	.95	1.50
Machinists, class B	22	170	1.20	.75	1.24
Packers, hand or machine	8	51	.89	.45	1.08
Pipefitters, class A	29	233	1.36	.96	1.50
Pipefitters, class B	24	219	1.17	.40	1.29
Pressmen, paraffin	5	77	1.14	.81	1.30
Pumpmen	50	647	1.25	.44	1.45
Pumpmen helpers	22	391	1.15	.45	1.28
Routine testers, laboratory	48	420	1.08	.48	1.37
Stillmen, cracking	38	270	1.40	.74	1.55
Stillmen, other	59	428	1.24	.47	1.60
Stillmen's helpers No. 1	45	767	1.20	.40	1.51
Stillmen's helpers No. 2	27	290	1.16	.35	1.38
Stock clerks	27	82	1.02	.47	1.56
Treaters	48	267	1.29	.50	1.56
Treaters' helpers	23	243	1.22	.46	1.34
Truck drivers, under 2½ tons	29	163	.94	.40	1.39
Truck drivers, 2½ tons and over	21	155	.93	.35	1.12
Watchmen	22	325	.97	.50	1.08
Wax operators	4	19	1.23	1.12	1.30
Welders, hand (gas and arc), class A	37	283	1.36	.90	1.50
Welders, hand (gas and arc), class B	21	89	1.10	.49	1.22
Working foremen, processing departments	24	61	1.18	.67	1.73

See footnotes at end of table.

TABLE 7.—*Average Hourly Earnings* [1] *of Male Workers in Selected Occupations in Texas Petroleum Refineries, April 1943*—Continued

Occupation and class	Inland [2]			Gulf Coast [2]		
	Hourly earnings			Hourly earnings		
	General average	Lowest plant average	Highest plant average	General average	Lowest plant average	Highest plant average
Carpenters, class A	$1.18	$0.95	$1.34	$1.38	$1.32	$1.44
Carpenters, class B	1.07	.80	1.25	1.18	.88	1.30
Centrifuge operators	(3)	(3)	(3)	1.31	1.30	1.32
Chillermen				1.33	1.22	1.37
Compounders	(3)	(3)	(3)	1.31	.78	1.42
Electricians, class A	1.19	.97	1.34	1.40	.94	1.50
Electricians, class B	1.09	.90	1.25	1.20	.86	1.25
Filtermen	(3)	(3)	(3)	1.29	1.20	1.36
Firemen, stills	1.01	.58	1.35	1.19	.60	1.26
Guards	.86	.50	1.03	.97	.33	1.08
Janitors	.60	.30	.78	.84	.44	.93
Machinists, class A	1.23	.95	1.34	1.38	1.20	1.50
Machinists, class B	1.05	.75	1.17	1.22	1.20	1.24
Packers, hand or machine	.72	.45	1.02	(3)	(3)	(3)
Pipefitters, class A	1.19	.97	1.44	1.39	.96	1.50
Pipefitters, class B	.89	.40	1.17	1.22	.88	1.29
Pressmen, paraffin	(3)	(3)	(3)	1.15	.84	1.30
Pumpmen	1.01	.44	1.30	1.31	.67	1.45
Pumpmen helpers	.83	.45	1.12	1.18	.95	1.28
Routine testers, laboratory	.92	.48	1.10	1.14	.66	1.37
Stillmen, cracking	1.28	.96	1.51	1.48	.74	1.55
Stillmen, other	1.04	.48	1.60	1.35	.47	1.53
Stillmen's helpers, No. 1	1.03	.40	1.30	1.26	.63	1.51
Stillmen's helpers No. 2	.99	.35	1.20	1.23	.37	1.38
Stock clerks	.90	.47	1.29	1.06	.52	1.56
Treaters	1.08	.56	1.32	1.38	.50	1.56
Treaters' helpers	.97	.65	1.32	1.25	.46	1.34
Truck drivers, under 2½ tons	.79	.40	1.39	1.01	.44	1.14
Truck drivers, 2½ tons and over	.58	.35	.96	1.04	.68	1.12
Watchmen	.85	.50	.96	.99	.50	1.08
Wax operators	(3)	(3)	(3)	1.26	1.22	1.30
Welders, hand (gas and arc), class A	1.23	.90	1.38	1.37	.94	1.50
Welders, hand (gas and arc), class B	.97	.49	1.17	1.18	.72	1.22
Working foremen, processing departments	1.13	.74	1.73	1.24	.67	1.51

[1] Exclusive of premium payments for overtime and night-shift work.
[2] For reasons of economy of printing space, columns showing number of plants and number of workers have been deleted from this section; they are, however, available in mimeographed form for persons desiring this information.
[3] Number of plants and/or workers too small to justify presentation of an average.

TABLE 8.—*Average Hourly Earnings*[1] *of Male Workers in Selected Occupations in Oklahoma Petroleum Refineries, April 1943*

Occupation and class	Number of plants	Number of workers	Hourly earnings		
			General average	Lowest plant average	Highest plant average
Carpenters, class A	5	21	$1.19	$1.05	$1.26
Carpenters, class B	3	3	.94	.88	1.05
Centrifuge operators	6	25	1.15	1.03	1.30
Chillermen	5	26	1.15	.94	1.42
Compounders	7	24	1.09	.96	1.26
Electricians, class A	11	27	1.26	1.08	1.42
Electricians, class B	7	8	.98	.76	1.12
Filtermen	7	36	1.15	1.00	1.30
Firemen, stills	15	108	1.04	.72	1.17
Guards	11	48	.88	.59	1.00
Janitors	11	27	.80	.50	.95
Machinists, class A	15	35	1.21	1.00	1.34
Machinists, class B	11	35	1.10	.75	1.18
Packers, hand or machine	5	38	.90	.72	.98
Pipefitters, class A	12	52	1.17	.89	1.26
Pipefitters, class B	6	63	1.12	.94	1.16
Pressmen, paraffin	6	37	1.01	.92	1.17
Pumpmen	18	105	1.05	.67	1.30
Pumpmen helpers	4	19	.95	.68	1.06
Routine testers, laboratory	17	120	.98	.61	1.24
Stillmen, cracking	20	113	1.21	.92	1.48
Stillmen, other	20	134	1.16	.70	1.42
Stillmen's helpers No. 1	15	128	1.08	.60	1.26
Stillmen's helpers No. 2	10	61	.97	.72	1.15
Stock clerks	14	35	.88	.63	1.71
Treaters	21	81	1.08	.76	1.32
Treater's helpers	7	36	.94	.69	1.09
Truck drivers, under 2½ tons	13	47	.83	.61	1.05
Truck drivers, 2½ tons and over	12	40	.88	.50	1.14
Watchmen	11	104	.78	.50	.92
Wax operators	5	26	1.13	1.00	1.24
Welders, hand (gas and arc), class A	19	97	1.22	1.00	1.45
Welders, hand (gas and arc), class B	12	63	1.08	.80	1.26
Working foremen, processing departments	4	28	1.39	.99	1.49

[1] Exclusive of premium payments for overtime and night-shift work.

TABLE 9.—*Average Hourly Earnings*[1] *of Male Workers in Selected Occupations in Louisiana Petroleum Refineries, April 1943*

Occupation and class	State				
	Number of plants	Number of workers	Hourly earnings		
			General average	Lowest plant average	Highest plant average
Carpenters, class A	5	47	$1.38	$1.24	$1.40
Carpenters, class B	3	40	1.17	1.00	1.18
Compounders	3	4	1.22	.87	1.43
Electricians, class A	8	48	1.41	1.15	1.44
Electricians, class B	3	16	1.29	1.00	1.32
Firemen, stills	7	73	1.14	.90	1.23
Guards	6	43	.89	.53	.95
Janitors	6	14	.64	.37	.80
Machinists, class A	7	89	1.40	1.00	1.42
Machinists, class B	3	46	1.18	1.00	1.18
Pipefitters, class A	8	34	1.29	1.18	1.40
Pipefitters, class B	8	25	1.00	.65	1.26
Pumpmen	12	106	1.18	.60	1.44
Pumpmen helpers	3	61	1.20	.99	1.26
Routine testers, laboratory	12	141	1.13	.40	1.23
Stillmen, cracking	7	80	1.43	1.00	1.50
Stillmen, other	14	150	1.36	.46	1.50
Stillmen's helpers No. 1	6	93	1.23	.81	1.29
Stillmen's helpers No. 2	4	59	1.15	.60	1.22
Stock clerks	5	8	1.04	.81	1.24
Treaters	8	45	1.23	.80	1.49
Treaters' helpers	4	34	1.06	.40	1.29
Truck drivers, under 2½ tons	6	17	.67	.36	.96
Watchmen	5	52	.94	.34	1.04
Welders, hand (gas and arc), class A	6	80	1.41	1.10	1.44
Welders, hand (gas and arc), class B	3	3	1.14	1.00	1.25
Working foremen, processing departments	3	3	1.70	1.67	1.73

Occupation and class	North Louisiana[2]			Gulf Coast[2]		
	Hourly earnings			Hourly earnings		
	General average	Lowest plant average	Highest plant average	General average	Lowest plant average	Highest plant average
Carpenters, class A	(3)	(3)	(3)	$1.38	$1.26	$1.40
Carpenters, class B	(3)	(3)	(3)	1.17	(3)	(3)
Compounders	(3)	(3)	(3)	1.34	(3)	(3)
Electricians, class A	$1.29	$1.24	$1.33	1.42	1.15	1.44
Electricians, class B				1.29	1.00	1.32
Firemen, stills	(3)	(3)	(3)	1.16	.90	1.20
Guards	.81	.53	.91	.93	.65	.95
Janitors	.50	.37	.60	.75	.45	.80
Machinists, class A	1.25	1.00	1.33	1.41	1.25	1.42
Machinists, class B	(3)	(3)	(3)	(3)	(3)	(3)
Pipefitters, class A	1.31	1.24	1.33	1.29	1.18	1.40
Pipefitters, class B	(3)	(3)	(3)	.98	.65	1.26
Pumpmen	1.02	.70	1.23	1.22	.60	1.44
Pumpmen helpers	(3)	(3)	(3)	(3)	(3)	(3)
Routine testers, laboratory	.94	.71	1.21	1.16	.40	1.23
Stillmen, cracking	1.40	1.33	1.45	1.44	1.00	1.50
Stillmen, other	1.12	.80	1.33	1.43	.46	1.50
Stillmen's helpers No. 1	1.07	.81	1.17	1.28	1.27	1.29
Stillmen's helpers No. 2	(3)	(3)	(3)	1.17	.60	1.22
Stock clerks	(3)	(3)	(3)	1.05	.81	1.24
Treaters	1.15	.89	1.23	1.31	.80	1.49
Treaters' helpers	(3)	(3)	(3)	1.09	.40	1.29
Truck drivers, under 2½ tons	(3)	(3)	(3)	.72	.36	.96
Watchmen	(3)	(3)	(3)	.96	.34	1.04
Welders, hand (gas and arc), class A	1.23	1.10	1.33	1.42	(3)	(3)
Welders, hand (gas and arc), class B	(3)	(3)	(3)	(3)	(3)	(3)
Working foremen, processing departments	(3)	(3)	(3)	(3)	(3)	(3)

[1] Exclusive of premium payments for overtime and night-shift work.

[2] For reasons of economy of printing space, columns showing number of plants and number of workers have been deleted from this section; they are, however, available in mimeographed form for persons desiring this information.

[3] Number of plants and/or workers too small to justify presentation of an average.

WAGE VARIATIONS BY SIZE OF PLANT

Of the 22 occupational groups analyzed in table 10, average earnings in the smallest plants were well below those in both groups of larger operations for 21 occupations; the single exception was the packers. In the comparison between the plants with 51 to 250 employees and those with more than 250 workers, the same type of relationship is apparent. For each of the 34 occupational groups, average earnings in the middle-size plants were below those for the largest establishments. As might be expected, the differences in some cases were less pronounced than those between the largest and smallest plants.

TABLE 10.—*Average Hourly Earnings*[1] *of Male Workers in Selected Occupations in Petroleum Refineries in the Southwest, by Size of Plant, April 1943*

Occupation and class	Small plants (9–50 employees)		Medium-sized plants (51–250 employees)		Large plants (251 or more employees)	
	Number of employees	Average hourly earnings	Number of employees	Average hourly earnings	Number of employees	Average hourly earnings
Carpenters, class A	(2)	(2)	20	$1.25	103	$1.34
Carpenters, class B	(2)	(2)	6	1.00	51	1.17
Centrifuge operators			8	1.06	67	1.30
Chillermen			5	.94	45	1.26
Compounders	(2)	(2)	4	1.08	52	1.22
Electricians, class A	(2)	(2)	30	1.22	190	1.40
Electricians, class B	(2)	(2)	16	1.06	85	1.21
Filtermen			14	.93	79	1.23
Firemen, stills	19	$0.79	141	1.05	376	1.18
Guards	12	.60	150	.80	301	1.01
Janitors	13	.41	46	.69	124	.85
Machinists, class A	(2)	(2)	48	1.26	409	1.37
Machinists, class B	(2)	(2)	28	1.06	220	1.20
Packers, hand or machine	7	.80	20	.69	63	.97
Pipefitters, class A	4	1.20	61	1.22	254	1.35
Pipefitters, class B	12	.70	46	.97	249	1.20
Pressmen, paraffin			8	.99	114	1.12
Pumpmen	60	.75	202	1.11	596	1.30
Pumpmen helpers	12	.73	58	.95	401	1.19
Routine testers, laboratory	22	.84	179	.93	480	1.14
Stillmen, cracking	39	1.08	157	1.29	267	1.44
Stillmen, other	157	.89	130	1.18	425	1.41
Stillmen's helpers No. 1	57	.74	139	1.12	792	1.23
Stillmen's helpers No. 2	26	.49	123	1.06	261	1.22
Stock clerks	17	.59	43	.92	65	1.12
Treaters	32	.85	126	1.12	235	1.36
Treaters' helpers	8	.78	49	.95	256	1.23
Truck drivers, under 2½ tons	38	.50	53	.90	136	1.01
Truck drivers, 2½ tons and over	30	.50	37	.83	131	1.04
Watchmen	16	.56	101	.83	364	.97
Wax operators			14	1.16	31	1.18
Welders, hand (gas and arc), class A	7	1.15	64	1.27	389	1.35
Welders, hand (gas and arc), class B	9	.79	32	.99	114	1.14
Working foremen, processing departments	17	.99	37	1.20	38	1.45

[1] Exclusive of premium payments for overtime and night-shift work.
[2] Number of workers too small to justify presentation of an average.

OTHER FACTORS INFLUENCING WAGE LEVELS

Wide differences also appear in the comparison of earnings in refineries with cracking units and those operating with simpler processes. With the single exception of class B machinists, average earnings in the cracking plants are significantly above those for the other operations in the 26 occupational groups for which data are shown in table 11. It is thus apparent that the predominance of large refinery units and/or cracking processes within an area would consequently result in higher wage levels than those found in an area where such

influences were less in evidence. For example, the presence of large plants equipped for cracking, in the Gulf Coast areas of Louisiana and Texas, is principally responsible for higher wage rates there than in the inland areas of these States.

TABLE 11.—*Average Hourly Earnings* [1] *of Male Workers in Selected Occupations in Refineries with Cracking Units and in Other Refineries in the Southwest, April 1943*

Occupation and class	Refineries possessing cracking units		Other refineries	
	Number of workers	Average hourly earnings	Number of workers	Average hourly earnings
Carpenters, class A	120	$1.33	4	$1.29
Carpenters, class B	52	1.16	6	1.08
Centrifuge operators	75	1.27		
Chillermen	50	1.23		
Compounders	55	1.21	(2)	(2)
Electricians, class A	216	1.37	5	1.20
Electricians, class B	101	1.18	(2)	(2)
Filtermen	89	1.20	4	.80
Firemen, stills	518	1.15	18	.78
Guards	447	.94	16	.64
Janitors	171	.81	12	.45
Machinists, class A	451	1.36	9	1.29
Machinists, class B	247	1.18	4	1.22
Packers, hand or machine	88	.90	(2)	(2)
Pipefitters, class A	311	1.33	8	1.29
Pipefitters, class B	291	1.17	16	.79
Pressmen, paraffin	122	1.11		
Pumpmen	798	1.25	60	.85
Pumpmen helpers	452	1.15	19	.91
Routine testers, laboratory	634	1.09	47	.91
Stillmen, cracking	463	1.36		
Stillmen, other	561	1.34	151	.91
Stillmen's helpers No. 1	947	1.21	41	.76
Stillmen's helpers No. 2	388	1.16	22	.60
Stock clerks	106	1.02	19	.73
Treaters	367	1.27	26	.81
Treaters' helpers	304	1.19	9	.62
Truck drivers, under 2½ tons	188	.97	39	.57
Truck drivers, 2½ tons and over	182	.95	16	.60
Watchmen	465	.93	16	.62
Wax operators	45	1.18		
Welders, hand (gas and arc), class A	446	1.34	14	1.28
Welders, hand (gas and arc), class B	150	1.10	5	.84
Working foremen, processing departments	79	1.27	13	1.20

[1] Exclusive of premium payments for overtime and night-shift work.
[2] Number of workers too small to justify presentation of an average.

Local labor-market conditions and unionization have also contributed to area wage differentials. Union plants in general pay higher wages than do nonunion establishments. Consequently, the degree of plant unionization within an area would affect the level of wages.

It is exceedingly difficult to estimate the influence of local labor-market conditions. Critical manpower shortages in certain areas have doubtless affected wage rates, but, on the other hand, the wage-stabilization program has presumably operated as a counteracting influence. From evidence available in Bureau of Labor Statistics files, it appears that area wage differences in petroleum refining are primarily the result of size of establishment and the processing technique utilized, and only secondarily the result of differences in unionization, local labor conditions, and other industrial characteristics.