

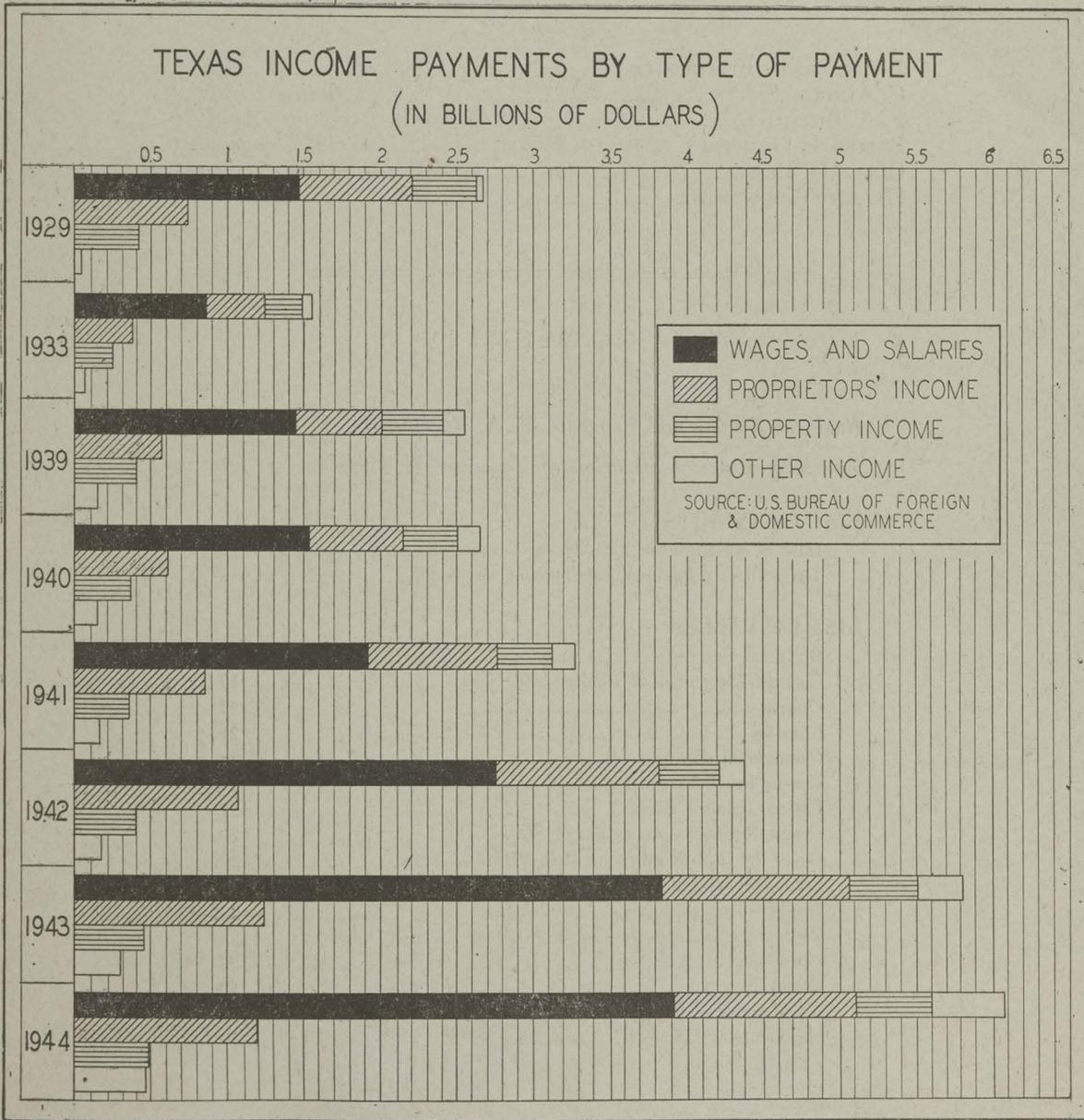
# TEXAS BUSINESS REVIEW

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## Business Review and Prospect

Little change has occurred during the past month in the general national economic picture from that briefly outlined in the October issue of the REVIEW except that the labor situation has become more critical with the announced strike of General Motor's employees on November 21 together with the outlook for probable additional strikes of other major industries if more rapid progress is not soon made in the solution of wage-price and related problems.

Reconversion of industry in the Midwest and Southwest would be in full swing except for labor and price difficulties, the U. S. Department of Commerce recently reported. Most plants are ready to produce, but cannot go ahead either because labor is not available or because O.P.A. price ceilings make it impossible to produce at a profit. Manufacturers are criticized, however, for failing to plan beyond the meeting of the built-up demand for consumer goods. Commenting on the effect of the end of the war on business, the report says: "the main force of the economic shock apparently has been dissipated and there is evidence that the foundation of the upturn has been established."

### TEXAS BUSINESS

As industrial reconversion from war to peacetime activity nears completion the question of the probable level and trend of income payments in Texas during the coming years will command increasing attention. By inspection of the chart on the front cover page of this issue of the REVIEW it will be seen that income payments in Texas during 1944 (probably the peak year in the present business cycle) were more than double those of the previous peak year, 1929, of the preceding business cycle, and nearly four times those of the depression year, 1933. Moreover, it is to be noted that of the four types of income payments shown, wages and salaries accounted for approximately 56% of the total in each of the years, 1929, 1933 and 1939; and it is significant that the percentage of total income payments going to wages and salaries increased to 58% in 1940, 59% in 1941, 62% in 1942, 66% in 1943 and then dropped to 64% in 1944. It is practically certain that payments for wages and salaries in 1945 will be less than they were in 1944 both relatively and absolutely. It is also more than probable that total income payments during 1945 in Texas will be less than they were in 1944 and that this downward tendency will continue to 1946.

In spite of the apparent downward tendency in total state income payments and the probable continuation of this tendency for a matter of months at least, there seems to be no indication of a reversal in the upward trend of dollar sales in retail trade. In this connection, it is significant to note that while Texas retail dollar sales reached an all-time peak in 1944 (which promises to be exceeded in 1945) these sales represented only about 50% of income payments in that year. By way of contrast, in 1929 retail dollar sales amounted to 75.0% of total income payments; in 1935, 64.6% and in 1939, 70.5%. Hence if income payments

in Texas during 1946 were to drop to 75% of those in 1944 no such corresponding decline is indicated for retail trade; in fact with a drop in income payments of the proportions indicated and with a ratio of retail trade to income payments such as prevailed in 1939, dollar sales at retail in 1945 would exceed those which have been estimated for 1944.

It should be mentioned in this connection that the Bureau of Business Research has under way studies for securing income data for the State as a whole corresponding to those of the U.S. Bureau of Foreign and Domestic Commerce used in the foregoing discussion. The method of approach used by this Bureau is totally different however from that used by the Federal Bureau and it has the advantage of lending itself to estimating income by counties.

The figures on income in the following table give the results obtained for Texas by the two agencies during the period 1929 to 1944 inclusive.

| Year | U.S. Bureau of Foreign and Domestic Commerce<br>(000 omitted) | U. T. Bureau of Business Research<br>(000 omitted) |
|------|---|--|
| 1929 | 2,668,800   | 2,677,622  |
| 1930 | 2,273,500   | 2,318,065  |
| 1931 | 1,888,800   | 1,716,062  |
| 1932 | 1,546,100   | 1,451,156  |
| 1933 | 1,552,100   | 1,554,219  |
| 1934 | 1,822,100   | 1,763,717  |
| 1935 | 1,971,200   | 1,876,538  |
| 1936 | 2,273,600   | 2,171,190  |
| 1937 | 2,558,500   | 2,724,078  |
| 1938 | 2,454,600   | 2,535,427  |
| 1939 | 2,558,400   | 2,512,581  |
| 1940 | 2,652,000   | 2,539,265  |
| 1941 | 3,269,000   | 3,146,515  |
| 1942 | 4,388,000   | 4,110,009  |
| 1943 | 5,819,000   | 5,503,062  |
| 1944 | 6,080,000   | 5,905,567  |

It will be noted that only in one year—1931—were the two sets of figures substantially out of line on a percentage basis; while the median deviation was only 4.3 per cent. The data which are being developed by this Bureau are subject to considerable further refinement and it is probable that the same may be true of the data by the Federal bureau. As this process of improvement proceeds the deviation between the two sets of figures may be expected to diminish. There is much need for further study on the relationship between income payments and retail trade, not only on the state level, but also by subdivisions of the state and, if possible, by counties.

### CURRENT BUSINESS ACTIVITY IN TEXAS

Despite general labor unrest and problems related to post-war price adjustments, current activity in various lines of Texas business is at an all time high. According to reports received from approximately 1,000 retail establishments from over the entire state, dollar sales of independent retail establishments averaged 22% above those of October 1944 and for the first nine months of the year aggregate sales of these establishments were

nearly 11% above those of the corresponding period a year ago. Every line of retail trade except restaurants showed an increase over October last year and for some lines the gain was quite striking.

According to October reports received by this Bureau from individual concerns, the gains registered over October last year and for the current year to date over the corresponding nine months period last year are shown below.

*Apparel Stores*—30% over October last year and 14.4% for the year to date over the corresponding period in 1944; and of this group of stores the gains over October last year and over the year to date last year were respectively, 20.8% and 8.3% for family clothing stores; 32.5% and 8.4% for men's and boy's clothing stores; 22.4% and 16.0% for shoe stores, 30.9% and 19.0% for women's specialty shops.

*Motor Vehicle Dealers*—a gain of 28.2% over October, 1944, but a decline of 3.0% for the year to date (1945) from the corresponding period last year. A sharp increase in activity for this group is certain as soon as new automobiles become available.

*Department Stores*—An increase of 19.8% over October 1944 and 11.4% for the year to date. These increases are the more striking because of their comparison with the very high level of sales a year ago and the scarcity or even unavailability of many important lines of merchandise.

*Other Groups*—increases over October last year and the year to date were for dry goods and general merchandise stores: 12.3% and 11.5% respectively; *filling stations*, 61.8% and 20.0%; *florists*, 28.2% and 18.0%; *Food Stores*, 11.7% and 3.5%; *jewelry* 13.8% and 9.2%; *lumber, building and hardware*, 24.6% and 23.1%.

The different geographic regions of the State show considerable variation in the year to year comparisons of retail dollar sales. The *Amarillo* area shows a gain of 15.4% over October, 1944, but a decline of 1.0% for the year to date from the corresponding period last year; for the *Lubbock* area the gains were 13.0% and 10.8% respectively over the two periods—October and the first nine months of 1944; for the *Abilene* area, 22.3% and 6.2%; for the *North-Central* area, 26.7% and 14.3% for the *Dallas-Fort Worth* area, 22.5% and 11.9%; for *East Texas*, 17.6% and 9.9%; for the *El Paso* area, 19.5% and 10.3%; for the *Austin, San Antonio and Corpus Christi* area, 30.3% and 14.6%; for the *Beaumont-Houston* area, 17.7% and 7.5%; for the *Laredo* area, 21.0% and 0.8%; and for the *Lower Rio Grande Valley*, 21.0% and 3.2%.

In the foregoing comparisons the changes from the preceding month were not given since the seasonal factor is very influential in retail sales and this varies for the different lines of retail trade. Hence unless the normal seasonal change is given in each case, comparisons with the preceding month may be misleading.

*Electric Power Consumption*—Influenced by the sharp drop in industrial power consumption, total power consumption during October declined 5.5%. However, commercial power consumption increased 22.8% over

October last year and residential consumption increased 13.8%. These increases were more than offset by declines in consumption from other sources, especially industrial consumption which dropped 18.2%. This decline, no doubt, reflected labor troubles and reconversion problems of the past two months and may be regarded as temporary.

*Building Permits*—Reports from upwards of 40 Texas cities show a total of nearly \$10 million in building permits, virtually no change from the preceding month, but an increase of 163% over October 1944. This sharp rise is all the more significant in view of the various bottle-necks which continue to retard building operations and are indicative of what may be expected as more and more of these obstacles are removed.

*Postal Receipts*—A substantial gain occurred in postal receipts from September to October in part the result of the difference in length of month; but there was a slight decline from October last year. Reports from upwards of 40 Texas towns and cities show an increase of more than 20% over September and a decline of 5% from October last year.

*Credit Ratios*—Reports from 60 Texas department and apparel stores show further decline in the ratio of credit sales to total sales while the ratio of collections to outstanding accounts continues to increase, reflecting increasing cash purchases and prompter payments of credit accounts. These tendencies have been noted for the past several years, but it is probable that as incomes begin to decline and credit restrictions are relaxed a reversal of this tendency will be shown in the monthly figures.

*Texas Charters*—According to reports in the State department 137 new corporations were chartered in Texas during October which compares with 83 in September and 57 during October, 1944. Capitalization of these corporations totalled \$2,942,000 compared with \$1,679,000 during September and \$886,000 during October a year ago.

*Cement Production*—Activity in Texas cement plants was well maintained. A slight decline occurred in production from 715 thousand barrels in August to 685 in September; but a gain was registered over the 597 thousand barrels produced during September, 1944; an increase occurred in shipments from 715 in August to 744 thousands barrels in September; which compares with 527 thousand barrels during September last year. Stocks of 638 thousand barrels were down from the 725 thousand barrels in August and 907 thousand barrels in September, 1944.

*Petroleum Production*—Average daily production of petroleum in Texas dropped from 1,859,100 in September to 1,482,350 barrels in October. These figures compare with average daily production of 2,133,350 barrels in October, 1944. For the United States the corresponding average daily production figures were: October, 1945, 3,977,800 barrels; the preceding month, 4,485,300 barrels; October last year 4,725,950 barrels. It will thus be noted that while average daily production in October, 1944, represented nearly 44% of the national total in October last year, in October of the current year the

average daily Texas output was approximately 37% of the national total. The November figures will show a substantial increase in Texas average daily production and, no doubt, a considerably higher proportion of the national total.

*Commercial Failures*—For the first time in many months one business failure in Texas was reported by Dun and Bradstreet, Inc. The liabilities of the firm were \$1,700 and the assets \$1,300.

INDEXES OF BUSINESS ACTIVITY IN TEXAS

The composite index of business activity in Texas during October was 153.3% which compares with 158.1% in September and 197.0% in October, 1944. Of the six components all but one (department store sales) showed a decline from the preceding month after adjustment for seasonal variation, but the recession was moderate. All but two of the components (department store sales and electric power consumption) showed a decline from October, 1944 and the drop in these four components from a year ago was sharp and carried the bulk of the weight in determining the composite index.

In this connection special attention should be called to the drop in the indexes of employment and pay rolls in comparison with October, 1944. These two components with a weight of 50 points out of the total of 100, reflect the drastic effects of the virtual discontinuance of most of the large government plants devoted to the production of airplanes, ordnance and ships; and they also reflect the effects of the labor troubles and strikes in Texas, during the early fall months particularly, and which have not yet been fully adjusted in all cases.

OCTOBER INDEXES OF BUSINESS ACTIVITY IN TEXAS

(Average Month of 1930=100)

|   | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|---|------------|------------|-------------|
| Composite .....   | 153.3*     | 197.0      | 158.1       |
| Employment .....  | 96.4       | 144.9      | 98.0        |
| Pay Rolls .....   | 148.4      | 269.8      | 162.4       |
| Miscellaneous Freight Carloadings<br>(Southwest District) ..... | 72.4       | 100.0      | 74.2        |
| Runs of Crude Oil to Stills .....                               | 191.4*     | 253.7      | 195.6       |
| Department Store Sales .....                                    | 217.8      | 198.3      | 207.9       |
| Electric Power Consumption .....                                | 308.2      | 272.3      | 317.2       |

\*Preliminary

TEXAS AGRICULTURE

A Texas cotton crop of 1,880,000 bales of 500 pounds gross weight was forecast by the U.S. Department of Agriculture as of November 1, 1945. This estimate is 120,000 bales below the indicated production a month earlier and compares with a production of 2,646,000 bales in the State last year and a 1934-1943 annual average of 3,112,000 bales. Ginnings for October of approximately 462,000 bales were but a little over half those for the corresponding month in 1945. This sharp drop in cotton production from a year ago together with an even greater relative decline in wheat production in comparison with last year accounts for the unfavorable year to year comparison of farm cash income in the State which has been noted since mid-summer. It is now

doubtful if farm cash income for the current year will equal that of 1944 and the disparity would be even greater were it not for the prevailing higher level of prices for cotton, livestock and livestock prices.

Shipments of livestock during October totalled 13,245 cars compared with 14,193 cars during the corresponding month last year. A moderate increase in cattle shipments was more than offset by declines in forwardings of calves, hogs and sheep. For the first nine months of the current year shipments of all classes of livestock totalled 99,034 cars which was slightly less than the 99,272 cars shipped during the corresponding period last year. Of these totals cattle accounted for 65,412 cars compared with 58,876 cars a year ago; calves 12,470 vs. 11,976 cars; sheep 16,463 vs. 14,816 cars; and hogs 4,689 vs. 13,604 cars. Thus it is seen that the decline of approximately 9,000 cars in hog shipments slightly more than offset the increases in shipments of cattle, calves and sheep resulting in a slight decline in the cumulative total as compared with 1944. Up to October the cumulative total during the current year was greater than during the corresponding period last year.

Poultry shipments (including turkeys) amounted to 27 cars in October, 1945, compared with 37 cars during the corresponding month last year; while egg shipments of 182 cars were less than one-fourth the 757 cars shipped during October, 1944.

The manufacture of butter and cheese was sharply below that of October last year, while the production of ice cream increased substantially. In terms of the milk used for manufactured dairy products of all kinds there was a decline of 18 per cent from a year ago.

FARM CASH INCOME IN TEXAS

Reflecting the sharp drop in the production and marketing of cotton, October farm cash income in Texas at \$148 million was sharply below the \$191 million during the corresponding month a year ago. For the first time this year the cumulative farm cash income dropped below that of a year ago—aggregate cash income for the current year to date being \$918 million compared with \$924 million during the corresponding period last year. Substantial increases were registered in the income from livestock and livestock products during the month but these only partially offset the decline in receipts from cotton.

Attention is called in the following table to the decline in cumulative farm cash income in the crop reporting districts in which cotton and wheat constitute a major source of income in contrast with the increase in those in which livestock, livestock products, fruits and vegetables are of most importance. Foremost among the cotton and wheat districts are districts 1-N, 1-S, 2, 4, 5, and 8 in all of which with one exception, district 2, there was either a decline or virtually no changes in the farm cash income during the first nine months this year in comparison with the corresponding period a year ago. On the other hand, districts, 6, 7, 9, 10 and 10A in which the major sources of income are livestock and livestock products, or as in the case of district 10-A, fruits and vegetables, substantial increases in the cumulative cash income this

year over last year are shown. It should be mentioned that in the case of district 2, while it is an important cotton district, it also is an important livestock district;

#### INDEXES OF AGRICULTURAL CASH INCOME IN TEXAS

(Average month for period 1935-1939 adjusted  
for seasonal variation=100)

| District | Oct., 1945 | Sept., 1945 | Oct., 1944 | Cumulative Cash Income<br>in Thousands of Dollars |         |
|----------|------------|-------------|------------|---|---------|
|          |            |             |            | Jan.-Oct. Inclusive<br>1945*                      | 1944    |
| 1-N      | 291.9      | 311.7       | 260.4      | 95,755  | 114,849 |
| 1-S      | 131.7      | 215.1       | 277.0      | 67,304  | 79,499  |
| 2        | 189.4      | 138.4       | 213.5      | 99,082  | 89,383  |
| 3        | 261.7      | 241.0       | 256.5      | 45,959  | 46,285  |
| 4        | 238.8      | 105.9       | 337.5      | 134,199   | 154,283 |
| 5        | 101.5      | 62.9        | 172.6      | 60,272  | 59,855  |
| 6        | 248.2      | 353.5       | 228.2      | 37,007  | 31,456  |
| 7        | 250.4      | 178.8       | 231.3      | 72,309  | 61,914  |
| 8        | 206.1      | 184.5       | 274.9      | 96,611  | 95,601  |
| 9        | 334.6      | 386.6       | 391.1      | 70,280  | 66,812  |
| 10       | 434.1      | 169.8       | 339.4      | 30,619  | 24,030  |
| 10-A     | 308.7      | 82.9        | 375.4      | 108,290   | 99,698  |
| STATE    | 209.0      | 168.7       | 265.6      | 917,687   | 923,665 |

NOTE: Farm cash income as computed by the Bureau understates actual farm cash income by from six to ten per cent. This situation results from the fact that means of securing complete local marketings, especially by truck, have not yet been fully developed. In addition, means have not yet been developed for computing cash income from all agricultural specialties of local importance in scattered areas throughout the State. This situation, however, does not impair the accuracy of the indexes to any appreciable extent.

\*September cumulative totals in the October issue of the REVIEW contained an adjustment for estimated August cotton marketings since actual marketings were not available at the time the report was prepared.

and moreover, in this district the cotton crop suffered less from adverse weather conditions than the adjacent district to the west and hence the loss of income from that source was less than in adjacent cotton districts. As a result cash income in this district for the year to date was well above that of the corresponding period last year.

The foregoing table of indexes of farm cash income for the State and for the twelve subdivisions of the State shows not only how far farm cash income has changed from the pre-war five year average for the State as a whole, but it also shows the wide variation among the crop reporting districts of the State in this respect. The October State index of 209 shows a gain of 109% over the average monthly income for the 60 month period 1935-1939 inclusive after adjustment for seasonal influences. The district gains, however, range from less than 2% for district 5 to nearly 335% for district 10. This latter district is devoted mainly to livestock production excepting only local areas known as the winter garden section which is devoted to the production of winter vegetables under intensive cultivation on irrigated land. The other districts showing large percentage gains over the base period are either important livestock areas, or producers of specialties such as fruits and vegetables in district 10-A and rice in district 9.

F. A. BUECHEL.

# The Raw Materials Situation of Texas

## PART I

The abundant supplies of diversified raw materials which Texas can furnish readily constitute one of the outstanding attractions for the further development of industry in the State. Just as the abundance of raw materials in Texas based upon the State's vast endowment of diversified natural resources has been the principal factor in the raw materials economy that has prevailed in the past, these same raw materials transformed into more elaborate finished forms by widely diversified industries constitute the foundation for a greatly expanded industrial growth in the State.

The basic importance of the agricultural group of raw materials which Texas produces in large amounts is, of course, pretty generally recognized everywhere, and this is true also of the State's fuel and power-producing minerals, such as petroleum and natural gas. Less well recognized, perhaps, are the State's forest raw materials suitable for industrial use, and which are available or can be rendered available not only for the pulp and paper industry, but also for the development of various cellulose-using industries, such as those based on the use of dissolving pulps for various industrial purposes.

The abundant supplies of various non-metallics in Texas are appreciated in a general way although their significance to expanding industrial programs in the State are less well comprehended.

So recent has come the large-scale utilization of hydrocarbons which are so readily available from Texas oil refineries and its natural gas resources, and so large do these raw materials bulk in the programs already in operation as well as in those that are definitely planned, that few indeed are in the fortunate position of having information sufficiently adequate to envision the wide scope and the fundamental significance of the potentialities of these materials as bases for building a tremendously large synthetic organic chemical industry in Texas.

Likewise, the potentialities of Texas for the production of metallic magnesium from the waters of the Gulf of Mexico to supply a highly diversified and expanding market for this remarkable material in the post-war years have to be considered from a somewhat similar point of view.

Finally, the possibilities of Texas for the development of the fabricating group of industries call for careful and thorough consideration, as these industries will bulk large in post-war industrial programs concerned with expansion of industry in the State. Such industries, other than the numerous smaller ones developed to supply the local markets of the communities in which they are situated, include a wide range of enterprises for the large production of finished goods made from materials which Texas agriculture, forestry, and industry will be able to supply in progressively increasing quantities. Among these fabricating industries, other than those already in operation in the State—many of which

can be substantially expanded—are included such enterprises as the making of plywoods, insulating board made from wood products, pharmaceuticals, plastics, synthetic rubber, magnesium, steel products, and so on, even including textile lines made from synthetic fibers, all of which have a wide variety of uses in supplying ever widening demands of expanding markets. Moreover, careful consideration can well be given to the production of industrial chemicals, magnesium, pulp and paper, as well as of fabricated products not only for the Texas and Southwestern market but also for the national market as well. Nor can the possibilities of producing many of these items for the foreign market be neglected.

Most of all, it must be emphasized that Texas industry at large is already entering a new era of remarkable promise. As a matter of fact industrial expansion in the State as exemplified in war-born and war-expanded industries considered in reference to the nation as a whole is little short of stupendous.

The following outline of some of the more important raw materials of Texas is meant to be suggestive; it seeks only to present brief factual statements which subsequently will be expanded and extended in order to cover these important subjects more fully. This article and the one to follow bring together in broad perspective the essentials of Texas raw materials, thereby affording an insight into the wide scope these substances present for the further development of diversified industry in Texas.

As regards many of the mineral raw materials especially, there is a great need for more precise information as to the volume of workable reserves together with exact locations of the deposits in the State, as well as the quality of the materials and the degree to which certain of these raw materials may be treated or beneficiated in order to render them industrially suitable for specific uses. Even a mere listing, however, of the main raw materials may be important as a starting point, and especially is this the case where important raw materials are so diverse as is the case for Texas.

One of the outstanding problems of modern industry everywhere is to secure a continuous flow of the necessary raw materials in adequate amounts and of desired quality. Historically, the raw materials problem did not become one of world concern until around 1900; intensified by World War I, the problem as a whole has been crystallized by World War II into one of the major questions of the post-war world. During the next few years the Texas situation with respect to its raw materials will become one of increasing interest and importance not only to Texas but also to the nation as a whole.

### AGRICULTURAL AND FOREST RAW MATERIALS

Texas is a large producer of agricultural and forest raw materials which are processed mostly in large-scale establishments. Such agricultural processing industries as flour milling and meat packing have long been established in Texas. And although one of the first pulp and

paper mills in the South was built in Texas prior to World War I, the development of these industries on a large scale in the State has come during the past 10 years.

By-products of the meat-packing industry include a wide variety of substances and materials, ranging from fertilizer materials, hides and skins, soap, glue, and glycerine, animal oils and oleomargarine, to biological extracts and pharmaceutical products which require highly specialized methods in manufacture. Glycerine, for instance, is not only a raw material for the manufacture of a number of products, but also industrial demands for glycerine are constantly expanding. It is used in large quantities in the manufacture of explosives, cellophane, synthetic resins, and antifreeze solutions. A recent use that is rapidly growing in importance is that of reacting glycerine with phthalic anhydride for the production of synthetic resins of the alkyd group. Although most of the glycerine produced in the United States is a by-product of soap making, it can be produced in large quantities from propylene, one of the abundant refinery gases available from cracking operations.

Vegetable oils, especially cottonseed oil, constitute highly important raw materials on the one hand as industrial materials for the manufacture of edible fats such as cooking "compounds" and margarine, as well as soap manufacture, and, on the other hand, their by-products are important as high-quality concentrated feedstuffs in great demand by the livestock industry. It should be emphasized that the vegetable oils industry is and will continue to be one of the outstanding groups of modern agricultural, commercial, and industrial enterprises, not only in the United States but from a world point of view as well. This is an industry that will receive increasing attention, particularly in Texas and the South, in the near future.

Vegetables and fruits, especially citrus fruits, are produced in quantity and of a quality to justify considerable expansion in the canning industry in the State and at the same time justify important developments in the frozen foods industry. A recent announcement states that California Packing Corporation, a subsidiary of Del Monte Company, will build a \$500,000 canning plant at Crystal City, Texas.

Texas possesses adequate possibilities as well as material advantages for a substantial expansion of its dairy products industries.

Without going into detail, it should be emphasized that agricultural crops are being utilized increasingly as industrial raw materials. For instance, it may be surprising to note that industrial uses of corn in recent years have consumed around 130,000,000 bushels annually of that crop.

The production of chemicals and explosives during the war consumed large quantities of corn starch. Corn starch is used in large amounts by the aluminum industry in which it is employed as a flotation agent for the concentration of alumina, the substance from which aluminum is made. Large amounts of corn starch are used in the production of pharmaceuticals, in the manufacture

of paper, of textiles, as well as for adhesives. The corn syrup industry alone consumes some 25,000,000 bushels of corn.

The vast quantities of corn-steep liquor from distilleries have proven invaluable in the production of penicillin.

Cellulose from wood as well as from cotton linters is a highly important industrial raw material; it is likewise one of the oldest used chemical raw materials. Conventional uses of wood pulp for the manufacture of papers of various types promise much in the way of expanding industries in the State. In addition, as has already been mentioned, there is the important field of dissolving pulps for the rapidly growing rayon industry as well as for other uses, of which the production of the plastic material, ethyl cellulose, is certainly an important industrial possibility in Texas. Ethyl cellulose plastics (Ethocel of Dow, Lumarith E. C. of Celanese, and Hercules' Ethyl Cellulose) require ethyl chloride for their manufacture. Ethyl chloride is made in large quantities from ethylene and hydrogen chloride. Methyl cellulose is still another promising cellulosic product; methyl chloride is used in its production. One process used in the preparation of methyl chloride is by chlorination of methane.

The forest resources of East Texas were summarized in 1943 by E. L. Demmon, then Director of the Southern Forest Experiment Station as follows:

"According to the recently completed forest survey conducted by the U. S. Forest Service, the productive forest area of Texas, by forest type and condition, was classified as follows (for 1935):

| Forest Type           | Old Growth       | Second Growth | Reproduction and clear cut | Total  | Per Cent |
|-----------------------|------------------|---------------|----------------------------|--------|----------|
|                       | —Thousand acres— |               |                            |        |          |
| Longleaf              | 128              | 513           | 290                        | 931    | 9        |
| Shortleaf-loblolly    | 378              | 5,825         | 126                        | 6,326  | 60       |
| Upland hardwoods      | 259              | 1,051         | 112                        | 1,422  | 13       |
| Bottom-land hardwoods | 698              | 1,138         | 38                         | 1,874  | 18       |
| Total                 | 1,460            | 8,527         | 566                        | 10,553 | 100      |
| Per Cent              | 14               | 81            | 5                          |        |          |

"The total merchantable wood volume in Texas, classed either as saw timber or cordwood, on January 1, 1939, was as follows:

| Tree species group           | Saw Timber (1)<br>Million foot b.m.<br>(lumber tally) | Cordwood (2)<br>Thousand cords |
|------------------------------|---|--------------------------------|
| Pine                         | 19,290  | 73,189                         |
| Hardwood (including cypress) | 10,336  | 55,084                         |
| Total                        | 29,626  | 128,273                        |

(1) Pine 9 inches and larger, and hardwoods 13 inches and larger, in diameter, at breast height.

(2) All trees 5 inches in diameter and larger, at breast height, whether saw-timber size or under; excludes culls and hardwood tops and limbs.

These forests today are characterized by second-growth timber, much of it below the minimum size for most industrial uses. While these young forests do not have the high quality of the original old-growth stands, they are of sufficient good quality to supply most market needs."

Considering the area in forests as well as their location and availability, Demmon summarized the situation as

follows: "After many years of exploitation and clearing of forest land for farms, the commercial forest of East Texas still occupy almost 11 million acres, or about 57 per cent of the land area. Actually, this exceeds by 3 million acres the total acreage of the State's principal farm crop, cotton. Forests are found in every section of East Texas with the exception of the tidal marshes along the Gulf of Mexico. Road, rail, and water transportation facilities are entirely adequate. Logging operations are relatively simple; as a result of the construction of highways and improvements in motorized equipment, transportation of logs and lumber by truck has become common and is rapidly increasing in importance."

In connection with the production of agricultural raw materials, it should be borne in mind that the farm and livestock industries in turn constitute large markets for such products as insecticides, spray materials, chemical fertilizers, and the like as well as medicinals for treating animal diseases. For instance, it is reported that the first unit (the reported cost of which is \$2,500,000) of the new du Pont chemical plant to be built on the Houston-Galveston canal near La Porte will manufacture the chemical, phenothiazine, to be used in treating livestock for internal parasites. This plant will also produce new organometallic fungicides as well as disinfectants used in agriculture.

Also, it should be noted that Southern Acid and Sulphur Company, Inc., is operating a plant on the Houston Ship Channel. This plant, built at a reported cost of \$3,500,000, produces normal and triple super-phosphate, at a rated capacity of 250,000 tons a year. The same company operates a sulphuric acid plant at Port Arthur and another one at Beaumont, the latter having a capacity of 87.5 tons a day. This plant regenerates spent sulphuric acid into fresh sulphuric acid.

#### NON-METALLICS (OTHER THAN OIL AND NATURAL GAS)

In addition to their common and conventional uses, which are indeed of wide extent, non-metallics are of special significance industrially because upon their utilization is built the vast industry of inorganic chemicals production.

Texas is particularly fortunate both in the wide array of non-metallics which it possesses and in the vast to substantially large reserves it has of many of them, such, for example, as sulphur, common salt, limestone, dolomitic limestones, clays for the production of cement, tile, and brick, clays used in drilling fluid, as well as gypsum deposits, building stone, bleaching and filtering clays. To this list may be added sand and gravel materials, large deposits of which occur in many parts of the state, as well as caliche which is plentiful as surface or near-surface deposits in West and South Texas. Still another material is volcanic ash, deposits of which occur particularly in Catahoula, Jackson and Fayette formations of the Gulf Coastal Plain, as well as in numerous localities in the Trans-Pecos and in many areas on the High Plains, where they are found in filled-in lake deposits.

Geologically considered, non-metallics including oil and gas occur as or in the sedimentary rocks of the earth's crust. A scientific perspective of the non-metallic re-

sources requires therefore an understanding of the field of stratigraphic geology.

#### CHEMICAL MINERALS

*Salt.* Common salt not only is the preponderant mineral constituent of sea water but it is also the principal mineral of those sedimentary deposits laid down from the desiccation of lakes and seas of the geologic past. This common substance is an essential raw material for the establishment of a whole group of heavy chemical industries. Large deposits of common salt, which is made up chemically of sodium and chlorine, are present in Texas in abundance.

Large masses of salt occur in the numerous salt domes of the Coastal Plain in Texas and Louisiana, in the salt-dome belt of country along the coast as well as interiorward in the inner salt-dome basins, as at Grand Saline, in East Texas. Vast deposits of common salt also occur along with other evaporites in the Permian basin of West Texas.

The total quantity of salt produced in the United States during 1944 amounted to 15,717,171 short tons, valued at \$45,989,264. Of this total, evaporated (manufactured) salt amounted to 3,942,621 short tons; rock salt, 3,448,238 short tons; and salt produced in brine, 8,326,312 short tons.

Texas accounted for 7 per cent of the total salt sold or used by producers in the United States during 1944. The Texas total amounted to 1,147,397 short tons, valued at \$3,627,528. The corresponding Texas figures for 1943 were 1,127,854 short tons produced, valued at \$3,610,532.

In 1944, Texas shipments of evaporated salt amounted to 566,273 short tons and of rock salt, 243,388 short tons.

During 1944, only the much older salt producing States of Michigan, New York, Ohio, together with Louisiana, exceeded Texas in the production of salt.

Chemical manufacture consumes the largest portion of salt produced; in 1944, the chemical industry consumed all the salt of brine and 35 per cent of the dry salt produced in the United States. One of the new industrial uses of salt is in the manufacture of synthetic rubber. Exclusive of chlorine, the synthetic rubber industry used 140,000 short tons of salt during 1944.

As is well known, large quantities of salt are used in the preparation of foods as well as for preserving, curing, and pickling purposes. It is also consumed in large amounts by livestock. In addition, salt is used in numerous industrial, chemical, and metallurgical processes and as a refrigerant as well. As has been noted, its largest use is as a raw material in the chemical industry, in which its consumption is expanding rapidly.

As a chemical raw material the significance of common salt could hardly be over-emphasized; from this substance, caustic soda (sodium hydroxide), soda ash (sodium carbonate), chlorine, sodium chlorite, and metallic sodium are produced. Calcium chloride is a by-product of the Solvay process for the manufacture of soda ash. Large and complicated plant equipment is required for the modern production of alkalis and chlorine. Production operations are concentrated in a relatively few plants. Owing to the low unit values of

these products, two factors of economic importance are of primary concern in the location of alkali plants: abundant raw materials, fuel and power, on the one hand, and low-cost transportation for the shipping of the products to the consuming markets on the other hand.

In volume of production, the heavy alkalies and the co-product, chlorine, rank second only to the mineral acids in the chemical industry; as to value of output, they have been outranked in the past only by the finished products of the coal-tar industry.

Soda ash is considered the most important of the alkalies; also, it is a low-cost product.

One of the large uses of soda ash is in glass making, which in the pre-war years took a little more than 25 per cent of the total output; nearly 25 per cent of the soda ash produced went into the manufacture of caustic soda, and slightly more than 20 per cent was consumed in the manufacture of other chemicals. Nearly 10 per cent was used in soap making. As noted later in this paper soda ash is also used in the manufacture of synthetic salt cake.

Both caustic soda and chlorine are being made in increasing quantities by electrolysis of brine; caustic soda can also be made by the direct conversion of soda ash through the lime-caustic process, in which a solution of soda ash is reacted with lime, either in the form of milk of lime or as quick lime. Caustic soda ranks second in importance among the alkalies. Although more costly than soda ash, caustic soda is used wherever a concentrated alkali is required. Large consumers of caustic soda include soap making and rayon manufacture, as well as for the production of cellulose film, pulp, and in petroleum refining; large quantities are also consumed in the manufacture of other chemicals, such as many of the organic chemicals, as well as in the production of alumina from bauxite, the raw material of aluminum.

Growth in demand for caustic soda and soda ash which now are highly standardized products is dependent upon expansion in the numerous consuming industries, which in turn pivots primarily about trends in general industrial activity.

Electrolysis of fused salt (solid salt melted by electricity) yields metallic sodium, with chlorine as a co-product. Chlorine is also a co-product of the Dow method of making metallic magnesium as well as in the manufacture of synthetic sodium nitrate, the latter being a commercial fertilizer product.

Sodium can be reacted with lead to form a sodium-lead alloy, which in turn is used in the manufacture of tetraethyl lead. Sodium is also used in the manufacture of dyestuffs, pharmaceuticals, including some of the "sulfa" drugs, sodium cyanide, sodium peroxide, as well as in the valves of many aircraft motors, where it serves as an efficient heat-transfer material.

Chlorine is also a low-cost industrial chemical. The versatility in the uses of chlorine not only in the chemical industry itself but also for various other purposes is amazing.

Chlorine production has grown tremendously during the war years; a large expansion in chlorine consumption, however, had developed before World War II. Production of chlorine in 1939 amounted to 485,554 tons; cur-

rent capacity for producing chlorine is said to be in excess of 1,500,000 tons. The bulk of the expanded capacity was built with Government funds, as chlorine is an essential war chemical.

Before the war about 65 per cent of the United States output of chlorine was consumed in the pulp and paper industry; some 20 per cent went to the textile industry and 10 per cent was used for sanitation purposes. It has been estimated that new uses for chlorine together with the expansion of other consuming industries will bring the annual requirements for this chemical to more than 1,000,000 tons in the immediate post-war period.

Chlorine has long been used as a process chemical in the manufacture of textile bleaches, pulp bleaches, and disinfectants, as well as for water treatment. It is estimated that during the war period pulp bleaching used about 20 per cent of the United States output of chlorine; another 20 per cent was consumed in the bleaching of textiles, in water purification, and in sewage disposal. The remaining 60 per cent was largely consumed in the manufacture of industrial chemicals of a wide range.

The point of emphasis is that chlorine has now become of vital importance as a chemical raw material; considerably more than half the United States output of chlorine is used in chemical manufacturing.

Chlorine is also an ingredient in hydrochloric acid and in hydrogen chloride, as well as in such compounds as zinc chloride, ammonium chloride (sal ammoniac), and barium chloride.

Still another rapidly growing group of chemicals using chlorine comprises the chlorinated hydrocarbons, including ethyl chloride (used in the manufacture of tetraethyl lead), methyl chloride (made by reacting methanol and hydrochloric acid), methylene chloride (used as a refrigerant in air conditioning), as well as chloroform, carbon tetrachloride, and trichlorethylene. It may be surprising to note that such chlorinated hydrocarbons as hexachloroethane and perchloroethylene as well as carbon tetrachloride are being produced in Texas by the Dow Chemical Company at Freeport. It is reported that Dow plans to produce both methyl chloride and methylene chloride at Freeport.

Another type of chlorinated hydrocarbons include the polyvinyls, such as polyvinyl chloride, as well as polyvinylidene chloride; in the production of the intermediates for these substances, ethylene is reacted with chlorine.

Still other chlorinated hydrocarbons include intermediates used in the manufacture of Neoprene and Thiokol types of synthetic rubbers.

As to increasing demands for chlorine in the near future the indicated large expansion of the pulp and paper industry—a large proportion of which will be in the South—is expected to take increasingly large amounts of this chemical. Owing to their advantages in bleaching paper pulp as well as rayon, celanese, and cotton, the consumption of sodium chlorite and its derivative, chlorine dioxide, is expected to increase considerably.

Furthermore, increased use of chlorinated hydrocarbons for solvents and other compounds, and the indicated replacement to some extent at least of styrene by dichlorostyrene for the manufacture of GR-S type

of synthetic rubber as well as some plastics will still further expand the demands for chlorine. In this connection, mention should be made of the use of chlorine in the new group of synthetic resins known as the silicones. One of the raw materials for the final synthesis of the silicones is silicon tetrachloride.

The rapidly growing demand for chlorine during recent years has resulted in a large increase of the electrolytic process wherein an aqueous solution of common salt simultaneously yields caustic soda in solution and chlorine and hydrogen as gases. Currently, about 55 per cent of the caustic soda output of the United States is made by electrolysis of brine; the other 45 per cent is made from soda ash.

All of the soda ash producers in the United States also make caustic soda by electrolysis. Hercules Powder Company, Gull Kemming Company and 15 pulp plants also have their own electrolytic plants, consuming the entire product themselves.

The future of chlorine production in Texas and the Gulf Southwest is largely tied in with the expansion of pulp and paper production in the South and with the possibilities for expansion of the manufacture of synthetic organic chemicals in the Gulf Southwest.

**Bromine.** The extraction of bromine from Gulf waters at Freeport, Texas, is being carried on by the Dow Chemical Company. Two thousand gallons of sea water contain about one pound of bromine; the oceanic supply is inexhaustible. Chief use for bromine is in the production of ethylene dibromide, an ingredient of Ethyl Fluid used in Ethyl gasoline.

Bromine production in the United States during 1924 was approximately 2 million pounds; by 1931, the output was 9 million pounds, all extracted from natural brines and bitterns.

The rapid rate of increase indicated was due to the accelerated demand for bromine for making ethylene dibromide, a necessary constituent of tetraethyl lead, an ingredient of high-octane gasolines.

When it became apparent, in the light of the rapidly growing demand, that the then available sources of bromine would be inadequate to meet this demand, attention was given to obtaining bromine from other sources. Although the bromine content of sea water is less than 70 parts per million, yet a cubic mile of sea water contains the large amount of 600,000,000 pounds of bromine. The problem then became that of the effective extraction of bromine from the dilute solution in which it occurs in sea water.

The Ethyl-Dow Chemical Company was incorporated in July, 1933 and in 1934 this company built the Ethyl-Dow plant at Kure Beach, near Wilmington, North Carolina; soon thereafter, this plant was extracting 15,000 pounds of bromine daily from sea water. In 1938, it was reported that this plant produced 1,343,000 gallons of ethylene dibromide.

In March, 1941, the first of two Ethyl-Dow units went into operation at Freeport, Texas. The second unit began to operate on April 11, 1944. This plant is now the world's largest producer of ethylene dibromide. The capacity of this plant is 64 million pounds annually and the Freeport plant supplies 60 per cent of the ethylene dibromide produced in the United States.

**Sodium sulphate**, or salt cake, occurs in brines in alkali lakes or in brines slightly underground in several counties of the southern High Plains in West Texas. From these brines is produced salt cake which is important as a process chemical in the manufacture of kraft pulp and as an ingredient in glass making. Sodium sulphate is produced by the Arizona Chemical Company at plants near O'Donnel in Lynn County, and near Brownfield, Terry County, and by the Ozark Chemical Company in a plant south of Monahans in Ward County.

For several years Mathieson Alkali Works has been producing "synthetic salt cake" at its Lake Charles, Louisiana, plant. Synthetic salt cake is a sintered mixture of soda ash and sulphur in proportions of about 10 parts of soda ash to 3 of sulphur. Synthetic salt cake is consumed entirely in the making of kraft pulp, which, of course, is the principal process employed in pulping Southern pines.

**Lime** is a raw material of great importance in the chemical industry. It is the lowest cost form of alkali. Limestone, for example, is an essential primary material in the Solvay or ammonia-soda process for making sodium carbonate, or soda ash. It is the source of the carbon dioxide which upon combining chemically with the sodium forms sodium bicarbonate; it also provides the lime with which the process ammonia is recovered, the recovery of ammonia for reuse over and over again being the key to the entire operations of the Solvay process. Lime is also a necessary process chemical in the direct conversion of soda ash to caustic soda by the lime-caustic process. Lime is also a process chemical used in the extraction of magnesium from sea water. In the form of soluble calcium hydroxide it is used to convert the soluble but dilute magnesium chloride in sea water to insoluble magnesium hydroxide which can then be precipitated and concentrated for the next stage of the process.

Lime is made by calcining, or heating limestone or dolomite in a kiln. Total sales of lime by producers in the United States during 1944 amounted to 6,473,563 tons, having a value of \$48,698,162. Quick lime comprised 80 per cent of these sales; and hydrated lime, 20 per cent. Principal categories in uses of lime include agricultural lime, lime for building purposes, chemical and industrial uses, and dead-burned dolomite. Chemical and industrial uses of lime include a wide range of fields, such as metallurgical (steel fluxing material, and ore concentration), paper mills, water purification, carbide and cyanamide production, glass works, insecticides and disinfectants, tanneries, and sewage disposal.

Limestone in adequate quantities and of a grade suitable for producing lime is present in numerous localities in the central and western portions of the State, from both Lower and Upper Cretaceous and various Paleozoic formations. Lime plants, in which limestone is calcined, occur in Travis, Williamson, Dallas, Coryell, Comal, and El Paso counties. According to the Bureau of Mines, Texas had 8 active lime plants in 1944. These produced 94,923 short tons having a value of \$757,141. The corresponding figures for 1943 were 132,167 tons produced and the value, \$1,034,355.

Oyster shell dredged from shallow lagoons and bays along the Gulf Coast is being used increasingly as a

source of lime. Oyster shell is used in the lime plant of the Dow Chemical Company at Freeport.

*Dolomite*, a rock made up of calcium carbonate and magnesium carbonate, occurs in large quantities in the Ellenburger formation and has been mined in Burnet County.

Lime is used in the building trades, in the pulp and paper industry, in chemical industries, as well as in tanning operations and sugar refining, and also as a soil amendment.

Limestone and clay are the main raw materials used in Portland cement manufacture. Limestone is an important ingredient in the manufacture of glass. It is also used in blast furnace operations in the steel industry.

Lime has a multitude of uses in the chemical industry, as it either forms a part of, or enters into, the manufacture of innumerable products; for most of these uses substitution of some other material is difficult or impossible. The demands for lime for chemical and industrial purposes in 1944 comprised the largest category of general uses; that chemical lime will play an important part in the broadly expanding post-war industrial program is, of course, not questioned by those who are in a position to know current trends in the industry.

*Sulphur*. Sulphur is one of the outstanding raw materials of the chemical industry, due to the fact that sulphur compounds enter extensively not only into various sorts of processing chemicals but also into the chemical composition of many industrial chemicals. Native sulphur occurs in large quantities in the cap-rock formations of certain salt domes of the Texas-Louisiana coast country. These cap-rock formations consist of limestone, gypsum and anhydrite, with salt beneath in the salt-core. Oil also occurs in many of the caprock formations but only a relatively few of the known salt domes have sulphur deposits of commercial magnitude. Among these are Boling Dome, at Newgulf, Wharton County; Hoskins Mound near Freeport in Brazoria County; Clemens Dome, at Brazoria, Brazoria County; and Orchard Dome, at Orchard, Fort Bend County. The sulphur deposits at Bryan Mound, near Freeport, have been exhausted. In Louisiana, sulphur is obtained from Grand Ecaille, Plaquemines Parish, and the St. Elaine Dome, Terrebonne Parish, has been explored by drilling. Incidentally, it is of importance to note that the mining of sulphur by the Frasch process requires large quantities of water, which in turn consumes large amounts of natural gas for heating purposes.

Total production of native sulphur in the United States for 1944 was 3,218,156 long tons; the corresponding figure for 1943 was 2,538,786 long tons. All of the native sulphur is supplied by two States, Texas and Louisiana. In 1943 Texas produced 1,908,581 long tons, or 75 per cent of the total for the United States; Louisiana produced the remaining 25 per cent.

The main use of sulphur, quantitatively considered, is in the manufacture of sulphuric acid, one of the most important of the so-called heavy chemicals. Sulphuric acid, one of the most widely used chemicals, is the most important of the mineral acids. Sulphuric acid,

caustic soda, and soda ash have been called the drayhorse chemicals. They have been the "Big Three" of the heavy inorganic chemicals. These chemicals are characterized by large tonnage production and low prices per unit of volume.

Because sulphuric acid is a low cost product and in addition in order to minimize transportation costs, sulphuric acid manufacture is localized, the production being carried on near the consuming industries.

In the pre-war years the annual output of sulphuric acid was around 8 million tons a year; of this volume, a fourth was used in the manufacture of commercial fertilizers; a fourth was used in oil refining operations; another fourth went into metallurgical industries; and the remaining fourth into the manufacture of a variety of substances, including chemicals, rayon and textiles, paints and pigments, and explosives. In 1943 the United States consumed 13,917,000 short tons of sulphuric acid (expressed as 50 deg. B). In that year the fertilizer industry led in consumption, followed by chemicals, including explosives, with petroleum refining and iron and steel next in order.

Some 70 per cent of the native sulphur output of the United States goes into sulphuric acid production; about 20 per cent is used to make sulphurous acid, which is largely consumed in the pulp and paper industry.

Not all sulphuric acid, however, is made from native sulphur. Considerable amounts are made from pyrites and also by various mining companies as a by-product of smelter gases from treating sulphur-bearing ores, such as sulphides.

The use of sulphur is indispensable in the vulcanization of rubber. Sulphur is used in the chemical manufacture of wood pulp, by both the sulphite and the sulphate (kraft) processes. It is also used both as an ingredient and as a process chemical in making Thiokol, one of the groups of synthetic rubbers.

In regard to sulphur reserves, the late Dr. Donald C. Barton some years ago conservatively placed the estimates for the Texas Gulf country at 35 to 50 million tons, and for Louisiana about 20 million tons. The *Manchester Guardian Commercial* of April 14, 1939, in an article on sulphur stated: "The world's known reserves of native sulphur are estimated at about 180,000,000 tons, of which about four-fifths are accounted for by Texas and Louisiana."

*Potash*. Large deposits of potash salts are known to occur in various parts of the Permian basin in southeastern New Mexico and West Texas. Present production of potash from these deposits is located near Carlsbad, New Mexico. The chief potash mineral in the Texas portion of the Permian basin is polyhalite and the chief polyhalite deposits are in Ector, Midland, Crane, Upton, Crockett, and Irion counties.

Potash deposits, like deposits of gypsum and common salt, are evaporites laid down in desiccating seas from which tremendous quantities of water were evaporated.

In the evaporation of sea water, the evaporites are precipitated not all at once but certain ones are laid down at definite stages in the concentration of the solutions in the evaporating waters, the sequence being

known as selective precipitation. The first compound to be precipitated is calcium carbonate; this is followed by calcium sulphate (gypsum) and then by common salt; last of the compounds to be precipitated, on complete evaporation of the solution, are those of potassium and magnesium.

#### INDUSTRIAL AND MANUFACTURING MATERIALS OTHER THAN CHEMICAL MINERALS

*Glass sands.* Sandstones are sedimentary rocks consisting mainly of quartz grains. The primary source of these quartz grains is the weathering of such igneous or metamorphic rocks as contain quartz as one of their commonest minerals.

Texas has considerable quantities of sands suitable for making certain kinds of glassware; one of these areas is that of Santa Anna in Coleman County, in which the sands occur in the basal beds of the Comanchean series.

Sands occur elsewhere in the State, such as in the Carrizo and Queen City formations of Eocene age, although many of them are known to have a fairly high iron content.

Glass sand is a comparatively pure form of silica. Silica (silicon dioxide), the foundation raw material of the glass industry, comprises around 50 per cent of the total raw materials used in commercial glass manufacture.

Ball Brothers' glass plant at Wichita Falls obtains its sand from Oklahoma. Siliceous sands of high purity occur abundantly in outcrops of the Simpson formation of Ordovician age in the Arbuckle Mountains.

The plate-glass plant of Libby-Owens-Ford at Shreveport, Louisiana, obtains its sand from Guion, Arkansas, at outcrops of the St. Peter sandstone which also is of Ordovician in age.

It is reported that the Owens-Illinois glass plant at Waco obtains its glass sands from Missouri and Arkansas.

Pure sand is mostly silica and silica is coming to be increasingly important as a chemical raw material. Sodium silicate is one of these chemicals. A large use of sodium silicate is as a low-cost mineral adhesive in the machine manufacture of corrugated paper shipping cases, which have largely displaced the once-ordinary wooden box. Sodium silicate is used in large tonnages in the manufacture of laundry soap. It is also used in water softening, in making refractory cements, and in other chemicals. It is also used in welding operations—in the fabrication of ships, trucks, and weapons. Sodium silicate is the raw material used in the manufacture of silica gel, used as a catalyst in the making of ingredients for synthetic rubber and aviation gasoline.

A still newer use of silica is in the manufacture of the recently developed silicones which are used in making certain types of plastics as well as in one of the newer synthetic rubbers; silicones can also be prepared as lubricants.

*Clays.* The primary origin of clays is from the weathering of those igneous rocks which have a high proportion of feldspathic constituents. Clays occupy a predominant place in sedimentary rocks as a whole, being even more

abundant than sands and sandstones. Limestone, by way of contrast, is less abundant in the geologic column than either sandstones or clays.

Clays are not minerals in the strict sense of the term; they consist of an aggregate of minerals and colloidal materials. Clays are formed by the chemical decomposition of aluminous rocks through weathering. Clays have a wide variety of industrial uses, and those uses are constantly expanding. Of the 17,295,328 tons of all clays sold or used in the United States in 1944, about 40 per cent was consumed in heavy clay products, 31 per cent in refractories, 16 per cent in Portland cement, 3 per cent in paper, and 2 per cent in pottery. The remaining 8 per cent went into numerous other uses. Although the heavy clay products industry, which includes fire clay together with stoneware clay and miscellaneous clay, operated at only a small fraction of its capacity in 1944, it is expected to step up operations rapidly once the post-war building program gets well under way. Clays employed in specialized industrial uses fared very well in 1944. The chief types of clay, data on the production and utilization of which are supplied by the Bureau of Mines, include kaolin, or China clay, ball clay, fire clay and stoneware clay, bentonite, fuller's earth, and miscellaneous clay.

China clays, originally used almost entirely in making pottery, are now used in a wide variety of industries. This form of clay results primarily from the decomposition (kaolinization) of granitic rocks in which the feldspar is transformed through the action of water and carbon dioxide into a hydrated silicate of alumina.

In Texas, China clays are found in Jeff Davis County in the Trans-Pecos and in Real County in the Edwards Plateau. The deposit in Jeff Davis County has been formed, according to Dr. E. H. Sellards, by the decomposition of igneous rocks through hydrothermal alteration. The deposits near Leakey in Real County, occur in "sinks" in the Edwards limestone, but the nature of their origin is not known.

Chief use of China clay in 1944 was in the paper industry which consumed 516,602 short tons as filler and for coating purposes; next came refractories in which a variety of uses consumed 103,843 short tons. Pottery and stoneware consumed 83,904 short tons; miscellaneous uses accounted for 60,540 short tons. The rubber industry took 59,588 short tons, the paint industry 17,415 and cement manufacture, 15,335 short tons.

Clays suitable for making building brick and tile are found in all the Texas regions.

The Wilcox formation of the Eocene in the Gulf Coast Plains not only contains large quantities of clays which are utilized in conventional clay-using industries, such as brick, hollow tile, and sewer pipe, but it also is a source of refractory clays which are used in making fire brick. Texas produced 104,771 short tons of fire clay in 1944. According to the Bureau of Economic Geology, The University of Texas, the Wilcox formation of the Gulf Coastal Plain probably possesses more valuable clays than any other geologic formation in the State.

*Bleaching clays.* Bleaching clays, as distinguished from burning clays, include fuller's earth and bentonitic-type clays.

The term, fuller's earth, does not imply any particular chemical composition. In the Bureau of Mines usage, fuller's earth is a mineral substance resembling clay and having physical properties which give it a high capacity for adsorbing and thereby removing basic colors from petroleum products or vegetable oils. The Bureau of Mines classes as fuller's earth all natural bleaching or filtering clay-like materials which have a high adsorptive capacity without having to be chemically treated in order to render them activated. Activation through treatment with an acid, commonly sulphuric, is practiced with some clays in order to achieve the highest bleaching efficiency possible, and such clays often belong to the bentonitic type.

Although the production of fuller's earth became important in Texas only since 1920, this material has been in commercial production in the State since 1907. For years, however, practically all of the fuller's earth consumed in Texas was obtained from elsewhere, principally from Georgia and Florida.

The petroleum industry became really interested in Texas fuller's earth production in the early 1920's. Two plants were built at Riverside, Walker County, one in 1921, the other in 1923. These plants have been in operation since. One of these plants is owned by Continental Oil Company; the other, by the Texas Company. Both have large reserves of the raw materials. Activated clay did not become important until around 1926. A large plant for producing this clay was built soon thereafter near La Grange in Fayette County, and is operated by the Texas Company. The raw material is a bentonitic-type clay which is acid treated to transform it into activated clay.

Bleaching clays (fuller's earth or bentonitic clays) occur in the upper Claiborne and other Tertiary formations in the Gulf Coastal Plain of Texas. Specifically, the formations in which these clays occur are the Fayette, of the Jackson group, and the Catahoula which is considered by many geologists to be of Lower Miocene age. Deposits of bleaching clays and volcanic ash of late geologic age also occur in lake deposits on the High Plains. A plant at Silvertown utilizing these clays has been operating for several years.

Bentonite is a clay derived from the alteration of volcanic ash; its main constituent is the clay-mineral, montmorillonite. A bentonitic clay has been produced from the Taylor formation in Bexar County, near San Antonio; this plant, however, was dismantled years ago.

Bentonitic clays also occur in the Trans-Pecos—in the southern part of Green Valley in Brewster County as well as in the belt of Tornillo clays which surround the Chisos Mountains in the Big Bend country.

Since the overburden is thin and unconsolidated, open pit operations are employed in the production of bleaching clays. Fuller's earth deposits may be as much as 16 feet in thickness; usually, however, they are not more than 10 feet.

Production of fuller's earth in the United States had been declining for nearly ten years prior to 1941. Since then, however, the trend has been reversed. The 1943 output was nearly double that for 1940; the production in 1944 was still higher than for 1943.

Texas has been for several years the principal producer of fuller's earth; in 1944, Texas accounted for 38 per cent of the total United States output. In tonnage, Florida and Georgia together produced somewhat more than Texas; their combined production, however, was valued at more than double that for Texas.

In 1944, of the 294,737 short tons of fuller's earth produced in the United States, and which were valued at \$3,297,000, 61 per cent of the tonnage was consumed in petroleum refining operations, 8 per cent in vegetable oil refining, and 31 per cent in such various applications as rotary drilling mud, in foundries, as well as for filtering and clarifying purposes.

Texas production of bentonite has been around 25,000 short tons for some years. Activated bentonitic clays are reported to be a more effective oil filter than are naturally active clays. Bentonitic clays are versatile materials widely used in oil refining, foundries, and as drilling mud in rotary drilling. The following statement from Mineral Market Report No. 1336, Bureau of Mines, August 4, 1945, concisely summarizes the situation as regards this material: "Although consumption in nearly all uses was well maintained, the principal expansion was in rotary drilling mud. Bentonite owes its growth in this market not only to the increase in the number of holes drilled but also to the greater average depth and to the relatively higher proportion of holes drilled with rotary rather than cable equipment. Consequently, whereas in 1944 about one-third more oil wells were drilled than in 1943, 76 per cent more bentonite was consumed in drilling mud." Bentonitic clays suitable for drilling mud are widely distributed in Texas.

For the United States as a whole, the production of bentonite has been steadily rising since 1940. In 1940 the United States output was 251,032 short tons; in 1944, it was 546,399 short tons. Texas production of bentonite increased from 14,399 short tons in 1940, valued at \$127,949, to 24,081 short tons in 1944, valued at \$216,861.

According to Dr. E. H. Sellards, diatomaceous earth—which chemically is not a clay—is found in Pliocene and Pleistocene beds in fresh water lake deposits in Crosby County in the High Plains. Diatomaceous earth, or diatomite, is very porous and extraordinarily light in weight. It is an accumulation of vast numbers of the siliceous shells of diatoms, which are microscopic in size. Its main use is as a filter; it also has excellent insulating qualities.

*Feldspar* occurs in considerable quantities in the pre-Cambrian rocks of the Llano Uplift, as well as in the Van Horn mountains of the Trans-Pecos regions. Feldspar is used in relatively small quantities as a raw material in glass making.

*Graphite* occurs in certain schists of the Llano Uplift.

*Fluorspar* is known to occur in the Trans-Pecos, in the Eagle Mountains in Hudspeth County. Chief consumer of fluorspar is the steel industry, where it is used in the basic open hearth process. Much smaller quantities are consumed by the glass and enamel industries, and still smaller miscellaneous uses are of wide extent. Second to steel as a consumer of fluorspar is the hydrofluoric acid industry. A strategic new use of hydrofluoric acid

is that of a catalyst in the alkylation process, which became the keystone in the manufacture of aviation gasoline during the war. Another important use is that of employing hydrogen fluoride in the manufacture of Freon-12, which possesses ideal properties as a refrigerant liquid in air-conditioning units as well as in domestic refrigerators.

*Lignite.* Considerable quantities of lignite occur in certain Tertiary formations, especially the Wilcox, of the Gulf Coastal Plain. Lignite is used as a fuel, but at present its importance is largely as a reserve material.

"Darco," an activated carbon, has been produced in the Darco plant near Marshall for more than 20 years, using lignite as the raw material. This is the only plant in the United States manufacturing activated carbon from lignite. The principal use of activated carbons is in the refining of sugar, including corn sugar or glucose. Activated carbons are also used in treating water for municipal use as well as in the removal of color and odor from solvents employed in dry-cleaning operations; it recovers the solvent vapors some of which are objectionable and all of which would otherwise be lost. It is also used in decolorizing vegetable oils prior to their being hydrogenated.

The Darco plant also produces a type of carbon from wood charcoal made from fresh sawdust which is used in the production of penicillin.

*Helium.* From the standpoint of its world occurrence, helium is indeed a rare gas. It is characterized by extreme lightness of weight, its lifting power being slightly less than that of hydrogen. Although this inert, nonflammable gas occurs in natural gas fields, the origin of helium is entirely different from that of natural gas. Certain portions of the Panhandle natural gas field, such as the Cliffside structure, has gas containing upwards of one per cent helium. Presumably, the Panhandle field contains the largest reserves of helium in the world. The entire production of helium is controlled by the Bureau of Mines; the Government owns the 50,000-acre Cliffside natural gas field in the Panhandle from which helium gas has been extracted since April, 1929.

The Government built four new helium plants as a part of the Bureau of Mines \$16,000,000 wartime expansion—two in Kansas, one in New Mexico, and the fourth at Exell, Texas. It has been announced that current and future military needs will be met by the Exell, Texas, and Otis, Kansas, plants. The other Kansas plant at Cunningham is to be dismantled. The Amarillo plant will be closed temporarily. The 50,000-acre Cliffside field near Amarillo will be used as an underground storage reservoir into which helium produced from the Exell plant in excess of current demands will be stored. The Amarillo plant will continue to supply helium in cylinders for commercial use from a supply in storage and its operations will be resumed whenever its production is needed.

The Exell, Texas, and Otis, Kansas, plants not only embody the latest designs and the most modern production methods, but also these plants process commercial natural gas flowing regularly to domestic and industrial consumers, and "if the helium is not extracted as the gas flows through the pipelines en route to market, it is

irretrievably lost." In the meantime, the helium gas reserves of the Cliffside Field will be saved for future utilization.

Although the widely publicized use of helium is in the inflation of balloons and other lighter-than-air craft, helium has become of great importance for other purposes, especially industrial applications. The marketing of non-military supplies of helium is handled mainly by commercial distributors of compressed gases who maintain stocks of helium in cylinders in many cities of the country.

In addition to the medical uses of helium, there are many newly-developed industrial uses, one of the most important being in the welding of magnesium and its alloys—in which "the welding process is shielded by inert helium gas to cool the metal, control the inflammability, and improve the strength and quality of the weld."

A Bureau of Mines release of July 29, 1945, states: "For the current fiscal year the Congress has appropriated funds for Helium Utilization and Research and this phase of operation will be continued at the Cryogenic Laboratory at Amarillo, with the entire program under the general direction of Dr. C. W. Siebel, supervising engineer of the Bureau of Mines helium plants.

"It is expected that the research work under this program will involve the use of helium as a tracer gas in connection with studies of oil and gas reservoir conditions; shielded arc welding; heat treatment of steel in an atmosphere of helium, and other uses applicable to operations at industrial plants."

During the 1944 fiscal year a total of 2,187,205 cubic feet of helium went to commercial distributors from the Bureau of Mines producing plants; the corresponding figure for 1943 was 1,059,655 cubic feet.

*Carbon black.* The production of carbon black has risen to the status of an important industry. Practically all the carbon black produced in the United States is made from natural gas, owing largely to the cheapness and large supplies of natural gas; carbon black made from natural gas is also of higher quality ordinarily than that made from either oil or acetylene. Phillips Petroleum Company is making an improved carbon black—Philback—by the furnace process from a combination of oil and natural gas.

Since 1923 carbon black has been used increasingly in the compounding of rubber for use in tires; and the rubber industry normally takes 90 per cent of the total consumption.

Both production and sales of carbon black reached new peaks in 1944. Production in 1944 was 801,860,000 pounds, which was 35 per cent above the 1942 figure, and considerably above the former high of 1941.

Although output by channel black processes increased in 1944 after a 3-year decline, it was still 17 per cent below the 1940 figure.

Furnace black production continued to increase rapidly; in 1944 the output of furnace black amounted to 387,840,000 pounds which was 48 per cent of the total production, and was 81 per cent greater than the 1943 output.

All carbon black producing States except California registered a gain in 1944; the largest proportional increases were in Kansas and Oklahoma.

In 1944 carbon black plants burned 355.77 million cubic feet of natural gas—an increase of 13 per cent over the 1943 figure, as compared with an output increase of 35 per cent. This difference was due to the increasing production of furnace black, the method for producing the latter being a high-yield process. The average yield for all types of carbon black in 1943 was 1.88 pounds per thousand cubic feet; in 1944, this yield had risen to 2.20 pounds. The average value of natural gas used by all carbon black plants in 1943 was 1.62 cents per thousand cubic feet; the corresponding figure for 1944 was 1.47 cents. The average value of carbon black at the plants in 1943 (and 1942 as well) was 3.41 cents a pound; in 1944, the corresponding figure was 3.67 cents.

The total sales, including exports, of carbon black in 1944 amounted to 937,430,000 pounds; the corresponding figure in 1940 was 529,774,000 pounds, and for 1930 it was 251,539,000 pounds. Exports increased from 84,260,000 pounds in 1930 to 156,942,000 pounds in 1944.

Owing, however, to the shortage of carbon black, the War Production Board in 1944 approved new carbon black plants costing \$19,500,000.

The Bureau of Mines estimate for average annual for the 5-year period 1946-50, as of July 20, 1945, was 1,140,000,000 pounds.

The rise in consumption is due to the fact that synthetic rubber requires much larger quantities of carbon black than does natural rubber. Currently, 950 pounds of carbon black are required per ton of synthetic rubber for tires in comparison to 460 pounds per ton of natural rubber.

#### STRUCTURAL AND BUILDING MATERIALS

*Gypsum.* Gypsum, a calcium sulphate compound, is widely distributed over western Texas where it occurs as an evaporite deposit. Large deposits of gypsum occur in the Double Mountain group of formations of Permian age in West Texas. "They include as many as four or five layers of rock gypsum of workable size, besides having local accumulations of gypsite at the surface. Rock is mined mostly for Keene's cement and special grades of calcined plasters, whereas gypsite is preferred for ordinary wall plasters because of its plastic qualities." Gypsite is a surface accumulation of gypsum admixed with clay and marly clays. Gypsum deposits also occur in the Castile anhydrite which outcrops in Reeves and Culbertson counties east of the Guadalupe Mountains. Large quantities of gypsum are exposed in the Malone Mountains in Hudspeth County. Gypsum also occurs in the caprock of certain salt domes; it is mined from such at the Hockley dome, northwest of Houston, and at Gyp Hill, south of Falfurrias. For the United States as a whole, about 90 per cent of the total output is used in construction; it is calcined and then made into plasters, cements, wallboard and laminated board. Gypsum products are made in several plants in the Permian Plains country of West Texas. In this connection, announcement was

made in October, 1945, that National Gypsum Company is expanding its fiber insulation board plant at Rotan, Texas; a 25 per cent production increase is planned, costing \$300,000.

The total United States production of crude gypsum mined in 1944 was 3,761,234 short tons. The 7 active mines in Texas produced 344,936 short tons in 1943, valued at \$489,638. In 1944 Texas produced 237,461 short tons of calcined gypsum, valued at \$1,166,096.

*Cement materials.* The great growth in building construction and more especially the almost spectacular expansion of highway construction since World War I have created large demands for cement. Texas is well supplied with limestone, including oyster shell deposits, together with clays and marls, which provide raw materials in abundance for the production of Portland cement. The three cement plants in Harris County use oyster shell and local clays as raw materials. Cretaceous limestones and shales are used by the two plants in Dallas County, and by the plants at Waco, Fort Worth, and El Paso. The two plants in Bexar County use a natural cement marl which occurs in the Upper Cretaceous at the base of the Taylor marl formation.

The 10 active cement plants in Texas during 1943 shipped 9,177,392 barrels of cement valued at \$15,635,708; the corresponding figures for 1944 were 6,261,931 barrels produced, and valued at \$11,138,156.

National cement production reached an all-time high in 1942 with an output of more than 185 million barrels. Thereafter production declined rapidly.

Quoting from a statement issued by the Bureau of Mines, July 31, 1945: "The ruling of the Federal Trade Commission abrogating the basic point price system may lead to greater decentralization of cement plants or to the production of clinker only at the present large mills, with shipment of clinker to grinding mills nearer the established markets. A closer control of raw materials and more exact specifications will be expected for the postwar industry . . ."

The Bureau of Mines statement also pointed out that: "The industry is therefore ready to take advantage of the anticipated enormous postwar building program which the F. W. Dodge Corp. has estimated will exceed 15 billion dollars in the region east of the Rocky Mountains. Furthermore, the planned 3-year program of postwar highway construction exceeds 3 billion dollars."

*Stone and associated materials.* Texas possesses a wide variety of dimension stone, for use in building, ornamental, and other purposes, as in and adjacent to the Llano Uplift, where they occur in the pre-Cambrian and formations of the Lower Paleozoic particularly.

Limestones occur plentifully in the Lower and Upper Cretaceous as well as in some members of the Lower Permian. One particular occurrence of limestone suitable for building purposes is that of the "Cordova cream" or "Cordova shell" which is quarried near Cedar Park, Texas, in Williamson County, from a member of the Walnut formation of the Lower Cretaceous. Limestone has been extensively quarried for years along the Balcones Escarpment near New Braunfels.

Raw materials for the crushed stone industry also occur widely in the State. Caliche occurs in large outcrops in

certain sections of South and West Texas, and is extensively used as a road-making material.

Sand and gravel deposits suitable for construction and road building purposes occur in considerable quantities in various parts of the State; some sections of the State, however, are deficient in these materials. Gravel deposits suitable for commercial use occur in terraces bordering the major streams flowing across the Coastal Plain, as well as in such continental formations as the Goliad, the Uvalde, and the Seymour.

Dolomitic limestones occur in large quantities in the Ellenburger formation of the Early Paleozoic, in outcrops occurring on the flanks of the Llano Uplift.

Deposits of oil shales occur in the Barnett formation of the Mississippian in areas on the north flank of the Llano Uplift.

Asphalt rock occurs in several localities in Texas. Asphaltic limestone of the Anacacho formation of the Upper Cretaceous in Uvalde County has for years been quarried on a fairly extensive scale.

#### METALS

*Iron.* Considerable quantities of the so-called brown iron ores occur in portions of northeast Texas as near-surface deposits. These ores occur in association with outcrops of the Weches formation of the Eocene. The large amounts of scrap iron in Texas must also be considered as a highly important raw material for the steel industry.

*Mercury.* The Terlingua district in southern Brewster and southeastern Presidio counties of Trans-Pecos Texas has for years produced mercury in relatively small quantities.

*Magnesium.* The successful extraction through low-cost processes of magnesium metal from Gulf waters is, of course, an accomplished fact. Magnesium has also been produced in Texas from dolomite, quarried from formations flanking the Llano Uplift, by International Minerals and Chemicals Corporation, at the Defense Plant Corporation's plant at Austin.

The location of Dow's chemical plant at Freeport was deliberately chosen by the company as the sea coast site that best met the strict requirements of a plant to extract magnesium from sea water. The Freeport site met those requirements and in addition it was accessible to vast supplies of natural gas. Not only did the location have

these advantages, but also it had access to adequate supplies of lime, sulphur, and oil. Furthermore, both rail and water transportation facilities were available.

The first ingot of metallic magnesium was poured at the Freeport plant in January, 1941—the first instance in the history of the world that any metal had ever been extracted from sea water on a commercial basis.

The capacity of this plant was 18,000,000 pounds of metallic magnesium annually. The plant was designed to extract one cubic foot of magnesium from each 800 cubic feet of sea water treated. Shortly after the Freeport plant began operating, the Defense Plant Corporation asked Dow Chemical to build another plant, also of 18,000,000 pounds capacity.

Later still another magnesium plant was built by the Defense Plant Corporation at Velasco, Texas, which had a rated production capacity of 72,000,000 pounds annually.

Magnesium is one of the American industries producing basic materials that has been revolutionized by the war. Exclusive of private investments in this country, the Government has invested \$389,000,000 in magnesium production and fabrication facilities. Capacity for magnesium production expanded from 3300 tons a year in 1939 to 293,000 tons, of which 263,000 tons is Government-owned. Production of Texas magnesium plants prior to the cutback in January, 1944, was at the rate of 66,000 tons a year.

Estimates of post-war demand, 1946-50, have been put at 32,000 tons annually. It is evident that only the most efficient plants will be retained. The following statement is quoted from the *Industrial Bulletin* of Arthur D. Little, Inc., of September, 1945: "Magnesium cost at the most efficient DPC plant—that at Velasco, Texas—for the best three months was 12.1 cents per pound, excluding plant depreciation and interest on the investment."

There is no particular point in discussing the reserves of magnesium as those of the ocean waters are well-nigh inexhaustible, so far as any possible production program is concerned. It has been calculated, however, that each cubic mile of sea water contains 9 billion pounds of magnesium.

Part II of this article will emphasize petroleum and natural gas as sources of raw materials for industrial chemicals.

ELMER H. JOHNSON

## EMPLOYMENT AND PAY ROLLS IN TEXAS

October, 1945

|                                      | Estimated Number of Workers Employed* |                           | Percentage Change |                 | Estimated Amount of Weekly Pay Roll |                           | Percentage Change |                 |
|--------------------------------------|---------------------------------------|---------------------------|-------------------|-----------------|-------------------------------------|---------------------------|-------------------|-----------------|
|                                      | Sept., 1945 <sup>(1)</sup>            | Oct., 1945 <sup>(2)</sup> | from Sept., 1945  | from Oct., 1944 | Sept., 1945 <sup>(1)</sup>          | Oct., 1945 <sup>(2)</sup> | from Sept., 1945  | from Oct., 1944 |
| <b>MANUFACTURING</b>                 |                                       |                           |                   |                 |                                     |                           |                   |                 |
| <b>All Manufacturing Industries</b>  | 154,215†                              | 158,424†                  | + 2.7             | - 6.9           | \$4,929,757                         | \$4,574,459               | - 7.2             | - 27.2          |
| <i>Food Products</i>                 |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Baking .....                         | 11,301                                | 10,896                    | - 3.6             | + 1.8           | 568,640                             | 556,127                   | - 2.2             | + 36.9          |
| Carbonated Beverages .....           | 3,305                                 | 3,255                     | - 1.5             | - 11.4          | 105,823                             | 102,969                   | - 2.7             | - 7.5           |
| Confectionery .....                  | 1,308                                 | 1,220                     | - 6.8             | - 20.6          | 23,328                              | 22,563                    | - 3.3             | + 8.5           |
| Flour Milling .....                  | 2,537                                 | 2,562                     | + 1.0             | + 18.4          | 91,792                              | 94,270                    | + 2.7             | + 26.2          |
| Ice Cream .....                      | 1,538                                 | 1,431                     | - 6.9             | - 4.7           | 45,792                              | 41,803                    | - 8.7             | - 3.9           |
| Meat Packing .....                   | 5,177                                 | 5,137                     | - 0.8             | - 18.9          | 181,398                             | 178,855                   | - 1.4             | - 18.1          |
| <i>Textiles</i>                      |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Cotton Textile Mills .....           | 5,402                                 | 5,514                     | + 2.1             | + 10.7          | 141,576                             | 146,700                   | + 3.6             | + 21.6          |
| Men's Work Clothing .....            | 3,885                                 | 3,671                     | - 5.5             | - 8.3           | 64,691                              | 63,086                    | - 2.5             | - 14.6          |
| <i>Forest Products</i>               |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Furniture .....                      | 989                                   | 999                       | + 1.1             | - 15.5          | 36,279                              | 38,128                    | + 5.1             | + 11.9          |
| Planing Mills .....                  | 1,850                                 | 1,803                     | - 2.5             | + 5.8           | 61,353                              | 61,113                    | - 0.4             | + 11.1          |
| Saw Mills .....                      | 13,994                                | 14,076                    | + 0.6             | - 4.3           | 26,412                              | 25,395                    | - 3.8             | - 13.0          |
| Paper Boxes .....                    | 999                                   | 973                       | - 2.5             | + 5.1           | 25,713                              | 24,453                    | - 4.9             | + 5.8           |
| <i>Printing and Publishing</i>       |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Commercial Printing .....            | 2,420                                 | 2,389                     | - 1.3             | + 4.5           | 92,931                              | 99,469                    | + 7.0             | + 20.4          |
| Newspaper Publishing .....           | 3,724                                 | 4,130                     | + 10.9            | + 6.9           | 127,201                             | 136,936                   | + 7.7             | + 14.8          |
| <i>Chemical Products</i>             |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Cotton Oil Mills .....               | 2,249                                 | 2,827                     | + 25.6            | + 2.9           | 44,171                              | 56,868                    | + 28.8            | + 14.2          |
| ‡Petroleum Refining .....            | 17,743                                | 19,045                    | + 7.3             | - 24.1          | 989,660                             | 775,041                   | - 21.7            | - 50.0          |
| <i>Stone and Clay Products</i>       |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Brick and Tile .....                 | 1,833                                 | 1,880                     | + 2.6             | + 27.0          | 41,699                              | 40,584                    | - 2.7             | + 44.8          |
| Cement .....                         | 803                                   | 816                       | + 1.6             | + 13.9          | 34,045                              | 35,177                    | + 3.3             | + 16.3          |
| <i>Iron and Steel Products</i>       |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Structural and Ornamental Iron ..... | 1,751                                 | 1,879                     | + 7.3             | - 21.5          | 58,579                              | 63,198                    | + 7.9             | - 22.8          |
| <b>NONMANUFACTURING</b>              |                                       |                           |                   |                 |                                     |                           |                   |                 |
| Crude Petroleum Production .....     | 28,473                                | 28,444                    | - 0.1             | + 1.0           | 1,559,178                           | 1,499,704                 | - 3.8             | - 4.4           |
| Quarrying .....                      | (3)                                   | (3)                       | + 0.5             | + 5.4           | (3)                                 | (3)                       | + 1.9             | + 2.2           |
| Public Utilities .....               | (3)                                   | (3)                       | + 1.3             | + 7.7           | (3)                                 | (3)                       | - 1.0             | + 20.9          |
| Retail Trade .....                   | 214,193                               | 220,568                   | + 3.0             | + 1.2           | 5,623,181                           | 5,959,694                 | + 6.0             | + 9.4           |
| Wholesale Trade .....                | 62,022                                | 62,463                    | + 0.7             | + 2.5           | 2,629,971                           | 2,659,206                 | + 1.1             | + 6.0           |
| Dyeing and Cleaning .....            | 2,834                                 | 3,026                     | + 6.8             | + 4.6           | 76,459                              | 79,276                    | + 3.7             | + 15.3          |
| Hotels .....                         | 19,448                                | 19,327                    | - 0.6             | + 0.6           | 374,526                             | 383,522                   | + 2.4             | + 8.6           |
| Power Laundries .....                | 12,909                                | 13,372                    | + 3.6             | - 2.7           | 253,846                             | 258,925                   | + 2.0             | + 3.4           |

CHANGES IN EMPLOYMENT AND PAY ROLLS IN SELECTED CITIES<sup>(4)</sup>

|                | Employment                |                          | Pay Rolls                 |                          |                  | Employment                |                          | Pay Rolls                 |                          |
|----------------|---------------------------|--------------------------|---------------------------|--------------------------|------------------|---------------------------|--------------------------|---------------------------|--------------------------|
|                | Sept., 1945 to Oct., 1945 | Oct., 1944 to Oct., 1945 | Sept., 1945 to Oct., 1945 | Oct., 1944 to Oct., 1945 |                  | Sept., 1945 to Oct., 1945 | Oct., 1944 to Oct., 1945 | Sept., 1945 to Oct., 1945 | Oct., 1944 to Oct., 1945 |
| Abilene .....  | + 4.0                     | + 1.6                    | - 0.1                     | + 6.9                    | Galveston        | - 6.4                     | - 38.1                   | - 5.8                     | - 52.7                   |
| Amarillo ..... | + 2.7                     | - 16.2                   | + 3.5                     | + 10.5                   | §Houston .....   | - 6.4                     | - 38.1                   | - 5.8                     | - 52.7                   |
| Austin .....   | + 2.8                     | + 8.8                    | + 3.6                     | + 18.7                   | Port Arthur      |                           |                          |                           |                          |
| Beaumont       |                           |                          |                           |                          | San Antonio ..   | + 5.1                     | + 3.5                    | + 2.1                     | + 8.6                    |
| Corpus Christi | + 0.5                     | - 4.7                    | - 11.0                    | - 18.1                   | Sherman          |                           |                          |                           |                          |
| §Dallas .....  | + 2.3                     | - 49.8                   | + 4.4                     | - 56.7                   | Waco .....       | - 0.9                     | - 8.1                    | - 1.8                     | - 9.5                    |
| El Paso .....  | - 0.1                     | + 4.8                    | + 2.0                     | + 12.9                   | Wichita Falls .. | + 0.6                     | + 2.9                    | + 2.2                     | + 4.6                    |
| §Fort Worth .. | - 2.7                     | - 56.0                   | - 8.1                     | - 63.5                   | STATE .....      | - 1.6                     | - 31.6                   | - 8.6                     | - 43.6                   |

ESTIMATED NUMBER OF EMPLOYEES IN NONAGRICULTURAL BUSINESS AND GOVERNMENT ESTABLISHMENTS<sup>(6)</sup>

|                | 1943 <sup>(2)</sup> | 1944 <sup>(2)</sup> | 1945 <sup>(2)</sup> | 1943            | 1944                     | 1945                     |
|----------------|---------------------|---------------------|---------------------|-----------------|--------------------------|--------------------------|
| January .....  | 1,385,000           | 1,429,000           | 1,418,000           | July .....      | 1,450,000 <sup>(1)</sup> | 1,448,000 <sup>(2)</sup> |
| February ..... | 1,397,000           | 1,433,000           | 1,413,000           | August .....    | 1,441,000 <sup>(2)</sup> | 1,446,000 <sup>(2)</sup> |
| March .....    | 1,415,000           | 1,433,000           | 1,417,000           | September ..... | 1,448,000 <sup>(2)</sup> | 1,432,000 <sup>(1)</sup> |
| April .....    | 1,433,000           | 1,435,000           | 1,402,000           | October .....   | 1,455,000 <sup>(2)</sup> | 1,420,000 <sup>(2)</sup> |
| May .....      | 1,458,000           | 1,435,000           | 1,397,000           | November .....  | 1,461,000 <sup>(2)</sup> | 1,434,000 <sup>(2)</sup> |
| June .....     | 1,478,000           | 1,448,000           | 1,387,000           | December .....  | 1,470,000 <sup>(2)</sup> | 1,467,000 <sup>(2)</sup> |

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

†Does not include strictly war industries.

‡Decrease due to strikes in this industry and area.

||Not published separately because of inadequate sample.

§Decrease due to cancellation of war contracts.

<sup>(1)</sup>Revised.

<sup>(2)</sup>Subject to revision.

<sup>(3)</sup>Not available.

<sup>(4)</sup>Based on unweighted figures.

<sup>(5)</sup>Less than 1/10 of one percent.

<sup>(6)</sup>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 co-operating with the Bureau of Labor Statistics. Due to the national emergency, publication of data for certain industries is being withheld until further notice.

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

|   | Cattle |       | Calves |       | Hogs |      | Sheep |       | Total  |        |
|---|--------|-------|--------|-------|------|------|-------|-------|--------|--------|
|   | 1945   | 1944  | 1945   | 1944  | 1945 | 1944 | 1945  | 1944  | 1945   | 1944   |
| Total Interstate Plus Fort Worth.....     | 7,742  | 7,385 | 2,312  | 2,470 | 144  | 692  | 903   | 944   | 11,101 | 11,491 |
| Total Intrastate Omitting Fort Worth..... | 1,346  | 1,458 | 362    | 401   | 56   | 34   | 380   | 809   | 2,144  | 2,702  |
| TOTAL SHIPMENTS.....                      | 9,088  | 8,843 | 2,674  | 2,871 | 200  | 726  | 1,283 | 1,753 | 13,245 | 14,193 |

TEXAS CAR-LOT\* SHIPMENTS OF LIVE STOCK FOR YEAR 1945

|   | Cattle |        | Calves |        | Hogs  |        | Sheep  |        | Total  |        |
|---|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|
|   | 1945   | 1944   | 1945   | 1944   | 1945  | 1944   | 1945   | 1944   | 1945   | 1944   |
| Total Interstate Plus Fort Worth.....     | 57,908 | 52,236 | 11,017 | 10,607 | 4,428 | 12,803 | 14,834 | 12,655 | 88,187 | 88,301 |
| Total Intrastate Omitting Fort Worth..... | 7,504  | 6,640  | 1,453  | 1,369  | 261   | 801    | 1,629  | 2,161  | 10,847 | 10,971 |
| TOTAL SHIPMENTS.....                      | 65,412 | 58,876 | 12,470 | 11,976 | 4,689 | 13,604 | 16,463 | 14,816 | 99,034 | 99,272 |

\*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 1,500 station agents, representing every livestock shipping point in the State. The data are compiled by the Bureau of Business Research.

OCTOBER CARLOAD MOVEMENT OF POULTRY AND EGGS

Shipments from Texas Stations

|                 | Cars of Poultry |      |         |      |       |      | Cars of Eggs |      |       |      |                   |      |
|-----------------|-----------------|------|---------|------|-------|------|--------------|------|-------|------|-------------------|------|
|                 | Chickens        |      | Turkeys |      | Shell |      | Frozen       |      | Dried |      | Shell Equivalent† |      |
|                 | 1945            | 1944 | 1945    | 1944 | 1945  | 1944 | 1945         | 1944 | 1945  | 1944 | 1945              | 1944 |
| TOTAL.....      | 12              | 25½  | 15      | 11   | 52    | 28½  | 21           | 104  | 11    | 65   | 182               | 756½ |
| Intrastate..... | 5               | 11   | 0       | 5    | 13    | 14   | 0            | 42   | 0     | 26   | 13                | 306  |
| Interstate..... | 7               | 14½  | 15      | 6    | 39    | 14½  | 21           | 62   | 11    | 39   | 169               | 450½ |

Receipts at Texas Stations

|                 |   |    |   |   |    |    |   |    |   |    |    |     |
|-----------------|---|----|---|---|----|----|---|----|---|----|----|-----|
| TOTAL.....      | 8 | 22 | 2 | 2 | 52 | 65 | 1 | 92 | 3 | 29 | 78 | 481 |
| Intrastate..... | 0 | 5  | 0 | 1 | 9  | 19 | 0 | 50 | 0 | 11 | 9  | 207 |
| Interstate..... | 8 | 17 | 2 | 1 | 43 | 46 | 1 | 42 | 3 | 18 | 69 | 274 |

†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  | Jan.   | Feb.   | March  | April   | May     | June    | July    | Aug.    | Sept.   | Oct.   | Nov.   | Dec.   | Total     |
|---|--------|--------|--------|---------|---------|---------|---------|---------|---------|--------|--------|--------|-----------|
| <b>CREAMERY BUTTER</b><br>(1000 lb.)                      |        |        |        |         |         |         |         |         |         |        |        |        |           |
| 1945*.....  | 1,546  | 1,786  | 2,492  | 3,612   | 3,934   | 3,407   | 2,910   | 2,495   | 1,974   | 1,502  |        |        |           |
| 1944*.....  | 1,827  | 1,984  | 2,548  | 3,634   | 3,998   | 3,594   | 3,388   | 2,556   | 2,407   | 2,027  | 1,549  | 1,717  | 32,304    |
| 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  | 33,048    |
| <b>ICE CREAM</b> (1000 gal.) ‡                            |        |        |        |         |         |         |         |         |         |        |        |        |           |
| 1945*.....  | 1,209  | 1,250  | 1,627  | 2,663   | 2,276   | 2,914   | 2,901   | 2,852   | 2,967   | 2,040  |        |        |           |
| 1944*.....  | 991    | 1,075  | 2,332  | 1,516   | 2,090   | 2,674   | 2,825   | 2,517   | 2,127   | 1,759  | 1,680  | 1,076  | 24,011    |
| 1930-39 average.....                                      | 215    | 262    | 434    | 570     | 752     | 893     | 904     | 845     | 686     | 460    | 259    | 205    | 6,485     |
| <b>AMERICAN CHEESE</b><br>(1000 lbs.)                     |        |        |        |         |         |         |         |         |         |        |        |        |           |
| 1945*.....  | 779    | 893    | 1,433  | 1,871   | 2,183   | 2,074   | 2,020   | 1,694   | 1,147   | 688    |        |        |           |
| 1944*.....  | 762    | 919    | 1,306  | 1,886   | 2,255   | 2,312   | 2,114   | 1,684   | 1,372   | 1,128  | 869    | 708    | 17,197    |
| 1930-39 average.....                                      | 554    | 590    | 737    | 1,050   | 1,215   | 1,129   | 1,119   | 1,025   | 866     | 852    | 718    | 641    | 10,496    |
| <b>MILK EQUIVALENT OF DAIRY PRODUCTS</b> †<br>(1000 lbs.) |        |        |        |         |         |         |         |         |         |        |        |        |           |
| 1945*.....  | 57,308 | 63,892 | 90,817 | 124,559 | 143,240 | 137,514 | 127,623 | 113,952 | 99,478  | 71,003 |        |        |           |
| 1944*.....  | 59,584 | 65,589 | 86,493 | 121,197 | 140,769 | 140,176 | 136,854 | 110,497 | 100,545 | 85,557 | 63,531 | 57,455 | 1,190,864 |
| 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.

## OCTOBER CREDIT RATIOS IN TEXAS DEPARTMENT AND APPAREL STORES

(Expressed in Per Cent)

|  | Number of Stores Reporting | Ratio of Credit Sales to Net Sales |      | Ratio of Collections to Outstanding |      | Ratio of Credit Salaries to Credit Sales |      |
|--|----------------------------|------------------------------------|------|-------------------------------------|------|--|------|
|  |                            | 1945                               | 1944 | 1945                                | 1944 | 1945                                     | 1944 |
| All Stores   | 60                         | 44.8                               | 45.2 | 68.5                                | 64.7 | 0.9                                      | 1.0  |
| Stores Grouped by Cities:                                    |                            |                                    |      |                                     |      |  |      |
| Austin   | 7                          | 35.7                               | 39.2 | 74.3                                | 73.8 | 1.3                                      | 1.3  |
| Corpus Christi   | 4                          | 41.7                               | 54.5 | 81.0                                | 85.7 | 1.4                                      | 2.1  |
| Dallas   | 8                          | 54.5                               | 40.0 | 66.4                                | 62.1 | 0.6                                      | 0.7  |
| El Paso  | 3                          | 39.5                               | 38.2 | 64.6                                | 64.5 | 1.2                                      | 1.3  |
| Fort Worth   | 6                          | 45.6                               | 42.5 | 73.6                                | 68.9 | 1.0                                      | 1.0  |
| Houston  | 7                          | 41.5                               | 44.2 | 71.7                                | 64.7 | 1.3                                      | 1.3  |
| San Antonio  | 5                          | 35.8                               | 37.6 | 67.4                                | 66.5 | 1.0                                      | 1.2  |
| Waco   | 5                          | 43.3                               | 44.4 | 69.5                                | 65.0 | 1.0                                      | 1.1  |
| All Others   | 15                         | 37.6                               | 40.0 | 73.1                                | 68.5 | 1.0                                      | 1.0  |
| Stores Grouped According to Type of Store:                   |                            |                                    |      |                                     |      |  |      |
| Department Stores (Annual Volume Over \$500,000)             | 18                         | 44.6                               | 44.4 | 71.6                                | 69.7 | 0.9                                      | 1.0  |
| Department Stores (Annual Volume under \$500,000)            | 7                          | 37.2                               | 38.2 | 69.5                                | 61.1 | 1.6                                      | 1.7  |
| Dry-Goods-Apparel Stores                                     | 3                          | 35.9                               | 37.2 | 70.0                                | 69.4 | 1.4                                      | 1.7  |
| Women's Specialty Shops                                      | 17                         | 51.6                               | 50.6 | 63.9                                | 61.1 | 0.6                                      | 0.8  |
| Men's Clothing Stores  | 15                         | 32.7                               | 40.0 | 71.9                                | 58.3 | 1.3                                      | 1.3  |
| Stores Grouped According to Volume of Net Sales During 1944: |                            |                                    |      |                                     |      |  |      |
| Over \$2,500,000   | 18                         | 48.3                               | 47.8 | 68.3                                | 64.7 | 0.8                                      | 0.9  |
| \$2,500,000 down to \$1,000,000                              | 15                         | 34.0                               | 37.0 | 74.2                                | 69.5 | 0.7                                      | 0.7  |
| \$1,000,000 down to \$500,000                                | 9                          | 36.0                               | 38.4 | 71.2                                | 65.0 | 0.7                                      | 0.9  |
| Less than \$500,000  | 18                         | 27.7                               | 34.0 | 67.8                                | 63.6 | 1.7                                      | 2.0  |

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.

## OCTOBER RETAIL SALES OF INDEPENDENT STORES IN TEXAS

|   | Number of Establishments Reporting | Percentage Changes in Dollar Sales |                             |                            |
|---|------------------------------------|------------------------------------|-----------------------------|----------------------------|
|   |                                    | Oct., 1945 from Oct., 1944         | Oct., 1945 from Sept., 1945 | Year, 1945 from Year, 1944 |
| TOTAL TEXAS   | 910                                | + 22.0                             | + 16.2                      | + 10.8                     |
| STORES GROUPED BY LINE OF GOODS CARRIED:              |                                    |                                    |                             |                            |
| APPAREL   |                                    |                                    |                             |                            |
| Family Clothing Stores                                | 115                                | + 30.1                             | + 14.8                      | + 14.4                     |
| Men's and Boys' Clothing Stores                       | 25                                 | + 20.8                             | + 19.0                      | + 8.3                      |
| Men's and Boys' Clothing Stores                       | 41                                 | + 32.5                             | + 25.0                      | + 8.4                      |
| Shoe Stores   | 17                                 | + 22.4                             | - 4.8                       | + 16.0                     |
| Women's Specialty Shops                               | 32                                 | + 30.9                             | + 9.6                       | + 19.0                     |
| AUTOMOTIVE*   |                                    |                                    |                             |                            |
| Motor Vehicle Dealers                                 | 72                                 | + 31.0                             | + 19.8                      | - 0.4                      |
| Motor Vehicle Dealers                                 | 64                                 | + 28.2                             | + 17.6                      | - 3.0                      |
| COUNTRY GENERAL                                       |                                    |                                    |                             |                            |
| Country General                                       | 85                                 | + 12.0                             | + 7.3                       | + 4.4                      |
| DEPARTMENT STORES                                     |                                    |                                    |                             |                            |
| Department Stores                                     | 53                                 | + 19.8                             | + 19.1                      | + 11.4                     |
| DRUG STORES   |                                    |                                    |                             |                            |
| Drug Stores   | 97                                 | + 9.5                              | + 0.4                       | + 6.3                      |
| DRY GOODS AND GENERAL MERCHANDISE                     |                                    |                                    |                             |                            |
| Dry Goods and General Merchandise                     | 27                                 | + 12.3                             | + 16.7                      | + 11.5                     |
| FILLING STATIONS                                      |                                    |                                    |                             |                            |
| Filling Stations                                      | 25                                 | + 61.8                             | + 20.7                      | + 20.0                     |
| FLORISTS  |                                    |                                    |                             |                            |
| Florists  | 21                                 | + 28.2                             | + 28.6                      | + 18.0                     |
| FOOD*   |                                    |                                    |                             |                            |
| Grocery Stores  | 125                                | + 11.7                             | + 9.5                       | + 3.5                      |
| Grocery Stores  | 34                                 | + 4.6                              | + 1.6                       | + 0.1                      |
| Grocery and Meat Stores                               | 85                                 | + 13.3                             | + 11.0                      | + 4.3                      |
| FURNITURE AND HOUSEHOLD*                              |                                    |                                    |                             |                            |
| Furniture Stores                                      | 63                                 | + 21.0                             | + 31.7                      | + 8.1                      |
| Furniture Stores                                      | 57                                 | + 20.4                             | + 32.7                      | + 8.3                      |
| JEWELRY   |                                    |                                    |                             |                            |
| Jewelry   | 23                                 | + 13.8                             | + 25.7                      | + 9.2                      |
| LUMBER, BUILDING, AND HARDWARE*                       |                                    |                                    |                             |                            |
| Lumber, Building, and Hardware*                       | 19                                 | + 24.6                             | + 14.6                      | + 23.1                     |
| Farm Implement Dealers                                | 159                                | + 16.4                             | - 2.6                       | + 9.3                      |
| Hardware Stores                                       | 45                                 | + 21.1                             | + 14.9                      | + 15.4                     |
| Lumber and Building Material Dealers                  | 94                                 | + 26.5                             | + 17.0                      | + 29.0                     |
| RESTAURANTS   |                                    |                                    |                             |                            |
| Restaurants   | 26                                 | - 0.8                              | - 10.7                      | + 6.2                      |
| ALL OTHER STORES                                      |                                    |                                    |                             |                            |
| All Other Stores                                      | 14                                 | + 19.1                             | + 16.9                      | + 8.2                      |
| TEXAS STORES GROUPED ACCORDING TO POPULATION OF CITY: |                                    |                                    |                             |                            |
| All Stores in Cities of—                              |                                    |                                    |                             |                            |
| Over 100,000 Population                               | 143                                | + 25.1                             | + 18.0                      | + 13.6                     |
| 50,000-100,000 Population                             | 117                                | + 20.0                             | + 14.1                      | + 8.6                      |
| 2,500-50,000 Population                               | 438                                | + 18.7                             | + 14.7                      | + 7.5                      |
| Less than 2,500 Population                            | 212                                | + 15.2                             | + 13.1                      | + 8.8                      |

\*Group total includes kinds of business other than the classification listed.

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

RETAIL SALES OF INDEPENDENT STORES IN TEXAS

(By Districts)

|   | Number of<br>Estab-<br>lishments<br>Reporting | Percentage Changes               |                                   |                                  |
|---|---|----------------------------------|-----------------------------------|----------------------------------|
|   |   | Oct., 1945<br>from<br>Oct., 1944 | Oct., 1945<br>from<br>Sept., 1945 | Year, 1945<br>from<br>Year, 1944 |
| TOTAL TEXAS                                   | 910   | + 22.0                           | + 16.2                            | + 10.8                           |
| TEXAS STORES<br>GROUPED BY<br>PRODUCING AREAS |   |                                  |                                   |                                  |
| District 1-N                                  | 57  | + 15.4                           | + 15.0                            | - 1.0                            |
| Amarillo                                      | 22  | + 15.0                           | + 12.6                            |                                  |
| Plainview                                     | 11  | + 17.3                           | + 0.6                             |                                  |
| All Others                                    | 24  | + 15.4                           | + 21.0                            |                                  |
| District 1-S                                  | 26  | + 13.0                           | + 18.8                            | + 10.8                           |
| Lubbock                                       | 15  | + 13.0                           | + 15.4                            |                                  |
| All Others                                    | 11  | + 12.8                           | + 32.1                            |                                  |
| District 2                                    | 75  | + 22.3                           | + 15.3                            | + 6.2                            |
| Abilene                                       | 15  | + 4.0                            | + 10.4                            |                                  |
| All Others                                    | 60  | + 28.4                           | + 16.6                            |                                  |
| District 3                                    | 34  | + 26.7                           | + 11.0                            | + 14.3                           |
| District 4                                    | 215   | + 22.5                           | + 15.1                            | + 11.9                           |
| Dallas  | 29  | + 26.5                           | + 14.2                            |                                  |
| Fort Worth                                    | 32  | + 14.6                           | + 17.7                            |                                  |
| Waco  | 24  | + 28.1                           | + 16.0                            |                                  |
| All Others                                    | 130   | + 20.4                           | + 13.0                            |                                  |
| District 5                                    | 105   | + 17.6                           | + 14.3                            | + 9.9                            |
| District 6                                    | 28  | + 19.5                           | + 13.5                            | + 10.3                           |
| District 7                                    | 49  | + 20.0                           | + 11.6                            | + 4.6                            |
| District 8                                    | 150   | + 30.3                           | + 17.6                            | + 14.6                           |
| Austin  | 13  | + 27.1                           | + 20.1                            |                                  |
| Corpus Christi                                | 21  | + 12.3                           | + 0.8                             |                                  |
| San Antonio                                   | 42  | + 36.6                           | + 22.0                            |                                  |
| All Others                                    | 74  | + 27.2                           | + 14.8                            |                                  |
| District 9                                    | 101   | + 17.7                           | + 21.2                            | + 7.5                            |
| Beaumont                                      | 15  | + 8.8                            | + 19.8                            |                                  |
| Houston                                       | 40  | + 21.6                           | + 22.2                            |                                  |
| All Others                                    | 46  | + 12.7                           | + 18.4                            |                                  |
| District 10                                   | 22  | + 21.0                           | + 5.3                             | + 0.8                            |
| District 10A                                  | 42  | + 21.0                           | + 14.3                            | + 3.2                            |

\*Change of less than .5%

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

TEXAS CHARTERS

|   | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|---|------------|------------|-------------|
| Domestic Corporations:                  |            |            |             |
| Capitalization*                         | \$2,942    | \$886      | \$1,679     |
| Number                                  | 137        | 57         | 83          |
| Classification of new corporations:     |            |            |             |
| Banking-Finance                         | 4          | 1          | 3           |
| Manufacturing                           | 19         | 6          | 6           |
| Merchandising                           | 41         | 17         | 22          |
| Oil                                     | 4          | 2          | 1           |
| Public Service                          | 2          | 0          | 1           |
| Real Estate Building                    | 19         | 8          | 13          |
| Transportation                          | 5          | 3          | 4           |
| All Others                              | 43         | 20         | 33          |
| Number capitalized at less than \$5,000 | 27         | 11         | 31          |
| Number capitalized at \$100,000 or more | 6          | 0          | 5           |
| Foreign Corporations                    |            |            |             |
| (Number)                                | 15         | 15         | 6           |

\*In thousands.

NOTE: Compiled from records of the Secretary of State.

COMMODITY PRICES

|   | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|---|------------|------------|-------------|
| Wholesale Prices:   |            |            |             |
| U.S. Bureau of Labor Statistics (1926=100)                        | 105.9      | 104.0      | 105.2       |
| Farm Prices:  |            |            |             |
| U.S. Bureau of Labor Statistics (1926=100)                        | 127.3      | 123.4      | 124.3       |
| Retail Prices:  |            |            |             |
| Food (U.S. Bureau of Labor Statistics (1935-1939=100))            | 139.3      | 136.4      | 139.4       |
| Cost of Living Index (1935-1939=100)                              | 128.9      | 126.4      | 128.9       |
| Department Stores (Fairchild's Publications<br>January, 1931=100) |            |            |             |
|   | 113.5      | 113.4      | 113.5       |

COTTON BALANCE SHEET FOR THE UNITED STATES AS OF NOVEMBER 1, 1945

(In Thousands of Running Bales Except as Noted)

| Year      | Carryover<br>Aug. 1 | Imports to<br>Nov. 1* | Gov. Est. as<br>of Nov. 1* | Total  | Cons. to<br>Nov. 1 | Exports<br>to Nov. 1 | Total | Balance<br>Nov. 1 |
|-----------|---------------------|-----------------------|----------------------------|--------|--------------------|----------------------|-------|-------------------|
| 1936-1937 | 5,397               | 32                    | 12,400                     | 17,829 | 1,856              | 1,613                | 3,469 | 14,360            |
| 1937-1938 | 4,498               | 22                    | 18,234                     | 22,763 | 1,729              | 1,626                | 3,355 | 19,480            |
| 1938-1939 | 11,533              | 40                    | 12,137                     | 23,710 | 1,637              | 1,054                | 2,691 | 21,019            |
| 1939-1940 | 13,033              | 37                    | 11,845                     | 24,915 | 1,941              | 1,744                | 3,685 | 21,230            |
| 1940-1941 | 10,596              | 30                    | 12,847                     | 23,473 | 2,064              | 350                  | 2,414 | 21,059            |
| 1941-1942 | 12,376              | 109                   | 11,020                     | 23,505 | 2,703              | 439                  | 3,142 | 20,363            |
| 1942-1943 | 10,590              | †                     | 13,329                     | 23,919 | 2,864              | †                    | 2,864 | 21,055            |
| 1943-1944 | 10,687              | †                     | 11,442                     | 22,129 | 2,560              | †                    | 2,560 | 19,565            |
| 1944-1945 | 10,727              | †                     | 12,320                     | 23,407 | 2,430              | †                    | 2,430 | 20,617            |
| 1945-1946 | 11,160              | †                     | 9,368                      | 20,528 | 2,201              | †                    | 2,201 | 18,327            |

The Cotton Year begins August 1.

\*Figures are in 500-lb. bales.

†Figures on imports and exports to November 1 not available.

## BUILDING PERMITS

|                      | Oct., 1945          | Oct., 1944          | Sept., 1945         |
|----------------------|---------------------|---------------------|---------------------|
| Abilene .....        | \$ 44,950           | \$ 4,750            | \$ 321,986          |
| Amarillo .....       | 482,752             | 62,842              | 398,782             |
| Austin .....         | 687,640             | 81,961              | 410,687             |
| Beaumont .....       | 197,272             | 83,047              | 76,148              |
| Big Spring .....     | 68,235              | 26,295              | 33,605              |
| Brownsville .....    | 107,236             | 8,176               | 74,443              |
| Brownwood .....      | 18,200              | 1,300               | 293,975             |
| Coleman .....        | 34,700              | 400                 | 8,300               |
| Corpus Christi ..... | 437,176             | 287,834             | 304,739             |
| Dallas .....         | 1,740,729           | 457,399             | 1,503,192           |
| Edinburg .....       | 70,550              | 736                 | 56,985              |
| Denison .....        | 44,496              | 5,585               | 29,000              |
| Denton .....         | 13,750              | 3,875               | 28,150              |
| El Paso .....        | 269,140             | 132,872             | 308,525             |
| Fort Worth .....     | 1,007,609           | 329,476             | 655,885             |
| Galveston .....      | 81,060              | 76,076              | 562,697             |
| Gladewater .....     | 29,610              | 3,950               | 3,662               |
| Harlingen .....      | 43,275              | 11,025              | 39,000              |
| Houston .....        | 1,673,913           | 1,445,470           | 2,016,698           |
| Jacksonville .....   | 48,800              | 9,000               | 11,650              |
| Kenedy .....         | 9,150               | 0                   | 10,850              |
| Kerrville .....      | 66,011              | 5,735               | 13,005              |
| Longview .....       | 29,302              | 9,475               | 55,335              |
| Lubbock .....        | 408,465             | 88,521              | 224,568             |
| McAllen .....        | 89,640              | 11,395              | 62,100              |
| Marshall .....       | 97,125              | 9,384               | 32,748              |
| Midland .....        | 57,550              | 32,350              | 112,200             |
| New Braunfels .....  | 53,594              | 4,945               | 14,205              |
| Palestine .....      | 34,986              | 4,150               | 31,964              |
| Pampa .....          | 38,425              | 4,271               | 444,000             |
| Paris .....          | 29,975              | 10,225              | 29,975              |
| Plainview .....      | 40,175              | 19,895              | 48,775              |
| Port Arthur .....    | 85,543              | 20,753              | 135,464             |
| Seguin .....         | 14,130              | 6,550               | 23,500              |
| San Antonio .....    | 1,377,514           | 713,912             | 1,202,713           |
| Sherman .....        | 24,927              | 11,576              | 51,443              |
| Snyder .....         | 4,500               | 9,800               | 0                   |
| Sweetwater .....     | 19,880              | 14,820              | 20,060              |
| Tyler .....          | 136,605             | 35,157              | 96,686              |
| Waco .....           | 136,880             | 20,834              | 204,995             |
| Wichita Falls .....  | 94,289              | 15,970              | 57,026              |
| <b>TOTAL .....</b>   | <b>\$ 9,949,759</b> | <b>\$ 3,781,917</b> | <b>\$10,009,721</b> |

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

## POSTAL RECEIPTS

|                      | Oct., 1945          | Oct., 1944          | Sept., 1945         |
|----------------------|---------------------|---------------------|---------------------|
| Abilene .....        | \$ 32,017           | \$ 54,104           | \$ 26,050           |
| Amarillo .....       | 64,836              | 67,070              | 56,501              |
| Austin .....         | 105,705             | 113,691             | 97,830              |
| Beaumont .....       | 50,797              | 58,495              | 42,249              |
| Big Spring .....     | 14,894              | 14,868              | 13,522              |
| Brownsville .....    | 13,219              | 14,851              | 9,849               |
| Brownwood .....      | 18,717              | 34,213              | 18,198              |
| Childress .....      | 6,285               | 7,680               | 5,665               |
| Cleburne .....       | 6,258               | 8,167               | 5,201               |
| Coleman .....        | 4,709               | 5,722               | 4,522               |
| Corpus Christi ..... | 78,623              | 82,613              | 70,850              |
| Corsicana .....      | 11,378              | 11,794              | 9,609               |
| Dallas .....         | 659,605             | 647,593             | 532,086             |
| Del Rio .....        | 5,672               | 8,438               | 5,823               |
| Denison .....        | 10,711              | 12,915              | 8,600               |
| Denton .....         | 15,083              | 16,087              | 10,944              |
| El Paso .....        | 101,290             | 122,249             | 91,331              |
| Fort Worth .....     | 321,445             | 317,905             | 216,666             |
| Galveston .....      | 55,654              | 62,598              | 44,041              |
| Gladewater .....     | 4,875               | 5,834               | 3,227               |
| Graham .....         | 4,225               | 4,053               | 3,442               |
| Harlingen .....      | 16,276              | 17,351              | 16,120              |
| Houston .....        | 435,517             | 455,486             | 379,210             |
| Jacksonville .....   | 5,991               | 6,810               | 4,594               |
| Kenedy .....         | 2,271               | 2,860               | 1,841               |
| Kerrville .....      | 5,403               | 5,706               | 4,343               |
| Lubbock .....        | 43,518              | 49,875              | 34,959              |
| Lufkin .....         | 8,934               | 10,047              | 7,794               |
| McAllen .....        | 10,253              | 9,908               | 7,365               |
| Marshall .....       | 12,361              | 14,901              | 34,144              |
| Midland .....        | 19,747              | 15,862              | 14,270              |
| Palestine .....      | 10,410              | 11,048              | 7,396               |
| Pampa .....          | 12,027              | 14,714              | 10,790              |
| Paris .....          | 14,640              | 23,126              | 16,616              |
| Port Arthur .....    | 26,982              | 33,209              | 21,941              |
| San Angelo .....     | 30,192              | 29,082              | 23,916              |
| San Antonio .....    | 290,797             | 298,934             | 245,873             |
| Seguin .....         | 4,837               | 5,544               | 4,085               |
| Sherman .....        | 16,940              | 16,787              | 12,504              |
| Snyder .....         | 2,773               | 3,344               | 2,526               |
| Sweetwater .....     | 7,816               | 9,642               | 6,222               |
| Temple .....         | 17,296              | 19,278              | 15,137              |
| Tyler .....          | 31,812              | 39,249              | 26,572              |
| Waco .....           | 64,492              | 68,553              | 54,068              |
| Wichita Falls .....  | 56,340              | 50,284              | 45,307              |
| <b>TOTAL .....</b>   | <b>\$ 2,734,623</b> | <b>\$ 2,882,540</b> | <b>\$ 2,273,799</b> |

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

**CEMENT**

(In Thousands of Barrels)

|                         | Sept., 1945 | Sept., 1944 | Aug., 1945 |
|-------------------------|-------------|-------------|------------|
| <b>Texas Plants</b>     |             |             |            |
| Production .....        | 685         | 597         | 715        |
| Shipments .....         | 744         | 527         | 715        |
| Stocks .....            | 638         | 907         | 725        |
| <b>United States</b>    |             |             |            |
| Production .....        | 9,826       | 8,746       | 9,921      |
| Shipments .....         | 11,211      | 10,221      | 11,467     |
| Stocks .....            | 14,581      | 17,000      | 15,940     |
| Capacity Operated ..... | 50.0%       | 44.0%       | 49.0%      |

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

**LUMBER**

(In Board Feet)

|  | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|--|------------|------------|-------------|
| <b>Southern Pine Mills:</b>                          |            |            |             |
| Average Weekly Production per unit .....             | 178,432    | 194,565    | 180,855     |
| Average Weekly Shipments per unit .....              | 181,782    | 197,845    | 199,105     |
| Avtrage Unfilled Orders per unit, end of month ..... | 1,107,108  | 1,481,767  | 1,103,753   |

NOTE: From Southern Pine Association.

**PERCENTAGE CHANGES IN CONSUMPTION OF ELECTRIC POWER**

|                    | Oct., 1945 from Oct., 1944 | Oct., 1945 from Sept., 1945 |
|--------------------|----------------------------|-----------------------------|
| Commercial .....   | +22.8                      | - 7.8                       |
| Industrial .....   | -18.2                      | - 9.8                       |
| Residential .....  | +13.8                      | - 4.5                       |
| All Others .....   | - 1.4                      | -13.8                       |
| <b>TOTAL</b> ..... | - 5.5                      | - 9.3                       |

Prepared from reports of 8 electric power companies to the Bureau of Business Research.

**TEXAS COMMERCIAL FAILURES**

|                                       | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|---------------------------------------|------------|------------|-------------|
| Number .....                          | 1          | 0          | 0           |
| Liabilities* .....                    | \$1.7      | 0          | 0           |
| Assets* .....                         | \$1.3      | 0          | 0           |
| Average Liabilities per failure ..... | \$1.7      | 0          | 0           |

\*In thousands.

Note: From Dun and Bradstreet, Inc.

**PETROLEUM**

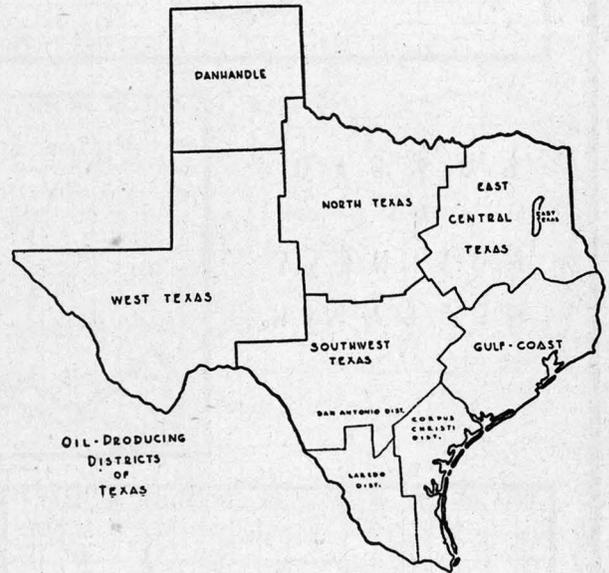
Daily Average Production (In Barrels)

|                            | Oct., 1945 | Oct., 1944 | Sept., 1945 |
|----------------------------|------------|------------|-------------|
| Coastal Texas* .....       | 341,550    | 537,700    | 461,500     |
| East Central Texas .....   | 103,400    | 149,500    | 124,350     |
| East Texas .....           | 249,000    | 371,350    | 315,300     |
| North Texas .....          | 125,350    | 148,800    | 141,900     |
| Panhandle .....            | 88,000     | 98,800     | 88,000      |
| Southwest Texas .....      | 237,400    | 334,400    | 286,750     |
| West Texas .....           | 337,650    | 492,800    | 441,300     |
| <b>STATE</b> .....         | 1,482,350  | 2,133,350  | 1,859,100   |
| <b>UNITED STATES</b> ..... | 3,977,800  | 4,725,950  | 4,485,300   |

Gasoline sales as indicated by taxes collected by the State Comptroller were: September, 1945, 140,683,306 gallons; September, 1944, 111,519,573 gallons; August, 1945, 140,879,206 gallons. September sales to the United States government as recorded by motor fuel distributors in Texas were 150,362,404 gallons.

\*Includes Conroe.

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

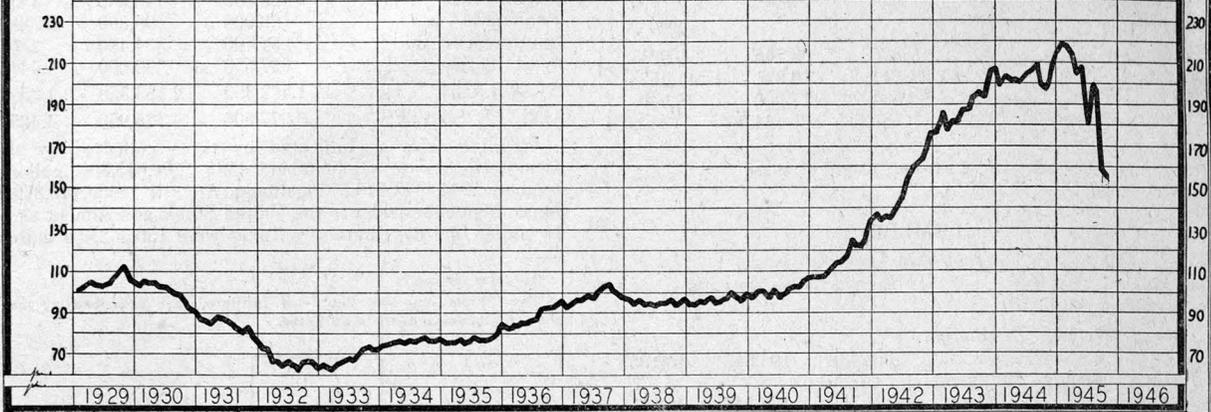


# INDEXES OF BUSINESS ACTIVITY IN TEXAS

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 •



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TEXAS

