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A Monthly Summary of Economic and Business Conditions in Texas
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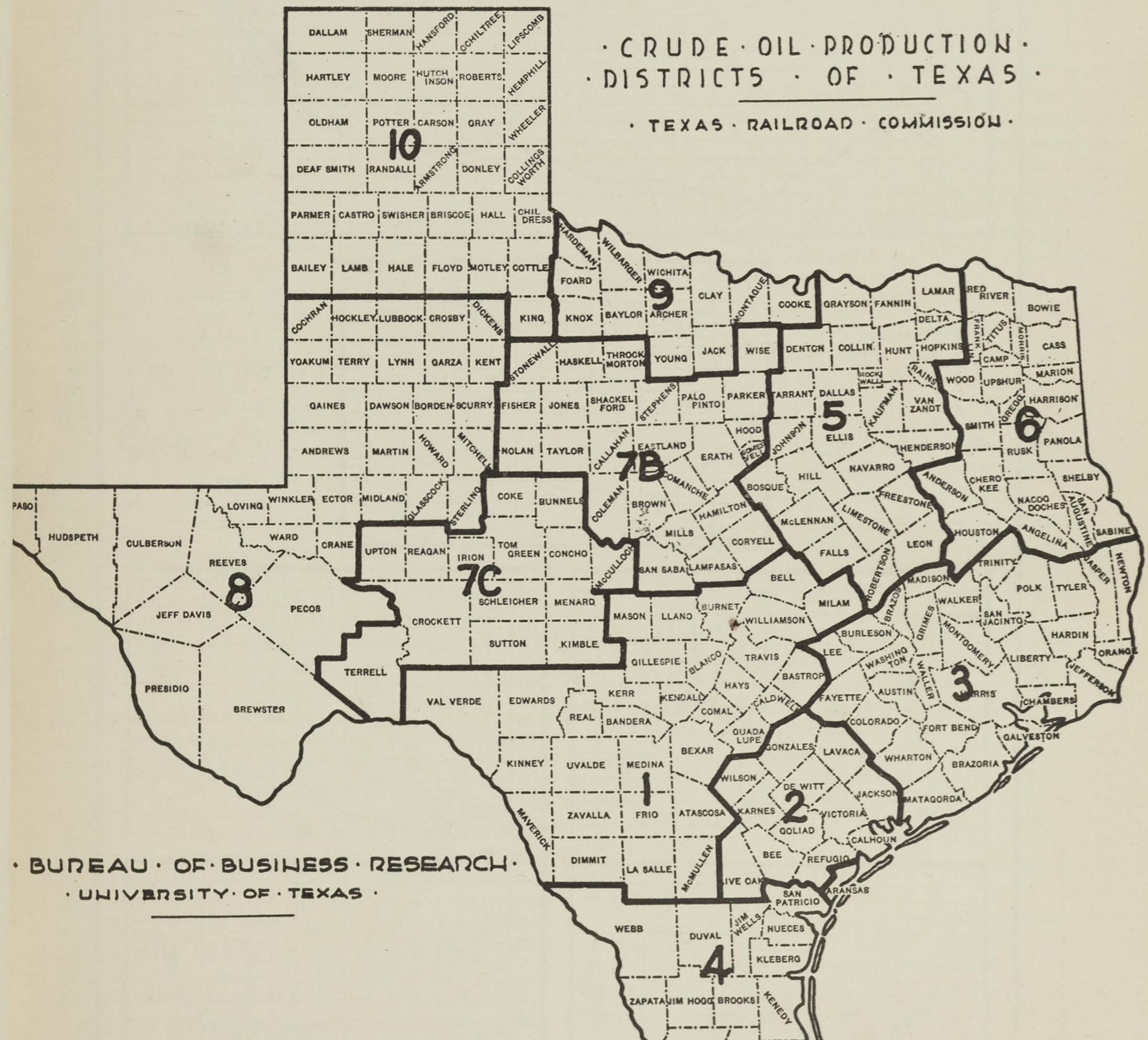


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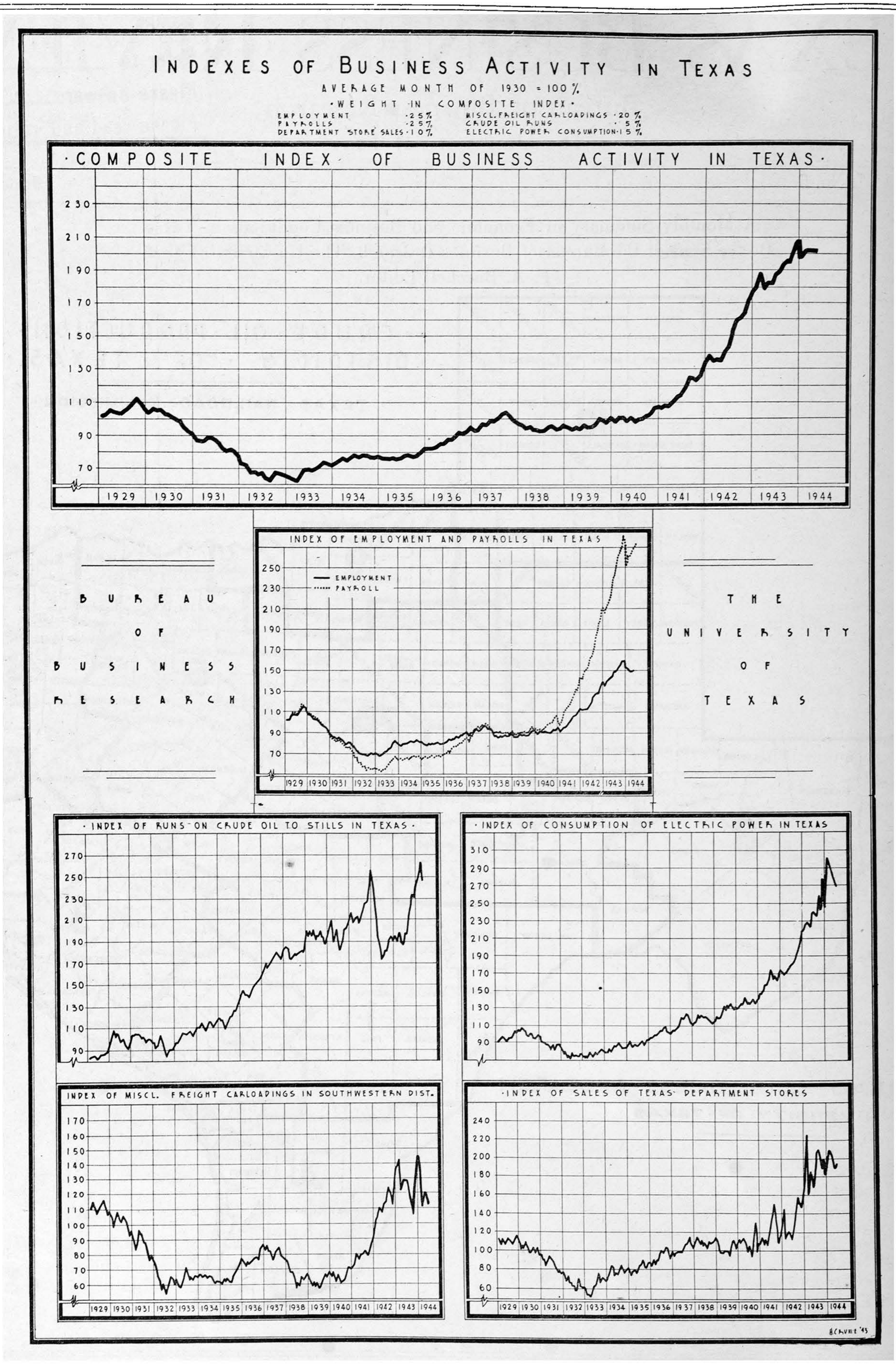

INDEXES OF BUSINESS ACTIVITY IN TEXAS
AVERAGE MONTH OF 1930 = 100%
·WEIGHT IN COMPOSITE INDEX·
EMPLOYMENT ·25%
PAYROLLS ·25%
DEPARTMENT STORE SALES ·10%
MISCL. FREIGHT CARLOADINGS ·20%
CRUDE OIL RUNS ·5%
ELECTRIC POWER CONSUMPTION ·15%
·COMPOSITE INDEX OF BUSINESS ACTIVITY IN TEXAS·
INDEX OF EMPLOYMENT AND PAYROLLS IN TEXAS
EMPLOYMENT
PAYROLL
BUREAU OF BUSINESS RESEARCH
THE UNIVERSITY OF TEXAS
·INDEX OF RUNS ON CRUDE OIL TO STILLS IN TEXAS·
·INDEX OF CONSUMPTION OF ELECTRIC POWER IN TEXAS
INDEX OF MISCL. FREIGHT CARLOADINGS IN SOUTHWESTERN DIST.
·INDEX OF SALES OF TEXAS DEPARTMENT STORES
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944

# Business Review and Prospect

*Cutbacks* in some lines of war production now tend to offset *increases* of war production in other lines with the net result of a virtually stationary output of war goods at the highest level thus far attained. Shortages of industrial materials and food products no longer present serious problems for the most part, but surpluses are appearing at various points in the war program. Increasing attention is being given to the conversion of war plants for the production of civilian goods where it becomes clear that the war effort will not be impeded with respect to either manpower or materials. As Mr. Nelson has stated, "We have reached the point where we have to set full speed ahead on military production and at the same time be ready to turn around quickly and move in the other direction." An over-all cutback of some 50 per cent is expected upon the defeat of Germany.

Business men are in the unusual position of knowing what the next major change in the business situation will be, i.e., curtailment of war production and release of plants, materials, and labor for peacetime work. Nevertheless, they face major uncertainties. They do not know how fast cutbacks in the war program are likely to come, which lines will be involved, and how far the cutbacks are likely to go. They do not know how soon or to what extent manufacturers whose war contracts are cancelled will be permitted to resume civilian production or what the governing policies will be. These questions are of concern not only to war producers and all classes of business men but to the whole country, for upon the answers will depend the state of employment and trade in the comparatively near future.

Manufacturers are watching inventories and price trends, while alert distributors are seeking not to be caught with unbalanced stocks or with "ersatz" merchandise when goods of standard quality and in sufficient volume again become available. Barring the uncertainties which will accompany conversion from war to peace economy, the outlook for retail distributors appears bright for at least several years.

Another factor which justifies restrained optimism is the relative stability of prices, both wholesale and retail, as well as the general cost of living. During the past year there has been no significant change either way in the level of prices and there is no present indication of an impending departure from the current price index level. Arguments in support of the idea that there will be sharp commodity price inflation are, for the present at least, being about evenly matched by arguments on the side of price deflation; a fact which might be taken to mean that the indexes of retail prices will continue relatively stable for a while longer at least.

It would be unfortunate, however, if the current price stability should lead to a complacent attitude with respect to the inflationary threat. After some success in fighting inflation people tend to tire of the subject and become dulled to the danger. They need to be reminded that the business losses, depression and unemployment which set in less than two years after the end of World War I, when prices dropped 45 per cent and industrial production 33 per cent, were not so much the direct result of the war as of the price inflation after the war. The troubles were directly due to the excesses of 1919 and the first half of 1920.

The basic forces which produced the price inflation of 1919 and 1920 are with us today and with even greater power. Government deficits are much larger and the increases in currency and bank credit are far greater. Wage cases are pending which, if decided in favor of the unions, might start a new cycle of wage increases in industry generally. The rise of farm land prices—as great in percentage as during the corresponding period of the first World War—has evoked warnings from both public officials and farm authorities. The rise started from a severely depressed level and thus the index of farm land prices is still slightly below that of the 1912–1914 base period. Moreover, present average farm land prices must rise 50 per cent before reaching the peak attained in 1920.

Extension of the price control legislation for at least a year seems assured. The case in support of its continuation has been unanswerable, but it is not possible to say what modifications, if any, will be made in the present organization. While it is true that there are cases where the increase in production is keeping pace with the growing demand for goods, it is not likely that any responsible group would care to be in the position of lifting the price lid at this time.

International conferences are being either announced or considered in connection with several important subjects. A study group to collect available facts on raw material sources and requirements around the globe is about to be announced by the Administration. It is expected that Mr. Bernard Baruch will be appointed to head up the group and that Dr. J. Kenneth Leith will work with him on minerals. The Atlantic Charter's fourth point agreed "to further the enjoyment by all states, great or small, victor or vanquished, of access on equal terms to the trade and to the raw materials of the world which are needed for their economic prosperity." Obviously this country could not enter an international conference without making decisions on fundamental issues. Appointment of a competent study group appears, therefore, to be the logical antecedent to such a conference.

An editorial dealing with another international economic problem in the June 14, 1944 issue of the *Journal of Commerce* is worthy of quotation at some length:

"The United Nations Monetary and Financial Conference will open at Bretton Woods, N. H., on July 1. The fundamental objective of this conference is substantially the same as that of the London economic and financial conference of 11 years ago. Once again representatives of the nations of the world are gathering to formulate measures that will bring about an expansion of economic relations among countries. Once again plans are to be discussed for monetary stabilization, so that fluctuating currencies which breed strangling trade barriers can be anchored to fixed parities.

"High hopes were entertained for the London Conference when it met 11 years back. In the initial stages, some hopeful progress was made. Then the President gave way to those of his advisors who feared that our adherence to a currency stabilization agreement would prevent them from undertaking pet economic experiments involving devaluation of the dollar, lifting of the commodity price level, heavy Federal spending, etc. The result was the message attributing the wish to stabilize currencies to 'so called international bankers,' and the end of this well-meant effort to stem the deterioration of international economic relations.

"The Bretton Woods conference gathers in an entirely different atmosphere. There is very little popular support for it. . . . The United States Government, which broke up the London Conference, is taking the leadership in seeking an agreement now, while many other countries, including Great Britain, display considerable reluctance about joining. The 'international bankers' to whom President Roosevelt referred in 1933, are especially dubious about the whole thing.

"In a larger sense the Bretton Woods Conference may be regarded as the adjourned session of the parley which ended abruptly in London 11 years before, almost to the day. The need for international collaboration for currency stabilization and the expansion of economic relations among countries will be greater than ever after the war. Agreement at Bretton Woods upon an effective program to achieve these results could help greatly to assure economic prosperity and peace for the post-war world."

No state in the Union has more at stake than has Texas in a sound international program and policy. This situation arises both because of the state's strategic geographic location and the enormous actual and potential products available for export. It is therefore especially important at this time for citizens of Texas to keep well informed on international economic developments as they unfold during coming months.

## Texas Business

Industry and trade in Texas continues at an even keel on a level well above a year ago but below the peak reached during the closing weeks of 1943.

The composite index of Texas business activity adjusted for seasonal variation for May is 201.5, approximately 15 per cent above the corresponding month lost year but slightly below the adjusted April index.

MAY INDEXES OF BUSINESS ACTIVITY IN TEXAS

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Employment | 150.2 | 145.1 | 149.0 |
| Pay Rolls | 275.3 | 232.8 | 266.0 |
| Miscellaneous Freight Carloadings Southwest District | 113.4 | 127.6 | 120.3 |
| Runs of Crude Oil to Stills | 246.9 | 187.6 | 249.1 |
| Department Store Sales | 196.1 | 168.8 | 190.1 |
| Electric Power Consumption | 269.6 | 239.4 | 284.9 |
| Composite | 201.5 | 182.2 | 202.0 |

All of the adjusted component indexes were higher than for May, 1943, except the index of miscellaneous freight car loadings; but compared with April the indexes of employment, pay rolls, and department stores sales showed gains; while the indexes of freight car loadings, electric power consumption, and runs of crude oil to stills declined.

No marked departure from the prevailing general business picture in Texas is indicated for the immediate future but changes could occur rapidly in specific lines of activity in reflection of the war situation.

Cash income from agriculture in Texas during May was $83 million compared with $73 million in May, 1943, an increase of 14 per cent. For the period January to May inclusive aggregate cash income was $328 million compared with $319 million during the corresponding period in 1943, an increase of 3 per cent.

INDEX OF AGRICULTURAL CASH INCOME IN TEXAS

(Av. Mo. 1928–32=100%)

| Districts | May, 1944 | April, 1944 | May, 1943 | Cumulative Cash Income in Thousands of Dollars January–May Inclusive 1944 | 1943 |
|---|---|---|---|---|---|
| 1-N | 144.9 | 137.3 | 210.7 | $ 21,625 | $ 42,440 |
| 1-S | 465.6 | 746.9 | 404.1 | 31,735 | 30,862 |
| 2 | 220.9 | 238.8 | 211.6 | 24,589 | 27,860 |
| 3 | 266.8 | 232.1 | 214.0 | 13,127 | 12,766 |
| 4 | 252.3 | 226.3 | 209.2 | 41,086 | 33,782 |
| 5 | 229.2 | 231.1 | 198.9 | 12,430 | 11,006 |
| 6 | 247.2 | 326.4 | 377.8 | 15,900 | 24,359 |
| 7 | 211.2 | 164.3 | 190.5 | 22,644 | 23,030 |
| 8 | 315.4 | 290.5 | 206.2 | 32,353 | 24,217 |
| 9 | 242.2 | 294.5 | 250.9 | 27,078 | 23,940 |
| 10 | 70.4 | 274.2 | 80.6 | 15,047 | 19,052 |
| 10-A | 977.2 | 782.7 | 731.0 | 70,645 | 45,640 |
| STATE | 274.5 | 301.4 | 243.4 | $328,258 | $318,954 |

In comparison with the average month during the five-year base period (1928–1932 inclusive) adjusted for seasonal variation, the May index of cash income for the State as a whole was up 175 per cent.

Substantial gains over May a year ago were registered in the cash income from cattle in several districts, a result of deferred shipments to the grazing areas of Kansas because of the April floods. Substantial gains also were registered from vegetables out of the Lower Rio Grande Valley. In addition, income from sheep was sharply above May last year while moderate gains were registered for poultry and milk products.

Present indications are that the year to year margin of gain will widen for the balance of the year. Income from wheat for example is certain to be more than twice that received last year since the latest government estimate is more than 60 million bushels, almost twice that of a year ago, and current farm prices are approximately $1.40 per bushel, or well above the price at this time last year. Over a period of years District 1–N has accounted for about three-fourths of the State's production of wheat. At prevailing prices and estimated production in this district, the 1944 farm cash income in district 1–N alone is expected to be approximately $60 million. If this estimate is borne out, it would amount to an average of nearly $5,000 per farm for wheat alone in district 1–N.

## TREND OF FARM CASH INCOME BY PRODUCTS IN DISTRICTS 8 AND 9 BY PRODUCTS FROM 1927 to 1943 INCLUSIVE

In each issue of the REVIEW from January to May, tabulations have been included on the trend of farm cash income in Texas by products from 1927 to 1943 inclusive. In the January issue of the REVIEW these data were given in a tabulation for the State as a whole and in the subsequent issues, through May, similar data were given for each of the following crop reporting districts:—1–N and 1–S in the February issue; 2 and 3 in the March issue; 4 and 5 in the April issue; 6 and 7 in the May issue. The tabulations on page 23 give corresponding information for districts 8 and 9. A chart delineating the crop reporting districts with the names of the counties included is shown on the outer cover page of the May issue of the REVIEW.

In both districts cash income from cotton in the early '40s has been sharply below that of the late '20s while cash income from cottonseed has been relatively well maintained because of the higher price level for this product during recent years as compared with the late '20s. Both districts show marked increases in cash income from calves, poultry, eggs, milk, and milk products. During the past two years a substantial cash return has been received in district 8 from the sale of peanuts, a development in response to the government's needs for fats.

The most distinctive characteristic of agriculture in district 9 is the rice industry, the cash income from which has grown from $7 million in 1927 to $28 million in 1943.

F. A. BUECHEL.

# Texas Oil Production

## In Regional Perspective

"The State of Texas owes its huge wealth and modern-day prosperity to sea muds, shales, and sandstones which have been compacted and lithified into its present-day rock sheets.

"Not only do they weather into its varied soils, but the same clays and shales which the farmer plows at the surface contain minute particles of oil, which, when assembled together in quantity and collected in the adjacent strata of porous sands beneath the surface, constitute the pools from which our vast supply of petroleum comes."—Robert T. Hill, *The Dallas Morning News*, January 26, 1931.

Two features of Texas—its vast size together with the kinds and wide variety of its geologic features—have conditioned the amount and quality of the soil and gas accumulations in the State. The following article outlines only the high points necessary to an appreciation of the factors concerned in the tremendous growth of this industry in Texas.

### The Position of Oil in Texas

Petroleum is not only the principal mineral resource of Texas but together with natural gas, it supplies the bases for any large-scale development of industry in the State. The problem of expanding industry in Texas, especially in the postwar period, is unquestionably one of the greatest of challenges the State will have to consider; the key factor, both in the maintenance of the large manufacturing industries already in the State and in bringing in of other industries into Texas, consists of the State's oil and natural gas resources.

Texas' oil production in 1943 was 592,884,000 barrels, which was nearly 39.5 per cent of the total national output of 1,501,905,000 barrels for 1943. Although there were annual variations, Texas oil production for the 6 years prior to 1943 had hovered around 500 million barrels annually.

Texas total output to the end of 1943 was 8 billion 161 million barrels; this was 29 per cent of the total national production of 28 billion 97 million barrels up to the end of 1943.

Texas oil reserves, according to *The Oil and Gas Journal*, of January 27, 1944, amounted to 11 billion 692 million barrels as of January 1, 1944, or 56.7 per cent of the nation's reserves, which were placed at 20 billion 746 million barrels.

By way of comparison, California's oil reserves as of January 1, 1944, were placed at 14.9 per cent of the national total, those of Oklahoma at 5.5 per cent and of Louisiana, 5.4 per cent of the national total.

The reserves in the "old" oil producing states east of the Mississippi River, are now almost pitiably small: those of Pennsylvania, 0.9 per cent of the total for the United States and of West Virginia and New York, only 0.2 per cent each.

Of outstanding importance in the oil picture of the United States is the Gulf Southwest as a whole, in which, Texas, of course, occupies a preponderant position not only as to past and current production but also as regards estimated reserves.

The reserves in the Gulf Southwest, Kansas and New Mexico included, together with Texas made up 76.8 per cent of the national reserves, as of January 1, 1944. The percentages of the total of national reserves by states in the Gulf Southwest are as follows:

| | |
|---|---|
| Texas | 56.7 |
| Oklahoma | 5.5 |
| Louisiana | 5.4 |
| Kansas | 4.5 |
| New Mexico | 2.9 |
| Arkansas | 1.8 |
| | 76.8 |

Texas oil production as well as Texas oil and gas reserves, all of which occupy an overwhelming position in the United States, are based upon three interrelated groups of conditions. These are:

(1) The large size of the State and the position this section of the United States occupies at large in the North American continent, as to both the geologic make-up on the one hand and the fact of geographic orientation on the other.

(2) The character of the stratigraphic sections together with the variety of structures and geologic situations favorable to oil and gas accumulation which occur in the State.

(3) The large number and the substantial size of Texas oil and gas producing districts, each of which is stamped by its own particular combinations of stratigraphy and structures.

### Earlier Growth in Geologic Knowledge of Texas

The development of knowledge of the geology of Texas, the patient and careful accumulation of facts, and the scientific interpretations made therefrom, and particularly the unraveling of structures and stratigraphy paralleling the advance of the oil industry in the States, can be appropriately designated one of the romances of modern scientific investigation.

The first geologist to geologize in Texas was Ferdinand Roemer—in the middle 1840's—now almost a century ago. Roemer had been sent from Germany to report on the colonization possibilities of Texas. His "Texas," only recently translated into English, remains a classic.

As early as 1880, E. D. Cope had called attention to the great fault we now know as the Balcones, and the Balcones Escarpment. But even earlier—as early as 1874—Robert T. Hill had begun his remarkable geologic observations and studies of Texas, of land-form features such as Round Mountain at Comanche and of the fossils and rocks of that section. Hill's first scientific paper, "The Topography and Geology of the Cross Timbers and Surrounding Regions in Northern Texas," was published in the *American Journal of Science* in April, 1887, and around 1888, Hill was able to determine the true geologic nature of the Balcones Escarpment, which he named in 1890. It may be noted that Roemer had entirely missed out on the geology of this escarpment—and was more than a little perturbed when Hill published his conclusions.

It was in this period in the late '80's that Hill announced his conclusions regarding the Comanchean system, which is the Lower Cretaceous, and which he named Comanchean in honor of the little village of Comanche, Texas.

At this period, there were only three geologists working in Texas—Robert T. Hill, E. T. Dumble, who had been a travelling salesman, and W. F. Cummins. To this group was added in the early 1890's a number of geologists including R. A. F. Penrose, Jr., Joseph Taff, T. Wayland Vaughan, and William Kennedy. Ralph S. Tarr of Cornell University spent part of a year in Texas in the late '80's.

At the turn of the century Robert T. Hill was bringing out that classic work on the Texas Cretaceous, the "Geography and Geology of the Black and Grand Prairies," published in the Twenty-First Annual Report of the United States Geological Survey, 1899–1900. Concerning the importance of this great monograph, Alexander Deussen wrote in 1935: "This publication remains one of the notable and outstanding contributions to the geology of Texas, and it has not been possible since that time to add very much to Hill's classification, definition, and description of the Cretaceous deposits of Texas." Attention should be called to the fact that this great geologic work preceded any interest in oil in Texas; it was brought out under the "guise" of a contribution to the study of underground water resources of the State. Shortly thereafter Captain Lucas brought in Spindletop. The large amount of oil revealed in the Lucas gusher not only startled American oil men, but it also marked the beginning of the transformation of the American oil industry from a kerosene industry of pint-measure proportions into one of the large-scale industries of the American economy. It might be noted that Captain Lucas had conferred in Washington with members of the United States Geological Survey concerning the geology of the Gulf Coast, and particularly in regard to the remarkable salt bodies of this region (now called salt domes) of which something had been known in the Louisiana Gulf Coast country since the days of the War between the States; and furthermore, Lucas had drilled into some of these salt domes prior to putting down the well at Spindletop.

During the first decade of the present century, J. A. Udden began his studies in Texas; A. C. Veatch and G. D. Harris were working in Louisiana; Alexander Deussen was a young instructor of geology at The University of Texas, and Charles Gould was beginning his geologic studies of Oklahoma. It was about this time, too, that L. C. Snider became a member of the Geological Survey of Oklahoma, and that Wallace Pratt from the plains of western Kansas was graduating from the University of Kansas, and Everette DeGolyer was graduating at Oklahoma. These men, together with the earlier geologists previously mentioned, were leaders in unraveling the geology of Texas and adjacent states, thereby providing a secure basis for an understanding of the great oil and gas reserves which are a function of the geology of these regions. Since World War I the number of oil geologists working upon practically every phase of the pre-Pleistocene geology of the State has of course been greatly increased.

### Early Development of Oil in Texas

Oil seeps had been known in the Nacogdoches area from about 1840. About 1894, or perhaps earlier, shallow oil was struck at Corsicana while drilling for water. And out in the Brownwood country oil from a shallow well is said to have been used as axle grease.

Prior to 1901, however, there was little interest in Texas oil. But when Spindletop came in so spectacularly on January 10, 1901, the show was ready to begin, even if some twenty years were to elapse before Texas became one of the Big Three. However great the upsurge following Spindletop, in which production from several salt domes was brought in—such as Sour Lake, Batson, Saratoga, Humble, and also a few in coastal Louisiana—the oil industry in Texas remained a rather small item for several years. Only shallow production could be brought in, and during this period other states such as Oklahoma and California and the Appalachian district east of the Mississippi River were away ahead of Texas.

In 1904 oil was discovered in Clay County, although it apparently attracted little interest. Shallow oil at Electra was discovered in 1911, thereby ruining a good water well, but still there was no particularly great interest manifested in Texas oil.

Salient points in a brief summary of the earlier phases of Texas oil development include the following: First recorded production in the State was in 1889 but the State's annual output remained below 500 barrels until 1895. After the Spindletop discovery production ran up to a peak of 28 million barrels in 1905, with the development of shallow production from piercement-type domes in the Gulf Coast country. Production thereafter decreased, to as low as 9 million barrels in 1910 with the decline of the piercement-type domes, no new ones having been found in the meantime. Then with the opening up of fields in other sections of Texas, the State's output rose to 25 million barrels, in 1915, although the 100 million barrel annual output was not attained until 1921.

### World War I and North-Central Texas

#### *Production from the Pennsylvanian and Lower Ordovician*

It was during the period of World War I that interest in Texas oil resources began to crystallize. In Oklahoma, the Bartlesville area, discovered in 1904, and such pools as Glenn and Cushing, discovered in 1904 and 1912 respectively, were going strong in this period. However, the greatly increased demand for oil occasioned by the war was bringing about fears of a shortage.

Fortunately, the El Dorado, Kansas, field was brought in in 1917. This is one of the big fields of the United States, having produced 184,851,000 barrels to the end of 1943, and estimated to have a remaining reserve, *The Oil and Gas Journal* estimate, of 26,449,000 barrels as of January 1, 1944. In this connection fields with a total output of 100 million barrels are relatively rare in the world's oil industry. It might also be noted by way of comparison that the total for the El Dorado field is more than twice the total oil production of Japan to date.

In North-central Texas, shallow production at Electra had been discovered in 1911; Burkburnett was discovered in 1919 and Electra "deep" production was found in the same year. Both Electra and Burkburnett are "buried hills" structures overlain by lenticular sands, and the early shallow production was from the Cisco formation of the upper Pennsylvanian. It is of importance to note that the exploration carried on by drilling at Electra and Burkburnett gave to the geologists by the early 1920's a knowledge of the Red River uplift—a buried series of folds of mountainous proportions—the axis of which parallels the trend of the Arbuckle-Wichita mountains of Oklahoma. The Red River uplift or upfold is a broad structure and is approximately 180 miles in length. The arch consists of pre-Cambrian granites together with Lower Ordovician limestone, broadly upfolded; the major structure is characterized by subsidiary domes and anticlines. The oil-bearing rocks occur on these subsidiary structural features (domes and anticlines) and in the sand lenses above and on the flanks of the main upfold.

The Ellenburger limestone produces on structural highs in this district; Pennsylvanian production, much of which is from the Cisco and Strawn groups, is largely from lenticular sands. Accumulation of oil is conditioned largely by structural features; the structural accumulation is modified, however, by stratigraphic conditions, as by the pinching out of beds as they rise on the flanks of the structure.

In the meantime, Ranger, in Eastland County, was discovered in 1917, producing from the Marble Falls limestone in the Bend group of the lower Pennsylvanian. The wells from the Bend Limestone had a high initial production and their decline was very rapid. Other well known fields include Breckenridge, Stephens County, and Desdemonia in Eastland, Erath, and Comanche counties.

Recognition of the existence of a marked unconformity between the Bend and the higher Pennsylvanian groups, together with new facts attained by extension of drilling, gave increasing knowledge of the prominent structural feature, together with its bearings on the accumulation of oil and gas, in the Pennsylvanian of North-central Texas—the so-called Bend Arch, or Bend Flexure—on which Ranger, Breckenridge, as well as numerous other fields and patches of production are located. The first map of the Bend Arch, as we now know it, was published in the *Oil Trade Journal*, of May, 1918, by M. G. Cheney.

The Bend Arch is a broad structural feature which modifies the prevailing westward dip of the Pennsylvanian rocks of North-central Texas. It extends for a distance of about 175 miles from just north of the Llano uplift to the central portion of Archer County. Its maximum east-west width is in excess of 100 miles.

A summary of the Pennsylvanian in Texas is quoted from the U. S. G. S.:

"The Pennsylvanian series in north-central Texas consists of a great succession of limestones, shales, and sandstones, having a maximum thickness of nearly 6,000 feet; these have been divided into the 'Bend,' Strawn, Canyon, and Cisco groups, named in order of age from oldest to youngest. These groups have in turn been subdivided into many formations and members, and many of the oil-bearing beds, which form only small parts of formations or members have received special names because of their economic importance.

"Oil has been found in commercial quantities in all four of the groups of the Pennsylvanian series, but the largest production has come from the 'Bend group.' The Pennsylvanian rocks have yielded oil in notable quantities in three principal areas—north Texas, north-central Texas, and the Texas Panhandle. All these areas also yield gas in commercial quantities. In the west Texas area the Pennsylvanian rocks lie deeply buried beneath younger rocks and do not come to the surface within many miles of the oil and gas fields; thus far they have not proved to be an important source of oil or gas in that area."

The K. M. A. field in Wichita County was discovered in 1931, with production from the Strawn, in the Pennsylvanian. K. M. A. deep was discovered in 1940 with production from the Ellenburger. The K. M. A. structure is a plunging anticline which branches off from the Red River arch. The K. M. A. field is the outstanding development in the entire area during recent years. K. M. A. had produced a total of 51,700,000 barrels to the end of 1943 but the estimated reserves are given as 228 million barrels. Electra and Burkburnett have each produced in excess of 100 million barrels; Electra had produced 146 million barrels and Burkburnett, 138 million barrels to the end of 1943. As to estimated reserves, however, Electra had only 14 million barrels and Burkburnett 12 million, as of January 1, 1944.

Although different designations are given this entire district and its two subdivisions, the designations used herein are North-central Texas for the entire area, extending from the Llano uplift to Red River; North Texas for the portion along Red River and West-central Texas for the Bend Arch portion. In the Bend Arch fields all four groups of the Pennsylvanian yield oil, from depths ranging from 250 to 4,200 feet or more. All of the production comes from "minor structural features on the Bend Arch. These minor features include anticlinal folds, anticlinal and monoclinal noses, lenses of porous sand in beds having a monoclinal attitude, and porous sand layers that merge into impervious materials up the dip. Oil has been found in this district in hundreds of such structural features."

Total production for North Texas to the end of 1943 was 808 million barrels and the estimated reserves, as of January 1, 1944, were placed at 551 million. Total production for West-central Texas was 391 million barrels and the estimated reserves were put at 94 million barrels. The combined production for the entire North-central Texas area is almost 15 (14.7) per cent of the Texas total; the combined estimated reserves, however, amount to less than 6 (5.7) per cent of the Texas total.

Shallow production prevails over the district at large, but as already noted, deeper production has been attracting increasing attention in the Red River area during recent years.

## After World War I

Large production of oil in Texas after World War I had been preceded by three decades of fundamental geologic study and by twenty years of rather extensive exploration.

Oil had been found at Corsicana in 1894, from shallow production of about 700 feet in the Nacatoch sand of the Navarro group, which is in the Upper Cretaceous. The great Balcones displacement had been known since the 1880's, but no one then dreamed of the complementary aspect of this fault zone to the eastward or of the extension of the fault system into the northeastern sector of the State.

Furthermore, the sub-surface extension of the Woodbine formation—the basal portion of the Upper Cretaceous—which also had been named by Hill prior to 1900, was recognized, and, furthermore, the Woodbine was known to carry fresh water eastward from its outcrops in the Eastern Cross Timbers, even as far east as Corsicana.

It was thought during the earlier period of its development that the Woodbine was the producing formation in the large Caddo field, on the northwestern margin of the Sabine uplift, which had been producing since 1904; however, this has proved not to be the case. The western part of the Caddo field is in the northeastern part of Marion County, Texas; the eastern portion of the field is in Louisiana. The main oil producing horizon is now known to be in the Tokio formation, in an anticlinal structure, the Lower Cretaceous beds on which have been truncated by erosion; above the unconformity occur beds of the Upper Cretaceous. Also later knowledge showed that the water wells in the Woodbine in the vicinity of Corsicana were west of the great fault line.

In 1920, Col. A. E. Humphreys, on the advice of F. Julius Fohs, a geologist, who for years now has been an independent operator, drilled at Mexia what was then a deep well—into the Woodbine sand at 3,100 feet.

The features of the Mexia-Powell fault line together with the associated structures were rapidly developed along this zone—Mexia, Powell, Richland, Currie, and Wortham. This was the period of the early 1920's. Two fields in this district are in the 100 million barrel grouping. Powell has produced 116 million barrels to date and Mexia, 99 million barrels. The estimated reserves of these fields, however, are low—around 5 million barrels for each one.

In 1922 oil was discovered in Luling, along the complementary fault line of the Balcones Escarpment, in what is now designated as the southern fault-line fields. The Woodbine sand does not extend this far south, and oil at Luling is produced from the porous (weathered?) upper portion of the Edwards limestone of the Comanchean, or Lower Cretaceous. Two wells at Luling encountered a schist bedrock at a depth of about 4,750 feet. This schist is, of course, barren of oil.

Production from Mexia and Powell, combined with the flush production of Smackover, Arkansas, discovered in 1922, and which reached its peak in 1925, together with the large production of Long Beach and Santa Fe Springs, California, both of which were brought in in 1921, gave rise to a considerable excess of production. One result of this new flood of oil was to run down the prices of crude oil in the middle 1920's.

Reviewing briefly the trend in oil prices, which had started to climb in 1916, the average for the United States during 1920 was $3.00 a barrel, although an average of quantities of wide range really means but little. Pennsylvanian oil boomed to $6.10 a barrel on March 2, 1920, and Mid-Continent crude was selling at $3.50 a barrel. By 1925, however, the average price for the United States had fallen to $1.98 a barrel. By 1924 such outstanding fields as Powell, discovered in 1923, and Luling, discovered in 1922 were going strong, and Big Lake was discovered in 1923; Huntington Beach, California, discovered in 1920, Santa Fe Springs, and Long Beach, both discovered in 1921, Salt Creek, Wyoming, discovered in 1908, Smackover, Arkansas, in 1922, together with Tonkawa, Oklahoma, discovered in 1921, and Burbank, Oklahoma, in 1920, all were at or near their peaks of production. During the next three years, large production from Spindletop deep, found in 1926, Yates, discovered in 1926, and Seminole, Oklahoma, in 1926, were added, and in 1927 the average price of crude had fallen to $1.30 a barrel. The year 1927 is especially important as it marked the beginnings of restricted production, as a general policy in the oil industry.

Of these Texas fields, Powell at the end of 1943 had produced 116 million barrels, and Big Lake had almost attained the 100 million barrel mark. Yates has proved to be one of the really big fields of the nation, having produced to the end of 1943 a total of 276 million barrels and with estimated reserves of 375 million barrels as of January 1, 1944.

It is important to note that although organized proration was begun in the Seminole district in Oklahoma early in 1927, Seminole production continued, however, to expand; in 1928 Oklahoma City and Kettleman Hills in California were added to the list of big fields of the United States and Van came along in 1929. In that year production in the United States exceeded the billion barrel mark for the first time, and the average of crude prices stood at $1.27.

Summing up Texas production during the decade of the 1920's, production steadily rose from 106 million barrels in 1921 to nearly 300 million barrels in 1930. Then came East Texas in 1930, followed by Conroe in 1931, and Tom Ball and Greta in 1933, and still later the development of deep production in the southern High Plains.

All of these developments obviously led to greatly increased production in Texas. The State's output in 1931 was 332 million barrels and in 1937 it exceeded the 500 million barrel mark. For the past several years until 1943 Texas oil production hovered around 500 million barrels annually; in 1943 it rose to an all-time high of 593 million barrels.

Price trends in this period need not be detailed, but the flood of oil from big new fields, together with the concept of potentials built up in connection with restricted production engendered a psychology as regards our oil resources which has largely dominated our national thinking as to oil until the past year or so.

### West Texas and the Panhandle

*Production from the Permian and Lower Ordovician*

The scattered pattern of Texas oil production is a somewhat curious one, and to this day great belts or blocks of the State are characterized by the absence of oil or gas production, whereas other areas are just as distinctly characterized by prolific production. This scattered occurrence of oil (and gas) resources conforms to the facts of distribution of minerals, all of which are irregularly distributed in the earth's crust the world over. This scattered pattern of oil occurrences was apparent even in the early days of development of the Texas oil industry. Seepages at Sour Lake had been known long before the Spindletop discovery. Gas seepages in the Petrolia field of Clay County seem to have been known as early as 1900. Oil had been found at Corsicana in 1894 and at Electra in 1911—in both cases at shallow depths, and in both cases while in drilling for water. Captain Lucas, following a "hunch," had drilled at Spindletop, but he picked a likely surface location. Oil was found at Caddo in 1904, although seepages in the vicinity of Caddo Lake had been known long prior to this time.

But in West Texas and the Panhandle the situation was different indeed. In 1906, Charles N. Gould published "Geology and Water Resources of the Eastern Portion of the Panhandle of Texas," and in 1907, the companion paper on the western Panhandle.

Although Gould was geologizing for water, he called attention in Water-Supply Paper, 191, U. S. G. S., to an anticline, the Amarillo fold, exposed in the Canadian River lowland in Potter County, north of Amarillo. At the time these papers were published—almost 40 years ago—no one seriously considered that western Texas could have either oil or gas in substantial quantities.

But in 1918, under the aegis of the World War search for oil, and in the time of the Ranger boom, a wildcat well was drilled on the anticline which Gould had discovered. The location of this well was recommended by Gould at the time—but it did not strike oil. It was only the first gas well in what is now considered the greatest gas field in the world! But at that time it was oil that the drillers were after.

The Panhandle gas field, following along the broad structural feature on the crest of the Amarillo uplift or the Amarillo Buried Mountains—apparently a prolongation of the Wichita-Arbuckle mountains—is approximately 120 miles long; the gas occurs in the higher part of the uplift. The gas producing territory, it has been estimated, covers more than a million acres. There is but one other natural gas field of similar production capacity known—the vast Hugoton field also in the Permian of southwest Kansas. And it may be that in time drilling will connect these two gigantic fields.

Oil was discovered on the anticlinal structure in Potter County in 1921 although it was not until 1925–26 that intensive development of the field got under way. It is now proven that a large oil field—one of the big oil fields of Texas—occurs along the northern margin of the Panhandle gas field, on the gentle slopes of the gigantic structure. The oil fields extend along the north side of the Panhandle gas field for a distance of about 90 miles.

Oil production in the Panhandle field is from the "granite wash" an accumulation of water-laid fragments of disintegrated granite, mainly along the flanks of the buried granite ridge, as well as from porous zones of a limestone group and from a dolomite member, mostly in the Permian.

The granitic detrital material is considered by some to be Pennsylvanian in age. Normal marine limestones were laid down in late Pennsylvanian and early Permian during submergences, followed by evaporites deposited in desiccating seas. Red Beds with gypsum and anhydrite of the upper Permian were subsequently covered by continental deposits of the late Teritary and the Pleistocene.

A still different picture had been painted for the Permian basin. The Triassic where it outcrops east of the High Plains is a continental deposit and the Permian section characteristic of west Texas was held to be a series of evaporites and red beds, and furthermore, since the evaporites, laid down in a desiccating interior sea could not possibly have had source beds from which the hydrocarbons could have been supplied in quantities sufficient for accumulation in oil and gas fields.

As has been previously noted, Udden began his geologic work in Texas soon after the turn of the century. Udden's studies by microscopic examination of water well samples in Illinois were the first of their kind anywhere. After coming to Texas he was able to continue these studies on a larger scale, and he is now given credit for starting this fruitful and very significant field of subsurface research. Udden's discovery of potash compounds in samples from the deep water well on the Spur ranch near Spur, Texas, in 1917 was but one of the many results of this type of scientific investigation.

Udden had also been engaged for several years on studies of geologic problems in the Trans-Pecos, as well as of the Glass Mountains and the Marathon Basin. In his "Notes on the Geology of the Glass Mountains," 1917, this master geologist wrote the following remarkable statement for the time, for it must be remembered that West Texas subsurface geology twenty-five years ago was a *terra incognito.*

> "We have here a geologic problem, the solution of which may be of decided economic importance. . . . The Comanchean limestones contain several sharply marked horizons that can be followed long distances in the southwest part of Pecos County, and in most of Upton, Reagan and Crockett counties. Quite accurate measurements of any structure present can certainly be made. It is, however, a region where very little work has yet been done, and in the absence of any accurate knowledge of the conditions involved, further speculations seem unprofitable. We can only see that in the buried unconformity which certainly must exist between the lower folded series and the overlying merely gently folded or quite undisturbed sediments, there are natural chances for finding accumulations of gas as well as oil."

At this place a quotation from an appraisal of Udden's studies, by another untiring investigator of Texas geologic problems, Alexander Deussen, is appropriate. Deussen, speaking on the campus of The University of Texas in 1925, said: "I am of the impression that the results of these studies have had far-reaching results. Casually I should mention that this splendid University plant which it is my privilege to enjoy today is in large measure the direct result of the fruitful labor of this untiring investigator. I seriously question whether The University of Texas has as yet given adequate recognition to the work that he has done."

It should be borne in mind that the statements quoted from Udden were published in 1917—at a time when no commercial oil was known in the Permian Basin and a year before the gas discovery well was drilled in the Panhandle.

Again it was the wildcatter who took the chance of finding oil in the Permian Basin. Leases were made in Reagan County on the trend suggested by Udden and drilling began in what is now the Big Lake field in 1921. This discovery well was completed in May, 1923. Production at Big Lake initiated a new wave of explorations which also afforded materials for wider geologic studies, all of which resulted in the bringing in of a new crop of fields in West Texas—Yates, 1926; Hendricks, 1926; Hobbs, New Mexico, 1928; as well as McCamey, McElroy, Church-Fields, Howard-Glasscock, World-Powell, and others in the same period. The discovery well in West

Texas was Big Lake (shallow) in 1923. Deep production from the Ordovician at Big Lake was not developed until 1928. After a period of exploration and discoveries in the late '20's and early '30's, a new crop of fields, some of them in the 100 million barrel class, has been brought in in the northern portion of the Permian Basin —whose production in the Permian porous limestones is largely a function of acidizing the wells. Seminole, in the southern High Plains, discovered in 1927, has an estimated reserve of more than 102 million barrels. Wasson, discovered in 1937, covers an area of 48,000 acres, and has an estimated reserve of 399 million barrels, as of January 1, 1944, as given by *The Oil and Gas Journal.* Slaughter, discovered in 1927, covers an area of 72,000 acres (and which is not fully defined as yet), and its estimated reserves have been placed at 445 million barrels. Both Wasson and Slaughter produce from the San Andres formation which is a dolomite, at the top of the Leonard; the lower Leonard is regarded as the Clear Fork equivalent out in the Basin.

The general aspects of the Permian series have been summarized by the U. S. G. S. as follows: "The Permian . . . comprises a maximum of over 5,000 feet of limestones, dolomites, sandstones, and shales. The main area of outcrop of these beds is in north-central and northern Texas, but they also appear in western Texas and in scattered areas of small to medium size. In extensive areas in northwestern and western Texas they lie buried and concealed beneath younger formations, but are accessible to the drill. In central and northern Texas and in the eastern part of western Texas the Permian rocks have been divided into the Wichita group, Clear Fork formation, and the Double Mountain group, named in order of age, the oldest first. Each of these units has been subdivided into formations or members, and local names have been given to still smaller oil-bearing units."

Still lower, underneath the Permian, is the Ordovician—and if folding and structures should occur in the Ordovician in these northern fields of the Basin—but that is still another story.

In this connection, however, it may be noted that there is production from the Ellenburger as well as from the Simpson, both of Ordovician age, in North-central Texas. The Lower Ordovician is the source of prolific production in Kansas and Oklahoma.

The geology of the Permian Basin, not completely interpreted as yet, has nevertheless been sufficiently unraveled that the general conditions are fairly obvious. The following outline includes only the barest essentials of these conditions:

1. The Permian Basin is a vast geosyncline of Paleozoic formations. The Permian beds of the eastern limb of the basin dip westward from off the Pennsylvanian strata; those of the westward flank dip eastward from off the Cordilleran uplifts.

The Permian basin is divided into northern and southern sections by the buried Amarillo Mountains the axis of which parallels that of the Wichita Mountains of southwestern Oklahoma. Apparently the buried Amarillo range represents a prolongation of the Wichitas.

2. The Permian Basin of West Texas-Southeastern New Mexico here consists of two sections: the Delaware Basin and the Midland Basin, with a platform—the West Texas Platform, or the Central Basin Platform—rising between these basins. Permian deposition in this basin was complex, being complicated by strange admixtures of normal marine beds of sandstone sheets, thick limestone formations and dolomites, the peculiar so-called reef limestone and dolomite beds, and the various types of evaporite series, laid down in desiccating seas, and the entire area subsequently blanketed by vast deposits of Continental Red Beds. As summed up by the U. S. G. S.: "A major structural feature of the west Texas district is a buried uplifted platform of Paleozoic rocks, having a width of 30 miles or more and extending northwestward from Crockett County into New Mexico, a distance of more than 200 miles. This uplift is known as the 'Central Basin Platform.' West of this uplift is a structural basin 75 miles wide, the Delaware Basin, in which the rocks lie much lower than rocks of corresponding age in the Central Basin uplift; east of the uplift is another basin, the main Permian basin, 60 to 75 miles wide, in which the rocks lie some 2,000 feet lower than (the rocks of corresponding age) on the uplift. . . . The east and west flanks of the Central Basin Platform are steep. . . ."

3. Accumulations of oil and gas in the Permian limestone of these fields are controlled in part at least by so-called reef structures and are influenced to some extent by buried hills and folds in the formations below the Permian.

4. Beneath the Permian is an earlier Paleozoic section, dominantly Lower Paleozoic, and principally Lower Ordovician. The history of development of oil production from the Ordovician is worthy of considerable attention. Production has been attained in the Ellenburger and the Simpson of the Lower Ordovician, which lies unconformably beneath the later formation. Quoting from an article "Permian Basin Pays Are Many—and Deep" in *World Petroleum,* March, 1944: "Good Permian prospects were often somewhat dependent upon the location of and existence of buried reefs; not so with the pre-Permian, where oil is found in intensely folded and faulted and truncated beds, giving rise to a variety of reservoir traps."

For comparative purposes it is to be noted that the Arbuckle limestone, the time equivalent of the Ellenburger limestone, has produced large amounts of oil in the El Dorado, Kansas, field, on the Nemaha buried granite ridge, and in the Oklahoma City field; it is also the chief producing horizon in western Kansas. The increasing importance of the Ellenburger limestone in North and West Texas is of course attracting considerable attention. Sandstones of the Simpson group of Oklahoma and their equivalents in Texas, also in the Lower Ordovician, are important producers in Oklahoma, notably in the Oklahoma City field and in the Seminole district, where there is also some production in the Simpson dolomites. There is also production from the Simpson in the Red River district of Texas as well as in Pecos County in West Texas.

5. The distribution of the various groups of fields, both the older and newer ones of the Permian Basin, are closely associated with major structural alignments of the basin.

From the geologic studies that have been carried on in conjunction with exploration work and drilling campaigns it has come to be recognized that West Texas possesses one of the great blocks of oil reserves not only of Texas but of the nation as well; for the estimated reserves of West Texas are placed at 30 per cent of the Texas reserves and 17 per cent of the total reserves of the United States. Total production of West Texas at the end of 1943 amounted to 1 billion 378 million barrels and the estimated reserves, as of January 1, 1944, were put at 2 billion 807 million barrels. Total production of the Panhandle at the end of 1943 amounted to 469 million barrels, largely in Gray and Hutchinson counties, and the reserves were put at 600 million barrels.

Comparison may also be made with the older producing states of the Appalachian district.

| | Estimated Reserves (Barrels) | Total Production to End of 1943 (Barrels) |
|---|---|---|
| West Texas | 2,807,000,000 | 1,378,000,000 |
| Panhandle | 600,000,000 | 469,000,000 |
| Total | 3,407,000,000 | 1,847,000,000 |
| Combined total for West Virginia, Pennsylvania, New York and Ohio | 294,419,000 | 2,201,444,000 |

Production in the Appalachian district has been going on for more than 80 years; the total output to date of the states noted above amounts to a little less than 8 per cent of the national total. The reserves in these old oil producing states are low. By contrast, the large production in West Texas and the Panhandle has grown up rapidly and the reserves of this entire region as compared with those of the old oil producing states are distinctly large.

As to current production, West Texas and the Panhandle together in 1943 supplied nearly 9 (8.8) per cent of the nation's output of oil and more than 22 per cent of the Texas total.

## The East Texas Basin

### *Production from the Cretaceous*

In 1910 G. D. Harris defined the outstanding structural feature of northwest Louisiana and extreme northeast Texas which is known as the Sabine uplift. The Sabine uplift is a low dome, with complementary basins to the west—the East Texas Basin—and to the east. South of the Sabine uplift the beds dip gently Gulfward. These conclusions by Harris had been preceded, however, by geologic studies extending back into the 1890's. In fact, William Kennedy had indicated the existence of the Tyler trough on a map published in 1895. Production on the uplift had begun at Caddo, 1904–08.

Then came a period of several years of quietude for the region in general, but during which the fault-line fields at the western margin of the East Texas basin were being developed. In the late 1920's exploration in the region became active. The Van field, in the interior salt dome basin of the East Texas syncline, was discovered in 1929; and a little later a wildcat driller discovered the gigantic East Texas field. Production at Van is from the Woodbine sand; the structure is a faulted anticline. The cumulative production of Van to the end of 1943 was 139 million barrels and the estimated reserves, as of January 1, 1944, were placed at 301 million barrels. Van, therefore, is easily one of the big fields of the United States.

The East Texas field originally had, according to Deussen, some five billion barrels of oil. This field simply dwarfs all other fields in the country. Production in East Texas has been so large and its reserves in sight so enormous that this single field has since its discovery dominated to a considerable degree the entire oil industry of the United States. Production to date plus the estimated reserves of this one field alone are much greater than comparable figures for any state in the United States excepting only California, Oklahoma, and the rest of Texas. Total production of this field at the end of 1943, as given by *The Oil and Gas Journal*, amounted to 1 billion 980 million barrels, and the estimated reserves as of January 1, 1944, as given by the above source, amounted to 2 billion 620 million barrels. To date the East Texas field has produced half as much oil as all the states east of the Mississippi River; and the estimated reserves for the East Texas field are nearly three times those for all the states east of the Mississippi. The reservoir rock of the East Texas field is the Woodbine sand laid down as a near shore-line deposit on the west flank of the Sabine Uplift. The Woodbine is truncated on the margin of the Sabine uplift; here, during a time of emergence, it was subjected to erosion, which produced a wedging-out condition up the dip on the west flank of the uplift. The Woodbine is entirely absent on the summit of the uplift at the east and its truncated surface on the west flank was sealed off by overlying impervious beds of later deposition in the Upper Cretaceous. The accumulation of oil in the gigantic East Texas field is considered a splendid example of a stratigraphic trap.

Total output of the entire East Texas basin to the end of 1943, according to *The Oil and Gas Journal*, January 27, 1944, was 2 billion 274 million barrels and the total estimated reserves from the same source amounted to 3 billion 290 million barrels.

Including the Mexia zone, the Sabine uplift, and the Southern district, so listed by *The Oil and Gas Journal*, the cumulative production of the total East Texas region, to the end of 1943, was 2 billion 602 million barrels, and the estimated reserves, as of January 1, 1944, were placed at 3 billion 315 million barrels. The combined figure of production to date plus the estimated reserves for this entire area just about equals total production plus the total reserves of the second Big Three—Louisiana, Kansas, and Pennsylvania.

Production in this entire area in Texas is from the Cretaceous, the Woodbine sand of the Upper Cretaceous being the great reservoir for the fields of the East Texas basin.

As summarized by the U. S. G. S.:

"The Cretaceous rocks of Texas are separable into two great divisions—the Lower Cretaceous or Comanche series, and the Upper Cretaceous or Gulf series. Each division has a maximum thickness of over 4,000 feet. The rocks are of different kinds and are so distributed that one or another kind predominates throughout a considerable thickness, thus making it possible to subdivide the rocks into formational units. Although consolidated in various degrees the Cretaceous rocks are in general softer than the older pre-Cretaceous rocks of the State. Only those formations that are known to carry commercial quantities of oil will be especially described.

"The rocks of the Cretaceous system crop out across central Texas in an irregular northeast-southwest belt, the main part of which has a length of over 600 miles and a maximum width in western Texas of over 200 miles. The strata dip to the southeast and south, toward the Gulf of Mexico, at the rate which, though gentle, is greater than the inclination of the surface of the ground. The result is that the formations become buried to greater and greater depths toward the coast. Some of the more porous of these formations are important as sources of oil and gas in their buried coastward extensions. The rocks of the Cretaceous system and of the overlying Tertiary system together form a great monoclinal fold of gentle slope. The uniform dip of the Cretaceous strata is modified locally by structural breaks and deformations, some of which are important as determining the places at which oil and gas are concentrated.

### Lower Cretaceous Rocks

(Comanche Series)

"The rocks of the Lower Cretaceous or Comanche series consist mainly of hard limestones and interbedded soft chalky marls, but shales, sandstones, and sands also make up considerable parts of the series. The series is known to have a maximum thickness of over 4,000 feet, but except in the Rio Grande Basin, is generally less than 3,000 feet thick. The series is divided into numerous formations, but the Edwards limestone, which lies a little above the middle of the series, is the only one that is known to be an important oil bearer. North of the Colorado River the belt of outcrop coincides approximately with the Grand Prairie, and south and west of the Colorado it coincides with the Edwards Plateau.

"*Edwards limestone.*—In Bastrop, Caldwell, and Guadalupe counties, where the Edwards limestone is the source of oil in the Luling, Salt Flat, Darst Creek, and smaller fields, it is about 700 feet thick, and the oil is found within the upper 150 feet, mainly in faulted beds."

With reference to production from the Lower Cretaceous, it should be noted that members of the Glen Rose group particularly are important producers on the north and northwest flanks of the Sabine uplift, in the basin area lying between the Sabine uplift and the Ouachita Mountains.

### Upper Cretaceous Rocks

(Gulf Series)

"The Upper Cretaceous or Gulf series consists of 1,500 to 4,000 feet of clays, shales, marls, chalks, and sands, which are divisible into formational units. The belt of outcrop of these rocks form the inner or landward portion of the Gulf Coastal Plain.

"The Woodbine sand is the basal unit of the Gulf series and has a maximum thickness of 500 feet or more. It is made up mainly of sand and sandstone but includes also considerable bodies of clay. Although limited in its distribution to about 18,000 square miles in the northeastern Texas, the formation is by far the most important oil-bearing formation in the Upper Cretaceous series. It is the source of oil in the great East Texas field; in the Mexia-Powell district, in Navarro, Freestone, and Limestone counties; and in the Van pool in Van Zandt County.

"Other formations in the Gulf Series that have yielded oil are the Austin chalk, which lies rather low in the series; sand members in Taylor marl, which overlies the Austin chalk; the Nacatoch sand of the Navarro group in Navarro County (the Navarro group forms the upper part of the series); other sand members of the Navarro group; a sand member of the Escondido formation in Medina County; and bodies of igneous rock consisting of serpentine and water-laid igneous detritus, which are interbedded with the Upper Cretaceous rocks.

"In the Upper Cretaceous series the oil is found mainly in faulted beds (Mexia-Powell fields), and in monoclines (East Texas field); minor quantities are found in anticlines, terraces, and salt domes."

## The Gulf Coast

### *Production from the Tertiary*

After having glanced all too briefly at other sections of the State, it is appropriate to return to the scenes where the Texas oil industry got its first important impulses.

In the first place, too much emphasis can hardly be placed upon the fact that the entire Gulf Coast of Texas and Louisiana constitutes one of the great oil and natural gas reserves of the United States. Drilling depths have by no means reached their limits in this vast region, nor is it known what deeper drilling exploration will reveal.

Tests are proceeding in the Wilcox of the Tertiary. The Cretaceous in this region is untested, and, as yet, it has not been determined whether or not the Jurassic extends under the Gulf Coast country.

After the discovery of Spindletop, there had ensued a wave of exploration, the object of which was to find oil fields from such surface indications—mounds, hills, ridges, lakes—as did exist on the flattish, featureless plain.

Some thirty of such locations were found in a few years after Spindletop and a few good fields were brought in—Batson, Sour Lake, Saratoga, Barber's Hill, Humble, and others. These, like Spindletop, are salt dome fields of the piercement type.

But these types located by surface indications were soon discovered; the production was shallow, and after a period of flush production the inevitable decline set in. Gulf Coast production receded perceptibly before and during the period of World War I. By 1920 the Gulf Coast as a whole was not very active, so far as oil was concerned.

Then came two revolutionary developments in exploration technique which were particularly applicable to the Gulf Coast country. One of these is the miscoscopic examination of rock samples and the use of diagnostic foraminifera in correlation of strata which do not outcrop, such as certain ones, for example, of the Oligocene. Micropaleontology was introduced in the Gulf Coast about 1922.

The other remarkable development was the use of the refraction seismograph which was introduced in this region about 1923. The refraction seismograph initiated the second wave of exploration in the Gulf Coast, and by it exploration to medium depths, of 4,000 to 5,000 feet, was made possible.

As a consequence, some thirty new domes were discovered in this five-year period, 1923–28. Production in the region, however, was not greatly stepped up from the discovery of these domes—as there were few good producers at these depths in the crop of structures picked up in this wave of exploration.

In 1928, the reflection seismograph was introduced; this instrument was capable of picking up deeper-seated domes and gentler structures than was the case of the refraction seismograph. From the use of the reflection seismograph a new wave of exploration was initiated, and in consequence some of the largest and richest of the Gulf Coast fields were discovered. These were the non-piercement type domes, as exemplified by Conroe, Tom Ball, Hastings, Anahuac, and Dickinson.

The following is a summary of the Tertiary rocks, particularly of the Coastal Plain, from the U. S. G. S.:

"The rocks of the Tertiary system consist of clays, shales, sands, sandstones, and subordinate amounts of marl and limestone, of unknown maximum thickness but estimated at 12,000 feet or more. In general these materials are relatively softer than the Cretaceous and pre-Cretaceous rocks, but they are in fact consolidated in varying degrees, and some layers are fairly hard. The Tertiary rocks have been subdivided into series (Eocene, Oligocene, Miocene, and Pliocene) and each series into formations and members, but the materials composing them are as a whole of similar kinds, and separate descriptions of the subdivisions are not necessary in this summary.

"The main body of the Tertiary rocks underlies the part of the Gulf Coastal Plain between the southeastern edge of the belt of outcrop of the Cretaceous rocks and the coast of the Gulf of Mexico. This tract is nearly 600 miles long and is 270 miles wide at its widest part. Late Tertiary rocks, which cover a tract of wide extent on the high plains in the northern part of the State, are too thin to have an important bearing on the oil geology.

"The Tertiary rocks, like the Cretaceous, dip gently coastward at an inclination somewhat greater than that of the surface of the ground; as a result the older subdivisions of the system crop out farthest inland and the younger subdivisions crop out in belts successively nearer the coast. The buried sands and sandstones of the system are, under favorable structural conditions, the principal reservoirs for the accumulation of oil and gas in the Gulf Coast and southwestern Texas oil fields. The type of limestone generally known as cap rock, which occurs at the crests of salt domes, is also a source of oil.

"In the Gulf coast fields oil is chiefly found in structural features of two types—domes and salt domes. In the southwestern Texas fields the oil and gas are found in anticlines, monoclines, and terraces, some of which are slightly affected by faulting."

Tertiary production in Texas comes from two districts of the Gulf Coast country and from the Laredo district.

(a) The Upper Gulf Coast, or Houston district, characterized primarily by salt domes of the piercement type and by deeper structures which are thought to be deeply buried domes; also, as previously stated, the Wilcox is being tested. The Wilcox has given good production in two fields in Louisiana—at Eola, discovered in 1939, and at Ville Platte, discovered in 1940. The so-called Wilcox trend is known to extend from the lower part of the Mississippi River to La Salle County, Texas, and it has now been established that productive members may occur throughout the entire section of the Wilcox sands. Salt domes of the piercement type, it may be noted, give fields of rather small producing areas, territorially considered.

(b) The Lower Gulf Coast, sometimes designated as the Corpus Christi district, in which fields of the structural type together with stratigraphic trap accumulations occur. This district is *not* characterized by piercement-type salt domes. Oil in these districts is produced from the Eocene to the Pliocene.

(c) The Laredo or South Texas district, hitherto characterized by somewhat scattered, shallow production from lensing sands in the Oligocene and Eocene.

Truly large fields in the Upper Gulf Coast district are not numerous. Production in only 4 fields has risen to the 100 million barrel mark: Spindletop, 129 million; Humble, 126 million; Hull, 98 million, with estimated reserves of 17 million barrels; and Conroe, 162 million. Of these fields, the only one with a sizable reserve left is Conroe, the estimated reserves for which are set at 538 million barrels. Six other fields in this district will rise to the 100 million barrel ranking, if their estimated reserves are realized. These are Anahuac, the estimated reserves of which are placed at 257 million barrels; Webster, 326 million barrels; Thompson, 176 million barrels; Hastings, 306 million barrels; West Ranch in Jackson County, 220 million barrels; and West Columbia, 19 million barrels. Total production of West Columbia amounts to 92 million barrels.

Later developments in the Gulf Coast include exploration of the so-called trends, such as the Conroe or Cockfield trend, the Wilcox trend, and so on; these trends have been carried across the Texas Gulf Coast into Louisiana.

Space does not permit more than brief mention of developments in the Lower Gulf Coast or of the Laredo district, in neither of which, as previously noted, is production of the salt-dome type. Production in the Laredo district is from the Eocene and Oligocene from a variety of types of structures. Production in the Lower Gulf Coast is from the Eocene, Oligocene, and Miocene.

During the early days of exploration this entire territory of the Laredo and Corpus Christi districts was considered a prolongation geologically of the Upper Gulf Coast country and consequently a search was made for possible salt dome production. Two such domes were found, Palangana and Piedras Pintas, in Duval County; the combined production of these two domes has been small.

With the discovery of production at Refugio, which lies just north of this territory and of production from a number of shallow sands in the Miranda area, the search for oil changed to the following of trends and exploration for structural features with which wedging sands are associated.

The shallow Mirando sand trend produces mainly from the Jackson group, but along this trend there is also somewhat deeper production, as much as 2,000 feet, from the Frio, Catahoula and Yegua, all of which are in the Eocene. Deeper drilling has resulted in finding some oil in the Cook Mountain group.

Exploration has subsequently proceeded coastward in the search for trends. The geologic problems, however, are complicated, involving a multitude of complex factors, including lateral gradation of beds from continental to marine, the gradation of sandy members into shales, together with the entering of numerous sand wedges into the geologic column.

A succession of trends has since been developed between the Mirando sand trend and the Gulf coast. The Benavides-Pettus trend produces from the same general sand series as the Mirando trend—the Jackson and Cockfield groups—but farther down dip, and therefore deeper, where wedge edges have been formed. Production is from depths ranging from 4,000 to 5,000 feet.

The Vicksburg trend produces from a wedging formation occurring between the Jackson and the overlying Frio. Fields on this trend include Alice, East Premont, Ben Bolt, and the Wade City-Orange Grove group. It is believed that the Vicksburg will be found at depths of around 11,000 feet along the coast. The Vicksburg is the source of deep production at Pierce Junction and at Thompson, but is not important elsewhere in the Upper Gulf Coast.

Next is the trend in the Frio sands which are considered as the down-dip phase of the outcropping Catahoula. Down the dip the Frio thickens considerably. The Frio and Vicksburg are considered as lower Oligocene. Although Refugio, brought in in 1922, produces from Frio sands, the importance of the Frio did not become appreciated until Saxet and other fields in Nueces County were discovered. Tom O'Connor field also produces from the Frio. The Frio provides prolific production.

The Marginulina, of the upper Oligocene, is the easternmost of the producing trends, producing along the coast in Flour Bluff, McCampbell and other coastal fields. It is considered that some of these fields may be producing from the underlying Frio formation.

For the sake of a wider perspective of the whole Coastal Plain, it should be mentioned that the Lower Cretaceous (Glen Rose, etc.) produces in the Tri-State, or the Arkansas-Louisiana-Texas district of northeast Texas, southwest Arkansas and northwest Louisiana—this being an expansion of the old Shreveport district. Also, among the geologic surprises of recent developments in this district has been the determination of buried Jurassic formations, such as Cotton Valley and the Smackover lime, as a source of deep production in southwest Arkansas and northeast Louisiana. Whether or not the Jurassic continues under the Gulf Coast country of Texas is another geologic problem that may in time be cleared up by deep drilling.

Another question of momentous importance pertains to the state of hydrocarbons at great depths under the Gulf Coast, that is, if hydrocarbons exist at such depths. There is apparently little question but that increased exploration will greatly augment the already proven large gas reserves of this region. However that may be, the Texas Tertiary districts of the Gulf Coast, including the Laredo district, have an estimated total of four billion barrels, which is more than a third (34.6 per cent) of the total estimated reserves of Texas, and nearly twenty (19.6) per cent of the nation's reserves.

In brief, it may be concluded that when engineering equipment is adequate to go to much greater depths satisfactorily, another wave of exploration will take place in this region—in what is now recognized as one of the two or three great oil reserve provinces of the United States.

The scope of the oil industry of Texas, owing to the inherent nature of the numerous complex conditions involved, cannot be properly appreciated without a comparative view of the oil industry of the country at large. A comparative study has been prepared for a future issue of the TEXAS BUSINESS REVIEW.

In addition, it should be noted that the scope of the Texas oil industry cannot be presented without also tying in rather precisely the factors and characteristics of production, as well as conditions of accumulation and reserves, with the geologic conditions concerned—a problem obviously too complex for a short article. A brief outline of some of the main geologic aspects of the three major oil producing states will be presented in a future article.

### SUMMING UP OF TEXAS GEOLOGIC CONDITIONS AT LARGE AS RELATING TO OIL PRODUCTION

1. By far the greater proportion of Texas is underlain by sedimentary strata which as a rule are but gently inclined, or at most, with certain exceptions, are only gently inclined or moderately folded.

Oil and gas accumulations in the State are associated with a variety of structures, some of which, such as the gigantic East Texas field, are of a rather simple nature.

2. The distribution of oil and gas accumulations in Texas is closely associated with the general geology and the stratigraphy of the various major regions of the State.

3. Within these regions the strata are affected by local exceptional conditions of a structural or stratigraphic nature, or both, which have proven to be of determining importance in the localization of oil and gas accumulations. These local conditions include the following:

(a) Areas in which sharper folding of the strata prevail.

(b) Zones of faulting, in which the strata have suffered displacement.

(c) The occurrence of salt domes of the piercement type, consisting of salt plugs upthrust through the various beds underlying portions of the Coastal Plain.

(d) Conditions associated with unconformities in which underlying beds have been planed off by erosion during emergent periods and which were subsequently covered over and thereby sealed off by the later deposition of impervious beds.

### A SUMMARY OF ECONOMIC ASPECTS OF THE OIL INDUSTRY OF TEXAS

1. Nowhere has the influence of large oil fields on oil production been more important than in Texas. Because of the many regions concerned in this development, however, the influence of big fields at first glance is less apparent than it may be, for instance in California or Louisiana. Throughout the history of the oil industry in Texas, the State's production of oil has been characterized by the opening up of one large field after another. That is, Texas oil history has been a function of the prolific flush production of big fields as they have been progressively opened up in the several oil regions of the State.

2. Oil and gas have been and are being produced in Texas at prodigious rates. Both oil and gas are wasting assets; they are irreplaceable resources. Moreover, the oil and gas reserves of Texas are basic resources absolutely fundamental to the future expansion of the State's industrial economy. Because of these inescapable facts, the problems of oil and gas conservation and of the highest possible type of utilization of these vital resources loom as fundamental issues of the State's economy in the post-war years.

3. The rate of growth of Texas oil production has in general paralleled the growth of the automobile in the United States. Particularly striking is the fact that the rapid expansion of the Texas oil industry since World War I has paralleled the almost spectacular rise of the automobile industry in the nation at large.

Along with the rate of growth in demand for derivatives from oil, there have been the revolutionary developments in oil refining technology which have resulted in increased yields of desirable products from a barrel of crude oil and at the same time greatly improved the quality of these derivatives.

4. Important to the growth of oil production in Texas, and of the oil refining industry in the State as well, have been the advantages of deep-water transportation to the large markets, particularly those of the upper Atlantic Coast.

Paralleling the revolutionary technologic advances made in oil refining are the just as revolutionary advances made in the chemical utilization of oil and gas hydrocarbons. Upon the further utilization of these advances can be built a vast chemical industry, the proportions of which from a national or even from a world standpoint virtually stagger the imagination.

ELMER H. JOHNSON.

# Postwar World Demand for Cotton

Any worth-while planning for cotton in the postwar period must take into account certain basic facts and developments which have occurred during the period of the war.

Immediately following the war the bottleneck of the cotton industry will be capacity to manufacture cotton. The world is bare of cotton goods and the pent up buying power coupled with rehabilitation programs assures the demand for the goods and raw cotton. The problem is how much can be manufactured and where.

### Conditions of World Cotton Manufacturing Equipment

In 1939, the latest year for which complete statistics are available, there were 145 million cotton spinning spindles in the world, and of these only about 45 million are in countries exempt from war damage. The other 100 million are in countries where they are subjected to destruction by the war and some have already been destroyed and more may be destroyed before the war closes.

The 45 million spindles outside the theater of war are now consuming cotton at the rate of about 17.5 million bales per year. This high rate will not be maintained after the war especially in the United States.

Data available now indicate the British industry with about 36 million spindles has suffered or will suffer very little damage and will be able to manufacture as much cotton as prior to the war, or 2.5 to 3.0 million bales.

Continental Europe in the war zone not including Russia has about 35 million spindles. Some of these have doubtless been destroyed and some more will be, depending on where major campaigns are waged. In the main, the textile industries of those countries are not in the cities so far destroyed nor are they closely associated with industrial centers basic in producing war supplies. It would be a high estimate to say that 10 million of these spindles have or will be destroyed. The area under consideration normally manufactured about 5,500,000 bales a year. It is probable they could manufacture 4 million bales after the war with some repairs.

Russia had 10,350,000 spindles in 1939 engaged almost entirely in production for home consumption out of Russian grown cotton, or about 3.5 million bales a year.

Japan had 11,500,000 cotton spinning spindles in 1939. These are all in place now though in the absence of sufficient raw cotton many of these are operating on rayon or not at all. The industry may be largely destroyed if Japan has to be bombed out of the war. Japan's normal consumption was about 3.5 million bales per year.

China had built its cotton manufacturing capacity up to about 4 million spindles by 1939. It is known that some of these have been destroyed and more may be as Japan is forced to withdraw. China's consumption at its best was 2.5 million bales.

### Postwar Cotton Manufacturing Capacity

It seems fairly certain the world will have at least 125 million cotton spinning spindles ready for operation, or which can be made ready rather quickly. How much cotton can they be expected to use?

The capacity of the cotton manufacturing industry to consume raw cotton is quite flexible as indicated by the experience of the United States in expanding consumption from a normal of about 6.5 million bales prewar to a maximum of 11,170,000 in 1942–43 with some decrease in numbers of spindles. This was achieved primarily by increasing hours per day of operation and by spinning lower count yarns for coarser goods.

In most European countries it was customary prior to the war to operate the cotton mills on one shift of eight hours per day. A change from one to two shifts would almost double consumption capacity especially if at this same time mills went to coarser goods to make them cheaper.

Few lines of activity are more fruitful in putting people to work than cotton manufacturing. The great deficit of all kinds of cotton goods will stimulate great activity in cotton manufacturing provided supplies of raw cotton can be had. Some of the European countries have large dollar reserves in the United States and will be able to finance a substantial part of their imports from the beginning. They are also in position to buy freely from other exporting countries.

The United Nations Relief and Rehabilitation Administration (UNRRA) will have about 2,500 million dollars in cash to facilitate recovery of the people in the devastated countries. It is contemplated that much raw cotton will be furnished for manufacture as one of the most effective means of getting workers into civilian employment.

The Export-Import Bank will be in position to aid substantially in financing the export of raw cotton to European, Asiatic and other countries in need of raw cotton.

### Shift of Cotton Manufacturing

A fact of substantial importance in the situation is the increase of the number of cotton spinning spindles in cotton growing countries during the war, especially in South America, Africa, and India. This will probably mean less raw cotton for export to world markets and a growing demand for cotton.

### Cotton Required for Restocking

European countries are practically bare of raw cotton. The normal working stocks of cotton in a mill are from 6 weeks to 2 months supply. This means that at least 2 million bales will be absorbed in this, an additional amount will be absorbed in what is known as in transit to mills, probably 1 million bales, and finally a substantial amount of cotton goods will be required to restock the shelves of converters, wholesalers and retailers.

The data presented indicate that under favorable conditions the world's capacity to manufacture cotton will probably be in excess of 26 million bales and that the cotton required for restorcking and in transit will raise the demand substantially above that.

A. B. Cox.

## COTTON BALANCE SHEET FOR THE U.S. AS OF JUNE 1, 1944

(In Thousands of Running Bales Except as Noted)

| Year | Carryover August 1 | Imports to June 1* | Final Ginnings | Total | Cons. to June 1 | Exports to June 1 | Total | Balance June 1 |
|---|---|---|---|---|---|---|---|---|
| 1933–1934 | 8,176 | 127 | 12,664 | 20,967 | 4,977 | 6,769 | 11,746 | 9,221 |
| 1934–1935 | 7,746 | 94 | 9,472 | 17,312 | 4,586 | 4,174 | 8,760 | 8,552 |
| 1935–1936 | 7,138 | 122 | 10,417 | 17,677 | 5,189 | 5,519 | 10,708 | 6,969 |
| 1936–1937 | 5,397 | 198 | 12,130 | 17,725 | 6,680 | 5,086 | 11,766 | 5,959 |
| 1937–1938 | 4,498 | 119 | 18,242 | 22,859 | 4,856 | 5,227 | 10,083 | 12,776 |
| 1938–1939 | 11,533 | 122 | 11,621 | 23,276 | 5,758 | 3,107 | 8,866 | 14,410 |
| 1939–1940 | 13,033 | 137 | 11,477 | 24,647 | 6,591 | 5,931 | 12,522 | 12,125 |
| 1940–1941 | 10,596 | 150 | 12,287 | 23,033 | 7,619 | 976 | 8,595 | 14,438 |
| 1941–1942 | 12,367 | † | 10,489 | 22,856 | 9,218 | † | 9,208 | 13,648 |
| 1942–1943 | 10,590 | † | 12,437 | 23,027 | 9,342 | † | 9,342 | 13,685 |
| 1943–1944 | 10,687 | 80‡ | 11,121 | 21,888 | 8,412 | 975‡ | 9,387 | 12,501 |

The Cotton year begins August 1.
*Figures are in 500-pound bales.
†Not available.
‡Figures are up to May 1, 1944.

## BUILDING PERMITS

| | May, 1944 | May, 1943 | April, 1944 | First Quarter Year, 1943† | First Quarter Year, 1944† |
|---|---|---|---|---|---|
| Abilene | $ 13,460 | $ 57,131 | $ 12,380 | $ 2,592 | $ 149,095 |
| Amarillo | 124,035 | 155,958 | 94,505 | 155,289 | 269,410 |
| Austin | 45,448 | 27,474 | 43,309 | 79,372 | 106,930 |
| Beaumont | 41,450 | 101,592 | 102,873 | 1,684,093 | 234,799 |
| Big Spring | 28,025 | 22,035 | 18,525 | * | * |
| Brownsville | 33,117 | 4,690 | 6,138 | 13,810 | 14,395 |
| Brownwood | 3,093 | 401 | 5,425 | 4,550 | 118,225 |
| Coleman | 0 | 0 | 5,050 | 0 | 300 |
| Corpus Christi | 115,553 | 148,780 | 139,880 | 510,286 | 344,862 |
| Corsicana | 1,000 | 1,450 | 1,008 | 4,785 | 2,589 |
| Dallas | 1,490,192 | 216,349 | 708,293 | 445,891 | 2,113,898 |
| Denton | 1,050 | 750 | 975 | 3,605 | 14,507 |
| Edinburg | 625 | 0 | 650 | 10,864 | 6,890 |
| El Paso | 226.599 | 47.374 | 194.301 | 134,459 | 104,761 |
| Fort Worth | 402,929 | 1,383.516 | 455,880 | 630,777 | 830,633 |
| Galveston | 128.019 | 21,335 | 15,063 | 254,059 | 264,912 |
| Gladewater | 1,050 | 0 | 1,050 | 9,235 | 2,805 |
| Harlingen | 12.650 | 1.250 | 3,350 | 2,615 | 23,600 |
| Houston | 804.107 | 535.615 | 495,064 | 3,617,980 | 1,482,636 |
| Jacksonville | 800 | 3.900 | 5,650 | 2,300 | 18,750 |
| Kenedy | 550 | 750 | 1,000 | 0 | 3,800 |
| Kerrville | 1,075 | 0 | 925 | 1,498 | 2,700 |
| Longview | 3,075 | 2,150 | 11,505 | 0 | 0 |
| Lubbock | 81,648 | 14,289 | 64,937 | 44,217 | 89,939 |
| McAllen | 10.275 | 3.295 | 11,095 | 16,418 | 22,875 |
| Marshall | 12,076 | 6,215 | 42.617 | 282.904 | 19,736 |
| Midland | 21.050 | 3,002 | 3.701 | 5,385 | 116,550 |
| New Braunfels | 9.085 | 460 | 7,755 | 3,879 | 6,981 |
| Pampa | 1.765 | 6,325 | 4.150 | 160,300 | 10,540 |
| Paris | 10,260 | 5,950 | 9.745 | 70,960 | 100,295 |
| Plainview | 5.200 | 300 | 1.500 | 9.230 | 2.500 |
| Port Arthur | 25.433 | 10.912 | 37.646 | 27,405 | 78,986 |
| San Antonio | 312.099 | 190.865 | 385.089 | 436.666 | 1,032,280 |
| Sherman | 14,891 | 1,689 | 16,703 | 35.887 | 29,987 |
| Snyder | 0 | 0 | 0 | 650 | 0 |
| Sweetwater | 71.135 | 1.465 | 3,890 | 8,755 | * |
| Texarkana | 11,181 | 18.700 | 3.900 | 159.446 | 15,100 |
| Tyler | 18.010 | 3.407 | 42.968 | 8.759 | 26,630 |
| Waco | 258,972 | 79.871 | 239,920 | 121.374 | 279,867 |
| Wichita Falls | 9,590 | 13,640 | 22,658 | 21,556 | 69,987 |
| TOTAL | $ 4,350,572 | $ 3,092,885 | $ 6,313,958 | $ 8,981,851 | $ 8,012,750 |

*Not available.
†Revision of Quarterly figures in April issue.
NOTE: Compiled from reports from Texas chambers of commerce to the Bureau of Business Research.

## EMPLOYMENT AND PAY ROLLS IN TEXAS

### May, 1944

| | Estimated Number of Workers Employed* Apr., 1944[1] | May, 1944[2] | Percentage Change from April 1944 | Percentage Change from April 1943 | Estimated Amount of Weekly Pay Roll April, 1944[1] | May, 1944[2] | Percentage Change from April, 1944 | Percentage Change from May, 1943 |
|---|---|---|---|---|---|---|---|---|
| **MANUFACTURING** | | | | | | | | |
| **All Manufacturing Industries** | 165,673 | 160,061 | − 3.4 | − 2.0 | 5,603,343 | 5,524,388 | − 1.4 | + 9.8 |
| *Food Products* | | | | | | | | |
| Baking | 9,452 | 10,115 | + 7.0 | + 25.7 | 325,582 | 365,603 | + 12.3 | + 56.1 |
| Carbonated Beverages | 3,431 | 3,562 | + 3.8 | − 1.1 | 100,897 | 104,940 | + 4.0 | + 4.6 |
| Confectionery | 1,502 | 1,426 | − 5.1 | + 29.6 | 20,733 | 19,773 | − 4.6 | + 57.5 |
| Flour Milling | 2,274 | 2,233 | − 1.8 | + 5.6 | 68,546 | 70,334 | + 2.6 | + 19.8 |
| Ice Cream | 1,461 | 1,538 | + 5.2 | + 11.8 | 38,724 | 38,724 | + (5) | + 15.6 |
| Meat Packing | 6,056 | 6,345 | + 4.8 | + 18.5 | 182,034 | 202,454 | + 11.2 | + 15.1 |
| *Textiles* | | | | | | | | |
| Cotton Textile Mills | 5,272 | 5,109 | − 3.1 | − 23.5 | 118,423 | 117,600 | − 0.7 | − 15.4 |
| Men's Work Clothing | 4,332 | 4,251 | − 1.9 | − 9.6 | 74,767 | 75,075 | + 0.4 | − 6.0 |
| *Forest Products* | | | | | | | | |
| Furniture | 1,155 | 1,119 | − 3.1 | − 32.3 | 30,454 | 30,628 | + 0.6 | − 9.6 |
| Planing Mills | 1,803 | 1,810 | + 0.3 | − 10.7 | 51,704 | 52,184 | + 0.9 | + 2.5 |
| Saw Mills | 14,453 | 13,847 | − 4.2 | − 11.5 | 276,965 | 240,572 | − 13.1 | − 8.1 |
| Paper Boxes | 768 | 772 | + 0.5 | − 10.2 | 17,667 | 18,833 | + 6.6 | − 2.5 |
| *Printing and Publishing* | | | | | | | | |
| Commercial Printing | 2,465 | 2,494 | + 1.2 | + 1.8 | 85,326 | 86,527 | + 1.4 | + 4.5 |
| Newspaper Publishing | 3,966 | 3,854 | − 2.8 | − 8.7 | 111,885 | 112,274 | + 0.4 | − 3.1 |
| *Chemical Products* | | | | | | | | |
| Cotton Oil Mills | 2,930 | 2,383 | − 18.7 | − 0.4 | 47,646 | 39,360 | − 17.4 | + 12.4 |
| Petroleum Refining | 24,409 | 24,662 | + 1.0 | + 10.1 | 1,406,303 | 1,406,303 | − (5) | + 17.2 |
| *Stone and Clay Products* | | | | | | | | |
| Brick and Tile | 1,701 | 1,528 | − 10.2 | − 5.4 | 29,133 | 26,384 | − 9.4 | + 3.8 |
| Cement | 889 | 877 | − 1.4 | − 23.8 | 34,413 | 32,755 | − 4.8 | − 26.3 |
| *Iron and Steel Products* | | | | | | | | |
| Structural and Ornamental Iron | 2,427 | 2,456 | + 1.2 | − 14.0 | 81,374 | 82,510 | − 1.4 | − 1.1 |
| **NONMANUFACTURING** | | | | | | | | |
| **Crude Petroleum Production** | 26,944 | 27,002 | + 0.2 | + 7.0 | 1,457,108 | 1,446,660 | − 0.7 | + 22.0 |
| **Quarrying** | (3) | (3) | − 1.8 | − 14.4 | (3) | (3) | − 2.8 | − 1.6 |
| **Public Utilities** | (3) | (3) | + 0.6 | + 5.7 | (3) | (3) | + 0.4 | + 13.1 |
| **Retail Trade** | 209,731 | 206,225 | − 1.7 | − 5.7 | 4,811,161 | 4,791,653 | − 0.4 | + 5.5 |
| **Wholesale Trade** | 61,934 | 61,582 | − 0.6 | + 2.3 | 2,373,608 | 2,399,470 | + 1.1 | + 13.5 |
| **Dyeing and Cleaning** | 2,885 | 2,981 | + 3.3 | − 1.2 | 66,063 | 70,966 | + 7.4 | + 15.4 |
| **Hotels** | 19,424 | 19,751 | + 1.7 | + 10.1 | 337,207 | 339,517 | + 0.7 | + 27.9 |
| **Power Laundries** | 14,192 | 14,507 | + 2.2 | − 3.2 | 239,501 | 244,045 | + 1.9 | + 3.6 |

## CHANGES IN EMPLOYMENT AND PAY ROLLS IN SELECTED CITIES[4]

| | Employment Percentage Change Apr., 1944 to May, 1944 | Employment Percentage Change May, 1943 to May, 1944 | Pay Rolls Percentage Change Apr., 1944 to May, 1944 | Pay Rolls Percentage Change May, 1943 to May, 1944 |
|---|---|---|---|---|
| Abilene | − 2.2 | − 1.6 | + 3.9 | + 18.0 |
| Amarillo | − 1.8 | − 5.0 | + 6.4 | + 1.5 |
| Austin | − 10.0 | − 2.7 | − 3.9 | + 0.6 |
| Beaumont | + 5.6 | − 2.9 | + 5.6 | + (5) |
| Dallas | + 0.5 | + 47.2 | + 1.4 | + 96.8 |
| El Paso | + 2.9 | − 2.6 | + 0.9 | + 15.1 |
| Fort Worth | − 0.6 | − 5.8 | + 5.6 | + 8.8 |
| Galveston | + 1.1 | + 14.3 | + 3.0 | + 71.2 |
| Houston | + 1.1 | − 2.5 | + 6.5 | + 18.2 |
| Port Arthur | + 2.1 | + 5.3 | − 0.7 | + 8.3 |
| San Antonio | − 0.1 | + 2.4 | + 0.8 | + 5.7 |
| Sherman | − 0.2 | + 3.7 | + 0.8 | + 24.1 |
| Waco | − 2.0 | − 1.2 | − 3.1 | + 5.8 |
| Wichita Falls | − 1.7 | − 6.8 | + 3.2 | + 6.6 |
| STATE | + 0.8 | + 6.5 | + 3.5 | + 23.6 |

## ESTIMATED NUMBER OF EMPLOYEES IN NONAGRICULTURAL BUSINESS AND GOVERNMENT ESTABLISHMENTS[6]

| | 1942[1] | 1943[1] | 1944 |
|---|---|---|---|
| January | 1,170,000 | 1,385,000 | 1,429,000[2] |
| February | 1,199,000 | 1,397,000 | 1,433,000[2] |
| March | 1,226,000 | 1,415,000 | 1,433,000[2] |
| April | 1,222,000 | 1,433,000 | |
| May | 1,251,000 | 1,458,000 | |
| June | 1,291,000 | 1,478,000 | |
| July | 1,317,000 | 1,450,000[1] | |
| August | 1,352,000 | 1,441,000[2] | |
| September | 1,373,000 | 1,448,000[2] | |
| October | 1,384,000 | 1,455,000[2] | |
| November | 1,389,000 | 1,461,000[2] | |
| December | 1,413,700 | 1,470,000[2] | |

*Does not include proprietors, firm members, officers of corporations, or other principal executives. Factory employment excludes also office, sales, technical and professional personnel.

[1]Revised.

[2]Subject to revision.

[3]Not available.

[4]Based on unweighted figures.

[5]Less than 1/10 of one per cent.

[6]Not including self-employed persons, casual workers, or domestic servants, and exclusive of military and maritime personnel. These figures are furnished by the Bureau of Labor Statistics, U.S. Department of Labor.

Prepared from reports from representative Texas establishments to the Bureau of Business Research coöperating with the Bureau of Labor Statistics. Due to the national emergency, publication of data for certain industries is being withheld until further notice.

## MAY CREDIT RATIOS IN TEXAS DEPARTMENT AND APPAREL STORES

(Expressed in Per Cent)

| | Number of Stores Reporting | Ratio of Credit Sales to Net Sales 1944 | 1943 | Ratio of Collections to Outstandings 1944 | 1943 | Ratio of Credit Salaries to Credit Sales 1944 | 1943 |
|---|---|---|---|---|---|---|---|
| All Stores | 60 | 43.7 | 46.7 | 65.9 | 63.5 | 1.0 | 1.1 |
| Stores Grouped by Cities: | | | | | | | |
| Austin | 3 | 34.6 | 37.6 | 87.0 | 77.7 | 0.9 | 1.0 |
| Bryan | 6 | 38.5 | 40.0 | 76.1 | 73.9 | 1.2 | 1.4 |
| Corpus Christi | 3 | 41.7 | 37.5 | 56.3 | 63.0 | 1.0 | 1.1 |
| Dallas | 10 | 50.9 | 56.7 | 63.6 | 62.5 | 0.8 | 0.9 |
| El Paso | 3 | 39.4 | 41.0 | 65.8 | 68.2 | 1.3 | 1.3 |
| Fort Worth | 4 | 37.9 | 42.7 | 67.8 | 62.4 | 1.1 | 1.3 |
| Houston | 6 | 42.2 | 46.3 | 66.2 | 56.6 | 1.4 | 1.4 |
| San Antonio | 5 | 38.3 | 36.8 | 65.2 | 66.3 | 1.2 | 1.4 |
| Waco | 5 | 43.5 | 42.9 | 67.9 | 60.1 | 1.2 | 1.3 |
| All Others | 15 | 41.1 | 43.0 | 71.3 | 72.8 | 1.0 | 1.0 |
| Stores Grouped According to Type of Store: | | | | | | | |
| Department Stores (Annual Volume Over $500,000) | 20 | 42.9 | 46.3 | 68.9 | 64.6 | 1.1 | 1.2 |
| Department Stores (Annual Volume under $500,000) | 9 | 40.1 | 39.4 | 63.8 | 65.6 | 1.4 | 1.5 |
| Dry-Goods-Apparel Stores | 3 | 36.8 | 41.7 | 70.8 | 69.4 | 1.8 | 1.8 |
| Women's Specialty Shops | 16 | 47.7 | 50.1 | 59.2 | 59.9 | 0.7 | 0.8 |
| Men's Clothing Stores | 12 | 42.1 | 45.3 | 66.5 | 63.8 | 1.2 | 1.2 |
| Stores Grouped According to Volume of Net Sales During 1943: | | | | | | | |
| Over $2,500,000 | 20 | 40.8 | 49.8 | 71.7 | 68.2 | 1.2 | 1.3 |
| $2,500,000 down to $1,000,000 | 9 | 41.6 | 36.3 | 69.2 | 67.1 | 1.0 | 1.6 |
| $1,000,000 down to $500,000 | 13 | 37.3 | 40.7 | 69.7 | 69.7 | 1.3 | 1.5 |
| Less than $500,000 | 18 | 38.0 | 30.0 | 72.4 | 71.4 | 2.3 | 2.1 |

NOTE: The ratios shown for each year, in the order in which they appear from left to right are obtained by the following computations: (1) Credit Sales divided by Net Sales. (2) Collections during the month divided by the total accounts unpaid on the first of the month. (3) Salaries of the credit department divided by credit sales. The data are reported to the Bureau of Business Research by Texas retail stores.

## MAY RETAIL SALES OF INDEPENDENT STORES IN TEXAS

| | Number of Establishments Reporting | Percentage Changes in Dollar Sales: May, 1944 from May, 1943 | May, 1944 from April, 1944 | Year, 1944 from Year, 1943 |
|---|---|---|---|---|
| TOTAL TEXAS | 988 | +18.4 | + 7.9 | +11.4 |
| STORES GROUPED BY LINE OF GOODS CARRIED: | | | | |
| APPAREL | 107 | +22.5 | + 8.1 | +12.3 |
| Family Clothing Stores | 23 | +11.3 | + 3.8 | + 7.4 |
| Men's and Boys' Clothing Stores | 33 | +11.5 | + 7.3 | + 3.8 |
| Shoe Stores | 16 | +13.1 | −11.6 | + 3.1 |
| Women's Specialty Shops | 35 | +30.8 | +11.5 | +18.9 |
| AUTOMOTIVE* | 82 | + 7.2 | + 9.3 | + 5.4 |
| Motor Vehicle Dealers | 74 | + 9.0 | + 8.8 | + 6.2 |
| COUNTRY GENERAL | 6 | + 4.9 | −20.6 | + 5.4 |
| DEPARTMENT STORES | 61 | +23.9 | + 7.8 | +14.7 |
| DRUG STORES | 111 | +11.0 | + 9.9 | +13.3 |
| DRY GOODS AND GENERAL MERCHANDISE | 26 | +12.5 | + 7.1 | + 9.1 |
| FLORISTS | 20 | +27.1 | − 4.2 | +30.9 |
| FOOD* | 141 | +18.4 | +10.3 | +11.4 |
| Grocery Stores | 36 | + 7.5 | + 2.4 | + 7.3 |
| Grocery and Meat Stores | 97 | +21.1 | +11.5 | +12.8 |
| FURNITURE AND HOUSEHOLD* | 79 | − 0.5 | + 9.9 | − 5.0 |
| Furniture Stores | 71 | − 0.4 | + 8.9 | − 3.7 |
| JEWELRY | 24 | − 4.6 | +34.8 | + 6.8 |
| LUMBER, BUILDING, AND HARDWARE* | 79 | − 0.5 | + 9.9 | − 5.0 |
| Farm Implement Dealers | 16 | +50.5 | +13.7 | +32.0 |
| Hardware Stores | 51 | +31.2 | + 6.2 | +25.1 |
| Lumber and Building Material Dealers | 99 | + 9.4 | + 3.5 | − 2.1 |
| RESTAURANTS | 25 | + 5.1 | + 0.1 | +16.6 |
| ALL OTHER STORES | 11 | + 6.5 | − 2.1 | + 5.9 |
| TEXAS STORES GROUPED ACCORDING TO POPULATION OF CITY: | | | | |
| All Stores in Cities of— | | | | |
| Over 100,000 Population | 151 | +23.2 | + 9.7 | +14.1 |
| 50,000–100,000 Population | 131 | +13.4 | + 6.1 | + 8.1 |
| 2,500–50,000 Population | 472 | +14.7 | + 6.6 | + 8.4 |
| Less than 2,500 Population | 234 | +13.4 | + 4.6 | +14.2 |

*Group total includes kinds of business other than the classification listed.
Prepared from reports of independent retail stores to the Bureau of BusinessResearch, coöperating with the U.S. Bureau of the Census.

## MAY, 1944, CARLOAD MOVEMENTS OF POULTRY AND EGGS

### Shipments from Texas Stations

| *Destination | Cars of Poultry: Chickens 1944 | Chickens 1943 | Turkeys 1944 | Turkeys 1943 | Cars of Eggs: Shell 1944 | Shell 1943 | Frozen 1944 | Frozen 1943 | Dried 1944 | Dried 1943 | Shell Equivalent† 1944 | Shell Equivalent† 1943 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL | 39 | 6 | 17 | 1 | 182 | 9 | 122 | 94 | 106 | 126 | 1,274 | 1,205 |
| Intrastate | 12 | 0 | 8 | 0 | 82 | 9 | 71 | 65 | 25 | 27 | 384 | 355 |
| Interstate | 27 | 6 | 9 | 1 | 100 | 0 | 51 | 29 | 81 | 99 | 870 | 850 |
| **Receipts at Texas Stations** | | | | | | | | | | | | |
| TOTAL | 8 | 0 | 6 | 0 | 52 | 16 | 54 | 42 | 7 | 22 | 216 | 276 |
| Intrastate | 1 | 0 | 6 | 0 | 22 | 10 | 50 | 40 | 7 | 22 | 198 | 266 |
| Interstate | 7 | 0 | 0 | 0 | 30 | 6 | 4 | 2 | 0 | 0 | 18 | 10 |

*The destination above is the first destination as shown by the original waybill. Changes in destination brought about by diversion factors are not shown.

†Dried eggs and frozen eggs are converted to a shell egg equivalent on the following basis: 1 rail carload of dried eggs=8 carloads of shell eggs, and 1 carload of frozen eggs=2 carloads of shell eggs.

NOTE: These data furnished to the Division of Agricultural Statistics, B. A. E., by railroad officials through agents at all stations which originate and receive carload shipments of poultry and eggs. The data are compiled by the Bureau of Business Research.

## DAIRY PRODUCTS MANUFACTURED IN PLANTS IN TEXAS

| Product and Year | January | February | March | April | May | June | July | August | September | October | November | December | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *CREAMERY BUTTER* (1000 lb.) | | | | | | | | | | | | | |
| 1944* | 2,043 | 2,126 | 2,765 | 3,535 | 4,008 | | | | | | | | |
| 1943* | 2,636 | 2,743 | 3,076 | 3,652 | 4,544 | 4,275 | 4,051 | 3,452 | 2,629 | 2,581 | 2,236 | 1,924 | 38,071 |
| 1930–39 average | 2,074 | 2,109 | 2,392 | 3,138 | 3,556 | 3,166 | 4,113 | 2,867 | 2,513 | 2,608 | 2,301 | 2,211 | 32,048 |
| *ICE CREAM* (1000 gal.)‡ | | | | | | | | | | | | | |
| 1944* | 1,115 | 1,211 | 1,520 | 1,687 | 2,491 | | | | | | | | |
| 1943* | 1,125 | 1,187 | 1,396 | 1,770 | 2,302 | 2,391 | 2,758 | 2,763 | 1,990 | 1,622 | 1,443 | 940 | 22,237 |
| 1930–39 average | 215 | 262 | 434 | 570 | 752 | 893 | 904 | 845 | 686 | 460 | 259 | 205 | 6,486 |
| *AMERICAN CHEESE* (1000 lb.) | | | | | | | | | | | | | |
| 1944* | 902 | 956 | 1,229 | 1,884 | 2,273 | | | | | | | | |
| 1943* | 914 | 948 | 1,063 | 1,594 | 2,010 | 1,943 | 1,896 | 1,405 | 1,019 | 819 | 621 | 809 | 15,272 |
| 1930–39 average | 554 | 590 | 737 | 1,050 | 1,215 | 1,129 | 1,119 | 1,025 | 866 | 852 | 718 | 641 | 10,496 |
| *MILK EQUIVALENT OF DAIRY PRODUCTS*† (1000 lb.) | | | | | | | | | | | | | |
| 1944* | 67,873 | 71,519 | 92,663 | 119,889 | 144,977 | | | | | | | | |
| 1943* | 80,106 | 83,301 | 94,470 | 118,447 | 149,577 | 142,700 | 143,120 | 124,558 | 93,186 | 85,084 | 73,290 | 62,253 | 1,271,809 |
| 1930–39 average | 54,675 | 57,139 | 67,456 | 89,641 | 104,323 | 97,562 | 97,075 | 89,185 | 76,165 | 73,444 | 60,119 | 55,872 | 922,656 |

*Estimates of production made by the Bureau of Business Research.
†Milk Equivalent of Dairy products was calculated from production data by the Bureau of Business Research.
‡Includes ice cream, sherbets, ices, etc.
NOTE: 10-year average production on creamery butter, ice cream and American cheese based on data from the Agricultural Marketing Service, U.S.D.A.

## SHIPMENTS OF LIVE STOCK CONVERTED TO A RAIL-CAR BASIS*

| | Cattle 1944 | Cattle 1943 | Calves 1944 | Calves 1943 | Swine 1944 | Swine 1943 | Sheep 1944 | Sheep 1943 | Total 1944 | Total 1943 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Interstate Plus Fort Worth | 6,109 | 4,507 | 830 | 769 | 1,720 | 1,717 | 2,510 | 1,432 | 11,169 | 8,425 |
| Total Intrastate Omitting Fort Worth | 848 | 903 | 201 | 247 | 96 | 86 | 134 | 44 | 1,279 | 1,280 |
| TOTAL SHIPMENTS | 6,957 | 5,410 | 1,031 | 1,016 | 1,816 | 1,803 | 2,644 | 1,476 | 12,448 | 9,705 |

## TEXAS CAR-LOT* SHIPMENTS OF LIVE STOCK FOR YEAR TO DATE

| | Cattle 1944 | Cattle 1943 | Calves 1944 | Calves 1943 | Swine 1944 | Swine 1943 | Sheep 1944 | Sheep 1943 | Total 1944 | Total 1943 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Interstate Plus Fort Worth | 22,063 | 30,218 | 3,304 | 3,355 | 8,190 | 7,306 | 3,890 | 4,029 | 37,447 | 44,908 |
| Total Intrastate Omitting Fort Worth | 3,385 | 4,508 | 690 | 1,025 | 602 | 346 | 313 | 232 | 4,990 | 6,111 |
| TOTAL SHIPMENTS | 25,448 | 34,726 | 3,994 | 4,380 | 8,792 | 7,652 | 4,203 | 4,261 | 42,437 | 51,019 |

*Rail-car Basis: Cattle, 30 head per car; calves, 60; swine, 80; and sheep, 250.

Fort Worth shipments are combined with interstate forwardings in order that the bulk of market disappearance for the month may be shown.

NOTE: These data are furnished the United States Bureau of Agricultural Economics by railway officials through more than 2,500 station agents, representing every livestock shipping point in the state. The data are compiled by the Bureau of Business Research.

## POSTAL RECEIPTS

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Abilene | $ 47,392 | $ 38,406 | $ 42,510 |
| Amarillo | 56,042 | 45,567 | 56,959 |
| Austin | 102,044 | 78,815 | 94,507 |
| Beaumont | 49,325 | 41,266 | 47,600 |
| Big Spring | 10,685 | 8,282 | 11,287 |
| Brownsville | 12,137 | 8,475 | 12,002 |
| Brownwood | 27,598 | 15,918 | 26,136 |
| Childress | 5,477 | 4,585 | 5,569 |
| Cleburne | 5,702 | 4,578 | 5,543 |
| Coleman | 3,966 | 4,673 | 4,507 |
| Corpus Christi | 70,325 | 51,563 | 66,995 |
| Corsicana | 9,718 | 8,354 | 9,958 |
| Dallas | 549,032 | 436,951 | 524,891 |
| Del Rio | 6,527 | 5,611 | 6,910 |
| Denison | 11,191 | 9,590 | 9,461 |
| Denton | 12,066 | 10,396 | 12,037 |
| Edinburg | 4,519 | 3,452 | 4,643 |
| El Paso | 105,503 | 92,608 | 93,026 |
| Fort Worth | 238,508 | 203,067 | 233,723 |
| Galveston | 53,351 | 44,961 | 50,111 |
| Gladewater | 3,836 | 3,011 | 5,148 |
| Graham | 3,410 | 2,620 | 3,562 |
| Harlingen | 13,764 | 11,611 | 15,321 |
| Houston | 399,251 | 301,219 | 371,712 |
| Jacksonville | 6,530 | 5,946 | 6,507 |
| Kenedy | 2,766 | 2,423 | 2,689 |
| Kerrville | 3,904 | 3,309 | 4,221 |
| Longview | 14,806 | 11,873 | 14,302 |
| Lubbock | 32,669 | 27,639 | 34,466 |
| Lufkin | 8,422 | 5,461 | 7,315 |
| McAllen | 7,078 | 5,462 | 8,408 |
| Marshall | 10,701 | 8,760 | 11,687 |
| Pampa | 1,537 | 9,787 | 11,708 |
| Paris | 22,297 | 17,114 | 24,002 |
| Plainview | 6,180 | 5,343 | 5,880 |
| Port Arthur | 28,937 | 23,823 | 28,863 |
| San Angelo | 22,638 | 19,702 | 22,653 |
| San Antonio | 274,400 | 216,556 | 264,719 |
| Sherman | 12,265 | 10,963 | 12,758 |
| Snyder | 2,602 | 2,026 | 2,620 |
| Sweetwater | 8,767 | 7,892 | 10,222 |
| Temple | 15,132 | 13,974 | 14,621 |
| Texarkana | 28,736 | 21,857 | 31,285 |
| Tyler | 31,081 | 19,341 | 28,221 |
| Waco | 54,551 | 44,789 | 52,761 |
| Wichita Falls | 44,021 | 43,417 | 41,972 |
| TOTAL | $2,441,389 | $1,961,036 | $2,355,998 |

NOTE: Compiled from reports from Texas chambers of commerce to the Bureau of Business Research.

## COMMODITY PRICES

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Wholesale Prices: | | | |
| U.S. Bureau of Labor Statistics (1926=100%) | 104.0 | 104.1 | 103.9 |
| Farm Prices: | | | |
| U.S. Bureau of Labor Statistics (1926=100%) | 122.9 | 125.7 | 123.2 |
| Retail Prices: | | | |
| Food (U.S. Bureau of Labor Statistics (1935–1939=100%) | 135.5 | 143.0 | 134.6 |
| Cost of Living Index (1935–1939 =100%) | 125.0 | 125.1 | 124.5 |
| Department Stores (Fairchild's Publications January, 1931=100%) | 113.4 | 113.2 | 113.4 |

## PETROLEUM

Daily Average Production (In Barrels)

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Coastal Texas* | 519,800 | 375,200 | 517,500 |
| East Central Texas | 137,100 | 124,300 | 124,600 |
| East Texas | 364,100 | 339,300 | 363,000 |
| North Texas | 147,200 | 131,850 | 143,500 |
| Panhandle | 91,000 | 91,100 | 91,500 |
| Southwest Texas | 307,100 | 214,000 | 292,700 |
| West Texas | 429,100 | 226,750 | 365,700 |
| STATE | 1,995,400 | 1,502,500 | 1,898,600 |
| UNITED STATES | 4,512,000 | 3,995,200 | 4,414,700 |

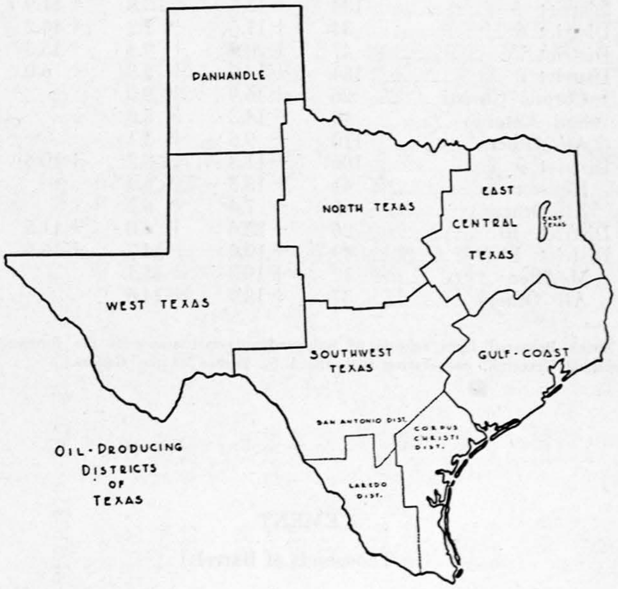
Gasoline sales as indicated by taxes collected by the State Comptroller were: April 1944, 108,901,194 gallons; April 1943, 109,683,822 gallons; March 1944, 107,789,390 gallons.

April sales of gasoline to the United States government as reported by motor fuel distributors in Texas were 207,012,634 gallons. By comparison these figures in past years were as follows:

| | |
|---|---|
| 1939–40 | 18,902,000 |
| 1940–41 | 47,129,000 |
| 1941–42 | 274,303,000 |
| 1942–43 | 882,000,000 |
| First 4 months of 1944 | 711,000,000 |

*Includes Conroe.

NOTE: From American Petroleum Institute. See accompanying map showing the oil producing districts of Texas.




## LUMBER

(In Board Feet)

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Southern Pine Mills: | | | |
| Average Weekly Production per unit | 196,811 | 247,311 | 202,054 |
| Average Weekly Shipments per unit | 205,926 | 280,318 | 202,943 |
| Average Unfilled Orders per unit, end of month | 1,558,546 | 1,481,784 | 1,626,466 |

NOTE: From Southern Pine Association.

## MAY RETAIL SALES OF INDEPENDENT STORES IN TEXAS

(By Districts)

| | Number of Establishments Reporting | Percentage Changes May, 1944 from May, 1943 | May, 1944 from April, 1944 | Year, 1944 from Year, 1943 |
|---|---|---|---|---|
| TOTAL TEXAS | 988 | +18.4 | + 7.9 | +11.4 |
| TEXAS STORES GROUPED BY PRODUCING AREAS: | | | | |
| District 1-N | 72 | +18.6 | + 9.6 | + 4.9 |
| Amarillo | 26 | +13.6 | + 8.4 | |
| Plainview | 15 | +27.1 | + 6.3 | |
| All Others | 31 | +22.5 | +12.2 | |
| District 1-S | 31 | +11.0 | − 3.1 | + 7.8 |
| Lubbock | 20 | +11.9 | − 4.4 | |
| All Others | 11 | + 7.2 | + 3.1 | |
| District 2 | 76 | + 7.6 | + 6.2 | − 0.7 |
| District 3 | 32 | +22.3 | + 4.4 | +12.6 |
| District 4 | 228 | +26.3 | +10.1 | +15.6 |
| Dallas | 35 | +32.9 | +10.4 | |
| Fort Worth | 27 | +21.9 | +11.7 | |
| Sherman | 14 | +12.0 | + 8.2 | |
| Waco | 28 | +20.9 | + 6.9 | |
| All Others | 124 | +10.1 | + 7.8 | |
| District 5 | 103 | +13.5 | + 3.8 | +11.9 |
| District 6 | 34 | +17.6 | + 7.2 | +14.2 |
| District 7 | 47 | +20.9 | + 9.4 | +15.3 |
| District 8 | 184 | +13.0 | + 5.3 | + 6.0 |
| Corpus Christi | 26 | +16.9 | + 9.0 | |
| San Antonio | 48 | +14.3 | + 5.8 | |
| All Others | 110 | + 9.6 | + 3.1 | |
| District 9 | 106 | +11.3 | + 8.2 | +10.4 |
| Houston | 41 | +13.5 | + 9.4 | |
| All Others | 65 | + 7.4 | + 6.1 | |
| District 10 | 26 | +22.6 | + 4.0 | +11.5 |
| District 10-A | 49 | +19.0 | +14.7 | +16.6 |
| McAllen | 12 | +19.3 | +15.1 | |
| All Others | 37 | +18.9 | +14.6 | |

NOTE: Prepared from reports of independent retail stores to the Bureau of Business Research, coöperating with the U.S. Bureau of the Census.

## TEXAS CHARTERS

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Domestic Corporations: | | | |
| Capitalization* | $768 | $172 | $976 |
| Number | 50 | 24 | 62 |
| Classification of new corporations: | | | |
| Banking-Finance | 1 | 1 | 2 |
| Manufacturing | 3 | 2 | 6 |
| Merchandising | 20 | 6 | 11 |
| Oil | 2 | 1 | 3 |
| Public Service | 0 | 0 | 3 |
| Real Estate Building | 4 | 8 | 9 |
| Transportation | 0 | 2 | 1 |
| All Others | 20 | 4 | 27 |
| Number capitalized at less than $5,000 | 12 | 13 | 14 |
| Number capitalized at $100,000 or more | 4 | 0 | 2 |
| Foreign Corporations (Number) | 10 | 13 | 28 |

*In thousands.

NOTE: Compiled from records of the Secretary of State.

## PERCENTAGE CHANGES IN CONSUMPTION OF ELECTRIC POWER

| | May, 1944 from May, 1943 | May, 1944 from April, 1944 |
|---|---|---|
| Commercial | + 6.8 | − 0.8 |
| Industrial | +19.1 | + 3.2 |
| Residential | + 8.1 | − 2.6 |
| All Others | −15.8 | − 9.8 |
| TOTAL | + 8.3 | − 0.4 |

Prepared from reports of 9 electric power companies to the Bureau of Business Research.

## CEMENT

(In Thousands of Barrels)

| | April, 1944 | April, 1943 | March, 1944 |
|---|---|---|---|
| Texas Plants | | | |
| Production | 575 | 862 | 456 |
| Shipments | 622 | 970 | 549 |
| Stocks | 984 | 620 | 1,032 |
| United States | | | |
| Production | 6,463 | 11,239 | 6,139 |
| Shipments | 7,373 | 12,748 | 6,225 |
| Stocks | 24,085 | 22,549 | 24,987 |
| Capacity Operated | 32.0% | 55.0% | 29.0% |

NOTE: From U.S. Department of Interior, Bureau of Mines.

## TEXAS COMMERCIAL FAILURES

| | May, 1944 | May, 1943 | April, 1944 |
|---|---|---|---|
| Number | 0 | 1 | 0 |
| Liabilities* | 0 | $184 | 0 |
| Assets* | 0 | 166 | 0 |
| Average Liability per failure* | 0 | 184 | 0 |

*In thousands.

NOTE: From Dunn and Bradstreet, Inc.

## DISTRICT 8—TREND OF ANNUAL FARM CASH INCOME BY PRODUCTS ($000)

| Product | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 57,749 | 68,082 | 40,217 | 48,642 | 20,156 | 15,822 | 28,504 | 29,504 | 19,833 | 18,165 | 28,991 | 17,631 | 14,919 | 13,851 | 20,132 | 28,310 | 38,777 |
| Cotton Seed | 8,132 | 11,010 | 6,520 | 8,271 | 2,703 | 1,961 | 3,430 | 6,238 | 4,800 | 4,008 | 5,428 | 4,090 | 2,621 | 2,844 | 5,975 | 6,514 | 9,523 |
| Wheat | 20 | 31 | 59 | 33 | 13 | 14 | 1 | — | — | — | — | — | — | — | — | — | 34 |
| Grain Sorghum | 473 | 275 | 304 | 139 | 128 | 118 | 139 | 115 | 168 | 62 | 45 | 70 | 134 | 152 | 210 | 255 | 438 |
| Corn | 2,305 | 2,076 | 1,239 | 764 | 839 | 717 | 735 | 469 | 988 | 1,743 | 1,461 | 774 | 552 | 936 | 1,199 | 1,589 | 2,366 |
| Oats | 314 | 242 | 126 | 71 | 203 | 99 | 48 | 77 | 57 | 169 | 216 | 49 | 23 | 16 | 24 | 22 | 95 |
| Cattle | 6,466 | 7,498 | 6,760 | 4,005 | 3,556 | 2,287 | 1,594 | 2,288 | 3,380 | 2,788 | 4,433 | 4,119 | 4,066 | 3,174 | 3,639 | 9,790 | 9,971 |
| Calves | 2,229 | 2,777 | 2,198 | 1,588 | 1,440 | 892 | 793 | 725 | 1,563 | 1,340 | 3,105 | 3,566 | 5,159 | 3,573 | 4,487 | 10,819 | 10,158 |
| Hogs | 531 | 550 | 755 | 445 | 167 | 74 | 54 | 59 | 220 | 696 | 1,325 | 811 | 529 | 61 | 476 | 1,645 | 2,831 |
| Sheep | 27 | 70 | 72 | 37 | 85 | 92 | 9 | 24 | 66 | 13 | 13 | 14 | 60 | 33 | 48 | 228 | 555 |
| Poultry | 2,682 | 2,748 | 2,841 | 2,694 | 2,180 | 1,836 | 1,678 | 2,190 | 2,644 | 2,215 | 2,511 | 2,474 | 2,371 | 2,249 | 2,396 | 2,644 | 3,366 |
| Wool | 141 | 236 | 261 | 181 | 144 | 101 | 319 | 285 | 252 | 327 | 420 | 259 | 302 | 398 | 542 | 800 | 797 |
| Mohair | 364 | 550 | 420 | 308 | 163 | 114 | 226 | 139 | 251 | 430 | 423 | 321 | 435 | 591 | 612 | 813 | 827 |
| Eggs | 3,242 | 3,903 | 4,253 | 3,413 | 2,614 | 2,040 | 1,960 | 2,801 | 3,729 | 3,768 | 3,734 | 3,482 | 3,251 | 3,301 | 6,411 | 8,564 | 6,965 |
| Milk Products | 3,184 | 3,293 | 3,878 | 4,745 | 3,642 | 2,907 | 2,787 | 3,052 | 3,814 | 4,386 | 4,745 | 6,310 | 6,416 | 6,835 | 8,328 | 12,288 | 16,369 |
| Fruits, Vegs. Canning | 2,337 | 1,255 | 2,003 | 1,136 | 2,613 | 4,693 | 1,296 | 1,664 | 1,547 | 803 | 2,867 | 2,106 | 466 | 615 | 524 | 10 | 3,296 |
| Peanuts | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2,974 | 3,758 |
| TOTAL | 90,196 | 104,596 | 71,906 | 76,472 | 40,646 | 33,767 | 43,573 | 49,630 | 43,312 | 40,913 | 59,717 | 46,076 | 41,304 | 38,629 | 55,003 | 87,265 | 110,126 |

## DISTRICT 9—TREND OF ANNUAL FARM CASH INCOME BY PRODUCTS ($000)

| Product | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 18,311 | 23,073 | 5,902 | 15,105 | 8,502 | 5,073 | 8,397 | 8,354 | 6,157 | 5,146 | 9,596 | 4,761 | 5,719 | 9,552 | 5,105 | 8,398 | 15,805 |
| Cotton Seed | 2,447 | 3,455 | 927 | 2,651 | 1,079 | 625 | 989 | 1,801 | 1,520 | 1,164 | 1,946 | 1,096 | 962 | 1,864 | 1,455 | 1,794 | 3,981 |
| Rice | 6,633 | 7,746 | 7,392 | 6,533 | 6,341 | 4,239 | 5,688 | 5,774 | 7,001 | 7,160 | 8,899 | 9,511 | 9,308 | 12,028 | 16,924 | 24,544 | 27,746 |
| Grain Sorghum | — | — | — | — | — | — | — | — | — | — | — | — | 3 | 3 | 10 | 13 | 20 |
| Corn | 585 | 239 | 115 | 254 | 175 | 152 | 166 | 102 | 169 | 353 | 228 | 178 | 166 | 253 | 322 | 403 | 570 |
| Cattle | 3,733 | 4,412 | 2,863 | 1,516 | 1,044 | 688 | 551 | 757 | 2,006 | 1,590 | 1,743 | 1,155 | 1,614 | 1,315 | 1,304 | 2,914 | 3,650 |
| Calves | 1,922 | 3,419 | 2,777 | 1,518 | 944 | 691 | 518 | 593 | 965 | 902 | 1,107 | 1,053 | 1,990 | 2,377 | 3,138 | 5,904 | 6,740 |
| Hogs | 203 | 121 | 197 | 117 | 36 | 14 | 10 | 3 | 24 | 98 | 9 | 4 | — | — | 3 | 159 | 459 |
| Sheep | 5 | 31 | 27 | 6 | 4 | 1 | 4 | 5 | 9 | 6 | 9 | — | 3 | 12 | 7 | 5 | 5 |
| Poultry | 1,456 | 1,522 | 1,691 | 1,558 | 1,144 | 915 | 812 | 1,054 | 1,341 | 1,304 | 1,463 | 1,519 | 1,449 | 1,456 | 1,302 | 2,106 | 3,123 |
| Wool | 34 | 42 | 34 | 39 | 18 | 13 | 29 | 38 | 33 | 43 | 43 | 26 | 33 | 37 | 53 | 104 | 102 |
| Mohair | 9 | 15 | 11 | — | 5 | 1 | 12 | 4 | 11 | 22 | 16 | 13 | 21 | 22 | 20 | 12 | 12 |
| Eggs | 3,936 | 4,382 | 4,875 | 4,276 | 2,928 | 2,436 | 2,548 | 3,397 | 2,043 | 4,621 | 4,537 | 4,291 | 3,893 | 4,153 | 5,863 | 7,804 | 10,020 |
| Milk Products | 3,404 | 3,520 | 4,146 | 4,453 | 3,900 | 2,963 | 3,125 | 3,426 | 3,895 | 4,404 | 4,841 | 4,831 | 4,289 | 5,180 | 6,659 | 12,249 | 16,998 |
| Fruits, Vegs. Canning | 549 | 408 | 282 | 931 | 657 | 500 | 239 | 220 | 104 | 161 | 149 | 266 | 1,631 | 498 | 975 | 1,615 | 443 |
| Peanuts | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 589 | 552 |
| TOTAL | 43,227 | 52,385 | 31,239 | 38,957 | 26,777 | 18,311 | 23,088 | 25,528 | 25,278 | 26,974 | 34,586 | 28,704 | 31,081 | 38,750 | 43,140 | 68,613 | 90,226 |

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