

Copy 2

TEXAS BUSINESS REVIEW

Bureau of Business Research
The University of Texas

Vol. XVIII, No. 4

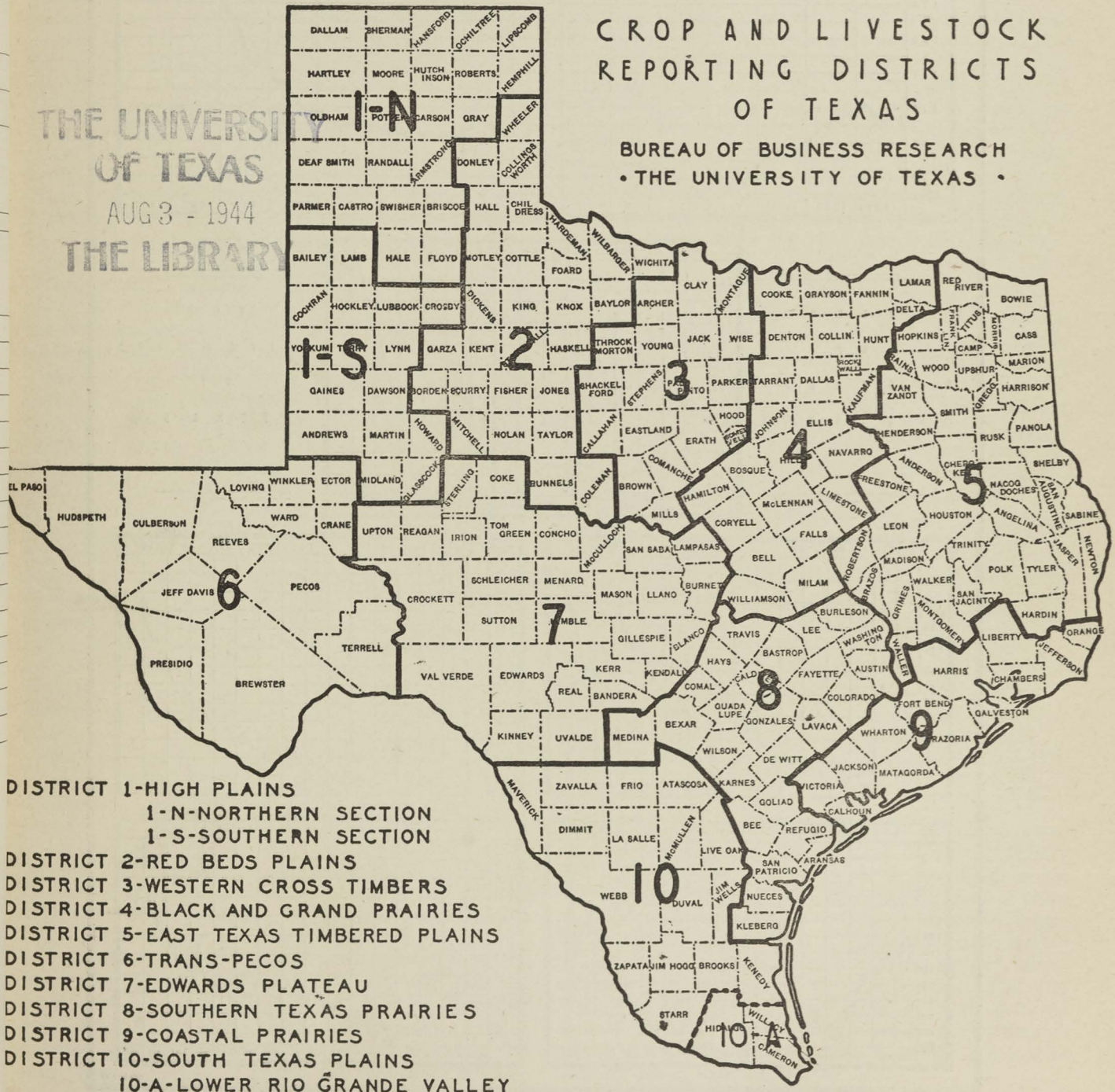
May, 1944

A Monthly Summary of Economic and Business Conditions in Texas
By the Staff of the Bureau of Business Research, The University of Texas
F. A. Buechel, Editor.

THE UNIVERSITY
OF TEXAS
AUG 3 - 1944
THE LIBRARY

CROP AND LIVESTOCK REPORTING DISTRICTS OF TEXAS

BUREAU OF BUSINESS RESEARCH
• THE UNIVERSITY OF TEXAS •



Entered as second class matter on May 7, 1928, at the post office at Austin, Texas, under Act of August 24, 1912

TEN CENTS PER COPY

ONE DOLLAR PER YEAR

INDEXES OF BUSINESS ACTIVITY IN TEXAS

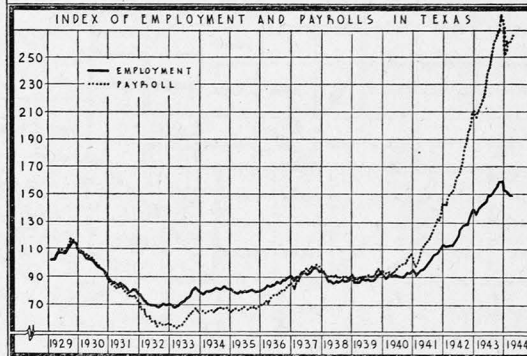
AVERAGE MONTH OF 1930 = 100%

WEIGHT IN COMPOSITE INDEX

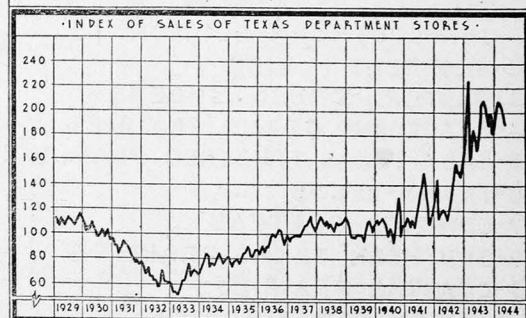
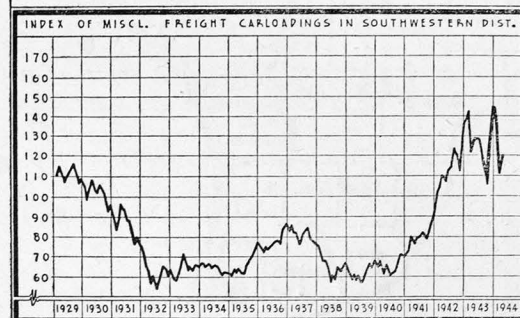
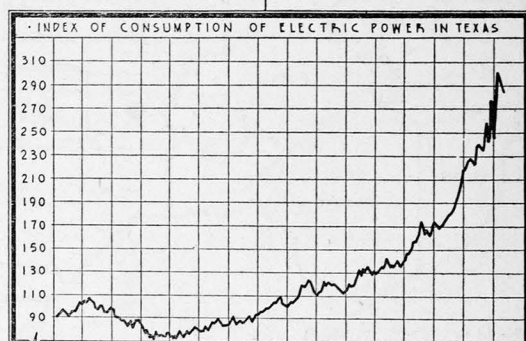
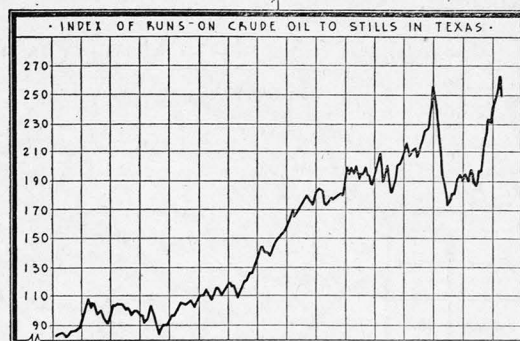
EMPLOYMENT	25%	MISCL. FREIGHT CARLOADINGS	20%
PAYROLLS	25%	CRUDE OIL RUNS	5%
DEPARTMENT STORE SALES	10%	ELECTRIC POWER CONSUMPTION	15%



BUREAU
OF
BUSINESS
RESEARCH



THE
UNIVERSITY
OF
TEXAS



Business Review and Prospect

War production for the United States during the first four months of the current year amounted to approximately \$30 billion, larger than that for the corresponding period during any year since our entrance into the war. April expenditures for war purposes of \$7.4 billion were 5 per cent below those of the month before and slightly above those for April, 1943. Year-to-year comparisons from now on are likely to show declining margins, if any gain at all, over a year ago; and it is expected that by the end of summer, if not before, monthly war costs will have passed the peak and will have started on the decline. War production is being concentrated more and more upon aircraft and shipping, thus rapidly giving this country such preponderance of strength in these two fields as to justify the expectation of a speedy military decision once the full force of these factors is brought to bear, first in Europe and then in the Orient. Until the military collapse of the European end of the Axis occurs, the needs of war production both in the form of labor and materials will continue to have first claim on our production capacity. Thus, while the military situation is being rendered more and more secure the postwar economic outlook is becoming increasingly uncertain, giving rise to a great diversity of opinion concerning probable business trends.

Much of the current diversity of opinion regarding probable future economic trends in this country arises from the failure to distinguish between temporary and permanent factors. Thus, a prevailing idea now appears to be that prices and living costs are definitely under control. Even the Office of Price Administration appears to be undecided at this time whether its main function is to be that of preventing deflation or inflation. Price Administrator Bowles, himself, though his job is the control of prices to prevent them from rising, has recently given expression to fears of postwar price deflation and apparently is giving increased attention to means of combatting such a development. He advocates the release by the Government of "purchasing power into the markets through its expenditures," which is of course exactly what is happening now in the form of war expenditures.

In view of the violent dislocations which have occurred in our economic structure during the past three years as necessary consequences of the war program, it is to be expected that many and varied cross-currents will tend to obscure the main economic trend during the months and years of readjustment which lie ahead. Some of these cross-currents may continue long enough to give the appearance of permanence. For example, because of a temporary unbalance in the supply and demand for certain poultry and meat products causing a relaxation in food controls, an impression seems to prevail that the food problem is no longer as critical as it was sometime ago. Actually, the food situation deserves more careful handling than at any time since our entrance into the war. Huge surpluses of grains and feed-stuffs of three

years ago have largely disappeared and supplies of these products from now on will depend on current production. In the meantime, because of the stimulus given livestock, poultry and dairy production through government price policies, the number of animal units requiring feed has greatly increased. The full effect of this situation is yet to be felt. It could result in a greater shortage in the supplies of these products than has yet been experienced.

Similarly, many eddies and cross-currents are to be expected in the employment situation which will often tend to obscure the main stream of employment and pay rolls during the period of readjustment and post-war development. Here the most significant factor for progressive economic development will be a clear and broad vision of the problem on the part of those holding strategic positions in government, labor organizations, and business management. The instrument for creating the necessary conditions for such a vision to come into being and to thrive is a dynamic and vital educational program.

TEXAS BUSINESS

Industry and trade in Texas remained virtually unchanged between March and April but were substantially above April, 1943. The composite index for April is nearly 11 per cent above a year ago but it is a small fraction of one per cent below March. Factors showing gains in the index from March to April were the indexes of pay rolls and carloadings, while declines were registered in employment, runs of crude oil to stills, department store sales, and electric power consumption. All of the component indexes show an increase over April, 1943.

INDEXES OF BUSINESS ACTIVITY IN TEXAS

(Average Month, 1930=100%)

	April, 1944	April, 1943	March, 1944
Employment	149.0	143.9	149.3
Pay Rolls	266.0	220.9	261.8
Miscellaneous Freight Carloadings (Southwest District)	120.3	127.7	111.2
Runs of Crude Oil to Stills	249.1	189.2	263.7
Department Store Sales	190.1	183.6	204.6
Consumption of Electric Power	284.9	225.4	290.3
COMPOSITE INDEX	202.0	182.4	202.2

The composite chart on the opposite page appears to indicate that a gradual stabilization of Texas industry and trade is taking place, but there is nothing as yet in the underlying statistical factors upon which the chart is based to suggest that a decline is about to begin. Post-war economic problems in Texas will relate largely to readjustments in industries producing aircraft, ships, and ordnance, and there is good ground for belief that expansion of peace-time industries to meet deferred demand for civilian goods will offset to a considerable extent, at least, the decline in the industries which have been set up to meet the war crisis.

FARM CASH INCOME

Cash income from agriculture in Texas during April was well above that of the preceding month but fell substantially below the figure for April, 1943. For the State as a whole cash income for April totalled approximately \$69 million, compared with \$54 million (revised) in March and \$75 million during April, 1943. Aggregate farm cash income for the first four months was almost the same as the figure for the corresponding period a year ago—\$244,936,000 and \$245,080,000 for the first four months of 1944 and 1943 respectively.

INDEX OF AGRICULTURAL CASH INCOME IN TEXAS

Districts	April, 1944	March* 1944	April, 1943	Cumulative Cash Income in Thousands of Dollars January-April, Inclusive	
				1944	1943
1-N	193.5	137.3	503.3	\$18,245	\$37,527
1-S	326.5	746.9	357.6	25,049	25,059
2	158.6	238.8	226.4	17,969	21,518
3	195.2	232.1	220.6	9,114	9,547
4	351.6	226.3	268.9	31,829	26,105
5	216.6	231.1	198.0	9,998	8,896
6	261.6	326.4	435.0	12,032	18,446
7	187.4	164.3	198.4	11,249	12,754
8	386.3	290.5	209.0	20,970	16,776
9	187.3	294.5	193.3	23,452	20,184
10	236.4	274.2	288.3	12,639	16,284
10-A	620.4	782.7	498.5	52,390	31,984
STATE	274.9	301.4	301.2	\$244,936	\$245,080

*Revised.

The unfavorable comparison of cash income with that of last year was the result of the sharp decline in marketings and the moderate decline in prices of cattle and calves. Part, at least, of the decline in marketings was the result of serious flood conditions in central and eastern Kansas and northern Oklahoma during the latter part of April.

It is a distinctive characteristic of interstate cattle marketings from Texas in April that the bulk of the forwardings are destined for summer pasturage in the Flint Hills of Kansas and the Osage Country of Oklahoma. This year, because of the flood conditions already mentioned, many of the cattle were delayed in transit and instead of

reaching their destination on schedule in April did not arrive until early in May. It is expected, therefore, that the May figures on marketings, when they appear later, will reflect this situation in the form of relatively large marketings to these areas. According to press reports pasture conditions in the Kansas-Oklahoma region are excellent and the cattle are expected to gain more than the normal amount of weight during the current season.

Forwardings of sheep during April were moderately above and shipments of hogs substantially above the corresponding month of last year. Prices of both sheep and hogs, however, were below those of a year ago and this fact partly offset the gains in marketings.

Substantial gains in cash income were registered by fruits and vegetables, for which more than \$18 million was received during April and of which more than \$11 dollars went to the Lower Rio Grande Valley. This compares with total receipts of about \$12 million from fruits and vegetables during April last year, of which nearly \$9 million was received in the Lower Rio Grande Valley.

CROP REPORTING DISTRICTS

In the January, February, March and April issues of the REVIEW a series of tables has appeared showing the trend of farm cash income in Texas from 1927 to 1943, inclusive, by sources, for the State as a whole and for a number of crop reporting districts. As space permits, similar data for the remaining crop reporting districts will be presented in future issues of the REVIEW. In passing, it might be stated that the statistical tabulations in question are summaries of a comprehensive statistical study of Texas by the writer, embracing prices, marketings, and farm cash income now in manuscript form.

In response to inquiries as to the counties embraced in the crop reporting districts of Texas, there is presented on the outer cover page of this issue of the REVIEW an outline county map of the State with the crop reporting districts delineated upon it. This chart will be of service not only in connection with the district figures already issued but for those which are to follow.

F. A. BUECHEL.

TEXAS BUSINESS REVIEW

Subscription: One Dollar per Year.

For club rates on five or more subscriptions Address:

Bureau of Business Research, The University of Texas,
Austin

Economic Development In Texas

[Editor's Note: In this article Mr. Johnson points out the dependence of basic industries on natural resources in relation to Texas. In subsequent articles Mr. Johnson will elaborate in greater detail some of the topics he has suggested toward the end of his present article under the caption "Point of View" emphasizing the growth possibilities of consumer goods industries for which the chemical industry particularly is now laying a foundation.]

IN RELATION TO PHYSICAL CONDITIONS AND INSTITUTIONAL FACTORS

Programs concerned with economic problems in Texas, and particularly with developmental possibilities of an economic nature in the State in the postwar years, will necessarily have to give undivided attention to certain fundamental considerations. Foremost among these fundamental items are the State's rich and varied natural resources, which in conjunction with the conditions of the physical environment, constitute the material foundation upon which the economic structure is necessarily built. How significant natural resources have become is apparent from even a brief consideration of the larger aspects of World War II; and the problems of control of the essential natural resources of the world will be insistent ones in the post-war period. Neither wishful thinking, nor the highest achievements of technology, are able to create natural resources where they do not already exist in nature. The achievements of technology, together with the scientific attainments upon which these achievements are based, are to be considered as attempts made in the unfolding of human intelligence to render available to mankind the vast variety of products derivable from natural resources. Considered as such, technology at large is an institutional factor furthering the utilization of the world's supply of natural resources. The physical environment, although many of its features are evanescent from the standpoint of geologic time, is, however, a rather permanent thing in so far as human time is concerned. Another group of fundamental conditions embraces the setting of Texas not only in the national picture but also in the world-wide situation as concerns especially such outstanding economic activities as the petroleum industry and the newly developing chemical industries, as well as agriculture and the pulp and paper industries. This is to say that in order to comprehend better the Texas situation, *per se*, as regards these *basic* industries, it is necessary to have a comparative view of them from a world-wide standpoint. Not only, for instance, must these basic industries be considered in reference to the national market but also the international market as well, and this necessarily embraces not only the all-important fields of regional industrial integration but also those of regional and industrial competition.

It is hardly necessary to add that power-driven machinery, modern methods of transportation and communication, the widespread applications of science, together with the resulting territorial division of labor and the use of large amounts of capital, have wrought within the past few decades a veritable revolution in the utiliza-

tion of natural resources the world over. No one will question that all of these factors are to be considered in the interpretation of the economic growth of Texas. The point of emphasis in this paper, however, is that a brief summary of economic growth in Texas, considered from the point of view of the comparative factors of economic development concerned, may provide a foundation for appreciating more fully the problems that inevitably lie ahead.

NATURAL RESOURCES AND NATURAL REGIONS

Fortunately, a splendid endowment of diverse natural resources vital to the economy of tomorrow is one of the predominant characteristics of the Texas region. This rich natural endowment is the key factor—and, if considered in a discriminating and scientific manner, it is a factor hardly susceptible of over-emphasis—to the future of Texas' economic and industrial development. Worthy of repetition is the statement that in the nature of the country lies the destiny of its people.

One of the most essential, and at the same time perhaps the most difficult of facts to get before those who are vitally concerned with the potentialities of the State and the material welfare of its citizenship is that of the breadth and variety of the physical scope of the Texas region itself. It is indeed a formidable enough undertaking to obtain a clear picture of the vastness embodied in the extent of the surface features of Texas, including the variety of and diversity in the outcropping geologic materials which are characteristic of the various portions of the State, together with the topographic features that have developed on and in relation to these geologic materials, as well as the variety and diversity in the distribution and characteristics of the State's soil resources, its natural vegetation and its surface waters.

In addition to this, however, it is necessary to give careful consideration to the subsurface features—to the characteristics of the numerous sedimentary, that is, the bedded rock formations which predominantly make up the geologic sections of the different regions of the State; it is also necessary to give attention to the kinds and complexity of the structures present in these sedimentary sections the thickness of which ranges, depending upon the section of State under consideration, from zero to perhaps as much as 25,000 to 30,000 feet, from the surface down to the old crystalline rocks of complex, complicated structure which comprise the geologic basement. The full significance of these geologic features is obvious from the simple fact that the huge oil and natural gas reserves of Texas, as well as its wealth in nonmetallic resources together with its underground water supplies, are all closely associated with subsurface materials and characteristics.

Obviously, the scope of the State's economic activities is conditioned by the extent and diversity of its available natural resources. The size and diversity of Texas' agricultural and range livestock enterprises alone are sufficient to give the State a prominent place in the nation's economy. The predominant position Texas has attained

in the oil and gas industries of the United States is sufficient to give the State an outstanding position in the world picture of large oil producing regions, and this is the case also as regards the oil and gas resources of Texas, both as to the volume of proven reserves, as well as to the relative and actual position these reserves occupy in the national picture. To the breadth of its agriculture and range livestock industries and its preponderance in oil and gas, Texas has added to its economic enterprises a new and large and already somewhat diversified chemical industry, all of which are represented by outstanding achievements in the war program. These chemical industries, together with other new undertakings that are being, or which will be established, give promise, to say the least, of being an outstanding factor in the post-war period of industrial growth in the State.

Summing up: Other than the wide extent of its area, three features pertaining to the scope of Texas make the State stand out in any inclusive economic survey of the nation at large. These are:

a) The State's striking diversity in rich natural resources, mostly occurring on a magnificent scale: These include its large areas of productive agricultural soils, widely distributed over the State; its forest regions, which although confined to East Texas, possess a natural capacity to grow timber of good quality, both rapidly and in large amounts, as well as its widespread grazing lands which form the basis of the State's diversified range livestock industry. In addition to these are the large petroleum and natural gas resources and the overwhelming position the State's reserves of oil and gas occupy in the national picture, together with the State's extensive and varied non-metallic resources other than oil and gas. Nor are mineral resources, such as magnesium, available from the waters of the Gulf of Mexico to be omitted from even a brief survey of the State's natural resources.

b) The particularly wide range of climatic conditions which in combination with the genetically associated large soil regions gives to the State agriculturally such varied farming regions as are manifested in its subtropical citrus producing areas of the Lower Rio Grande Valley, the broad extent of its several outstanding cotton growing regions, the widespread wheat producing lands in the northern portions of the State, as well as the even more widespread grain sorghums regions. Also associated with the prevailing climatic conditions of the various natural regions of Texas is the distribution as well as the characteristics of the natural vegetation, both of which are also closely tied in genetically with the distribution and characteristics of the Great Soil Groups displayed in a magnificent manner in Texas.

The humid lands of East Texas are characterized by the display of diversified forest growth. The rest of the State is characterized predominantly by grass lands of various types, although woodlands occupy certain edaphic areas—that is, areas in which certain local environmental features predominate. Still another climatic feature consists of the generally open winters together with the sunshiny conditions that prevail over much of the State.

c) The extensive coast line of the State along the western portion of the Gulf of Mexico brings to a large proportion of Texas the distinctive economic advantages of low-cost water transportation, not only to markets along the Gulf Coast and the Atlantic Seaboard but also to foreign markets as well.

INSTITUTIONAL FACTORS

Another factor essential to laying out a comprehensive industrial program for Texas involves a careful and discriminating consideration of the more inclusive trends in current economic development, and of industry in particular, together with the actual developments wherein these forces react upon the Texas scene. The impingement of these movements upon the Texas region illustrates in an outstanding manner the dynamic aspects of modern economic development. Since the decade of the 1870's the economy of the United States as well as that of every other important country in the world has come to be more and more closely associated with, and in many cases very definitely dependent upon, advances made in manufacturing industries.

Since the decade of the 1870's the world has witnessed those grand shifts in the development and production of its agriculture, its minerals, its manufactured products, together with the associated revolutionary movements in world trade, that have literally transformed our entire economy from what it was a century ago. And in the light of the current situation, practically the whole material future of Texas depends upon the continued industrial progress based upon the more intensive and wider utilization of its rich and varied natural resources.

ECONOMIC DEVELOPMENT IN TEXAS

Texas economic development in the historical sense comprises a series of impacts of these greater economic movements coming to terms with the natural environment in the State, or in the major natural regions of the State, as step by step the various groups of natural resources of Texas have come to be utilized. The peopling of Texas by the Anglo-Americans was part and parcel of the Westward Movement, characterized in particular by the spread of population across the vast expanses of the American continent, and which is recognized as the dominant institutional force in American economic development of the 19th century. In its broader aspects, the Westward Movement was part and parcel of the opening up of the Continental Interiors of the Mid-Latitudes—a world-wide movement and which therefore was not unique to the United States alone. The main phases of the Western Movement, however, took place between the decade of the 1870's and World War I. By no means, however, should that phase of the Westward Movement which took place between the close of the Napoleonic Wars in Europe and the decade of the 1870's be minimized; the importance of this particular phase of the Westward Movement lies in the fact that in this earlier period the larger picture of the pattern of internal commerce in the United States first came into being. The unfolding of the economic development of the major regions of the United States—which

in time was to become one of the distinguishing features of American economy—had begun. Thenceforth the Westward Movement comprised successive waves of migration of people and of industries seeking the opportunities provided by rich natural resources of the new lands on the frontier which could be had almost for the asking.

It is worthwhile from the standpoint of a wider perspective to consider briefly the early phase of the Westward Movement. For this purpose, the following quotation from Guy Stevens Callender, which was written in 1909, is appropriate:

"To form a correct judgment of the influences which produced this movement, it is necessary to understand the general character of our economic development during the period when it occurred. We will begin, therefore, with a brief sketch of that development during the first forty or fifty years of the nineteenth century. The most important event in our economic history during the period was the opening of the west. By the opening of the west I do not mean the early settlement of the region west of the mountains, which took place on a large scale during the thirty years after the Revolution. This in itself, as I shall attempt to show, had very little influence upon the economic life of the country. I refer rather to that improvement in the economic condition of the west which set in about the time of the second war with England, and which in a decade or two entirely changed the relation of that region to the rest of the country, lifting it for the first time into that important place in our economic life which it has until recently occupied. This event marks the shifting of the center of interest in our economic activity from the ocean and foreign commerce to the interior and internal commerce. It was the ending of the colonial period in our economic development, and the beginning of what has been the chief object of our economic activity ever since; namely, the application of capital to the settlement of the interior and the development of its natural resources. In order to appreciate the significance of this change to the movement we are studying, it will be necessary to trace its history in considerable detail."

Considered as a phase of the opening up of the Continental Interiors of the Middle Latitudes, the Westward Movement in the United States was a consequence of, in the sense that it was conditioned by, the rapid growth of the new manufacturing industry in West-central Europe and Northeastern United States. It was, in brief, an outgrowth of forces set in motion by the Industrial Revolution of forces which after the middle of the 19th century were an outgrowth of the large use of mineral resources. The rise of great industrial regions not only provided the markets for the surplus foodstuffs and raw materials which these interior plains, because of their natural resources and physical environment, could readily supply in large amounts but it also provided the means of the new transportation on land and by sea, together with the machinery and mechanical equipment that were necessary to the economic conquest of these interior plains and to which at the same time these new lands were so admirably suited.

Nor was the Westward Movement in this wider sense limited to the agricultural conquests of the new environments of the vast grassland plains. The rise of the oil industry to large proportions west of the Mississippi River after 1900, and the rapid growth of the oil and gas industries in Texas and the Gulf Southwest after World War I, together with the more recent industrial developments of a diversified nature in this large region

are further manifestations of the economic conquest of the extensive areas of the continental interior lands.

As previously stated, this movement of the economic conquest of interior continental areas of the Middle Latitudes was not confined to the United States. Agriculturally considered, the vast developments in Argentina and Australia belong in this category of economic development as does the agricultural expansion in wheat production particularly in Russia; and in Russia, the large-scale development of industry reflects still another aspect of this inclusive movement.

The spread of peoples across Texas, particularly in the latter third of the 19th century, was, however, largely an agricultural movement and it was accompanied by the rise to a prominent position of cotton, livestock, and lumber production in the State. The rapid tempo of increase of these three types of production in Texas was the result, on the one hand, of shifts of production of these enterprises as each advanced zonewise across the United States westward and southwestward into new and extensive producing regions, and on the other hand, of the utilization of three great groups of Texas natural resources—soils, native grasses, and forests. It should be noted particularly that these groups of natural resources—soils, native grasses, and forests—important as they were then, have assumed a greatly added importance since the earlier days of their utilization in Texas. The native grasses of the extensive plains of West and South Texas have supported the State's range livestock industry in the varied forms and stages through which it has passed since the middle of the 19th century to the present time. The rich soils of the Black Prairies, together with those equally fertile of the Black Earth type in the western and southern plains of the State, are outstanding soil resources of Texas; and these extensive bodies of soil resources also are of a type which gives them a leading position in the soil picture, and therefore, in the agriculture of the nation at large.

It is well to note at this place that with the further extension of the pulp and paper industry, together with associated industries, that the rapidly growing, diversified forests of East Texas, important though they have been in the past, will certainly take on a greatly accentuated importance in the near future. It is coming to be recognized that these forests constitute one of the State's outstanding groups of natural resources. Furthermore, with proper care these forests are permanent resources.

The growth and spread of cotton and livestock and lumber production in the latter third of the 19th century in Texas was paralleled by the extension of railroads into and across the State, as well as by the concurrent growth of commercial centers in major regions of Texas. Prior to 1900 these products of the soil were pre-eminent in the economic life of Texas; in the main, the commodities obtained therefrom were sold into distant markets. An outstanding problem of those times was how to get these products to the markets that lay far beyond the boundaries of the State. The romantic trail driving period of the years when the range cattle industry was sweeping rapidly across the State is, of

course, one of the best known examples of the early day marketing of Texas' surplus cattle production. In brief, this period in Texas history, in the latter portion of the 19th century, was one dominated by the bulk production of a few raw materials which had to be disposed of mostly in markets outside the State. Such an economy is definitely a colonial economy,—an economy based on the production of raw materials and which was expressly dependent upon outside, and usually distant markets not only for its prosperity but even for its very existence.

After the turn of the century, the economy of Texas began to change perceptibly. The first stage of rapid transformation in the State's economic life coincided, however, with the period of World War I and immediately thereafter. As everyone knows, the rapid tempo of transformation of economic conditions in Texas after 1900, and particularly after World War I, was associated with the development of the Texas phase of the oil industry. This is now, of course, a commonplace observation; but it is also high time to reemphasize the fundamental position of oil in the State's economy, and even more so of the vital place Texas oil, and natural gas as well, will occupy in the future of the State and of the nation also; for these are things, especially their tremendous potentialities, not fully appreciated even at the present time, and that in spite of the fact that World War II will inevitably continue to place greater burdens upon our natural resources, and especially upon our oil and gas resources than they have ever been subjected to at any time in the past.

Still another set of facts may aid in visualizing better these changes through which the State has passed during the last 40 years. Texas in 1900 had a population of some 3 million people, and at that time more than 80 per cent of that population was rural; no city in Texas in 1900 had a population of as much as 60,000. In 1940 Texas had a population of 6,415,000, of which 3,503,000 or 54.6 per cent was classed as rural. A decade before, in 1930, the rural population had comprised 59 per cent of the State total of 5,825,000.

Paralleling these striking changes in the growth and distribution of the total population of Texas, together with the expansion of older industries and the rise of new ones, have come impressive changes in employment.

The number of people engaged in agriculture in the State has increased greatly since 1890, but the proportion of this group in relation to the total number employed in Texas has decreased, whereas the number of those engaged in manufacturing and mechanical industry as well as in service occupations has increased both as to actual numbers so engaged and even more so as regards the proportion each of these groups comprises of the total number employed in the State.

In 1900, Texas had 9,791 miles of railways, which in that year carried 22,380,000 tons of revenue freight. In 1939 the mileage had been increased to 17,101 and the annual volume of revenue freight to 66,930,000 tons. The peak year in amount of revenue freight was 1926 when the volume transported by rail was 95,765,000 tons. The decreased tonnage hauled by railroads since 1926 is due to the availability and use of other means

of transport, such as pipelines and motor trucks. In 1900 Texas had practically no oil industry and the natural gas industry as such had not been dreamed of. As a matter of fact, the extensive pipeline system of Texas has been built mostly since World War I and the very large output of Texas oil did not come about until the late 1920's and the early 1930's.

SINCE WORLD WAR I

Since World War I still other aspects belonging to the more inclusive movement of the economic development of the continental interiors have become increasingly important to Texas. Furthermore, it should be pointed out that continued development in the utilization of natural resources in the continental interiors is part and parcel of an expansion that has already transformed many features of the world's economy and that it is a movement which to date has by no means run its full course.

Shortly after the turn of the century, following the discovery of the spectacular Lucas gusher at Spindletop, the Texas oil industry began its upward march toward the position of overwhelming importance which it now holds in the American oil industry.

The growth, particularly since World War I, of the Texas phase of the American oil industry has supplied the factors which have virtually transformed the economic life of the State. This group of industries is concerned with the exploration for, and the production, transportation, and refining of oil. More recently still the production, long-distance transportation, and the ensuing wider distribution of Texas natural gas have grown into a highly important industry. Owing to the vast size of the State, to the large number of its varied and diverse geologic regions which possess suitable structures for oil accumulation, together with the wide range of its geologic strata and the great thickness of the sedimentary section ranging in age from the geologically oldest oil-bearing formations to the youngest, Texas has come to be by far the leading oil and natural gas producing State of the nation; and, furthermore, as regards reserves of both oil and gas, it may be reemphasized that Texas occupies an overwhelming position in the nation as regards both of these significant and vital mineral resources. Texas attained first place in natural gas production in 1927, and of oil production in 1928; since those years, the State's production of both of these essential commodities has steadily forged ahead. The leading place Texas occupies in oil production is obviously a major factor in the growth to large proportions of the many enterprises in the State that are accessory to the oil business, such, for instance, as drilling, supply, and other forms of oil industry equipment concerns, together with numerous auxiliary enterprises.

Texas, however, did not become one of the Big Three of the oil producing states immediately after the momentous discovery of Spindletop. Although Texas oil production was stepped up considerably in the period of World War I and in the early 1920's, the really great expansion in the oil industry of the State has come since 1930.

Both in volume of oil production to date and in the amount of proven oil reserves, the Texas figures are amazingly large. Texas at the close of 1943 had produced a total of 8 billion 161 million barrels of oil—which is 29 per cent of the total national output. The almost spectacular increase in Texas oil activity in the last few years is reflected in the fact that 58 per cent of the total oil output of the State has been produced during the past 10 years.

As to proven oil reserves, as estimated by *The Oil and Gas Journal*, January 27, 1944, Texas had 11 billion 692 million barrels as of January 1, 1944—or 56.7 per cent of the national total which was placed at 20 billion 746 million barrels. These facts reflect in an unmistakable manner the preponderant position Texas occupies in the American oil industry.

In the early 1930's Texas attained first rank in petroleum refining, which is still the State's leading manufacturing enterprise. Oil refining, like oil production, had been of some local importance in Texas even prior to 1900, as at Corsicana. But for several years after the historic Lucas gusher came in at Spindletop in 1901, the Texas oil refining industry remained local in proportions. Since around 1910, and particularly since the period of World War I, paralleling the rapid growth of the national market for oil products, and of motor fuels in particular, oil refining in Texas has steadily progressed to the proportions of a huge national industry; in the 1930's Texas petroleum refining attained first place in the country, even though normally large quantities of crude oil continue to be shipped outside the State, to be refined elsewhere, particularly in refining centers along the upper Atlantic Seaboard. The movement towards the concentration of a considerable share of modern refining capacity on the western Gulf Coast, which has access to Atlantic Seaboard markets by low-cost tanker transportation, in conjunction with the occurrence of large reserves of crude oil in the State, bids fair to raise the rank of Texas in oil refining still higher. And, furthermore, in spite of substantial beginnings already in evidence, the large production of a wide range of chemicals from petroleum products and natural gas may be considered as having only been started in the State. Also, the large expansion of the oil refining industry and recent readjustments therein have been factors of no small proportions in the development of markets for large quantities of equipment requiring high-grade special steels, for sulphuric acid and various other chemicals, as well as for numerous other products such, for instance, as Fuller's earth. It is obvious that the growing demand for these chemicals and auxiliary products is one of the factors which serves to increase the markets for goods made from Texas raw materials.

Petroleum refining has been for years the State's leading line in manufacturing. Although volume figures as to the status of Texas oil refineries in the Government's 100-octane aviation program are not available, the State's position in this vast development is a very high one. A large proportion of these refined products has always gone to market outside Texas. Petroleum refining in Texas is a mass-production industry, manufacturing commodities under large-scale operations, largely for distant markets. The conventional products of natural gas,

however, are also important. Texas is by far the leading producer of carbon black. The production of carbon black is currently being modified considerably owing to the requirements of this essential substance in compounding rubber for tires from synthetic rubber.

Near Amarillo are located two helium producing plants. Helium is that rather strange non-hydrocarbon gas, of light weight and noninflammable, which occurs in relatively large amounts in the natural gas of the gigantic Panhandle field. It is found also in certain other natural gas fields of the United States. The United States is the only country in the world producing helium in quantity. The recent increase in helium production, which is now 25 times the pre-war output, is entirely under the control of the government, due to the use of helium as a strategic war material.

The government's program for obtaining hydrogen by pyrolysis of natural gas for the synthesis of ammonia as a strategic war material adds still another important new industry based upon the natural gas resources of Texas and the Southwest.

Natural gas has long since become an important household fuel; it has attained first rank in Texas as an industrial fuel in power plants for the generation of electricity; and it is being more widely used as an industrial fuel, not only in conventional ways, but also for special purposes, such as heat treatment of metals. Natural gas is often referred to as the perfect fuel. Furthermore, it has been aptly observed that had the wasted natural gas of Texas been properly conserved in the past, the amount of such fuel would be sufficient to support in Texas a good portion of the power-using industries of the Middle West. Nor can too much emphasis be placed on the fact that natural gas is particularly desirable as a fuel for certain outstanding industries, such as the glass-making, the smelting of non-ferrous metals, heat treatment of metals, and for the manufacture of pottery and ceramics.

Besides its growing significance in natural gasoline production and its increasing strategic importance in the manufacture of high-test aviation gasoline, the potentialities of natural gas fractions as a source of hydrocarbon raw materials for vastly extended developments in the chemical industry probably outweigh all other considerations, insofar as future industrial developments having to do with natural gas are concerned. Moreover, the possibilities of producing gasoline from natural gas itself promise to be deserving of careful consideration.

Because of the obvious significance of its oil and gas resources to the State, because these resources will be so vital in the future, and also because Texas oil and gas production and reserves bulk so overwhelmingly in the national picture of the oil industry that some mention should be made, even in a brief discussion of Texas economic development, of the geologic aspects which condition the occurrence of these vital natural resources. And more particularly, attention should be given to the comparative geologic features of Texas in order to provide in larger perspective the background for a fuller understanding and a more thorough comprehension of the magnitude of the oil and gas reserves of Texas. These aspects will be considered in future articles.

RECENT TRENDS

Consequences of Geographic Dispersion of Industry

In the processing and manufacturing of Texas raw materials, as has already been noted, three main historical stages are obvious; the earlier ones, of course, persist in modified and extended form, and thus overlap into the later stages. Proper recognition and full consideration of these various stages are of importance not only in interpreting the economic development of Texas itself, but also a knowledge of their characteristics is necessary in comprehending the setting of Texas development in the larger and more inclusive field of American economic development at large. These stages are briefly summarized in the following resumé:

(1) Prior to 1900 practically all processing industries in Texas were local in scope and they were concerned to a somewhat limited extent with the working up of agricultural, range, and forest raw materials, for these were the only types of raw products available at the time, and the local markets for such processed products were small.

(2) Since 1900, and more especially since World War I, coincident with the increased production of the wider diversification in agricultural production, which in part was the result of widened markets, these agricultural processing industries in general have not only expanded but also they have been considerably widened to embrace numerous new industries. In this connection the recent and large development in pulp and paper production in the State should be mentioned. The past two decades, it may be noted, have brought into prominence, not only from a national view but from a world standpoint as well, the essential part that cellulose products (which include wood pulp) and vegetable oils play in modern economy. The South as a whole has not as yet sufficiently grasped the potentialities of, and therefore the range and diversity of the attendant problems associated with their further industrialization, which these groups of essential commodities unquestionably are destined to have in the post-war world. Quite definitely, Texas' timber resources in conjunction with the natural conditions prevailing in the forest regions of the State are such as to favor a considerable further expansion of pulp production and of the paper industry in East Texas.

Since the period of World War I, Texas has witnessed its outstanding growth in petroleum and natural gas production, the expansion of its petroleum refining industry, and more recently the establishing of production of chemicals from oil and its derivatives, the increase in the use of natural gas as an industrial fuel in the State, and the beginnings, at least, of the use of natural gas as an important chemical raw material. As is well known there has been in the past 15 years a greatly increased use of natural gas in Texas for both domestic purposes and as an industrial fuel. The availability of natural gas in adequate volume is an important industrial factor in the growth of the various smelting and metal-refining industries of the State, such as those at El Paso, as well as at Amarillo and Dumas in the Panhandle, Laredo, Corpus Christi, and of the tin smelter at Texas City.

The availability of natural gas as an industrial fuel has been an item of marked economic importance in the

recent development of the pulp and paper industry in Texas, as well as in Louisiana and Arkansas. As a matter of fact, had natural gas not been available in adequate volume, there is little likelihood that the pulp and paper industry would have developed anywhere in the Gulf Southwest to any considerable extent, and the same statement applies to glass-making establishments and to most of the smelting and refining of metals in Texas.

What may be of even greater importance is the fact that the continued production and especially the future expansion of these industries in Texas is dependent upon continued adequate supplies of natural gas as industrial fuel.

(3) Since the early 1930's, however, Texas has witnessed the growth on a broad scale of a new type of industry, or rather of new groups of new industries in the State; these cannot fail to be of momentous significance to the economic life of Texas in decades to come. This new type of industry is already manifesting itself in various forms, but, in brief, these divergent phases are part and parcel of the developing chemical industry which somewhat silently, but none the less inexorably, is entering into and at the same time transforming economic life everywhere.

Under the aegis of a quickened industrial expansion that is nationwide, Texas has also witnessed extensive beginnings in the use of its non-metallic resources (other than oil and natural gas), of which the State has large reserves of such materials as limestone, clays, gypsum, sulphur, salt, potash, and others.

Representative of one group of enterprises using non-metallics are the cement and gypsum industries, which undoubtedly will be of still greater importance in the future. Representative of another group using non-metallics are the heavy inorganic chemical industries, producing, besides sulphuric acid, a number of less important products, and more recently the inauguration of the heavy alkali industry and the associated chlorine production in Texas which was begun with the establishment of the large plant of Southern Alkali Corporation at Corpus Christi. In this connection mention should be made also of the alkali and chlorine plant of Matthieson Alkali Works at Lake Charles, Louisiana, which was established about the same time as the one at Corpus Christi, and which has since been expanded with the result that its capital investment is now about four times that of the original plant. Also, there are the various plants of the Solvay Process Company and of the Ethyl Gasoline Corporation at Baton Rouge, Louisiana, where, in conjunction with the operations of the large refinery of Standard Oil of Louisiana, to which an important group of plants engaged in the government rubber program have been added, the pattern for one of the outstanding integrated industrial centers of the South is evolving.

As is well known there are a number of other enterprises making use of non-metallics. The potash industry represents still another important achievement in making use of non-metallics; this industry has already attained a substantial development in the Carlsbad, New Mexico, district, to the extent that it is able to meet the national

demands for this essential commodity. These various enterprises are important, not only because of the volume of their products, singly and in the aggregate, but also in that they illustrate the wide diversity of the Texas region in manufacturing industries, together with the economic potentialities such a diversity reflects.

In passing, it may be noted that in addition to the potentialities Texas possesses for further industrialization, a continued increase in the diversity of manufacturing enterprises and the growth of large integrated industrial centers in the State are necessarily problems of the first magnitude for careful consideration as regards the possibilities as well as the challenges of the post-war period. Examples of the rise of interrelated industry centers, wherein finished materials or by-products of one plant or unit becomes the raw materials of another plant or unit, that already are apparent in the State include the various Dow industries at Freeport, the various diversified enterprises of the Houston Ship Channel and Texas City, the synthetic rubber group of industries at Port Neches, together with the modern oil-refining establishments in the Beaumont-Port Arthur district. Another center in which integrated industrial activity is being developed includes the Corpus Christi district with its heavy alkali and chlorine production, its modern oil refining enterprises, butadiene production, electrolytic refining of zinc, together with the projected chemical utilization of natural gas hydrocarbons in that area. Still another integrated center, also with vast potentialities for further expansion is being developed around oil refining, natural gas utilization and synthetic rubber production in the Texas Panhandle.

Industry integration as well as unit integration within a single industrial plant is particularly important in the synthetic rubber program and in the production of aviation gasoline as well. In the current operations of the Wood River, Illinois, refinery of Shell Oil Company, 14 different units in the one plant are engaged in supplying the components for the 100-octane gasoline produced in this refinery. This diversity in operation units enables this refinery to produce a very high percentage of 100-octane gasoline on the basis of the amount of crude used. Another striking example of industry integration is the case of Carbide and Chemicals Corporation—the chemical subsidiary of the Union Carbide and Carbon Corporation engaged in producing synthetic organic chemicals—whose plant at Texas City uses as raw materials hydrocarbon refinery gases from the near-by refinery of Pan American Refining Corporation.

To sum up: The wide range of non-metallic resources in Texas, including of course the hydrocarbon resources of oil and gas, in conjunction with the ever-widening uses and growing demand for products made from these materials, and supported by the extensive fuel supplies of the State, give assurance that the expanded utilization of these materials will become an important factor in Texas industrial growth in years to come.

MORE RECENT INDUSTRIES

Recently attaining the proportions of a large Texas industry has been the development of metallic mag-

nesium production through the application of electrolytic methods, using as raw materials the magnesium chloride content of the waters of the Gulf of Mexico. These operations have been expanded, and currently Texas dolomite is being used as a source of magnesium produced electrolytically.

With the growth of the war effort has come the increasingly larger military demands for toluene, for aviation gasoline, for ammonia, and even more spectacular has been the colossal challenge to produce synthetic rubber in adequate amounts and of sufficient quality to meet both military requirements and civilian needs. All of these commodities are now under production in the State, by industries using materials supplied very largely from oil and natural gas. Preliminary to the production of synthetic rubber, however, is the manufacture in large amounts of both butadiene and styrene, the two intermediates out of which synthetic rubber of the GR-S type (formerly called Buna-S) is made.

The progress already made in Texas, within a period of less than a decade, as regards the large-scale production of these essential chemicals reflects in a most striking manner what can be done in the transformation of Texas raw materials into the most vital and strategic products of the times. That important further developments are currently under way is evidenced by announcements regarding the coming to Texas of new plants and of expansions in the already established ones in the State.

Consideration of the post-war future of many of these recent developments and operations is already an issue of considerable magnitude. Concerning the immediate future of these developments made possible by the war program, C. R. Wagner, who was then Chief of the Process Development Section, Refining Division, Office of Petroleum Administrator for War, wrote in *The Oil and Gas Journal*, March 25, 1943, as follows: "Whatever may be the economic value of the particular units now operated or installed to produce war material we can be certain that our industry is advancing in technical development as it never has before, and that we shall see a chemical industry of unprecedented size grow out of these developments.

"The technique that is making possible the large-scale production today of such products as isobutylene, butene-1, butene-2, butadiene, isoprene, and acetylene will scarcely fail when peacetime industry demands these and countless other organic chemicals as raw materials for the synthesis of products to fill needs of which we are today unaware."

Still another problem concerning the future of these industries built upon hydrocarbons derived from oil and natural gas is that of the adequacy of the reserves of these raw materials. In this regard, it must be emphasized that the problem of adequate reserves of oil and natural gas for bulk manufacture of the conventional products of the oil industry, such as gasoline, is one thing; that of adequacy of oil and gas hydrocarbons for a potentially great organic chemical industry is distinctly another sort of proposition.

As to the adequacy of raw materials bases to support these revolutionary new industries, the following quotation from an article by K. S. Adams, President, Phillips

Petroleum Company, in *Chemical and Engineering News* of June 25, 1943 is appropriate: "Another example is the much discussed synthetic rubber. The volume of butadiene for Buna rubber which could be made from the butanes annually available would result in a volume of rubber approximately five times that consumed in normal times. Is it any wonder then that the petroleum industry looks forward with confidence to the Nation's current rubber problem? Raw materials are in abundance."

Or, as John A. Tallant, Manager Technical Data Service, Hycar Chemical Company, has expressed it in an article in *World Petroleum*, August, 1943: "Out of the total volume of petroleum products produced in the United States, less than one-half of one per cent would be required to supply us with our rubber requirements. However, there will be a continuing market for butadiene and other such raw materials after the war and these could well prove to be the foundation of a new petrochemical branch of the oil industry, with considerable economic importance."

WORLD WAR II AND THE POTENTIALITIES OF THE NEW CHEMICAL INDUSTRY

Everyone is now conscious of the fact that World War II is demanding vast quantities of petroleum derivatives in ever increasing proportions. World War II is also demanding enormous amounts of chemicals—of chemicals produced from non-metallic resources, and even more so, of chemicals which can be supplied in immense volume by the use of hydrocarbons available from the vast storehouses of our petroleum and natural gas reserves. Also, large quantities of magnesium metal are being produced, for World War II has stressed in no uncertain terms the strategic importance as well as the economic significance of the light-weight metals.

It may be said that the Texas phase of the American chemical industry was only well started by 1940. The wide variety of large chemical developments, which since 1941 have come to the State together with those scheduled to be located here, reflects in a striking manner the broad and substantial bases which the scope of Texas natural resources so magnificently afford. This secure foundation for a large chemical industry, including the establishment already made, in conjunction with the wide range of the required natural resources present in large quantities in the State, and which obviously can support even greater developments in chemical lines than those now in the State, present the material bases upon which Texas industry in the post-war period can, and no doubt will rise to still higher levels of achievement.

THE ALL-PERVADING CHEMICAL INDUSTRY

Perhaps, in consideration of the breadth of chemical industry possibilities in Texas, a brief resumé of the chemical industry itself will not be out of place. Unquestionably, of all industries, the chemical industry and the complex of problems associated with its further expansion, will be outstanding in the post-war years, not only in Texas but also in various other parts of the world. Besides being a huge industry in its own right,

chemistry permeates, usually to a considerable degree, practically every other industry on the face of the earth. With the continued progress of scientific discoveries, and this progress obviously is being drastically hastened by the exigences of war, one may predict with considerable assurance that in the post-war years, chemistry will attain to levels both as regards practical performance and scientific achievements which in a comparative sense will dwarf many truly great accomplishments of the past.

In its historical perspective, the chemical industry as an organized enterprise had its beginnings in England during the first half of the 19th century, where it was predominantly an alkali industry. But a shift to the continent of Europe was in evidence shortly after the middle of the century and it was Germany that led in the development of chemical enterprises from the 1870's until World War I. Germany's great chemical industry was in the line of organic chemistry; it was built on the utilization of coal-tar by-products provided by its large coke-manufacturing industry, an industry that grew up with the large expansion of the German iron and steel industry during the latter part of the 19th century. The outstanding group of chemicals made in Germany prior to World War I embraced the coal-tar dyes, and dyes may be considered as belonging in the category of fine chemicals. In this intensive type of rather highly specialized industry Germany easily held a world monopoly prior to 1914. It is important to note, however, that just before the outbreak of World War I, the great German chemist Fritz Haber (who has since died in exile) had perfected a method for making synthetic ammonia, through a catalytic process involving high pressures and temperatures. Thus was a new chemical technique made available in a commercial sense and by its operation Germany secured the vitally needed ammonia for making nitric acid required in manufacturing explosives, and without which Germany could not have continued in the war for more than a few months.

But in another sense the development of this technique, involving the large-scale application of catalytic methods which around the turn of the century had received a great impetus from the work of the French chemist, Sabatier, made possible an expansion in the production of a large variety of new types of heavy chemicals, not only in Germany, but also in the United States and Russia in the period following World War I.

When World War I broke out, both England and the United States realized to their sorrow how utterly dependent they had been upon Germany for numerous chemicals, and of how limited were their own chemical industries, particularly those called upon to supply military explosives in large amounts. In fact, Germany's chemical achievements have since been referred to as that country's secret weapon in World War I. Naturally, the impetus for the development of a great chemical industry in the United States dates from this period of critical scarcity of World War I. Although the newly evolving American chemical industry in the years following World War I was a diverse one, it was, to a very large extent concerned with developing a large organic chemical industry—in which synthetic organic chemicals took the leadership in products manufactured.

The production of coal-tar chemicals, such as dyes, for instance stood out distinctly in this post-war period. Also, during the two decades following World War I the growth of the so-called synthetic fibers made from cellulose—rayon and Celanese, for example—was almost spectacular. And just before World War II a group of new synthetics characterized by their striking versatility and unique properties, such as Nylon, Vinyon, Saran and others, were making their appearance commercially. These are true synthetics, and production of which is based on the chemist's increasing knowledge of large molecules. The production of this new group of synthetics, together with other resins and plastics, is currently expanding by leaps and bounds owing to their strategic value as war materials. All of these synthetics are built primarily upon hydrocarbon compounds which can be supplied from coal or oil or natural gas. The inherent adaptabilities of petroleum and natural gas to supply raw materials for these rapidly evolving and rapidly growing industries merit special attention, not only because of their already spectacular growth but also because of the potentialities they hold for further development in the near future.

Attention also should be called to an important shift in chemical technology that was becoming evident in the United States prior to World War II. The German organic chemical development was built primarily upon the aromatic group of hydrocarbons, those derived from coal tar. This was so too for the large proportion of American development in organic chemical industry following immediately after World War I.

Petroleum and natural gas hydrocarbons are characteristically of the aliphatic group and it was with these hydrocarbons that the American phase of the chemical industry was largely concerned with, insofar as new developments were concerned in the period prior to World War II.

That phase of modern industrial chemistry based upon the utilization of the aliphatic hydrocarbons is largely an American development and it is this field that offers the vast potentialities in chemical industrial developments in the near future. Furthermore, it is possible to convert certain of the aliphatics into aromatic hydrocarbons, and this too is largely a development of American chemistry.

The new synthetic products which have made such rapid progress in the past two decades are characterized by the remarkable diversity and adaptability as to the uses to which they may be put. In fact, from the standpoint of economics, the high degree of versatility inherent in the synthetic organic chemicals as a group is one of their most significant properties.

Now, under the rapidly expanding needs of the war program, the synthetic organic chemical industry is receiving one of the greatest impulses of any industry in all time. Military requirements for aviation gasoline of high quality and in large volume has brought about within the past two years revolutionary developments in this particular phase of oil refining. The compounds used in making 100-octane gasoline are synthetic in the sense that they do not occur in nature; they are products

of chemical synthesis and conversion. The new needs for explosives in large quantities have brought about the production of toluene as an oil derivative, and toluene is being turned out today from oil refineries under mass production methods. Toluene, chief ingredient of TNT, was formerly made from coal-tar materials, but the current demands for this vital product are so large that the coal-tar industry under present conditions could not possibly meet the volume requirements; fortunately, the oil industry was ready to put into operation sufficient capacity to meet the requirements for this essential material. So successful was the toluene production that currently all 15 plants of the Army Ordnance Department's toluene program in the United States are now contributing toluene for use as a blending agent in the manufacture of 100-octane aviation gasoline—a fact which also illustrates the flexibility of modern chemical operations.

When the Japanese took over most of the rubber production of the Far East, the United States was brought sharply to the realization that something had to be done, and quickly, too, in order to bring synthetic rubber into large production. As a consequence of programs based upon a long extended and varied line of petrochemical research, butadiene and styrene plants have been turning out these intermediates in quantity and the program of large production of synthetic rubber is apparently on its way to full realization. Texas, with its capacity to produce both butadiene and styrene in large amounts, has achieved a substantial position in furnishing these products and also it has a good share of the copolymer plants which will manufacture synthetic rubber of the GR-S type from butadiene and styrene.

In brief, in the national emergency, the natural resources of oil and gas in which Texas is so rich and which are capable of supplying large quantities of hydrocarbon compounds for the manufacture of synthetic rubber have been pressed into use, serving to alleviate what might have been one of the most critical of shortages that has ever confronted the nation.

Nitric acid is another essential item used in large amounts for the manufacture of munitions and explosives; nitric acid is made from ammonia. The government has aided in the establishment of a number of plants in Texas and the Southwest for obtaining hydrogen from natural gas; the hydrogen by proper reaction with nitrogen from the air is synthesized into ammonia. Thus is natural gas, which is one of the lowest-cost sources of hydrogen, also playing a vital part in supplying the requirements for this highly strategic material.

Concerning the potentialities of natural gas as a source of chemical products the following brief quotation from A. P. Peck in the *Scientific American* for March, 1944, is appropriate: "Look upon natural gas as a raw material source for the chemical industry in the near future. Virtually a chemical twin to petroleum, natural gas is currently being used to the extent of over 95 per cent for industrial and household fuel. It is entirely probable however, that more and more of this gas will be diverted to other purposes.

"Butadiene, glycerine, carbon tetrachloride, gasoline, sulfa drugs, and fertilizers are some of the products available directly or indirectly from natural gas. Upon such possibilities can technology build an important chemical future for this product of nature."

POINT OF VIEW

Emphasis in this paper is placed upon the industries that are primarily wealth-creating as well as market-creating. They may appropriately be designated as *basic* industries. It should be kept in mind, however, that by virtue of the growth of these wealth-creating industries to considerable proportions in the State, a large and growing market for consumers' goods has concurrently arisen. And as a consequence of the expansion of these basic industries in the State, developed upon large utilization of the various groups of natural resources, conditions are created for the further growth of market-following, or consumers' goods industries. In brief, the extent, diversity, and to some degree the character of the Texas and Southwestern market are conditioned ultimately by the amount and character of utilization of the natural resources of this important region.

The potentialities in Texas for the further development of capital and heavy goods industries will continue to be a function of the utilization of the State's natural resources and of the processing and manufacture of raw materials and intermediates obtained from this utilization. That the widening of these industrial operations broadens the structure of the economic life of the entire State needs no demonstration. One aspect of this broadening in the economy of the State is reflected in the fact that the market in Texas for consumers' goods—based upon industries supplying buying power—is already attracting considerable attention as exemplified by the variety of industries supplying the needs of Texas enterprises as well as by the growth in the size and diversity of retail markets in Texas. It may be noted, too, that the volume of buying power in Texas and the Gulf Southwest is already such that it occupies an important sector in the national market. Furthermore, in emphasizing still more the essential significance of the market in all considerations of an economic nature, there is the outstanding fact that our domestic American market embraces 130,000,000 consumers having a relatively high standard of living, and that this market is one not impeded, theoretically at least, by tariff barriers. That this vast domestic market is an outstanding feature of our American economy, no one will question. In addition, there is the fundamental factor of economic integration for the nation at large, which necessarily has to be based upon the optimum economic development of each of its several major regions in conjunction with the necessity of tying these producing regions more closely together by trade. This is, of course, the essential function of internal commerce.

In addition, there is the highly important problem of the changed position Texas manufactured products may assume in post-war developments. Certainly international trade in the future, to take one very important item, will reflect trends of a nature considerably different from those obtaining in the past.

Texas' major industries, however, will continue to be dependent upon the national market to take a large share of their products. But, as a corollary of the facts presented above, further growth of the Texas and Southwestern market—a growth sustained by the progressive utilization of the rich and varied natural resources of these states—will be of momentous importance not only to such undertakings as wholesaling and retailing and industrial marketing, but it will serve as the incentive to and the support for a further large expansion of manufacturing in this sector of the nation's map. It is this growth in large industrial production, using mass-production methods to manufacture goods for distant markets, which more than anything else will serve as the springboard to bring about needed corrections in regional freight rate structures just as it has been the rich natural resources and commercial advantages of Texas and the Southwest that already have actually brought about a substantial development in manufacturing and industry as a consequence of the migration of large industries into this sector of the United States. It is obvious that these industries have come to Texas because of the pull of the advantages which the State possesses and that they have come in spite of various obstacles which have intervened.

The outlook for the continued growth of the so-called population-following industries, or market-following enterprises, in Texas—including such widely different enterprises as the roasting and packaging of coffee, the manufacture of paper and of products therefrom, the transformation of vegetable oils into cooking compounds and margarine, the making of soap, the tanning of leather, the manufacture of glass and glassware, can and container manufacturing, the making of air-conditioning equipment, the development of pottery and ceramic products, or the synthesis of complex chemicals and the like—is such that trends in this direction will be followed with increasing attention, not only in Texas but also in the nation at large. Another aspect of the broadening in the economy of the State is reflected in the entire field of service occupations—and the group is a large one—of the State.

That the continued expansion of the basic industries built directly on the natural resources of the State is obviously of the greatest importance to the economy of Texas in the near future, is, of course, generally apparent. But also it should be borne in mind that with the large output of such a product as magnesium, together with the mass production of synthetic organic chemical intermediates and of synthetic rubber in the State as a consequence of the war program, it would be only common sense to consider that the possibilities of turning out consumers' products in Texas from these materials may become important in the post-war period. Should such possibilities materialize, important new enterprises in the line of fabricating operations would be added to the growing list of Texas' diversified industries. At this point, attention may be called to the possibilities of the light-weight metals in a long-range consideration of the economics of the whole field of metal-consuming industries. A discussion of this problem will be undertaken in a future article.

Industrialization in its more complete aspects requires the development of integrated, inter-connected enterprises wherein the finished commodities, by-products, and waste materials of one industry or group of industries become the raw materials of other industries, all operating in an organized sequence until the final product comes into being. That phase of modern industry represented by the facts of concentration in particular industries has long received considerable emphasis; equally important, however, in industry operation, is that phase of modern industry designated as industrial differentiation. Industrial differentiation in this sense includes those inter-relations of individual industries and of groups of industries necessary to the manufacture of a particular line of products; as such it is a basic feature of industrialization and one which generally has been simply taken for granted, that is to say, one that has been generally neglected in industry studies.

Unquestionably, the war has brought to the people of Texas a new and broader appreciation of the State's rich endowment in natural resources, together with a fuller knowledge of the diversity of industries, both large and small, which have been built upon these resources. The war has served to crystallize in the minds of the people of the State a recognition of the deeper significance of industry development in Texas, just as it has also served to broaden the realization of how vitally important to this State its large and varied natural resources actually are. It is incumbent upon the citizenship of the State not only to realize fully what these developments mean in the economic life of Texas currently but also to consider in a comprehensive manner what these current trends may well mean to the State in meeting the complex array of difficult and involved problems which the postwar years will inevitably bring.

Industry development is no panacea for the automatic solving of these diverse problems—but at the same time, it can hardly be over-emphasized that economic progress in Texas will be conditioned very largely by industrial expansion within the State.

In summing up, it may be emphasized that in addition to the industries and plants that have become part and parcel of the war production program in Texas, it is to be kept in mind also that the large production of such new commodities in the State as magnesium metal together with the mass production of intermediates already achieved in the synthetic organic chemical industry, primarily from petroleum and natural gas hydrocarbons, provide the raw-materials for diverse fabricating industries a wide range of consumers' goods, including such things as automobile tires, plastics and fabricated articles made therefrom as well as products from magnesium, and even whole new industries based upon the potentially abundant raw materials which can be supplied as chemical derivatives from oil, natural gasoline, and natural gas.

Without question the possibilities for the development of such new industries in Texas—of fabricating industries which will make use of these raw materials that can be so efficiently produced in large volume in the State—constitutes a problem of utmost importance. Unquestionably, too, this is an important problem for consideration in regard to the establishing of new and substantial industries in Texas during the post-war years.

In conclusion, the attainment of a more fully integrated industrial economy in the State at large constitutes a challenge to, embraces the potentialities of, and at the same time includes the overcoming of obstacles to the further industrialization of Texas to a degree commensurate with the enormous wealth represented by the State's varied natural resources and its advantageous geographic orientation with reference to the rest of the United States as well as to other countries. Henceforth, the regional economy of Texas will be conditioned to a considerable degree by the progress of industrial development in the State.

ELMER H. JOHNSON.

Cotton In Texas Agriculture

Texas agriculture is under pressure from many powerful forces. War demands and price, for some more or less specialty crops, are out of line with peace time trends. The rapid growth of industry and city population in Texas is demanding more perishable food products, such as fresh milk and fruits and vegetables, and a greater variety and quantity of agricultural raw materials. Labor shortages and high wages are causing farmers to change their farming systems to more extensive agriculture or to substitute machine equipment for labor. These economy adjustments, war prices, and the fear of inflation are causing land values to rise out of proportion to long term prospect.

In addition to the more or less temporary conditions suggested above, it is necessary to remember that Texas agriculture is in a period of transition in terms of farming systems. In the main, the movement is constructive in that it is away from soil exploitation toward a system of creative agriculture.

It is the adjustment to long term trends after the war emergency is over that is most vital to the welfare of Texas farmers and the State. These adjustments must center around problems of developing farming systems in each region through the selection and adaptation of crops, livestock and other enterprises which will prevent erosion, build soil fertility, give the farmer the greatest amount of profitable employment, and reduce his production and market risks to the minimum.

One practical way to develop a farming system is for farmers to select the enterprise best adapted to their

natural environments and economic conditions, and to supplement them with enterprises to most nearly accomplish the above objectives.

Cotton is Texas' most productive and surest major crop. The high value of both cotton lint and cottonseed per acre tends to give cotton production the value of two crops in a farming system. Even so, the value of cotton in Texas agriculture and Texas economy will probably be underrated because we have been told so often that cotton is a soil depleting crop. The fact is generally known that cotton lint and cotton linters contain no plant food and this is to a large degree true of cottonseed oil. Thus, if the cottonseed meal, hulls, and stalks are restored to the soil, even though fed to livestock first, they will not only add to the profitableness of the crop itself, but will make possible the association of other enterprises with cotton heretofore impractical. Successful harvesting of cotton by machine methods, which now seems assured, will greatly enhance the value of cotton in farming systems in Texas.

The adjustment and development of farming systems in Texas to fit the natural requirements of each region, the market outlook, and technological developments are perhaps the major business problems of Texas. The Agricultural and Mechanical College of Texas working with farmers has already done much work in this field, but it is one in which Chambers of Commerce and other business organizations can contribute much.

A. B. Cox.

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

(In Thousands of Running Bales Except as Noted)

Year	Carryover August 1	Imports to May 1*	Final Ginnings ¹	Total	Cons. to May 1	Exports to May 1	Total	May 1 Balance
1933-1934	8,176	112	12,664	20,952	4,458	6,458	10,943	10,009
1934-1935	7,746	83	9,472	17,301	4,116	3,986	8,102	9,199
1935-1936	7,138	102	10,417	17,657	4,658	5,167	9,825	7,832
1936-1937	5,387	167	12,130	17,694	6,017	4,762	10,779	6,915
1937-1938	4,498	99	13,242	22,839	4,430	5,034	9,464	13,375
1938-1939	11,533	108	11,621	23,262	5,153	2,964	8,117	15,145
1939-1940	13,033	123	11,477	24,633	5,955	5,695	11,650	12,983
1940-1941	10,596	119	12,287	23,022	6,993	885	7,878	15,124
1941-1942	12,367	†	10,498	22,856	8,250	†	8,250	14,606
1942-1943	10,590	†	12,437	23,027	8,440	†	8,440	14,587
1943-1944	10,687	80 ²	11,121	21,888	7,580	975 ²	8,555	13,333

The Cotton year begins August 1.

¹Running bales.

²N. Y. Cotton Exchange.

*Figures are in 500-pound bales.

†Not available.

EMPLOYMENT AND PAY ROLLS IN TEXAS

April, 1944

	Estimated Number of Workers Employed*		Percentage Change from		Estimated Amount of Weekly Pay Roll		Percentage Change from	
	Mar., 1944 ⁽¹⁾	Apr., 1944 ⁽²⁾	Mar., 1944	Apr., 1943	Mar., 1944 ⁽¹⁾	Apr., 1944 ⁽²⁾	Mar., 1944	Apr., 1943
MANUFACTURING								
All Manufacturing Industries	165,322	163,685	- 1.0	- 0.4	5,541,659	5,479,975	- 1.1	+ 12.6
<i>Food Products</i>								
Baking	9,360	9,462	+ 1.1	+ 20.7	325,243	325,582	+ 0.1	+ 43.9
Carbonated Beverages	3,515	3,434	- 2.3	- 2.9	102,324	100,591	- 1.7	+ 3.6
Confectionery	1,552	1,502	- 3.2	+ 24.4	21,303	20,733	- 2.7	+ 25.5
Flour Milling	2,344	2,377	- 2.9	+ 3.9	70,302	68,765	- 2.2	+ 16.2
Ice Cream	1,355	1,461	+ 7.9	+ 13.4	37,091	38,724	+ 4.4	+ 22.3
Meat Packing	6,008	5,982	- 0.4	+ 8.3	183,702	177,425	- 3.4	+ 12.0
<i>Textiles</i>								
Cotton Textile Mills	5,453	5,286	- 3.1	- 22.1	121,333	118,676	- 2.2	- 16.5
Men's Work Clothing	4,509	4,332	- 3.9	- 17.3	77,807	74,767	- 3.9	- 7.5
<i>Forest Products</i>								
Furniture	1,547	1,155	- 25.3	- 33.4	39,489	30,454	- 22.9	- 13.6
Planing Mills	1,895	1,803	- 4.9	- 11.6	54,728	51,464	- 6.0	- 4.2
Saw Mills	14,912	14,568	- 2.3	- 8.4	277,500	276,965	- 0.2	+ 3.7
Paper Boxes	789	766	- 3.0	- 11.7	18,250	17,756	- 2.7	- 7.2
<i>Printing and Publishing</i>								
Commercial Printing	2,496	2,465	- 1.2	- 3.3	89,329	85,326	- 4.5	+ 9.0
Newspaper Publishing	3,992	3,966	- 0.7	- 6.8	112,664	111,885	- 0.7	- 5.5
<i>Chemical Products</i>								
Cotton Oil Mills	3,244	2,930	- 9.6	+ 2.0	51,455	47,579	- 7.5	+ 20.9
Petroleum Refining	24,098	24,331	+ 1.0	+ 9.8	1,380,066	1,389,512	+ 0.7	+ 24.6
<i>Stone and Clay Products</i>								
Brick and Tile	1,753	1,701	- 2.9	- 3.1	30,595	29,133	- 4.8	+ 3.7
Cement	907	889	- 1.9	- 23.9	33,571	34,413	+ 2.5	- 23.0
<i>Iron and Steel Products</i>								
Structural and Ornamental Iron	2,351	2,393	+ 1.8	- 18.1	78,837	79,935	+ 1.4	+ 0.9
NONMANUFACTURING								
Crude Petroleum Production	26,800	27,031	+ 0.9	+ 5.0	1,416,119	1,473,986	+ 4.1	+ 26.1
Quarrying	(3)	(3)	- 0.7	- 12.8	(3)	(3)	+ 1.8	+ 3.0
Public Utilities	(3)	(3)	+ 0.1	+ 4.4	(3)	(3)	+ 1.6	+ 14.8
Retail Trade	203,834	208,456	+ 2.3	- 3.3	4,694,113	4,740,444	+ 1.0	+ 6.7
Wholesale Trade	62,551	61,934	- 1.0	+ 2.8	2,375,857	2,378,106	+ 0.1	+ 14.3
Dyeing and Cleaning	2,750	2,874	+ 4.5	- 1.5	64,881	65,785	+ 1.4	+ 10.1
Hotels	19,460	19,363	- 0.5	+ 8.9	329,671	337,572	+ 2.4	+ 26.9
Power Laundries	14,051	14,192	+ 1.0	- 5.8	234,333	239,501	+ 2.2	+ 1.0

CHANGES IN EMPLOYMENT AND PAY ROLLS IN SELECTED CITIES⁽⁴⁾

Employment				Pay Rolls				Employment				Pay Rolls			
Percentage Change				Percentage Change				Percentage Change				Percentage Change			
Mar., 1944		Apr., 1943		Mar., 1944		Apr., 1943		Mar., 1944		Apr., 1943		Mar., 1944		Apr., 1943	
to		to		to		to		to		to		to		to	
Apr., 1944		Apr., 1944		Apr., 1944		Apr., 1944		Apr., 1944		Apr., 1944		Apr., 1944		Apr., 1944	
Abilene	_____	+	4.8	-	2.2	+	6.1	+	16.8	Galveston	_____	-	6.4	+	8.9
Amarillo	_____	-	6.5	-	20.2	+	1.8	-	9.1	Houston	_____	+	0.2	-	0.9
Austin	_____	+	0.9	+	8.5	-	1.3	+	9.3	Port Arthur	_____	-	0.6	+	3.2
Beaumont	_____	-	0.6	-	7.8	+	3.2	+	2.1	San Antonio	_____	-	0.7	-	1.5
Dallas	_____	+	0.7	+	34.7	+	3.3	+	70.0	Sherman	_____	+	4.0	-	3.8
El Paso	_____	+	0.2	-	1.8	-	1.3	+	14.4	Waco	_____	+	1.1	+	4.9
Fort Worth	_____	-	2.8	-	2.8	-	1.7	+	8.2	Wichita Falls	_____	+	0.6	-	16.9
										STATE	_____	-	0.2	+	4.2
												+	1.6	+	20.4

ESTIMATED NUMBER OF EMPLOYEES IN NONAGRICULTURAL BUSINESS AND GOVERNMENT ESTABLISHMENTS⁽⁵⁾

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

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

(1) Revised.

(2) Subject to revision.

(3) Not available.

(4) Based on unweighted figures.

(5) Less than 1/10 of one per cent.

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 cooperating with the Bureau of Labor Statistics.

Due to the national emergency, publication of data for certain industries, is being withheld until further notice.

APRIL RETAIL SALES OF INDEPENDENT STORES IN TEXAS

	Number of Estab- lishments Reporting	Percentage Changes in Dollar Sales		
		April, 1944 from April, 1943	April, 1944 from March, 1944	Year, 1944 from Year 1943
TOTAL TEXAS	923	+ 5.2	- 8.1	+ 9.5
STORES GROUPED BY LINE OF GOODS CARRIED:				
APPAREL				
Family Clothing Stores	23	+ 2.7	+ 4.8	+ 6.4
Men's and Boys' Clothing Stores	32	- 1.0	+ 4.0	+ 2.3
Shoe Stores	11	+11.8	+10.3	- 0.4
Women's Specialty Shops	35	+10.0	-31.1	+15.7
AUTOMOTIVE*				
Motor Vehicle Dealers	65	-14.0	-13.5	+ 5.5
COUNTRY GENERAL				
DEPARTMENT STORES	93	+11.2	+ 0.7	+ 8.8
DRUG STORES	60	+ 9.2	- 5.0	+12.2
DRY GOODS AND GENERAL MERCHANDISE	107	+ 8.8	- 3.8	+14.0
FILLING STATIONS	27	+11.1	+ 5.6	+ 7.8
FLORISTS	25	- 5.2	- 5.9	+ 5.8
FOOD*	18	+26.6	+39.7	+32.2
Grocery Stores	31	+11.9	+ 1.7	+ 7.2
Grocery and Meat Stores	90	+10.4	- 4.9	+10.2
FURNITURE AND HOUSEHOLD*				
Furniture Stores	55	-10.5	- 8.7	- 4.9
JEWELRY				
LUMBER, BUILDING, AND HARDWARE*	24	-15.6	-33.7	+11.9
Farm Implement Dealers	13	+27.4	- 0.7	+25.5
Hardware Stores	53	+12.5	- 1.4	+24.0
Lumber and Building Material Dealers	97	-10.2	+ 2.0	- 4.9
RESTAURANTS	25	+15.2	+ 0.3	+19.8
ALL OTHER STORES	9	+ 0.7	+ 2.9	+ 5.7
TEXAS STORES GROUPED ACCORDING TO POPULATION OF CITY:				
All Stores in Cities of—				
Over 100,000 Population	140	+ 6.2	-15.6	+11.6
50,000-100,000 Population	113	+ 2.4	- 4.1	+ 6.5
2,500-50,000 Population	439	+ 4.7	+ 2.6	+ 6.7
Less than 2,500 Population	231	+ 9.3	+ 2.0	+14.4

*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.

APRIL 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 Outstandings		Ratio of Credit Salaries to Credit Sales	
		1944	1943	1944	1943	1944	1943
All Stores	61	42.4	46.2	63.5	61.7	1.3	1.2
Stores Grouped by Cities:							
Austin	6	39.1	41.1	71.6	71.5	1.3	1.2
Bryan	3	42.7	35.7	59.3	52.9	1.1	1.1
Dallas	9	48.6	55.4	60.4	59.2	1.0	0.8
El Paso	3	37.1	43.0	65.6	65.8	1.7	1.3
Fort Worth	4	37.5	43.8	63.0	61.1	1.6	1.2
Houston	8	41.5	44.9	63.1	57.9	1.6	1.6
San Antonio	5	38.8	37.1	64.6	65.3	1.3	1.5
Waco	5	43.5	44.5	62.8	57.4	1.3	1.2
All Others	18	41.4	44.7	73.1	72.1	1.1	0.9
Stores Grouped According to Type of Store:							
Department Stores (Annual Volume Over \$500,000)	19	41.2	45.8	65.3	62.1	1.4	1.3
Department Stores (Annual Volume under \$500,000)	9	40.0	41.3	65.8	66.9	1.3	1.4
Dry-Goods-Apparel Stores	3	39.4	43.8	67.3	69.1	1.9	1.8
Women's Specialty Shops	17	47.8	49.4	58.7	60.1	0.9	0.8
Men's Clothing Stores	13	39.4	43.9	66.7	61.4	1.4	1.2
Stores Grouped According to Volume of Net Sales During 1943:							
Over \$2,500,000	19	40.5	44.7	62.4	64.2	1.2	1.1
\$2,500,000 down to \$1,000,000	9	43.5	38.1	71.5	65.3	1.3	1.2
\$1,000,000 down to \$500,000	14	35.9	39.8	66.5	69.6	1.5	1.3
Less than \$500,000	19	30.1	34.1	67.7	68.3	2.4	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.

DAIRY PRODUCTS MANUFACTURED IN PLANTS IN TEXAS

Product and Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
CREAMERY BUTTER (1000 lb.)													
1944*	2,043	2,126	2,765	3,535									
1943*	2,636	2,743	3,076	3,652	4,740	4,275	4,051	3,452	2,629	2,581	2,236	1,924	38,071
1930-39 average	2,074	2,109	2,392	3,138	3,556	3,166	4,113	2,867	2,513	2,608	2,301	2,211	32,048
ICE CREAM (1000 gal.)†													
1944*	1,115	1,211	1,520	1,687									
1943*	1,125	1,187	1,396	1,770	2,327	2,391	2,758	2,763	1,990	1,622	1,443	940	22,237
1930-39 average	215	262	434	570	752	893	904	845	686	460	259	205	6,486
AMERICAN CHEESE (1000 lb.)													
1944*	902	956	1,229	1,884									
1943*	914	948	1,063	1,594	2,120	1,943	1,896	1,405	1,019	819	621	809	15,272
1930-39 average	554	590	737	1,050	1,215	1,129	1,119	1,025	866	852	718	641	10,496
MILK EQUIVALENT OF DAIRY PRODUCTS† (1000 lb.)													
1944*	67,873	71,519	92,663	119,889									
1943*	80,106	83,301	94,470	118,447	154,491	142,700	143,120	124,558	93,186	85,084	73,290	62,253	1,291,709
1930-39 average	54,675	57,139	67,456	89,641	104,323	97,562	97,075	89,185	76,165	73,444	60,119	55,872	922,656

*Estimates of production made by the Bureau of Business Research.

†Milk Equivalent of Dairy products was calculated from production data by the Bureau of Business Research.

‡Includes ice cream, sherbets, ices, etc.

NOTE: 10-year average production on creamery butter, ice cream and American cheese based on data from the Agricultural Marketing Service, U.S.D.A.

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

	Cattle		Calves		Swine		Sheep		Total	
	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
Total Interstate Plus Fort Worth	7,627	11,528	687	568	1,762	1,598	552	551	10,628	14,245
Total Intrastate Omitting Fort Worth	919	1,133	121	170	178	47	34	19	1,252	1,369
TOTAL SHIPMENTS	8,546	12,661	808	738	1,940	1,645	586	570	11,880	15,614

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

	Cattle		Calves		Swine		Sheep		Total	
	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
Total Interstate Plus Fort Worth	15,615	25,712	2,458	2,687	6,465	5,589	1,379	2,597	25,917	36,485
Total Intrastate Omitting Fort Worth	2,500	3,604	488	777	495	260	178	187	3,661	4,828
TOTAL SHIPMENTS	18,115	29,316	2,946	3,364	6,960	5,849	1,557	2,784	29,578	41,313

*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.

APRIL, 1944, CARLOAD MOVEMENTS OF POULTRY AND EGGS

Shipments from Texas Stations

*Destination	Cars of Poultry						Cars of Eggs					
	Chickens		Turkeys		Shell		Frozen		Dried		Shell Equivalent†	
	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943	1944	1943
TOTAL	20	1	20	2	52	32	158	91	154	104	1,600	1,046
Intrastate	8	0	9	0	28	31	44	70	26	18	324	315
Interstate	12	1	11	2	24	1	114	21	128	86	1,276	731
Receipts at Texas Stations												
TOTAL	10	0	1	1	45	36	56	71	10	13	237	282
Intrastate	1	0	1	1	26	35	47	66	8	13	124	271
Interstate	9	0	0	0	19	1	9	5	2	0	113	11

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

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

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

BUILDING PERMITS

	April, 1944	April, 1943	March, 1944
Abilene	\$ 12,380	\$ 6,060	\$ 11,290
Amarillo	94,505	49,374	188,395
Austin	43,309	36,767	57,364
Beaumont	102,873	54,590	48,956
Big Spring	18,525	7,830	11,675
Brownsville	6,138	7,366	8,405
Brownwood	5,425	2,992	4,000
Coleman	5,050	0	300
Corpus Christi	139,880	388,406	104,357
Corsicana	1,008	1,555	678
Dallas	708,293	140,637	433,797
Del Rio	3,990	1,850	5,878
Denton	975	2,800	1,940
Edinburg	650	605	10,890
El Paso	194,301	46,745	40,285
Fort Worth	455,880	593,344	374,468
Galveston	15,063	14,560	44,085
Gladewater	1,050	1,500	550
Graham	1,533	0	0
Harlingen	3,350	0	17,650
Houston	495,064	173,765	555,896
Jacksonville	5,650	3,000	12,300
Kenedy	1,000	750	3,800
Kerrville	925	950	350
Laredo	5,972	8,485	5,329
Longview	11,505	695	4,055
Lubbock	64,937	11,114	39,627
McAllen	11,095	4,135	9,265
Marshall	42,617	7,790	5,251
Midland	3,701	15,215	91,400
New Braunfels	7,755	410	4,430
Pampa	4,150	2,900	690
Paris	9,745	20,390	82,325
Port Arthur	37,646	13,132	30,848
San Antonio	385,089	173,499	378,482
Sherman	16,703	23,632	12,437
Snyder	0	0	0
Sweetwater	3,890	2,135	9,075
Texarkana	3,900	7,643	6,450
Tyler	42,968	6,909	10,668
Waco	239,920	175,708	114,585
Wichita Falls	22,658	45,298	33,567
TOTAL	\$3,231,068	\$2,054,536	\$2,775,793

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

APRIL RETAIL SALES OF INDEPENDENT STORES
IN TEXAS

(By Districts)

	Number of Estab- lishments Reporting	April, 1944 from April, 1943	April, 1944 from March, 1944	Percentage Changes Year to Date 1944 from Year to Date 1943
TOTAL TEXAS	923	+ 5.2	- 8.1	+ 9.5
TEXAS STORES GROUPED BY PRODUCING AREAS:				
District 1-N	61	+ 3.0	+ 4.4	+ 0.4
Amarillo	21	+ 0.6	+ 7.3	- 3.3
Plainview	12	+ 2.6	+ 0.2	+ 2.8
All Others	28	+ 5.3	+ 3.3	+ 3.5
District 1-S	27	+ 0.7	+ 3.0	+ 7.0
Lubbock	19	+ 4.7	+ 3.5	+ 7.4
All Others	8	-20.5	*	+ 6.3
District 2	70	- 6.1	- 0.9	- 2.8
District 3	31	+ 13.7	+ 2.8	+ 10.1
District 4	207	+ 4.6	-16.7	+12.3
Dallas	30	+10.0	-26.4	+16.6
Fort Worth	22	+ 2.0	-11.7	+ 9.0
Waco	27	+ 2.2	- 1.1	+ 6.4
All Others	128	- 4.3	+ 4.4	+ 8.5
District 5	100	+ 9.5	+ 4.3	+11.2
District 6	37	+ 9.2	-10.3	+13.3
District 7	47	+24.3	+10.9	+13.8
District 8	160	+ 4.8	- 5.0	+ 4.2
San Antonio	43	+ 6.6	- 7.7	+ 6.7
All Others	117	+ 2.3	- 0.5	+ 0.2
District 9	111	+ 3.2	- 7.4	+10.1
Houston	45	+ 4.4	-10.3	+11.7
All Others	66	+ 0.9	- 1.4	+ 7.4
District 10	24	+13.7	+ 4.3	+ 8.6
District 10A	48	+ 2.5	- 1.3	+16.2

*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.

COMMODITY PRICES

April, 1944 April, 1943 March, 1944

Wholesale Prices:

U.S. Bureau of Labor Statistics (1926=100%)	103.9	103.7	103.8
--	-------	-------	-------

Farm Prices:

U.S. Bureau of Labor Statistics (1926=100%)	123.2	123.9	123.6
--	-------	-------	-------

Retail Prices:

Food (U.S. Bureau of Labor Statistics (1935-1939=100%))	134.6	140.6	134.7
Cost of Living Index (1935-1939=100%)	124.5	124.1	123.8
Department Stores (Fairchild's Publications, Jan., 1931=100%)	113.4	113.2	113.4

POSTAL RECEIPTS

	April, 1944	April, 1943	March, 1944
Abilene	\$ 42,510	\$ 41,498	\$ 42,425
Amarillo	56,959	51,920	54,231
Austin	94,507	91,911	93,345
Beaumont	47,600	40,749	46,691
Big Spring	11,287	9,150	10,763
Brownsville	12,002	9,988	11,096
Brownwood	26,136	24,148	22,400
Childress	5,569	4,049	5,508
Cleburne	5,543	4,661	5,639
Coleman	4,507	3,807	4,563
Corpus Christi	66,995	55,562	65,736
Corsicana	9,958	7,943	9,974
Dallas	524,891	459,682	525,096
Del Rio	6,910	6,565	5,921
Denison	9,461	9,219	9,797
Denton	12,037	12,349	11,446
Edinberg	4,643	3,606	3,932
El Paso	93,026	95,020	91,781
Fort Worth	233,723	186,514	246,420
Galveston	50,111	46,526	48,019
Gladewater	5,148	4,130	3,778
Graham	3,562	2,779	3,397
Harlingen	15,321	10,863	15,889
Houston	371,712	323,887	373,748
Jacksonville	6,507	5,902	4,913
Kenedy	2,689	2,368	2,260
Kerrville	4,221	3,471	3,742
Longview	14,302	12,121	14,105
Lubbock	34,466	27,552	33,619
Lufkin	7,315	6,861	7,935
McAllen	8,408	6,654	7,182
Marshall	11,687	9,168	10,538
Palestine	7,847	7,252	7,716
Pampa	11,708	10,632	10,022
Paris	24,002	19,167	22,774
Port Arthur	28,863	22,876	27,134
San Angelo	22,653	18,377	21,002
San Antonio	264,719	240,930	254,283
Sherman	12,758	11,034	12,039
Snyder	2,620	1,916	2,294
Sweetwater	10,222	7,851	9,568
Temple	14,621	14,620	15,857
Texarkana	31,285	22,215	28,342
Tyler	28,221	34,731	29,254
Waco	52,761	47,148	54,746
Wichita Falls	41,972	45,280	43,266
TOTAL	\$2,357,965	\$2,084,655	\$2,334,186

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

PETROLEUM

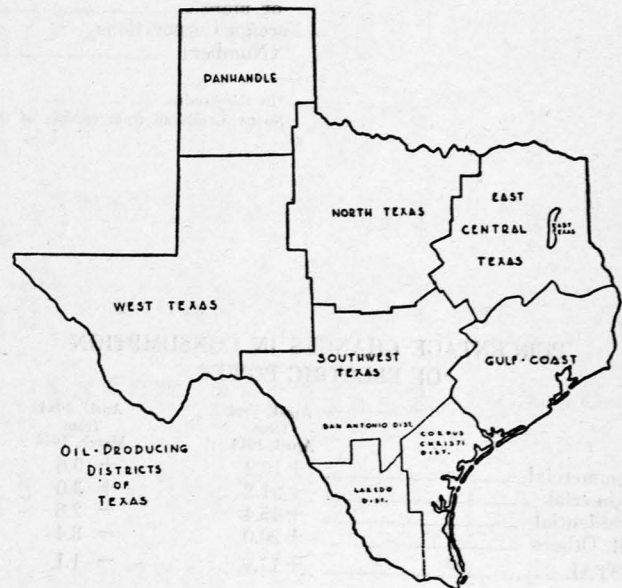
Daily Average Production (In Barrels)

	April, 1944	April, 1943	March, 1944
Coastal Texas*	517,500	340,650	514,100
East Central Texas	124,600	99,700	116,600
East Texas	363,000	319,800	367,800
North Texas	143,500	134,950	142,300
Panhandle	91,500	91,000	93,800
Southwest Texas	292,700	188,500	291,300
West Texas	365,700	214,400	343,000
STATE	1,898,600	1,389,000	1,868,900
UNITED STATES	4,414,700	3,924,550	4,391,000

Gasoline sales as indicated by taxes collected by the State Comptroller were: March, 1944, 107,789,390 gal.; March, 1943, 103,420,300 gal.; February, 1944, 90,577,742 gal.

*Includes Conroe.

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



LUMBER

(In Board Feet)

	April, 1944	April, 1943	March, 1944
Southern Pine Mills:			
Average Weekly Production per unit	202,054	258,674	206,170
Average Weekly Shipments per unit	202,943	286,438	213,026
Average Unfilled Orders per unit, end of month	1,626,466	1,392,710	1,735,789

NOTE: From Southern Pine Association.

TEXAS CHARTERS

	April, 1944	April, 1943	March, 1944
Domestic Corporations:			
Capitalization*	\$976	\$1,045	\$314
Number	62	33	50
Classification of new corporations:			
Banking-Finance	2	1	0
Manufacturing	6	9	2
Merchandising	11	8	11
Oil	3	3	4
Public Service	3	1	0
Real Estate Building	9	4	21
Transportation	1	0	1
All Others	27	7	11
Number capitalized at less than \$5,000	14	17	17
Number capitalized at \$100,000 or more	2	2	0
Foreign Corporations (Number)	28	14	10

*In thousands.

NOTE: Compiled from records of the Secretary of State.

PERCENTAGE CHANGES IN CONSUMPTION
OF ELECTRIC POWER

	April, 1944 from April, 1943	April, 1944 from March, 1944
Commercial	+ 10.2	+ 0.6
Industrial	+ 21.2	+ 3.0
Residential	+ 15.4	- 2.8
All Others	+ 20.0	- 8.4
TOTAL	+ 17.9	- 1.1

Prepared from reports of 7 electric power companies to the Bureau of Business Research.

CEMENT

(In Thousands of Barrels)

	March, 1944	March, 1943	Feb., 1944
Texas Plants:			
Production	456	996	479
Shipments	549	897	470
Stocks	1,032	729	1,124
United States:			
Production	6,139	11,392	5,686
Shipments	6,225	10,108	5,055
Stocks	24,987	24,058	25,059
Capacity Operated	29.0%	54.0%	29.0%

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

TEXAS COMMERCIAL FAILURES

	April, 1944	April, 1943	March, 1944
Number	0	1	0
Liabilities*	0	\$15	0
Assets*	0	9	0
Average Liabilities per failure*	0	15	0

*In thousands.

NOTE: From Dun and Bradstreet, Inc.

DISTRICT 6—TREND OF ANNUAL FARM CASH INCOME BY PRODUCTS (\$000)

Product	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
Cotton _____	6,240	5,810	5,298	3,457	1,576	1,296	2,546	3,733	2,617	4,072	3,484	2,832	3,835	3,880	6,187	10,129	7,415
Cotton Seed ____	744	869	811	696	267	174	278	969	692	1,035	710	704	926	844	1,718	1,850	1,607
Cattle _____	10,087	9,921	12,827	9,967	4,704	1,994	2,158	4,814	3,916	5,581	8,502	12,352	13,300	11,153	14,207	21,039	19,620
Calves _____	2,952	2,609	2,897	3,280	1,889	1,202	988	895	685	703	965	1,269	1,950	2,529	2,906	2,517	5,359
Hogs _____	62	39	8	12	18	—	—	9	5	14	20	—	5	34	7	50	2,263
Sheep _____	693	626	1,144	462	639	434	695	739	693	764	1,734	1,530	1,443	1,756	2,056	3,200	1,941
Poultry _____	374	366	424	336	281	221	176	224	315	343	332	319	333	422	363	547	707
Wool _____	1,099	1,329	1,423	1,008	1,168	692	1,821	1,408	1,400	1,797	2,668	1,826	2,166	2,905	3,733	3,954	3,744
Mohair _____	406	613	471	315	180	56	251	154	286	445	450	334	447	581	604	771	786
Eggs _____	1,768	1,867	1,830	1,542	539	963	989	1,303	669	1,507	1,448	1,456	1,431	1,588	2,025	2,377	2,373
Milk Products _	681	705	830	1,134	766	654	577	737	929	1,032	1,070	1,044	1,067	971	1,191	2,299	2,604
Fruits Vgs.																	
Canning ____	9	4	14	15	11	1	1	19	12	—	—	—	—	—	—	—	147
TOTAL _____	25,115	24,758	27,977	22,224	12,038	7,687	10,480	15,004	12,219	17,293	21,383	23,666	26,903	26,663	34,997	49,033	48,566

DISTRICT 7—TREND OF ANNUAL FARM CASH INCOME BY PRODUCTS (\$000)

Product	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
Cotton _____	10,843	10,809	8,421	3,176	3,082	3,470	3,143	3,252	4,371	4,589	3,948	1,207	1,398	2,501	4,627	4,265	3,080
Cotton Seed ____	1,536	1,823	1,423	716	431	499	436	813	1,159	1,139	843	292	323	592	1,351	1,024	793
Wheat _____	224	142	248	128	180	86	56	90	68	166	243	426	171	157	266	233	256
Grain Sorghum _	487	280	137	280	102	122	98	168	145	121	99	83	89	109	142	221	359
Corn _____	519	238	127	293	103	124	115	118	153	356	278	183	108	160	192	248	375
Oats _____	1,153	819	413	273	332	273	253	329	428	254	358	218	157	131	156	291	249
Cattle _____	13,280	15,366	13,663	9,322	6,055	3,147	3,352	5,799	3,202	4,309	8,354	6,126	6,721	6,861	7,114	14,384	14,023
Calves _____	1,956	2,318	2,040	2,272	1,059	957	1,048	833	886	822	1,343	1,692	2,312	2,559	2,720	3,166	2,783
Hogs _____	589	528	605	450	219	80	92	51	254	361	474	327	266	373	574	1,322	3,829
Sheep _____	5,105	6,181	6,665	2,997	3,319	2,561	3,275	3,168	3,143	4,111	9,052	5,937	5,855	7,160	7,197	11,484	11,474
Poultry _____	1,139	1,161	1,242	1,208	1,483	579	383	376	477	459	493	480	454	413	432	475	549
Wool _____	9,370	11,904	9,712	7,072	5,845	3,527	11,951	9,680	9,558	13,081	17,032	10,548	11,625	15,127	19,544	20,770	20,940
Mohair _____	4,622	6,965	5,340	3,960	2,054	952	3,079	1,901	3,320	4,841	5,124	3,696	4,893	7,114	7,399	8,360	8,473
Eggs _____	812	947	983	806	589	403	473	638	791	760	763	693	630	746	1,141	1,889	1,314
Milk Products _	416	430	506	669	475	355	393	502	601	663	724	496	457	662	855	1,501	1,788
Fruits, Vgs.																	
Canning ____	12	43	16	3	4	—	—	2	—	—	—	—	—	—	—	—	—
Peanuts _____	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	634	890
TOTAL _____	52,063	59,954	51,541	33,625	25,332	17,135	28,147	27,720	28,556	36,032	49,128	32,404	35,459	44,665	53,710	70,267	71,175

CONTENTS

	PAGE
<i>Business Review and Prospect</i> , F. A. Buechel.....	3
<i>Economic Development in Texas</i> , Elmer H. Johnson.....	5
<i>Cotton in Texas Agriculture</i> , A. B. Cox.....	16

LIST OF CHARTS

Crop and Livestock Reporting Districts of Texas.....	1
Indexes of Business Activity in Texas.....	2

LIST OF TABLES

Building Permits	20
Carload Movement of Poultry and Eggs	19
Cement	22
Charters	22
Commercial Failures	22
Commodity Prices	20
Cotton Balance Sheet	16
Credit Ratios in Texas Retail Stores	18
Dairy Products Manufactured in Plants in Texas.....	19
Employment and Pay Rolls in Texas	17
Lumber	21
Percentage Changes Consumption in Electric Power.....	22
Petroleum	21
Postal Receipts	21
Retail Sales of Independent Stores in Texas by Class of Establishment.....	18
Retail Sales of Independent Stores in Texas by Districts.....	20
Shipments of Livestock	19
Trend of Farm Cash Income by Products 1927-1943, Districts 6 and 7.....	23